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228th ECS Meeting

PHOENIX, AZ

October 11-15, 2015

Hyatt Regency Phoenix &
Phoenix Convention Center

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228th ECS Meeting
PHOENIX, AZ
October 11-15, 2015

ECS WELCOMES YOU TO PHOENIX

Daniel Scherson
ECS President

Welcome to Phoenix, Arizona! On behalf of the Board of Directors, volunteer leadership and staff of ECS, it is my pleasure to welcome you to the sunny city of Phoenix for the 228th ECS meeting. Our meeting, being held in downtown Phoenix, at both the Phoenix Convention Center and the Hyatt Regency, is an ideal location that offers convenient access to many of the city's attractions. We hope your time in Phoenix will give you an opportunity to network with colleagues, discuss important research, and discover new opportunities for collaboration.

Please join us for the Sunday Evening Get-Together at 1730h in the Hyatt Atrium to kick-off what is sure to be a successful week! Additionally, you won't want to miss the highly anticipated Plenary Session on Monday, October 12 at 1700h in the Hyatt Ballroom where we will wrap-up the first full day of the 228th ECS Meeting by welcoming all meeting attendees and recognizing the ECS Society Award recipients, and the **2015 Class of Fellows** before turning the spotlight over to Adam Heller, who will present The ECS Lecture, "Wealth, Global Warming and Geoengineering;" Dr. Heller is also the recipient of the ECS Europe Section Heinz Gerischer Award. The ECS Society Award recipients include Digby Macdonald receiving the **Olin Palladium Award**, and Martin Winter receiving the **Carl Wagner Memorial Award** and the **ECS Battery Division Research Award**. Be sure to take the time to attend the ECS Society, Division, and Section award talks in various symposia throughout the week. You can find further details in the technical program beginning on page 62 or by using the ECS Meeting Scheduler.

This international conference includes more than 1,900 technical presentations, and features the **Fifth International ECS Electrochemical Energy Summit (E2S)**, which begins on Monday, October 12 at 0800h and runs through Wednesday, October 14. The E2S program is focused around Solar Critical Issues and Renewable Energy. The E2S sessions will be kicked off by Dr. Franklin (Lynn) M. Orr Jr., **U.S. Under Secretary for Science and Energy**, delivering the E2S Plenary Address at 0800h. The program on Monday will be focused on the DOE Hubs, featuring a Plenary and invited talks from the Joint Center for Energy Storage Research (JCESR), the Joint Center for Artificial Photosynthesis (JCAP), and the Energy Efficiency & Renewable Energy Fuel Cell Technologies Office (EERE FCTO). The program on Tuesday and Wednesday will include keynote talks from five Energy Frontier Research Centers (EFRC) Directors, and other relevant invited speakers, and round table discussions. *Further details are listed on pages 28.*

In addition to the surplus of exciting technical presentations we encourage you to take advantage of our educational short courses offered on Sunday, October 11, and our professional development sessions throughout the week, which are free of charge and provide essential information on enhancing career opportunities, resume building, and networking. Finally, don't forget to stop by the dynamic exhibit hall where there is certainly no better way to network, or get to know the industry's leading innovators. In the exhibit hall we have several exciting events planned including the student and general poster presentation receptions.

We encourage you to plan your schedule accordingly in order to make the most of the technical program and social events. The meeting program should be your guide to a productive and enjoyable time here in Phoenix. If you have any additional questions, please do not hesitate to stop by the ECS Registration desk in the Hyatt Atrium for further assistance. We thank you again for your continued support of ECS!

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GENERAL MEETING INFORMATION

REGISTRATION INFORMATION

Meeting Registration—The meeting registration area will be located at the Hyatt Regency in the Atrium. Registration will open on Saturday afternoon and the technical sessions will be conducted Sunday through Thursday.

Registration Hours

Saturday, October 10 ..... 1600-1900h
Sunday, October 11 ..... 0700-1900h
Monday, October 12 ..... 0700-1900h
Tuesday, October 13 ..... 0700-1730h
Wednesday, October 14 ..... 0800-1600h
Thursday, October 15 ..... 0800-1200h

Who must pay the registration fee?
All meeting participants, including invited speakers, are required to pay the appropriate registration fees. Short course registrants who wish to attend the meeting in addition to their short course are required to pay the meeting registration fee in addition to the short course fee.

Travel Companions/Nontechnical Registrants
Travel companions of attendees are invited to register for the 228th ECS Meeting as a nontechnical registrant. The nontechnical registrant fee of $55 includes admission to non-ticketed social events and a special "Welcome to Phoenix" gift bag, along with food and drink vouchers for the meeting venues.

Registration Fees
ALL PARTICIPANTS AND ATTENDEES ARE REQUIRED TO PAY THE APPROPRIATE REGISTRATION FEE LISTED BELOW.

	Onsite Registration Fees
ECS Member	$775
Nonmember	$915
ECS Student Member	$465
Student Nonmember	$500
One Day ECS Member	$625
One Day Nonmember	$725
Emeritus & Honorary Member	$0
Nontechnical Registrant	$55

Short Course Registration
Five short courses will be offered in Phoenix on Sunday, October 11, 2015, from 0900h to 1630h. The onsite registration fee for the short courses is $625 for ECS members and $750 for nonmembers. Students may register for a short course at a 50% discount—ECS student members: $312.50, and nonmember students: $375. Pre-registration for short courses is required—the deadline was September 11, 2015; **however, if you are interested in registering for a short course please visit the registration area to see if there is space available.**

The registration fee for the course includes participation in the course, course materials, continental breakfast, luncheon, and refreshment breaks; the short course registration fee does not include or apply to the general meeting registration, and it is not applicable to any other activities of the meeting. All individuals participating in short courses along with the meeting are required to register for both events.

Lost Badge or Ticket
There will be a $30 charge for reprinting lost badges or tickets. Admittance will **not** be granted to ticketed events without the actual ticket. Tickets must be reprinted at registration during scheduled hours and cannot be reprinted at the event itself.

THINGS TO KNOW

ADA Accessibility
Special accommodations for those attendees living with a disability will be handled on an individual basis. Contact the ECS headquarters immediately if you will need assistance at meetings@electrochem.org.

Permissions Granted to ECS
ECS reserves the right to electronically record any or all meeting-related events. By registering for and/or attending an ECS meeting you are granting ECS permission to use any recording or photography made of you at any meeting event or anywhere within the meeting venue.

Speaker Indemnification
The ideas and opinions expressed in the technical sessions, conferences, and any handout materials provided are those of the presenter. They are not those of ECS, nor can any endorsement by ECS be claimed.

Financial Assistance
Financial assistance is limited and generally governed by the symposium organizers. Contact your symposium organizers to see if funding is available. Individuals requiring an official letter of invitation should write to ECS headquarters office; such letters will not imply any financial responsibilities of ECS. Please check the current meeting website to confirm submission deadlines in advance.

Letters of Attendance
Individuals requiring an official letter of attendance should see an ECS representative in the registration area.

ECS Central
Stop by ECS Central located next to Registration, in the Atrium, for the answers to all your ECS questions. Our staff will be available to answers any questions concerning ECS publications, future meetings, and membership. You can also pick up copies of *ECS Transactions* and *Interface* magazine.

PHOTOGRAPHY AND RECORDING

PHOTOGRAPHY AND RECORDING IS NOT PERMITTED IN TECHNICAL SESSIONS

By attending the ECS meeting, you agree that you will not record any technical session activity, without the express written consent from ECS. If you violate this policy you will be removed from the meeting and your registration will be revoked without the possibility of a refund.

GENERAL MEETING INFORMATION

MEETING TOOLS

ECS Meeting Abstracts

ECS Meeting Abstracts are always right at hand—and as always, are **FREE with registration**. Registrants may easily access them through Wi-Fi, which will be available at the meeting or download them directly from the 228th ECS Meeting website. Paper editions of meeting abstracts are not distributed; attendees who require paper should download abstracts and print them in advance of the meeting.

Information for Presenters

Oral presentations must be in English. Laptop computers and LCD projectors will be available in each symposium room for oral presentations. Authors must bring their presentation on a USB flash drive only. Speakers requiring special equipment must make written request to ECS headquarters (meetings@electrochem.org) no later than three weeks before the meeting, and appropriate arrangements will be made at the expense of the author.

Poster presentations must be in English, and correspond to the abstract number and assigned date of presentation as detailed in the final program. Plan your display to fit on one upright panel as per the below dimensions. Present displayed information from left to right, starting at the top left of the panel. The paper title, number, names, and affiliations of all authors MUST be at the top of the display. Authors should minimize written text but use it when necessary to emphasize essential data and/or to stimulate discussion. Commercial advertisements or publicity will NOT be permitted in poster presentations. Authors violating this regulation will be asked to remove their presentations immediately.

Recommended Dimensions:

- Board: approximately 3' 10" high by 3' 10" inches wide (1.17 meters high by 1.17 meters wide)
- Print size for the title is approximately 1″ to 2″ (2.5 cm to 5 cm) high.
- Written text and charts should be large enough to read from a distance of 5′ (1.5 m)
- Matted and finished photographs are recommended to enhance visibility.

You may mount your poster only on your assigned day from 0900h to 1600h. Any posters unclaimed at 1600h will be discarded. Please do not begin setting up your poster until all the poster boards have been numbered. Pushpins and/or thumbtacks will be supplied. No posters will be displayed without author participation. NO EXCEPTIONS WILL BE GRANTED. Authors are responsible for the security of their displays and all items of value. ECS will not assume any responsibility for lost, stolen, or broken articles. Additional information or special requirements should be addressed to the individual symposium organizers prior to the meeting.

The Student Poster Session will be held as a part of the Tuesday General Poster Session and Technical Exhibit. All meeting registrants are invited to attend. Students may start setting up their presentations at 0900h; judging of the posters will begin at 1700h and formal presentations will begin at 1800h. Winners will be announced and awards will be granted on Wednesday in the general poster session, 1800-2000h.

WIFI AND MEETING APP INFORMATION

ECS IS PLEASED TO PROVIDE A COMPLIMENTARY WIRELESS NETWORK AND MEETING APP!

ECS is pleased to provide a complimentary wireless network courtesy of Princeton Applied Research/Solartron Analytical! For the duration of the meeting, ECS will be providing a wireless network for your use under the **name: ECS228**, **password: ParSolartron**

Go Mobile with the ECS Meeting App

Go to electrochem.org/Phoenix and put the meeting technical program and personal scheduler on your mobile device. Browse, add, and sync sessions, events, and presentations to your itinerary!

Stay Connected to Your Community

Connect, share, and discover through ECS's social media pages. Stay informed with the latest news in the world of electrochemistry and solid state science, and interface with a like-minded community.

redcat ecsblog.org | facebook.com/TheElectrochemicalSociety | @ECSorg | YouTube.com/ECS1902

LOCAL AREA MAP

The Hyatt Regency is located at 122 North Second Street, Phoenix, Arizona, USA, 85004
The Phoenix Convention Center is located at 100 North Third Street, Phoenix, Arizona, USA, 85004

FLOOR PLANS

THE HYATT REGENCY

First Floor

ECS Headquarters

Second Floor

Meeting Registration

ECS Central

Third Floor

THE PHOENIX CONVENTION CENTER

West 100 Level

West 200 Level

THE PHOENIX CONVENTION CENTER

West Hall 1
Technical Exhibit and Posters

HIGHLIGHTED EVENTS

ECS STUDENT MIXER

Always one of the most popular events of the meeting, the student mixer is by invitation, with registration required, and takes place on **Monday, October 12** from 1830 to 2030h.

Students registered for the meeting will receive an e-mail invitation with details of the mixer. Students in attendance will have the opportunity to join distinguished members and staff of ECS for an evening of fun, networking, and socializing over complimentary food and beverages.

Registration is required as space is limited for this event. Please contact customerservice@electrochem.org or visit the meeting registration desk for more information.

PLENARY SESSION

Join us for the Plenary Session on **Monday, October 12** at **1700h** in the Regency Ballroom where **President Dan Scherson** will wrap up the first full day of the 228th Meeting by welcoming all ECS meeting attendees.

Meeting attendees will then turn their attention to **Adam Heller** who will deliver the highly anticipated ECS Lecture, "Wealth, Global Warming and Geoengineering" and ECS award recipients will be honored.

This can't miss awardee line-up includes **Digby Macdonald** recipient of the ECS Olin Palladium Award, **Martin Winter** recipient of the ECS Carl Wagner Memorial Award, **Nathaniel Leonard** recipient of the Norman Hackerman Young Author Award, and **Pengfei Guo**, **Ran Cheng** and **Wei Wang** recipients of the Bruce Deal and Andy Grove Young Author Award.

STUDENT AND GENERAL POSTER SESSIONS

Don't miss the opportunity to meet the best and brightest students in the industry!

ECS student poster sessions allow the next generation of electrochemists to present their research and compete for awards. Held in the exhibit hall along with the general poster session on **Tuesday** and **Wednesday** beginning at **1800h** each night, these sessions are the perfect excuse to socialize over cold drinks and delicious snacks while browsing unbeatable content and networking with the exhibitors. The **student poster award winners** will be named on **Wednesday** at **1800h**.

ECS CENTRAL

Do you have questions about the ECS programs? ECS has answers! Stop by ECS Central located next to Registration in the Atrium if you have any questions or want to learn more about ECS. You can also pick up copies of *ECS Transactions* and *Interface* magazine, and check out the ECS journals.

- Discover the easy way to submit your abstract to an ECS Meeting.
- See how to submit your meeting presentation to *ECS Transactions*.
- Learn about the ECS journals continuous publication model: your article, online, fast!
- Find out about ECS's new Open Access (OA) program.
- Determine which ECS peer-reviewed journals are best for your latest research.
- Hear about the latest Focus Issues for the ECS journals.
- Get an inside view on how *Interface* articles are selected.
- Learn about (and suggest topics for) upcoming ECS monographs.
- Find out more about future ECS Meetings.
- Learn more about becoming an ECS Member.

PROFESSIONAL DEVELOPMENT WORKSHOPS

Professional development workshops are offered to provide attendees with an opportunity to enhance networking and career search skills. As a multi-part series, individuals are encouraged to attend sessions to walk away with the best experience possible. Students and early-career professionals are strongly encouraged to attend. The following workshops are **free to all meeting registrants**. Please see page 13 for more information.

Part 1: Essential Elements for Employment Success
Part 2: Résumé Review
Panel of Professionals : Career Exploration in Electrochemical and Solid State Science and Technology

SESSION CHAIR ORIENTATION BREAKFAST

The success of the meeting is very much due to the role that Session Chairs play before, during, and after each session.

Session Chairs, Division Members, and Symposium Organizers are encouraged to attend an orientation breakfast on **Monday October 12** at **0700h** in the Sundance room in order to make sure they are best prepared to serve their session, and learn helpful information for future meetings.

SUNDAY EVENING GET-TOGETHER

The Sunday Evening Get-Together is the perfect way to kick start the week.

This informal get-together will be held on **Sunday** from **1730h-1930h** in the Atrium.

All technical and non-technical registrants are welcome to pop in for some tasty desserts, drinks and ample networking.

ELECTROCHEMICAL ENERGY SUMMIT 2015

Solar Critical Issues and Renewable Energy

Summit Dates | Oct. 12-14, 2015

With population growth and industrialization, global energy needs continue to grow as well. Economic, political, and environmental issues are largely dictated by energy needs. The fifth international ECS Electrochemical Energy Summit (E2S) is designed to foster an exchange between leading policy makers and energy experts about society needs and technological energy solutions.

The E2S program will be focused around Solar Critical Issues and Renewable Energy. It will begin on **Monday, October 12** and run through **Wednesday, October 14, 2015**. The program on Monday will be focused on the DOE Hubs, featuring a Plenary and invited talks from the Joint Center for Energy Storage Research (JCESR), the Joint Center for Artificial Photosynthesis (JCAP), and the Energy Efficiency & Renewable Energy Fuel Cell Technologies Office (EERE FCTO). The program on Tuesday and Wednesday will include keynote talks from five Energy Frontier Research Centers (EFRC) Directors, relevant invited speakers, and round table discussions.

EDISON THEATRE

The Edison Theatre is a place where students and scientists will be doing live demonstrations sharing new ideas, techniques, and programs. These demos will be taking place throughout the week.

Drop by Edison Theatre to see who is presenting at this meeting. Join us in the exhibit hall.

Why Go Open Access at ECS

Reach more readers

ECS offers Author Choice Open Access, giving you the opportunity to make your papers Open Access (OA) – available to any scientist (or anyone, for that matter) with an Internet connection, and **increasing your pool of potential readers.**

Quality publications

The research published in our journals (*Journal of The Electrochemical Society* and *ECS Journal of Solid State Science and Technology*) is truly at the cutting edge of our technical arenas, and ECS publications have continued to focus **on achieving quality through a high standard of peer-review.** Our two peer-reviewed titles are among the most highly-regarded in their areas.

Choosing to make your paper Open Access within these journals makes no difference to the quality processes we uphold at ECS—selection criteria and peer review remain exactly the same. The difference is in who can see your content. Papers not published as Open Access can only be read by those from a subscribing institution or those who are willing to pay a fee to access it. Make your work more accessible by making it OA.

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You can publish your papers as Open Access for FREE if you have an Article Credit. Authors who are ECS members, or who are coming from subscribing institutions qualify. Those who cannot claim an Article Credit will be asked to pay an $800 Article Processing Charge to make their papers Open Access – a fee ECS continues to keep low.

Keep your copyright

ECS's Open Access publishing agreement with authors does not require a transfer of copyright: **the copyright remains with the author.** Authors, however, must choose what kind of license they want to grant their readers, and ECS offers a choice of two Creative Commons usage licenses that authors may attach to their work (see sidebar).

Save the World

Next time you submit a paper, why not make it Open Access? Electrochemistry and solid state science research is helping scientists and researchers across the globe solve problems facing our modern world, and the more people who can access your work, the faster those problems may be solved. If you have any questions about our Open Access program, please visit www.electrochem.org/oa or email us at oa@electrochem.org.

A WORD ABOUT COPYRIGHT

- ✔ When publishing OA the copyright remains with the author.
- ✔ The author selects one of two Creative Commons (CC) usage licenses defining how the article may be used by the general public.
- ✔ CC BY license is the most liberal allowing for unrestricted reuse of content, subject only to the requirement that the source work is appropriately attributed.
- ✔ CC BY-NC-ND license is more similar to the current usage rights under the transfer of copyright agreement: it limits use to non-commercial use (NC), and restricts others from creating derivative works(ND).

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PROFESSIONAL DEVELOPMENT WORKSHOPS

Professional development workshops are free to all meeting registrants and provide attendees with an opportunity to enhance networking and career search skills. As a multi-part series, individuals are encouraged to attend sessions to walk away with the best experience possible.

Part 1: Essential Elements for Employment Success

John R. Susko, *Instructor*

Location: Suite 324
Sunday, October 11 | 1400-1600h
Monday, October 12 | 0800-1000h

Landing your next job requires selective and effective networking, developing and submitting specifically targeted résumés and cover letters, locating relevant job opportunities and preparing for and participating in the job interview. This workshop will provide up-to-date information and tips for employment success.

Part 2: Résumé Review

John Susko, *Instructor*

Location: Suite 324
Monday, October 12 | 1200-1600h
Tuesday, October 13 | 0800-1200h
Wednesday, October 14 | 0800-1200h

Now that you've attended Part 1: Essential Elements for Employment Success, bring your résumé for a one-on-one session with an industry leader and expert on résumé development. You will walk away with a résumé that is sure to land you your next interview.

Panel of Professionals: Career Exploration in Electrochemical and Solid State Science and Technology

Location: Suite 318
Wednesday, October 14 | 1500-1600h

Join Jamie Noël, PhD, University of Western Ontario, as he moderates a panel representing professionals from industry, academia (large research & small teaching), and government, where each individual will discuss the unique opportunities and challenges of pursuing a career in their chosen field. Attendees will have the opportunity to speak with each professional through small breakout groups following the panel. Students and early-career professionals are strongly encouraged to attend.

SHORT COURSES

ECS Short Courses are all-day classes designed to provide students or the seasoned professional with an in-depth education on a wide range of topics. Taught by industry experts, the small class size makes for an excellent opportunity for personalized instruction helping both novices and experts advance their technical expertise and knowledge.

Five short courses will take place on **Sunday, October 11, 2015**, from **0900h** to **1630h**. Registration fee for the course includes participation in the course, materials, continental breakfast, luncheon, and refreshment breaks; **the short course registration fee does not include or apply to the general meeting registration**, and it is not applicable to any other activity of the meeting. All individuals participating in short courses along with the meeting are required to register for both events.

Short Course #1

Basic Impedance Spectroscopy
Mark Orazem, *Instructor*
Location: Curtis A

This course is intended for chemists, physicists, materials scientists, and engineers with an interest in applying electrochemical impedance techniques to study a broad variety of electrochemical processes. The attendee will develop a basic understanding of the technique, the sources of errors in impedance measurements, the manner in which experiments can be optimized to reduce these errors, and the use of graphical methods to interpret measurements in terms of meaningful physical properties.

The topics to be covered include

- the motivation for using impedance spectroscopy advantages as compared to other transient techniques and the conditions under which its use is ideally suited,
- the basic concepts of how impedance is measured,
- proper selection of experimental parameters,
- graphical representation of impedance data, including methods to extract some physically meaningful parameters,
- constant-phase elements,
- application of electrical circuit analogues, and
- the meaning of the Kramers-Kronig relations

The concepts will be illustrated by applications to different systems including corrosion, fuel cells, batteries, and transport through membranes such as skin. A list of suggested references will be provided.

This course is the first in a two course sequence offered at alternating ECS meetings by Professor Orazem. The second course in the series, "Advanced Impedance Spectroscopy," introduces model development based on proposed reaction mechanisms, statistical analysis of impedance data, and regression analysis.

About the Instructor

Mark Orazem is a recognized expert on impedance spectroscopy. He has offered both introductory and advanced short courses on the topic at annual meetings of The Electrochemical Society and at the Fuel Cell Seminar. He also has delivered this course to companies and to local sections of ECS.

Orazem is a Distinguished Professor of Chemical Engineering at the University of Florida, where he also holds the ExxonMobil Chemical Engineering Alumni and the University of Florida Research Foundation term professorships. Orazem is also Adjunct Professor at the Beijing University of Chemical Technology. He obtained his BS and MS degrees from Kansas State University and his doctorate in 1983 from the University of California, Berkeley. He was recognized as an outstanding educator in 2004 by BP Azerbaijan. He was recognized as the 2005 College of Engineering Distinguished International Educator, and he was recognized as a 2008 Blue Key Distinguished Professor. Prof. Orazem is a Fellow of The Electrochemical Society and served for ten years as Associate Editor for the *Journal of The Electrochemical Society*. He served as President of the International Society of Electrochemistry. He has over 180 refereed publications and has co-authored, with Bernard Tribollet of the CNRS in Paris, a textbook on the subject, *Electrochemical Impedance Spectroscopy*. The Chinese translation was published by Chemical Industry Press in 2014. Orazem received the 2012 ECS Henry B. Linford Award for Distinguished Teaching.

Short Course #2

Fundamentals of Electrochemistry
Jamie Noël, *Instructor*
Location: Curtis B

This course covers the basic theory and application of electrochemical science. It is targeted toward people with a physical sciences or engineering background who have not been trained as electrochemists, but who want to add electrochemical methods to their repertoire of research approaches. There are many fields in which researchers originally approach their work from another discipline but then discover

(continued on next page)

(continued from previous page)

that it would be advantageous to understand and use some electrochemical methods to complement the work that they are doing.

The course has just been fully revised to include more practical examples and a more manageable volume of material. It complements a revised sister course, "Fundamentals of Electrochemistry: Basic Theory and Thermodynamic Methods," offered by the same instructor at the ECS spring meetings. The two courses have a different emphasis, and each is designed to be a stand-alone introduction to electrochemical fundamentals. If both courses are desired, they can be taken in either order.

- Introduction and Overview of Electrode Processes
- Potential: Significance and Proper Measurement
  - cell potentials and EMF, half-reactions, cell notation, reference electrodes, standard potentials and Nernst equation vs. open circuit potential
  - electrode-solution interface and double-layer structure
- Chemical Stoichiometry vs. Faraday's Law
  - coulometry, bulk electrolysis
- Theoretical Basis for Methods
  - chemical vs. electrochemical kinetics, current-potential relationship, exchange current, Butler-Volmer equation, Tafel equation and Tafel plots, reaction mechanisms
  - mass-transfer effects, Nernst approximation
  - coupled reactions and corrosion
- Methodology
  - potential measurements, cyclic voltammetry, Tafel analysis, linear polarization technique, chronoamperometry, chronocoulometry, rotating disk and rotating ring disc electrodes, ultra microelectrodes, electrochemical impedance spectroscopy
- Electrochemical Instrumentation
  - voltmeters, ammeters, potentiostats, galvanostats, IR compensation, design of electrochemical cells

About the Instructor

Jamie Noël is an electrochemist and corrosion scientist. He obtained his BSc (1987) and MSc (1990) degrees from the University of Guelph under supervision of Dr. Jacek Lipkowski. He then worked on corrosion issues in the nuclear industry while employed by Ontario Hydro Research and later Atomic Energy of Canada Ltd. Concurrent with his work at AECL, he earned his PhD (2000) through the University of Manitoba with David Shoesmith. Dr. Noël joined the University of Western Ontario in London, Canada in 1998 as a research scientist and adjunct professor in the Department of Chemistry. He assists professors David Shoesmith and Clara Wren in training and directing students, carrying out fundamental and applied electrochemistry research projects, and teaching electrochemistry at the graduate level. He uses electrochemical and other surface analytical techniques to study the corrosion of nuclear reactor components and nuclear waste management systems materials, including carbon steel, titanium, zirconium, copper, nickel alloys, cobalt alloys, and the uranium dioxide fuel itself. He continues to refine techniques that combine electrochemical measurements with neutron-based materials science techniques.

Dr. Noël won the Lash Miller Award of the ECS Canada Section in 2003. He is an active participant in public science outreach activities, developing and presenting chemistry demonstrations for potential young scientists from preschool to high school ages. He has authored over 65 journal articles, 45 conference proceedings papers, 2 book chapters, and 15 company reports.

Short Course #3

Basic Corrosion
Luis F. Garfias-Mesias, *Instructor*
Location: Ellis West

This course covers the basics of corrosion science and corrosion engineering. It is targeted toward people with a physical sciences or engineering background who have not been trained as corrosionists, but who want to understand the basic concepts of corrosion, learn to select the appropriate materials and know which will be the typical techniques and methodologies to test and qualify materials (resistant to corrosion).

The course will begin with a general, basic foundation of electrochemistry and corrosion. It will cover the terminology and definitions commonly used in corrosion, as well as the different types of corrosion (and passivity). The course will cover the typical engineering materials (metals, non-metals, composites, etc.) and their interaction with their environment (temperature, pressure, gases, liquids, etc.) and the common methodologies to prevent and control their degradation (material selection, adding inhibitors, applying a protective coating, using cathodic or anodic protection, etc.). Basic knowledge of corrosion monitoring and inspection as well as field and laboratory testing will be covered.

Course Outline:

- Introduction to Corrosion
- Types of Corrosion
- Interactions of Materials and their Environment
- Corrosion Control
- Corrosion Monitoring and Inspection
- Basic Corrosion Testing
- Advanced Corrosion Testing (electrochemistry and microscopy)
- Case studies and lessons learned from failure analysis and corrosion projects

About the Instructor

Luis F. Garfias has a Chemical Engineering degree from the University of Yucatan (in Mexico). He has a M.Sc. on Corrosion Science and Engineering from UMIST (UK) and a Ph.D. on Materials Science from Oxford University (UK). Luis was a Postdoctoral Researcher at the Corrosion Research Center in the University of Minnesota (USA) working under Prof. William Smyrl on in-situ microscopy and corrosion of implant materials.

From 1998 to 2005 Luis became a Principal Scientist at Bell Labs where he managed the Reliability and Corrosion Materials Laboratory and did pioneering work on Corrosion of Electronic materials and devices. From 2005 to 2007 Luis was the head of the Corrosion Laboratory at SC Johnson where he worked on accelerated methodologies to test and qualify materials used in consumer products. From 2007 to 2012 Luis worked as the Director of Technology Qualification at DNV Columbus where he invented the mini-autoclave to perform in-situ microscopy at High Pressure and High Temperature (HP/HT) in sour environments and worked in many projects related to oil and gas. Luis was recently the Director of Materials and Testing at Intertek and currently is a Consultant at Wood Group Kenny in Houston. Luis works on projects related to Materials Science and Materials Engineering, Asset Integrity Management and novel techniques for microscopy at HP/HT in aggressive environments. Luis is an active member of NACE, ECS and ACS and has published several scientific papers for major corrosion and Materials Science journals.

SHORT COURSES

Short Course #4
Grid Scale Energy Storage
Jeremy Meyers, *Instructor*
Location: Borein A

This course is intended for chemists, physicists, materials scientists, and engineers to better understand the specific requirements for energy storage on the electric grid. The course will introduce students to the concepts associated with the "smart grid" and the demands that intermittent renewable power sources place on the grid from the perspective of distribution. We will then examine some of the key technologies under consideration for energy storage and the technical targets and challenges that must be addressed. Students will be brought up to date with the current state of the art, and review data from demonstration systems, experimental data from prototype designs, and some modeling and analysis. The following areas will be covered in this short course:

- introduction to the electric grid and renewable power sources;
- current role of energy storage on the grid;
- location and deployment of energy storage on the "smart grid";
- existing technologies for energy storage on the grid;
- adaptation of secondary batteries for grid-based storage applications;
- redox flow batteries;
- high-temperature batteries for energy storage;
- novel battery concepts;
- materials and engineering challenges for grid storage; and
- diagnostics and characterization techniques.

About the Instructor
Jeremy Meyers is a research scientist at Molecular Rebar Design, an early-stage startup commercializing discrete carbon nanotube additives for battery electrodes and other applications.

From 2010-2012, he was director of stack engineering at EnerVault, where he led the development, delivery, and deployment of a 250 kW, 1MWh flow battery stack to provide load shifting for a solar farm. Previously, Dr. Meyers was on the faculty of the Texas Materials Institute and Department of Mechanical Engineering at the University of Texas at Austin. While at the University of Texas, he was a founding member of the Center for Electrochemistry and received the Dupont Young Faculty award for his research on PEM fuel cells.

From 2000 to 2006, Dr. Meyers was a staff engineer and research manager at UTC Power, a division of United Technologies focused on PEM fuel cell technology.

In 2006, he and his colleagues received the George Mead Medal for engineering achievement, the highest technical honor at the Fortune 40 company. His original research papers have been cited in excess of 800 times and he is the inventor or co-inventor of more than a dozen patents. His research has touched on simulation and analysis of fuel cells, lead-acid and lithium-ion batteries, flow batteries, and the economics of grid-based energy storage.

Short Course #5
Polymer Electrolyte Fuel Cells
Hubert A. Gasteiger and Thomas J. Schmidt, *Instructors*
Location: Borein B

This short course develops the fundamental thermodynamics and electrocatalytic processes critical to polymer electrolyte fuel cells (PEFCs, including Direct Methanol and Alkaline Membrane FCs). In the first part, we will discuss the relevant half-cell reactions, their thermodynamic driving forces, and their mathematical foundations in electrocatalysis theory (e.g., Butler-Volmer equations). Subsequently, this theoretical framework will be applied to catalyst characterization and the evaluation of kinetic parameters like activation energies, exchange current densities, reaction orders, etc.

In the second part of the course, we will illuminate the different functional requirements of actual PEFC (incl. DMFC and AMFC) components and present basic in situ diagnostics (Pt surface area, shorting, H2 crossover, electronic resistance, etc.). This will be used to develop an in-depth understanding of the various voltage loss terms that constitute a polarization curve. Finally, we will apply this learning to describe the principles of fuel cell catalyst activity measurements, the impact of uncontrolled-operation events (e.g., cell reversal), and the various effects of long-term materials degradation.

To benefit most effectively from this course, registrants should have completed at least their first two years of a bachelor's program in physics, chemistry, or engineering; or have several years of experience with PEFCs.

About the Instructors
Hubert A. Gasteiger received his MS in chemical engineering from Oregon State University in 1988, and his PhD in chemical engineering from UC Berkeley in 1993 (with Elton Cairns). After postdoctoral positions at the Lawrence Berkeley Laboratory with Phil Ross and Nenad Markovic and at Ulm University (with Jürgen Behm), he joined GM/Opel's Fuel Cell Activities program (Honeoye Falls, NY, USA) as Technical Manager for PEM fuel cell materials development (1998-2008), where he was promoted to GM Technical Fellow (2004). Subsequently, he worked for one year as Director of Catalyst Technologies at Acta S.p.A. (Italy). In 2009, he was appointed Visiting Professor at MIT in the group of Yang Shao-Horn, working on lithium-air batteries and fuel cell electrocatalysis. Since 2010, he is full professor at the Technische Universität München, focusing on materials and electrode development for batteries and fuel cells.

He has co-authored 100 peer-reviewed articles, 15 book chapters, and 36 patents/patent applications. He also served as Editor-In-Chief for Wiley's *Handbook of Fuel Cells* (2003 & 2009) and currently leads the ECS Fuel Cell Subcommittee. In 2011, he was named ECS Fellow (2011). He received the Klaus-Jürgen Vetter Award from the International Society of Electrochemistry (2004), the Grove Medal for fuel cell research (2012), and the Grahame Award of the Physical and Analytical Electrochemistry Division of the ECS (2015).

Thomas J. Schmidt obtained his PhD (2000) in Chemistry from the University of Ulm (Germany, with R. J. Behm), before he joined the group of P. N. Ross and N. M. Markovic at the Lawrence Berkeley National Laboratory. He continued to work with G. G. Scherer at Paul Scherrer Institut's Electrochemistry Laboratory in Villigen/Switzerland. Since the fall of 2002, he has been working in the industrial development of high temperature PEFC membrane electrode assemblies and their components. During these eight years in industry, Dr. Schmidt led the high-temperature MEA R&D activities as Director of R&D. At the same time he was working as Lecturer for Physical Chemistry at Provadis School of International Management and Technology in Frankfurt/Germany.

In February 2011, Dr. Schmidt became Full Professor at ETH Zurich and Head of the Electrochemistry Laboratory at Paul Scherrer Institute. Since 2014, he is also Director of one Swiss Competence Center for Energy Research (SCCER Heat & Electricity Storage). The co-Author of 80 peer-reviewed papers, several book chapters and more than 20 patent/applications is the 2010 ECS Charles W. Tobias Young Investigator Award recipient. He was awarded the Otto Monsted Guest Professorship of the Energy Conversion and Storage Department at the Technical University of Denmark (2013). Currently, he is also an Associate Editor of the *Journal of The Electrochemical Society*.

Short Course Refund Policy: Written requests for short course refunds will be honored only if received at ECS headquarters by October 5, 2015. All refunds are subject to a 10% processing fee and requests for refunds must be made in writing and emailed to **customerservice@electrochem.org.** Refunds will not be processed until AFTER the meeting.

MEETING EVENTS-AT-A-GLANCE

Sunday, October 11
0700h..... Registration Opens, Atrium
0800h..... Technical Sessions
(Check Technical Program for exact time)
0800h..... Short Course Breakfast, Regency B
0900h..... Short Courses Begin
1400h..... Professional Development Workshop: Part 1–Essential Elements for Employment Success, Suite 324
1730h..... Sunday Evening Get-Together, Atrium

Monday, October 12
0700h..... Registration Opens, Atrium
0700h..... Session Chair Orientation Breakfast, Sundance
0800h..... Professional Development Workshop: Part 1–Essential Elements for Employment Success, Suite 324
0800h..... E2S- ECS Electrochemical Energy Summit Plenary, 101-A&B&C (PCC)
0845h..... E2S – ECS Electrochemical Energy Summit Sessions Begin, 101-C (PCC)
0900h..... Technical Sessions
(Check Technical Program for exact time)
0930h..... Technical Session Coffee Break
1200h..... Professional Development Workshop: Part 2–Résumé Review, Suite 324
1410h..... Digby Macdonald's Olin Palladium Award Address, 102-A (PCC)
1500h..... E2S Breakouts 1 and 2 Begin, 106-B&C (PCC)
1700h..... Plenary Session, Regency Ballroom
1830h..... Student Mixer (invitation only), Atrium

Tuesday, October 13
0700h..... Registration Opens, Atrium
0800h..... Technical Sessions
(Check Technical Program for exact time)
0800h..... E2S – ECS Electrochemical Energy Summit: EFRC's, 101-C (PCC)
0800h..... Professional Development Workshop: Part 2–Résumé Review, Suite 324
0930h..... Technical Session Coffee Break
1245h..... Leveraging the Labs sponsored by the Fuel Cell Technologies Office, 213-A (PCC)
1300h..... Technical Exhibit, West Hall 1 (PCC)
1400h..... Matteo Bianchini's Battery Division Student Research Award Address, 106-B (PCC)
1400h..... David Shoesmith's Corrosion Division H. H. Uhlig Award Address, 102-A (PCC)
1430h..... Eric Schindelholz's Corrosion Division Morris Cohen Graduate Student Award Address, 102-A (PCC)
1650h..... Martin Winter's Carl Wagner Memorial and Battery Division Research Award Address, 106-B (PCC)
1730h..... Lab Showcase sponsored by the Fuel Cell Technologies Office, 2nd Floor Lobby (PCC)
1735h..... Adam Heller's Heinz Gerischer Award Address, 104-B (PCC)
1800h..... Technical Exhibit and General and Student Poster Session, West Hall 1 (PCC)

Wednesday, October 14
0800h..... Registration Opens, Atrium
0800h..... Technical Sessions
(Check Technical Program for exact time)
0800h..... E2S – ECS Electrochemical Energy Summit: EFRC's, 101-C (PCC)
0800h..... Professional Development Workshop: Part 2–Résumé Review, Suite 324
0800h..... Ashok Shukla's Battery Division Technology Award Address, 106-B (PCC)
0900h..... Technical Exhibit, West Hall 1 (PCC)
0930h..... Technical Session Coffee Break
1400h..... Daniel Schwartz's Electrodeposition Division Research Award Address, 103-A (PCC)
1500h..... Panel of Professionals: Career Exploration in Electrochemical and Solid State Science and Technology, Suite 318
1800h..... Technical Exhibit and General Poster Session, West Hall 1 (PCC)

Thursday, October 15
0800h..... Registration Opens, Atrium
0900h..... Technical Sessions
(Check Technical Program for exact time)
0900h..... Technical Exhibit, West Hall 1 (PCC)
0930h..... Technical Sessions Coffee Break

(PCC) This event will be held in the Phoenix Convention Center .

FEATURED EVENTS

DIVISION, COMMITTEE, AND BOARD MEETINGS

Sunday, October 11

1600h..... Nominating Committee, Suite 322

1630h..... *Interface* Advisory Board, Suite 312

1700h..... DST & EPD Symposium Planning Meeting, Regency B

1700h..... Physical and Analytical Electrochemistry Division Symposium Planning Committee, Suite 320

1700h..... Low Temperature Fuel Cell Coordinating Committee, Sundance

1730h..... Corrosion Division Executive Committee, Suite 324

1800h..... Battery Division Executive Committee & Symposium Planning Subcommittee, Suite 316

1800h..... Sensor Division Executive Committee, Suite 318

2000h..... Electronics & Photonics Division Executive Committee, Suite 318

Monday, October 12

0700h..... High Temperature Materials Division Executive Committee, Suite 312

0700h..... Industrial Electrochemistry & Electrochemical Engineering Division Executive Committee, Cassidy

0700h..... Physical & Analytical Electrochemistry Division Executive Committee, Suite 314

1000h..... Ethical Standards Committee, Suite 314

1300h..... Education Committee, Suite 314

1400h..... *ECS Transactions* Editorial Board, Suite 312

1500h..... Individual Membership Committee, Division & Section Representatives, Suite 316

1530h..... Interdisciplinary Science & Technology Subcommittee, Suite 318

1800h..... Europe Section Executive Committee, Suite 312

1800h..... Luminescence & Display Materials Division Executive Committee & General Reception,Sundance

1900h..... Electrodeposition Division Executive Committee, Suite 314

1900h..... Energy Technology Division Executive Committee, Cowboy Artist

Tuesday, October 13

0700h..... Joint Journal Editorial Boards, Suite 312

0700h..... Symposium Planning Advisory Board, Regency A

0730h..... Council of Past Presidents, Suite 314

0815h..... Sponsorship Committee, Suite 316

0930h..... Publications Subcommittee, Suite 312

1215h..... Battery Division Luncheon and Business Meeting*, Regency B

1215h..... Corrosion Division Luncheon and Business Meeting*, Sundance

1215h..... High Temperature Materials Division Luncheon and Business Meeting*, Suite 320

1215h..... Sensor Division Luncheon and Business Meeting*, Suite 322

1330h..... Meetings Subcommittee, Suite 314

1600h..... Honors and Awards Committee, Suite 312

1800h..... Corrosion Division Award Reception*, Sundance

1900h..... Europe Section Reception in honor of Adam Heller

Wednesday, October 14

0700h..... Technical Affairs Committee, Suite 312

1215h..... Electrodeposition Division Luncheon and Business Meeting*, Sundance

1900h..... Battery Division Award Reception*, Cassidy

Thursday, October 15

0800h…..Board of Directors Meeting; Cowboy Artist

**Ticket required to attend. Please see the ticketed event box below for more information.*

TICKETED EVENT INFORMATION

Tuesday, October 13

Battery Division Luncheon and Business Meeting $65.00

Corrosion Division Luncheon and Business Meeting $65.00

Corrosion Division Award Reception $65.00

High Temperature Materials Division Luncheon and Business Meeting $65.00

Sensor Division Luncheon and Business Meeting $65.00

Wednesday, October 14

Electrodeposition Division Luncheon and Business Meeting $65.00

Battery Division Award Reception $65.00

ecstransactions

Volume 69—Phoenix, Arizona

from the Phoenix meeting, October 11—October 15, 2015

The following issues of ECS Transactions are from symposia held during the Phoenix meeting. All issues are available in electronic (PDF) editions, which may be purchased by visiting http://ecsdl.org/ECST/. Some issues are also available in CD/USB editions. Please visit the ECS website for all issue pricing and ordering information. (All prices are in U.S. dollars; M = ECS member price; NM = nonmember price.)

Enhanced Issues

Vol. 69 No. 1 **Batteries – Theory, Modeling, and Simulation**
USB/CD.....M $127.00, NM $159.00
PDF .....M $115.62, NM $144.53

Vol. 69 No. 2 **Pits & Pores 6: Nanomaterials – In Memory of Yukio H. Ogata**
USB/CD.....M $105.00, NM $131.00
PDF .....M $95.53, NM $119.41

Vol. 69 No. 3 **Nonvolatile Memories 3**
USB/CD.....M $96.00, NM $119.00
PDF .....M $78.86, NM $98.57

Vol. 69 No. 4 **Photovoltaics for the 21st Century 11**
USB/CD.....M $96.00, NM $119.00
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USB/CD.....M $96.00, NM $119.00
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USB/CD.....M $103.00, NM $129.00
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Vol. 69 No. 9 **Thermoelectric and Thermal Interface Materials 2**
USB/CD.....M $96.00, NM $119.00
PDF .....M $53.93, NM $67.41

Vol. 69 No. 10 **ULSI Process Integration 9**
USB/CD.....M $96.00, NM $119.00
PDF .....M $86.89, NM $108.61

Vol. 69 No. 11 **GaN & SiC Power Technologies 5**
USB/CD.....M $96.00, NM $119.00
PDF .....M $66.81, NM $83.51

Vol. 69 No. 12 **Low-Dimensional Nanoscale Electronic and Photonic Devices 8**
USB/CD.....M $111.00, NM $138.00
PDF .....M $100.71, NM $125.89

Vol. 69 No. 13 **Solid-State Electronics and Photonics in Biology and Medicine 2**
USB/CD.....M $96.00, NM $119.00
PDF .....M $51.35, NM $64.19

Vol. 69 No. 14 **State-of-the-Art Program on Compound Semiconductors 58 (SOTAPOCS 58)**
USB/CD.....M $96.00, NM $119.00
PDF .....M $72.83, NM $91.04

Vol. 69 No. 15 **High Temperature Experimental Techniques and Measurements 2**
USB/CD.....M $96.00, NM $119.00
PDF .....M $41.05, NM $51.31

Vol. 69 No. 16 **Ionic Conducting Oxide Thin Films**
USB/CD.....M $96.00, NM $119.00
PDF .....M $56.50, NM $70.63

Vol. 69 No. 17 **Polymer Electrolyte Fuel Cells 15 (PEFC 15)**
USB/CD.....M $200.00, NM $250.00
PDF .....M $181.77, NM $227.21

Forthcoming Issues

The following Standard issues of ECS Transactions are forthcoming and will be available after the Phoenix meeting. Please visit the ECS Phoenix Program at https://ecs.confex.com/ecs/228/webprogram/programs.html for additional issue information.

A01, A03, A04, A05, A06, A07, A08, A09, B01, C01, C02, C03, C04, C05, D01, E01, E02, E03, E04, F01, F02, F03, I01, I02, J01, L01, L02, L03, L04, L05, L06, L07, L08, M01, M02, M03, Z01, Z02, Z03

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7/2/15

Where in the world is Dr. Reducks?

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PLENARY SPEAKER AND SOCIETY AWARD WINNERS

JOIN US FOR THE PLENARY SESSION

When: Monday, October 12 at 1700h
Where: Hyatt Regency Ballroom

ECS President **Dan Scherson** will wrap up the first full day of the 228th Meeting by welcoming the ECS meeting attendees and introducing the highly anticipated ECS lecturer, **Adam Heller**.

The Plenary Session is one of the highlight events of the meeting, allowing participants from every symposia to come together and recognize some of the greatest minds in the field. This year in addition to Dr. Heller's lecture "Wealth, Global Warming and Geoengineering," the Olin Palladium Award will be presented to **Digby Macdonald** in recognition of his contributions to the development of the modern theory of passivity and passivity breakdown, in the form of the Point Defect Model (PDM), and in the development of the deterministic corrosion damage protocol, Damage Function Analysis (DFA). The Carl Wagner Memorial Award will be presented to **Martin Winter** for his highly prolific work, leadership and important contribution to the fields of energy storage and conversion, development of unique electro-analytical tools and spectro-electrochemical tools for fundamental studies related to power sources. The Norman Hackerman Young Author Award will be presented to **Nathaniel D. Leonard** for the paper, "Analysis of Adsorption Effects on a Metal-Nitrogen-Carbon Catalyst Using a Rotating Ring-Disk Study," in the *Journal of The Electrochemical Society* (JES, Vol. 161, No. 13, p. H3100). The Bruce Deal and Andy Grove Young Author Award will be presented to **Pengfei Guo, Ran Cheng,** and **Wei Wang** for the paper, "Silicon Surface Passivation Technology for Germanium-Tin P-Channel MOSFETs: Suppression of Germanium and Tin Segregation for Mobility Enhancement," in the *ECS Journal of Solid State Science and Technology* (JSS, Vol. 3, No. 8, p. Q162).

The **2015 Class of Fellows of The Electrochemical Society** will be recognized for their contributions to the advancement of science and technology, for leadership in electrochemical and solid state science and technology, and for active participation in the affairs of The Electrochemical Society: Simon Deleonibus, Raymond Gorte, Ellen Ivers-Tiffée, Deborah Jones, Robert Kostecki, Kailash Mishra, Mogens Mogensen, Emanuel Peled, E. Jennings Taylor, John Turner, and Steven Visco.

Don't miss the opportunity to honor and support your friends and colleagues. Also, be sure to use the meeting app to add the Society and Division and Section award winner's talks to your agenda, they are scheduled in various symposia throughout the week.

5 Questions with Adam Heller

Tell us about the beginning of your interest in science.
I went to—like all the young Israelis—to serve in the Israeli army. And at that time I was interested in a medical career. When I was in boot camp and they learned that I wanted to be a physician, they sent me to the medical corps to work in the pathology institute of a military hospital. There I very quickly discovered at the time, medicine was not yet science. And I saw—being in the pathology institute—mistakes. I decided that I'd rather be a scientist working toward better medicine.

When did you become involved in solar technology?
At GTE Labs, my colleague Heinz Gerischer was interested in electroluminescence. He was teaching me the elements of semiconductor electrochemistry and telling me that we can make a semiconductor liquid junction solar cell. At GTE, I couldn't do much work on these—my responsibilities were totally different and mostly lighting product related. I returned to Bell Laboratories in 1975 and then I really started to work seriously on the semiconductor liquid junction solar cells. And over five years we published a series of papers on efficient, more than 10 percent efficient, electrochemical solar cells.

Tell us about the development of the painless diabetes blood monitor.
People were pricking their fingers, getting large blood drops. It was painful: get a strip, touch it, get a blood sample, measure the glycemia (the blood glucose concentration). Five percent of the people of the world are diabetic. One percent of the people need these measurements. If they don't do it, they go blind, they lose their kidneys, they develop neuropathy, their legs are amputated. It can become a horrible disease, if they don't monitor their blood sugar. [My son] observed that if he pricks his skin in the arm, he can painlessly get a much smaller sample of blood. By pricking his finger, he got, painfully, a large drop of blood. So he asked me, "Can we make a sensor for such a small sample of blood?" I knew that it could be done if I used a small enough electrode.

What does the future of electrochemistry look like?
You see wonderful things in electrochemistry: shrinking down power sources, making electrical car batteries. Sooner or later we will have a long-lived, moderate temperature, high-power-density fuel cell that uses methane instead of hydrogen, followed by one that uses higher boiling hydrocarbons. I think in electrochemistry, that's the greatest challenge that I can imagine. I know that this will come. It's up to the next generation. So pretty soon—on a historical scale of 100 years—there's no question in my mind that we will drive liquid fuel-based fuel cell powered cars.

How was receiving the National Medal of Technology and Innovation?
It certainly was the highlight of my professional life—to be in the White House, to spend time with the president. And it's indeed pretty rare for an individual to get that medal. I feel that it is absolutely wonderful, considering that I come from Cluj, Romania, and passed through a concentration camp. Now that I was allowed to survive, I was honored by the president of the United States. What can I do next to pay Society for this? I am doing my best.

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PLENARY SPEAKER AND SOCIETY AWARD WINNERS

THE ECS LECTURE

When: Monday, October 12 at 1700h
Where: Hyatt Regency Ballroom

Wealth, Global Warming and Geoengineering

by Adam Heller

ADAM HELLER'S work in electrochemical engineering has touched the lives of people across the globe. As the inventor of the painless diabetes blood monitor, his developments in healthcare have had enormous societal and economic impact. Heller's work spans a range of technologies, touching areas related to battery and energy—including solar cells, the lithium battery, and photoelectrocatalysis.

Heller's journey through the sciences took flight in 1961, when he received his PhD from Ernest David Bergmann at the Hebrew University. From there, he had research related stints at such notable establishments as GTE Laboratories and Bell Laboratories, where he headed the Electronic Materials Research Department from 1977-1988.

His research soon transcended into teaching when he became a professor of engineering at the University of Texas in Austin. During this time, Heller co-founded what would be one of his most significant contributions to science—the painless blood glucose monitoring system.

It began in 1996 when Heller and his son Ephraim Heller founded TheraSense, which has transitioned to become a major part of Abbott Diabetes Care of Alameda, CA. Here, the FreeStyle™ system of TheraSense was developed, which made the monitoring of blood glucose painless by accurately monitoring the glucose concentration in just 300 nanoliters of blood.

Heller also established the field of the electrical wiring of enzymes (1988-2005), the electrical connection of their catalytic redox centers to electrodes and built, with wired enzymes subcutaneously implanted miniature glucose sensors, which became the core technology of the 2008 FreeStyle Navigator™ and of the 2014 FreeStyle Libre™. This continuous glucose monitoring system of Abbott Diabetes Care intended to replace the 16 billion annually performed blood-requiring strip assays. Its disposable part is factory calibrated, requires no blood samples, and operates for two weeks.

His study of the physical chemistry of inorganic oxyhalide solutions resulted in the first neodymium liquid lasers (1964-1967) and in the publication of the first paper on the lithium thionyl chloride battery with James J. Auborn in 1973, which would be used in implanted medical and defense systems that required a shelf life of greater than 20 years or a higher than average energy density.

Similarly, Heller continued his research in energy by exploring solar cells, which resulted in 11.5% efficient solar cells in 1980 and in 11 % efficient hydrogen evolving photoelectrodes in 1981. Along with Heinz Gerischer, Heller was able to show that the rate of photo-assisted oxidation of organic matter on photocatalytic titanium dioxide particles was controlled by the rate of reduction of adsorbed oxygen by trapped electrons.

Heller has been recognized for his scientific achievements by some of the top establishments in the world. Most notably, he received the United States National Medal of Technology and Innovation in 2008—the top technology award in the U.S.

He has been awarded many times by The Electrochemical Society, including its David C. Grahame Award, Vittorio de Nora Gold Medal, and the Heinz Gerischer Award of its Europe Section. He is an ECS Fellow.

Among Heller's other awards and achievements are his induction to the U.S. National Academy of Engineering (2009) and the American Academy of Arts and Science (2009), Spiers Medal and Faraday Medal of the Royal Society of Chemistry UK, Fresenius Gold Medal of the Society of German Chemists, and the Torbern Bergman Medal of the Swedish Chemical Society—an award he shared with ECS Fellow Allen J. Bard.

PLENARY SPEAKER AND SOCIETY AWARD WINNERS

SOCIETY AWARDS

The ECS Society Awards being given during this meeting at the Plenary Session on Monday, October 12 at 1700h in the Hyatt Regency Ballroom are the Olin Palladium Award of The Electrochemical Society to Digby Macdonald, the Carl Wagner Memorial Award of The Electrochemical Society to Martin Winter, the Norman Hackerman Young Author Award to Nathaniel Leonard, and the Bruce Deal & Andy Grove Young Author Award to Pengfei Guo, Ran Cheng, and Wei Wang.

Olin Palladium Award of The Electrochemical Society

Monday, October 12, 1410-1450h
102-A Phoenix Convention Center

Some Critical Issues of the Breakdown of Passive Films
by Digby Macdonald

Digby D. Macdonald is the current Professor in Residence at the University of California, Berkeley's Departments of Nuclear Engineering and Materials Science and Engineering. After obtaining his Bachelor's degree in New Zealand, Macdonald moved to Canada to receive his PhD in Chemistry from the University of Calgary.

Throughout his career, Macdonald has held numerous positions at Ohio State University and Pennsylvania State University. He has received many awards for his scientific work, including the 2014 Frumkin Memorial Medal from the International Society of Electrochemistry for his work on passivity and passivity breakdown. His work on the properties of aqueous solutions at high temperatures and pressures also earned him the 2013 Gibbs Award.

Additionally, ECS has presented Macdonald with the Wagner Memorial and Uhlig Awards. Aside from his ECS Fellowship, he also holds fellow status at NACE-International, Royal Society of Canada, Royal Society of New Zealand, ASM International, World Innovation Foundation, Institute of Corrosion, and International Society of Electrochemistry.

Carl Wagner Memorial Award of The Electrochemical Society

Tuesday, October 13, 1650-1730h
106-B Phoenix Convention Center

Anodes for Lithium Ion Batteries Revisited: From Graphite to High-Capacity Alloying- and Conversion-Type Materials and Back Again
by Martin Winter

Martin Winter has focused on R&D of new materials, components and cell designs for batteries and supercapacitors—in particular for lithium-ion batteries—for nearly 25 years. Currently, he holds a Chair for Applied Materials Science for Electrochemical Energy Storage and Conversion at the Institute of Physical Chemistry at Münster University, Germany.

Aside from his position at Münster University, Winter is the Director of the Münster Electrochemical Energy Technology (MEET) Battery Research Center. The center combines outstanding equipment with an international team of 140 scientists, engineers, and technicians. Winter has also been named Director of the new Helmholtz Institute Münster, as well as serving as an associate of the National Platform E-Mobility, where he consults the German chancellor and government.

Additionally, Winter is the head of the research council of the Battery Forum Germany, which advises the German Federal Ministry of Education and Research in the field of electrochemical energy storage. His strides in battery technology have yielded him much recognition, including ECS's Battery Technology Award and the Research and Technology Award of the International Battery Materials Association.

PLENARY SPEAKER AND SOCIETY AWARD WINNERS

2014 ECS YOUNG AUTHOR AWARDS

The Norman Hackerman Young Author Award was established in 1928 for the best paper published in the *Journal of The Electrochemical Society* for a topic in the field of electrochemical science and technology by a young author or authors. The Bruce Deal & Andy Grove Young Author Award, established in 2013, is being presented for the best paper published in the *ECS Journal of Solid State Science and Technology* for a topic in the field of solid state science and technology by a young author or authors.

Norman Hackerman Young Author Award

Awarded to Nathaniel D. Leonard for "Analysis of Adsorption Effects on a Metal-Nitrogen-Carbon Catalyst Using a Rotating Ring-Disk Study" (JES, Vol. 161, No. 13, p. H3100).

Nathaniel D. Leonard received his PhD in Chemical Engineering from Michigan State University under the supervision of Scott Calabrese Barton. Nathaniel's work focused on synthesis, characterization, and modeling of non-precious metal catalysts for oxygen reduction in proton-exchange membrane fuel cells. During his time at Michigan State University he was selected to be a Transatlantic Program Young Technology Leader in automotive research and development. He completed his undergraduate studies in Mechanical Engineering and German from Valparaiso University where he found his appreciation for electrochemistry while conducting high temperature electrolysis studies in molten salt electrolytes. He was also a German Academic Exchange Service (DAAD) undergraduate scholar. His research interests include electrode design and optimization for non-precious metal catalysts, modeling of transport phenomena in porous electrochemical systems, and rotating ring-disk electrode studies of metal-nitrogen-catalysts.

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www.electrochem.org/awards

Bruce Deal & Andy Grove Young Author Award

Awarded to Pengfei Guo, Ran Cheng, and Wei Wang for "Silicon Surface Passivation Technology for Germanium-Tin P-Channel MOSFETs: Suppression of Germanium and Tin Segregation for Mobility Enhancement" (JSS, Vol. 3, No. 8, p. Q162).

Pengfei Guo received the Bachelor of Engineering (Electrical, first class honors) degree and the Doctor of Philosophy degree from the National University of Singapore (NUS), in 2008 and 2013, respectively. His PhD dissertation was focused on investigation of advanced transistors with low supply voltage, including tunneling field-effect transistors and high-mobility transistors. He has authored or co-authored over 40 journal and conference papers during his PhD study. He is now working in the Technology Development department in GLOBALFOUNDRIES, Singapore. Dr. Guo was a recipient of the Ministry of Education (Singapore) scholarship in 2003 and the NUS Graduate School scholarship in 2008.

Ran Cheng received the BEng (with honors) and PhD degrees in Electrical Engineering from National University of Singapore (NUS), Singapore. Her research interests include advanced strain engineering, Si, Ge, and GeSn transistors with advanced structures. She has authored and co-authored over 20 papers during her PhD study. She is now working as a research fellow in Zhejiang University in China. Dr. Cheng was awarded the Bachelor's scholarship from the Ministry of Education (Singapore, 2005-2009) and the fellowship from Zhejiang University (China, 2014-2016).

Wei Wang received the BS degree in Electronic Science and Technology from Huazhong University of Science and Technology, in 2006, and PhD degree in physical electronics from the Institute of Semiconductors, Chinese Academy of Sciences, in 2011. From 2011 to present, he is a Research Fellow in Department of Electrical and Computer Engineering, the National University of Singapore (NUS). His research interests are in semiconductor epitaxial growth, semiconductor devices and device physics.

PLENARY SPEAKER AND SOCIETY AWARD WINNERS

2015 CLASS OF FELLOWS

Established in 1989 for advanced individual technological contributions in the field of electrochemical and solid-state science and technology. These members are being recognized for contributions to the advancement of science and technology, for leadership in electrochemical and solid state science and technology, and for active participation in the affairs of The Electrochemical Society.

Simon Deleonibus began his career at Thomson Semiconductors, where he co-invented the contact/via plug technology principal in 1984. This technology is used today as a standard by the microelectronics industry in all integrated circuits produced worldwide. Deleonibus went on to join CEA Leti in 1986, where he currently serves as the Research Director. Here, he developed a recognized expertise on process modules like filed isolation, especially on Flash memories.

Earlier in his career, Deleonibus realized the world's smallest transistor at the Electronic Nanodevices Laboratory. During this time, he and his team pioneered numerous breakthrough process modules for future miniaturization of integrated circuits.

Among his many accomplishment, Deleonibus was awarded the IEEE Fellow award in 2006 for his "contributions to nanoscaled complementary metal oxide semiconductor (CMOS) devices technology." He has served as Associate Editor for *IEEE Transactions on Electronic Devices* (2008-2014) and the *European Physical Journal* (2008-2014). He has recently edited two books on nanodevices and integrated nanosystems and has been a Visiting Professor at the Tokyo Institute of Technology since 2014.

Raymond J. Gorte is currently the Russell Pearce and Elizabeth Crimian Heuer Professor of Chemical & BIomolecular Engineering—with a secondary appointment in Materials Science & Engineering—at the University of Pennsylvania. Since joining the university in 1981, Gorte's esteemed research has focused on electrodes for solid oxide fuel cells and the catalytic properties of core-shell materials. He is also known for his research on zeolite acidity and for metal-support effects, especially with ceria-supported precious metals, used in automotive emissions control.

Gorte is currently an Associate Editor of the *Journal of The Electrochemical Society* and has chaired numerous conferences, including the Gordon Conference on Catalysis (1998).

Among the many honors attributed to him, Gorte has received the Parravano Award of the Michigan Catalysis Society (1997), the Philadelphia Catalysis Club Award (1998), the Paul Emmett Award of the North American Catalysis Society (1999), the Penn Engineering Distinguished Research Award (2001), and the AIChE Wilhelm Award (2009).

Ellen Ivers-Tiffée has been a researcher in the field of functional ceramics for the energy sector for more than three decades, with her focus being on electrochemical energy storage and conversion devices. Currently, she heads the Institute of Applied Materials – Materials for Electrical and Electronic Engineering at Karlsruhe Institute of Technology in Germany. Previously, she has worked with such notable companies as Siemens AG, Corporate Research and Technology, and the Center of Applied Materials Research.

Her research aims at characterizing electrical/electrochemical reactions & transport processes, developing nanoscaled functional layers & interfaces and modelling/simulating materials properties in solid oxide fuel cells, lithium-ion batteries and oxygen-permeation membranes. Through her career, she has published 350 full research papers and conferences proceedings, as well as many book contributions including a German-language standard textbook on materials for electrical engineering.

Since joining ECS in 2003, Ivers-Tiffée has served in the High Temperatures Materials Division and is co-organizer of the ECS "Solid-Gas Electrochemical Interfaces" symposium. She is a member of many additional societies, including the German Academy of Science & Engineering.

Deborah Jones has been dedicated to innovation in fuel cell and electrolyser materials for the past 20 years, introducing new concepts for fuel cell membrane compositions and architectures and contributed to understanding of membrane degradation mechanisms. Currently, she is the Full Senior Researcher of the French National Scientific Research Council and the Associate Director of the Institute for Molecular Chemistry and Materials, where she has co-authored more than 200 international journal articles and 17 review articles and book chapters.

Jones has been involved in collaborative research across Europe for many years, initiating the European Coordination Action on Membrane Electrode Assemblies and the biennial international CARISMA conferences on materials for medium and high temperature polymer electrolyte fuel cells. She has led several large European collaborative efforts, and is currently member of the European Fuel Cells and Hydrogen Joint Undertaking Scientific Committee.

Additionally, Jones has served as Senior Editor of the journal *Fuel Cells*, co-edited volumes of *ECS Transactions*, and was the co-organizer of the 2015 ECS Conference on Electrochemical Energy Conversion & Storage with SOFC-XIV.

Robert Kostecki is often recognized for his groundbreaking work in the field of electrochemical energy storage and conversion systems, photocatalysis and water treatment technologies, which often helped bridge the gap between fundamental science and applications of significant technological importance. As a pioneer in advanced characterization of electrochemical interface in lithium-ion batteries, his research interests focus on fundamental interfacial phenomena that determine the function and performance of electrical energy storage systems, including degradation modes and failure mechanisms.

Among his many scientific achievements, Kostecki is most recognized for developing and deploying novel characterization methodologies, including *in situ* and *ex situ* optical far- and near-field spectroscopy and imaging techniques to probe basic properties of materials, interfaces and interphases at the atomic, molecular, and nanoparticulate levels.

Kostecki is currently a Senior Scientist in the Energy Storage and Distributed Resources Division at Lawrence Berkeley National Laboratory, where he contributes to areas of energy and environment through research initiatives and partner relationships. Additionally, he has served as officer and Chair of the ECS San Francisco Section and he is currently Chair of the ECS's Battery Division.

PLENARY SPEAKER AND SOCIETY AWARD WINNERS

Kailash C. Mishra is engaged in the research and development of luminescent materials, working in close collaboration with various phosphor research groups, as well as within academia and national labs. Currently, he is the Head of Technology Scouting of Osram Corporate Innovation at Central Research and System Laboratories of Osram Sylvania.

Mishra's area of expertise includes theory of electronic structures and associated properties of materials, theory of luminescence, and optical and luminescence properties of III-V semiconducting materials. He has published extensively on luminescence of solids, and on the electronic structures and associated properties of atoms, molecules, metals, semiconductors and ionic crystals.

Since joining ECS in 1998, Mishra has served as Chair of the ECS Luminescence and Display Materials Division, co-organized several ECS symposia, and co-edited multiple volumes of *ECS Transactions.* Additionally, he is currently one of the technical editors of the *ECS Journal of Solid State Science and Technology* and *ECS Solid State Letters.*

Mogens Mogensen's research focuses on electrochemistry, materials science, solid and liquid electrolytes, electrochemical kinetics, electrolysers, reversible fuel cells, and energy conversion and storage. He is currently a professor at the Technical University of Denmark's Department of Energy Conversion and Storage. In addition to his involvement in academia, Mogensen has been involved in electrochemistry research and development for 42 years, continuously leading Danish and European electrochemical projects.

Mogensen has co-authored more than 350 scientific papers, of which over 200 were published in international refereed journals. He has participated in a large number of international conferences and given more than 40 invited talks, some of which were keynote and plenary talks.

Throughout his career in academia, he has supervised over 10 Master students, more than 20 PhD students, and approximately 25 postdoctoral researchers. Among his many honors, Mogensen has received the Christian Friedrich Schönbein Medal of Honour in 2008 and the Science of Hydrogen & Energy Award in 2012.

Emanuel Peled is known among the scientific community as the inventor and developer of the solid electrolyte interphase (SEI) model for nonaqueous alkali-metal batteries. His in-depth exploration of batteries has allowed him to develop unique state of charge meter (residual capacity) for lithium batteries in his laboratory that was manufactured by a startup company Chemtronics, for which he was a co-founder. While here, he and his team also developed high power hydrogen bromine fuel cells, direct methanol and direct ethylene glycol fuel cells with world record power.

Peled is also a co-founder of EnStorage, a startup company aimed at the development and commercialization of very large energy storage systems based on regenerative fuel cell and a co-founder of a start-up company (Honeycomb) aimed at the development and commercialization of a novel 3D lithium battery. He has since broadened his industrial roots and delved into academia, joining the staff at Tel Aviv University's School of Chemistry as an emeritus professor.

ECS's Battery Division has previously awarded Peled their Research Award for his outstanding achievements in the field of energy.

E. Jennings (EJ) Taylor's 35 year career in industrial electrochemistry has been focused on developing innovative electrochemical technologies both as an "intrapreneur" while employed at corporate R&D laboratories and as an entrepreneur at Faraday Technology. As Faraday Technology's Founder and Chief Technical Officer, his approach to technology development is based on a careful balance between fundamental understandings combined with the rational acceptance of evolving observations that do not necessarily fit the current electrochemical paradigm. Taylor has created a culture at Faraday that encourages teamwork across a variety of science and engineering disciplines, to enable technology development from conception to beta-scale demonstration.

Taylor's involvement with ECS over the years has been immense, serving on many committees and co-organizing numerous symposia. Currently, he serves as ECS's Treasurer.

Taylor has over 190 publications and is a recipient of the 2008 Blum Scientific Achievement Award of the National Association of Surface Finishers based on Faraday Technology's Contributions to the field of pulse/pulse reverse electrolytic surface finishing. In conjunction with a team from Faraday Technology, Taylor also received a 2013 Presidential Green Chemistry Challenge Award for electrodeposition of functional chromium coatings from a trivalent electrolyte.

John A. Turner started his scientific career working on sodium and potassium amalagam batteries as an undergraduate student at Idaho State University. Throughout his academic career, he worked with such pillars of electrochemistry as Bob and Janet Osteryoung, Fred Anson, and Heinz Gerischer.

Upon joining the National Renewable Energy Laboratory in 1979—where he is currently a Research Fellow—Turner began to work on photoelectrochemical water splitting for hydrogen production. His research topics include the direct conversion (photoelectrolysis) systems for hydrogen production from sunlight and water, catalysts for the hydrogen and oxygen reactions, materials for advanced fuel cell membranes, and corrosion studies of fuel cell metal bipolar plates. Other work involves the study of electrode materials for high energy density lithium batteries and fundamental processes of charge transfer at semiconductor electrodes

Turner has co-authored over 160 peer-reviewed publications in the areas of photoelectrochemistry, fuel cells, batteries, general electrochemistry and analytical chemistry. He has received a multitude of awards, including the Midwestern Research Institute President's Award for Exceptional Performance in Research and the Hydrogen Technical Advisory Panel Award for Research Excellence.

Steven Visco is currently the Founder and Chief Executive Officer of PolyPlus Battery Company, which he co-founded in 1991 to research and develop next generation batteries. Visco's company was selected by TIME magazine in its "50 Best Inventions" issue, as well as awarded the Gold Edison Award in 2012.

Aside from his role at PolyPlus Battery Company, Visco also serves as a Guest Scientist in the Materials Science Division at the Lawrence Berkeley National Laboratory, where his research interests have included advanced batteries and fuel cells. He currently holds 103 U.S. patents, more than 200 international patents, and has authored over 70 publications.

His immense impact in battery technology and industry has yielded Visco the City of Berkeley's Visionary Award. Additionally, he was awarded the 2011 International Battery Association Award for "outstanding contributions to the development of lithium-air and lithium-water batteries."

DIVISION & SECTION AWARD WINNERS

Take the time to honor and support your friends and colleagues, be sure to add the Division and Section award winners' talks to your calendar, they are scheduled in various symposia throughout the week.

ECS Battery Division Student Research Award

Tuesday, October 13, 1400-1440h
106-B Phoenix Convention Center

Real-time Diffraction Studies of Electrode Materials for Li-ion and Na-ion Batteries
by Matteo Bianchini

Matteo Bianchini began his scientific career at the Polytechnic University in Milan, where he obtained his Bachelor's degree (2009) and Master of Science (2012) in Physics Engineering. During this time, he had many transformative experiences in the sciences, including a semester spent at the University of Amsterdam in 2010 as part of the Erasmus Programme.

Bianchini's PhD focused on advanced characterizations of electrode materials for lithium-ion and sodium-ion batteries in a shared program among three French institutions: the Institut Laue-Langevin (ILL, Grenoble), the Laboratoire de Réactivité et de Chimie de Solides (LRCS, Amiens) and the Institut de Chimie de la Matière Condensée (ICMCB, Bordeaux). Research focuses primarily on real-time (operando) diffraction experiments using neutrons, x-rays, and synchrotron radiation to student lithium and sodium (de)intercalation processes inside rechargeable batteries. Through the collaboration, Bianchini has been able to access different domains of electrochemical and diffraction fields.

ECS Corrosion Division H.H. Uhlig Award

Tuesday October 13, 1400-1430h
102-A Phoenix Convention Center

Application of Electrochemistry in the Development of Performance Assessment Models for High Level Nuclear Waste Disposal
by David Shoesmith

David Shoesmith's research interests cover a wide range of areas in corrosion science and engineering, with an emphasis on electrochemical and surface analytical methods, the development of techniques to analyze corroding surfaces, and the development of deterministic and probabilistic models to describe and predict corrosion performance. After a 25 year career at Atomic Energy of Canada Limited's Whiteshell Laboratories, Shoesmith moved to the University of Western Ontario where he currently holds the position of Canadian Natural Science and Engineering Research Council/Nuclear Waste Management Organization Industrial Research Chair.

Shoesmith has a substantial body of work with over 290 journal articles and refereed conference proceedings published, including 27 book chapters and review articles, and approaching 150 commercial and company reports.

His main research area of focus shows an emphasis on corrosion issues (containers, wasteforms) related to the storage and disposal of high level nuclear waste. Outside of this area, he has funded research programs in the areas of gas transmission pipelines, the automotive industry and a fundamental research grant to investigate the basic science

ECS Corrosion Division Morris Cohen Graduate Student Award

Tuesday, October 13, 1430-1500h
102-A Phoenix Convention Center

Impact of Salt Deliquescence on the Humidity-Dependence of Atmospheric Corrosion
by Eric Schindelholz

Eric Schindelholz is a senior member of technical staff at Sandia National Laboratories. He received his PhD in Materials Science at the University of Virginia in 2014 under the direction of Professor Robert Kelly. His graduate work focused on understanding the interrelationship between the hygroscopic behavior of marine atmospheric particles and the humidity dependence of steel corrosion associated with these particles.

Prior to his studies, Schindelholz served as a conservator in both federal and private institutions, specializing in the corrosion assessment and mitigation of historic artifacts and monuments.

His present work includes electrochemical measurement and modeling of atmospheric corrosion, corrosion in supercritical fluids and advanced materials.

ECS Battery Division Research Award

Tuesday, October 13, 1650-1730h
106-B Phoenix Convention Center

Anodes for Lithium Ion Batteries Revisited: From Graphite to High-Capacity Alloying- and Conversion-Type Materials and Back Again
by Martin Winter

Martin Winter has focused on R&D of new materials, components and cell designs for batteries and supercapacitors—in particular for lithium-ion batteries—for nearly 25 years. Currently, he holds a Chair for Applied Materials Science for Electrochemical Energy Storage and Conversion at the Institute of Physical Chemistry at Münster University, Germany.

Aside from his position at Münster University, Winter is the Director of the Münster Electrochemical Energy Technology (MEET) Battery Research Center. The center combines outstanding equipment with an international team of 140 scientists, engineers, and technicians. Winter has also been named Director of the new Helmholtz Institute Münster, as well as serving as an associate of the National Platform E-Mobility, where he consults the German chancellor and government.

Additionally, Winter is the head of the research council of the Battery Forum Germany, which advises the German Federal Ministry of Education and Research in the field of electrochemical energy storage. His strides in battery technology have yielded him much recognition, including ECS's Battery Technology Award and the Research and Technology Award of the International Battery Materials Association

DIVISION & SECTION AWARD WINNERS

ECS Europe Section Heinz Gerischer Award

Tuesday October 13, 1735-1815h
104-B Phoenix Convention Center

A Perspective of Photoelectrochemistry: Past Expectations and Present Realities
by Adam Heller

Adam Heller's work in electrochemical engineering has touched the lives of people across the globe. As the inventor of the painless diabetes blood monitor, his developments in healthcare have had an enormous societal and economic impact. Heller's work spans a range of technologies, touching areas related to battery and energy—including solar cells, the lithium battery, and photoelectrocatalysis.

Heller's innovation and research has impacted both industry and academia. He began his career with such notable companies as GTE Laboratories and Bell Laboratories, where he headed the Electronic Materials Research Department. He transitioned into academia soon after when he joined the staff at the University of Texas in Austin. During this time, Heller co-found what would be one of his most significant contributions to science—the painless blood glucose monitoring system.

Aside from this development, Heller's research also resulted in the first paper on the lithium thionyl chloride battery, which would be used in implanted medical and defense systems that required a shelf life of greater than 20 years or a higher than average energy density. Additionally, his early work in solar resulted in 11.5% efficient solar cells in 1980 and in 11 % efficient hydrogen evolving photoelectrodes in 1981. These achievements and many others earned him the U.S. National Medal of Technology and Innovation in 2008.

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ECS Battery Division Technology Award

Wednesday, October 14, 0800-0840h
106-B Phoenix Convention Center

Lead-Carbon Ultracapacitors: How, Why and Where Is the Technology
by Ashok Shukla

Ashok Shukla's creative, interdisciplinary, and cutting-edge research has made extensive fundamental and applied contributions to the fields of storage batteries, fuel cells, and supercapacitors. In particular, his research works on novel electrocatalysts, lithium-ion cathodes/anodes, lead-carbon ultracapacitors, nickel-iron batteries and tropical lead-acid batteries are truly path breaking.

As the current Honorary Professor at Indian Institute of Science, Bangalore, Shukla has pioneered work in electrochemical storage science and technology. His research has also been actively engaged in innovative engineering of self-supported polymer electrolyte, direct methanol and direct borohydride fuel cell systems.

Shukla is a member of many editorial advisory boards of several international journals. Among his many honors, Shukla also been named fellow of the Indian National Science Academy, Indian National Academy of Engineering, National Academy of Sciences India, India Academy of Sciences, and The International Society of Electrochemistry.

ECS Electrodeposition Division Research Award

Wednesday October 14, 1400-1440h
103-A Phoenix Convention Center

The Scanning Bipolar Cell: Design Principles for Patterning of Diverse Metals without Contact to the Substrate
by Daniel Schwartz

Daniel T. Schwartz's interest in chemical engineering was first kindled in the mid-1980s when he began working for the Silicon Valley start-up Cybernex Corporation. He then transitioned from industry to a national lab setting when he joined the team at Lawrence Berkeley National Laboratory for his postdoc.

In 1991, Schwartz joined the University of Washington as an assistant professor, where he founded the Electrochemical Materials and Interfaces Laboratory. Schwartz still resides at the University of Washington where he now holds the position of Boeing-Sutter Professor of Chemical Engineering and Director of the Clean Energy Institute. Here, his students combine electrochemical fundamentals and engineering principles to understand, design, and improve a wide range of electrochemical systems.

He has served the ECS as Chair of the Electrodeposition Division, Chair of the Council of Sections, and as a member of several other committees. Select honors include the University of Washington Marsha Landolt Distinguished Graduate Mentor Award and ECS's Henry B. Linford Award.

SOLAR CRITICAL ISSUES AND RENEWABLE ENERGY

Summit Dates, October 12-14, 2015

With population growth and industrialization, global energy needs continue to grow as well. Economic, political, and environmental issues are largely dictated by energy needs. The **Fifth International ECS Electrochemical Energy Summit (E2S)** is designed to foster an exchange between leading policy makers and energy experts about society needs and technological energy solutions.

The E2S program will be focused around Solar Critical Issues, and Renewable Energy. It will begin on **Monday, October 12** and run **through Wednesday, October 14, 2015**. The program on Monday will be focused on the DOE Hubs, featuring a Plenary, and invited talks from the Joint Center for Energy Storage Research (JCESR), the Joint Center for Artificial Photosynthesis (JCAP), and the Energy Efficiency & Renewable Energy Fuel Cell Technologies Office (EERE FCTO). The program on Tuesday and Wednesday will include keynote talks from five Energy Frontier Research Centers (EFRC) Directors, relevant invited speakers, and round table discussions.

ORGANIZERS

- Daniel Scherson, Case Western Reserve University
- Adam Weber, Lawrence Berkeley National Laboratory
- Krishnan Rajeshwar, University of Texas, Arlington

KEY PARTICIPANTS

David Wesolowski
Oak Ridge National Laboratory

The Fluid Interface Reactions, Structures and Transport (FIRST) Energy Frontier Research Center

The overarching goal of the FIRST Center, which is in its sixth year of operation, is to develop fundamental understanding and validated, predictive models of the unique nanoscale environment at fluid-solid interfaces, that will enable transformative advances in electrical energy storage and electrocatalysis.

In order to achieve our goal, we integrate novel substrate and electrolyte synthesis and characterization, advanced electron (TEM) and scanning probe microscopies (SPM), neutron and X-ray scattering, and multiscale computational modeling ranging from quantum Monte Carlo to classical density functional theory approaches. Electrolytes investigated include aqueous, polar organic and room temperature ionic liquids (RTILs), representing increasing cost and electrochemical stability, and decreasing viscosity, competing factors in device performance.

Our recent efforts have focused on predicting the functionality of interfacial systems for capacitive and pseudocapacitive electrical energy storage in microdevice to grid scale applications.

M. Stanley Whittingham
Binghampton University

NorthEast Center for Chemical Energy Storage (NECCES)

The mission of the NorthEast Center for Chemical Energy Storage (NECCES) is to develop an understanding of how key electrode reactions occur, and how they can be controlled to improve electrochemical performance, from the atomistic level to the macroscopic level throughout the life-time of the operating battery.

The processes that occur in batteries are complex, spanning a wide range of time and length scales. The team of experimentalists and theorists will make use of, and develop new methodologies to determine how model compound electrodes function in real time, as batteries are cycled.

The specific goals of NECCES are to close the gap between the realized and the theoretical energy density for intercalation compounds, to attain reversible multi-electron transfer in a cathode material using lithium, and to understand performance limiting transport in positive electrode structures from the local through the meso to the macroscale.

Gary Rubloff
University of Maryland

Nanostructures for Electrical Energy Storage (NEES) Energy Frontier Research Center

NEES seeks to understand the electrochemical behavior of nanostructures, particularly in dense mesoscale architectures, for their use in energy storage: how to precisely control the multiple components of the nanostructures; how to densely pack and connect them to optimize their performance; how they behave – individually and collectively – during charging and discharging, and why; and how to make them safe and long-lasting over thousands of charging cycles.

With its past achievements creating and characterizing precise multi-component (heterogeneous) nanostructures, NEES now focuses on four areas: (1) understanding and controlling interfaces in storage nanostructures; (2) revealing new mesoscale challenges which dense assemblies of nanostructures pose, and the correlation of these architectures with electrochemical performance and degradation; (3) identifying the fundamental degradation mechanisms which accompany storage nanostructures and architectures; and (4) pursuing advances in the synthesis and characterization of 3-D nanostructured solid state storage configurations.

Esther Takeuchi
Stony Brook University

The Center for Mesoscale Transport Properties, m2M, (molecular to mesoscale)

Understanding the underlying ionic and electronic conduction phenomena is needed to further improve energy storage systems in order to bridge the gap between theoretical and achievable values.

During the operation of an energy storage system, ions and electrons are transported over multiple size domains where the sum of these processes leads to complex physics. Exploration of local conduction and transport phenomena is needed, encompassing investigations from the molecular to nano to mesoscale.

The vision of the m2M center is to minimize heat and maximize work of electrical energy storage devices. The center will accomplish this through understanding and ultimately controlling transport properties in complex battery systems with respect to multiple length scales. Redox active materials from several families are under investigation including 1D, 2D and 3D structures. Further, the influences of the electrode environment as well as the battery system on the electrochemical performance are key considerations.

Paul Fenter
Argonne National Laboratory

Center for Electrochemical Energy Science (CEES)

CEES seeks to develop a fundamental understanding of the lithium ion electrochemistry of oxides in lithium ion battery systems, through coordinated studies of three types of chemistries with a focus on model materials: Li ion insertion reactions, Li ion conversion reactions, and Li-O_2/Li-ion hybrid reactions.

One broad theme in these studies is the role of interfaces in these reactions and I will also summarize recent work in which we seek to isolate and understand the role of interfacial reactivity in these systems using X-ray based approaches (e.g., X-ray reflectivity).

Harry Atwater
Director JCAP

Joint Center for Artificial Photosynthesis-Progress and Prospects (JCAP)

JCAP is pioneering revolutionary methods of synthesizing transportation fuels simply by combining three of Earth's most abundant resources: carbon dioxide, water, and sunlight.

The goal is to generate liquid hydrocarbon or alcohol fuel products whose heating value equals or exceeds that of methanol, using selective and efficient chemical pathways.

The grand challenge at the heart of solar fuels production is controlled catalysis. Over the last five years, JCAP made significant advances in solar-driven catalytic production of hydrogen from water - but as yet there remains no known catalyst, whether electrochemical or photoelectrochemical, which can reduce carbon dioxide with high efficiency and selectivity under mild conditions.

To tackle CO_2 reduction, JCAP's efforts are aligned along four fronts: experimental and theoretical discovery of fundamental electrocatalysis mechanisms and materials, experimental and theoretical discovery of photocatalysts and light absorbers, systems integration, and testbed prototyping.

George Crabtree
Director JCESR

The Joint Center for Energy Storage Research (JCESR)

The Joint Center for Energy Storage Research (JCESR) seeks to establish next-generation electricity storage through a new research paradigm that unites discovery science, battery design, research prototyping and manufacturing collaboration.

JCESR focuses exclusively on beyond-lithium-ion batteries. Its vision is to transform transportation and the electricity grid with high performance, inexpensive electricity storage that enables widespread deployment of electric cars, broad penetration of wind and solar electricity and breaks the century-old constraint of matching instantaneous electricity generation with instantaneous electricity demand. Its mission is to deliver two prototypes, one for transportation and one for the grid, which when scaled to manufacturing are capable of delivering five times the energy density at one-fifth the cost of the commercial batteries available at its launch in 2012.

JCESR intends to leave three legacies: a library of fundamental science of the materials and phenomena of energy storage at atomic and molecular levels; two prototypes, one for transportation and one for the grid, that when scaled to manufacturing are capable of meeting JCESR's aggressive performance and cost targets; and a new paradigm for battery research and development that integrates discovery science, battery design, research prototyping, and manufacturing collaboration.

Franklin (Lynn) M. Orr, Jr.
Oak Ridge National Laboratory

U.S. Under Secretary for Science and Energy

Dr. Franklin (Lynn) M. Orr was sworn in as the Under Secretary for Science and Energy on December 17, 2014.

As the Under Secretary, Dr. Orr is the principal advisor to the Secretary and Deputy Secretary on clean energy technologies and science and energy research initiatives.

Dr. Orr is the inaugural Under Secretary for the office, which was created by Secretary of Energy Ernest Moniz to closely integrate DOE's basic science, applied research, technology development, and deployment efforts. As Under Secretary, he oversees DOE's offices of Electricity Delivery and Energy Reliability, Energy Efficiency and Renewable Energy, Fossil Energy, Indian Energy Policy and Programs, Nuclear Energy, and Science. In total, these programs steward the majority of DOE's National Laboratories (13 of 17).

ELECTROCHEMICAL ENERGY SUMMIT 2015

PROGRAM

Please note, the E2S talks are tagged within the technical program beginning on page 62, the full technical program can also be viewed online, and within the meeting scheduler. Unless noted otherwise, all E2S events take place in room 101-C (PCC).

Monday, October 12, 2015

0800h-0845h.....Electrochemical Energy Summit Plenary Address, 101-AB&C (PCC)

Speaker: U.S. Under Secretary for Science and Energy, F. (Lynn) M. Orr Jr.

Chair: D. Scherson

0845h-0955h.....Electrochemical Energy Summit Session 1–JCESR Talks

Speakers: G. Crabtree, K. R. Zavadil, F. R. Brushett

Chair: D. Scherson

1005h-1125h.....Electrochemical Energy Summit Session 2–JCAP Talks

***Speakers*:** H. A. Atwater, M. T. McDowell, I. D. Sharp

Chair: K. Rajeshwar

1135h-1300h.....Electrochemical Energy Summit Session 3–Industry Talks

Speaker: S. Satyapal

Chair: A. Z. Weber

1245h-1400h.....Leveraging the Labs: This session will demystify the process of working with national labs and discuss the mechanisms put in place to put labs to work on industry problems.
213-A (PCC)

1500h-1600h.....Electrochemical Energy Summit Breakout Session 1: Public-Private Partnerships for Research and Development

Chair: J. P. Chamberlain

1500h-1600h.....Electrochemical Energy Summit Breakout Session 2: Team Science

Chair: G. Crabtree

1730h-1800h.....Lab Showcase: The second session, during the Business-2-Business Product Theater, will highlight technologies developed at the national labs, their unique capabilities, and opportunities for collaboration.
2nd Floor Lobby (PCC)

Tuesday, October 13, 2015

0800h-1010h.....Electrochemical Energy Summit Session 4–EFRC Talks

Speakers: P. Fenter, A. C. Marschilok, C. Lian, K. W. Chapman, C. Wang

Chair: E. S. Takeuchi

1030h-1220h.....Electrochemical Energy Summit Session 5–EFRC Talks

Speakers: G. W. Rubloff, A. A. Gewirth, J. Come, S. Meng

Chair: D. J. Wesolowski

1400h-1550h.....Electrochemical Energy Summit Session 6–EFRC Talks

Speakers: M. S. Whittingham, Y. Wang, A. Ulysal, J. W. Elam

Chair: P. Fenter

Wednesday, October 14, 2015

0800h-1010h.....Electrochemical Energy Summit Session 7–EFRC Talks

Speakers: E. S. Takeuchi, M. Beidaghi, H. Iddir, K. Leung, L. F. J. Piper

Chair: G. W. Rubloff

1030h-1220h.....Electrochemical Energy Summit Session 8–EFRC Talks

Speakers: D. J. Wesolowski, S. P. Ong, A. A. Talin, M. K. Y. Chan

Chair: M. S. Whittingham

(PCC) This event will be held in the Phoenix Convention Center.

E2S

The Electrochemical Society

electrochemical energy summit 2015

Featuring Hydrogen Fuel Cells

Sponsored by the Fuel Cell Technologies Office

Phoenix Convention Center, Phoenix, AZ

PLENARY SPEAKER

Monday, October 12, 2015 at 8:00 am
Lynn Orr
Under Secretary for Science and Energy
U.S. Department of Energy

DOE EERE LAB TECH TO MARKET SHOWCASE

LEVERAGING NATIONAL LAB CAPABILITIES TO SOLVE INDUSTRY PROBLEMS

TUESDAY, OCTOBER 13

On Tuesday, October 13, join us at these two **one-day-only events** to increase collaboration between national labs and industry:

LEVERAGING THE LABS | 12:45-2:00 PM

The first session will demystify the process of working with national labs and discuss the mechanisms put in place to put labs to work on industry problems.

LAB SHOWCASE | 5:30-6:00 PM

The second session, during the Business-2-Business Product Theater, will highlight technologies developed at the national labs, their unique capabilities, and opportunities for collaboration.

Following presentations from each lab, representatives will be available in the room to further discuss their industrial solutions.

3-D X-ray Tomography of a mixed-potential hydrogen sensor at LANL. Sensor response is controlled by the kinetics of the electrode reactions occurring at the gas-electrode-electrolyte interface.

NREL has received four Fuel Cell Hybrid Vehicles—Advanced (FCHV-adv) on loan from Toyota, enhancing their research capabilities related to hydrogen fueling infrastructure.

Xiaoping Wang of Argonne National Laboratory prepares a cell for testing the activity of fuel cell catalysts.

U.S. DEPARTMENT OF ENERGY

Energy Efficiency & Renewable Energy

EERE-funded research has:

- Reduced cost of fuel cells by more than 50% since 2006 and 30% since 2008
- Achieved a more than five-fold reduction in the platinum content of fuel cells
- Led to more than 500 patents, 45 commercial technologies, and 65 emerging technologies that will be commercialized in the next 3-5 years
- http://energy.gov/eere/fuelcells/downloads/2014-pathways-commercial-success-technologies-and-products-supported-fuel

www.energy.gov/eere/fuelcells

TECHNICAL EXHIBIT

The ECS Technical Exhibit is always the talk of the meeting—technical exhibits are popular networking opportunities, as attendees gather together with colleagues and meet new contacts. The exhibitors in Phoenix will provide demonstrations and showcase instruments, materials, systems, publications, and software, as well as other products and services. Complimentary coffee breaks are scheduled on Wednesday and Thursday at 0930h in the Exhibit Hall. In addition, the Poster Sessions and receptions will be held in the Exhibit Hall on Tuesday and Wednesday evenings, beginning at 1800h. **The Exhibit Hall will be located in West Hall 1 in the Phoenix Convention Center.**

EXHIBIT HOURS

Tuesday, October 13, 2015

0800-1300h ..... Exhibitor Move-In
1300-1600h ..... Technical Exhibit
1800-2000h ..... Technical Exhibit, General & Student Poster Session

Wednesday, October 14, 2015

0900-1400h ..... Technical Exhibit
0930-1000h ..... Coffee Break in Exhibit Hall
1800-2000h ..... Technical Exhibit & General Poster Session

Thursday, October 15, 2015

0900-1200h ..... Technical Exhibit
0930-1000h ..... Coffee Break in Exhibit Hall
1200-1600h ..... Technical Exhibit Tear Down

EXHIBITORS

Asahi/America, Inc.

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The Department of Energy Fuel Cell Technologies Office

Booth 401

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1.202.287.6319
www.energy.gov/eere/fuelcells

The U.S. Department of Energy's Fuel Cell Technologies Office is a comprehensive portfolio of activities that address the full range of barriers facing the development and deployment of hydrogen and fuel cells with the ultimate goals of decreasing our dependence on oil, reducing carbon emissions, and enabling clean, reliable power generation.

ECOTEC Solutions, Inc.

Booth 403

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As the leader in gas and humidity analysis equipment for PEM fuel cell testing, greenhouse gas measurement at landfills, and many other applications, **ECOTEC** continues to provide innovative solutions with superior service and support. The ECOTEC HS-1000 solves the challenges of accurately measuring humidity levels in fuel cell gas conditions.

El Cell

Booth 116

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(continued on next page)

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(continued from previous page)

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Taiwan Section – Cheng-Lun Wang, Chair
Texas Section – Harovel Wheat, Chair
Twin Cities Section – Vincent Chevrier, Chair

ECS STUDENT CHAPTERS

ECS Student Chapter (Year Founded)	**Faculty Advisor**
Atlanta Student Chapter at Georgia Tech (2008)	Peter J. Hesketh
Auburn University (2007)	Jeffrey Fergus
Belgium (2015)	Stefan De Gendt Philippe Vereecken
Boston (2009) Northeastern University Harvard University MIT	Eugene Smotkin
Brno University of Technology (2006)	Jiri Vondrak
Calgary (2011)	Viola Birss
California State University (2012) Fullerton Division	John Haan
Central Illinois (2008)	Andrzej Wieckowski
Clemson University (2014)	Stephen Creager
ECS Cleveland Section and Ernest B. Yeager Center for Electrochemical Sciences Joint Student Chapter (2005)	James D. Burgess
Colorado School of Mines (2012)	Andrew Herring
Drexel University (2012)	Yury Gogotsi Ekaterina Pomerantseva
Illinois Institute of Technology (2015)	Vijay Ramani Adam Hock
Indiana University (2012)	Lane Baker Dennis Peters
Kerala, India at CUSAT (2008)	M. K. Jayaraj
Lahore, Pakistan (2008)	Inam Ul Haque
Montana State University (2013)	Paul Gannon Ryan Anderson
Montreal (2010)	Steen B. Schougaard
North Florida (2014)	Pedro Moss
Norwegian University of Science and Technology (2014)	Ann Mari Svensson
Ohio State University (2006)	Anne Co
Ohio University (2011)	Gerardine Botte
Rensselaer Polytechnic Institute (2013)	Daniel Lewis David Duquette

ECS Student Chapter (Year Founded)	**Faculty Advisor**
Research Triangle Student Chapter (2013) Duke University NC State UNC - Chapel Hill	Jeffrey Glass (Duke)
South Brazilian (Univ. Fed. do Rio Grande do Sul) (2010)	Luis Frederico P. Dick
SRM University (2013)	Ranjit Thapa Bhalchandra Kakade
Tel Aviv University (2009)	Eliezer Gileadi Yosi Shacham-Diamand
Tyndall National Institute (2012)	Alan O'Riordan
University of Arkansas (2014)	Rick Wise Ingrid Fritsch
University of British Columbia (2013)	Dan Bizzotto
University of California – Berkeley (2006)	Bryan McCloskey
University of California – Riverside (2011)	Alexander Balandin
University of California – San Diego (2014)	Shirley Meng
University of Central Florida (2000)	Kalpathy Sundaram
University of Cincinnati (2007)	Marc Cahay
University of Florida (2005)	Mark Orazem
University of Iowa (2014)	Johna Leddy
University of Kentucky (2014)	Mona Shirpour
University of Maryland (2011)	Eric Wachsman
University of Nevada - Reno (2014)	Dev Chidambaram
University of Pittsburgh (2014)	Prasanth Kumta
University of South Carolina (2010)	Xiao-Dong Zhou
University of Tartu (2013)	Kaido Tammeveski
University of Texas at Austin (2006)	Ram Manthiram
University of Texas at Dallas (2012)	Moon Kim
University of Virginia (2006)	Giovanni Zangari
Valley of the Sun (Central Arizona) (2013)	Candace Chan

START
a Student Chapter!

ECS currently has 47 student chapters around the world, which provide students with an opportunity to gain a greater understanding of electrochemical and solid state science, to have a venue for meeting fellow students, and to receive recognition for their organized scholarly activities.

For more information on starting a student chapter, please contact Beth Fisher at **Beth.Fisher@electrochem.org** or call **609.737.1902, ext. 103**.

Future Meetings

2016

229th ECS Meeting
San Diego, CA

May 29-June 3, 2016

Hilton San Diego Bayfront &
San Diego Convention Center

IMLB 2016
Chicago, IL

June 19-24, 2016

Hyatt Regency Chicago

PRiME 2016
Honolulu, HI

October 2-7, 2016

Hawaii Convention Center &
Hilton Hawaiian Village

2017

231st ECS Meeting
New Orleans, LA

May 28-June 2, 2017

Hilton New Orleans Riverside

232nd ECS Meeting
National Harbor, MD

(greater Washington, DC area)

October 1-6, 2017

Gaylord National Resort
and Convention Center

ECS electrochem.org/meetings

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American Association for the Advancement of Science
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Chemical Heritage Foundation
Yury Gogotsi ..... *Heritage Councilor*, Spring 2018
Federation of Materials Societies
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External Relations Representative
Mark Orazem ..... Spring 2016
National Inventors Hall of Fame
Peter Fedkiw ..... *Chair, Honors & Awards Committee*, Spring 2019

SYMPOSIUM TOPICS & ORGANIZERS

A — Batteries and Energy Storage

A01 — Joint General Session: Batteries and Energy Storage -and- Fuel Cells, Electrolytes, and Energy Conversion
B. Y. Liaw, K. M. Abraham, A. Manivannan, S. R. Narayanan, D. Wang
Battery, Energy Technology

A02 — Batteries - Theory, Modeling, and Simulation
Y. Qi, A. Van der Ven, P. B. Balbuena
Battery
CD/USB

A03 — Batteries Beyond Lithium-Ion
D. A. Steingart, V. Thangadurai, V. Kalra, Y. Xing, V. Di Noto
Battery, Energy Technology

A04 — Battery Safety
D. H. Doughty, G. G. Botte, C. J. Orendorff
Battery, Industrial Electrochemistry and Electrochemical Engineering

A05 — Electrolytes and Electrochemical Interfaces in Energy Storage Systems
B. L. Lucht, T. R. Jow, R. Kostecki, D. Guyomard, A. M. Herring, V. Di Noto
Battery, Energy Technology

A06 — High-Energy Li-Ion Intercalation Materials
S. Meng, G. Koenig, W.-S. Yoon
Battery

A07 — Intermetallic Anodes
K. Edstrom, D. Wang, V. Di Noto
Battery

A08 — Materials and Cell Designs for Flexible Energy Storage and Conversion Devices
G. Yu, J. Xiao, M. A. Allen, J. St-Pierre, J. Wu
Battery, Energy Technology

A09 — Recent Advances in Supercapacitors
V. Kalra, O. M. Leonte, A. Manivannan, R. Kostecki
Energy Technology, Battery, Dielectric Science and Technology

B — Carbon Nanostructures and Devices

B01 — Carbon Nanostructures: Fullerenes to Graphene
R. B. Weisman, P. J. Kulesza, V. Di Noto
Nanocarbons, Dielectric Science and Technology, Physical and Analytical Electrochemistry

C — Corrosion Science and Technology

C01 — Corrosion General Poster Session
R. Buchheit, S. Virtanen
Corrosion

C02 — Coating and Surface Modification for Corrosion Protection
H. N. McMurray, S. Fujimoto
Corrosion

C03 — Contemporary Aspects of Corrosion and Protection of Magnesium and Its Alloys
S.Virtanen, N. Birbilis
Corrosion

C05 — Critical Factors in Localized Corrosion 8
S. Fujimoto, G. Frankel, E. Tada, J. Kish
Corrosion

C06 — Pits & Pores 6: Nanomaterials - In Memory of Yukio H. Ogata
P. Granitzer, R. Boukherroub, D. J. Lockwood, H. Masuda
Corrosion, Luminescence and Display Materials
CD/USB

D — Dielectric Science and Materials

D02 — Nonvolatile Memories
S. Shingubara, Z. Karim, B. Magyari-Kope, H. Shima, Takasumi Ohyanagi, H. Kubota, J.-G. Park, K. Kobayashi, L. Goux, G Bersuker
Dielectric Science and Technology
CD/USB

D03 — Photovoltaics for the 21st Century 11
M. Tao, H. Hamada, T. Druffel, C. Claeys, L. Deligianni, J. M. Fenton, J.-G. Park, K. Rajeshwar
Dielectric Science and Technology, Electrodeposition, Electronics and Photonics, Energy Technology, Industrial Electrochemistry and Electrochemical Engineering, Physical and Analytical Electrochemistry
CD/USB

D04 — Semiconductors, Dielectrics, and Metals for Nanoelectronics 13
S. Kar, M. Houssa, K. Kita, D. Landheer, S. Van Elshocht, D. Misra, S. A. Dayeh
Dielectric Science and Technology, Electronics and Photonics
CD/USB

D05 — Processing Materials of 3D Interconnects, Damascene and Electronics Packaging 7
K. Kondo, S. Mathad, R. Akolkar, W.-P. Dow, H. Philipsen, M. Hayase, M. Koyanagi, Y. Kaneko, F. Roozeboom
Electronics and Photonics, Dielectric Science and Technology
CD/USB

E — Electrochemical/Electroless Deposition

E01 — Current Trends in Electrodeposition - An Invited Symposium
C. Bonhôte
Electrodeposition

E02 — Fundamentals of Electrochemical Growth and Surface Limited Deposition
S. Brankovic, J. L. Stickney, N. Vasiljevic, N. Dimitrov
Electrodeposition, Physical and Analytical Electrochemistry

E03 — Novel Design and Electrodeposition Modalities 2
E. J. Podlaha-Murphy, Q. Huang
Electrodeposition

E04 — Semiconductors, Metal Oxides, and Composites: Metallization and Electrodeposition of Thin Films and Nanostructures 3
J. Fransaer, P. M. Vereecken, G. Oskam
Electrodeposition

F — Electrochemical Engineering

F01 — Electrochemical Engineering General Session
V. Subramanian, V. K. Ramani
Industrial Electrochemistry and Electrochemical Engineering

F03 — Membrane-based Electrochemical Separations
H. Xu, J. A. Staser, T. M. Gur
Energy Technology, High Temperature Materials, Industrial Electrochemistry and Electrochemical Engineering, Physical and Analytical Electrochemistry

G — Electronic Materials and Processing

G01 — Atomic Layer Deposition Applications 11
F. Roozeboom, J. W. Elam, A. Londergan, O. van der Straten, A. Delabie, S. De Gendt
Electronics and Photonics, Dielectric Science and Technology
CD/USB

G02 — Semiconductor Cleaning Science and Technology 14 (SCST 14)
T. Hattori, J. Ruzyllo, P. W Mertens, R. E Novak
Electronics and Photonics
CD/USB

G03 — Thermoelectric and Thermal Interface Materials 2
C. O'Dwyer, J.-H. He, K. M. Razeeb, R. Chen
Electronics and Photonics, High Temperature Materials
CD/USB

G04 — ULSI Process Integration 9
C. Claeys, C. Huffman
Electronics and Photonics
CD/USB

G05 — GaN & SiC Power Technologies 5
K. Shenai, M. Dudley, N. Ohtani, M. Bakowski
Electronics and Photonics, Dielectric Science and Technology
CD/USB

H — Electronic and Photonic Devices and Systems

H01 — Low-Dimensional Nanoscale Electronic and Photonic Devices 8
Y.-L. Chueh, C. O'Dwyer, M. Suzuki, S. Jin, S.-W. Kim, J.-H. He, J. C. Ho, Z. Fan, Q. Li, G. W. Hunter, K. Takei
Electronics and Photonics, Dielectric Science and Technology, Sensor
CD/USB

H02 — Solid-State Electronics and Photonics in Biology and Medicine 2
Y.-L. Wang, A. Hoff, M. J. Deen, Z. Pascual Aguilar, L. F. Marsal
Electronics and Photonics, Sensor
CD/USB

H03 — State-of-the-Art Program on Compound Semiconductors 58 (SOTAPOCS 58)
J.-H. He, C. O'Dwyer, F. Ren, E. A. Douglas, C. Jagadish, S. Jang, Y.-L. Wang, R. P. Lynch, T. J. Anderson, J. K. Hite
Electronics and Photonics
CD/USB

I — Fuel Cells, Electrolyzers, and Energy Conversion

I02 — Harnessing Multi-Step Electrochemical Reactions for Energy Conversion and Storage
S. R. Narayanan, S. Mukerjee
Energy Technology, Physical and Analytical Electrochemistry

I03 — High Temperature Experimental Techniques and Measurements 2
T. Markus, R. A. Walker, G. S. Jackson
High Temperature Materials
CD/USB

I04 — Ionic Conducting Oxide Thin Films
E. Traversa, T. M. Gur, C. R. Kreller, V. Thangadurai
High Temperature Materials
CD/USB

I05 — Polymer Electrolyte Fuel Cells 15 (PEFC 15)
H. A. Gasteiger, A. Z. Weber, V. K. Ramani, T. F. Fuller, R. A. Mantz, H. Uchida, F. N. Büchi, M. Edmundson, C. Coutanceau, J. M. Fenton, S. Mitsushima, T. J. Schmidt, K. Shinohara, K. Swider-Lyons, Deborah J. Jones, B. S. Pivovar, K. E. Ayers, K. A. Perry, S. R. Narayanan, P. Strasser
Energy Technology, Battery, Industrial Electrochemistry and Electrochemical Engineering, Physical and Analytical Electrochemistry
CD/USB

SYMPOSIUM TOPICS & ORGANIZERS

J — Luminescence and Display Materials, Devices, and Processing

J01 — Physics and Chemistry of Luminescent Materials
A. A Setlur, M. Raukas, R.-J. Xie, J. Collins, R.-S. Liu
Luminescence and Display Materials e

L — Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry

L01 — Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry General Session
P. J. Kulesza
Physical and Analytical Electrochemistry e

L03 — Electroactive and Redox Active Polymers
J. Jiang, A. M. Herring
Physical and Analytical Electrochemistry, Energy Technology e

L04 — Electrode Processes 10
A. C. Hillier, L. A .Diaz, J. St-Pierre
Physical and Analytical Electrochemistry, Energy Technology, Industrial Electrochemistry and Electrochemical Engineering e

L05 — Nanoscale Electrochemistry
T. Ito, A. Kusoglu
Physical and Analytical Electrochemistry, Energy Technology e

L06 — Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 6
N. Wu, E. L. Miller, A. Manivannan, D. Chu, H. N. Dinh, P. J. Kulesza, H. Wang, J. J. Lee
Energy Technology, Physical and Analytical Electrochemistry, Sensor e

L07 — Physical and Analytical Electrochemistry in Ionic Liquids 4
P. C. Trulove, R. A. Mantz, H. C. De Long, M. T. Carter, E. J. Biddinger, W. Xu
Physical and Analytical Electrochemistry, Battery, Industrial Electrochemistry and Electrochemical Engineering, Sensor e

M — Sensors

M01 — Sensors, Actuators, and Microsystems General Session
N. Wu, M. T. Carter, R. Mukundan, L. A. Nagahara, G. W. Hunter, B. A. Chin
Sensor e

M03 — Sensors for Agriculture
B. A. Chin, A. Simonian, S. Mitra, P. Hesketh, Y. Chai
Sensor e

Z — General

Z01 — General Student Poster Session
V. Subramanian, V. Chaitanya, K. B. Sundaram, P. Pharkya
All Divisions e

Z02 — Nanotechnology General Session
O. M Leonte, M. K. Sunkara
All Divisions, Interdisciplinary Science and Technology Subcommittee e

Z03 — Impedance Technologies, Diagnostics, and Sensing Applications
P. Vanýsek, V. Lvovich, M. E. Orazem, M. Itagaki
Physical and Analytical Electrochemistry, Corrosion, Industrial Electrochemistry and Electrochemical Engineering, Sensor e

Z04 — Electrochemical Energy Summit (E2S)
D. Scherson, K. Rajeshwar, A. Z. Weber
All Divisions e

ecstransactions

ECS TRANSACTIONS – FORTHCOMING ISSUES

Issues of *ECS Transactions* (ECST) for symposia with titles in **bold** in the list above may be pre-ordered and picked up at the meeting. Each of these issues will be distributed in a single package that will contain identical content on both a compact disc and a USB drive (CD/USB). These issues can also be purchased online through the ECS Digital Library as full-issue PDF files or individual article PDF files (e) beginning on October 2, 2015.

ECS will begin publishing papers in the ECST issues for the remaining symposia approximately 2 weeks after the Phoenix meeting. These issues and individual articles will be available as PDFs only.

If you would like to receive information on any of these issues when they become available, please sign up for the eTOC alerts by visiting www.ecsdl.org/site/misc/alerts.xhtml.

Meeting Topics

- A – Batteries and Energy Storage
- B – Carbon Nanostructures and Devices
- C – Corrosion Science and Technology
- D – Dielectric Science and Materials
- E – Electrochemical/Electroless Deposition
- F – Electrochemical Engineering
- G – Electronic Materials and Processing
- H – Electronic and Photonic Devices and Systems
- I – Fuel Cells, Electrolyzers, and Energy Conversion
- K – Organic and Bioelectrochemistry
- L – Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry
- M – Sensors
- Z – General Topics

Important Deadlines

- **Meeting Abstracts** due by December 11, 2015
- **Registration** opens February 2016
- **Early Bird** pricing available through April 25, 2016
- **Exhibition and Sponsorship Opportunities**, submit your application by March 11, 2016

Future Meetings

2016, October 2-7 — Honolulu, HI
PRiME 2016 at the Hawaii Convention Center & Hilton Hawaiian Village

2017, May 28-June 2 — New Orleans, LA
231st Meeting at the Hilton New Orleans Riverside

2017, October 1-6 — National Harbor, MD
(greater Washington, DC area)
232nd Meeting at the Gaylord National Resort and Convention Center

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Available Volumes

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5th International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors
Lake Tahoe, California, June 14 - 18, 2015

Vol. 67 No. 1 **2015 International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors (ULSIC vs. TFT 5)**
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2014 Fuel Cell Seminar & Energy Exposition
Los Angeles, California, November 10 - 13, 2014

Vol. 65 No. 1 **Fuel Cell Seminar & Energy Exposition 2014**
CD-ROM.....M $87.00, NM $109.00
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15th International Conference on Advanced Batteries, Accumulators and Fuel Cells (ABAF 15)
Brno, Czech Republic, August 24 - 28, 2014

Vol. 63 No. 1 **15th International Conference on Advanced Batteries, Accumulators and Fuel Cells (ABAF 2014)**
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IMLB 2014: International Meeting on Lithium Batteries
Como, Italy, June 10 - 14, 2014

Vol. 62 No. 1 **17th International Meeting on Lithium Batteries (IMLB 2014)**
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China Semiconductor Technology International Conference 2014
Shanghai, China, March 16 - 17, 2014

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ECEE 2014: Electrochemical Conference on Energy & the Environment
Shanghai, China, March 13 - 16, 2014

Vol. 59 No. 1 **Electrochemical Conference on Energy & the Environment (ECEE 2014)**
Soft-cover.....M $138.00, NM $172.00
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Volume 57
13th International Conference on Solid Oxide Fuel Cells 13 (SOFC-XIII)
Okinawa, Japan, October 6 - 11, 2013

Vol. 57 No. 1 **Solid Oxide Fuel Cells 13 (SOFC-XIII)**
CD-ROM.....M $215.00, NM $269.00
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Fuel Cell Seminar & Energy Exposition
Columbus, Ohio, October 21 - 24, 2013

Vol. 56 No. 1 **Fuel Cell Seminar 2013**
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Volume 54
4th International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors
Villard-de-Lans, France, July 7 - 12, 2013

Vol. 54 No. 1 **2013 International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors (ULSIC vs. TFT 4)**
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China Semiconductor Technology International Conference 2013 (CSTIC 2013)
Shanghai, China, March 19 - 21, 2013

Vol. 52 No. 1 **China Semiconductor Technology International Conference 2013 (CSTIC 2013)**
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2012 Fuel Cell Seminar & Exposition
Uncasville, Connecticut, November 5 - 8, 2012

Vol. 51 No. 1 **Fuel Cell Seminar 2012**
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27th Symposium on Microelectronic Technology and Devices
Brasília, Brazil, August 30 - September 2, 2012

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Hard-cover.....M $146.00, NM $183.00
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Volume 48
13th International Conference on Advanced Batteries, Accumulators and Fuel Cells (ABAF 2012)
Brno, Czech Republic, August 26 - August 26, 2012

Vol. 48 No. 1 **Advanced Batteries, Accumulators and Fuel Cells (ABAF 13)**
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Volume 47
China Semiconductor Technology International Conference 2012 (CSTIC 2012)
Shanghai, China, March 18 - 19, 2012

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Proceedings of the Workshop on Knudsen Effusion Mass Spectrometry
Juelich, Germany, April 23 - 25, 2012

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Volume 68—Glasgow, Scotland

from the ECS Glasgow meeting, July 26-July 31, 2015

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Vol. 68 No. 1 **Solid Oxide Fuel Cells XIV (SOFC-XIV)**
Editors: Singhal, Eguchi
CD-ROM..... M $215.00, NM $269.00
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Vol. 68 No. 2 **Batteries**
Editors: Bruce, Grey, Freunberger, Xiao
PDF..... M $TBD, NM $TBD

Vol. 68 No. 3 **Low-Temperature Fuel Cells, Electrolyzers, and Redox Flow Cells**
Editors: Jones, Schmidt, Herranz, Gasteiger
PDF..... M $TBD, NM $TBD

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A01: Joint General Session: Batteries and Energy Storage and Fuel Cells

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G02: Semiconductor Cleaning Science and Technology 14 (SCST 14)

		Sunday, October 11		Monday, October 12		
Code	**Technical Symposium**	**AM**	**PM**	**AM**	**PM**	
A01	**Joint General Session: Batteries and Energy Storage-and-Fuel Cells, Electrolytes, and Energy Conversion** B. Y. Liaw, K.M. Abraham, A. Manivannan, S. R. Narayanan, D. Wang *Battery, Energy Technology*			**Abst 1-7** PCC, 106-A, 1st Floor	**Abst 8-13** PCC, 106-A, 1st Floor	
A02	**Batteries-Theory, Modeling, and Simulation** Y. Qi, A. Van der Ven, P. B. Balbuena *Battery*				**Abst 144-148** PCC, 101-B, 1st Floor	
A03	**Batteries Beyond Lithium-Ion** D. A. Steingart, V. Thangadurai, V. Kalra, Y. Xing, V. Di Noto *Battery, Energy Technology*	**Abst 204-217** Hyatt, Phoenix East, 2nd Floor **Abst 218-232** Hyatt, Phoenix West, 2nd Floor		**Abst 233-239** PCC, 102-C, 1st Floor	**Abst 240-247** PCC, 102-C, 1st Floor	
A04	**Battery Safety** D. H. Doughty, G. G. Botte, C. J. Orendorff *Battery, Industrial Electrochemistry and Electrochemical Engineering*					
A05	**Electrolytes and Electrochemical Interfaces in Energy Storage Systems** B. L. Lucht, T. R. Jow, R. Kostecki, D. Guyomard, A. M. Herring, V. Di Noto *Battery, Energy Technology*				**Abst 356-360** PCC, 101-A, 1st Floor	
A06	**High-Energy Li-Ion Intercalation Materials** S. Meng, G. Koenig, W.-S. Yoon *Battery*				**Abst 432-437** PCC, 105-A, 1st Floor	
A07	**Intermetallic Anodes** K. Edstrom, D. Wang, V. Di Noto *Battery*					
A08	**Materials and Cell Designs for Flexible Energy Storage and Conversion Devices** G. Yu, J. Xiao, M. A. Allen, J. St-Pierre, J. Wu *Battery, Energy Technology*					
A09	**Recent Advances in Supercapacitors** V. Kalra, O. M. Leonte, A. Manivannan, R. Kostecki *Energy Technology, Battery, Dielectric Science and Technology*			**Abst 555-563** PCC, 103-A, 1st Floor	**Abst 564-569** PCC, 103-A, 1st Floor	

	Tuesday October 13		Wednesday, October 14		Thursday, October 15	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
	Abst 14-24 PCC, 106-B, 1st Floor **Abst 25-34** PCC, 106-A, 1st Floor	**Abst 35-40** PCC, 106-B, 1st Floor **Abst 45-55** PCC, 106-A, 1st Floor **Abst 104** PCC, 106-B, 1st Floor **Posters 56-82** PCC, West Hall 1, Lower Level	**Abst 83-92** PCC, 106-B, 1st Floor **Abst 93-103** PCC, 106-A, 1st Floor	**Abst 105-110** PCC, 106-B, 1st Floor **Abst 111-121** PCC, 106-A, 1st Floor **Abst 41-44** PCC, 106-B, 1st Floor	**Abst 122-132** PCC, 106-A, 1st Floor	**Abst 133-143** PCC, 106-A, 1st Floor
	Abst 149-157 PCC, 101-B, 1st Floor	**Abst 158-165** PCC, 101-B, 1st Floor **Posters 166-174** PCC, West Hall 1, Lower Level	**Abst 175-183** PCC, 101-B, 1st Floor	**Abst 184-189** PCC, 101-B, 1st Floor	**Abst 190-197** PCC, 101-B, 1st Floor	**Abst 198-203** PCC, 101-B, 1st Floor
	Abst 248-266 PCC, 102-C, 1st Floor	**Posters 267-300** PCC, West Hall 1, Lower Level	**Abst 301-312** PCC, 102-C, 1st Floor	**Abst 313-318** PCC, 102-C, 1st Floor	**Abst 319-335** PCC, 102-C, 1st Floor	
	Abst 336-340 Hyatt, Remington A, 2nd Floor **Abst 341-344** Hyatt, Remington A, 2nd Floor	**Abst 345-349** Hyatt, Remington A, 2nd Floor	**Abst 350-355** Hyatt, Remington A, 2nd Floor			
	Abst 361-371 PCC, 101-A, 1st Floor	**Abst 372-381** PCC, 101-A, 1st Floor	**Abst 382-389** PCC, 101-A, 1st Floor	**Abst 390-401** PCC, 101-A, 1st Floor **Posters 402-408** PCC, West Hall 1, Lower Level	**Abst 409-419** PCC, 101-A, 1st Floor	**Abst 420-431** PCC, 101-A, 1st Floor
	Abst 438-447 PCC, 105-A, 1st Floor	**Abst 448-457** PCC, 105-A, 1st Floor **Posters 458-469** PCC, West Hall 1, Lower Level	**Abst 470-479** PCC, 105-A, 1st Floor	**Abst 480-489** PCC, 105-A, 1st Floor	**Abst 490-499** PCC, 105-A, 1st Floor	**Abst 500-503** PCC, 105-A, 1st Floor **Abst 504-509** PCC, 105-A, 1st Floor
			Abst 511-526 Hyatt, Russell B, 2nd Floor			
		Abst 527-533 PCC, 213-B, 2nd Floor **Posters 534-538** PCC, West Hall 1, Lower Level	**Abst 539-546** PCC, 213-B, 2nd Floor	**Abst 547-554** PCC, 213-B, 2nd Floor		
	Abst 570-580 PCC, 103-A, 1st Floor	**Abst 581-590** PCC, 103-A, 1st Floor **Posters 591-595** PCC, West Hall 1, Lower Level				

		Sunday, October 11		Monday, October 12		
Code	**Technical Symposium**	**AM**	**PM**	**AM**	**PM**	
B01	**Carbon Nanostructures: Fullerenes to Graphene** R. B. Weisman, P. J. Kulesza, V. Di Noto *Nanocarbons, Dielectric Science and Technology, Physical and Analytical Electrochemistry*					
C01	**Corrosion General Poster Session** R. Buchheit, S. Virtanen *Corrosion*					
C02	**Coating and Surface Modification for Corrosion Protection** H. N. McMurray, S. Fujimoto *Corrosion*					
C03	**Contemporary Aspects of Corrosion and Protection of Magnesium and Its Alloys** S.Virtanen, N. Birbilis *Corrosion*					
C05	**Critical Factors in Localized Corrosion 8** S. Fujimoto, G. Frankel, E. Tada, J. Kish *Corrosion*			**Abst 672-680** PCC, 102-A, 1st Floor	**Abst 681** PCC, 102-A, 1st Floor **Abst 682-684** PCC, 102-A, 1st Floor	
C06	**Pits & Pores 6: Nanomaterials-In Memory of Yukio H. Ogata** P. Granitzer, R. Boukherroub, D. J. Lockwood, H. Masuda *Corrosion, Luminescence and Display Materials*			**Abst 717** PCC, 102-B, 1st Floor **Abst 718-721** PCC, 102-B, 1st Floor	**Abst 722-726** PCC, 102-B, 1st Floor	
D02	**Nonvolatile Memories** S. Shingubara, Z. Karim, B. Magyari-Kope, H. Shima, Takasumi Ohyanagi, H. Kubota, J.-G. Park, K. Kobayashi, L. Goux, G Bersuker *Dielectric Science and Technology*					
D03	**Photovoltaics for the 21st Century 11** M. Tao, H. Hamada, T. Druffel, C. Claeys, L. Deligianni, J. M. Fenton, J.-G. Park, K. Rajeshwar *Dielectric Science and Technology, Electrodeposition, Electronics and Photonics, Energy Technology, Industrial Electrochemistry and Electrochemical Engineering, Physical and Analytical Electrochemistry*					
D04	**Semiconductors, Dielectrics, and Metals for Nanoelectronics 13** S. Kar, M. Houssa, K. Kita, D. Landheer, S. Van Elshocht, D. Misra, S. A. Dayeh *Dielectric Science and Technology, Electronics and Photonics*			**Abst 812-818** PCC, 105-B, 1st Floor	**Abst 819-820** PCC, 105-B, 1st Floor **Abst 821** PCC, 105-B, 1st Floor	

	Tuesday October 13		Wednesday, October 14		Thursday, October 15	
	AM	PM	AM	PM	AM	PM
			Abst 596-605 Hyatt, Borein B, 2nd Floor	**Abst 606-616** Hyatt, Borein B, 2nd Floor **Poster 617** PCC, West Hall 1, Lower Level		
				Posters 618-630 PCC, West Hall 1, Lower Level		
			Abst 631-642 PCC, 102-A, 1st Floor	**Abst 643-653** PCC, 102-A, 1st Floor		
			Abst 654-662 Hyatt, Russell A, 2nd Floor	**Abst 663-671** Hyatt, Russell A, 2nd Floor		
	Abst 685-695 PCC, 102-A, 1st Floor	**Abst 696-697** PCC, 102-A, 1st Floor **Abst 698-700** PCC, 102-A, 1st Floor **Abst 701-706** PCC, 102-A, 1st Floor			**Abst 707-716** PCC, 102-A, 1st Floor	
	Abst 727-730 PCC, 102-B, 1st Floor **Abst 731-734** PCC, 102-B, 1st Floor	**Abst 735-738** PCC, 102-B, 1st Floor **Abst 739-743** PCC, 102-B, 1st Floor **Posters 744-745** PCC, West Hall 1, Lower Level	**Abst 746-750** PCC, 102-B, 1st Floor **Abst 751-755** PCC, 102-B, 1st Floor	**Abst 756-760** PCC, 102-B, 1st Floor		
			Abst 761-763 Hyatt, Curtis B, 2nd Floor **Abst 764-768** Hyatt, Curtis B, 2nd Floor	**Abst 769-772** Hyatt, Curtis B, 2nd Floor **Posters 773-774** PCC, West Hall 1, Lower Level	**Abst 775-777** Hyatt, Curtis B, 2nd Floor **Abst 778-781** Hyatt, Curtis B, 2nd Floor	**Abst 782-786** Hyatt, Curtis B, 2nd Floor
	Abst 787-790 Hyatt, Ellis West, 2nd Floor **Abst 791-793** Hyatt, Ellis West, 2nd Floor	**Abst 794-796** Hyatt, Ellis West, 2nd Floor **Abst 797-799** Hyatt, Ellis West, 2nd Floor **Posters 800-804** PCC, West Hall 1, Lower Level	**Abst 805-808** Hyatt, Ellis West, 2nd Floor **Abst 809-811** Hyatt, Ellis West, 2nd Floor			
	Abst 822-824 PCC, 105-B, 1st Floor **Abst 825-831** PCC, 105-B, 1st Floor	**Abst 832-836** PCC, 105-B, 1st Floor **Abst 837-841** PCC, 105-B, 1st Floor	**Abst 842-849** PCC, 105-B, 1st Floor	**Abst 850-856** PCC, 105-B, 1st Floor **Posters 857-860** PCC, West Hall 1, Lower Level		

		Sunday, October 11		Monday, October 12		
Code	**Technical Symposium**	**AM**	**PM**	**AM**	**PM**	
D05	**Processing Materials of 3D Interconnects, Damascene and Electronics Packaging 7** K. Kondo, S. Mathad, R. Akolkar, W.-P. Dow, H. Philipsen, M. Hayase, M. Koyanagi, Y. Kaneko, F. Roozeboom *Electronics and Photonics, Dielectric Science and Technology*			**Abst 861-862** Hyatt, Borein A, 2nd Floor **Abst 863-866** Hyatt, Borein A, 2nd Floor	**Abst 867-871** Hyatt, Borein A, 2nd Floor	
E01	**Current Trends in Electrodeposition-An Invited Symposium** C. Bonhôte *Electrodeposition*					
E02	**Fundamentals of Electrochemical Growth and Surface Limited Deposition** S. Brankovic, J. L. Stickney, N. Vasiljevic, N. Dimitrov *Electrodeposition, Physical and Analytical Electrochemistry*					
E03	**Novel Design and Electrodeposition Modalities 2** E. J. Podlaha-Murphy, Q. Huang *Electrodeposition*					
E04	**Semiconductors, Metal Oxides, and Composites: Metallization and Electrodeposition of Thin Films and Nanostructures 3** J. Fransaer, P. M. Vereecken, G. Oskam *Electrodeposition*					
F01	**Electrochemical Engineering General Session** V. Subramanian, V. K. Ramani *Industrial Electrochemistry and Electrochemical Engineering*			**Abst 950-957** Hyatt, Remington A, 2nd Floor	**Abst 958-963** Hyatt, Remington A, 2nd Floor	
F03	**Membrane-based Electrochemical Separations** H. Xu, J. A. Staser, T. M. Gur *Energy Technology, High Temperature Materials, Industrial Electrochemistry and Electrochemical Engineering, Physical and Analytical Electrochemistry*					
G01	**Atomic Layer Deposition Applications 11** F. Roozeboom, J. W. Elam, A. Londergan, O. van der Straten, A. Delabie, S. De Gendt *Electronics and Photonics, Dielectric Science and Technology*					

	Tuesday October 13		Wednesday, October 14		Thursday, October 15	
	AM	PM	AM	PM	AM	PM
	Abst 872-874 Hyatt, Borein A, 2nd Floor **Abst 875-877** Hyatt, Borein A, 2nd Floor	**Abst 878-879** Hyatt, Borein A, 2nd Floor **Abst 880-882** Hyatt, Borein A, 2nd Floor				
				Abst 883-886 PCC, 103-A, 1st Floor		
	Abst 887-889 Hyatt, Russell A, 2nd Floor **Abst 890-894** Hyatt, Russell A, 2nd Floor	**Abst 895-900** Hyatt, Russell A, 2nd Floor **Posters 901-902** PCC, West Hall 1, Lower Level				
	Abst 903-909 Hyatt, Russell B, 2nd Floor	**Abst 910-915** Hyatt, Russell B, 2nd Floor		**Posters 916-918** PCC, West Hall 1, Lower Level		
			Abst 919-923 PCC, 103-A, 1st Floor	**Posters 924-934** PCC, West Hall 1, Lower Level	**Abst 935-938** PCC, 103-A, 1st Floor **Abst 939-941** PCC, 103-A, 1st Floor	**Abst 942-946** PCC, 103-A, 1st Floor **Abst 947-949** PCC, 103-A, 1st Floor
	Abst 964-973 PCC, 213-A, 2nd Floor			**Posters 974-975** PCC, West Hall 1, Lower Level		
	Abst 976-977 Hyatt, Phoenix East, 2nd Floor **Abst 978-982** Hyatt, Phoenix East, 2nd Floor	**Abst 983-986** Hyatt, Phoenix East, 2nd Floor **Abst 987-988** Hyatt, Phoenix East, 2nd Floor	**Abst 989** Hyatt, Phoenix East, 2nd Floor **Abst 990-994** Hyatt, Phoenix East, 2nd Floor	**Abst 995-997** Hyatt, Phoenix East, 2nd Floor **Abst 998-999** Hyatt, Phoenix East, 2nd Floor **Posters 1000-1004** PCC, West Hall 1, Lower Level	**Abst 1005-1007** Hyatt, Phoenix East, 2nd Floor **Abst 1008-1010** Hyatt, Phoenix East, 2nd Floor	

		Sunday, October 11		Monday, October 12	
Code	**Technical Symposium**	**AM**	**PM**	**AM**	**PM**
G02	**Semiconductor Cleaning Science and Technology 14 (SCST 14)** T. Hattori, J. Ruzyllo, P. W. Mertens, R. E. Novak *Electronics and Photonics*			**Abst 1011** PCC, 104-A, 1st Floor **Abst 1012-1015** PCC, 104-A, 1st Floor	**Abst 1016-1018** PCC, 104-A, 1st Floor **Abst 1019-1022** PCC, 104-A, 1st Floor
G03	**Thermoelectric and Thermal Interface Materials 2** C. O'Dwyer, J.-H. He, K. M. Razeeb, R. Chen *Electronics and Photonics, High Temperature Materials*				
G04	**ULSI Process Integration 9** C. Claeys, C. Huffman *Electronics and Photonics*			**Abst 1072-1075** PCC, 103-B, 1st Floor	**Abst 1076-1079** PCC, 103-B, 1st Floor
G05	**GaN & SiC Power Technologies 5** K. Shenai, M. Dudley, N. Ohtani, M. Bakowski *Electronics and Photonics, Dielectric Science and Technology*			**Abst 1110-1112** Hyatt, Ellis East, 2nd Floor	**Abst 1113-1116** Hyatt, Ellis East, 2nd Floor
H01	**Low-Dimensional Nanoscale Electronic and Photonic Devices 8** Y.-L. Chueh, C. O'Dwyer, M. Suzuki, S. Jin, S.-W. Kim, J.-H. He, J. C. Ho, Z. Fan, Q. Li, G. W. Hunter, K. Takei *Electronics and Photonics, Dielectric Science and Technology, Sensor*			**Abst 1136-1141** PCC, 105-C, 1st Floor	**Abst 1142-1169** PCC, 105-C, 1st Floor
H02	**Solid-State Electronics and Photonics in Biology and Medicine 2** Y.-L. Wang, A. Hoff, M. J. Deen, Z. Pascual Aguilar, L. F. Marsal *Electronics and Photonics, Sensor*			**Abst 1183-1189** Hyatt, Ellis West, 2nd Floor	**Abst 1190-1193** Hyatt, Ellis West, 2nd Floor **Abst 1194-1197** Hyatt, Ellis West, 2nd Floor
H03	**State-of-the-Art Program on Compound Semiconductors 58 (SOTAPOCS 58)** J.-H. He, C. O'Dwyer, F. Ren, E. A. Douglas, C. Jagadish, S. Jang, Y.-L. Wang, R. P. Lynch, T. J. Anderson, J. K. Hite *Electronics and Photonics*			**Abst 1201-1206** Hyatt, Curtis A, 2nd Floor	**Abst 1207-1209** Hyatt, Curtis A, 2nd Floor
I02	**Harnessing Multi-Step Electrochemical Reactions for Energy Conversion and Storage** S. R. Narayanan, S. Mukerjee *Energy Technology, Physical and Analytical Electrochemistry*			**Abst 1230-1239** Hyatt, Remington C, 2nd Floor	
I03	**High Temperature Experimental Techniques and Measurements 2** T. Markus, R. A. Walker, G. S. Jackson *High Temperature Materials*			**Abst 1242-1246** Hyatt, Remington B, 2nd Floor	**Abst 1247-1250** Hyatt, Remington B, 2nd Floor

	Tuesday October 13		Wednesday, October 14		Thursday, October 15	
	AM	PM	AM	PM	AM	PM
	Abst 1023-1026 PCC, 104-A, 1st Floor	**Abst 1027-1033** PCC, 104-A, 1st Floor **Abst 1034-1037** PCC, 104-A, 1st Floor **Posters 1038-1044** PCC, West Hall 1, Lower Level	**Abst 1045-1052** PCC, 104-A, 1st Floor			
	Abst 1053-1058 Hyatt, Remington C, 2nd Floor	**Abst 1059-1062** Hyatt, Remington C, 2nd Floor	**Abst 1063-1068** Hyatt, Remington C, 2nd Floor	**Abst 1069-1071** Hyatt, Remington C, 2nd Floor		
	Abst 1080-1083 PCC, 103-B, 1st Floor **Abst 1084-1087** PCC, 103-B, 1st Floor	**Abst 1088-1092** PCC, 103-B, 1st Floor **Abst 1093-1097** PCC, 103-B, 1st Floor	**Abst 1098-1100** PCC, 103-B, 1st Floor **Abst 1101-1103** PCC, 103-B, 1st Floor	**Abst 1104-1108** PCC, 103-B, 1st Floor **Poster 1109** PCC, West Hall 1, Lower Level		
	Abst 1117-1118 Hyatt, Ellis East, 2nd Floor **Abst 1119-1122** Hyatt, Ellis East, 2nd Floor	**Abst 1123-1124** Hyatt, Ellis East, 2nd Floor **Abst 1125-1126** Hyatt, Ellis East, 2nd Floor	**Abst 1127-1128** Hyatt, Ellis East, 2nd Floor **Abst 1129-1132** Hyatt, Ellis East, 2nd Floor	**Abst 1133-1135** Hyatt, Ellis East, 2nd Floor		
	Abst 1146-1149 PCC, 105-C, 1st Floor **Abst 1150-1153** PCC, 105-C, 1st Floor	**Abst 1154-1157** PCC, 105-C, 1st Floor **Abst 1158-1162** PCC, 105-C, 1st Floor **Posters 1163-1165** PCC, West Hall 1, Lower Level	**Abst 1145-1170** PCC, 105-C, 1st Floor **Abst 1171-1174** PCC, 105-C, 1st Floor	**Abst 1175-1178** PCC, 105-C, 1st Floor **Abst 1179-1182** PCC, 105-C, 1st Floor		
				Posters 1198-1200 PCC, West Hall 1, Lower Level		
	Abst 1210-1214 Hyatt, Curtis A, 2nd Floor	**Abst 1215-1220** Hyatt, Curtis A, 2nd Floor **Poster 1221** PCC, West Hall 1, Lower Level	**Abst 1222-1225** Hyatt, Curtis A, 2nd Floor **Abst 1226-1229** Hyatt, Curtis A, 2nd Floor			
				Poster 1240 PCC, West Hall 1, Lower Level		
		Posters 1251-1253 PCC, West Hall 1, Lower Level				

		Sunday, October 11		Monday, October 12		
Code	**Technical Symposium**	**AM**	**PM**	**AM**	**PM**	
I04	**Ionic Conducting Oxide Thin Films** E. Traversa, T. M. Gur, C. R. Kreller, V. Thangadurai *High Temperature Materials*					
I05	**Polymer Electrolyte Fuel Cells 15 (PEFC 15)** H. A. Gasteiger, A. Z. Weber, V. K. Ramani, T. F. Fuller, R. A. Mantz, H. Uchida, F. N. Büchi, M. Edmundson, C. Coutanceau, J. M. Fenton, S. Mitsushima, T. J. Schmidt, K. Shinohara, K. Swider-Lyons, Deborah J. Jones, B. S. Pivovar, K. E. Ayers, K. A. Perry, S. R. Narayanan, P. Strasser *Energy Technology, Battery, Industrial Electrochemistry and Electrochemical Engineering, Physical and Analytical Electrochemistry*	**Abst 1274-1282** Hyatt, Regency A, 1st Floor	**Abst 1283-1291** Hyatt, Regency D, 1st Floor **Abst 1292-1302** Hyatt, Regency A, 1st Floor	**Abst 1303-1306** PCC, PCC, 211-A+B, 2nd Floor	**Abst 1307-1311** PCC, PCC, 211-A+B, 2nd Floor	
J01	**Physics and Chemistry of Luminescent Materials** A. A Setlur, M. Raukas, R.-J. Xie, J. Collins, R.-S. Liu *Luminescence and Display Materials*			**Abst 1565-1570** Hyatt, Phoenix West, 2nd Floor		
L01	**Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry General Session** P. J. Kulesza *Physical and Analytical Electrochemistry*			**Abst 1596-1603** Hyatt, Borein B, 2nd Floor	**Abst 1604-1609** Hyatt, Borein B, 2nd Floor	
L03	**Electroactive and Redox Active Polymers** J. Jiang, A. M. Herring *Physical and Analytical Electrochemistry, Energy Technology*					
L04	**Electrode Processes 10** A. C. Hillier, L. A .Diaz, J. St-Pierre *Physical and Analytical Electrochemistry, Energy Technology, Industrial Electrochemistry and Electrochemical Engineering*					
L05	**Nanoscale Electrochemistry** T. Ito, A. Kusoglu *Physical and Analytical Electrochemistry, Energy Technology*					

	Tuesday October 13		Wednesday, October 14		Thursday, October 15	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
	Abst 1254-1255 Hyatt, Remington B, 2nd Floor **Abst 1256-1259** Hyatt, Remington B, 2nd Floor	**Abst 1260-1264** Hyatt, Remington B, 2nd Floor	**Abst 1265-1266** Hyatt, Remington B, 2nd Floor **Abst 1267-1272** Hyatt, Remington B, 2nd Floor	**Poster 1273** PCC, West Hall 1, Lower Level		
	Abst 1312-1316 PCC, 212-B, 2nd Floor **Abst 1317-1325** PCC, 212-C, 2nd Floor **Abst 1326-1336** PCC, 211-A, 2nd Floor **Abst 1337-1343** PCC, 212-A, 2nd Floor **Abst 1344-1349** PCC, 211-B, 2nd Floor **Abst 1350-1353** PCC, 212-B, 2nd Floor	**Abst 1354-1360** PCC, 211-B, 2nd Floor **Abst 1361-1366** PCC, 212-B, 2nd Floor **Abst 1367-1376** PCC, 211-A, 2nd Floor **Abst 1377-1385** PCC, 212-A, 2nd Floor **Abst 1386-1420** PCC, 212-C, 2nd Floor **Posters 1393-1431** PCC, West Hall 1, Lower Level	**Abst 1432-1441** PCC, 211-A, 2nd Floor **Abst 1442-1451** PCC, 212-A, 2nd Floor **Abst 1452-1461** PCC, 213-A, 2nd Floor **Abst 1462-1470** PCC, 212-C, 2nd Floor **Abst 1471-1476** PCC, 211-B, 2nd Floor **Abst 1477-1481** PCC, 212-B, 2nd Floor	**Abst 1482-1490** PCC, 211-B, 2nd Floor **Abst 1491-1497** PCC, 212-C, 2nd Floor **Abst 1498-1508** PCC, 211-A, 2nd Floor **Abst 1509-1512** PCC, 212-A, 2nd Floor **Abst 1513-1522** PCC, 213-A, 2nd Floor **Abst 1523-1526** PCC, 212-A, 2nd Floor	**Abst 1527-1535** PCC, 211-A, 2nd Floor **Abst 1536-1541** PCC, 211-B, 2nd Floor **Abst 1542-1546** PCC, 212-A, 2nd Floor	**Abst 1547-1556** PCC, 211-B, 2nd Floor **Abst 1557-1564** PCC, 211-A, 2nd Floor
	Abst 1571-1578 Hyatt, Phoenix West, 2nd Floor	**Abst 1579-1584** Hyatt, Phoenix West, 2nd Floor **Posters 1585-1587** PCC, West Hall 1, Lower Level	**Abst 1588-1590** Hyatt, Phoenix West, 2nd Floor	**Abst 1591-1595** Hyatt, Phoenix West, 2nd Floor		
	Abst 1610-1613 Hyatt, Borein B, 2nd Floor **Abst 1614-1621** Hyatt, Borein B, 2nd Floor	**Abst 1622-1630** Hyatt, Borein B, 2nd Floor		**Posters 1631-1638** PCC, West Hall 1, Lower Level		
			Abst 1639-1640 Hyatt, Russell C, 2nd Floor **Abst 1641-1644** Hyatt, Russell C, 2nd Floor	**Abst 1645-1647** Hyatt, Russell C, 2nd Floor **Abst 1648-1651** Hyatt, Russell C, 2nd Floor **Posters 1652-1653** PCC, West Hall 1, Lower Level		
	Abst 1654-1665 PCC, 213-B, 2nd Floor					
	Abst 1666-1679 Hyatt, Russell C, 2nd Floor	**Poster 1680** PCC, West Hall 1, Lower Level				

		Sunday, October 11		Monday, October 12		
Code	**Technical Symposium**	**AM**	**PM**	**AM**	**PM**	
L06	**Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 6** N. Wu, E. L. Miller, A. Manivannan, D. Chu, H. N. Dinh, P. J. Kulesza, H. Wang, J. J. Lee *Energy Technology, Physical and Analytical Electrochemistry, Sensor*	**Abst 1681-1682** Hyatt, Regency C, 1st Floor	**Abst 1683-1685** Hyatt, Regency C, 1st Floor		**Abst 1686-1690** PCC, 104-B, 1st Floor	
L07	**Physical and Analytical Electrochemistry in Ionic Liquids 4** P. C. Trulove, R. A. Mantz, H. C. De Long, M. T. Carter, E. J. Biddinger, W. Xu *Physical and Analytical Electrochemistry, Battery, Industrial Electrochemistry and Electrochemical Engineering, Sensor*					
M01	**Sensors, Actuators, and Microsystems General Session** N. Wu, M. T. Carter, R. Mukundan, L. A. Nagahara, G. W. Hunter, B. A. Chin *Sensor*					
M03	**Sensors for Agriculture** B. A. Chin, A. Simonian, S. Mitra, P. Hesketh, Y. Chai *Sensor*			**Abst 1815-1823** Hyatt, Phoenix East, 2nd Floor		
Z01	**General Student Poster Session** V. Subramanian, V. Chaitanya, K. B. Sundaram, P. Pharkya *All Divisions*					
Z02	**Nanotechnology General Session** O. M Leonte, M. K. Sunkara *All Divisions, Interdisciplinary Science and Technology Subcommittee*					
Z03	**Impedance Technologies, Diagnostics, and Sensing Applications** P. Vanýsek, V. Lvovich, M. E. Orazem, M. Itagaki *Physical and Analytical Electrochemistry, Corrosion, Industrial Electrochemistry and Electrochemical Engineering, Sensor*					
Z04	**Electrochemical Energy Summit (E2S)** D. Scherson, K. Rajeshwar, A. Z. Weber *All Divisions*			**Abst 1947** PCC, 101 A+B+C, 1st Floor **Abst 1948-1950** PCC, 101 A+B+C, 1st Floor **Abst 1951-1953** PCC, 101 A+B+C, 1st Floor	**Abst 1954-1955** PCC, 101 A+B+C, 1st Floor	

	Tuesday October 13		Wednesday, October 14		Thursday, October 15	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
	Abst 1691-1693 PCC, 104-B, 1st Floor **Abst 1694-1697** PCC, 104-B, 1st Floor	**Abst 1698-1700** PCC, 104-B, 1st Floor **Abst 1701-1703** PCC, 104-B, 1st Floor **Abst 1704** PCC, 104-B, 1st Floor	**Abst 1705-1711** PCC, 104-B, 1st Floor	**Abst 1712-1714** PCC, 104-B, 1st Floor **Abst 1715-1720** PCC, 104-B, 1st Floor **Posters 1721-1736** PCC, West Hall 1, Lower Level	**Abst 1737-1744** PCC, 104-B, 1st Floor	**Abst 1745-1751** PCC, 104-B, 1st Floor
			Abst 1752-1763 Hyatt, Borein A, 2nd Floor	**Posters 1764-1765** PCC, West Hall 1, Lower Level		
	Abst 1766-1773 PCC, 106-C, 1st Floor	**Abst 1774-1781** PCC, 106-C, 1st Floor **Posters 1782-1792** PCC, West Hall 1, Lower Level	**Abst 1793-1796** PCC, 106-C, 1st Floor **Abst 1797-1802** PCC, 106-C, 1st Floor	**Abst 1803-1807** PCC, 106-C, 1st Floor **Abst 1808-1814** PCC, 106-C, 1st Floor		
		Posters 1824-1843 PCC, West Hall 1, Lower Level				
		Posters 1844-1924 PCC, West Hall 1, Lower Level				
				Abst 1925-1933 Hyatt, Remington B, 2nd Floor **Poster 1934** PCC, West Hall 1, Lower Level		
				Abst 1935-1944 Hyatt, Borein A, 2nd Floor **Posters 1945** PCC, West Hall 1, Lower Level		
	Abst 1956-1960 PCC, 101-C, 1st Floor **Abst 1961-1964** PCC, 101-C, 1st Floor	**Abst 1965-1968** PCC, 101-C, 1st Floor	**Abst 1969-1973** PCC, 101-C, 1st Floor **Abst 1974-1977** PCC, 101-C, 1st Floor			

Technical Sessions

Sunday, October 11

Highlight

1730h..... Sunday Evening Get Together, The Atrium, Hyatt Regency

A03 Batteries Beyond Lithium-Ion

Battery / Energy Technology

Phoenix East, Hyatt Regency

Metal Anode Systems – 09:30 – 16:20
Co-Chairs: Daniel A. Steingart, Venkataraman Thangadurai, Yangchuan Xing, and Vito Di Noto

09:30 **204** Investigation of Silver Oxide Electrochemical Behavior to Improve Silver-Zinc Battery Rechargeability – J. V. Ortega, R. E. Dueber, and T. W. Renkin (ZPower)

09:50 **205** A Modified Electrolyte for a Rechargeable Manganese-Zinc Alkaline Cell – B. J. Hertzberg (EOS Energy Storage LLC), D. A. Steingart (Princeton University), M. Chamoun (Stockholm University), A. Hsieh (Princeton University), G. Davies (MAE/ACEE Princeton University), A. Huang (University of California, San Diego), and S. Meng (University of California San Diego)

10:10 **206** Reduction of Dendrite Formation in Zn Electrodes By Controlled Pulse Electrodeposition – G. Garcia (Ruhr-University Bochum), E. Ventosa (University of Bochum), and W. Schuhmann (Ruhr-University Bochum)

10:30 **207** Delving into the Properties of Non-Aqueous Zn Electrolytes and Reversible Intercalation Chemistry for Zn Metal Batteries – S. D. Han, P. Senguttuvan (Argonne National Laboratory), N. N. Rajput, X. Qu (Lawrence Berkeley National Laboratory), B. Pan, M. Ferrandon, S. Tepavcevic, C. Liao (Argonne National Laboratory), K. A. Persson (Lawrence Berkeley National Laboratory), C. Johnson, and A. K. Burrell (Argonne National Laboratory)

10:50 Break

11:10 **208** Charge-Discharge Behavior of Zinc Electrodes in Alkaline Electrolytes with Water-Organic Mixed Solvents – A. Nakata, T. Kakeya, M. Ono, H. Arai, and Z. Ogumi (Kyoto University)

11:30 **209** Towards Realizing Wearable Batteries: Dual Ion Prussian Blue Analog/Zinc Battery Architecture with Long Cycle Life and High Energy Efficiency – T. Gupta, A. Kim, S. Biswas, and D. A. Steingart (Princeton University)

11:50 **210** Factors Affecting Rechargeability of Zinc Electrodes Evaluated By in Situ analysis – H. Arai, A. Nakata, M. Ono, T. Kakeya, T. Yamane, K. Fukuda, H. Tanida, M. Murakami, Y. Uchimoto, and Z. Ogumi (Kyoto University)

12:10 Lunch

13:40 **211** A Prototype Rechargeable Aluminum Battery – J. Guo, L. Geng (University of California, Riverside), G. Lv, and X. Xing (China University of Geosciences, Beijing)

14:00 **212** Investigation of Conversion Positive Electrode Active Materials for the Aluminum Rechargeable Battery – M. Chiku, T. Kunisawa, E. Higuchi, and H. Inoue (Osaka Prefecture University)

14:20 **213** Polymer Gel Membranes for Aluminum Deposition and Rechargeable Aluminum Ion Batteries – X. G. Sun (Oak Ridge National Laboratory), Y. Fang (Department of Chemistry, University of Tennessee), K. Yoshii (Keio University), and S. Dai (Oak Ridge National Laboratory, Department of Chemistry, University of Tennessee)

14:40 **214** Alkaline Earth Metals As Anode for High Energy Rechargeable Fluoride Ion Batteries – T. D. Tho and M. Fichtner (Karlsruhe Institute of Technology (KIT), Germany)

15:00 Break

15:20 **215** Interface Engineering of Next Generation Lithium Metal Anodes Using Atomic Layer Deposition – M. Noked, A. C. Kozen, A. J. Pearse, M. A. Schroeder (University of Maryland), C. F. Lin (Institute for Systems Research), L. Hu (University of Maryland, college park), S. B. Lee (Department of Chemistry), and G. W. Rubloff (Department of Materials Science and Engineering)

15:40 **216** Variational Multiscale Modeling of Charge Transport in Li Metal Battery – M. Moradi and L. Liu (The University of Kansas)

16:00 **217** Ionic Liquid Containing Solid Polymer Electrolytes for Lithium Metal Batteries – R. Jakelski, M. Winter, and P. Bieker (MEET Battery Research Center, University of Muenster)

Phoenix West, Hyatt Regency
Sodium Ion Batteries – 09:30 – 16:40
Co-Chairs: Daniel A. Steingart, Venkataraman Thangadurai, Yangchuan Xing, and Vito Di Noto

09:30 **218** A Novel Titanate As Anode Material for Sodium Ion Batteries – X. Ma and H. Chen (Georgia Institute of Technology)

09:50 **219** High Performance P2-Type $Na_{2/3}(Mn_{1/2}Fe_{1/4}Co_{1/4})O_2$ Cathode Material with Superior Rate Capability for Na-Ion Batteries – L. Liu, X. Li, S. H. Bo, Y. Wang (Massachusetts Institute of Technology), H. Chen (Georgia Institute of Technology), N. Twu, D. Wu, and G. Ceder (Massachusetts Institute of Technology)

10:10 **220** An Investigation of Na_1-XLi_{2x} $MnyNizO_d$ Compounds for High Performance Sodium-Ion Batteries – B. Mendoza-Sanchez, D. Roche, B. Montigny, C. Autret, and J. Santos Pena (Université François Rabelais de Tours)

10:30 **221** New Carbon Materials with Large Closed Pore Volume As Anode for High Energy Na-Ion Batteries – A. Kano, N. Hojo, S. Ito, M. Fujimoto, and K. Nakura (Panasonic Corporation)

10:50 Break

11:10 **222** Improved Cycling Stability of Polypyrrole Coated NaTi2(PO4)3 As an Aqueous Na-Ion Anode – A. I. Mohamed (Carnegie Mellon University)

11:30 **223** Disordered Carbons As Negative Electrode Materials for Na-Ion Batteries – D. Saurel, S. Clarke, and J. Ségalini (CIC Energigune)

11:50 **224** Design & Development of Powerful Next Generation Layered Cathode Materials for Na-Ion Batteries – D. Buchholz, M. Keller, C. Vaalma, and S. Passerini (Helmholtz Institute Ulm, Karlsruhe Institute of Technology (KIT))

12:10 **225** Structural Investigation of Sodium Layered Oxides Via *in Situ* Synchrotron X-Ray Diffraction – Y. H. Jung (Korea Advanced Institute of Science and Technology), A. S. Christiansen, R. E. Johnsen, P. Norby (Technical University of Denmark), and D. K. Kim (Korea Advanced Institute of Science and Technology)

12:30 Lunch

14:20 **227** Integration of Chemical Physics and Ab Initio Models for Application to Li-Ion and Na-Ion Electrolytes – K. L. Gering and J. S. McNally (Idaho National Laboratory)

14:40 **228** Structural and Electrochemical Studies on $NaMnO_2$ for Na-Ion Batteries – K. Kubota (Tokyo University of Science, ESICB-Kyoto Univeristy), M. Miyazaki (Tokyo University of Science), and S. Komaba (Tokyo University of Science, ESICB-Kyoto University)

15:00 **229** New Layered Cathode Compounds with High Energy Density for Sodium Ion Batteries – X. Li, Y. Wang, D. Wu, L. Liu, S. Dacek, and G. Ceder (Massachusetts Institute of Technology)

15:20 Break

15:40 **230** A Nanostructured Cathode Material with Varied Chemical Composition for High Energy Density Sodium Ion Batteries – J. Y. Hwang (Hanyang University), S. T. Myung (Sejong University), K. Y. Chung (Korea Institute of Science and Technology), I. Belharouak (Qatar Environment and Energy Research Institute), and Y. K. Sun (Energy Engineering, Hanyang University, Seoul, Korea)

16:00 **231** A Novel Carbon Supported Tellurium Electrode for Lithium and Sodium Secondary Batteries – T. Koketsu, P. Strasser (Technical University Berlin), C. Wu, and Y. Huang (Huazhong University of Science and Technology)

16:20 **232** Na_2CoPO_4f As High Voltage Positive Materials for Sodium Ion Batteries – K. Chihara (ESICB-Kyoto University), K. Kubota, and S. Komaba (Tokyo University of Science, ESICB-Kyoto University)

I05 Polymer Electrolyte Fuel Cells 15 (PEFC 15)

Energy Technology / Battery / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry

Regency A, Hyatt Regency

D0-1 Non-PGM Cathode Catalysts 1 – 08:20 – 12:00
Co-Chairs: Ken-ichro Ota and Nicolas Alonso-Vante Sr.

08:20 **1274** Oxygen Reduction Durability and Activity of Tantalum Oxide-Based Electrocatalysts for Cathode of Polymer Electrolyte Fuel Cells – K. Matsuzawa (Green Hydrogen Research Center, Yokohama Nat. Univ.), A. Ishihara (IAS, Yokohama National University, Green Hydr Res Ctr, Yokohama National University), N. Uehara (Yokohama National University), Y. Fujita (Green Hydrogen Research Center, YNU), Y. Kohno (Green Hydrogen Research Center, Yokohama Nat. Univ.), M. Matsumoto (Device-functional analysis Department, NISSAN ARC Ltd.), S. Mitsushima (Institute of Advanced Sciences, Yokohama Nat. Univ., Green Hydrogen Research Center, Yokohama Nat. Univ.), H. Imai (Device-functional analysis Department, NISSAN ARC Ltd.), and K. I. Ota (Yokohama National University)

08:40 **1275** Active Sites for Oxygen Reduction Reaction in Tantalum Oxynitride Nanoparticles on Multi-Walled Carbon Nanotubes Synthesized Using Ammonia Pyrolysis – M. Chisaka (Hirosaki University), A. Ishihara (IAS, Yokohama National University), N. Uehara, and K. I. Ota (Yokohama National University)

09:00 **1276** Development of Group 4 and 5 Metal Oxide Cathode with Electron Conductive Oxide – K. I. Ota, M. Hamazaki, K. Matsuzawa, S. Mitsushima (Yokohama National University), and A. Ishihara (IAS, Yokohama National University)

09:20 **1277** Preparation of Metal Nitrogen Carbon Electrocatalysts By High Pressure Pyrolysis for Oxygen Reduction Reaction in Acid and Alkaline Media – C. Gumeci, Y. Liu, J. M. Anibal, and S. Calabrese Barton (Michigan State University)

09:40 Intermission

10:00 **1278** Combining Nitrogen Precursors in Synthesis of Non-Precious Metal ORR Catalysts with Improved Fuel Cell Performance – H. T. Chung, E. F. Holby, G. M. Purdy (Los Alamos National Laboratory), S. Komini Babu, S. Litster (Carnegie Mellon University), D. A. Cullen, K. L. More (Oak Ridge National Laboratory), and P. Zelenay (Los Alamos National Laboratory)

10:20 **1279** Solvent-Engineering of High-Performance Non-Precious Metal Catalysts – U. Martinez, J. H. Dumont, H. T. Chung (Los Alamos National Laboratory), K. Artyushkova (University of New Mexico), A. Mohite, G. Gupta, and P. Zelenay (Los Alamos National Laboratory)

10:40 **1280** Non-PGM ORR Catalyst Active-Site Screening – E. F. Holby, S. Choudhury, and P. Zelenay (Los Alamos National Laboratory)

11:00 **1281** In-Situ through-Plane Measurements of Ionic Potential Distributions in Non-Precious Metal Catalyst Electrode for PEFC – S. Komini Babu (Carnegie Mellon University), H. T. Chung, P. Zelenay (Los Alamos National Laboratory), and S. Litster (Carnegie Mellon University)

11:20 **1282** The Effect of Carbon-Based Substrates Onto Non-Precious and Precious Electrocatalytic Centers – M. U. Sreekuttan Jr. (IC2MP, UMR CNRS 7285, University of Poitiers), C. A. Campos-Roldan Jr., J. M. Mora-Hernandez Jr. (IC2MP, UMR CNRS 7285, University of Poitiers, DIMM, Instituto Politécnico Nacional), Y. Luo Jr. (IC2MP - UMR-CNRS 7285 Universite de Poitiers), L. A. Estudillo-Wong Jr. (IC2MP, UMR CNRS 7285, University of Poitiers), and N. Alonso-Vante Sr. (IC2MP - UMR-CNRS 7285 Universite de Poitiers)

D0-2 Non-PGM Cathode Catalysts 2 and New Anode Catalysts – 14:00 – 18:00
Co-Chairs: Plamen Atanassov and Piotr Zelenay

14:00 **1292** Correlating Site Density and Catalytic Activity for Non-Precious ORR Electrocatalysts – P. Strasser, N. Ranjbar, J. Steinberg (Technical University Berlin), and U. Kramm (Technical University Darmstadt)

14:20 **1293** Synthesis of Non-PGM ORR Catalysts: Control of Chemical, Morphological and Catalytic Properties – A. Serov, S. Stariha, K. Artyushkova, N. Andersen, and P. Atanassov (University of New Mexico)

14:40 **1294** Integrating Non-Platinum Group Metal Catalysts into Membrane Electrode Assemblies: Chemical Interactions and Morphology of the Catalytic Layer – K. Artyushkova, S. Stariha, I. Matanovic, S. Kabir, A. Serov, and P. Atanassov (University of New Mexico)

15:00 **1295** Non-PGM Fe-N-C Catalysts for Oxygen Reduction Reaction in Pemfcs: MEA Design and Post-Mortem Analysis – S. Stariha, A. Serov, K. Artyushkova, and P. Atanassov (University of New Mexico)

15:20 **1296** Three-Dimensional Microstructure of PEFC Electrodes: Activity and Durability – M. J. Workman, K. Artyushkova (University of New Mexico), B. Halevi (Pajarito Powder, LLC), A. Serov, and P. Atanassov (University of New Mexico)

15:40 **1297** Helox Study of Transport Limitations in Non-PGM Cathodes for PEM Fuel Cells – R. Pavlicek (Northeastern University), N. Leonard, S. Calabrese Barton (Michigan State University), and S. Mukerjee (Northeastern University)

16:00 Intermission

16:20 **1298** Enhanced CO Tolerance and Durability of PtRu/C By the Modification with Metallic Ruthenium Nanosheets – D. Takimoto (Shinshu university), Y. Ayato (Shinshu University), D. Mochizuki (Shinshu university), T. Ohnishi, and W. Sugimoto (Shinshu University)

16:40 **1299** Activity and Stability of Molybdenum-Containing Pt Catalysts for CO Tolerance in Proton Exchange Membrane Fuel Cell Anodes – E. A. Ticianelli (Instituto de Quimica de Sao Carlos- USP), A. Hassan, and R. C. Iezzi (Instituto de Quimica de Sao Carlos - USP)

17:00 **1300** Development of Platinum-Niobium As a CO Tolerant Catalyst for PEFC Operating with CO Contaminated Hydrogen – T. A. Rocha (Instituto de Quimica de Sao Carlos), F. Colmati Jr. (Universidade Federal de Goiás), E. G. Ciapina (UNESP-Campus de Guaratingueta), J. J. Linares (Universidade de Brasília), and E. R. Gonzalez (Instituto de Quimica de Sao Carlos, USP)

17:20 **1301** Selective Hydrogen Oxidation Catalyst for Reduced Startup/Shutdown Degradation in Low Temperature Fuel Cells – J. Durst, A. Orfanidi, P. J. Rheinländer, F. Hasché (Technische Universität München), C. Eickes, P. Suchsland, M. Binder (SolviCore GmbH & Co. KG), and H. A. Gasteiger (Technische Universität München)

17:40 **1302** Surface Characterization and Pt-like electrocatalytic activity of Nano-Scale Platinum Deposited on Transition Metal Carbide Nanotubes Via Atomic Layer Deposition – S. R. Saha and D. Li (University of Wyoming)

Regency D, Hyatt Regency
A0-2 Modeling – 14:00 – 18:00
Co-Chairs: Marc Secanell and Jeffrey S. Allen

14:00 **1283** Pore Network Modeling of Gas Diffusion Layer As a Support to Better Understand Water Management in Proton Exchange Membrane Fuel Cells – J. Pauchet (CEA (French Atomic and Alternative Energy Commission)), M. Prat (INPT (Institut National Polytechnique de Toulouse)), N. Belgacem, T. Agaesse (CEA), and B. Straubhaar (INPT)

14:40 **1284** Combined Pore Network and Finite Volume Modeling of Thermal and Water Transport in Porous Transport Layers of PEM Fuel Cells Using Openfoam – J. G. Pharoah (Queen's University), A. French (Queens University), V. Konduru, E. Medici, and J. S. Allen (Michigan Technological University)

15:00 **1285** Theoretical Analysis of Relationship Between Porous Electrode Structure and Mass Transfer Performance for PEFCs By Direct Measurement and Simulation – G. Inoue, M. Kawase (Kyoto University), K. Yokoyama, J. Oyama, T. Terao, and N. Kubo (FC-Cubic)

15:20 **1286** Limiting Current Densities Based on Permeability of Porous Transport Layers of PEM Fuel Cells Using a Pore Network Model – V. Konduru, E. Medici, and J. S. Allen (Michigan Technological University)

15:40 **1287** Conjugate Analysis of Heat-Species-Charge Transport for Evaluating Effects of the Temperature Gradient on Cell Performance – K. Miyagawa, Y. Minegishi (Yokohama National University), and T. Araki (Yokohama National University, PREST, JST)

16:00 Break

16:20	**1288**	Stochastic Reconstruction and Transport Simulation of PEFC Catalyst Layers – L. M. Pant, M. Sabharwal (University of Alberta), S. Mitra (York University), and M. Secanell (University of Alberta)
16:40	**1289**	Three Dimensional, High Resolution MPL Generation for Thermal and Mass Transport Modeling of PEM Fuel Cells – R. Banerjee and A. Bazylak (University of Toronto)
17:00	**1290**	Lattice Boltzmann Simulation on Water Transport in Gdl of PEMFC – D. H. Jeon (Dep. of Mechanical System Eng., Dongguk University)
17:20	**1291**	Dynamic Modeling for the Simulation of AC Spectra for HT-PEMFC – P. I. Giotakos (Institute of Chemical Engineering Sciences) and S. G. Neophytides (FORTH/ICE-HT, Patras, Greece)

L06 Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 6

Energy Technology / Physical and Analytical Electrochemistry / Sensor
Regency C, Hyatt Regency

Keynote Speeches on Solar Energy Conversion – 13:55 – 15:40
Co-Chairs: Heli Wang and Nianqiang (Nick) Wu

13:55		Introductory Remarks
14:00	**1681**	Water Splitting Semiconductor Photoanodes - a Comparative Study – J. Augustynski (University of Warsaw)
14:40	**1682**	Catalysts, Protection Layers, and Semiconductors: The Challenge of Interfacing – I. Chorkendorff (Technical University of Denmark)
15:20		Break

Solar Fuel Generation by Materials Beyond Oxides-I: Invited Talks – 15:40 – 17:10
Co-Chairs: Ranjit T. Koodali and Nicolas Gaillard

15:40	**1683**	Photocatalytic Hydrogen Evolution from Earth Abundant Nickel Oxide Clusters Dispersed on MCM-48 Mesoporous Materials – R. Peng, K. Shrestha (University of South Dakota), G. Mishra (3M Deutschland GmbH), J. Baltrusaitis (Lehigh University), C. M. Wu, and R. T. Koodali (University of South Dakota)
16:10	**1684**	Towards Efficient and Acidically Stable Dye-Sensitized Photocathodes for Solar Fuels – Y. Wu (The Ohio State University)
16:40	**1685**	Efficient and Stable Silicon-Based Solar Water Splitting Devices – J. Oh (KAIST)

Monday, October 12

Highlights

0700h..... Session Chair Orientation Breakfast
Sundance, Hyatt Regency
0800h..... Electrochemical Energy Summit
Plenary Address, 101 A+B+C,
Phoenix Convention Center
0845h..... Electrochemical Energy Summit –
Sessions Begin, Various rooms,
Phoenix Convention Center
0930h..... Technical Session Coffee Break
First Floor, Phoenix Convention Center –
and–The Atrium, Hyatt Regency
1410h..... Olin Palladium Award Lecture
102-A, Phoenix Convention Center
1700h..... ECS Plenary Address
Regency Ballroom, Hyatt Regency

A01 Joint General Session: Batteries and Energy Storage -and- Fuel Cells, Electrolytes, and Energy Conversion

Battery / Energy Technology
106-A, Phoenix Convention Center

Elevated Temperature Systems – 09:20 – 12:00
Co-Chairs: Scott W. Donne and Vincent Sprenkle

09:20	**1**	Numerical Simulation of Single Solid Oxide Fuel Cell Performance By Coupling Dynamics of Electrochemical Flows with Thermal Impact on Solid Electrolytes – T. N. Chaudhary and B. Chen (Heriot Watt University)
09:40	**2**	A Study on Electrochemical Reaction of Bituminous Coal Treated Hydrochloric Acid and Nitric Acid – S. Eom, G. Choi, J. Cho (Pusan National Univ.), S. Ahn (CRIEPI), and D. Kim (Pusan National Univ.)
10:00	**3**	Use of Solid Carbon Anodes in the Direct Carbon Fuel Cell – S. W. Donne, J. A. Allen, C. Lian, and M. Glenn (University of Newcastle)
10:20		Break
10:40	**4**	Specific Electrical Conductivity in Molten Potassium Dihydrogen Phosphate KH2PO4 Electrolyte at ~300 °C – A. V. Nikiforov (Technical University of Denmark, DTU Energy), R. W. Berg (Technical University of Denmark, DTU Chemistry), and N. J. Bjerrum (Technical University of Denmark, DTU Energy)
11:00	**5**	Impact of Cathode Current Collector on High Temperature PEM Water Electrolysis – L. Hua (Graduate school of Engineering, Kyushu University), A. Inada (Kyushu University), N. Hinonori, and I. Kohei (Graduate school of Engineering, Kyushu University)

11:20 **6** A Planar Zebra Battery Based on Low Cost Intermediate-Temperature Na-FeCl2 Redox Chemistry – G. Li, X. Lu, J. Y. Kim, V. Viswanathan, K. Meinhardt, and V. Sprenkle (Pacific Northwest National Laboratory)

11:40 **7** Preparation of NiCl2 Nanorods with Enhanced Electrochemical Properties in Thermal Batteries – Y. L. Zhu, J. C. Xing (Beijing Institute of Technology), B. Yang (Beijing General Research Institute of Mining & Metallurgy), and Q. J. Jiao (Beijing Institute of Technology)

Batteries: Electrolytes, Additives & Binders – 14:00 – 16:00
Co-Chairs: Gao Liu and Shinichi Komaba

14:00 **8** Manipulating the Polarity of Conductive Polymer Binders for Si-Based Anodes in Lithium-Ion Batteries – Z. Jia, M. Wu, X. Song, X. Liu, V. Battaglia, W. Yang, and G. Liu (Lawrence Berkeley National Laboratory)

14:20 **9** Side-Chain Conducting and Phase-Separated Polymeric Binders for High Performance Silicon Anodes in Lithium-Ion Batteries – H. Zhao, S. J. Park, G. Ai, W. Yang, C. Wang, and G. Liu (Lawrence Berkeley National Laboratory)

14:40 **10** Latex Binder for Five-Volt Spinel in Li-Ion Battery – S. Komaba, S. Hitomi, K. Yamagiwa, K. Kubota (Tokyo University of Science), K. Hida, and T. Matsuyama (Nippon A & L Inc.)

15:00 **11** Effect of Different Conductive Additives on Electrochemical Performance of Li-Ion Coin Cells – M. Rashid, S. Ahamad, P. Bilaiya, and A. Gupta (Indian Institute of Technology Delhi)

15:20 **12** A New Cathode Additive to Compensate the Irreversible Lithium Loss at the Anode for a Lithium-Ion Battery – K. Park, B. C. Yu, and J. B. Goodenough (The University of Texas at Austin)

15:40 **13** Ionic Liquid Based Electrolytes for High Temperature Lithium-Ion Batteries – N. Plylahan, M. Kerner, D. H. Lim, and P. Johansson (Chalmers University of Technology)

A02 Batteries - Theory, Modeling, and Simulation

Battery
101-B, Phoenix Convention Center

Computational Materials Design and Mechanisms Understanding I – 14:00 – 16:15
Co-Chairs: Anton Van der Ven and Shyue Ping Ong

14:00 Welcoming Remarks

14:15 **144** (Invited) Probing Oxygen Activities and Their Effects on Cation Migration in Li Rich Mn Rich Layered Oxides – S. Meng (University of California San Diego)

14:55 **145** Atomic Structure Evolution during First Charge of Layered-Layered Composite Lithium Ion Battery Cathode Materials – H. Iddir (Materials Science Division, Argonne National Laboratory), J. R. Croy (Argonne National Laboratory), K. G. Gallagher (Joint Center for Energy Storage Research), C. Johnson (Joint Center for Energy Storage Research (JCESR), Argonne National Laboratory), R. Benedek (Argonne National Laboratory), and M. Balasubramanian (Advanced Photon Source, Argonne National Laboratory)

15:15 **146** Modeling of LiFePO4 Charging/Discharging Dynamics Based on the Many-Unit Concept: Validation Against *Operando* XRD Data – C. Delacourt (Laboratoire de Reactivite et Chimie des Solides), M. Farkhondeh, M. Pritzker, and M. Fowler (University of Waterloo)

15:35 **147** Mesoscale Modeling of Phase Transformations in Layered Intercalation Materials – M. Radin (University of California, Santa Barbara) and A. Van der Ven (University of California Santa Barbara)

15:55 **148** Particle-Level Electrochemical Simulation of Phase-Separating Li Intercalation Cathode – B. Orvananos, H. C. Yu (University of Michigan), A. Abdellahi, R. Malik (Massachusetts Institute of Technology), C. P. Grey (University of Cambridge), G. Ceder (Massachusetts Institute of Technology), and K. Thornton (University of Michigan)

A03 Batteries Beyond Lithium-Ion

Battery / Energy Technology
102-C, Phoenix Convention Center

Solid State Batteries – 09:00 – 11:40
Co-Chairs: Daniel A. Steingart, Venkataraman Thangadurai, Yangchuan Xing, and Vito Di Noto

09:00 **233** Mechanical Properties of $Li_7La_3Zr_2O_{12}$ and $Li_{0.33}La0.57TiO_3$ – J. Wolfenstine (Army Research Laboratory)

09:20 **234** All-Solid-State Lithium Secondary Battery Using Plastic Crystal As Solid Electrolyte – E. Yamauchi (Hitachi, Ltd., Center for Exploratory Research)

09:40 **235** Fabrication and Testing of Bulk-Type Solid State Batteries Based on a Garnet Oxide Electrolyte – V. Anandan and A. Drews (Ford Motor Company)

10:00 **236** Recent Progress in the Fundamental Understanding of Garnet-Based Superionic Conductors and Fabrication of Solid-State Cells for Advanced Lithium Batteries – T. Thompson (University of Michigan), M. Johannes (Naval Research Laboratory), A. Huq (Spallation Neutron Source, Oak Ridge National Laboratory), J. L. Allen, J. Wolfenstine (U.S. Army Research Laboratory), A. Sharafi, and J. Sakamoto (University of Michigan)

10:20 Break

10:40 **237** Structural Evaluation of Amorphous MoS3 Positive Electrode Active Materials in All-Solid-State Lithium Secondary Batteries – T. Matsuyama, M. Deguchi, A. Hayashi, M. Tatsumisago (Osaka Prefecture University), T. Ozaki (Technology Research Institute of Osaka Prefecture), and S. Mori (Osaka Prefecture University)

11:00 **238** In-Situ TEM Studies of Fluoride Based Solid State Batteries – V. S. K. Chakravadhanula (Karlsruhe Nano Micro Facility, Helmholtz Institut Ulm (HIU)), M. Hammad (Karlsruhe Institute of Technology), T. Scherer (Karlsruhe Nano Micro Facility, Karlsruhe Institute of Technology), X. Mu (Karlsruhe Institute of Technology), C. Rongeat (Karlsruhe Institute of Technology (KIT)), A. R. Munnangi (Helmholtz Institute Ulm (HIU)), M. Fichtner (Helmholtz Institute Ulm (HIU), Germany), H. Hahn (Karlsruhe Institute of Technology (KIT), Germany, Helmholtz Institute Ulm (HIU), Germany), and C. Kübel (Karlsruhe Institute of Technology, Helmholtz Institut Ulm (HIU))

11:20 **239** Ceramic Polymer Composite Electrolytes (CPCE) for a Solid-State, Conformal, Wearable Battery – J. Kumar (University of Dayton Research Institute), B. E. Henslee (Cornerstone Research Group, Inc.), and G. Subramanyam (University of Dayton)

Multiphase Energy Storage Systems – 13:00 – 16:00
Co-Chairs: Daniel A. Steingart, Venkataraman Thangadurai, Yangchuan Xing, and Vito Di Noto

13:00 **240** Effects of Composition and Size of Active Metal Particles on Electrochemical Performance and Characteristics of Sodium Metal Chloride Rechargeable Batteries – J. H. Choi, C. W. Ahn, M. Kim, J. J. Choi, J. W. Kim, W. H. Yoon, J. Ryu, B. D. Hahn (Korea Institute of Materials Science), and H. Lee (Pusan National University)

13:20 **241** Applying Reconfigurable Networks of Charge-Transporting Polycyclic Aromatic Hydrocarbons to Problems in Energy Storage – B. A. Helms (The Molecular Foundry), P. D. Frischmann, L. C. H. Gerber (Lawrence Berkeley National Laboratory), S. E. Doris (Department of Chemistry, Univ. of California, Berkeley), F. Fan, Y. M. Chiang (Massachusetts Institute of Technology), A. Jain, X. Qu, and K. A. Persson (Lawrence Berkeley National Laboratory)

13:40 **242** High-Performance Non-Aqueous All-Organic Redox Flow Batteries – X. Wei (Pacific Northwest National Laboratory), J. Huang, L. Zhang (Argonne National Laboratory), W. Xu, L. Cosimbescu, M. Vijayakumar, T. Liu, J. Liu, W. Wang, and V. Sprenkle (Pacific Northwest National Laboratory)

14:20 Break

14:40 **244** Nanoporous Aramid Nanofiber Separators for Non-Aqueous Redox Flow Batteries – S. O. Tung (University of Michigan, Ann Arbor), L. T. Thompson, S. Laramie (University of Michigan), R. Zhang, and N. Kotov (University of Michigan, Ann Arbor)

15:00 **245** Evaluation of Carbon Foams and Membranes As the Cathode in Non-Flow Zinc Bromine Energy Storage Cells to Mitigating Liquid Bromine Convection – S. Biswas (MAE/ACEE Princeton University), R. Mohr, A. Senju (Princeton University), and D. A. Steingart (MAE/ACEE Princeton University)

15:20 **246** Development of Anolyte Materials for All-Organic Redox Flow Batteries – J. Huang (Argonne National Laboratory), W. Duan (Pacific Northwest National Laboratory), J. Kowalski (Massachusetts Institute of Technology), I. A. Shkrob (Argonne National Laboratory), F. R. Brushett (Massachusetts Institute of Technology), X. Wei (Pacific Northwest National Laboratory), and L. Zhang (Argonne National Laboratory)

15:40 **247** Catholyte Development for Non-Aqueous Redox Flow Batteries – L. Zhang, J. Huang, I. A. Shkrob (Argonne National Laboratory), F. R. Brushett (Massachusetts Institute of Technology), X. Wei (Pacific Northwest National Laboratory), A. K. Burrell (Joint Center for Energy Storage Research (JCESR)), L. Cheng (Argonne National Lab), L. Curtiss (Materials Science Division, Argonne National Laboratory), and W. Duan (Pacific Northwest National Laboratory)

A05 Electrolytes and Electrochemical Interfaces in Energy Storage Systems

Battery / Energy Technology
101-A, Phoenix Convention Center

Cathode Interfaces – 14:00 – 16:00
Co-Chairs: Brett L. Lucht and Doron Aurbach

14:00 **356** The Carbon-Electrolyte Interface at High Cathodic Voltages – A. M. Svensson, B. Eikeland Nilssen, A. O. Tezel (Norwegian University of Science and Technology), and J. R. Tolchard (SINTEF)

14:20 **357** Electrolyte-Cathode Interactions – S. M. Russell, A. V. Cresce, and K. Xu (U.S. Army Research Laboratory)

14:40 **358** Effect of Using Fluorinated Phosphate Ester and Fluorinated Ether As Electrolyte Solvents for Lithium Ion Batteries with LiNi0.5Mn1.5-XTixO4 Cathode – T. Noguchi, Y. Kato, and K. Utsugi (Smart Energy Research Laboratories, NEC Corporation)

15:00 **359** Improvement of Electrode/ Electrolyte Interfaces in Graphite/LiNi0.5Mn1.5O4 Batteries at High Voltage with Lithium Trimethyl Alkyl Borates As Electrolyte Additives – B. L. Lucht, M. Xu (University of Rhode Island), L. Zhou (Silatronix), Y. Dong, U. Totempudi (University of Rhode Island), A. Garsuch, and F. F. Chesneau (BASF SE)

15:20 **360** (Invited) The Use of Eqcm-D for in-Situ Characterization of Dimensional Changes in Cycled Battery Electrodes – N. Shpigel (Bar-Ilan University), S. Sigalov (Department of Chemistry, Bar-Ilan University, Israel), M. D. Levi (Department of Chemistry, Bar-Ilan University), and D. Aurbach (Bar-Ilan University)

A06 High-Energy Li-Ion Intercalation Materials

Battery

105-A, Phoenix Convention Center

Cathode I – 13:50 – 16:00
Co-Chairs: Shirley Meng and Maximilian Fichtner

13:50 **432** (Invited) Li Rich FCC Materials As High Capacity Cathodes – S. Ren (Karlsruhe Institute of Technology (KIT), Germany), R. Chen (Helmholtz Institute Ulm (HIU), Germany), and M. Fichtner (Helmholtz Institute Ulm (HIU))

14:20 **433** Fluoride-Doped Layered-Spinel Hybrid Lithium-Rich Cathode Material for Lithium Ion Battery – J. Yi-Chun (Mater. Sci. Eng., National Tsing Hua University)

14:40 **434** High Capacity Li-Rich Cathode Materials – K. Luo, M. Roberts, R. Hao, and P. G. Bruce (University of Oxford)

15:00 **435** Re-Entrant Lithium Local Environments and Defect Driven Electrochemistry of Li- and Mn-Rich Li-Ion Battery Cathodes – B. Key (Joint Center for Energy Storage Research), F. Dogan, B. R. Long, J. R. Croy, K. G. Gallagher (Argonne National Laboratory), H. Iddir (Materials Science Division, Argonne National Laboratory), J. Russell (Argonne National Laboratory), and M. Balasubramanian (Advanced Photon Source, Argonne National Laboratory)

15:20 **436** Charging Voltage Limit Effects on the Electro-Chemical Behavior of High Capacity Manganese-Rich Cathode in Lithium Ion Batteries – W. F. Mao (Lawrence Berkeley National Laboratory, Tianjin University), Y. Fu, G. Ai, and V. Battaglia (Lawrence Berkeley National Laboratory)

15:40 **437** Origins of the DC-Resistance Increase in HCMR™ Cathodes – R. Kostecki, V. Battaglia (Lawrence Berkeley National Laboratory), G. Chen (Energy Storage and Distributed Resources Division, LBNL), W. Chen (LBNL), G. Liu (Lawrence Berkeley National Laboratory), D. Membreno (LBNL), K. A. Persson (Joint Center for Energy Storage Research (JCESR)), A. K. Shukla (Energy Storage and Distributed Resources Division, LBNL), L. Terborg (Lawrence Berkeley National Laboratory), and T. Yi (LBNL)

A09 Recent Advances in Supercapacitors

Energy Technology / Battery / Dielectric Science and Technology

103-A, Phoenix Convention Center

Pseudocapacitors I – 09:00 – 12:40
Co-Chairs: Vibha Kalra and O. M. Leonte

09:00 **555** (Invited) Novel Asymmetric Supercapacitor with Electrochemical Polymerized Conjugated Polymer and Vertically Aligned CNT – Y. Zhu (University of Akron)

09:40 Break

10:00 **556** Pseudocapacitive Carbon Nanofibers Using Sodium Chloride (a.k.a common salt) – R. Singhal and V. Kalra (Drexel University)

10:20 **557** Electrochemical Properties of Ordered, Two-Dimensional, Double Transition Metals Carbides (MXenes) – M. Beidaghi, B. Anasori, Y. Gogotsi, and M. W. Barsoum (Drexel University)

11:00 **559** The Cycling Behaviour of MnO_2 as Investigated By Synchrotron XRD, Stepped Potential Electrochemical Spectroscopy (SPECS) and Cycling on the Electrochemical Quartz Crystal Microbalance (EQCM) – S. W. Donne, A. J. Gibson, R. Wood, and M. F. Dupont (University of Newcastle)

11:20 **560** Porous Titania conformal Coating on Carbon Nanotubes As Energy Storage Materials – L. Yan, M. Zhou, G. Chen, and H. Luo (New Mexico State University)

11:40 **561** $FeWO_4$ As Electrode Material for High Volumetric Capacitance Supercapacitors – T. Brousse (RS2E, IMN, CNRS/University of Nantes), F. Favier (RS2E, Institut Charles Gerhardt), N. Goubard (IMN, RS2E), O. Crosnier (RS2E, CNRS-IMN), and C. Payen (IMN)

12:00 **562** Effect of Meso- and Micro-Porosity in Carbon Electrodes on Atomic Layer Deposition of Pseudocapacitive V_2O_5 for High Performance Supercapacitors – J. S. Daubert, H. N. Gotsch, N. P. Lewis, J. Z. Mundy, D. N. Monroe, E. C. Dickey (North Carolina State University), M. D. Losego (Georgia Institute of Technology), and G. N. Parsons (North Carolina State University)

12:20 **563** Designing Polyoxometalate Thin Films on Carbon Nanomaterials for Pseudocapacitive Electrodes – M. Genovese, Y. W. Foong, and K. Lian (University of Toronto)

Pseudocapacitors II – 14:00 – 16:00
Co-Chairs: O. M. Leonte and A. Manivannan

14:00 **564** Nitrogen Doped Hydrothermal Carbon for Supercapacitors – S. W. Donne and K. Latham (University of Newcastle)

14:20 **565** Electrochromic Nanocomposites with Endured Energy Storage Properties – Z. Guo (University of Tennessee Knoxville), H. Wei (Lamar University, University of Tennessee, Knoxville), Y. Wang, J. Guo, and X. Yan (University of Tennessee Knoxville)

14:40 **566** Redox-Active Xerogels As Pseudocapacitve Electrodes with Excellent Cycling Performance – M. Boota (Drexel University), M. Bécuwe (Laboratoire de Réactivité et Chimie des Solides, UMR 7314), and Y. Gogotsi (Drexel University)

15:00 **567** An Investigation into the Deposition Mechanism and Capacitive Behaviour of Thin Films of Manganese Oxides Deposited from $KMnO_4$ – S. W. Donne and A. J. Gibson (University of Newcastle)

15:20 **568** Probing the Mechanical Deformation of 2D Titanium Carbide (MXene) upon Cation Intercalation at the Nanoscale – J. Come, J. Black, M. Naguib (Oak Ridge National Laboratory), M. R. Lukatskaya, M. Beidaghi, Y. Gogotsi (Drexel University), S. V. Kalinin, and N. Balke (Oak Ridge National Laboratory)

15:40 **569** Functionalized Carbon Nanotube Supported By Nickel Nanowire Array with Improved Rate Capability for High Power Electrochemical Capacitors – H. Monshat (Mechanical Engineering Department Iowa State University) and S. Hu (Mechanical Engineering Department Iowa State University, Microelectronics Research Center Iowa State University)

C05 Critical Factors in Localized Corrosion 8
Corrosion
102-A, Phoenix Convention Center

Stainless Steels and High Corrosion Resistant Alloys I – 09:00 – 12:20
Co-Chair: Shinji Fujimoto

09:00 **672** Stress Corrosion Cracking of Sensitized 304 Stainless Steel Under $MgCl_2$ Droplets – K. Nakao, E. Tada, and A. Nishikata (Tokyo Institute of Technology)

09:20 **673** Investigation of Pitting on Stainless Steel Using Scanning Electrochemical Microscopy – R. M. Souto (Universidad de La Laguna)

09:40 **674** *in-Situ* Critical Pitting Temperature on Duplex Stainless Steels – L. F. Garfias-Mesias (Environmental & Corrosion Testing of Materials)

10:00 **675** The Effect of Biofilm Formation in Singapore Seawater on Corrosion of Metal and Alloys: New Observations and Concepts – S. L. Wijesinghe, Z. Tan (Singapore Institute of Manufacturing Technology,), D. Thierry, N. Larche (French Corrosion Institute), S. Teo, and D. J. Blackwood (National University of Singapore)

10:20 Intermission

10:40 **676** Pit Initiation and Growth on Stainless Alloys in Solutions Containing Sulfate and/or Chloride, and Thiosulfate – A. G. Carcea and R. C. Newman (University of Toronto)

11:00 **677** Diffusion-Limited 1D Pit Growth of S13Cr in Brine at Elevated Temperature – J. Jun, G. Frankel (Fontana Corrosion Center, The Ohio State University), and N. Sridhar (DNVGL)

11:20 **678** Experiments Based on One-Dimensional Diffusion Modeling to Determine Critical Factors in Pitting – J. Srinivasan and R. G. Kelly (University of Virginia)

11:40 **679** Microelectrochemical Investigation of Pit Initiation Site on Austenitic Cast Stainless Steel – A. Otake (Department of Materials Science, Tohoku University, Kawasaki Heavy Industries, Ltd.), I. Muto (Department of Materials Science, Tohoku University), A. Chiba (Department of Materials Science, Tohoku University, National Institute for Materials Science (NIMS)), Y. Sugawara, and N. Hara (Department of Materials Science, Tohoku University)

12:00 **680** Effect of Low-Temperature Carburizing Treatment on Improving Pitting Corrosion Resistance at Manganese Sulfide Inclusion in Type 304 Stainless Steel – A. Chiba (National Institute for Materials Science (NIMS)), S. Shibukawa (Institute for Materials Research, Tohoku University), I. Muto (Department of Materials Science, Tohoku University), T. Doi, K. Kawano (Nippon Steel & Sumitomo Metal Corporation), Y. Sugawara, and N. Hara (Department of Materials Science, Tohoku University)

Olin Palladium Award Address – 14:00 – 14:50
Co-Chairs: Gerald Frankel and Daniel Scherson

14:00 Introductory Remarks

14:10 **681★** (Olin Palladium Award) Some Critical Issues in the Breakdown of Passive Films – D. D. Macdonald (University of California at Berkeley)

Stainless Steels and High Corrosion Resistant Alloys II – 15:00 – 16:00
Co-Chair: Joseph Kish

15:00 **682** The Influence of Water Radiolysis on Corrosion By Supercritical Water – S. Hariharan (The University of Western Ontario), M. Momeni, V. Subramanian (University of Western Ontario), J. J. Noel, J. Joseph (The University of Western Ontario), and J. C. Wren (University of Western Ontario)

15:20 **683** Effect of Hydogen Sulfide Ions on a Passivation Behavior of Type-316L Stainless Steel – J. S. Lee, Y. Kitagawa, T. Nakanishi, Y. Hasegawa, and K. Fushimi (Hokkaido University)

15:40 **684** Dissolution and Repassivation Behaviour of Ti, Ti-6Al-4V, Type316L and Co-27Cr-5.5Mo in Bio-Mechano-Chemical Environment – K. Doi, S. Miyabe, and S. Fujimoto (Osaka University)

C06 Pits & Pores 6: Nanomaterials - In Memory of Yukio H. Ogata
Corrosion / Luminescence and Display Materials
102-B, Phoenix Convention Center

Electrodeposition and Pore Filling I – 09:00 – 09:50
Co-Chairs: Rabah Boukherroub and David J. Lockwood

09:00 Welcoming Remarks

09:10 **717** (Invited) Porous Silicon Studies of Prof. Yukio H. Ogata – T. Sakka and K. Fukami (Graduate School of Engineering, Kyoto University)

Electrodeposition and Pore Filling II – 10:00 – 12:00
Co-Chairs: M. J. Sailor and Tetsuo Sakka

10:00 **718** (Invited) Electrodeposition in Microporous Silicon from the Viewpoint of Hydration Property: Effect of Coexisting ions in Zinc Electrodeposition – K. Fukami, T. Sakka (Graduate School of Engineering, Kyoto University), R. Koda (Kyoto University), A. Koyama (Graduate School of Engineering, Kyoto University), T. Abe (Graduate School of Engineering, Kyoto University, Japan Science and Technology Agency), A. Kitada, and K. Murase (Graduate School of Engineering, Kyoto University)

10:40 Prof. Yukio H. Ogata and the "PSST" Conference Series

10:50 **719** Material Deposition into Porous Silicon Template – F. A. Harraz, A. A. Ismail, S. A. Al-Sayari, A. Al-Hajry, and M. S. Al-Assiri (Najran University)

11:10 **720** Effect of Displacement Deposition on Platinum Deposition within Nanoporous Silicon – A. Koyama, K. Fukami, R. Koda, T. Sakka, T. Abe, A. Kitada, and K. Murase (Graduate School of Engineering, Kyoto University)

11:30 **721** (Invited) Silicon Nanowires/Metal Nanoparticles Composites with Specific Properties – R. Boukherroub (IEMN)

Semiconductor Dissolution – 14:00 – 16:00
Co-Chairs: Klemens Rumpf and James L. Gole

14:00 **722** (Invited) Silicon Electrochemical Micromachining Technology: The Good, the Bad and the Future – G. Barillaro (University of Pisa)

14:30 **723** Porosity Control and Transfer in Silicon Nanostructures through Electrochemical & Chemical Etching – T. Defforge, S. Vijayakumar (Université de Tours/GREMAN/CNRS/CEA/INSA-CVL), A. Loni (pSiMedica Ltd), A. Chaix (ICGM), A. Sauldubois (Université d'Orléans Centre de Microscopie Electronique), C. Andreazza-Vignolle (Université d'Orléans, ICMN, CNRS), F. Cunin, F. Di Renzo (ICGM, CNRS), L. T. Canham (pSiMedica Ltd), and G. Gautier (Université de Tours/GREMAN/CNRS/CEA/INSA-CVL)

14:50 **724** Low Doped n-type Localized Porous Silicon Made By Hole Injection From Back-side p+/n Junction For Power Switches Application – A. Fèvre (ST Microelectronics, Tours, Université de Tours/GREMAN/CNRS/CEA/INSA-CVL), S. Menard (ST Microelectronics, Tours), T. Defforge, and G. Gautier (Université de Tours/GREMAN/CNRS/CEA/INSA-CVL)

15:10 **725** Metal-Assisted Etching of Silicon: Activity of Metal Catalysts and Control of Porous Structure – S. Yae, N. Fukumuro (University of Hyogo), and S. Sakamoto (University of Hyogo, Nippon Oikos Co., Ltd.)

15:30 **726** Porous Silicon Nanoneedles By Metal Assisted Chemical Etch for Intracellular Sensing and Delivery – C. Chiappini (Imperial College London), E. De Rosa, J. O. Martinez (Houston Methodist Research Institute), P. Campagnolo, C. Almeida (Imperial College London), E. Tasciotti (Houston Methodist Research Institute), and M. Stevens (Imperial College London)

D04 Semiconductors, Dielectrics, and Metals for Nanoelectronics 13

Dielectric Science and Technology / Electronics and Photonics
105-B, Phoenix Convention Center

High Mobility Channel – 09:00 – 12:30
Co-Chairs: Paul C. McIntyre and Shinichi Takagi

09:00 Welcoming Remarks

09:10 **812** Optimized Novel Indium Antimonide Quantum Well Field Effect Transistor for High-Speed and Low Power Logic Applications – R. Islam, M. M. Uddin, and M. A. Matin (Chittagong University of Engineering & Technology)

09:30 **813** HfO_2/Al_2O_3/Ingaas Mos Structures and Ingaas Plasma Nitridation Elaborated on a 300 Mm Pilot Line – M. Billaud (Univ.Grenoble Alpes, LTM, CNRS, CEA-LETI, MINATEC Campus), J. Duvernay (Univ. Grenoble Alpes, CEA, LETI, MINATEC Campus), H. Grampeix (Univ. Grenoble Alpes, CEA-LETI, MINATEC Campus), B. Pelissier (Univ. Grenoble Alpes, LTM, CNRS), M. Martin (LTM, CNRS), S. David, C. Vallée Sr. (Univ.Grenoble Alpes, LTM, CNRS), Z. Chalupa (Univ. Grenoble Alpes, CEA-LETI, MINATEC Campus), H. Boutry (Univ. Grenoble Alpes,CEA-LETI, MINATEC Campus), T. Baron (Univ.Grenoble Alpes, LTM, CNRS), M. Cassé (Univ. Grenoble Alpes, CEA-LETI, MINATEC Campus), T. Ernst (Univ. Grenoble Alpes,CEA-LETI), M. Vinet, G. Reimbold, and O. Faynot (Univ. Grenoble Alpes, CEA-LETI, MINATEC Campus)

09:50 Intermission

10:00 **814** (Invited) Towards a Vertical and Damage Free Post-Etch InGaAs Fin Profile: Dry Etch Processing, Sidewall Damage Assessment and Mitigation Options – U. Peralagu, X. Li, O. Ignatova, Y. C. Fu, D. A. J. Millar, M. J. Steer (University of Glasgow), I. M. Povey (Tyndall National Institute), K. Hossain, M. Jain, T. G. Golding (Amethyst Research Incorporated), R. Droopad (Texas State University), P. K. Hurley (Tyndall National Institute), and I. G. Thayne (University of Glasgow)

10:30 **815** (Invited) Mos Interface Control Technologies for Advanced III-V/ Ge Devices – S. Takagi, C. Y. Chang (The University of Tokyo, JST-CREST), M. Yokoyama (JST-CREST, The University of Tokyo), K. Nishi (The University of Tokyo, JST-CREST), R. Zhang (Zhejiang University, The University of Tokyo), M. Ke, J. H. Han, and M. Takenaka (The University of Tokyo, JST-CREST)

11:00 **816** (Invited) Border Trap Density in Al_2O_3/InGaAs MOS: Dependence on Hydrogen Passivation and Bias Temperature Stress – K. Tang (Stanford University), R. Droopad (Texas State University), and P. C. McIntyre (Stanford University)

11:30 **817** (Invited) Fabrication of N-Polar (Al,Ga,In)N Heterostructures for Transistor Applications – S. Keller and U. K. Mishra (University of California Santa Barbara)

12:00 **818** (Invited) Surface Passivation of High-k Dielectric Materials on Diamond Thin Films & Devices – K. K. Kovi, S. Majdi, M. Gabrysch, N. Suntornwipat, and J. Isberg (Uppsala University)

Nano Technology – 14:00 – 15:00
Co-Chair: Stacia Keller

14:00 **819** (Invited) Defects and Dopants in Silicon and Germanium Nanowires – M. Fanciulli (Dept. of Materials Science, University of Milano Bicocca, MDM Laboratory, IMM-CNR), M. Belli (MDM Laboratory, IMM-CNR), S. Paleari (Dept.of Materials Science, University of Milano Bicocca), A. Lamperti (MDM Laboratory, IMM-CNR), M. Sironi, A. Pizio (Dept. of Materials Science, University of Milano Bicocca), and A. Molle (MDM Laboratory, IMM-CNR)

14:30 **820** (Invited) Topological States in Multi-Orbital Honeycomb Lattices of Hgte (CdTe) Quantum Dots – W. Beugeling (MPIPKS Dresden, Utrecht University), E. Kalesaki (University of Luxembourg, IEMN Lille), C. Delerue (IEMN Dept. ISEN CNRS Lille), Y. M. Niquet (CEA INAC Grenoble), D. Vanmaekelbergh, and C. Morais Smith (Utrecht University)

Gate Metal – 15:00 – 16:00
Co-Chair: Marco Fanciulli

15:00 Best Paper Award

15:10 **821** (Invited) Factors Impacting Threshold Voltage in Advanced CMOS Integration: Gate Last (FINFET) vs. Gate First (FDSOI) – D. Triyoso, R. Carter, J. Kluth, S. Luning, A. Child, J. Wahl, B. Mulfinger, K. Punchihewa, A. Kumar, L. Kang, R. Sporer, X. Chen, S. Straub, G. Bohra, S. Patil, X. Zhang, A. Chen, M. Togo, and R. Pal (GLOBALFOUNDRIES)

D05 Processing Materials of 3D Interconnects, Damascene and Electronics Packaging 7

Electronics and Photonics / Dielectric Science and Technology
Borein A, Hyatt Regency

Device Application, Manufacturing – 09:00 – 10:20
Co-Chairs: Fred Roozeboom and Mitsumasa Koyanagi

09:00 **861** Plasma Dicing: Current State & Future Trends – R. Westerman, K. Mackenzie, and T. Lazerand (Plasma-Therm, LLC)

09:40 **862** Miniaturization and Biocompatible Encapsulation for Implantable Biomedical Silicon Devices – J. C. Souriau, J. M. Herrera Morales, L. Castagné, G. Simon (CEA, LETI, MINATEC Campus, Univ. Grenoble Alpes), K. Amara, and B. Boutaud (Sorin CRM SAS)

Via and Trench Filling - Damascene Process and PCB – 10:40 – 12:00
Co-Chairs: Kazuo Kondo and Masanori Hayase

10:40 **863** Kinetic on Copper Damascene and Cuprous Concentration Computation in with Cl- and SPS – V. H. Hoang, M. Yokoi, and K. Kondo (Osaka Prefecture University)

11:00 **864** Microvia Filling in an Acidic Copper Planting Bath with Insoluble Anodes – C. C. Liu and W. P. Dow (National Chung Hsing University)

11:20 **865** Using Copolymers As Suppressors in a Copper Plating Bath for through-Hole Filling – S. I. Wen and W. P. Dow (National Chung Hsing University)

11:40 **866** Accelerating Effect of Additives in Damascene Electrodeposition – T. Kitahara and Y. Kaneko (Kyoto University)

TSV Filling - Optimal Filling and Evaluation – 14:00 – 16:00
Co-Chairs: Harold Philipsen and Kazuo Kondo

14:00 **867** Optimizing TSV Fill Phases for Improved Fill Rate, Process Stability and Void Performance – J. Ghekiere, R. Mikkola, D. Kebreab, J. Burnham, B. Hoerner, and D. Erickson (Applied Materials)

14:40 **868** Impact of Accelerator Decomposition Products to the Stability of TSV Filling Processes – D. Rohde, K. Haubner, C. Jäger, A. Kirbs, M. Pölleth, J. Gaida, and J. Palm (Atotech Deutschland GmbH)

15:00 **869** Extreme Bottom-up in Through Silicon Vias by Leveler Pre-adsorption – T. Ishii, H. Egoshi, and M. Hayase (Tokyo University of Science)

15:20 **870** Reduction of Thermal Expansion Coefficient of Electrodeposited Copper – K. Kondo, S. Mukahara (Osaka Prefecture University), J. Onuki (Ibaraki University), and M. Yokoi (Osaka Prefecture University)

15:40 **871** Scanning Acoustic Microscopy Beyond Conventional Applications – S. Brand and M. Petzold (Fraunhofer Institute for Mechanics of Materials IWM)

F01 Electrochemical Engineering General Session

Industrial Electrochemistry and Electrochemical Engineering
Remington A, Hyatt Regency

Industrial Opportunities and Challenges in Electrochemical Engineering – 09:00 – 12:00
Co-Chairs: Mark E. Orazem, Douglas P. Riemer, and Gerardine G. Botte

09:00 **950** Advancements in Copper Interconnect Technology: The Effect of Sulfuric Acid on the Adsorption & Desorption of an Advanced MLI Suppressor – W. Olson, M. Schmidt, A. Wetterer (University of Portland), and M. Willey (Moses Lake Industries Inc.)

09:20 **951** Collaborative Development of a Functional Trivalent Chromium Electroplating Process – M. E. Inman (Faraday Technology Inc.), E. J. Taylor, T. D. Hall, S. Snyder, and S. Lucatero (Faraday Technology, Inc.)

09:40 Break

10:00 **952** Transition from Surface Finishing of Stainless Steel Semiconductor Valves to Nickel-Titanium Medical Materials By Analysis of Analogous Patent Art – E. J. Taylor (Faraday Technology, Inc.) and M. E. Inman (Faraday Technology Inc.)

10:20 **953** Coupling Phenomena Between Micromorphological Evolution and Ionic Mass Transfer Rate during Ag Electrodeposition in AgNO3 Aqueous Solution – Y. Fukunaka (Nanotechnology Research Institute, Waseda University), T. Wakatsuki (Sept. Energy Sci. & Tech., Kyoto University), and T. Homma (Dept. of Applied Chemistry, Waseda University)

10:40 **954** Fabrication of Bumping Mask for Flip-Chip Process on Stainless Steel Using through Mask Electrochemical Micro Machining(TMEMM) – J. B. Ahn, H. Y. Ryu, and J. G. Park (Hanyang University)

11:00 **955** Characterization of Electric Field Induced Ion Migration in Semiconductor Encapsulation Materials – S. Schwab (Kompetenzzentrum für Automobil u Industrieelektronik, Technical University of Vienna), J. Jung (Technical University of Vienna), S. Gruber (Infineon Technologies Austria AG, Technical University of Vienna), M. Bauer (Infineon Technologies AG Germany), M. Nelhiebel (Infineon Technologies Austria AG), and H. Hutter (Vienna University of Technology)

11:20 **956** Preparation of Transparent-Type Plasmonic Sensors By the Sol-Gel Process and Electrodeposition – M. Saito (Res. Org. for Nano&Life Innovation, Waseda University), M. Mita (KYODO INTERNATIONAL INC.), M. Yanagisawa (Res. Org. for Nano & Life Innovation, Waseda University), and T. Homma (Res. Org. for Nano&Life Innovation, Waseda University, Dept. of Applied Chemistry, Waseda University)

11:40 **957** A New Challeng for Hydrogen Isotope Electrolytic Separation System Combined with Fuel Cell – H. Matsushima, S. Shibuya, R. Ogawa, and M. Ueda (Hokkaido University)

Electrochemical Engineering General Session – 14:00 – 16:00
Co-Chairs: Elizabeth J. Biddinger and John A. Staser

14:00 **958** Characterizing Mechanical and Electrochemical Behavior of Mechanically Preloaded Electrodes in Lithium Ion Pouch Cells – L. Shi and U. Kunz (Inst. of Chem. and Electrochem. Process Eng.)

14:20 **959** Effect of ZrO_2 Additive for IrO_2-Ta_2O_5/Ti on Activity of Oer in Sulfuric Acid with Toluene Contamination – K. Nagai, K. Matsumae, Y. Kohno, K. Matsuzawa (Green Hydrogen Research Center, Yokohama Nat. Univ.), A. Kato (Permelec Electrode Ltd.), Z. Awaludin (Zaenal Awaludin), Y. Nishiki (Permelec Electrode Ltd.), and S. Mitsushima (Institute of Advanced Sciences, Yokohama Nat. Univ., Green Hydrogen Research Center, Yokohama Nat. Univ.)

14:40 **960** Nanoparticle Electrocatalysts for the Oxidation of Biomass – C. Arroyo-Torres (Ohio University), J. A. Staser (Chemical Engineering), and O. Movil-Cabrera (Ohio University)

15:00 **961** Electrochemical Enhanced Recovery of Precious Metals from Electronic Waste – L. A. Diaz, T. E. Lister, G. Clark, and J. Parkman (Idaho National Laboratory)

15:20 **962** 3D Printed Membraneless Water Electrolysis Cells – G. D. O'Neil (Columbia University) and D. Esposito (National Institute of Standards and Technology)

15:40 **963** A Direct Numerical Method of Lines Approach for Predicting Primary and Secondary Current Density Distributions: Linear and Nonlinear Boundary Conditions – M. Pathak (University of Washington Seattle), K. Mitra (Indian Institute of Technology, Hyderabad), M. Ramanathan (University of Washington, Seattle), and V. Subramanian (Pacific Northwest National Laboratory, University of Washington, Seattle)

G02 Semiconductor Cleaning Science and Technology 14 (SCST 14)

Electronics and Photonics
104-A, Phoenix Convention Center

Welcome and Keynote – 09:40 – 10:30
Co-Chairs: Jerzy Ruzyllo and Richard E. Novak

09:40 Welcoming Remarks

09:50 **1011** (Invited) Understanding and Controlling Electrochemical Effects in Wet Processing – S. Raghavan and C. C. Chiang (University of Arizona)

Water and Chemicals – 10:30 – 12:00
Co-Chairs: Srini Raghavan and Richard E. Novak

10:30 **1012** (Invited) Ultrapure Water for Advance Semiconductor Manufacturing: Challenges and Opportunities – S. Libman (Balazs NanoAnalysis), D. Wilcox (Samsung Austin Semiconductor), and B. Zerfas (IBM Microelectronics)

11:00 **1013** Oxygen Control Challenge for Advanced Wet Processing – Y. Yoshida (SCREEN Semiconductor Solutions Co. Ltd., imec), M. Otsuji, H. Takahashi, J. Snow, M. Sato, H. Shirakawa, H. Uchida (SCREEN Semiconductor Solutions Co. Ltd.), F. Sebaai, F. Holsteyns, and P. W. Mertens (imec)

11:20 **1014** Effects of Diluted-NH3 Water as Conductive Rinse Water in Single Wafer Cleaning Processes – Y. Hayashi, M. Kawakami, D. Yano, and K. Yamanaka (Organo Corporation)

11:40 **1015** Sulfate Adsorption onto and Desorption from Silicon Dioxide Films – B. Wu and S. Raghavan (University of Arizona)

Metallic Contamination – 13:30 – 14:40
Co-Chairs: Jin-Goo Park and Koichiro Saga

13:30 **1016** (Invited) Metallic Contamination Control in Advanced Ulsi Processing – K. Saga (Sony Corporation)

14:00 **1017** Prevention of Metal Contamination in Sub 50 Nm SC1 Cleaning Process – H. T. Kim, G. H. Park, B. J. Cho, J. H. Lee, M. S. Kim, J. Y. Kim, and J. G. Park (Hanyang University)

14:20 **1018** Behavior of Nickel Deposition on Silicon Wafers from TMAH Based SC1 Cleaning Process – D. Sinha (Self)

Particle Removal – 14:40 – 16:00
Co-Chairs: Koichiro Saga and Jin-Goo Park

14:40 **1019** Contamination, a New Perpective on Requirements and Reduction – P. W. Mertens (imec vzw)

15:00 **1020** Submicron Particle Removal during FPD Oxide TFT Process – J. Lee, M. S. Kim, H. T. Kim, I. C. Choi (Hanyang University), W. Y. Kim, D. S. Lim (LG Display), and J. G. Park (Hanyang University)

15:20 **1021** Effect of 30 Nm Particle Contaminant on the Extreme Ultraviolet (EUV) Mask and Megasonic Cleaning Process for Its Removal – M. S. Kim, I. C. Choi (Hanyang University), H. R. Ji (Hanyang Univerisy), H. T. Kim, I. S. Kim, S. H. Jang, J. Lee, J. H. Kim, H. K. Oh, J. H. Ahn, and J. G. Park (Hanyang University)

15:40 **1022** Removing Organic Residues Using Backside Brush Scrubber Clean – K. N. Chauhan, V. Sih, T. Bhat, M. H. Kang, E. Kabutoya, G. Cheng (GLOBALFOUNDRIES Inc.), and J. Prasad (GLOBALFOUNDRIES)

G04 ULSI Process Integration 9

Electronics and Photonics
103-B, Phoenix Convention Center

Welcome – 10:00 – 10:10
Co-Chair: Cor Claeys

10:00 Welcoming Remarks

3D Integration & Flexible Electronics – 10:10 – 12:10
Co-Chairs: Cor Claeys and Junichi Murota

10:10 **1072** (Keynote) Devices Architectures and Technology for Quantum Computing – T. Kodera, K. Horibe, and S. Oda (Tokyo Institute of Technology)

10:50 **1073** Smartphone ICs Driving Technology to 3-D Stacked Devices/Chips, 3-D Finfet Transistors and High Mobility Channel Materials from 20/22nm Production to 5/7nm Exploratory Research – J. O. Borland (J.O.B. Technologies)

11:20 **1074** (Invited) Gold-Induced Low-Temperature (<300°C) Growth of Quasi-Single Crystal Sige on Insulator for Advanced Flexible Electronics – T. Sadoh, J. H. Park, R. Aoki, and M. Miyao (Department of Electronics, Kyushu University)

11:50 **1075** (Invited) Temporary Bonding with Polydimethylglutarimide for Residue-Free Layer Transfer and 3-D Integration – T. Matsumae (Old Dominion University), A. D. Koehler (U.S. Naval Research Laboratory), J. D. Greenlee (NRC Postdoctoral Fellow Residing at NRL), T. J. Anderson (Naval Research Laboratory), H. Baumgart (Applied Research Center, Old Dominion University), G. G. Jernigan, K. D. Hobart, and F. J. Kub (Naval Research Laboratory)

Photonics & High Frequency Devices – 13:40 – 16:00
Co-Chairs: Junichi Murota and Frank Schwierz

13:40 **1076** (Keynote) Silicon Photonics Technology for Optical Communications with High Bandwidth Density Requirements (1Tbit/s and 1,000 Gbit/s/cm²) – S. Menezo, G. Pares, S. Bernabe, O. Castany (CEA-Leti), C. Sciancalepore, K. Hassan (CEA, Leti), B. Blampey, B. Charbonnier, J. Harduin, S. Messaoudene (CEA-Leti), S. Saeedi, A. Emami (California Institute of Technology), and B. Ben Bakir (CEA, Leti)

14:20 **1077** (Invited) Si Photonics and Recent Challenges for on-Chip Wdm – K. Wada (The University of Tokyo), Z. Zhang, M. Yako, K. Ju, and N. J. Kawai (Department of Materials Engineering, University of Tokyo)

14:50 Intermission

15:00 **1078** (Invited) Multifunctional Technology with Monolithic Integrated THz-, Photonic- and μ-Fluidic Modules – A. Mai, S. Lischke, M. Wietstruck, L. Zimmermann, M. Kaynak, and B. Tillack (IHP)

15:30 **1079** (Invited) Electrical Properties of Group 4 Metal-Nitride/Ge Contacts and the Application to Ge Optoelectronic Devices – H. Nakashima, K. Yamamoto, and D. Wang (Kyushu University)

G05 GaN & SiC Power Technologies 5

Electronics and Photonics / Dielectric Science and Technology

Ellis East, Hyatt Regency

Power Electronics Systems – 10:30 – 12:10
Co-Chairs: Michael Dudley and N. Ohtani

10:30 Welcoming Remarks

10:40 **1110** (Invited) Wide Bandgap Power Switching Devices for Distributed Clean Energy Systems – K. Shenai (LoPel Corporation)

11:10 **1111** (Invited) High Power SiC Power Processing Unit Development – R. Scheidegger (NASA)

11:40 **1112** (Invited) Silver Sinter Joining and Stress Migration Bonding for Wbg Die-Attach – K. Suganuma, T. Sugahara, J. Jiu, S. Nagao, E. Yokoi, and H. Zhang (Osaka University)

Materials Characterization 1 – 14:00 – 16:00
Co-Chairs: Srabanti Chowdhury and N. Ohtani

14:00 **1113** (Invited) Enabling SiC Yield and Reliability through Epitaxy and Characterization – H. Das, S. Sunkari, M. Domeij, A. Konstantinov, F. Allerstam, and T. Neyer (Fairchild Semiconductor)

14:30 **1114** (Invited) Structural Characterization of SiC Crystals Grown By Solvent Laser Heated Floating Zone Method and Hot Wall Chemical Vapor Deposition for the Development of a Low Defect Density Bulk Growth Technique for SiC – B. Raghothamachar, O. Y. Goue, and M. Dudley (Stony Brook University)

15:00 **1115** Direct Determination of Burgers Vectors of Threading Screw and Mixed Dislocations in 4H-SiC c-Plane Wafers Grown By PVT Method – J. Guo, Y. Yang, F. Wu, O. Y. Goue, B. Raghothamachar, and M. Dudley (Stony Brook University)

15:30 **1116** Assessment of Factors Controlling the X-ray Penetration Depth in Studies of 4H-SiC using Monochromatic and White Beam Synchrotron X-ray Topography in Reflection Geometry – Y. Yang, J. Guo, O. Y. Goue, F. Wu, B. Raghothamachar, and M. Dudley (Stony Brook University)

H01 Low-Dimensional Nanoscale Electronic and Photonic Devices 8

Electronics and Photonics / Dielectric Science and Technology / Sensor

105-C, Phoenix Convention Center

Low-Dimensional Nanoscale Electronic and Photonic Devices 1 – 09:50 – 12:30
Co-Chairs: Song Jin and Yu-Lun Chueh

09:50 Welcoming Remarks

09:55 Introductory Remarks

10:00 **1136** (Invited) Semiconductor Nanowires and Nanosheets for Extremely Widely Tunable Lasing – C. Z. Ning (Arizona State University)

10:30 **1137** (Invited) Lead Halide Perovskite Nanowire and Nanoplate Lasers with Low Lasing Thresholds and High Quality Factors – S. Jin (Department of Chemistry, UW-Madison)

11:00 **1138** (Invited) High Performance Deep Ultraviolet Nanowire Light Emitting Diodes and Lasers – Z. Mi, S. Zhao, and X. Liu (McGill University)

11:30 **1139** (Invited) Semiconductor/Oxide Composite Nanowires Supplying White Luminescence – F. Ishikawa (Ehime University) and N. Yamamoto (Tokyo Institute of Technology)

12:00 **1140** Physical and Electrical Properties of Ag Contacts on MoS_2 – H. Yuan, M. Pan (Huazhong University of Science and Technology), G. Cheng, C. A. Richter (National Institute of Standards and Technology), and Q. Li (George Mason University)

12:15 **1141** Post Deposition Annealing Atmosphere Effect on SSI-LEDs Made of Zr-Doped HfO_2 High-*k* Gate Dielectric – S. Zhang, Y. Kuo (Texas A&M University), and S. Verkhoturov (Texas A & M University)

Two Dimensional Materials 1 – 14:00 – 16:00
Co-Chairs: Colm O'Dwyer and Fumitaro Ishikawa

14:00 **1142** (Invited) Electronics Based on Monolayers – L. J. Li (King Abdullah University of Science and Technology)

14:30 **1143** (Invited) Integration of 2-D Materials for Electronic Device Application – J. Jia, J. Jeon, J. H. Park, and S. Lee (Sungkyunkwan University)

15:00 **1144** (Invited) Band Gap Tunable Monolayer $WSe_{2(1-x)}S_{2x}$ Synthesis, Characterization and Device Applications – B. Xiang, J. Huang, L. Yang, and Q. Fu (University of Science and Technology of China)

15:30 **1169** (Invited) Ultrashort Channel Length Black Phosphorus Field-Effect Transistors – J. Miao, S. Zhang, L. Cai, and C. Wang (Michigan State University)

H02 Solid-State Electronics and Photonics in Biology and Medicine 2

Electronics and Photonics / Sensor

Ellis West, Hyatt Regency

FET-based and Magnetic Biosensors – 09:00 – 12:50
Co-Chair: Zong-Hong Lin

09:00 **1183** (Invited) The Next Generation Biochip – Y. S. Yang (National Chiao Tung University)

09:30 **1184** (Invited) Development of Fibronectin-Modified Gold Egfet Sensor for the Detection of *S. Epidermidis* Biofilm and *Staphylococcal* 16S rRNA – C. S. Lai (Department of Electronic Engineering, Chang Gung Univ.)

10:00 **1185** (Invited) Electrical Sensing with a Tube-in-a-Tube Semiconductor – Y. Wang, A. Ng, Y. Piao (University of Maryland), C. F. Chen (National Chung Hsing University), H. Kwon, and C. Lee (University of Maryland)

10:30 Break

10:40 **1186** AlGaN/GaN High Electron Mobility Transistors for Cardiovascular Disease (CVD) Marker Detection – C. H. Chu, Y. L. Wang, I. Sarangadharan, A. Regmi (National Tsing Hua University), and Y. T. Chen (Institute of NanoEngineering and MicroSystems)

10:55 **1187** (Invited) Single Cell Detection Using Magnetic Zigzag Nanowire Biosensor – H. T. Huang and Z. H. Wei (National Tsing Hua University)

11:25 **1188** Simulation of the pH Sensing Capability of an Open-Gate GaN-Based Transistor – E. Patrick, M. Choudhury, and M. E. Law (University of Florida)

11:40 **1189** Aaptamer Immobilized Field-Effect Transistor for Early Diagnostic of Human Immunodeficiency Virus Type 1 (HIV-1) – C. H. Chu, Y. L. Wang, I. Sarangadharan, A. Regmi (National Tsing Hua University), and Y. T. Chen (Institute of NanoEngineering and MicroSystems)

11:55 Lunch

Solid-state Materials and Devices for Energy Harvest – 12:50 – 14:45 Co-Chair: Yu-Lin Wang

12:50 **1190** (Invited) Triboelectric Nanogenerators Harvesting (Bio)Mechanical Energy for Self-Powered Systems – S. Wang (Stanford University)

13:20 **1191** (Invited) Piezotronics in 1D/2D Nanomaterials for Active and Adaptive Nano-Electronics/ Optoelectronics – W. Z. Wu (Purdue University, School of Industrial Engineering)

13:50 **1192** (Invited) A Spontaneously Generated Electrical Charge of an Aqueous Droplet By Pipetting and Its Use of a Self-Powered Sensor – D. Choi and D. S. Kim (Pohang University of Science and Technology)

14:20 **1193** Development of Fiber-Based Devices As Energy Harvesters and Self-Powered Sensors – Z. H. Lin, T. W. Chang, and Y. Y. Ke (National Tsing Hua University)

14:35 Break

Nano Materials and Interficial Effects in Biology – 14:45 – 16:00
Co-Chair: Yu-Lin Wang

14:45 **1194** (Invited) New Electrochemiluminescent Materials for Bioanalysis – G. Xu, W. Qi, L. Zhang, X. Liu, and L. Hu (Changchun Institute of Applied Chemistry)

15:15 **1195** Cultivation of Rat Nerve Cells on Nanoimprinted Microstructures on Polydimethylsiloxane Sheets – E. Koshinuma, H. Maenosono, D. Endo, and Y. Nishioka (College of Science and Technology, Nihon University)

15:30 **1196** Nanobionic Architectures of Photosystem I on Ï€-System Modified Graphene Electrodes – S. C. Feifel, K. Stieger (Technical University of Applied Sciences), H. Lokstein (University of Glasgow), and F. Lisdat (University of Applied Sciences Wildau)

15:45 **1197** Investigation of the Dynamic Relaxation Behavior of Biomolecules Immobilized on Metal Electrode in Time Domain – C. P. Hsu (National Tsing Hua University)

H03 State-of-the-Art Program on Compound Semiconductors 58 (SOTAPOCS 58)

Electronics and Photonics

Curtis A, Hyatt Regency

Semiconductor Growth & Processing – 09:00 – 12:40
Co-Chair: Fan Ren

09:00 **1201** Si Dopant Behavior in InGaAs – K. S. Jones, A. Lind, H. Aldridge Jr. (University of Florida), and C. Hatem (Applied Materials)

09:40 **1202** CMOS Compatible *in-Situ N*-Type Doping of Ge Using New Generation Doping Agents $P(MH_3)_3$ and $As(MH_3)_3$ (M=Si, Ge) – C. Xu, J. D. Gallagher (Department of Physics, Arizona State Univ.), C. Senaratne, P. Sims, J. Kouvetakis (Dept. of Chemistry and Biochemistry, Arizona State Univ.), and J. Menendez (Department of Physics, Arizona State Univ.)

10:00 **1203** Thin-Film Vapor-Liquid-Solid Growth of Compound Semiconductors on Heteroepitaxial and Amorphous Substrates – R. Kapadia (University of Southern California)

10:40 Break

11:00 **1204** Propagation of Nanopores and Formation of Nanoporous Domains during Anodization of n-InP in KOH – D. N. Buckley, R. P. Lynch, N. Quill (University of Limerick, Ireland), and C. O'Dwyer (University College Cork)

11:40 **1205** Towards Electrochemical Fabrication of Free-Standing Indium Phosphide Nanofilms – N. Quill (University of Limerick, Ireland), C. O'Dwyer (University College Cork and Tyndall National Institute), D. N. Buckley, and R. P. Lynch (University of Limerick, Ireland)

12:00 **1206** Plasma Assisted Low Temperature Synthesis of WSe_2 – H. Medina, Y. Z. Chen, T. Y. Su, J. K. Li, and Y. L. Chueh (Dept. of Mater. Sci. and Eng., NTHU)

Compound Semiconductor Characterization – 14:00 – 16:00
Co-Chair: Travis J. Anderson

14:00 **1207** Advanced Characterization of Materials Electronic Structure with High Energy-Resolution X-Ray Spectroscopy – D. Sokaras, T. C. Weng, and D. Nordlund (SLAC National Accelerator Laboratory)

14:40 **1208** Terahertz Spectroscopy: Studying Carrier Dynamics in Semiconductor Nanostructures – L. V. Titova (Worcester Polytechnic Institute), S. Xu (University of Alberta), J. M. Baribeau (National Research Council), D. J. Lockwood (National Research Council Canada), and F. Hegmann (University of Alberta)

15:20 **1209** Characterization of Compound Semiconductors using Aberration-Corrected Electron Microscopy – D. Smith (Arizona State University Department of Physics)

I02 Harnessing Multi-Step Electrochemical Reactions for Energy Conversion and Storage

Energy Technology / Physical and Analytical Electrochemistry
Remington C, Hyatt Regency

Harnessing Multi-Step Electrochemical Reactions for Energy Conversion and Storage – 09:55 – 15:40
Co-Chair: S. R. Narayanan

09:55 Welcoming Remarks

10:00 **1230** Catalytic Design through Computational Modeling: Exploring the Electrochemical Oxidation of Glycerol By Nitroxyl Radical – D. P. Hickey (University of Utah), I. Matanovic (University of New Mexico), D. Schiedler (University of Utah), P. Atanassov (University of New Mexico), M. S. Sigman, and S. D. Minteer (University of Utah)

10:30 **1231** A Npg-Based Ultra-Thin Anode Catalyst Layer for Spewe – Y. Zeng, X. Guo, X. Wang, Z. Wang, H. Yu, Z. Shao, and B. Yi (Dalian Institute of Chemical Physics)

10:50 Break

11:00 **1232** Hybrid Biotic/Abiotic Catalysts for Oxidation of Complex Biofuels – I. Matanovic, A. T. Perry III, S. Babanova (University of New Mexico), S. Chakraborty (Los Alamos National Laboratory), D. P. Hickey (University of Utah), A. Serov, K. Artyushkova (University of New Mexico), J. S. Martinez (Los Alamos National Laboratory), S. D. Minteer (University of Utah), and P. Atanassov (University of New Mexico)

11:20 **1233** Electro-Oxidation of Ethanol at Low and Intermediate Temperature Investigated By on-Line Mass Spectrometry – A. C. Queiroz, W. O. Silva (Instituto de Química de Sao Carlos), V. S. Thoi (California Institute of Technology), S. M. Haile (California Institute of Technology, Northwestern University), and F. H. B. de Lima (Instituto de Química de Sao Carlos)

11:40 **1234** Borohydride Electro-Oxidation on Ni-Based Electrocatalysts: Investigation of Electrocatalytic Activity and Hydrolysis Process – D. C. de Oliveira, W. J. Paschoalino (Universidade de São Paulo (USP)), M. Chatenet (Grenoble Institute of Technology, Phelma), E. A. Ticianelli, and F. H. B. de Lima (Universidade de São Paulo (USP))

12:00 Lunch

14:00 **1235** CO2 Electrochemical Reduction to Hydrocarbon Fuels on Carbon-Supported Copper Nanoparticles: Support Effect – Q. Lu, A. Purdy (Naval Research Laboratory), B. Dyatkin, Y. Gogotsi (Drexel University), and O. A. Baturina (Naval Research Laboratory)

14:20 **1236** TEMPO-Modified Linear Poly(ethylenimine) for Immobilization-Enhanced Electrocatalytic Oxidation of Alcohol – D. P. Hickey, R. D. Milton, D. Chen, M. S. Sigman, and S. D. Minteer (University of Utah)

14:40 **1237** Experimental and Modelling Insights into the Borohydride Electrooxidation Reaction Mechanism at Platinum Electrodes – M. Chatenet, P. Y. Olu (LEPMI-Grenoble), A. Bonnefont (Université de Strasbourg), N. Job (Université de Liège), and E. R. Savinova (ICPEES UMR 7515-CNRS-Univeristy of Strasbourg)

15:00 **1238** Exploring the Non-Innocence of Inorganic Complex Ligands in (photo-) Electrochemical CO2 Reductions – K. Saravanan, V. B. Oyeyemi, and J. A. Keith (University of Pittsburgh)

15:20 **1239** Precise Viscosity Analysis of Alkali Metal Molten Salts at High Temperature – S. W. Kim, K. Uematsu, K. Toda, and M. Sato (Niigata University)

I03 High Temperature Experimental Techniques and Measurements 2

High Temperature Materials
Remington B, *Hyatt* Regency

Electrochemistry – 09:00 – 12:00
Co-Chairs: Torsten Markus and Xiao-Dong Zhou

09:00 Welcoming Remarks

09:40 **1242** A Laboratory Study of Partial Anode Effects during Aluminium Electrolysis – H. Åsheim (Norwegian University of Science and Technology), E. Sandnes (Norwegian University of Science and Technology, Hydro Primary Metal Technology), T. Aarhaug (SINTEF, Norway), O. S. Kjos (SINTEF Materials and Chemistry, 7456 Trondheim, Norway), A. Solheim (SINTEF Materials and Chemistry), and G. M. Haarberg (Norwegian University of Science and Technology)

10:00 **1243** Synthesis of VC-C Nanocomposite for Electrochemical Applications – M. Mahajan (THAPAR UNIVERSITY, Patiala), K. Singh (Thapar University), and O. P. Pandey (THAPAR UNIVERSITY, Patiala)

10:20 Break

10:40 **1244** *In Operando* Vibrational Raman Studies of Chlorine Contamination in Solid Oxide Fuel Cells – K. W. Reeping and R. A. Walker (Montana State University)

11:00 **1245** Reliable Determination of Surface Exchange and Bulk Diffusion Coefficients of $La_2NiO_{4+\hat{\imath}"}$ Cathode Materials for SOFC – W. Li, B. Guan, and X. Liu (West Virginia University)

11:20 **1246** Thermodynamic Properties of Nd in Liquid Nd-Bi Alloys Using Electrochemical Methods – N. D. Smith and H. Kim (Pennsylvania State University)

Corrosion – 14:00 – 16:00
Co-Chair: Gregory S. Jackson

14:00 **1247** Potential of Knudsen Effusion Mass Spectrometry (KEMS) for Thermo Chemical Studies in Materials Science – T. Markus (Mannheim University of Applied Sciences)

14:20 **1248** Behavior of Sodium Sulfate in Cryolite-Alumina Melts and Formation of Sulfurous Gases – R. Meirbekova (Norwegian University of Science and Technology, Reykjavik University), G. M. Haarberg, J. Thonstad (Norwegian University of Science and Technology), T. A. Aarhaug (SINTEF, Norway), and G. Saevarsdottir (Reykjavik University)

14:40 Break

15:00 **1249** In-Situ Reduction/Carburization of WO3 in the Presence of Hydrocarbon – G. Singla (THAPAR UNIVERSITY), K. Singh, and O. P. Pandey (Thapar University)

15:20 **1250** Corrosion of Hastelloy in Molten Salt Used As High Temperature Heat Transfer Fluids – D. F. Gervasio and H. H. Elsentriecy (University of Arizona)

I05 Polymer Electrolyte Fuel Cells 15 (PEFC 15)

Energy Technology / Battery / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry

211-A+B, Phoenix Convention Center

PEFC-15 Plenary Session I – 09:10 – 12:00
Co-Chairs: Hiroyuki Uchida and Hubert A. Gasteiger

09:10 Welcoming Remarks

09:20 **1303** Non-Platinum Group Metal Catalysts for Oxygen Reduction in Fuel Cell Applictaions – P. Atanassov, A. Serov, K. Artyushkova, I. Matanovic (University of New Mexico), B. Kiefer (New Mexico State University), and B. Halevi (Pajarito Powder, LLC)

10:00 **1304** Development of Alkaline Membranes and Alkaline Membrane Fuel Cells – L. Zhuang (Wuhan University)

10:40 **1305** Various Scales Of Aging Heterogeneities Upon PEMFC Operation – A Link Between Local MEA Materials Degradation And The Cell Performance – M. Chatenet, L. Dubau, J. Durst, L. Castanheira (LEPMI-Grenoble), F. Maillard (LEPMI, UMR 5279 CNRS), A. Lamibrac (LEMTA), J. Dillet (LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy), G. Maranzana (LEMTA), O. Lottin (LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy), A. El Kaddouri (LEPMI-LMOPS Chambéry), G. De Moor, C. Bas, L. Flandin (LEPMI-Univ. Savoie), E. Rossinot, and N. Caqué (AXANE)

11:20 **1306** The Power of in-Situ Studies: How X-Ray Absorption Spectroscopy Can Help to Develop PEMFC Catalysts with Increased Activity and Stability – C. Roth (Freie Universitaet Berlin), S. Kaserer (Materials Science, TU Darmstadt), C. Brieger, J. Melke (Freie Universitaet Berlin), D. E. Ramaker, and K. M. Caldwell (George Washington University)

PEFC-15 Plenary Session II – 13:40 – 16:50
Co-Chairs: Deborah Jacqueline Jones and Karen Swider-Lyons

13:40 **1307** Mathematical Modelling and Experimental Analysis of Thin, Low Loading Fuel Cell Electrodes – M. Secanell (University of Alberta), A. Putz (AFCC Automotive Fuel Cell Cooperation Corp.), S. Shukla, P. Wardlaw, L. M. Pant, M. Sabharwal, and M. Bhaiya (University of Alberta)

14:20 **1308** A Mechanistic Study of Perfluorosulfonic Acid Membrane Water Permeance Degradation in Air – F. D. Coms, T. J. Fuller, and C. P. Schaffer (General Motors Company)

15:00 Break

15:20 **1309** PEM Electrolysis: Ready for Impact – C. K. Mittelsteadt (Giner, Inc.)

16:00 **1310** Current Status and Future Outlook of Fuel Cell Vehicle Development in Toyota – K. Kojima and K. Fukazawa (Toyota Motor Corporation)

16:40 **1311** Fuel Cell Technology to Market Activity – S. Satyapal (U.S. Department of Energy)

J01 Physics and Chemistry of Luminescent Materials

Luminescence and Display Materials

Phoenix West, Hyatt Regency

New Phosphor Materials – 10:00 – 16:00
Co-Chairs: Anant A. Setlur and John Collins

10:00 **1565** RE-Doped Ternary Sulfides $ALnS_2$ (A = Rb, K, Na; Ln = La, Gd, Lu, Y) - a New Phosphor Family – V. Jary, L. Havlak (Institute of Physics, Czech Academy of Sciences), J. Barta (Czech Technical University in Prague.), E. Mihokova, M. Buryi, M. Rejman, and M. Nikl (Institute of Physics, Czech Academy of Sciences)

10:40 **1566** Red Emitting Ca_2SiO_4:Eu^{2+} Phosphors for White Light Emitting Diodes – Y. Sato (Department of Chemistry, Okayama University of Science), H. Kuwahara, H. Kato, M. Kobayashi, and M. Kakihana (IMRAM, Tohoku University)

11:00 **1567** Design and Luminescent Properties of Ce^{3+}-Activated Oxide Phosphor – S. W. Kim, T. Hasegawa, M. Muto, Y. Kawano, K. Uematsu, K. Toda (Niigata University), H. Takaba (Kogakuin University), T. Ishigaki, and M. Sato (Niigata University)

11:20 **1568** The Pursuit of Novel Phosphor Hosts for the Next Generation of Solid State Lighting – J. Brgoch (University of Houston)

12:00 Break

13:30 **1569** Recent Progress in Blue Phosphors: From Non-Thermal Quenching to Highly Efficient Phosphor – W. B. Im (Chonnam National University) and Y. H. Kim (School of Materials Science and Engineering)

14:10 **1570** Luminescent Materials Informatics Based on Confirmatory Factor Analysis – K. S. Sohn, S. Singh, W. B. Park, and M. Kim (Sejong University)

L01 Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry General Session

Physical and Analytical Electrochemistry
Borein B, Hyatt Regency

Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry I – 09:00 – 12:20
Co-Chairs: Luke M. Haverhals and Petr Vanýsek

09:00 **1596** Real Time Monitoring of Electrostatic Potentials in the Vicinity of Electrodes Delivering Current Pulses Used in Neural Stimulation – Z. Feng, D. Friel (Case western reserve university), and D. Scherson (Case Western Reserve University)

09:20 **1597** A Versatile Bioanode with Improved Current Density and the Coulombic Efficiency through a Cascade Reaction – M. N. Zafar (University of Gujrat, Gujrat, Pakistan), I. Aslam (Govt. College University Faisalabad, Pakistan), S. Murtaza (University of Gujrat, Gujrat, Pakistan), R. Ludwig (University of Natural Resources and Life Science, Austria), and L. Gorton (Lund University, Lund, Sweden)

09:40 **1598** Direct Electrochemical Conversion of Nitrogen to Ammonia from Air and Water on Nitride Electro-Catalysts at Ambient Conditions – Y. Abghoui and E. Skulason (University of Iceland)

10:00 Break

10:20 **1599** Electrochemical and Catalytic Properties of Liver Microsomes Adsorbed to Magnetic Nanoparticles – R. Nerimetla and S. Krishnan (Oklahoma State University)

10:40 **1600** Electron Transport in Magnetic Nanomaterials for Sensing and Catalytic Applications – S. Krishnan, G. Premaratne, T. Sunday, R. Matlock, and C. Walgama (Oklahoma State University)

11:00 **1601** Bimetallic Iron and Nickel Nanoparticles for the Electrocatalytic Oxidation of Methanol and Ethanol for Fuel Cells – S. L. Candelaria, N. Bedford, and L. F. Greenlee (National Institute of Standards & Technology)

11:20 **1602** Electrochemical Kinetic Study on the a Yeast-Catalyzed Activity in Microbial Half Cell – Y. B. Jeon (Dept. of Syst. Eng., University of Arkansas at Little Rock), F. Tang (Dept. of Biology, University of Arkansas at Little Rock), and J. W. Lee (Dept. of Syst. Eng., University of Arkansas at Little Rock)

11:40 **1603** The Effect of Intra Vs. Intermolecular Proton Transfer on the Oxidation of Phenylenediamine-Based Ureas – D. K. Smith and R. He (San Diego State University)

Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry II – 14:00 – 16:00
Co-Chairs: Stephen Maldonado and Sanjeev Mukerjee

14:00 **1604** Effect of High Energy Carbon Beam Irradiation on Carbon Nanotubes Modified Glassy Carbon and Its Application in Sensing of Deoxyguanosine – R. N. Goyal, R. Sharma (IIT Roorkee), and P. Gupta (IITRoorkee)

14:20 **1605** Mediator-Less Catalytic Oxidation of NADH Using Oxygen Plasma Treated Screen Printed Carbon Electrodes – M. Sankararao and J. Mathiyarasu (CSIR-Central Electrochemical Research Institute)

14:40 **1606** FEM Modelling of Diffusional Electrochemical Impedance Spectroscopy at a Channel Electrode – T. Holm, M. Ingdal, F. Seland (Norwegian University of Science and Technology), and D. A. Harrington (University of Victoria)

15:00 **1607** Reversibility of Ferri-Ferrocyanide Redox during in-Situ Soft X-Ray Spectroscopy – M. Risch, K. A. Stoerzinger (Massachusetts Institute of Technology), T. Z. Regier (Canadian Light Source), D. Peak (University of Saskatchewan), S. Nagy, and Y. Shao-Horn (Massachusetts Institute of Technology)

15:20 **1608** Impedance of Mediated Electrochemical Processes: Fenton Reaction – P. Polczynski (Department of Chemistry, University of Warsaw) and R. R. Jurczakowski (University of Warsaw, Department of Chemistry)

15:40 **1609** Application of the Wedge Scheme to Explain Quinone-Phenol Electrochemical Systems – P. A. Staley (University of California, San Diego) and D. K. Smith (San Diego State University)

L06 Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 6

Energy Technology / Physical and Analytical Electrochemistry / Sensor
104-B, Phoenix Convention Center

Solar Fuel Generation by Materials Beyond Oxides-II: Invited Talks – 14:00 – 16:00
Co-Chairs: Heli Wang and Nianqiang (Nick) Wu

14:00 **1686** Plasmon-Mediated Surface Chemistry for Solar Photocatalysis – W. D. Wei (University of Florida)

14:30 **1687** Hot-Carrier Interactions in Semiconductor Nanomaterials Designed for High-Efficiency Solar Energy Conversion – I. Robel, C. Cirloganu, L. A. Padilha, Q. Lin, N. Makarov, J. M. Pietryga, and V. I. Klimov (Los Alamos National Laboratory)

15:00 **1688** Solar-to-Hydrogen Production on Multi-Band Photoelectrodes: Surpassing the Current Matching Requirements of Conventional Tandem Devices – Z. Mi (McGill University), B. AlOtaibi (McGIll University), and S. Fan (McGill University)

15:30 **1689** New III-V Semiconductor Alloys for Solar Hydrogen Production – S. Sunkara, M. K. Sunkara, A. Garcia, H. Russell (University of Louisville), M. Menon (University of Kentucky), and J. B. Jasinski (University of Louisville)

16:00 **1690** Solar to Fuels Conversion By a Monolithic and Standalone Photoelectrochemical Device – H. S. Jeon, Y. J. Hwang (Korea Institute of Science and Technology), and B. K. Min (Korea Institute of Science and Technology, Green School, Korea University)

M03 Sensors for Agriculture

Sensor
Phoenix East, Hyatt Regency

Sensors for Agriculture - Oral Session – 09:00 – 16:00
Co-Chair: Bryan A Chin

09:00 **1815** Smart(er) Agriculture: Robotics, Sensing, and Autonomy – D. Schmoldt (National Institute of Food & Agriculture)

09:40 **1816** Sensor Research and Detection Technology for Efficient Water Usage and Security in Agriculture – D. J. KIM (Auburn University)

10:00 **1817** Oligopeptide Probe Coated Magnetoelastic Biosensors for the Rapid Detection of *Salmonella T*yphimurium – S. J. Suh (Department of Biological Sciences, Auburn University)
10:20 Break
10:40 **1818** The Center for Produce Safety - an Industry's Journey to Reduce Foodborne Illness – B. Fernandez-Fenaroli (Center for Produce Safety)
11:10 **1819** Spectral Imaging Technologies for Food Safety and Quality Evaluations – M. S. Kim (USDA-ARS)
11:40 **1820** New Development in Physical, Chemical, and Biological Sensors for Precision Agriculture – Z. Y. Cheng (Auburn University)
12:00 Lunch
14:00 **1821** Biomaterials Research Support at the National Science Foundation – A. Simonian (National Science Foundation)
14:30 **1822** Phase-Based Electrochemical Biosensors for Detection of Pathogenic Bacteria – Y. Zhou (Department of Chemistry, University of Georgia) and R. P. Ramasamy (College of Engineering,University of Georgia)
14:50 **1823** A Biosensor Based on Magnetic Resonance Relaxation – M. Sullivan and B. C. Prorok (Auburn University)
15:10 Discussion

Z04 Electrochemical Energy Summit (E2S)

All Divisions
101 A+B+C, Phoenix Convention Center

Electrochemical Energy Summit Plenary – 08:00 – 08:45
Co-Chair: Daniel Scherson

08:00 **1947** Electrochemical Energy Summit Plenary Address – F. M. Orr Jr. (Department of Energy)

Electrochemical Energy Summit Session 1 - JCESR Talks – 08:45 – 09:55
Co-Chair: Daniel Scherson

08:45 **1948** The Joint Center for Energy Storage Research (JCESR): A New Paradigm for Energy Storage Research – G. Crabtree (University of Illinois at Chicago)
09:15 **1949** Overcoming Key Challenges for a Viable Lithium-Sulfur Transportation Battery – K. R. Zavadil (Sandia National Laboratories, Joint Center for Energy Storage Research)
09:35 **1950** Non-aqueous Redox Flow Batteries for Grid Storage – F. R. Brushett (Joint Center for Energy Storage Research, Massachusetts Institute of Technology)

Electrochemical Energy Summit Session 2 - JCAP Talks – 10:05 – 11:25
Co-Chair: Krishnan Rajeshwar

10:05 **1951** Artificial Photosynthesis- Progress and Prospects – H. A. Atwater (California Institute of Technology)
10:35 **1952** New Advances in Stabilizing High-Efficiency Semiconductors for Use in Solar Fuels Applications – M. T. McDowell, K. Sun (California Institute of Technology), S. Hu, M. F. Lichterman (Joint Center for Artificial Photosynthesis), X. Zhou (California Institute of Technology), M. Shaner (Caltech), E. Verlage (Joint Center for Artificial Photosynthesis), B. Brunschwig (California Institute of Technology), and N. S. Lewis (Joint Center for Artificial Photosynthesis)
10:55 **1953** Bringing Components to Solar Fuels Prototypes: Material Discovery, Interface Engineering, and Integration – I. D. Sharp (Joint Center for Artificial Photosynthesis, Lawrence Berkeley National Laboratory)

Electrochemical Energy Summit Session 3 - Industry Talks – 11:35 – 13:00
Co-Chair: Adam Z. Weber

11:35 **1954** U.S. Department of Energy Hydrogen and Fuel Cell Tech-to-Market Activities and National Laboratory Impact Initiatives – S. Satyapal (U.S. Department of Energy), C. Ainscough (National Renewable Energy Laboratory), A. Z. Weber (Lawrence Berkeley National Laboratory), S. Malhotra (SRA International, Inc.), D. C. Papageorgopoulos, and R. Farmer (U.S. Department of Energy)
11:55 **1955** Industry Invited Talks: "The Future of Battery and Fuel Cell Powered Cars: Challenges and Opportunities" – TBD
12:55 Concluding Remarks

106-B, Phoenix Convention Center
Electrochemical Energy Summit Breakout Session 1 – Public-Private Partnership for Research and Development – 15:00 – 16:00

Co-Chair: Jeffrey Chamberlin

15:00 Breakout Session 1

106-C, Phoenix Convention Center
Electrochemical Energy Summit Breakout Session 2 – Team Science – 15:00 – 16:00
Co-Chair: George Crabtree

15:00 Breakout Session 2

Tuesday, October 13

Highlights

0800h ..... Electrochemical Energy Summit – Sessions Begin, 101-C, Phoenix Convention Center
0930h ..... Technical Session Coffee Break First Floor, Phoenix Convention Center–and–The Atrium, Hyatt Regency
1245h ..... DOE EERE Lab Tech to Market Showcase: Leveraging the Labs 213-A, Phoenix Convention Center
1300h ..... Technical Exhibit opens, West Hall 1, Phoenix Convention Center
1650h ..... Carl Wagner Memorial Award –and- ECS Battery Division Research Award Lecture, 106-B, Phoenix Convention Center
1730h ..... DOE EERE Lab Tech to Market Showcase: Lab Showcase, Second Floor Lobby, Phoenix Convention Center
1735h ..... ECS Europe Section Heinz Gerischer Award Lecture, 104-B, Phoenix Convention Center
1800h ..... Technical Exhibit & General & Student Poster Session

A01 Joint General Session: Batteries and Energy Storage -and- Fuel Cells, Electrolytes, and Energy Conversion

Battery / Energy Technology
106-B, Phoenix Convention Center

Batteries: Cathodes – 08:00 – 12:00
Co-Chairs: Jun Lu and Stephen J. Harris

08:00 **14** Effectively Suppressing Dissolution of Manganese from $LiMn_2O_4$ Spinel Via a Novel Nanoscale Surface-Doping Approach – J. Lu (Argonne National Laboratory), C. Zhan (Argonne National Laboratory, Tsinghua University, Beijing 100084, China), T. Wu (Argonne National Laboratory, Argonne, IL, 60439), X. Qiu (Tsinghua University Beijing), and K. Amine (Argonne National Laboratory)

08:20 **15** Electrochemical and Structural Properties of Rh Substituted Li_2MnO_3 – L. Torres-Castro (Dept. of Physics, University of Puerto Rico-Rio Piedras), A. Manivannan (U.S. Department of Energy), and R. S. Katiyar (University of Puerto Rico, Rio Piedras Campus)

08:40 **16** Direct Dry Synthesis of $LiNi_{0.8}Co_{0.2}O_2$ Thin Film for Lithium Ion Battery Cathodes – Y. Wang and R. Maric (University of Connecticut)

09:00 **17** Towards the 3D Thin-Film Li-Ion Battery: A Novel Solution-Based Process for the Deposition of (Multi-)Metal Oxide Coatings on High Aspect Ratio Features – S. Gielis, N. Peys (Hasselt University, imomec, imec), S. Moitzheim, P. M. Vereecken (imec, KU Leuven), A. Hardy, and M. K. Van Bael (Hasselt University, imomec, imec)

09:20 **18** Enhanced Electrochemical Properties of Gradient Cathode Material By Coating – H. Wu (Argonne National Laboratory)

09:40 **19** Improved Electrochemical Performance of Multi-Phase Layered-Spinel Cathodes for Li-Ion Batteries – D. Aurbach (Bar-Ilan University), P. Nayak (Bar-Ilan University, Ramat Gan, Israel 52900), J. Grinblat, M. D. Levi, O. Haik, and E. Levi (Bar-Ilan University)

10:00 Break

10:20 **20** Synthesis and Characterization of High Capacity $LiFeBO_3$ – M. A. Cambaz, A. R. Munnangi (Helmholtz Institute Ulm (HIU)), A. Pohl, R. Witte (Karlsruhe Institute of Technology (KIT)), and M. Fichtner (Karlsruhe Institute of Technology (KIT), Germany)

10:40 **21** Structurally Tailored Polyanion Deficient LiFePO4 As Cathode Materials for Li-Ion Batteries – C. Back, Y. Noh, and Y. Cho (EIG)

11:00 **22** What Is Different about Hydrothermally Synthesized Îμ-$LiVOPO_4$? – Y. Chung, B. Wen (NECCES at Binghamton University), F. Omenya (State University of New York at Binghamton), N. Chernova, K. Kharki (NECCES at Binghamton University), K. M. Wiaderek, K. W. Chapman, P. J. Chupas (NECCES at Argonne National Laboratory), and M. S. Whittingham (NECCES at Binghamton University)

11:20 **23** Lithium-Sulfur Battery Cathodes with in Situ Polymerized Conductive Polymer Coating – Y. Ansari and Y. M. Chiang (Massachusetts Institute of Technology)

11:40 **24** Ternary Metal Fluorides As High-Energy Cathodes with Low Cycling Hysteresis – F. Wang, S. W. Kim (Brookhaven National Lab), and J. Graetz (HRL Laboratories LLC)

106-A, Phoenix Convention Center
Electrocatalysis – 08:00 – 12:00
Co-Chairs: S. R. Narayanan and A. Manivannan

08:00 **25** Iron-Doped Nickel Cobalt Oxide Based High Performance Oxygen Evolution Reaction Electrode in Alkaline Media – P. Trinh, S. Malkhandi, A. K. Manohar (University of Southern California), A. Manivannan (U.S. Department of Energy), and S. R. Narayanan (University of Southern California)

08:20 **26** Investigation of Conducting Polymers As Binding Agents for Oer/ORR Electrode Characterization – M. A. Abreu Sepulveda (University of Rochester), G. Liu (Lawrence Berkeley National Laboratory), and A. Manivannan (U.S. Department of Energy)

08:40 **27** Effect of Substitution in $Pb_2Ru_2O_{7-\delta}$ on the Oxygen Evolution Reaction – M. Abreu-Sepulveda (University of Rochester), D. A. Tryk (Fuel Cell Nanomaterials Center, University of Yamanashi), S. R. Narayanan (University of Southern California), D. J. Quesnel (University of Rochester), and A. Manivannan (U.S. Department of Energy)

09:00 **28** Cobalt Nanoparticles Embedded in Porous Carbon Nanofibers As Bifunctional Electrocatalysts for Oxygen Reduction and Evolution Reactions – R. Singhal and V. Kalra (Drexel University)

09:20 **29** Activity and Stability of Perovskite Oxides at Neutral pH for Oxygen Evolution Catalysis – B. Han, M. Risch, Y. L. Lee (Massachusetts Institute of Technology), C. Ling, H. Jia (Toyota Research Institute of North America), and Y. Shao-Horn (Massachusetts Institute of Technology)

09:40 Break

10:00 **30** Improved RhxSy/C Catalyst Structure for Higher HOR/HER Activity – Y. Li (University of Kansas) and T. V. Nguyen (UNIVERSITY OF KANSAS)

10:20 **31** Manganese Dioxide Polymorphs As Oxygen Reduction Catalysts – S. W. Donne and S. Pulukadang (University of Newcastle)

10:40 **32** A Spatially Resolved PEM Fuel Cell Catalyst Degradation Study Under Automotive Load Cycle for Durability Prediction – M. Mayur (Offenburg University of Applied Sciences, Germany), M. Quinaud (DRT-LITEN/DEHT/SIGE/L2M, CEA Grenoble, France), and W. G. Bessler (Offenburg University of Applied Sciences, Germany)

11:00 **33** A New Guide for Searching High-Performance Catalysts for Direct Alcohol Fuel Cells – Y. Yang and Y. Yang (Colorado School of Mines)

11:20 **34** Functionalized Multi-Walled Carbon Nanotubes As Supporting Matrix for Enhancement Oxidation of Fucose on Gold Nanoparticle-Based Catalyst – V. T. Huong (JST, CREST, Osaka University), H. Yoshikawa (Osaka Univ, JST, CREST, Osaka University), L. Q. Hoa, H. Toake (Osaka Univ), and E. Tamiya (Osaka University)

106-B, Phoenix Convention Center
Batteries: System I – 14:00 – 16:40
Co-Chairs: Dean R. Wheeler and Doron Aurbach

14:00 **35★** (Battery Division Student Research Award) Real-time Diffraction Studies of Electrode Materials for Li-ion and Na-ion Batteries – M. Bianchini (UPJV/CNRS/Institut Laue-Langevin/RS2E), E. Suard (Institut Laue-Langevin), L. Croguennec (CNRS/RS2E), and C. Masquelier (UPJV/RS2E)

14:40 **36** Constraints of the Shuttle Mechanism in Li-S Batteries – D. Aurbach (Bar-Ilan University), A. Rosenman, E. Markevich (Bar Ilan University), G. Salitra (Department of Chemistry, Bar-Ilan University, Israel), and F. F. Chesneau (BASF SE)

15:00 **37** Percolation Pressure of Droplets Emerging through Pores: Geometrical and Pinning Considerations – A. Herescu (Purdue University Calumet)

15:20 **38** Quantifying the Influence of Carbon Black De-Agglomeration on the Electrochemical Performance of Lithium-Ion Battery – H. Dreger, L. Froböse, W. Haselrieder (TU Braunschweig), and A. Kwade (Technische Universität Braunschweig)

15:40 **39** Density Functional Theory and Conductivity Studies of Boron-Based Anion Receptors – K. Leung, K. R. Fenton, S. Rempe, M. Chaudhari, H. Pratt, C. Staiger, and G. Nagasubramanian (Sandia National Laboratories)

16:00 Break

16:20 **40** Structural Evolution during Lithiation Cycles of the Li-Au System Observed By in-Situ High-Energy x-Ray Diffraction – P. Bach (Hasselt University), I. Valencia-Jaime, A. H. Romero (West Virginia University), and F. U. Renner (Hasselt University, Max-Planck-Institut für Eisenforschung)

106-A, Phoenix Convention Center
Fuel Cells – 14:00 – 18:00
Co-Chairs: Trung Van Nguyen and Deryn Chu

14:00 **45** Analytical Modeling of Thermal Conductivity of Catalyst Layer of Polymer Electrolyte Membrane (PEM) Fuel Cells – M. Ahadi (Simon Fraser University), J. Stumper (Automotive Fuel Cell Cooperation Corporation), and M. Bahrami (Laboratory for Alternative Energy Conversion (LAEC))

14:20 **46** Alkaline Hydrogen-Iodine Reversible Fuel Cell – T. V. Nguyen, V. Yarlagadda (The University of Kansas), and D. Konwar (University of Kansas)

14:40 **47** A Dual-Mode Rechargeable Lithium-Bromine/Oxygen Fuel Cell – P. Bai (Massachusetts Institute of Technology), V. Viswanathan (Carnegie Mellon University), and M. Z. Bazant (Massachusetts Institute of Technology)

15:00 **48** A Glucose Fuel Cell with Graphene-Coated Carbon Fiber Cloth – K. Hoshi (College of Science and Technology, Nihon University), K. Muramatu, H. Sumi (Incubation Alliance, INC), and Y. Nishioka (College of Science and Technology, Nihon University)

15:20 **49** Integration of Glucose Biofuel Cells with a MEMS Diaphragm Micropump – T. Ishida, Y. Fukushi, and Y. Nishioka (College of Science and Technology, Nihon University)

15:40 **50** Modeling Diffusivity in Catalyst Layer of a PEMFC Based on a Unit Cell Approach – S. Salari, C. McCague (Simon Fraser University), M. Tam, J. Stumper (Automotive Fuel Cell Cooperation Corp.), and M. Bahrami (Laboratory for Alternative Energy Conversion (LAEC))

16:00 **51** A Multiscale Approach Toward the Design and Understanding of Stable and Conductive Anion Exchange Membrane Materials – K. N. Grew, J. P. McClure, D. Chu (U.S. Army Research Laboratory), V. Molinero, L. C. Jacobson, J. Lu, D. Bedrov, J. B. Hooper, Z. Li, R. M. Kirby (The University of Utah), A. van Duin, and W. Zhang (Pennsylvania State University)

16:20 **52** Understanding the Acid-Alkaline Bipolar Membrane Electrolyte for Fuel Cell Applications – K. N. Grew, J. P. McClure, D. Chu (U.S. Army Research Laboratory), J. M. Ahlfield, L. Liu, and P. A. Kohl (Georgia Institute of Technology)

16:40 **53** Experimental Development of Acid-Alkaline Bipolar Membrane Electrolytes – J. P. McClure, K. N. Grew, and D. Chu (U.S. Army Research Laboratory)

17:00 **54** Conducting Polymers As Electrode Modifiers for the Enhanced Microbial Fuel Cell Performance – S. Kim, J. Ahmed, Y. Jeon, Y. Lee, and J. H. Kim (Konkuk University)

17:20 **55** High-Temperature Self-Humidifying Proton Exchange Membrane Fuel Cell – W. Han and K. L. Yeung (The Hong Kong University of Science and Technology)

106-B, Phoenix Convention Center
Carl Wagner Memorial Award -and- Battery Division Research Award – 16:40 – 17:30
Co-Chairs: Robert Kostecki and Doron Aurbach

16:40 Introductory Remarks

16:50 **104★** (Carl Wagner Memorial Award -and- Battery Division Research Award) Anodes for Lithium Ion Batteries Revisited: From Graphite to High-Capacity Alloying- and Conversion-Type Materials and Back Again – M. Winter (University of Muenster, MEET Battery Research Center), H. Jia (MEET - Münster Electrochemical Energy Technology), B. Vortmann (MEET Battery Research Center, University of Muenster), M. Evertz, S. Nowak (University of Münster, MEET Battery Research Center), and T. Placke (University of Muenster, MEET Battery Research Center)

West Hall 1, Phoenix Convention Center
A01 Poster Session – 18:00 – 20:00
Co-Chairs: Won-Sub Yoon and A. Manivannan

- **56** Li Pre-Doping of Amorphous Si Thin Flakes in Li-Aromatic Complex Solutions – Y. Masuo (Doshisha University), S. Yoshida (DENSO CORPORATION, Doshisha University), D. Shibata (DENSO CORPORATION), M. Haruta, T. Doi, and M. Inaba (Doshisha University)
- **57** the Growth of Hierarchal Shape Tin Used As Catalysts Support Towards a Binder Free Fuel Cell Anodes – A. Schechter (Ariel University), H. Teller, P. Subramanian (Department of Biological Chemistry, Ariel University), and S. Ochanuna (Ariel University)
- **58** High Energy Density Capacitor By Plasma-Treated ALD BaTiO3 Thin Films – J. An (Seoul National University of Science and Technology, Stanford University) and F. B. Prinz (Stanford University)
- **59** Quinhydrone Formation and Its Impact on the Cell Voltage of the Quinone-Bromide Flow Battery – Q. Chen (Harvard School of Engineering and Applied Science), R. G. Bombarelli, L. Tong (Harvard Department of Chemistry and Chemical Biology), M. P. Marshak (Harvard School of Engineering and Applied Sciences), R. G. Gordon, A. Aspuru-Guzik (Harvard Department of Chemistry and Chemical Biology), and M. J. Aziz (Harvard School of Engineering and Applied Sciences)
- **60** Oxidation Controlled Anode Materials for Li Ion Battery – J. J. Jeong (Seoul National University)
- **61** Optimization of Dispersion Property of a Thin Ceramic-Coating Layer on Thermal and Electrochemical Properties of Separator for Lithium-Ion Batteries – H. Kim (korea institute of ceramic engineering & Technology)
- **62** Long-Term Stability of Quinone Electrolytes in Aqueous Flow Batteries – M. R. Gerhardt (Harvard School of Engineering and Applied Sciences), L. Tong (Harvard Department of Chemistry and Chemical Biology), M. P. Marshak (Harvard School of Engineering and Applied Sciences), R. G. Gordon (Harvard Department of Chemistry and Chemical Biology), and M. J. Aziz (Harvard School of Engineering and Applied Sciences)
- **63** Safety Characteristics of Chemically Delithiated Cathode Active Materials – Y. Aoki (Toray Research Center, Inc.), C. Yanagisawa, T. Nakagawa, Y. Furushima, Y. Hasegawa (Toray Research Center, inc.), and M. Oda (Toray Research Center, Inc.)
- **64** Effect of Co Incorporation of Ordered Mesoporous Sn-Based Alloy Materials for Li-Storage – J. Yoon, G. O. Park (Department of Energy Science, Sungkyunkwan University), S. B. Park, J. M. Kim (Department of Chemistry, Sungkyunkwan University), H. Kim (Hanyang University), and W. S. Yoon (Department of Energy Science, Sungkyunkwan University)
- **65** Thermogalvanic Waste Heat Recovery System in Automobiles – A. Gunawan, N. W. Fette, N. Wilson, V. Mujica, D. A. Buttry, and P. E. Phelan (Arizona State University)
- **66** Carbon-Supported Metal Oxide Nanoparticles As Electrocatalysts for the Oxygen Reduction Reaction in Li-O_2 Batteries – J. S. Chen, H. K. Yang, and C. C. Chin (National University of Kaohsiung)
- **67** High Rate Capability and Long Cycle Stability of $Co_3O_4/CoFe_2O_4$ nanocomposite As an Anode Material for High-Performance Secondary Lithium Ion Batteries – D. T. Pham, T. Vu Thi, J. Gim, J. Song, S. Kim, J. Jo, M. H. Alfaruqi, S. Kim, S. Park, and J. Kim (Chonnam National University)
- **68** New Additives to Improve Cycle Performance of Lithium Ion Battery Under High Voltage Conditions – K. Konno (Hitachi Chemical Co., Ltd.)
- **69** Nucleation and Growth Controlled Polyol Synthesis of Size-Focused Nanocrystalline $LiFePO_4$ Cathode for High Performance Li-Ion Batteries – J. P. Baboo (Chonnam national university), J. Gim, J. Song, S. Kim, M. H. Alfaruqi, J. Jo (Chonnam National University), J. Lee (Chonnam national university), and J. Kim (Chonnam National University)
- **70** Performance of $La_{0.8}Sr_{0.2}Co_{0.8}Ni_{0.2}O_{3-\delta}$-Based Oxygen Electrode for Solid Oxide Electrolysis Cells – Y. Tan (Huazhong University of Science and Technology), B. Chi (Huazhong University of Scienc and Technology), and N. Q. Duan (Huazhong University of Science and Technology)
- **71** All Solid State Supercapacitors Based on Ionic Liquid/Crosslinked PEO-PPO Tetrablock Copolymer Electrolytes – J. H. Han (Korea Research Institute of Chemical Technology, Hanyang University), T. H. Kim, and Y. T. Hong (Korea Research Institute of Chemical Technology)

- **72** Co_9S_8@MoS_2 Core-Shell Structures Formed on Carbon Nanofibers As Switchable Electrocatalyst for H_2 and O_2 Evolutions – H. Zhu and M. Du (Zhejiang Sci-Tech University)
- **73** Synthesis at Low Cost and Large Scale of Silicon Powder Suitable for Li-Ion Anodes – C. Reale Hernandez (INRS-EMT), Z. Karkar (CNRS-IMN; INRS-EMT), D. Guyomard, B. Lestriez (CNRS-IMN), and L. Roué (INRS-EMT)
- **74** High Energy and High Power Electrically Rechargeable Zinc-Air Battery – G. Toussaint, P. Stevens (Electricité de France, R&D division), R. Rouget, and F. Fourgeot (SCPS)
- **75** Ccto-P(VDF-CTFE) 0-3 Composites for Energy Storage Application – Y. Tong, L. Zhang, and Z. Y. Cheng (Auburn University)
- **76** Study on Electrochemical Performance of Thin Film C_{60} As an Anode Material for Lithium Secondary Batteries – M. Halim (Korea Institute of Science and Technology, Korea University of Science and Technology) and J. K. Lee (Korea University of Science and Technology)
- **77** Hydrocarbon Membrane for Vanadium Redox Flow Batteries – H. Kim (Yeungnam University)
- **78** High Temperature Lithium Ion Chemistry Development in Saft – J. Dong and T. A. Greszler (Saft America Inc)
- **79** Sealed Recombinant Flow Batteries – S. Selverston (Case Western Reserve University) and J. S. Wainright (Case Western Reserve University, Cleveland, Ohio, USA)
- **80** Highly Dispersed Poly(vinylidene fluoride) and Carbon Black in NMC Cathodes Produced Via Non-NMP Electrovaya Superpolymer 2.0 Processing Method – E. Memarzadeh, R. DasGupta, S. DasGupta (Electrovaya Corp.), and A. McLean (University of Toronto)
- **81** Manufacturing Low Cost Nano-Coatings for High Performance Battery Materials – J. E. Trevey, P. R. Lichty, D. M. King (PneumatiCoat Technologies), and S. J. Cho (North Carolina A&T State University)
- **82** Capacitive Performance of Mwcnts Decorated with MnO_x and Silver Nanoparticles As Electrodes in Neutral Electrolytes – Q. Yang (The Hong Kong Polytechnic University) and K. C. Yung (Hong Kong Polytechnic University)

A02 Batteries - Theory, Modeling, and Simulation
Battery
101-B, Phoenix Convention Center

Meso-scale Modeling and Systems Design I – 08:00 – 12:00
Co-Chairs: R. Edwin García and Donald J. Siegel

08:00 **149** (Invited) Microstructural Modeling of Heterogeneous Nucleation and Growth of Lithium Electrodeposits – R. E. García (Purdue University)

08:40 **150** Phase Field Modeling of Electrodeposition: from Stable Thin Films to Nanorods to Dendrites – R. Enrique, S. DeWitt, and K. Thornton (University of Michigan, Joint Center for Energy Storage Research)

09:00 **151** Lithium Plating and Stripping in the Framework of a 3D Electrochemical Model – S. Hein (Helmholtz Institute Ulm (HIU), German Aerospace Center (DLR)) and A. Latz (German Aerospace Center (DLR), Helmholtz Institute Ulm (HIU))

09:20 **152** Understanding the Intrinsic Limits of Ultra-Fast Charge Batteries – G. Davies (MAE/ACEE Princeton University), A. Hsieh, and D. A. Steingart (Princeton University)

09:40 Break

10:00 **153** (Invited) A Mesoscale Approach Toward Elucidating Microstructure-Transport-Performance Interaction in Li-S Battery Electrodes – P. P. Mukherjee, Z. Liu, C. F. Chen, and A. Mistry (Texas A&M University)

10:40 **154** Implementation of Porous Media Flow Model in Sodium Sulfur Battery Simulations – J. H. Mason (MAE Department, West Virginia University) and I. B. Celik (MAE Department, West Virginia University, Morgantown WV)

11:00 **155** Mesoscale Transport in Magnetite Electrodes for Lithium-Ion Batteries – K. W. Knehr, N. W. Brady, C. N. Lininger (Columbia University), C. A. Cama, D. C. Bock, Z. Lin, A. C. Marschilok, K. J. Takeuchi, E. S. Takeuchi (Stony Brook University), and A. C. West (Columbia University)

11:20 **156** Multicomponent Mass Transfer in All-Vanadium Redox Flow Battery Membrane Separator – Y. Ashraf Gandomi, K. Ekici (Dep. of Mechanical Engineering, University of Tennessee), Z. Tang (University of Tennessee, Knoxville, TN), D. Aaron (University of Tennessee), T. A. Zawodzinski (University of Tennessee, Knoxville, TN), and M. M. Mench (University of Tennessee)

11:40 **157** Multiphysics Simulation of the Bromine Cathode: Cell Architecture and Electrode Optimization – M. D. R. Kok and J. T. Gostick (McGill University)

Meso-scale Modeling and Systems Design II – 14:00 – 17:20
Co-Chair: Partha P. Mukherjee

14:00 **158** (Invited) Simulation Studies of Multilayer Electrode Coatings – R. Spotnitz (Battery Design LLC)

14:40 **159** Mesoscale Modeling and Simulation of Composition, Manufacturing, and Microstructure Effects on Electrical Conduction in Thermal Battery Cathodes – E. L. Reinholz (Sandia National Laboratories, University of New Mexico), S. A. Roberts (Sandia National Laboratories), P. R. Schunk, and C. A. Apblett (Sandia National Laboratories, University of New Mexico)

15:00 **160** Real Time Multi-Cell Multiple Chemistry Simulation of Reformulated Electrochemical Battery Models for EV and Grid Applications – S. B. Lee (Chemical Engineering, University of Washington, Seattle), M. Pathak (University of Washington Seattle), M. T. Lawder (EECE Department, Washington University in St. Louis), and V. Subramanian (University of Washington, Seattle, Pacific Northwest National Laboratory)

15:20 **161** Forced Air-Cooling Strategies for Lithium-Ion Batteries Using Integral Wake Splitters and Flow Guide-Vanes – K. Ismailov (University College London), D. Adair (School of Engineering, Nazarbayev University), Y. Massalin, and Z. Bakenov (Institute of Batteries, Astana)

15:40 Break

16:00 **162** Design of Graded Porous Electrodes Based on Inverse Optimization of Li-Ion Battery Models – Y. Qi, D. T. Schwartz (University of Washington), and V. Subramanian (University of Washington, Seattle, Pacific Northwest National Laboratory)

16:20 **163** Analyzing Capacitive Characteristics of Lithium-Ion Batteries Using a Distribution Function of the Differential Capacity – M. Schoenleber and E. Ivers-Tiffée (IAM-WET, Karlsruhe Institute of Technology (KIT))

16:40 **164** Evaluation of Relationship Between Dynamic Structural Deformation and Output Performance in Lithium-Ion Battery By Numerical Simulation – G. Inoue (Kyoto University)

17:00 **165** Influence of Binder Property and Interaction on Electrode Microstructure Formation in Energy Storage – Z. Liu and P. P. Mukherjee (Texas A&M University)

West Hall 1, Phoenix Convention Center
A02 Poster Session – 18:00 – 20:00
Co-Chair: Yue Qi

- **166** Study of the Impedance Growth and Capacity Fade of High Power Lithium-Iron Phosphate, Valve Regulated Lead Acid, and Nickel Metal Hydride Batteries When Cycled in High Rated Pulsed Profiles – D. A. Wetz Jr., M. J. Martin, C. Williams (The University of Texas at Arlington), and C. G. Gnegy-Davidson (University of Texas at Arlington)
- **167** Discovery of New Anode SEI Forming Additives Using an *in silico* Evolutionary Approach – S. E. Murdock, T. F. Hughes, S. H. Kwak, A. Goldberg, D. J. Giesen, Y. Cao, J. Sanders, J. Gavartin, G. K. P. Dathar, and M. D. Halls (Schrödinger Inc)
- **168** Thermal-Electrochemical Lithium-Ion Battery Simulations on Microstructure and Porous Electrode Scale – A. Latz (German Aerospace Center (DLR), Helmholtz Institute Ulm (HIU)) and J. Zausch (Fraunhofer Institute for Industrial Mathematics)
- **169** Reaction and Mass Transport Simulation of 3-Dimensional All-Solid-State Lithium-Ion Batteries for the Optimum Structural Design – F. Itoh, G. Inoue, and M. Kawase (Kyoto University)
- **170** A Computational Model for Sodium Sulfur Battery Analysis – H. Sezer (MAE Department, West Virginia University, Morgantown WV), M. Aygun (MAE Department, West Virginia University), E. Baran (Department of EE, West Virginia University), and I. B. Celik (MAE Department, West Virginia University, Morgantown WV)
- **171** Variability Analysis of Discharge Characteristics and Impedance Spectra in Li-Air Batteries – M. Mehta (Aeropropulsion, Mechatronics and Energy Center, Florida State University) and P. Andrei (Florida State University)
- **172** Robust Fail-Safe Iteration Free Solvers for Battery Models – M. Pathak (University of Washington Seattle), D. Sonawane (Chemical Engineering, University of Washington, Seattle), M. T. Lawder (EECE Department, Washington University in St. Louis), and V. Subramanian (Pacific Northwest National Laboratory, University of Washington, Seattle)
- **173** Computational Modelling Study on Electrochemical Activity of Nanoporous and Bulk Beta MnO_2 – P. E. Ngoepe (University of Limpopo, Sovenga, 0727, South Africa), T. X. T. Sayle (University of Kent, Canterbury, CT2 7NZ, UK.), and D. C. Sayle (University of Kent, Canterbury, CT2 7NZ, UK)
- **174** Modeling Degradation Mechanisms in Magnesium Batteries with Electronic Structure Calculations – J. S. Lowe and D. J. Siegel (University of Michigan)

A03 Batteries Beyond Lithium-Ion

Battery / Energy Technology
102-C, Phoenix Convention Center

Oxygen and Air Cathodes – 08:00 – 16:50
Co-Chairs: Daniel A. Steingart, Venkataraman Thangadurai, Yangchuan Xing, and Vito Di Noto

08:00 **248** Mo_2c Nanoparticle-CNT Composite Electrode for Lithium-Oxygen Battery – W. J. Kwak (Department of Energy Engineering, Hanyang University), L. Curtiss (Materials Science Division, Argonne National Laboratory), Y. K. Sun (Department of Energy Engineering, Hanyang University), K. C. Lau (Materials Science Division, Argonne National Laboratory), and K. Amine (Argonne National Laboratory)

08:20 **249** The Catalytic Behavior of Lithium Nitrate in Li-O_2 Batteries – D. Aurbach (Bar-Ilan University), D. H. Hirshberg (Bar Ilan University), D. Sharon, M. Afri (Bar-Ilan University), A. Garsuch (BASF SE), and A. A. Frimer (Bar Ilan University)

08:40 **250** 3D Pore-Scale Transport Model Incorporating Realistic Cathode Morphology and Peroxide Growth in Lithium-Air Batteries – C. Andersen and Y. Sun (Drexel University)

09:00 **251** High Efficient Charge of Li-O_2 Batteries with TEMPO Derivatives – Y. Hase, T. Shiga (Toyota Central R&D Labs., Inc.), F. Mizuno (Toyota Research Institute of North America), H. Nishikoori, H. Iba (Battery Research Division, Toyota Motor Corporation), and K. Takechi (Toyota Research Institute of North America)

09:20 Break

09:40 **252** Optimization of the Gas Diffusion Electrode for Rechargeable Zn-Air Battery with Ionic Liquid Electrolyte – N. Bogolowski, O. Ngaleu, and J. F. Drillet (DECHEMA-Forschungsinstitut)

10:00 **253** Reaction Mechanism Analysis of a Li-O_2 Battery: Structure of Electrode/Electrolyte Interface Probed Via Soft-x-Ray Absorption Spectroscopy, Hard x-Ray Photoelectron Spectroscopy, and *in-Situ* Hard x-Ray Diffraction – C. Yogi (Device-functional analysis Department, NISSAN ARC, Ltd.), K. Kamiguchi (Device-functional analysis Department, NISSAN ARC Ltd.), N. Takao (Device-functional analysis Department, NISSAN ARC, Ltd.), T. Watanabe (Japan Synchrotron Radiation Research Institute), K. Kubobuchi, M. Matsumoto (Device-functional analysis Department, NISSAN ARC Ltd.), T. Ohwaki (Device-functional analysis Department, NISSAN ARC, Ltd.), and H. Imai (Device-functional analysis Department, NISSAN ARC Ltd.)

10:20 **254** Dynamic Modeling of the Reaction Mechanism in a Li/O_2 Cell: Influence of a Redox-Mediator – D. Grübl (Offenburg University of Applied Sciences), B. Bergner, J. Janek (Justus-Liebig-Universität Gießen, Gießen, Germany), and W. G. Bessler (Offenburg University of Applied Sciences, Germany)

10:40 **255** Catalytic Activity of Double-Perovskite Type Ba*ln*Mn_2O_5 for Oxygen Reduction Reaction Using in Rechargeable Zinc-Air Batteries – E. Tsuji, H. Noda (Hokkaido University), T. Motohashi (Kanagawa University), Y. Aoki, and H. Habazaki (Hokkaido University)

11:00 Break

11:20 **256** Stability of Glyme-Solvate Ionic Liquid Electrolyte in the Presence of Oxygen Reduction Product – M. L. Thomas, H. M. Kwon, R. Tatara (Yokohama National University), K. Ueno (Yamaguchi University), K. Dokko, and M. Watanabe (Yokohama National University)

11:40 **257** The Aprotic Li-O_2 Battery: O_2 Reduction Mechanism and Its Implications – P. G. Bruce, L. Johnson, Y. Chen (University of Oxford, Department of Materials), Z. Liu (University of St Andrews), and S. A. Freunberger (Graz University of Technology)

12:00 **258** A Bifunctional Air Electrode Catalyzed By Nano-Crystal Lead Ruthenate for Li-Air Batteries – X. Z. Yuan, M. Toupin, W. Qu, A. Laforgue, J. Fahlman, and M. Jiang (National Research Council Canada)

12:20 **259** Multi-Wall Carbon Nanotubes As Cathodes for Lithium-Air Batteries: Effect of Catalysts and Additives – N. Chawla, A. Chamaani, and B. El-Zahab (Florida International University)

12:40 Lunch

14:10 **260** A Biomolecular Eco-Friendly Catalyst for Lithium-Oxygen Batteries – W. H. Ryu, F. S. Gittleson, and A. D. Taylor (Yale University)

14:30 **261** Towards Safe Rechargeable K-O_2 Batteries – Y. Wu (The Ohio State University)

14:50 **262** Morphology Progression of Electrodeposited Li_2O_2 during Charging of Li/O_2 Batteries – L. D. Griffith, A. Sleightholme, D. J. Siegel, and C. W. Monroe (University of Michigan)

15:10 **263** Cathode Design for a Molten Salt Lithium-Oxygen Battery – D. Tozier (California Institute of Technology), V. Giordani (LIOX Power, Inc.), B. M. Gallant (California Institute of Technology), C. Burke, B. D. McCloskey (University of California, Berkeley), J. R. Greer (California Institute of Technology), G. V. Chase, and D. Addison (LIOX Power, Inc.)

15:30 Break

15:50 **264** Synergy Between Different Graphene Structures in Layer-By-Layer Assembly for Li-Air Battery Cathodes – J. Kim and Y. L. Joo (Cornell University)

16:10 **265** Electrolyte Effects on Chemical Stability of NaO2 in Na-O2 Batteries – N. Ortiz-Vitoriano (CIC Energigune, Massachussets Institute of Technology), C. V. Amanchukwu, D. Kwabi, P. T. Hammond, and Y. Shao-Horn (Massachusetts Institute of Technology)

16:30 **266** Platinum-Nickel (Pt_3Ni) Alloy Nanoparticles Decorated Graphene As a Catalyst of Oxygen Electrode in Li-O_2 Cells – N. Munichandraiah, S. Kumar (Indian Institute of Science), and L. G. Scanlon (Wright-Patterson Air Force Base)

West Hall 1, Phoenix Convention Center

A03 Poster Session – 18:00 – 20:00

- **267** Novel Long Cycle Life Room Temperature Sodium-Sulfur Batteries – M. Kohl (Fraunhofer IWS), H. Althues (Fraunhofer IWS, Dresden), and S. Kaskel (Technische Universität Dresden)
- **268** Phase Field Modeling of Lithium-Ion Diffusion and Crack Formation in the Solid Electrolyte Interphase of Silicon-Based Lithium-Ion Battery – P. Guan and L. Liu (The University of Kansas)
- **269** Preparation and Stability Research of Ago As Cathode Material – Y. Yuan (China Academy of Engineering Physics)
- **271** Metal Oxides Nanoparticles Encapsulated in 3D Porous Carbon Microspheres for High Performance Lithium Storage – Y. Li (Texas A&M University) and L. Liu (University of Wisconsin-Milwaukee)
- **272** Study on the Application of Ailicon-Cobalt Oxide Anode Material in Lithium-Ion Batteries – W. L. Liu Sr., D. X. Wang, and M. Q. Wu (University of Electronic Science and Technology of China)
- **273** Solvothermal Route Based in Situ Carbonization to Metal-Oxide/Carbon Composite As Anode Material for Lithium Ion Battery – G. Chen, L. Yan, M. Zhou, and H. Luo (New Mexico State University)
- **274** Characterisation of Si-Based Anodes for Li-Ion Batteries By *Operando* Dilatometry and Acoustic Emission Measurements – A. Tranchot (INRS-EMT, INSA-Lyon), P. X. Thivel (Université Grenoble-Alpes), H. Idrissi (INSA-Lyon), and L. Roué (INRS-EMT)

- **275** Graphene-Coated Silicon Alloy with High Capacity and Good Cycling Stability for Lithium-Ion Batteries – S. H. Kim, H. S. Yang, S. H. Yook (Department of Chemical Engineering, Hanyang University), A. G Kannan (Department of chemical engineering, Hanyang University), S. K. Kim, C. H. Park (ILJIN Electric), and D. W. Kim (Department of Chemical Engineering, Hanyang University)
- **276** Investigations on the Chemical and Electrochemical Stability of Imidazolium Containing Ionic Liquids – P. Schmitz, R. Jakelski, M. Winter, and P. Bieker (MEET Battery Research Center, University of Muenster)
- **277** High-Performance Olivine for Lithium Batteries: Effects of Ni/Co Doping on the Properties of $LiFe_aNi_bCo_cPO_4$ Cathodes – G. Pagot, F. Bertasi, G. Nawn, E. Negro (Department of Chemical Sciences - University of Padova), S. Polizzi (Department of Molecular Sciences - University of Venice), and V. Di Noto (Department of Chemical Sciences - University of Padova)
- **278** ^{25}Mg NMR Studies of Mg-Ion Battery Materials – H. Wang (Argonne National Laboratory), N. Sa (Argonne National Lab), D. L. Proffit (Argonne National Laboratory), P. Senguttuvan (Joint Center for Energy Storage Research), C. Kim (Lawrence Berkeley National Laboratory), J. Cabana (NECCES at University of Illinois at Chicago), K. Poeppelmeier (Northwestern University), T. L. Kinnibrugh (Argonne National Laboratory), K. W. Chapman (NECCES at Argonne National Laboratory), A. K. Burrell (Joint Center for Energy Storage Research (JCESR)), J. T. Vaughey (Argonne National Laboratory), and B. Key (Argonne National Laboratory, Joint Center for Energy Storage Research)
- **279** A Low Cost and High Specific Surface Area Leaf-Derived Microporous Carbon for High Performance Li-S Batteries – G. Xu (Argonne National Lab), K. Amine, and Z. Chen (Argonne National Laboratory)
- **280** New Insights into the Kinetics of Na Insertion and Extraction into the $FePO_4/NaFePO_4$ System – D. Saurel, H. Anne, M. Galceran, B. Acebedo, M. Lepoitevin (CIC Energigune), T. Rojo (Universidad del País Vasco (UPV/EHU), CIC Energigune), and M. Casas-Cabanas (CIC Energigune)
- **281** Mesocellular Carbon Foam (MCF)/Sulfur Composites for High Performance Lithium Sulfur Batteries – H. S. Kim (Korea Institute of Science and Technology), T. K. Jeong, and Y. T. Kim (Pusan National University)
- **282** Electrochemical Behavior of Some Sodium Nickel Oxides for a Sodium-Ion Battery – K. Park, B. C. Yu, and J. B. Goodenough (The University of Texas at Austin)
- **283** Synthesis and Electrochemical Characterization of a Sodium Manganese Oxide By Facile Reduction Reaction for Sodium Ion Batteries – J. Song, J. Gim, S. Kim, J. Jo, M. H. Alfaruqi, S. Park, J. Yang, and J. Kim (Chonnam National University)
- **284** Amorphous Iron Phosphate : Potential Host for Various Charge Carrier Ions – S. Kim, J. Gim, J. Song, J. P. Baboo, M. H. Alfaruqi, J. Jo, D. Kim, Y. Kim, and J. Kim (Chonnam National University)
- **285** Electrochemical Reaction Mechanism in a High Capacity Zinc-Ion Battery System – M. H. Alfaruqi, J. Gim, J. Song, S. Kim, V. Mathew, J. Jo, S. Lee, S. Islam, and J. Kim (Chonnam National University)
- **286** Enhanced Cycling Stability of Hybrid Li-Air Batteries Enabled By Ordered Pd_3fe Intermetallic Electrocatalyst – Z. Cui, L. Li, A. Manthiram, and J. B. Goodenough (The University of Texas at Austin)
- **287** A Structurally Stable α-MnO_2 nanorod Cathode for Enhanced Reversible Divalent Zinc Storage – V. Mathew, Z. Xiu, M. H. Alfaruqi, J. Gim, S. Kim, J. Song, T. Vu Thi, D. P. Tung, J. P. Baboo, and J. Kim (Chonnam National University)
- **288** Homogeneous and Stable Lithium Electrodeposition through a Thin Single-Ion Conducting Layer for High Cycling Stability of Lithium Metal Secondary Batteries – J. Song, H. Lee, J. K. Park, and H. T. Kim (KAIST)
- **289** A Simple Composite Protective Layer Coating That Enhances the Cycling Stability of Lithium Metal Batteries – H. Lee (Korea Institute of Science and Technology (KAIST)), J. Song, Y. J. Kim, H. Noh, J. Lee, J. K. Park, and H. T. Kim (KAIST)
- **290** The Efficiency and Mechanism of 3D-Ordered Macroporous $La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_3$ as an Electrocatalyst for Aprotic Li-O2 Batteries – J. Cheng (Huazhong University of Science and Technology), B. Chi (Huazhong University of Scienc and Technology), Y. Jiang, and G. Zhang (Huazhong University of Science and Technology)
- **291** High Performance TiP_2O_7 Based Intercalation Negative Electrode for Aqueous Lithium-Ion Batteries Via a Facile Synthetic Route – J. Whitacre, W. Wu (Carnegie Mellon University), S. Shanbhag (Aquion Energy), J. Chang (West Virginia University), and A. Rutt (Carnegie Mellon University)
- **292** Polyanion Compounds As Positive Electrode Materials for Rechargeable Aqueous Sodium-Ion Batteries – Y. H. Jung, R. K. Petla, J. H. Kim, C. H. Lim, and D. K. Kim (Korea Advanced Institute of Science and Technology)
- **293** A Crosslinked Polyaniline-Coated Graphene Oxide/Sulfur Composite for Lithium-Sulfur Batteries with High Efficiency and Long Cycle Life – S. Moon, Y. H. Jung, and D. K. Kim (Korea Advanced Institute of Science and Technology)
- **294** Mechanically Milled Transition Metal Phosphides (M-P) As Anode Materials for Sodium Ion Batteries (M=Ti, Mn, Co, Cu, Zn) – L. Zheng (Department of chemistry, Dalhousie University) and M. N. Obrovac (Department of Chemistry, Dalhousie University)

- **295** Solvation and Desolvation Phenomenon and in-Situ NMR Studies on Stripping/Plating of Magnesium Metal in Magnesium Batteries – H. Wang (Argonne National Laboratory), N. Sa (Argonne National Lab), A. K. Burrell (Joint Center for Energy Storage Research (JCESR)), J. T. Vaughey (Argonne National Laboratory), and B. Key (Joint Center for Energy Storage Research)
- **296** Exploring Li Substituted O3-Structured Layered Oxides As Promising Cathode Materials for Rechargeable Na Batteries – H. Liu (University of California, San Diego), J. Xu, C. Ma (University of California San Diego), and S. Meng (NECCES at University of California, San Diego)
- **297** Pechini Synthesis of $Na_3V_2(PO_4)_2F_3$/C Doped with Aluminum As Cathode for Lithium Ion Batteries – N. Pineda Aguilar (Universidad Autónoma d Nuevo León), L. C. Torres González, E. M. Sánchez Cervantes (Universidad Autónoma de Nuevo León), R. K. B. Gover (University of St. Andrews), and L. L. Garza-Tovar (Universidad Autónoma de Nuevo León)
- **298** Increasing the Capacity Performance in Lithium Metal Secondary Battery By Using Nafion-Coated Cathodes – K. Y. Bae (Materials Science and Engineering, Korea University), B. H. Kim, and W. Y. Yoon (Korea University)
- **299** The Effect of Lithium Iodide in Li-O_2 Batteries – S. H. Lee, Y. K. Sun, H. J. Shin (Department of Energy Engineering, Hanyang University), D. Aurbach, D. Hirshberg, and D. Sharon (Bar-Ilan University)
- **300** Effect of Pth-Coated Li Powder Anode in Lithium Metal Batteries System – J. W. Lee, S. W. Hwang (Materials Science and Engineering, Korea University), and W. Y. Yoon (Korea University)

A04 Battery Safety

Battery / Industrial Electrochemistry and Electrochemical Engineering

Remington A, Hyatt Regency

Battery Materials Safety – 08:30 – 10:40
Co-Chair: D. H. Doughty

08:30 **336** Excellent Thermal Stability of VOPO4 As Cathode for Lithium-Ion Battery – Y. Huang (NECCES at Binghamton University), Y. C. Lin (NECCES at Univeristy of California, San Diego), Y. Chung, N. Chernova (NECCES at Binghamton University), F. Omenya (State University of New York at Binghamton), S. P. Ong (NECCES at University of California, San Diego), and M. S. Whittingham (NECCES at Binghamton University)

09:00 **337** Liquid Catholyte Investigations for Safer Storage of a Li Primary Battery – C. J. Patrissi and C. R. Schumacher (Naval Undersea Warfare Center Newport)

09:20 **338** Thermal Stability Studies in Charged Layered Sodium Transition Metal Oxide Cathode Materials for Na-Ion Batteries – S. M. Bak, Y. Zhou, E. Hu (Chemistry Department, Brookhaven National Laboratory), X. Yu (Chermistry Department, Brookhaven National Laboratory), and X. Q. Yang (Chemistry Department, Brookhaven National Laboratory)

09:40 **339** Electroactive Polymer for Reversible Overcharge Protection in Lithium-Ion Batteries – B. Wang (Institute of Chemical Materials, CAEP, Environmental Energy Technologies Division,LBNL) and J. Cheng (Institute of Chemical Materials, CAEP)

10:00 **340** 3D-Nanostructures-Path to High Capacity Lithium Batteries with Ultimate Safety – J. Prochazka, R. Stary, J. Pavlik (HE3DA s.r.o.), and M. Zukalova (J. Heyrovsky Institute of Physical Chemistry)

10:20 Break

Advanced Diagnostics and Characterization – 10:40 – 12:10
Co-Chair: Christopher J. Orendorff

10:40 **341** Determination of Battery Stability with Advanced Diagnostics – J. Lamb, C. J. Orendorff (Sandia National Laboratories), and J. Christophersen (Idaho National Laboratory)

11:10 **342** In Situ Diagnosis and Control of Li-Ion Batteries for Enhanced Safety – G. Zhang (Electrochemical Engine Center (ECEC), Penn State Univ.), S. Ge, T. Xu (EC Power), and C. Y. Wang (Electrochemical Engine Center (ECEC), Penn State Univ., EC Power)

11:30 **343** In Operando Li^+- Activity Measurements in Lithium Ion Batteries - a Method to Develop and Optimize Safe Operating Strategies Even at Unfavourable Conditions – B. I. Hogg and M. Wohlfahrt-Mehrens (Zentrum für Sonnenenergie- und Wasserstoff-Forschung BW)

11:50 **344** Single-Point Impedance Diagnostic for Internal Temperature Monitoring of Commercial Lithium-Ion Batteries – N. S. Spinner (US Naval Research Laboratory), C. T. Love (U.S. Naval Research Laboratory), S. G. Tuttle, and S. L. Rose-Pehrsson (US Naval Research Laboratory)

Abuse Testing, Modeling, and Simulation – 14:00 – 15:50
Co-Chairs: Gerardine G. Botte

14:00 **345** The Importance of Testing and Designing Lithium-Ion Batteries in the Relevant Environment – J. A. Jeevarajan (Underwriter's Laboratories Inc.)

14:30 **346** Quantifying the Impact of Overdischarge on Large Format Lithium Ion Cell Safety – D. Fuentevilla, A. Mansour (Naval Surface Warfare Center, Carderock Division), and C. Hendricks (Naval Surface Warfare Center, Carderock Division, University of Maryland, College Park)

14:50 **347** Development of an on-Demand Internal Short Circuit (NREL/NASA) – M. Keyser, A. Pesaran (National Renewable Energy Laboratory), and E. Darcy (NASA)

15:10 **348** Numerically Characterizing Nail Penetration Testing for Safety Evaluation of Li-Ion Cells – C. Yang, G. H. Kim, M. Keyser, and A. Pesaran (National Renewable Energy Laboratory)

15:30 **349** Probing Lithium-Ion Battery Safety in Mining Environments – S. M. Lipka, F. Rogers III, D. T. Whitlow, and T. Bramel (University of Kentucky)

A05 Electrolytes and Electrochemical Interfaces in Energy Storage Systems

Battery / Energy Technology

101-A, Phoenix Convention Center

Anode Interfaces I – 08:00 – 12:20

Co-Chairs: Brett L. Lucht, Emanuel Peled, and Arthur v. Cresce

08:00 **361** SEI-Component Formation on Nano-Silicon in Rechargeable Lithium-Based Batteries Using Modified Ether-Based Electrolytes – T. Jaumann, J. Balach, M. Klose, S. Oswald (Leibniz Institute of solid state and material research), U. Langklotz (TU Dresden, Institute for material science), H. Althues (Fraunhofer IWS, Dresden), J. Eckert (TU Dresden, Institute for material science, Leibniz institute for solid state and material science), and L. Giebeler (Leibniz Institute of solid state and material research)

08:20 **362** A Comparative Study of the Anodic and Cathodic Decomposition of Ethylene Carbonate, Vinylene Carbonate and Fluoroethylene Carbonate – S. Solchenbach, M. Metzger, and H. A. Gasteiger (Technische Universität München)

08:40 **363** Effect of Anion Solvation on the Passivation Chemistry of Lithium Ion Electrodes – A. V. Cresce, S. M. Russell (U.S. Army Research Laboratory), and K. Xu (Battery Material Research Center)

09:00 **364** (Invited) Study of SEI on High Performance 3D SiNWs and Sinps Based Anode for Lithium Ion Batteries – E. Peled, F. Patolski, D. Golodnitsky (Tel Aviv University), K. Freedman (School of Chemistry, Tel Aviv University), G. Davidi, D. Schneier, M. Goor, and K. Goldstein (Tel Aviv University)

09:40 Break

10:00 **365** *In-Situ* Analysis on Electrode/Electrolyte Interfaces in Li-Ion Batteries By *Operando* Neutron Reflectometry – H. Kawaura, M. Harada, Y. Kondo, H. Kondo, Y. Suganuma, N. Takahashi, J. Sugiyama, Y. Seno (Toyota Central Research and Development Labs., Inc.), and N. Yamada (High Energy Accelerator Research Organization)

10:20 **366** A New Class of Stable Electrolytes Based on "Hindered Glymes" to Prevent Graphite Exfoliation in Lithium Secondary Batteries – D. Shanmukaraj (CIC Energigune), S. Grugeon, S. Laruelle (Laboratoire de Réactivité et Chimie des Solides, UPJV, Réseau sur le Stockage Electrochimique de l'Energie), and M. Armand (CIC Energigune, Laboratoire de Réactivité et Chimie des Solides, UPJV)

10:40 **367** Capacity Fading Mechanisms of Submicron-Sized Silicon Negative Electrode for Lithium Ion Batteries – T. Yoon, B. L. Lucht, C. C. Nguyen, and D. Seo (University of Rhode Island)

11:00 **368** Impact of Libob Additive on Structure and Property of Solid Electrolyte Interphase Formed on Negative Electrodes Surface – T. Sanada, T. Baba, M. Matsumoto, K. Kamiguchi, C. Yogi, Y. Shichi, and H. Imai (Device-functional analysis Department, NISSAN ARC Ltd.)

11:20 **369** The Effect of CO2 on Alkyl Carbonate Trans-Esterification during Formation of Graphite Electrodes in Li-Ion Batteries – B. Strehle, M. Metzger, S. Solchenbach (Technische Universität München), S. Meini (BASF SE), and H. A. Gasteiger (Technische Universität München)

11:40 **370** Degradation Mechanism Analysis of 18650-Type Lithium-Ion Battery: A Hard X-Ray Photoelectron Spectroscopic Investigation – T. Baba, M. Matsumoto, C. Yogi, K. Kamiguchi, T. Sanada, Y. Shichi, and H. Imai (Device-functional analysis Department, NISSAN ARC Ltd.)

12:00 **371** Salt Effects on SEI Formation in Graphite and $LiNi_{0.5}Mn_{1.5}O_4$ Based Half Cells – X. G. Sun, S. Wan, G. M. Veith, R. R. Unocic, B. Guo (Oak Ridge National Laboratory), X. Jiang (Department of Chemistry, University of Tennessee), and S. Dai (Oak Ridge National Laboratory, Department of Chemistry, University of Tennessee)

Anode Interfaces II – 14:00 – 18:00

Co-Chairs: Brett L. Lucht, Takeshi Abe, and Oleg Borodin

14:00 **372** Behind the Stability of Graphite Anode in PC-Containing Electrolytes with a New Additive – H. Xiang (Hefei University of Technology, Pacific Northwest National Laboratory), D. Mei, S. D. Burton (Pacific Northwest National Laboratory), A. V. Cresce (U.S. Army Research Laboratory), Z. Zhu, R. Cao, X. Sun, Y. Zhou (Pacific Northwest National Laboratory), B. J. Polzin (Argonne National Laboratory), K. Xu (U.S. Army Research Laboratory), J. G. Zhang (Pacific Northwest National Laboratory,USA), and W. Xu (Pacific Northwest National Laboratory, USA)

14:20 **373** (Invited) Ion Transport in Graphite Composite Electrode – T. Abe (Graduate School of Engineering, Kyoto University, Japan Science and Technology Agency), K. Miyazaki, T. Fukutsuka, and S. Maruyama (Graduate School of Engineering, Kyoto University)

15:00 **374** Electrochemical Charge Transfer Reaction Kinetics at Silicon Electrode Surfaces – T. Swamy and Y. M. Chiang (Massachusetts Institute of Technology)

15:20 **375** In-Situ TEM Observation of Solid Electrolyte Interface Evolution during Li-Ion Battery Opeeration – A. Kushima (Massachusetts Institute of Technology), N. Kuriyama, T. Maebashi, Y. Fujiwara (Honda R&D Co., Ltd.), and J. Li (Massachusetts Institute of Technology)

15:40 **376** Measuring Dynamic Changes in Si SEI Chemistry – G. M. Veith, J. F. Browning, R. L. Sacci, T. Fears, and M. Doucet (Oak Ridge National Laboratory)

16:00 **377** Chemical, Electrochemical and Physical Properties of the Solid Electrolyte Interphase on HOPG Surface: Mechanisms of Formation and Transition Metal Deposition – B. K. Antonopoulos, C. Kirdar, F. Maglia, F. Schmidt-Stein (BMW Group), and H. E. Hoster (Lancaster University, Energy Lancaster)

16:20 **378** (Invited) Insight into Bulk and Interfacial Structure of Electrolytes and SEI Components from Molecular Modeling – O. Borodin (U.S. Army Research Laboratory), M. Olguin (US Army Research Laboratory), and W. A. Henderson (Pacific Northwest National Laboratory,USA)

17:00 **379** Cyclic Carbonate Additives Effect on the Solid Electrolyte Interphase of Li Ion Batteries – H. Tavassol (University of Illinois, Urbana-Champaign, California Institute of Technology), J. Esbenshade (University of Illinois, Urbana-Champaign), and A. A. Gewirth (University of Illinois at Urbana-Champaign)

17:20 **380** In-Situ Visualization of Solid-Electrolyte Interphase in Lithium-Ion Batteries – L. Chen (Suzhou Institute of Nanotech and Nanobionics, CAS)

17:40 **381** Contribution of Tof-SIMS Ion Profiling to Understanding the Surface and Bulk Modifications of Si Anode As a Function of Electrolyte Composition and Additives – J. Swiatowska (CNRS - Chimie ParisTech), C. Pereira-Nabais, A. Seyeux (CNRS – Chimie ParisTech), F. Ozanam, M. Rosso (CNRS - Ecole Polytechnique), M. Cassir Sr., and P. Marcus (CNRS - Chimie ParisTech)

A06 High-Energy Li-Ion Intercalation Materials

Battery

105-A, Phoenix Convention Center

Cathode II – 08:00 – 12:00
Co-Chairs: Jagit Nanda and Hikari Sakaebe

08:00 **438** (Invited) Advances in Cathode Materials for High Energy Density Lithium-Ion Batteries – J. Nanda (Oak Ridge National Laboratory)

08:30 **439** Structural Ambiguity in Li- and Mn-Rich Transition Metal Oxides: Trigonal, Monoclinic, or Both? – A. K. Shukla (Energy Storage and Distributed Resources Division,LBNL), Q. Ramasse (SuperSTEM), C. Ophus (NCEM, Molecular Foundry, LBNL), H. Duncan (Kinestral Technologies), G. Chen (Energy Storage and Distributed Resources Division, LBNL), and U. Dahmen (NCEM, Molecular Foundry, LBNL)

08:50 **440** Structural Evolution of High Capacity Li-Rich $0.5Li_2MnO_3$*$0.5LiMO_2$ (M=Mn, Ni and Co) Cathode Materials during Electrochemical Cycling – J. Rana (Helmholtz-Zentrum Berlin für Materialien und Energie), R. Kloepsch (MEET Battery Research Center, University of Muenster), J. Li (MEET Battery Research Center), G. Schumacher (Helmholtz-Zentrum Berlin für Materialien und Energie), M. Winter (MEET Battery Research Center, University of Muenster), and J. Banhart (Helmholtz-Zentrum Berlin für Materialien und Energie)

09:10 **441** Layered Cathode Materials with Controlled Particle Assembly for High Energy Lithium-Ion Batteries – F. Lin, Y. Li (Lawrence Berkeley National Laboratory), D. Nordlund (Stanford Synchrotron Radiation Lightsource), Y. Liu (SLAC National Accelerator Laboratory, USA), T. C. Weng (SLAC National Accelerator Laboratory), H. Xin (Brookhaven National Laboratory), and M. Doeff (Lawrence Berkeley National Laboratory)

09:30 **442** Degradation Mechanism of Nickel Manganese Cobalt Oxide-Type Commercial Lithium-Ion Cells By Long-Term Cycle Tests – T. Matsuda, K. Ando, M. Myojin (Japan Automobile Research Institute), M. Matsumoto, T. Sanada (Device-functional analysis Department, NISSAN ARC Ltd.), N. Takao (Device-functional analysis Department, NISSAN ARC, Ltd.), H. Imai (Device-functional analysis Department, NISSAN ARC Ltd.), and D. Imamura (Japan Automobile Research Institute)

09:50 Break

10:10 **443** (Invited) Surface Modification Effect on the First Charging Process over 4.5 V and the Enhancement of Energy of $LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$ – H. Sakaebe, A. Yano, M. Shikano (AIST), and Z. Ogumi (Kyoto University)

10:40 **444** High-Voltage, Lithium-Ion Research for Transportation Applications – J. R. Croy, K. G. Gallagher, S. G. Rinaldo, B. R. Long (Argonne National Laboratory), M. Balasubramanian (Advanced Photon Source, Argonne National Laboratory), J. S. Park, F. Dogan, Z. Yang, E. Lee, and A. K. Burrell (Argonne National Laboratory)

11:00 **445** Composite "Layered-Layered-Spinel" Electrodes for High Energy Lithium-Ion Batteries – J. S. Park, J. R. Croy, B. R. Long, E. Lee, and M. M. Thackeray (Argonne National Laboratory)

11:20 **446** Synthesis of $LiCoO_2$ and $LiNi_{1/3}Mn_{1/3}Co_{1/3}O_2$ 2D Nanosheets By Osmotic Swelling for High Performance Lithium-Ion Batteries – Q. Cheng and C. K. Chan (Arizona State University)

11:40 **447** Investigating Synthetic Effects on Ni-Based Oxide As a Cathode Material for Li-Ion Batteries – J. Xu and W. Tong (Lawrence Berkeley National Laboratory)

Cathode III – 14:00 – 18:00
Co-Chairs: Clare Grey and She-Huang Wu

14:00 **448** (Invited) Understanding Surface and Structural Changes in High Energy Density Electrodes By NMR and Computational Studies – C. P. Grey, A. Michan, M. Leskes, and I. Seymour (University of Cambridge)

14:30 **449** *Operando* Imaging of Electrochemical Phase Transitions in $LiNi_{0.8}Co_{0.15}Al_{0.05}O_2$ secondary Particles – Y. S. Yu (University of Illinois at Chicago, Lawrence Berkeley National Laboratory), C. Kim (Chungnam National University, University of Illinois at Chicago), Y. Liu (SLAC National Accelerator Laboratory, USA), and J. Cabana (NECCES at University of Illinois at Chicago)

14:50 **450** Layered-to-Spinel Phase Transformations Inhibited By ALD Coatings on NMC Cathodes to Mitigate Voltage Fade in Lithium-Ion Cells – K. Dahlberg (Energy Power Systems, LLC), D. Mohanty (Oak Ridge National Laboratory), M. Lee (XALT Energy, LLC), E. Anderson (Energy Power Systems, LLC), V. Mahajan, J. Stanley (XALT Energy, LLC), D. M. King (PneumatiCoat Technologies), D. L. Wood III (University of Tennessee), and F. Albano (XALT Energy, LLC)

15:10 **451** Diffusion in the Layered Li-Ni-Mn-Co Oxide Based Core-Shell/Gradient Materials during Sintering Simulated with Pellets in Contact – J. Li, K. Plucknett (Dalhousie University, Dept. of Process Engineering and Applied Scinece), and J. R. Dahn (Dalhousie University, Physics and Atomospheric Scinece, Dept. of Process Engineering and Applied Scinece)

15:30 **452** Aging Analysis of $LiNi_{1/3}Mn_{1/3}Co_{1/3}O_2$-Graphite Cells Via X-Ray Diffraction – I. Buchberger (TU München, TEC), S. Seidlmayer (TU München, MLZ, Heinz Maier-Leibnitz Zentrum), J. Hattendorff (Technische Universität München), A. Pokharel, M. Piana (TU München, TEC), P. Kudejova, R. Gilles (TU München, MLZ, Heinz Maier-Leibnitz Zentrum), and H. A. Gasteiger (Technische Universität München)

15:50 Break

16:10 **453** (Invited) Effects of Crystalline Structure on the Electrochemical Properties of High Voltage Spinel Cathode Materials – S. H. Wu, S. H. Su, and J. J. Shiu (Tatung University)

16:40 **454** High Energy X-Ray Used to Investigate the Synthesis of Full Concentration Gradient Cathode – Y. Li, R. Xu (Argonne National Laboratory), Y. Ren (Argonne National Laboratory, Advanced Photon Source), J. Lu, H. Wu, L. Wang, D. Miller (Argonne National Laboratory), Y. K. Sun (Department of Energy Engineering, Hanyang University), K. Amine, and Z. Chen (Argonne National Laboratory)

17:00 **455** The Effect on Electrochemical Properties By the Content of Mn^{3+} of High-Voltage Spinel LiNi0.5Mn1.5O4 Cathode Material for Highly Stable Lithium-Ion Batteries – J. Li (MEET Battery Research Center), H. Liu (MEET Battery Research center, University of Muenster), and J. Wang (MEET Battery Research Center)

17:20 **456** Influence of Using Additives in Spray Drying Process on Structural and Electrochemical Properties of $LiNi_{0.5}Mn_{1.5}O_4$ cathode Material – T. Risthaus, J. Wang, and J. Li (MEET Battery Research Center)

17:40 **457** Implementation of Stable Surface Structures; A Promising Key to Solve Capacity Fading Issues for the High-Voltage $LiNi_{0.5}Mn_{1.5}O_4$ – H. Yoon (University of California, San Diego), H. M. Cho, D. Qian (University of California San Diego), and S. Meng (NECCES at University of California, San Diego)

West Hall 1, Phoenix Convention Center

A06 Poster Session – 18:00 – 20:00

- **458** Transition Mechanism and Phase Transition Front of $Li_xNi_{0.5}Mn_{1.5}O_4$ – H. Komatsu, H. Arai, Y. Koyama, K. Sato (Kyoto University), T. Kato, R. Yoshida (Japan Fine Ceramics Center), H. Murayama, I. Takahashi, Y. Orikasa, K. Fukuda (Kyoto University), T. Hirayama, Y. Ikuhara (Japan Fine Ceramics Center), Y. Ukyo, Y. Uchimoto, and Z. Ogumi (Kyoto University)
- **459** Electrochemical Properties of $Li_2FeP_2O_7$/C Nanocomposites Prepared from LiH2PO4 and $Fe(NO_3)_3 \cdot 9\ H_2o$ used As a Precursor – H. C. Jang, H. Nagano, and I. Taniguchi (Tokyo Institute of Technology)
- **460** Effects of Transiotion Metal Co-Doping on the Electrochemical Properties of $Li_3V_{2-2x}Fe_xMn_x(PO_4)_3$/Graphene Cathode Material for Lithium Secondary Battery – H. S. Kim (KERI), M. Jeong (Osaka National University), and B. S. Jin (KERI)
- **461** Evolution of the Surface and Subsurface Chemical Environment of $Li_xNi_{0.8}Co_{0.15}Al_{0.5}O_2$ electrodes – S. Sallis (NECCES at Binghamton University), N. Pereira (Rutgers University), Y. Huang, N. F. Quackenbush, M. S. Whittingham (NECCES at Binghamton University), G. G. Amatucci (Rutgers University), and L. F. J. Piper (NECCES at Binghamton University)
- **462** Enhanced Cycleability of $LiNi_{0.5}Mn_{1.5}O_4$ Cathode with Zn Substitution – Z. Yang (Huazhong University of Science and Technology), Y. Jiang (Hubei University of Technology), and Y. Huang (Huazhong University of Science and Technology)
- **463** Oxygen Activity Promoting the Surface Transformation of High Voltage Layered Oxide Cathodes for Lithium Ion Batteries – S. Hy (University of California San Diego), H. Liu (University of California, San Diego), F. Lin, M. Doeff (Lawrence Berkeley National Laboratory), S. Wolff-Goodrich (University of California, Berkeley), D. Nordlund (Stanford Synchrotron Radiation Lightsource), H. Xin (brookhaven national laboratory), and S. Meng (NECCES at University of California, San Diego)
- **464** Advanced Performances of Full Concentration Gradient $Li[Ni_{0.65}Co_{0.08}Mn_{0.27}]O_2$ Cathode Materials for Lithium Ion Batteries – D. W. Jun (Department of Energy Engineering, Hanyang University), K. J. Park, B. B. Lim, C. S. Yoon (Hanyang University), and Y. K. Sun (Department of Energy Engineering, Hanyang University)
- **465** Capacity Fading Research on Si Anode in Lithium Ion Batteries – Y. Fu, X. Song, H. Zhao, W. Mao, G. Liu, and V. Battaglia (Lawrence Berkeley National Laboratory)
- **466** Effect of Crosslinking of Guar Gum As a Bio-Derivative Binder for Negative Electrodes of Lithium-Ion Batteries – I. Y. Choi, J. E. Lee, and E. S. Oh (University of Ulsan)
- **467** Performance Enhancement of $Li_4Ti_5O_{12}$ and Si/C Electrodes Using Graphene/CMC Conductive Composite Binder – J. E. Lee, I. Y. Choi, and E. S. Oh (University of Ulsan)

- **468** Electrospun Hollow Glassy Carbon-Reduced Graphene Oxide Nanofibers with Encapsulated ZnO Nanoparticles : A Free-Standing Anode for Li-Ion Batteries – S. Shilpa, B. M. Basavaraja (Indian Institute of Technology Kanpur), S. B. Majumder (Indian Institute of Technology Kharagpur), and A. Sharma (Indian Institute of Technology Kanpur)
- **469** Relaxation Behavior of Magnetization for Electrochemically Lithium Inserted Gamma-Fe_2O_3 – S. Takai (Graduate School of Energy Science, Kyoto University), H. Kawaji (Tokyo Institute of Technology), A. Tamura, T. Yabutsuka (Graduate School of Energy Science, Kyoto University), and T. Yao (Institute of Advanced Energy, Kyoto University)

A08 Materials and Cell Designs for Flexible Energy Storage and Conversion Devices

Battery / Energy Technology

213-B, Phoenix Convention Center

Paper and Thim Fim Based Flexible Batteries – 13:30 – 17:00
Co-Chairs: Mark A. Allen and Jean St-Pierre

13:30 Welcoming Remarks

13:35 **527** Foldable Paper-Based Lithium-Ion Batteries – C. K. Chan (Arizona State University)

14:10 **528** Design, Fabrication and Characterization of Flexible Thin Film Rechargeable Lithium Ion Batteries – S. Oukassi, C. Giroud-Garampon, S. Poncet, and R. Salot (CEA, LETI, MINATEC Campus, 38054 Grenoble, France)

14:30 **529** Dually Li Ion/Electron-Conductive Materials for Polymer-Based, Printable Lib Electrodes – M. B. McDonald (MIT) and P. T. Hammond (Massachusetts Institute of Technology)

14:50 Break

15:10 **530** A Stable Nanostructured Li-Deficient Oxide Thin-Film Electrode for Advanced Lithium-Ion Batteries – G. Tan (Argonne National Laboratory), F. Wu (Beijing Instituted of Technology), J. Lu, and K. Amine (Argonne National Laboratory)

15:45 **531** Flexible, Foldable and Multi-Functional Paper-Based Electronics – J. H. He (King Abdullah University of Science and Technology), P. K. Yang (Georgia Institute of Technology, King Abdullah University of Science and Technology), D. H. Lien (King Abdullah University of Science and Technology, National Taiwan University, Taipei, Taiwan, ROC), and C. H. Lin (King Abdullah University of Science and Technology)

16:20 **532** Performance of Si-Integrated Li-Ion Microbatteries with Side-By-Side Electrodes: A Geometry Study – K. Hoeppner, M. Ferch, P. Mackowiak (Berlin Institute of Technology), B. Mukhopadhyay, A. Froebe, R. Gernhardt, S. Roder, K. Marquardt, and R. Hahn (Fraunhofer IZM, Berlin)

16:40 **533** Prussian Blue Analog Batteries on Thread Substrates for Wearable Electronic Applications – A. Kim, S. Biswas, T. Gupta, and D. A. Steingart (Princeton University)

West Hall 1, Phoenix Convention Center

A08 Poster Session – 18:00 – 20:00
Co-Chair: James Wu

- **534** Flavin Mediated Electro-Oxidation of 1,4-Dihydronicotinamides Using Photogalvanic Cell – J. Yano (Niihama National College of Technology) and A. Kitani (Hiroshima University)
- **535** Package-Limitation of Cathode Material in Composite Electrode for Lithium-Ion Batteries – K. Kitada, H. Murayama, K. Fukuda, H. Arai, Y. Uchimoto, Z. Ogumi, and E. Matsubara (Kyoto University)
- **536** Pyro-Synthesis of Nanostructured Spinel $ZnMn_2O_4$/C As Negative Electrode for Rechargeable Lithium-Ion Batteries – J. Jo, J. Gim, J. Song, S. Kim, M. H. Alfaruqi, S. Nam, S. Rajan, J. P. Baboo, and J. Kim (Chonnam National University)
- **537** 3D Paper-Based Lithium-Ion Batteries Using Origami Folding Principles – Q. Cheng and C. K. Chan (Arizona State University)
- **538** Activated Carbon Fiber Treated in Different Temperature as Supercapacitor Electrodes: Electrochemical Characterization – D. A. L. Almeida, A. B. Couto, and N. G. Ferreira (Instituto Nacional de Pesquisas Espaciais)

A09 Recent Advances in Supercapacitors

Energy Technology / Battery / Dielectric Science and Technology

103-A, Phoenix Convention Center

Supercapacitors - General – 08:00 – 12:20
Co-Chairs: Robert Kostecki and Vibha Kalra

08:00 **570** (Invited) Three-Dimensional Freestanding Nanofiber Electrodes for Electric Double Layer and Pseudo-Capacitors – V. Kalra (Drexel University)

08:40 **571** Active Material Arrangement and Its Effect on Electronic Conductivity in a Suspension Electrode – K. B. Hatzell (Drexel University), J. Eller (Paul Scherrer Institut), and Y. Gogotsi (Drexel University)

09:00 **572** Separating the Faradaic and Non-Faradaic Charge Storage Mechanisms in Electrochemical Capacitors Using Step Potential Electrochemical Spectroscopy – S. W. Donne and M. F. Dupont (University of Newcastle)

09:20 **573** Capacitive Deionization Process Via Nano-Titanium Carburizing Electrode – L. Wang and Y. Zhou (Wuhan University of Science & Technology)

09:40 Break

10:00 **574** Supercapacitors Performance Evaluation – S. Zhang (University of California, Davis)

10:20 **575** Quaternized Graphene Oxide-Based Supercapacitor Electrode – O. Movil-Cabrera (Ohio University) and J. A. Staser (Chemical Engineering)

10:40 **576** Low-Temperature Chemical Passivation Routes for Integration of Supercapacitors Directly into Silicon Solar Cells – A. S. Westover, T. Metke, J. Afolabi, K. Share, R. E. Carter, A. P. Cohn, L. Oakes, and C. L. Pint (Vanderbilt University)

11:00 **577** Increasing the Energy Storage Capability of Porous Silicon Electrochemical Capacitor Devices – D. S. Gardner, C. W. Holzwarth III, Y. Liu, S. B. Clendenning, W. Jin, B. K. Moon, Z. Chen, T. Aldridge, E. C. Hannah (Intel Corporation), C. Chen, C. Wang (Florida International University), E. Mäkilä (University of Turku), and J. Gustafson (Ceranovo, Intel Corporation)

11:20 **578** Novel Asymmetric Capacitors Using Intercalated Metal-Organic Framework Negative Electrodes – N. Ogihara, Y. Ozawa, O. Hiruta, C. Okuda, Y. Kishida, and N. Ohba (Toyota Central R&D Labs., Inc.)

11:40 **579** Solid-State Planar Edlc Design Enabled By Hydroxide-Conducting Polymer – K. Lian, H. Gao, J. Li (University of Toronto), J. R. Miller (Case Western Reserve University), R. A. Outlaw (The College of William & Mary), and S. M. Butler (JME, Inc.)

12:00 **580** Carbon Dioxide Activated SiC-CDC: Attractive Material for Supercapacitor Electrodes – A. Jänes (University of Tartu), E. Tee (Institute of Chemistry, University of Tartu), I. Tallo, T. Thomberg, and E. Lust (University of Tartu)

Electric Double Layer Capacitors – 14:00 – 18:00
Co-Chairs: A. Manivannan and Robert Kostecki

14:00 **581** (Invited) Dynamic Behaviour of Electric Double Layer Capacitors – G. Madabattula and S. Kumar (Indian Institute of Science)

14:40 **582** Highly Porous Carbon Nanospheres and Carbon Foams for Supercapacitors Using Facile Spray Pyrolysisand One-Pot Reaction – C. Wang, M. J. O'Connell, and C. K. Chan (Arizona State University)

15:00 **583** The Influence of Conductive Salt Ion Selection on the Performance of High Voltage Edlcs – A. Balducci (Helmholtz Institute Ulm (HIU)), S. Pohlmann, C. Ramirez-Castro (MEET Battery Research Centre - University of Münster), and C. Schütter (MEET Battery Research Centre -University of Münster)

15:20 **584** Design and Testing of Supercapacitors for High Temperature Operation – E. J. Brandon, S. C. Jones, A. V. Shevade, K. J. Billings, J. Pasalic, C. C. Krause, V. K. Davis, K. B. Chin, and B. V. Ratnakumar (Jet Propulsion Laboratory)

15:40 **585** Structure-Directed CNT Arrays As Micro-Supercapacitor Electrodes and the Effect of Geometry on Electrolyte Selection – K. T. Nicol and J. J. Hill (Mainstream Engineering Corp.)

16:00 Break

16:20 **586** Performance Enhancement of Activated Carbon Based Supercapacitors By Incorporation of Fullerene Self-Assemblies – D. Sridhar, K. Balakrishnan, S. Raghavan, and K. Muralidharan (University of Arizona)

16:40 **587** Activated Carbon Derived from Hemp and Its Use in Electrochemical Capacitors – W. Sun, S. M. Lipka, and F. Yang (University of Kentucky)

17:00 **588** Freestanding Graphene/Carbide Derived Carbon Films As High-Performance Electrodes for Electrochemical Capacitors – M. Alhabeb, M. Beidaghi, K. L. Van Aken, and Y. Gogotsi (Drexel University)

17:20 **589** Ionic Liquid Mixtures As Electrolytes for Electrochemical Capacitors – K. L. Van Aken, M. Beidaghi (Drexel University), and Y. Gogotsi (Drexel University, A. J. Drexel Nanomaterials Institute)

17:40 **590** The Effect of Self-Discharge on the Performance of Symmetric Electric Double Layer Capacitors: Insights from Mathematical Modeling and Simulation – I. S. Ike (University of the Witwatersrand, MERG, University of the Witwatersrand, Johannesburg)

West Hall 1, Phoenix Convention Center
A09 Poster Session – 18:00 – 20:00

- **591** New Generation High Performance Lithium-Ion Capacitor Laminate Cells – W. Cao and X. Chen (General Capacitor LLC)
- **592** Environmental Friendly Electrode Preparation for Hybrid Battery-Supercapacitors Based on $Li_3V_{1.95}Ni_{0.05}(PO_4)_3$/C and Activated Carbon – C. Meuser (Zentrum für Sonnenenergie- und Wasserstoff-Forschung BW), H. Y. Tran (Zentrum für Sonnenenergie- und Wasserstoff-Forschung BW), M. Secchiaroli (Zentrum für Sonnenenergie- und Wasserstoff-Forschung BW), S. Dsoke, and M. Wohlfahrt-Mehrens (Zentrum für Sonnenenergie- und Wasserstoff-Forschung BW)
- **593** Unveiling the Pseudocapacitance of Ti2C Monolayer for High Performance Electrochemical Capacitor: a First-Principles Study – X. Ji and J. Jiang (Huazhong University of Science and Technology)
- **594** Facile Hydrothermal Synthesis of Feather-like Nickel Phosphite As Cathode Materials for Supercapacitors – Y. Ruan, J. Jiang (Huazhong University of Science and Technology), and H. Wan (houzhaow@gmail.com)
- **595** Solvothermal Synthesis of Copper Ferrite-Graphene Nanocomposite As a Supercapacitor Electrode Material – Y. Piao (Graduate School of Convergence Science and Technology, Seoul National University)

C05 Critical Factors in Localized Corrosion 8

Corrosion
102-A, Phoenix Convention Center

Al and Al Alloys – 08:00 – 12:00
Co-Chairs: Gerald Frankel and Kurt Hebert

08:00 **685** Cerium and Lanthanum Salts Used As Individual and Combined Inhibitors for Corrosion Protection of AA7075-T6 in Chloride Solution – B. Volaric, P. Rodic, and I. Milosev (Jozef Stefan Institute)

08:20 **686** Study of Single Al Corrosion Pit Growth By Electrochemical Techniques – W. Zhang, M. A. Kryzman, M. R. Jaworowski, and G. S. Zafiris (United Technologies Research Center)

08:40 **687** Stability Criteria for Intergranular Corrosion of AA5083-H131 – M. L. C. Lim (University of Virginia), E. Trueman (NSWC Carderock Division), J. R. Scully, and R. G. Kelly (University of Virginia)

09:00 **688** Coupled Tensile Stress Increases and Topography Evolution during Aluminum Corrosion – O. Capraz, S. Ide, P. Shrotriya, and K. Hebert (Iowa State University)

09:20 **689** Critical Factors Affecting Intergranular Corrosion of AA5083 Under Atmospheric Exposures – P. Khullar, J. V. Badilla, M. L. C. Lim, S. C. Hahn, D. W. Ellis, and R. G. Kelly (University of Virginia)

09:40 Break

10:00 **690** Pitting and Hydrogen Evolution on Aluminum in Concentrated HCl Solutions – B. Lynch, S. Fajardo, and G. Frankel (Fontana Corrosion Center, The Ohio State University)

10:20 **691** Intergranular Corrosion in Sensitized AA5083 Under Alternating Wet and Dry Conditions – M. L. C. Lim, S. C. Hahn, and R. G. Kelly (University of Virginia)

10:40 **692** Potential Dependence of Intergranular Corrosion Propagation in Sensitized Al-Mg Alloys – M. L. C. Lim, D. W. Ellis, S. C. Hahn, J. R. Scully, and R. G. Kelly (University of Virginia)

11:00 **693** Susceptibility of 5xxx Aluminum Alloys to Localized Corrosion in Natural Waters – J. S. Lee and B. J. Little (Naval Research Laboratory)

11:20 **694** Developing a Framework for Accelerated Test Design By Investigating the Impact of Key Testing Variables on the Exfoliation Corrosion of AA2060 – M. Parker, S. Shrivastava, and R. G. Kelly (University of Virginia)

11:40 **695** Role of Confinement in Localized Corrosion – R. Puranik and D. J. Quesnel (University of Rochester)

Corrosion Division Award Lectures – 14:00 – 15:00
Co-Chairs: Rudolph Buchheit and Sannakaisa Virtanen

14:00 **696★** (Corrosion Division H. H. Uhlig Award) Application Of Electrochemistry in the Development of Performance Assessment Models for High Level Nuclear Waste Disposal – D. Shoesmith (Western University)

14:30 **697★** (Corrosion Division Morris Cohen Student Award) Impact of Salt Deliquescence on the Humidity-Dependence of Atmospheric Corrosion – E. Schindelholz (Sandia National Laboratories), B. E. Risteen (Georgia Institute of Technology), and R. G. Kelly (University of Virginia)

Non Ferrous Materials – 15:00 – 16:00
Co-Chair: Shinji Fujimoto

15:00 **698** The Effect of the Flow-Regime, Reversal of Polarization, and Oxygen on the Long Term Stability in Capacitive De-Ionization Processes – I. Cohen, E. Avraham, Y. Bouhadana, A. Soffer, and D. Aurbach (Bar-Ilan University)

15:20 **699** The Dezincification of Brass: In Situ Measurement of Zn and Cu Dissolution with Atomic Emission Spectroelectrochemistry – K. Ogle and P. Zhou (Insitut de Recherche de Chimie-Paris)

15:40 **700** High Resolution in Situ Studies of Localized and Crevice Corrosion with Multiple Beam Interferometry and Atomic Force Microscopy – B. R. Shrestha (Max-Planck-Institut f. Eisenforschung GmbH), A. Bashir (Max-Planck-Institut für Eisenforschung GmbH), G. N. Ankah (Max-Planck-Institut für Eisenforschung), F. Renner (Hasselt University), and M. Valtiner (Max-Planck-Institut f. Eisenforschung GmbH)

Carbon Steels – 16:10 – 18:10
Co-Chair: Eiji Tada

16:10 **701** On Stress-Corrosion Cracking Initiation: Pitting Susceptibility and Cathodic Activity Near Nonmetallic Steel Inclusions – K. Brophy, F. Eliyan, and J. Kish (McMaster University)

16:30 **702** Heterogeneous Thermal Oxide Film Formed on Polycrystalline Pure Iron – Y. Takabatake, Y. Kitagawa, T. Nakanishi, Y. Hasegawa, and K. Fushimi (Hokkaido University)

16:50 **703** Localized Corrosion of Carbon Steel in the Presence of Gamma Radiation – J. C. Wren, L. Wu, D. Guo, A. Van Belois (University of Western Ontario), J. J. Noel (The University of Western Ontario), and P. Keech (Nuclear Waste Management Organization)

17:10 **704** Comparison of Fractographic Behaviors of Electrochemically Hydrogenated and Liquid N_2 Treated 4340 Steel of Various Microstructures – M. Hassan SK (Qatar University), R. Overfelt (Auburn University), and A. M. Abdullah (Center for Advanced Materials, Qatar University)

17:30 **705** Factors Affecting Stray Currents Corrosion of Buried Pipeline – Z. Qingjun Sr. (Institute of Oceanology, Chinese Academy of Sciences) and H. Baorong (Institute of Oceanology, Chinese Academy of Scineces)

17:50 **706** *Vibrio* neocaledonicus Sp., a Novel Marine Bacterium with the High Corrosion Inhibition Efficiency – M. Moradi, Z. Song, and T. Xiao (Ningbo Institute of Materials Technology and Engineering)

C06 Pits & Pores 6: Nanomaterials - In Memory of Yukio H. Ogata

Corrosion / Luminescence and Display Materials
102-B, Phoenix Convention Center

Magnetic and Optical Properties – 08:00 – 09:40
Co-Chairs: Jeffery L. Coffer and Kurt W. Kolasinski

08:00 **727** (Invited) Pore Filling of Porous Silicon with Ferromagnetic Nanostructures – K. Rumpf, P. Granitzer (Karl Franzens University Graz), P. Poelt (University of Technology Graz), and H. Michor (Vienna University of Technology)

08:30 **728** Magnetic Studies of Iron Oxide Nanoparticles Encapsulated within Nanostructured Silicon – P. Granitzer, K. Rumpf (Karl Franzens University Graz), R. Gonzalez-Rodriguez, J. Coffer (Texas Christian University Fort Worth), P. Poelt (University of Technology Graz), and M. Reissner (Vienna University of Technology)

08:50 **729** Morphological and Optical Properties of Stain Etched Silicon in Vanadium Oxide (V_2O_5) / Hydrofluoric Acid (HF) Solution – M. Ayat (CRTSE, USTHB), N. Gabouze, S. Sam (CRTSE), L. Boarino (INRIM), and R. Boukherroub (CNRS)

09:10 **730** (Invited) Bright Light Emitting Silicon/ Germanium Nanostructures – D. J. Lockwood (National Research Council Canada)

Optical and Electronic Properties – 10:00 – 12:00
Co-Chairs: Giuseppe Barillaro and Hiroki Habazaki

10:00 **731** (Invited) Electronic and Acoustic Applications of Anodized Nano-Crystalline Silicon – N. Koshida (Tokyo University of Agriculture and Technology)

10:30 **732** Plasmonic Mesostructures Prepared By Oriented Mesoporous Materials As a Template – S. Murai (PRESTO JST, Graduate School of Engineering, Kyoto University), S. Uno (Graduate school of Engineering, Kyoto University), R. Kamakura (Kyoto University), K. Fujita, and K. Tanaka (Graduate School of Engineering, Kyoto University)

10:50 **733** Porous Silicon in Microelectronics: From Academic Studies to Industry – G. Gautier, T. Defforge (Université de Tours/GREMAN/ CNRS/CEA/INSA-CVL), S. Desplobain (Silimixt Tours), J. Billoué, M. Capelle (Université de Tours/ GREMAN/ CEA/INSA-CVL), P. Povéda (ST Microelectronics, Tours), K. Vanga, B. Lu, B. Bardet, J. Lascaud, C. Seck, A. Fèvre (Université de Tours/ GREMAN/ CEA/INSA-CVL), S. Menard (ST Microelectronics, Tours), and L. Ventura (SILIMIXT)

11:10 **734** (Invited) Ultrafine Porous Polyimide Membrane for Rechargeable Lithium Batteries – K. Kanamura, K. Miyahara, Y. Aoyama, K. Ouchi, M. Haibara, and H. Munakata (Tokyo Metropolitan University)

Biomedical and Sensor Applications – 14:00 – 16:00
Co-Chairs: Jarno Salonen and Kiyoshi Kanamura

14:00 **735** (Invited) Electrochemical Preparation and Processing of Porous Silicon Nanoparticles for Targeted, Self-Reporting Drug Delivery – M. J. Sailor (University of California, San Diego)

14:30 **736** Nanoporous Silicon-Based Platforms for Biological Applications Fabricated By UV Laser Techniques – G. Recio-Sanchez (Universidad Católica de Temuco), R. J. Pelaez, C. N. Afonso (Instituto de Óptica), F. Vega (Universitat Politècnica de Catalunya), and R. J. Martin-Palma (Universidad Autónoma de Madrid)

14:50 **737** Response Simulation and Extraction of Gas Concentrations for Nanostructure Decorated Nano-/Microporous Silicon Interfaces – W. Laminack, C. Baker, and J. L. Gole (Georgia Institute of Technology)

15:10 **738** (Invited) Green Synthesis of Porous Silicon Derived from Accumulator Plants: Associated Morphologies and Stabilization of a Natural Bioactive Extract – N. T. Le, S. Howell, J. Kalluri (Texas Christian University), A. Loni, L. T. Canham (pSiMedica Ltd), and J. L. Coffer (Texas Christian University)

15:40 Intermission

Fabrication and Characterization – 16:00 – 18:00
Co-Chairs: Sachiko Ono and R. J. Martin-Palma

16:00 **739** (Invited) Organization in Molecular Layers Covalently Attached to Oxide-Free Silicon Surfaces – C. Henry de Villeneuve, T. L. Nguyen Le, S. Klaes, P. Allongue (CNRS-Ecole polytechnique), and F. Ozanam (CNRS - Ecole Polytechnique)

16:30 **740** Effects of Substrate Composition on Morphology and Growth of Porous Oxide Layers – H. Tsuchiya, M. S. Kim, T. Erami, Y. Otani, and S. Fujimoto (Osaka University)

16:50 **741** Porous Layers Composed of Oxide Crystallites Formed By the Combination of Laser Ablation and Anodization of Metal – K. W. Kolasinski, A. S. Ganas, D. A. Znamensky (West Chester University), N. Méndez Alba, and J. L. Hernández-Pozos (Universidad Autónoma Metropoplitana-Iztapalapa)

17:10 **742** Bias-dependent Photoabsorption Properties of GaN Porous Structures under Back-side Illumination – T. Sato, H. Kida, Y. Kumazaki, and Z. Yatabe (Hokkaido University)

17:30 **743** (Invited) Thermal Carbonization of Porous Silicon: The Current Status and Recent Applications – J. Salonen, M. Kaasalainen, O. P. Rauhala, M. Hakamies, T. Jalkanen, L. Lassila (University of Turku), R. Hahn (FAU), P. Schmuki (University of Erlangen-Nuremberg (FAU)), and E. Mäkilä (University of Turku)

West Hall 1, Phoenix Convention Center
C06 Poster Session – 18:00 – 20:00

• **744** Catalytic Activity of Ru for Metal-Assisted Etching of Si – D. Sadakane, K. Yamakawa, N. Fukumuro, and S. Yae (University of Hyogo)

• **745** Optical Property of Porous Silicon Produced By Metal-Assisted Etching – K. Yamakawa, S. Sakamoto, N. Fukumuro, and S. Yae (University of Hyogo)

D03 Photovoltaics for the 21st Century 11

Dielectric Science and Technology / Electrodeposition / Electronics and Photonics / Energy Technology / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry
Ellis West, Hyatt Regency

Perovskite – 08:30 – 10:00
Co-Chairs: Hiroki Hamada and Meng Tao

08:30 **787** (Invited) $CH_3NH_3PbI_3$ Perovskite Solar Cells on Inorganic Materials: Cucsn and Crystal Silicon – S. Ito (University of Hyogo)

09:00 **788** High Efficiency Millimeter-Scale Crystalline Perovskite Solar Cells – A. Mohite, W. Nie (Los Alamos National Laboratory), H. Tsai (Los Alamos National Lab), R. Asadpour (Purdue University), J. C. Blancon, A. Neukirch (Los Alamos National Lab), G. Gupta (Los Alamos National Laboratory), J. Crochet (Los Alamos National laboratory), M. Chhowalla (Rutgers University), M. Alam (Purdue University), H. L. Wang, and S. Tretiak (Los Alamos National Lab)

09:20 **789** Reduction of Graphene Oxide through Intense Pulsed Light Towards Transparent Conductive Coating Applications – G. Draper (University of Louisville, Conn Center for Renewable Energy), R. Dharamsena (University of Louisville), B. Lavery (Conn Center for Renewable Energy, University of Louisville), and T. Druffel (University of Louisville, Conn Center for Renewable Energy)

09:40 **790** Bandgap Engineering in TiO_2 By Sulfurization – W. J. Shin (Arizona State University), A. H. Granados (CIICAp-UAEMor and IER-UNAM), H. Hu (Instituto de Energías Renovables (IER), UNAM), and M. Tao (Arizona State University)

Crosscutting – 10:30 – 11:50
Co-Chairs: Meng Tao and Hiroki Hamada

10:30 **791** Renewable Energy Forecast Using Machine Learning – I. Shao, S. Lu, and H. F. Hamann (IBM T.J. Watson Research Center)

10:50 **792** Metallic Nanoparticles and Nanostructure for Light Trapping – Y. Tang and B. Vlahovic (North Carolina Central University)

11:10 **793** High Performing Semitransparent Graphene/ $BiFe_{0.95}Si_{0.05}O_3$/ITO Ferroelectric Photovoltaic Device – S. Gupta (Department of Physics, University of Puerto Rico), R. K. Katiyar (Dept. of Physics, University of Puerto Rico), R. Medwal (University of Puerto Rico), S. P. Pavunny (University of Puerto Rico), T. B. Limbu (University of Puerto Rico), M. Tomar (Miranda House, University of Delhi), G. Morell (University of Puerto Rico), V. Gupta (University of Delhi), and R. S. Katiyar (Institute of Functional Nanomaterials, Dept. of Physics, University of Puerto Rico-Rio Piedras)

Silicon I – 14:00 – 15:30
Co-Chairs: Thad Druffel and Takurou N. Murakami

14:00 **794** (Invited) Potential and Activities of III-V/Si Tandem Solar Cells – M. Yamaguchi (Toyota Technological Institute)

14:30 **795** Low Stress and High Ductility Copper Electroplating Additive Development – L. Wei, Y. H. Kao, R. Hazebrouck, R. Corona, B. Lieb, Y. Wang, M. A. Lowe, M. Lefebvre, S. H. Pyo, W. Tachikawa, and J. Calvert (The Dow Chemical Company)

14:50 **796** Efficiency Uniformization in Crystalline-Si Solar Cells By Numerical Simulation – L. Wang and M. Tao (Arizona State University)

Silicon II – 16:00 – 17:00
Co-Chairs: Takurou N. Murakami and Thad Druffel

16:00 **797** Electroplated Cu Grids on Crystalline Silicon Solar Cells and Its Long Term Degradation – Q. Huang (IBM TJ Watson Research Center)

16:20 **798** Flexible Ultra-Thin Silicon Solar-Cell Implemented with Energy-Down-Shift Via $Cd_{0.5}Zn_{0.5}s$/ZnS Core/Shell Quantum Dots – J. S. Park, J. H. Shim, Y. H. Ko, J. H. Park, G. S. Lee, and J. G. Park (Hanyang University)

16:40 **799** Electrochemical Behavior of Silicon in Eutectic Calcium Chloride and Calcium Fluoride Molten Salt – W. H. Huang and M. Tao (Arizona State University)

West Hall 1, Phoenix Convention Center
D03 Poster Session – 18:00 – 20:00
Co-Chair: Meng Tao

• **800** Comparison of Different TiO_2 Phase Structures and Morphologies on Dye-Sensitized Solar Cells – T. C. Tsui, W. Han, and K. L. Yeung (The Hong Kong University of Science and Technology)

• **801** Intense Pulsed Light Annealing of Perovskite Solar Cells – B. W. Lavery, T. Druffel, G. Draper, and M. K. Sunkara (University of Louisville)

• **802** Concept and Nanostructure Control of Plasmonic Porous Silicon Solar Cells – K. Murakami, K. Yamada (Tokyo Institute of Technology), A. Fave (Institut des Nanotechnologies de Lyon (INSA-Lyon)), and M. Ihara (Tokyo Institute of Technology)

• **803** Fabrication and Characterization of Hybrid Solar Cells Based on Perovskite Materials – T. M. Abdel-Fattah (Applied Research Center, Jefferson National Lab), S. Ebrahim, M. Soliman, M. Anas, and E. Moustafa (Alexandria University)

• **804** Perovskite Based Solar Cells with Multi-Walled Carbon Nanotubes (MWCNTs)/Carbon Back Contact – T. M. Abdel-Fattah (Applied Research Center, Jefferson National Lab), S. Ebrahim, W. Ramadan, M. Nofal, and M. Soliman (Alexandria University)

D04 Semiconductors, Dielectrics, and Metals for Nanoelectronics 13

Dielectric Science and Technology / Electronics and Photonics
105-B, Phoenix Convention Center

Dielectrics – 08:00 – 09:00
Co-Chairs: Samares Kar and Dolf Landheer

08:00 **822** Electrical Studies on Parylene-C Columnar Microfibrous Thin Films – I. H. Khawaji, C. Chindam (The Pennsylvania State University), W. Orfali (Taibah University, Kingdom of Saudi Arabia), O. O. Awadelkarim, and A. Lakhtakia (The Pennsylvania State University)

08:20 **823** Effect of Hydrogen Partial Pressure on in-Situ Steam Generation Oxide Layer – J. H. Yun (Samsung Institute of Technology, Samsung Electronics), S. G. Park (Samsung Institute of Technology), Y. H. Lee, C. Y. Lee, J. S. An, and I. S. Cho (Samsung Electronics)

08:40 **824** Highly Robust Advanced Single Precursor Based k 2.4 ILD for Beol Cu Interconnects – D. Priyadarshini (IBM Research, Albany), S. V. Nguyen, H. K. Shobha (IBM at Albany Nanotech), E. T. Ryan (GlobalFoundries), S. M. Gates (IBM Research), H. Huang, J. Chen (IBM Research, Albany), E. Liniger, S. A. Cohen, C. K. Hu (IBM T.J. Watson Research Center), A. Madan (IBM Semiconductor Research and Development Center), E. Adams (IBM Microelectronics), S. E. Molis (IBM Semiconductor Research and Development Center), T. J. Haigh (IBM at Albany Nanotech), G. Bonilla (IBM T.J. Watson Research Center), T. Standaert (IBM Research, Albany), D. F. Canaperi (IBM at Albany Nanotech), and A. Grill (IBM T.J. Watson Research Center)

Memory – 09:00 – 12:20
Co-Chairs: Kazuhiko Endo and Hongxin Yang

09:00 **825** The Effect of CoSi2 Formation Process on the CMOS Transistor Electrical Properties for Sub 100nm Memory Applications – J. H. Park, S. J. Kim, C. J. Yoo, J. H. Lee, H. J. Kang, B. C. Lee, and J. G. Jeong (SK Hynix Semiconductor)

09:20 **826** Electroless Deposition of Ferromagnetic Co_xFe_{1-x} alloys Using Metal Ion Reducing Agent – A. Joi (Corporate Technology Development, Lam Research), E. Chen (University of California-Berkely), and Y. Dordi (Corporate Technology Development, Lam Research)

09:40 Intermission

10:00 **827** (Invited) Variability in Finfet SRAM Cells – K. Endo, S. O'uchi, T. Matsukawa, Y. Liu, and M. Masahara (National Institute of AIST)

10:30 **828** (Invited) Intrinsic Unipolar SiO_x-Based Resistive Switching Memory: Characterization, Mechanism and Applications – Y. F. Chang (The University of Texas at Austin), B. Fowler (PrivaTran LLC), F. Zhou (The University of Texas at Austin), and J. C. Lee (University of Texas at Austin)

11:00 **829** (Invited) Novel Selector and 3D Rram Development for High Density Non-Volatile Memory – H. Yang, C. C. Tan, W. He, M. Li, Y. Jiang, and Y. Yang (Data Storage Institute, Singapore)

11:30 **830** (Invited) White-Light-Induced Annihilation of Percolation Paths in SiO_2 and High-k Dielectrics - Prospect for Gate Oxide Reliability Rejuvenation and Optical-Enabled Functions in CMOS Integrated Circuits – D. S. Ang (Nanyang Technological University), T. Kawashima (Nanyang Technological University, Toshiba Corporation Japan), Y. Zhou, K. S. Yew, M. K. Bera, and H. Zhang (Nanyang Technological University)

12:00 **831** Three-Dimensional Fully-Coupled Electrical and Thermal Transport Model of Dynamic Switching in Oxide Memristors – X. Gao, D. Mamaluy, P. R. Mickel, and M. Marinella (Sandia National Laboratories)

Interfaces, Traps, and Reliability – 13:40 – 15:40
Co-Chairs: Eddy Simoen and K. Kita

13:40 **832** Proximity Gettering Design Via Nano-Cavities Induced By Hydrogen-Ion Implantation for Si CMOS Image-Sensor – I. H. Kim, J. S. Park, G. S. Lee, and J. G. Park (Hanyang University)

14:00 **833** (Invited) The Influence of Defects on the Electronic Properties of Hafnia – D. R. Islamov, V. A. Gritsenko, and T. V. Perevalov (Rzhanov Institute of Semiconductor Physics SB RAS, Novosibirsk State University)

14:30 **834** (Invited) The Assessment of Border Traps in High-Mobility Channel Materials – E. Simoen (imec), A. Alian, H. Arimura, D. Lin (Imec), H. Mertens (imec), J. Mitard, S. Sioncke (Imec), W. Fang, J. Luo (Imecas), C. Zhao (Institute of Microelectronics, CAS), A. Mocuta (Imec), N. Collaert, A. Thean (imec), and C. Claeys (Imec)

15:00 **835** Quantitative Characterization of Near-Interface Oxide Traps in 4H-SiC Mos Capacitors By Transient Capacitance Measurements – Y. Fujino and K. Kita (The University of Tokyo)

15:20 **836** Effects of Deuterium Incorporation on Performance and Reliability of Gate-Last High-k/Metal Gate CMOS Devices – G. R. Kim (Sungkyunkwan University), H. C. Sagong, W. K. Lee, J. K. Park, S. W. Pae, J. W. Park (Samsung Electronics), and B. D. Choi (Sungkyunkwan University)

Characterisation – 16:00 – 17:40
Co-Chairs: K. Kita and Samares Kar

16:00 **837** Negative Gate Transconductance in MIS Tunnel Diode Induced by Peripheral Minority Carrier Control Mechanism – C. S. Liao and J. G. Hwu (National Taiwan University)

16:20 **838** Nanoscale Potential Fluctuation in Non-Stoichiometric Hafnium Suboxides – O. M. Orlov, G. J. Krasnikov (JSC Molecular Electronics Research Institute), V. A. Gritsenko (Novosibirsk State University, Rzhanov Institute of Semiconductor Physics SB RAS), V. N. Kruchinin (Rzhanov Institute of Semiconductor Physics SB RAS), T. V. Perevalov (Rzhanov Institute of Semiconductor Physics SB RAS, Novosibirsk State University), V. S. Aliev (Rzhanov Institute of Semiconductor Physics SB RAS), D. R. Islamov (Rzhanov Institute of Semiconductor Physics SB RAS, Novosibirsk State University), and I. P. Prosvirin (Boreskov Institute of Catalysis SB RAS)

16:40 **839** Tunneling Current Induced Frequency Dispersion in the C-V Behavior of Ultra-Thin Oxide MOS Capacitors – C. F. Yang and J. G. Hwu (National Taiwan University)

17:00 **840** Physically Based Analytical Modeling of 2D Electrostatic Potential for Symmetric and Asymmetric Double Gate Junctionless Field Effect Transistors in Subthreshold Region – I. Ahmed and Q. D. M. Khosru (Bangladesh University of Engineering and Technology)

17:20 **841** Non-Uniform Hole Current Induced Negative Capacitance Phenomenon Examined by Photo-Illumination in MOS(n) – H. H. Lin, Y. K. Lin, and J. G. Hwu (National Taiwan University)

D05 Processing Materials of 3D Interconnects, Damascene and Electronics Packaging 7

Electronics and Photonics / Dielectric Science and Technology
Borein A, Hyatt Regency

Cu Electrodeposition - from Fundamentals to Applications I – 09:00 – 10:20
Co-Chairs: Masanori Hayase and Harold Philipsen

09:00 **872** Towards Quantification of Contaminants in Electrodeposited Cu Films – V. Grimaudo, P. Moreno-García, P. Broekmann, and H. Nguyen (University of Bern)

09:40 **873** The Studies of Spontaneous Potential Oscillation in a Galvanostatic Copper Electrodeposition and the Crystallographic Textures Thereof – P. F. Chan and W. P. Dow (National Chung Hsing University)

10:00 **874** Superconformal Filling of High Aspect Ratio through Glass Vias for Interposer Applications Using Tnbt and Ntbc Additives – N. Dimitrov (Department of Chemistry, SUNY at Binghamton), P. Ogutu (Department of Chemistry SUNY - Binghamton), and E. Fey (Department of Chemistry, SUNY - Binghamton,)

Cu Electrodeposition - from Fundamentals to Applications II – 10:40 – 12:00
Co-Chairs: Wei-Ping Dow and S. Mathad

10:40 **875** (invited) Copper Electroplating Technology for Packaging – C. H. Lai, Y. C. Yuan (BASF Taiwan Ltd.), M. Arnold, and D. Mayer (BASF SE)

11:20 **876** Dielectric Spectroscopic Detection of Early Failures in 3-D Integrated Circuits – Y. S. Obeng, C. A. Okoro, J. J. Ahn, L. You, and J. J. Kopanski (National Institute of Standards and Technology)

11:40 **877** Combined Surface-Activated Bonding Technique for Low-Temperature Cu/SiO_2 Hybrid Bonding – R. He, M. Fujino (The University of Tokyo), A. Yamauchi (Bondtech Co., Ltd.), and T. Suga (The University of Tokyo)

TSV Fabrication - Etching, Dielectric – 14:00 – 15:00
Co-Chairs: Fred Roozeboom and Yutaka Kaneko

14:00 **878** Novel Si Etching and Dielectric Liner Film Processing Technologies for Low-Cost TSV Packaging – Y. Morikawa (ULVAC,Inc.)

14:40 **879** Electrografted P4VP as Dielectric in High Aspect Ratio TSV: Surface Preparation and Thermomechanical Consideration – T. Dequivre, E. Al Alam, G. Brisard, S. Charlebois (Université de Sherbrooke), A. Ruediger, and J. Plathier (Institut National de la Recherche Scientifique)

TSV Fabrication - Barrier Layer, Seed Layer – 15:20 – 16:20
Co-Chairs: Yutaka Kaneko and Wei-Ping Dow

15:20 **880** Effect of Plating Additives on Microstructure and Properties of Electrodeposited Ni-Fe Alloy – M. C. Hung, P. F. Chan, W. P. Dow (National Chung Hsing University), H. Y. Lee, Y. S. Lin, and P. F. Yang (Advanced Semiconductor Engineering Group)

15:40 **881** Highly Adhesive Displacement Plated Cu Seed on Cowb Barrier for All-Wet TSV Fill Process – K. Ohta (Kansai University.), F. Inoue (Tohoku University/IMEC), T. Shimizu, and S. Shingubara (Kansai University)

16:00 **882** Thermal Decomposition of Tungsten Nitrido Precursors for Low Temperature MOCVD of WNxCy – S. Y. Kim, A. Koley, R. Bonsu, M. Nolan, L. McElwee-White, and T. Anderson (University of Florida)

E02 Fundamentals of Electrochemical Growth and Surface Limited Deposition

Electrodeposition / Physical and Analytical Electrochemistry
Russell A, Hyatt Regency

Plenary Session – 08:00 – 10:20
Co-Chairs: Stanko Brankovic and John Lewellen Stickney

08:00 Welcoming Remarks

08:05 **887** (Keynote) Imaging Electrochemical Growth Using Liquid Cell Transmission Electron Microscopy – F. M. Ross (IBM T. J. Watson Research Center)

08:45 **888** (Invited) Thermodynamics of Deposition Flux Dependent Intrinsic Film Stress – M. J. Rost (Kamerlingh Onnes Laboratory - Leiden University)

09:25 **889** (Invited) Self-Terminated Electrodeposition Reactions – S. H. Ahn (NIST), Y. Liu (Argonne National Laboratory), R. Wang (National Institute of Standards and Technology), D. Gokcen (NIST), C. M. Hangarter (Excet, Inc.), U. Bertocci, and T. Moffat (National Institute of Standards and Technology)

10:05 Break

Deposition via SLRR and ECALD – 10:20 – 15:00
Co-Chairs: Miomir Vukmirovic, Nikolay Dimitrov, and Wu Dongjun

10:20 **890** (Invited) Semi-Automated System for Electrodeposition of Pt Monolayer Shell on Refractory Metal Core Fuel Cell Electrocatalysts Directly on Gas Diffusion Layer – S. Bliznakov (Sust. Ener. Techn. Dpt., Brookhaven Nat. Lab.), M. Vukmirovic (Chemistry Department, Brookhaven National Laboratory), J. Wegrzyn (Sust. Ener. Techn. Dep., Brookhaven Nat. Lab.), and R. Adzic (Chemistry Department, Brookhaven National Laboratory)

11:00 **891** Synthesis of II-VI Semiconductors Thin Films By Ecald from Citric Buffer – R. Kowalik (AGH University of Science and Technology)

11:20 **892** (Invited) Reaction Kinetics of Metal Deposition Via Slrr of UPD ML Studied By Surface Reflectivity Measurements – S. Brankovic, E. Bulut, W. Dongjun (University of Houston), and H. Kilic (Marmara University)

12:00 Lunch Break

14:00 **893** (Invited) A Coverage Dependent Behavior of Pt on Au Deposited Using Surface Limited Redox Replacement – N. Vasiljevic and Z. Al Amri (School of Physics, University of Bristol)

14:40 **894** Nanostructured, Bimetallic, Noble Metal Powders Prepared By Atomic Layer Electroless Deposition for Applications in Sensing and Catalysis – P. J. Cappillino (University of Massachusetts Dartmouth), J. D. Sugar (Sandia National Laboratories, Livermore, CA), F. El Gabaly (Sandia National Laboratories), T. Cai (Sandia National Laboratories, Livermore, CA), Z. Liu (Advanced Light Source, Lawrence Berkeley National Lab), J. L. Stickney (The University of Georgia), and D. B. Robinson (Sandia National Laboratories)

Underpotential, Overpotential and Electroless Deposition – 15:00 – 17:45
Co-Chairs: Natasa Vasiljevic and Miomir Vukmirovic

15:00 **895** Cu Underpotential Deposition on Ru(0001) – S. Brankovic and D. Wu (University of Houston)

15:20 **896** (Invited) *In Situ* Stress and Nanogravimetric Measurements during Underpotential Deposition – G. R. Stafford, M. Fayette, and U. Bertocci (National Institute of Standards and Technology)

16:00 **897** Towards a Mechanistic Understanding of Platinum Thin Film Deposition on Au(111) – K. Schwarz and T. Moffat (National Institute of Standards and Technology)

16:20 **898** (Invited) Electroless Deposition of Ruthenium Using Sodium Borohydride Reducing Agent: A Mechanistic Study Using Electrochemical Quartz Crystal Microbalance – A. Joi (Corporate Technology Development, Lam Research), A. Zieliene, E. Norkus, L. Tamasauskaite-Tamasiunaite (Center for Physical Sciences and Technology), and Y. Dordi (Corporate Technology Development, Lam Research)

17:00 **899** Effects of Cations on Electrochemical Behavior of Ni(II)/Ni in a Hydrophobic Ionic Liquid – Y. L. Zhu (Beijing Institute of Technology), Y. Katayama, and T. Miura (Keio University)

17:20 **900** In-Situ Stress Measurements during Cobalt Electrodeposition on (111)-Textured Au – M. Fayette (National Institute of Standards and Technology, Theiss Research), U. Bertocci, and G. R. Stafford (National Institute of Standards and Technology)

17:40 Concluding Remarks

West Hall 1, Phoenix Convention Center

E02 Poster Session – 18:00 – 20:00

• **901** *In Situ* Optical Microscopy Studies of Spontaneous Oscillatory Growth of Zinc Dendrites – D. Yu, H. Li (Department of Materials Science and Engineering,UCLA), J. H. Park (IBM T.J. Watson Research Center, Department of Materials Science and Engineering, UCLA), C. Orme (Lawrence Livermore National Laboratory), F. M. Ross (IBM T.J. Watson Research Center), and S. Kodambaka (Department of Materials Science and Engineering, UCLA)

• **902** The Effect of Brighteners on the Fabrication of Electroplated High-Bright Aluminum Films Using $AlCl_3$-Emic Ionic Liquids – F. Matsumoto, S. Kaneko, T. Tanabe, and T. Gunji (Kanagawa University)

E03 Novel Design and Electrodeposition Modalities 2

Electrodeposition

Russell B, Hyatt Regency

Novel Design and Electrodeposition Modalities I – 09:00 – 11:40
Co-Chairs: Elizabeth J. Podlaha, Qiang Huang, and Zhanhu Guo

09:00 **903** (Invited) Development of Bimetallic Electrocatalysts and Electrodes for Carbon Dioxide Electrolysis Via Direct Deposition Strategies – K. Carroll, Y. W. Hsiao, S. Brown, L. Su, and F. R. Brushett (Massachusetts Institute of Technology)

09:20 **904** (Invited) Electrodeposition of Fe-Pt Magnetic Films and Multilayers with Largemagnetic Anisotropy for Magnetic Recording and Microsystems – S. Ge (University of Virginia), D. Liang (Lam Research), and G. Zangari (University of Virginia)

09:40 **905** (Invited) Advanced Materials for Integrated on-Chip Power Converter – H. Deligianni (IBM, Thomas J. Watson Research Center), N. Wang (IBM, T.J. Watson Research Center), O. Jinka, J. Yoon, E. J. O'Sullivan (IBM, Thomas J. Watson Research Center), L. Romankiw (IBM TJ Watson Research Center), and W. J. Gallagher (IBM, Thomas J. Watson Research Center)

10:00 Coffee break

10:20 **906** (Invited) Controlling Component Distribution in Electrodeposited Multilayer and Alloy Films – I. Bakonyi and L. Péter (Wigner Research Centre for Physics, Hung. Acad. Sci.)

10:40 **907** Modification of Electrodeposited Co-Pd Alloy Catalysts By Superimposed High Magnetic Field – P. Zabinski, K. Mech, S. Banbur-Pawlowska, and R. Kowalik (AGH University of Science and Technology)

11:00 **908** Direct and Pulse Plating of Metastable Zn-Ni Alloys – S. Ieffa, R. Bernasconi, L. Nobili, P. L. Cavallotti, and L. Magagnin (Politecnico di Milano)

11:20 **909** Mediated Electrochemical Deposition of Copper and Silver Thin Films for Improved Resistivity, Grain Size and Intrinsic Stress – T. D. Pounds, S. L. Farias (Johns Hopkins University), K. Sieradzki (Arizona State University), and R. C. Cammarata (Johns Hopkins University)

Novel Design and Electrodeposition Modalities II – 14:00 – 16:40
Co-Chairs: Elizabeth J. Podlaha, Qiang Huang, and Zhanhu Guo

14:00 **910** (Invited) Pluse Plating for Compound Semiconductor Electrodeposition – J. L. Stickney, J. Czerniawski, X. Zhang, N. Bui, and S. Shen (The University of Georgia)

14:20 **911** Light Assisted Electrodeposition for the Metallization of Silicon Solar Cells – Q. Huang, S. Papa Rao, and K. Fisher (IBM TJ Watson Research Center)

14:40 **912** Intensity Modulated Photocurrent Spectroscopy (IMPS) Used to Detect Photoactive Intermediates during Ni-W Electrodeposition – S. Sun and E. J. Podlaha (Northeastern University)

15:00 Coffee break

15:20 **913** (Invited) Electropolymerized Polyaniline/ Manganese Iron Oxide Hybrids with Enhanced Electrochemical Energy Storage and Color Switching Response – Y. Wang (University of Tennessee Knoxville), H. Wei (Lamar University), J. Guo (University of Tennessee Knoxville), B. Qiu, S. Wei (Lamar University), and Z. Guo (University of Tennessee Knoxville)

15:40 **914** In-Situ Observations of Electrochemical Li Growth and Dissolution on a Lipon Electrolyte By High Resolution Scanning Electron Microscopy – M. Motoyama, T. Kimura, and Y. Iriyama (Graduate School of Engineering, Nagoya University, JST-ALCA)

16:00 **915** Hybrid Electro-Electroless Deposition (HEED) – R. Petro and M. Schlesinger (University of Windsor)

F03 Membrane-based Electrochemical Separations

Energy Technology / High Temperature Materials / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry

213-A, Phoenix Convention Center

Separations/Synthesis – 08:25 – 12:30
Co-Chairs: Hui Xu, John A. Staser, and Turgut M. Gur

08:25 Welcoming Remarks

08:30 **964** (Invited) Membranes of Mixed Ionic and Electronic Conductors for Gas Separation: Effect of Surface and Interfaces – M. Liu (School of Materials Science and Engineering, Georgia Tech) and M. Liu (School of MSE, Georgia Tech)

09:00 **965** Electrochemical Oxygen Separation Using Layered Double Hydroxides As Hydroxide Ion Conductor – K. Tadanaga (Hokkaido University), Y. Arishige, A. Hayashi, and M. Tatsumisago (Osaka Prefecture University)

09:20 **966** Modifying Electrode Architectures for Solid Acid Electrochemical Hydrogen Separation Devices – D. L. Wilson III (The University of Tennessee), T. A. Zawodzinski (University of Tennessee, Knoxville, TN), and A. B. Papandrew (University of Tennessee)

09:40 **967** Reaction Dependent Transport of Carbonate and Bicarbonate through Anion Exchange Membranes in Electrolysis and Fuel Cell Operations – W. A. Rigdon, T. J. Omasta, C. A. Lewis (University of Connecticut), and W. E. Mustain (University of Connecticut, Center for Clean Energy Engineering)

10:00 **968** (Invited) Applications of Solid Electrolyte Membranes in Heterogeneous Catalysis. Electrochemical Reaction and Separation – M. Stoukides, A. Vourros, E. Vasileiou, V. Kyriakou, and I. Garagounis (Aristotle University of Thessaloniki)

10:30 **969** Ion Exchange Membrane Based Ammonia Synthesis – H. Xu, T. McCallum (Giner, Inc.), and S. S. Kocha (National Renewable Energy Laboratory)

10:50 **970** Water Purification in Porous Media Via Shock Electrodialysis – S. Schlumpberger, N. B. Lu, M. E. Suss, and M. Z. Bazant (Massachusetts Institute of Technology)

11:30 **972** Porous Diamond Membrane Fabricated By Templated Growth for Electrochemical Separation Processes – F. Gao, C. Giese, G. Lewes-Malandrakis, and C. E. Nebel (Fraunhofer IAF)

11:50 **973** Simultaneous Recovery of Potassium, Chloride and Removal of COD from Landfill Leachate Concentrates Using a Combination of Cation-Exchange Membrane Electrolysis – X. Li (University of Chinese Academy of Sciences)

G01 Atomic Layer Deposition Applications 11

Electronics and Photonics / Dielectric Science and Technology

Phoenix East, Hyatt Regency

Energy Applications I – 08:30 – 10:00
Co-Chairs: Jeffrey W. Elam and Fred Roozeboom

08:30 Opening Remarks

08:40 **976** (Invited) Atomic Layer Deposition of Core-Shell Nanowires for Solar Energy Conversion Devices – A. R. Bielinski and N. P. Dasgupta (University of Michigan, Ann Arbor)

09:20 **977** Opportunities of Atomic Layer Deposition for Perovskite Solar Cells – V. Zardetto (Eindhoven University of Technology, Solliance), F. Di Giacomo (University of Rome “Tor Vergata”), M. A. Mohammed (Eindhoven University of Technology), G. Lucarelli (University of Rome "Tor Vergata"), S. Razza (University of Rome “Tor Vergata”), A. D'Epifanio, S. Licoccia (University of Rome Tor Vergata), A. Di Carlo (University of Rome “Tor Vergata”), T. M. Brown (University of Rome "Tor Vergata"), W. M. M. Kessels, and M. Creatore (Eindhoven University of Technology, Solliance)

Energy Applications II – 10:00 – 12:20
Co-Chairs: Jeffrey W. Elam and Neil P. Dasgupta

10:00 **978** (Invited) A rational design for batteries at nanoscale by atomic layer deposition – C. Liu (University of Maryland, Department of Materials Science and Engineering), E. Gillette (University of Maryland, Department of Chemistry), X. Chen (Lam Research Corp., University of Maryland), A. J. Pearse, A. C. Kozen, M. A. Schroeder, K. Gregorczyk (University of Maryland, Department of Materials Science and Engineering), S. B. Lee (University of Maryland, Department of Chemistry), and G. W. Rubloff (Department of Materials Science and Engineering, University of Maryland)

10:40 **979** Spatial Atmospheric ALD of functional thin films for CIGS Solar Cells – A. Illiberi, C. Frijters (TNO/Solliance), E. Balder (Solliance/TNO), P. J. Bolt, P. Poodt (TNO/Solliance), and F. Roozeboom (Eindhoven University of Technology, TNO Eindhoven)

11:00 **980** (Invited) Atomic Layer Deposition of Nanophase Materials for Electrical Energy Storage – X. Meng and J. W. Elam (Argonne National Laboratory)

11:40 **981** Sensitization of ZnO By Light-Harvesting Antennas Composed of Multiple Stacked Dyes Grown By Liquid-Phase Molecular Layer Deposition – Y. Matsumura and T. Yoshimura (Tokyo University of Technology)

12:00 **982** Understanding Photovoltage in Insulator-Protected Water-Splitting Half-Cells – A. G. Scheuermann, C. E. D. Chidsey, and P. C. McIntyre (Stanford University)

Textile and Related Coatings – 14:00 – 16:40
Co-Chairs: J. W. Elam and Helmut Baumgart

14:00 **983** (Invited) Organic-Inorganic Hybrid Materials Formed By ALD Organometallic Infiltration into Polymers – J. S. Jur (Department of Textile Engineering, Chemistry & Science, North Carolina State University) and H. I. Akyildiz (North Carolina State University, Department of Textile Engineering, Chemistry & Science)

14:40 **984** (Invited) Opportunities in Atomic Layer Deposition for Electronic Textile and Hydrophobic Coating Applications – H. B. R. Lee (Incheon National University)

15:20 Break

15:40 **985** (Invited) Engineered Combinations of Inorganic ALD/CVD Layers and Monomolecular Organic Films – S. Armini (IMEC)

16:20 **986** Room Temperate Bonding of Al2O3 Layers By Atomic Layer Deposition on Polyimide Substrates – T. Matsumae (The University of Tokyo), T. Dushatinski, T. M. Abdel-Fattah (Christopher Newport University), T. Suga (The University of Tokyo), K. Zhang, X. Chen (Old Dominion University, Applied Research Center), and H. Baumgart (Applied Research Center, Old Dominion University)

Characterization – 16:40 – 17:20
Co-Chairs: Stefan De Gendt and Jesse S. Jur

16:40 **987** Raman Spectroscopy of Aluminum-Doped Znic Oxide Thin Films Synthesized By Atomic Layer Deposition – P. Lin (Applied Research Center, Old Dominion University), X. Chen, K. Zhang (Applied Research Center), and H. Baumgart (Old Dominion University)

17:00 **988** Atomic Layer Deposition and in-Situ Characterization of Yttrium Oxide and Yttria-Stabilized Zirconia – L. Lecordier (Ultratech-Cambridge NanoTech)

G02 Semiconductor Cleaning Science and Technology 14 (SCST 14)

Electronics and Photonics
104-A, Phoenix Convention Center

Wafer Drying-Related Issues – 09:00 – 11:00
Co-Chairs: Steven Verhaverbeke and Paul W. Mertens

09:00 **1023** (Invited) Supercritical Drying: A Sustainable Solution to Pattern Collapse of High-Aspect-Ratio and Low-Mechanical-Strength Device Structures – H. W. Chen, S. Verhaverbeke, R. Gouk, K. Leschkies, S. Sun, N. Bekiaris, and R. J. Visser (Applied Materials, Inc.)

09:30 **1024** Effect of Surface Energy Reduction for Nano-Structure Stiction – T. Koide, S. Kimura, H. Iimori, T. Sugita, K. Sato, Y. Sato, and Y. Ogawa (Toshiba)

09:50 Cofee Break

10:10 **1025** Dewetting Model Study on a Spinning Substrate - Challenges for Low Chemical Consumption – K. I. Sano (Lam Research Corp.), D. Mui, and M. Kawaguchi (Lam Research)

10:30 **1026** Effect of Surface Reactivity on Watermark Formation Studied By Sessile Droplet Evaporation Approach – A. H. Tamaddon (imec), H. Philipsen (IMEC), P. W. Mertens (imec vzw), G. Vereecke, F. Holsteyns (imec), M. Heyns (KU Leuven), S. DeGendt (IMEC), J. Kelly (university Utrecht), and D. H. van Dorp (IMEC)

10:50 Break

Wet Etching and Related Topics – 11:00 – 15:40
Co-Chairs: Kurt Wostyn and Steven Verhaverbeke

11:00 **1027** (Invited) Selective Etch of Si and Sige for Gate All-Around Device Architecture – K. Wostyn, F. Sebaai, J. Rip, H. Mertens, L. Witters, R. Loo, A. Y. Hikavyy, A. Milenin, P. W. Mertens, N. Horiguchi, N. Collaert, A. Thean, F. Holsteyns (imec), and S. De Gendt (Katholieke Universiteit Leuven, imec)

11:30 **1028** Advanced Wet-Etch-Only Process for Complete Tri-Layer Rework – P. Steinke, J. Calvo, and B. Uhlig (Fraunhofer Institute for Photonic Microsystems)

11:50 **1029** Etching of Silicon Nitride in 3D NAND Structures – D. Bassett, W. Printz, and T. Furukawa (Tokyo Electron)

12:10 Lunch Break

14:00 **1030** Silicon Nitride Etch: an Alternative to Orthophosphoric Acid – P. Garnier, M. Neyens (STMicroelectronics), T. Massin, D. Thomassin (stmicroelectronics), and C. Maurice (STMicroelectronics)

14:20 **1031** Wet Etchant Diffusion through Photoresist during Gate Oxide Patterning – M. Neyens, P. Garnier (STMicroelectronics), M. Garach (CEA Léti), N. Rochat (CEA LETI), C. Licitra, and R. Tiron (CEA Léti)

14:40 **1032** Acoustic Characterization of Resist Degradation during Wet Etching – C. Virgilio (IEMN), P. Garnier, M. Foucaud (STMicroelectronics), A. Devos (IEMN), D. Pinceau (STMicroelectronics), J. Carlier, P. Campistron, B. Nongaillard (IEMN), M. Neyens, and L. Broussous (STMicroelectronics)

15:00 **1033** Post Salicidation Clean: Removal of Unreacted Pt from High Pt Content Nipt Silicide – A. Sehgal, G. Derderian, and P. Muralidhar (GLOBALFOUNDRIES, Inc.)

15:20 Break

BEOL Cleaning – 15:40 – 17:30
Co-Chairs: Kanwaljit Singh and Kurt Wostyn

15:40 **1034** (Invited) Nano-Controlled Etching of Polycrystalline Metals - a Key Enabler for Future Technologies – K. Singh (Intel Corporation)

16:20 **1035** Dual-Fluid Spray Process for Particle and Fluorocarbon-Polymer Removal in Beol Applications – A. Iwasaki, A. Higuchi, K. Komori, M. Sato, and H. Shirakawa (SCREEN Semiconductor Solutions Co., Ltd.)

16:40 **1036** Development of a Cu and W Compatible PERR Clean in BEOL Advanced Interconnect Patterning – E. Kesters, Q. T. Le, S. Decoster (imec), V. Vega Gonzalez (IMEC), F. Holsteyns, and S. De Gendt (imec)

17:00 **1037** Effect of Dissolved Oxygen on the Removal of BTA from Cu By Tetra Methyl Ammonium Hydroxide – R. Srinivasan (Indian Institute of Technology - Madras), S. Raghavan (University of Arizona), and A. MS (Indian Institute of Technology - Madras)

17:20 Poster Introduction

West Hall 1, Phoenix Convention Center
G02 Poster Session – 18:00 – 20:00

- **1038** Surface Cleaning of SiGe(100) and Passivation of Ge(100) with Aqeuous Ammonium Sulfide – S. L. Heslop (University of Arizona), P. Engesser, H. F. Okorn-Schmidt (Lam Research AG), and A. J. Muscat (University of Arizona)
- **1039** Evaluation of Ingaas and InP Compatibility with Alkaline Photoresist Stripping Formulations – G. Westwood (Avantor Performance Materials)
- **1040** Optimizing Middle of Line (MoL) Contact Cleaning to Preserve Tungsten (W) Integrity in Advanced Technology Nodes – S. Singh (GLOBALFOUNDRIES), P. Muralidhar (GLOBALFOUNDRIES, Inc.), K. Das, and S. Scott (GLOBALFOUNDRIES)
- **1041** Post CMP Cleaning: a Comparison of Contact and Non-Contact Physical Cleaning Methods – D. Dussault, M. Beck (Product Systems, Inc.), F. Fournel, and C. Morales (CEA, Leti, Minatec Campus)
- **1042** Effect of Pre-Wet Cleaning Conditions on the Pad Oxide Thickness – D. Bhattacharyya, S. P. Sampathkumar, and J. Prasad (GLOBALFOUNDRIES)

- **1043** Real- Time pH Monitoring of Ultra-Diluted Chemistry with Micro-Sampling pH Monitor – Y. Nakai, K. Miyamura, S. Takagi, and Y. Mori (HORIBA, Ltd.)
- **1044** Enhanced Point of Use Filtration for Cleaning without Small Particle Addition – S. J. Kweskin, P. Chen, S. Ham (SunEdison Semiconductor, Inc.), T. Phely-Bobin, and A. Patel (Entegris, Inc.)

G03 Thermoelectric and Thermal Interface Materials 2

Electronics and Photonics / High Temperature Materials

Remington C, Hyatt Regency

Thermoelectric Materials and Devices I – 08:10 – 12:40
Co-Chairs: Kafil M. Razeeb and Colm O'Dwyer

08:10 **1053** (Invited) Advanced Nanostructured Thermoelectric Materials for Energy Conversion – Y. Wu (Iowa State University)

08:50 **1054** (Invited) Silicon-Based Nanocomposites for Thermoelectric High Temperature Waste Heat Recovery – G. Schierning, H. Wiggers, and R. Schmechel (Faculty of Engineering, University of Duisburg-Essen)

09:30 Intermission

10:00 **1055** (Invited) Computation-Driven Materials Search for Thermoelectric Applications – Q. Hao and H. Zhao (University of Arizona)

10:40 **1056** (Invited) Optimizations of p and n-Type Bi_2Te_3-Based Ternary Compounds By Ms-Pulsed Plating and Annealing Under Telluride Atmospheres – K. Nielsch (Leibniz Inst. of Solid State and Material Research Dresden)

11:20 **1057** (Invited) Seebeck Coefficient Measurement of Pbsete / PbTe Nanolaminate Structures – X. Chen (Applied Research Center, Old Dominion University), P. Lin (Old Dominion University, Applied Research Center), K. Zhang (Applied Research Center), H. Baumgart (Applied Research Center, Old Dominion University), B. Geist, and V. Kochergin (MicroXact Inc.)

12:00 **1058** (Invited) Novel Strategies for the Bottom-up Assembly of Nanowires into Highly Efficient Bulk Thermoelectrics – S. Vaddiraju (Department of Chemical Engineering, Texas A&M University)

Thermoelectric Materials and Devices II – 14:30 – 17:10
Co-Chair: Renkun Chen

14:30 **1059** (Invited) Thermoelectric Materials and Modules for High Temperature Application – R. Funahashi and T. Barbier (Nat. Inst. Adv. Industrial Sci. & Tech.)

15:10 **1060** (Invited) Recent Advances on the Promising Thermoelectric Oxides Materials – T. Barbier and R. Funahashi (Nat. Inst. Adv. Industrial Sci. & Tech.)

15:50 **1061** (Invited) Optimization of Pulsed Electrodeposited Bi_2Te_3-Based Thin Films from DMSO Solution: Influence of Deposition Parameters, Electrolytic Bath Composition and Annealing – D. Gautam (Tyndall National Institute, University College Cork), M. O'Neill (Analog Devices BV, Ireland), and K. M. Razeeb (Tyndall National Institute, University College Cork)

16:30 **1062** (Invited) Colloidal Nanocrystal Composites with High and Low Thermal Conductivity – R. Wang (Arizona State University)

G04 ULSI Process Integration 9

Electronics and Photonics

103-B, Phoenix Convention Center

Ge and III-V Technologies 1 – 08:00 – 10:00
Co-Chairs: Hiroshi Iwai and Shigeaki Zaima

08:00 **1080** Self-Assemble Formation of Ge Dots on Si(100) via C/Ge/C/Si Structure – Y. Itoh, T. Kawashima, and K. Washio (Graduate School of Engineering, Tohoku University)

08:20 **1081** Gate-Bias Dependent Phonon Softening Observed in Ge Mosfets – S. Kabuyanagi, T. Nishimura, T. Yajima, and A. Toriumi (The University of Tokyo)

08:40 **1082** Biaxial Stress Evaluation in Sige Epitaxially Grown on Ge Substrate By Oil-Immersion Raman Spectroscopy – K. Takeuchi (School of Science and Technology, Meiji University), D. Kosemura (Renewable Energy Res. Labs., Meiji University), S. Yamamoto, M. Tomita (School of Science and Technology, Meiji University), K. Usuda (AIST-GNC), N. Sawamoto, and A. Ogura (Meiji University)

09:00 **1083** (Invited) Challenges of Energy Band Engineering with New Sn-Related Group IV Semiconductor Materials for Future Integrated Circuit – S. Zaima, O. Nakatsuka (Nagoya University), T. Yamaha, T. Asano, S. Ike (Nagoya University, Japan Society for the Promotion of Science Research Fellow), A. Suzuki, M. Kurosawa, W. Takeuchi, and M. Sakashita (Nagoya University)

09:30 Break

Ge and III-V Technologies 2 – 10:00 – 12:00
Co-Chairs: Shigeaki Zaima and Hiroshi Iwai

10:00 **1084** (Invited) Tunneling FET Technologies Using III-V and Ge Materials – S. Takagi, M. Kim (The University of Tokyo, JST-CREST), M. Noguchi (The University of Tokyo), K. Nishi, and M. Takenaka (The University of Tokyo, JST-CREST)

10:30 **1085** (Invited) Vertical Tunnel FETs Using III-V Nanowire/Si Heterojunctions – K. Tomioka (GS-IST, RCIQE, Hokkaido University, Japan Science and Technology Agency (JST) - PRESTO), T. Fukui (Hokkaido Unversity), and J. Motohisa (Hokkaido University)

11:00 **1086** (Invited) On the Electrical Activity of Extended Defects in High-Mobility Channel Materials – E. Simoen (imec), G. Eneman (Imec), A. Y. Hikavyy, R. Loo (imec), S. Gupta (Imec), C. Merckling (imec), A. Alian, A. Schulze, M. Caymax, R. Langer (Imec), K. Barla (IMEC), and C. Claeys (Imec)

11:30 **1087** (Invited) Material and Device Integration for Hybrid III-V/SiGe CMOS Technology – V. V. Deshpande, V. Djara, D. Caimi, E. O'Connor, M. Sousa, L. Czornomaz, and J. Fompeyrine (IBM Zurich Research Laboratory)

Gate Stack and Characterization – 13:30 – 16:00
Co-Chairs: Eddy Simoen and Meng Tao

13:30 **1088** (Invited) Characterization of Individual Si/SiO2 Interface Traps: Direct Observation of Single P_{b0} Centers by the Charge Pumping (CP) Method and Correction of the Conventional CP Theory – T. Tsuchiya (Shimane University)

14:00 **1089** (Invited) Scavenging Kinetics of Interfacial SiO_2 in $HfO_2/SiO_2/Si$ Gate Stacks – A. Toriumi and X. Li (The University of Tokyo)

14:30 **1090** (Invited) High-Resolution Photoemission Study of High-k Dielectric Bilayer Stack on Ge(100) – S. Miyazaki and A. Ohta (Graduate School of Engineering, Nagoya University)

15:00 **1091** (Invited) Negative Capacitance Using Ferroelectrics for Future Steep Slope Mosfets – A. O'Neill (Newcastle University)

15:30 **1092** Photoemission Study on Chemical and Electronic Structures of Thermally-Grown SiO_2/4H-SiC – H. Watanabe, A. Ohta, K. Makihara, and S. Miyazaki (Nagoya University)

15:50 Intermission

Semiconductor Processing – 16:00 – 18:00
Co-Chairs: John O. Borland and Simon Deleonibus

16:00 **1093** (Invited) Effect of Individual Dopants in Nano-SOI-MOSFETs and Nano-pn-Diodes – M. Tabe (Research Institute of Electronics, Shizuoka University), D. Moraru, A. Samanta (Shizuoka University), K. Tyszka (Shizuoka University, Warsaw University of Technology), H. N. Tan, Y. Takasu (Shizuoka University), R. Jablonski (Warsaw University of Technology), L. T. Anh (Japan Advanced Institute of Science and Technology), H. Mizuta (Japan Advanced Institute of Science and Technology, University of Southampton), and T. Mizuno (Shizuoka University)

16:30 **1094** (Invited) Silicon Field Emitter Array Photocathode – H. Shimawaki (Hachinohe Institute of Technology), M. Nagao (National Inst. of Advanced Industrial Sci. and Technol.), Y. Neo, H. Mimura (Shizuoka University), F. Wakaya, and M. Takai (Osaka University)

17:00 **1095** Hydrogen Plasma Utilization in Advanced Logic Technology – Q. Han (Semiconductor Manufacturing International Corp.), X. Meng (Semiconductor Manufacturing International Corp.), and H. Zhang Sr. (SMIC)

17:20 **1096** Process Optimization on Self-Aligned Double Patterning Fin Etch – H. Zhang, Y. Wang, and F. Xiao (Semiconductor Manufacturing International Corporation)

17:40 **1097** Strained p-Channel Mosfet Fabrication Challenge and Perspective for the 28-Nm Technology Node and Beyond – Z. Zheng, F. Xiao, and H. Zhang (Semiconductor Manufacturing International Corporation)

G05 GaN & SiC Power Technologies 5

Electronics and Photonics / Dielectric Science and Technology
Ellis East, Hyatt Regency

Power Switching Devices 1 – 09:00 – 10:00
Co-Chairs: Robert J. Kaplar and N. Ohtani

09:00 **1117** (Invited) Role of GaN-Based Devices in Medium and High Power Conversion – S. Chowdhury (Arizona State University)

09:30 **1118** (Invited) AlGaN Higher Power Devices – K. A. Jones (Army Research Lab)

Power Semiconductor Switch Reliability 1 – 10:30 – 12:30
Co-Chairs: Kenneth A. Jones and Travis J. Anderson

10:30 **1119** (Invited) Ultra-Wide-Bandgap Semiconductors for Power Electronics – R. J. Kaplar, A. A. Allerman, A. M. Armstrong, J. J. Wierer, A. G. Baca, and J. C. Neely (Sandia National Laboratories)

11:00 **1120** Avalanche Energy of High-Voltage Silicon and SiC Power Diodes – K. Shenai (LoPel Corporation)

11:30 **1121** (Invited) Threshold Voltage Stability Comparison of Commercial SiC Mosfets and Related Issues – R. Green (US Army Research Laboratory), A. Lelis (U.S. Army Research Laboratory), and D. Habersat (US Army Research Laboratory)

12:00 **1122** (Invited) Baseplate Materials for Securing Reliability of Wide Band Gap Power Semiconductor Module Operating at High Temperatures – H. Takahashi (AIST, FUJI ELECTRIC CO., LTD.), T. Anzai (AIST, Calsonic Kansei Corp.), F. Kato (AIST), S. Sato, H. Tanisawa (AIST, Sanken Electric Co., Ltd.), Y. Murakami (AIST, NISSAN MOTOR CO., LTD.), K. Watanabe, and H. Sato (AIST)

Materials Synthesis – 13:30 – 14:30
Co-Chairs: Srabanti Chowdhury and Balaji Raghothamachar

13:30 **1123** (Invited) Epitaxial III-Nitride Film Growth in a Single Wafer Rotating Disk MOCVD Reactor – G. D. Papasouliotis (Veeco Instruments, Inc.), J. Su, B. Krishnan (Veeco Instruments Inc.), and R. Arif (Veeco Instruments, Inc.)

14:00 **1124** (Invited) Quality Improvement and Mapping Analysis of Single Crystal 4H SiC Grown with Purified Beta-SiC Powder Source – Y. Kim, E. Jung, M. Lee, J. Kim (Korea Institute of Ceramic Engineering and Technology), and D. Choi (Yonsei University)

Materials Characterization 2 – 15:00 – 16:00
Co-Chairs: N. Ohtani and Travis J. Anderson

15:00 **1125** The Study of Double Shockley Stacking Faults inside the Facet Region from 4H-SiC Wafers Grown By PVT Method – Y. Yang, J. Guo, O. Y. Goue, B. Raghothamachar, and M. Dudley (Stony Brook University)

15:30 **1126** Study on the Relaxation Process in 4H-SiC Homoepitaxy Growth – J. Guo, Y. Yang, F. Wu, O. Y. Goue, B. Raghothamachar, and M. Dudley (Stony Brook University)

H01 Low-Dimensional Nanoscale Electronic and Photonic Devices 8

Electronics and Photonics / Dielectric Science and Technology / Sensor
105-C, Phoenix Convention Center

Energy Harvesting and Storage 1 – 08:00 – 10:00
Co-Chairs: Johnny C. Ho and Tao Wu

08:00 **1146** (Invited) Functional Nanostructures for Highly Efficient Photoelectrochemical Water Splitting – Y. Zhang (Chinese Academy of Sciences)

08:30 **1147** (Invited) Two-Dimensional Layered Materials/ Silicon Heterojunctions for Energy and Optoelectronic Applications – J. Jie (Soochow University)

09:00 **1148** ZnCdSe-sensitized WO_3 and TiO_2 based photoelectrodes: A Comparative Study – R. Gakhar and D. Chidambaram (University of Nevada Reno)

09:30 **1149** (Invited) Enhanced Energy Harvesting Scheme Utilizing Hierarchical Micro/Nanostructures – Y. L. Chueh (Dept. of Mater. Sci. and Eng., NTHU)

Wearable, Flexible and Smart Electronics – 10:20 – 12:20
Co-Chairs: Sang-Woo Kim and Jiansheng Jie

10:20 **1150** (Invited) Wearable Electronics Using Low-Dimensional Nanomaterials – J. U. Park (UNIST)

10:50 **1151** (Invited) Physical, Chemical and Biological Sensors Based on Nanomaterials for Wearable and Smart Electronics – N. E. Lee, T. Q. Trung, E. Roh, B. U. Hwang, D. Kim, S. Shrivastava, L. T. Duy, V. Q. Dang, Y. M. Son, W. Lee, I. Y. Sohn (Sungkyunkwan University), J. H. Lee (Sungkyunkwan university), B. Y. Kim, S. Siddiqui (Sungkyunkwan University), and S. W. Kim (Sungkyunkwan University (SKKU))

11:20 **1152** (Invited) Printed High Performance Flexible Device Sheet – K. Takei (Osaka Prefecture University)

11:50 **1153** (Invited) Flexible Electronic Skins for Wearable Sensors – H. Ko (Ulsan National Institute of Science and Technology)

Low-Dimensional Nanoscale Electronic and Photonic Devices 2 – 14:00 – 16:00
Co-Chairs: Hyunhyub Ko and Nae-Eung Lee

14:00 **1154** (Invited) Laser Cooling in Semiconductors – J. Zhang (SKLSM, Institute of Semiconductors, CAS)

14:30 **1155** (Invited) Surfactant-Assisted Chemical Vapor Deposition of High-Performance Small-Diameter Gasb Nanowires – J. C. Ho (City University of Hong Kong)

15:00 **1156** (Invited) Emerging Oxide Nanowires: Creation Concept and Their Promises for Novel Nanoscale Devices – T. Yanagida (Kyushu University)

15:30 **1157** (Invited) New Synthesis Approaches to Nanostructured Complex Functional Metal Oxides – C. K. Chan (Arizona State University)

Energy Harvesting and Storage 2 – 16:15 – 18:15
Co-Chairs: Jr-Hau He and Kuniharu Takei

16:15 **1158** (Invited) *Operando* Measurement of Energy Band Alignment and Built-in Potential in Thin-Film Photovoltaic Devices – L. Chen (Suzhou Institute of Nanotech and Nanobionics, CAS)

16:45 **1159** (Invited) Efficient Perovskite Thin Film Solar Cells on Nanostructrue – Z. Fan (HKUST), M. M. Tavakoli (The Hong Kong University of Science and Technology), S. F. Leung (Hong Kong University of Science and Technology), and T. Kwong-Hoi (The Hong Kong University of Science and Technology)

17:15 **1160** Nanopatterned Fiber Based Textile Triboelectiric Nanogenerator – W. Seung (Sungkyunkwan University) and S. W. Kim (Sungkyunkwan University (SKKU))

17:30 **1161** Highly Flexible and Transferable Supercapacitors with Ordered Three-Dimensional MnO_2/Au/MnO_2 Nanospikes Arrays – Y. Gao, Q. Lin (HKUST), M. M. Tavakoli (ECE,HKUST), S. F. Leung (Hong Kong University of Science and Technology), and Z. Fan (HKUST)

17:45 **1162** (Invited) Strain and Phonon-Carrier Interactions in Ge-$Si_{0.5}Ge_{0.5}$ Core-Shell Nanowires Probed Using Tip-Enhanced Raman Spectroscopy – E. T. Yu, Z. Zhang, D. Dillen (University of Texas at Austin), B. W. Brasile (The Ohio State University), and E. Tutuc (The University of Texas at Austin)

West Hall 1, Phoenix Convention Center
H01 Poster Session – 18:00 – 20:00

- **1163** Multiple-Input Multiple-Output Optical Integrator Design By Non-Interacting Control Via Dynamic Extension – S. H. Williams (Mercer University), X. Xue (Toyota Technological Institute Japan), and M. Thitsa (Mercer University)
- **1164** Characterization of InN - $In_{0.25}Ga_{0.75}N$ Quantum Well Laser Structure for 1330 nm Wavelength – M. M. H. Polash (Bangladesh University of Engineering & Technology, University of Asia Pacific) and M. S. Alam (Bangladesh University of Engineering & Technology)
- **1165** Optical Gain Optimization of $Al_{0.8}Ga_{0.2}N$-Delta-GaN Quantum Well Laser in Ultraviolet Spectra Using Genetic Algorithm – M. M. H. Polash (Bangladesh University of Engineering & Technology, University of Asia Pacific) and M. S. Alam (Bangladesh University of Engineering & Technology)

H03 State-of-the-Art Program on Compound Semiconductors 58 (SOTAPOCS 58)

Electronics and Photonics
Curtis A, Hyatt Regency

Optoelectronics – 09:00 – 12:00
Co-Chair: Yu-Lin Wang

09:00 **1210** Hybrid Perovskites: A New Class of Compound Semiconductors with Unique Properties – T. Wu (KAUST)

09:20 **1211** Recent Developments in Mercury Cadmium Telluride IR Detector Technology – J. Antoszewski, N. D. Akhavan, G. Umana-Membreno, R. Gu, W. Lei, and L. Faraone (The University of Western Australia)

09:40 Break

10:00 **1212** Bridging the Gap - Rediscovering Black Phosphorus As an Anisotropic Layered Material for Electronics and Optoelectronics – H. Wang (University of Southern California)

10:40 **1213** Flexible Graphene Electrode-Based Organic Photovoltaics with Record-High Efficiency – H. Park (Ulsan National Institute of Science and Technology), S. Chang, X. Zhou, J. Kong, T. Palacios (Massachusetts Institute of Technology), and S. Gradecak (MIT Department of Materials Science)

11:00 **1214** Crystalline Tetrahedral Phases $Al_{1-x}B_xPSi_3$ and $Al_{1-x}B_xAsT_3$ (T = Si, Ge) Via Reactions of $Al(BH_4)_3$ and M(TH3)3 (M = P, As) – P. Sims (Dept. of Chemistry and Biochemistry, Arizona State Univ.), T. Aoki (LeRoy Eyring Center for Solid State Science), J. Menendez (Department of Physics, Arizona State Univ.), and J. Kouvetakis (Dept. of Chemistry and Biochemistry, Arizona State Univ.)

11:20 Lunch

Nitride Materials & Devices – 14:00 – 17:40
Co-Chair: Jennifer K. Hite

14:00 **1215** Future Power Electronics with GaN and Diamond – S. Chowdhury (Arizona State University)

14:40 **1216** (Invited) From Mrta to Smrta: Improvements in Activating Implanted Dopants in GaN – J. D. Greenlee (NRC Postdoctoral Fellow Residing at NRL), B. Feigelson, T. J. Anderson (Naval Research Laboratory), J. K. Hite (U.S. Naval Research Laboratory), K. D. Hobart, and F. J. Kub (Naval Research Laboratory)

15:20 **1217** Effect of GaN Buffer Layer Quality on Dc Characteristics of AlGaN/GaN High Electron Mobility Transistor – S. Ahn, W. Zhu, C. Dong, L. Le, Y. H. Hwang, B. J. Kim, F. Ren, S. J. Pearton, A. G. Lind, K. S. Jones (University of Florida), I. Kravchenko (Oak Ridge National Laboratory), and M. L. Zhang (Hebei University of Technology)

15:40 Break

16:00 **1218** Thermal Engineering of GaN Semiconductor Devices – S. Graham (Georgia Institute of Technology)

16:40 **1219** Low Dislocation Density AlGaN Epilayers for UV Laser Diodes and Devices for Power Electronics – A. A. Allerman, M. W. Moseley, M. H. Crawford, J. J. Wierer, A. M. Armstrong, A. G. Baca, R. J. Kaplar, and B. G. Clark (Sandia National Laboratories)

17:20 **1220** Inductively Coupled $BCl_3/Cl_2/Ar$ Plasma Etching of High Al Content AlGaN – E. Douglas, C. Sanchez, A. G. Baca, A. Allerman, and R. J. Kaplar (Sandia National Laboratories)

West Hall 1, Phoenix Convention Center
H03 Poster Session – 18:00 – 20:00

• **1221** Effect of Buffer Oxide Etchant (BOE) on Ti/Al/Ni/Au Ohmic Contacts for AlGaN/GaN Based Hemt – Y. H. Hwang, S. Ahn, C. Dong, W. Zhu, B. J. Kim, F. Ren, A. G. Lind, K. S. Jones, S. J. Pearton (University of Florida), I. Kravchenko (Oak Ridge National Laboratory), and M. L. Zhang (Hebei University of Technology)

I03 High Temperature Experimental Techniques and Measurements 2
High Temperature Materials

I03 Poster Session – 18:00 – 20:00

• **1251** Oxidation Behaviors of Ash Free Coals in a Coin Type Direct Carbon Fuel Cell – S. W. Lee, T. K. Kim, Y. J. Kim, and C. G. Lee (Hanbat National University)

• **1252** Electrochemical Analysis for the Identification of Electrode Reaction in Ni-YSZ Anode As for Solid Oxide Electrolysis Cell – H. N. Im, D. K. Lim, T. R. Lee (Jeonnam National University), Y. S. Yoo, M. Choi (Korea Electric Power Corporation Research Institute), and S. J. Song (Jeonnam National University)

• **1253** Oxidation Characteristics with Various Fuels in a Molten Carbonate Fuel Cell – T. K. Kim, Y. J. Kim, S. W. Lee, and C. G. Lee (Hanbat National University)

I04 Ionic Conducting Oxide Thin Films
High Temperature Materials
Remington B, Hyatt Regency

Fundamentals Studies 1 – 08:20 – 10:00
Co-Chairs: Enrico Traversa and Jennifer L. M. Rupp

08:20 **1254** Defect Chemistry of Perovskite Titanates: From Bulk Materials to Nanostructured Materials – X. Guo (Huazhong University of Science and Technology)

09:00 **1255** Mass Transport in Oxide Thin Films - Visualization and Control – J. J. Kim, D. Chen, S. R. Bishop, S. N. Cook, and H. L. Tuller (Massachusetts Institute of Technology)

09:40 Break

Fundamentals Studies 2 – 10:00 – 12:20
Co-Chairs: Enrico Traversa and Cortney R. Kreller

10:00 **1256** Grain Boundary Engineering to Improve the Performance of Microsofcs – A. Tarancón, A. Morata (IREC, Catalonia Institute for Energy Research), D. Pla, A. M. Saranya (IREC-Catalonia Institute for Energy Research), I. Garbayo (Electrochemical Materials, ETH Zurich), A. Cavallaro (Imperial College London), J. Canales-Vázquez (Universidad de Castilla La Mancha), F. Chiabrera (IREC-Catalonia Institute for Energy Research), J. A. Kilner (Imperial College London, London, UK), and M. Burriel (Laboratoire des Matériaux et du Génie Physique, France)

10:40 **1257** Vertical-Aligned Nanocomposites Oxide Thin Films with Enhanced Ionic Conductivity – Q. Su, H. Wang (Texas A&M University), W. Zhang, C. Jacob (Texas A & M University), D. Yoon (University of Texas at Austin), and A. Manthiram (The University of Texas at Austin)

11:20 **1258** Electrochemical Characterization of Columnar Anodic Thin Films Deposited By Pulsed Laser Deposition – A. C. Cavazos Sepulveda (King Abdullah University of Science and Technology, Materials for Energy Conversion and Storage Laboratory), L. Bi (King Abdullah University of Science and Technology-KAUST), and E. Traversa (Saudi Arabia)

11:40 **1259** Let`s Design the Structural-Defect Twists in Solid State Ionic Films: Strained Architectures for Novel Electronics and Energy Conversion Devices – J. L. M. Rupp (Electrochemical Materials, ETH Zurich, Electrochemical Materials ETH Zurich)

Towards MicroSOFCs – 14:00 – 17:20
Co-Chairs: Cortney R. Kreller and Joon Hyung Shim

14:00 **1260** Ultra-Thin Film Solid-Oxide Fuel Cell Technology Development: Status, Challenges, and Opportunities – M. Tsuchiya (SiEnergy Systems)

14:40 **1261** Ion Transport and Surface Kinetics in Oxygen Ion Conducting Nanocrystalline Oxide Thin Films – J. Bae (Hanyang University), J. An (Seoul National University of Science and Technology), Y. B. Kim (Hanyang University), T. M. Gur, and F. B. Prinz (Stanford University)

15:20 **1262** Effect of water adsorption on conductivity in epitaxial $Sm_{0.1}Ce_{0.9}O_{2-\delta}$ thin film for micro solid oxide fuel cells applications – N. Yang (CNR-SPIN, Università Niccolò Cusano), S. Jesse, E. Strelcov (Oak Ridge National Laboratory), A. Tebano (University of Rome Tor Vergata), V. Foglietti (CNR-SPIN), G. Balestrino (University of Rome Tor Vergata), S. V. Kalinin (Oak Ridge National Laboratory), C. Aruta (CNR-SPIN), A. Belianinov (Oak Ridge National Laboratory), C. Schlueter, and T. L. Lee (Diamond Light Source Ltd)

16:00 Break

16:20 **1263** Disorder and Ionic Transport in Pyrochlore/ Defect Fluorite Oxide Thin Films – C. R. Kreller, T. Holesinger, J. Valdez, Y. Wang, and B. Uberuaga (Los Alamos National Laboratory)

16:40 **1264** Multi-Layered Thin Film Y:$BaZrO_3$ Electrolytes for Anode-Supported Protonic Ceramic Fuel Cells – K. Bae, D. Y. Jang (Korea University), H. S. Noh (Korea Institute of Science and Technology), H. J. Kim (Korea University), J. Hong, B. K. Kim, K. J. Yoon, J. W. Son (Korea Institute of Science and Technology), and J. H. Shim (Korea University)

I05 Polymer Electrolyte Fuel Cells 15 (PEFC 15)

Energy Technology / Battery / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry

212-B, Phoenix Convention Center

B1-1 Bipolar Plates – 08:00 – 10:00
Co-Chair: Benjamin D. Gould

08:00 **1312** Electrochemical Characterisitcs of Thin Carbon Coatings for Metal Bipolar Plates - Evaluation of the Relative Porosity Using EIS – H. Bramfeldt, A. Jansson (Sandvik Materials Technology AB), G. Rannou, and D. Thierry (French Corrosion Institute)

08:40 **1313** Improved Water Management with Thermally Sprayed Coatings on Stainless Steel Bipolar Plates of PEMFC – A. S. Gago (German Aerospace Center), D. G. Sanchez (German Aerospace Center (DLR)), A. S. Ansar, P. Gazdzicki (German Aerospace Center), N. Wagner (German Aerospace Center DLR), J. Arnold (German Aerospace Center), and K. A. Friedrich (University of Stuttgart, German Aerospace Center (DLR))

09:00 **1314** Aluminum Bipolar Plates for PEM Fuel Cells – K. Swider-Lyons (U.S. Naval Research Laboratory), P. M. Natishan (Naval Research Laboratory), M. B. Sassin, J. Moran, S. Policastro (US Naval Research Laboratory), C. Wang (TreadStone Technologies, Inc.), and B. D. Gould (US Naval Research Laboratory)

09:20 **1315** Improvement of PEFC Performance and Endurance By Employing Electrochemically Assisted Self-Assembly Porous Carbon Plate – X. Guo, Z. Wang, Y. Zeng, and Z. Shao (Dalian Institute of Chemical Physics)

09:40 **1316** Materials and Cell Designs for Bipolar Fuel Cells – P. A. Kohl, J. M. Ahlfield, L. Liu, W. Huang (Georgia Institute of Technology), and D. Chu (U.S. Army Research Laboratory)

211-A, Phoenix Convention Center

D1-1 Activity and Durability of Pt-Based Cathode Catalysts 1 – 08:00 – 12:00
Co-Chairs: Shyam S. Kocha and Peter Strasser

08:00 **1326** CO Adsorption on Platinum Nanoparticles - the Importance of Size Distribution Studied with in-Situ Drifts and DFT Calculations – C. Brieger, J. Melke, P. Kaghazchi, and C. Roth (Freie Universitaet Berlin)

08:20 **1327** Re-Examination of the Particle Size Effect on the ORR for Nafion-Free Ultrathin Uniform Pt/C Catalyst Layers – K. Shinozaki (Toyota Central R&D Labs., Inc.) and S. S. Kocha (National Renewable Energy Laboratory)

08:40 **1328** Platinum Dissolution from Carbon Supported Nanoparticles – Z. Wang, E. Tada, and A. Nishikata (Tokyo Institute of Technology)

09:00 **1329** Corrosion Resistance of Pt-Co Alloy Under Potential Cycling in Sulfuric Acid Solution – Y. Sugawara (Department of Materials Science, Tohoku University), M. Konno (Tohoku University, present: NSSMC Ltd.), I. Muto, and N. Hara (Department of Materials Science, Tohoku University)

09:20 **1330** Stabilization Strategies for PtCo/C Catalysts for Htpem Fuel Cells – C. Grimmer, A. Schenk, B. E. Pichler, and V. Hacker (Graz University of Technology)

09:40 Intermission

10:00 **1331** Design of Supported PtCo Electrocatalysts for Pemfcs – A. Stassi, I. Gatto, A. Saccà, A. Patti, G. Monforte, V. Baglio, and A. S. Aricò (CNR-ITAE)

10:20 **1332** Ptfe Porous Hollow Nanocapsule Electrocatalysts with Remarkably Enhanced Oxygen Reduction Activity – H. Kuroki, T. Tamaki (Kanagawa Academy of Science and Technology, Tokyo Institute of Technology), S. Nakanishi (Tokyo Institute of Technology), M. Matsumoto, K. Kamiguchi, K. Kubobuchi, M. Arao, H. Imai (Device-functional analysis Department, NISSAN ARC Ltd.), Y. Kitamoto, and T. Yamaguchi (Kanagawa Academy of Science and Technology, Tokyo Institute of Technology)

10:40 **1333** Bimetallic Aerogels: Nanostructured Oxygen Reduction Reaction Electrocatalysts – S. Henning, J. S. Herranz (Electrochemistry Laboratory, Paul Scherrer Institut), L. Kühn, A. Eychmüller (Chair of Physical Chemistry, TU Dresden), and T. J. Schmidt (Laboratory of Physical Chemistry, ETH Zürich, Electrochemistry Laboratory, Paul Scherrer Institut)

11:00 **1334** Highly Active and Durable Extended Surface Oxygen Reduction Electrocatalysts – S. M. Alia, K. C. Neyerlin (National Renewable Energy Laboratory), S. Pylypenko (Colorado School of Mines), A. A. Dameron, S. S. Kocha, and B. S. Pivovar (National Renewable Energy Laboratory)

11:20 **1335** Enhanced Durability with Cu-Containing Chemically Ordered Pt-Alloy Catalyst for Oxygen Reduction Reaction in Polymer Electrolyte Fuel Cell – B. Arumugam, T. Tamaki (Tokyo Institute of Technology, Kanagawa Academy of Science and Technology), and T. Yamaguchi (Kanagawa Academy of Science and Technology, Tokyo Institute of Technology)

11:40 **1336** Controlling the Activity and Stability of Pt-Based Electrocatalysts By Means of the Lanthanide Contraction – M. Escudero-Escribano, P. Malacrida, U. G. Vej-Hansen, V. Tripkovic, A. A. Velázquez-Palenzuela, J. Schiøtz, J. Rossmeisl, I. E. L. Stephens, and I. Chorkendorff (Technical University of Denmark)

212-C, Phoenix Convention Center

C1-1 PFSA Ionomer Properties and High Temperature Membranes – 08:00 – 12:00

Co-Chairs: Kelly A. Perry and Deborah Jacqueline Jones

08:00 **1317** Nafion Nanothin Films – K. Karan (University of Calgary)

08:40 **1318** Gas Permeation Study in Thin and Ultra-Thin Ionomer Films – A. Z. Weber, M. Tesfaye, and B. D. McCloskey (Lawrence Berkeley National Laboratory)

09:00 **1319** Characterization of Low EW Ionomers in Fuel Cells – A. Kusoglu and A. Z. Weber (Lawrence Berkeley National Laboratory)

09:20 Break

09:40 **1320** Durability Improvements in PBI Membranes – G. Qian, K. Fishel, X. Chen, Y. Mao, H. Ploehn, and B. C. Benicewicz (University of South Carolina)

10:20 **1321** Investigation of Phosphoric Acid Distribution in PBI Based HT-PEM Fuel Cells – N. Pilinski, M. Rastedt (NEXT ENERGY • EWE Research Centre for Energy Technology), and P. Wagner (NEXT ENERGY)

10:40 **1322** Local Structure and Proton Transport in HT-PEFCs Measured with Neutron Scattering – O. Holderer, O. Ivanova, M. Khaneft, B. Hopfenmüller, W. Lüke, A. Majerus, M. S. Appavou, N. Szekely, M. Krutyeva, R. Zorn (Forschungszentrum Jülich GmbH), W. Lehnert (Forschungszentrum Jülich GmbH, RWTH Aachen University, Germany), and E. Kentzinger (Forschungszentrum Jülich GmbH)

11:00 **1323** Charge-Transfer Complex Hybrid Films Consisting of Proton Conductive Donor Molecules for High Temperature PEM – M. Nishihara (WPI-I2CNER, Kyushu University, NEXT-FC, Kyushu University), L. Christiani, F. Shiyan (Graduate School of Engineering, Kyushu University), and K. Sasaki (Kyushu University)

11:20 **1324** Thermo-Stable Non-PFSA Cation-Conductive Fluoropolymers for Medium-Temperature PEMFCs – S. Xu (Southern Illinois University), R. Jiang (Midwest Energy Group, Inc.), and Y. Gao (Southern Illinois University)

11:40 **1325** Organic/Inorganic Composite Membrane Using a Proton-Conducting SnP2O7 Electrolyte and PFSA Polymers for Intermediate Temperature PEMFC – K. S. Lee, Y. S. Kim, C. R. Kreller, M. S. Wilson, and R. Mukundan (Los Alamos National Laboratory)

212-A, Phoenix Convention Center

E1-1 Alkaline Membranes – 08:20 – 12:00

Co-Chairs: Chulsung Bae and Patric Jannasch

08:20 **1337** Molecular Engineering of Ion-Conducting Polymers for Fuel Cell Membrane Applications – W. H. Lee, A. D. Mohanty, and C. Bae (Rensselaer Polytechnic Institute)

09:00 **1338** Hydroxide Transport in Next Generation Anion Exchange Membranes – A. M. Herring, M. W. Liberatore, D. M. Knauss (Colorado School of Mines), E. B. Coughlin (University of Massachusetts, Amherst), T. P. Pandey, H. N. Sarode, and Y. Yang (Colorado School of Mines)

09:20 **1339** MEA with Thin Pore-Filling Anion Exchange Membrane and Water Transport Analysis in SAFC – Y. Oshiba (Tokyo Institute of Technology, JST-CREST), J. Hiura, Y. Suzuki (Tokyo Institute of Technology), and T. Yamaguchi (JST-CREST, Tokyo Institute of Technology)

09:40 Intermission

10:00 **1340** Tethering Cations to Aromatic Polymers via Flexible Spacers to Enhance the Performance of Alkaline Fuel Cell Membranes – P. Jannasch (Lund University)

10:40 **1341** Synthesis and Properties of a Multiblock Copolymer with Long Side Chains for Anion Exchange Membrane Fuel Cells – P. A. Kohl, J. M. Ahlfield, L. Liu (Georgia Institute of Technology), and D. Chu (U.S. Army Research Laboratory)

11:00 **1342** Membrane Permeability and Water Management in Alkaline Membrane Fuel Cells – S. Gottesfeld (Fuel Cell Consulting , Inc), M. Page (CONSALTANT), and Y. Paska (ELBIT SYSTEMS , ISREAL)

11:20 **1343** Mechanical and Transport Properties of Anion Exchange Membranes for Electrochemical Applications – T. P. Pandey, M. W. Liberatore, and A. M. Herring (Colorado School of Mines)

211-B, Phoenix Convention Center

A1-1 Catalyst Layer 1 – 09:00 – 11:40

Co-Chairs: Simon Thiele and Shawn Litster

09:00 **1344** Tomographic Analysis of Fuel Cell Catalyst Layers: Methods, Challenges and Validity – S. Thiele, S. Vierrath, M. Klingele, and R. Zengerle (University of Freiburg)

09:40 **1345** Accurate Ex-situ Measurements of PEM Fuel Cells Catalyst Layer Dry Diffusivity – S. Salari, C. McCague (Simon Fraser University), M. Tam, M. S. Saha (Automotive Fuel Cell Cooperation Corp.), J. Stumper (Automotive Fuel Cell Cooperation Corporation), and M. Bahrami (Laboratory for Alternative Energy Conversion (LAEC))

10:00 Break

10:20 **1346** Novel Approach to Measure Key Structural Parameters of PEM Fuel Cell Catalyst and Gas Diffusion Layer Based on Archimedes Principle – B. Zahiri (Automotive Fuel Cell Cooperation Corp., UBC), C. McCague (Simon Fraser University), M. Bahrami (Laboratory for Alternative Energy Conversion (LAEC)), J. Stumper (Automotive Fuel Cell Cooperation Corp.), and W. Mérida (Clean Energy Research Centre, UBC)

10:40 **1347** Fracture Properties of Catalyst Coated Membranes – Y. Singh, R. M.H. Khorasany, W. Kim, A. Sadeghi Alavijeh, E. Kjeang, and R. K. N. D. Rajapakse (Simon Fraser University)

11:00 **1348** FIB+SEM Tomography and Numerical Simulation of Corroded PEM Fuel Cell Cathodes – A. G. Star and T. F. Fuller (Georgia Institute of Technology)

11:20 **1349** 3D Imaging of Fuel Cell Electrode Structure Degraded Under Cell Voltage Reversal Conditions Using Nanoscale X-Ray Computed Tomography – P. Mandal (Carnegie Mellon University), B. K. Hong (Hyundai Motor Company, Carnegie Mellon University), J. G. Oh (Hyundai Motor Company), and S. Litster (Carnegie Mellon University)

212-B, Phoenix Convention Center
B1-2 Advanced Membrane Electrode Assemblies – 10:00 – 12:00
Co-Chair: Megan B. Sassin

10:00 **1350** Bing Energy Reduced Pt Membrane Electrode Assemblies – J. P. Zheng (Florida State University) and W. Zhu (Bing Energy International Inc.)

10:40 **1351** Ultra-Low Pt Loading Catalyst Layers for PEMFC Using Reactive Spray Deposition Technology – H. Yu (University of Connecticut), A. Baricci (Politechnico di Milano, Department of Energy), J. Roller (FEI Company), Y. Wang (University of Connecticut), A. Casalegno (Politecnico di Milano, Department of Energy), W. E. Mustain, and R. Maric (University of Connecticut)

11:20 **1352** An Open Cathode Fuel Cell for Atmospheric Flight – B. D. Gould, M. W. Hazard, J. A. Rodgers, and R. O. Stroman (US Naval Research Laboratory)

11:40 **1353** Evidence for Micro-Porous Layer Degradation Under Accelerated stress test Conditions – M. Andisheh-Tadbir (Simon Fraser University), M. Dutta (Ballard Power Systems), F. Orfino, and E. Kjeang (Simon Fraser University)

211-B, Phoenix Convention Center
A1-2 Imaging – 14:00 – 16:40
Co-Chairs: Daniel S. Hussey and Jens Eller

14:00 **1354** New Neutron Imaging Detectors for PEMFC through-Plane Water Content Measurement – D. S. Hussey, J. M. LaManna, E. Baltic, and D. L. Jacobson (NIST)

14:20 **1355** 3D Analysis of PEM Fuel Cell Membrane Cracks Using X-Ray Computed Tomography – Y. Singh, O. Luo, F. Orfino (Simon Fraser University), M. Dutta (Ballard Power Systems), and E. Kjeang (Simon Fraser University)

14:40 **1356** Fast X-Ray Tomographic Imaging: Investigation of Freezing Mechanisms in PEFC during Sub-Zero Start-Ups – I. Mayrhuber (Electrochemistry Laboratory, Paul Scherrer Institut), F. Marone (Paul Scherrer Institut), M. Stampanoni (Institut of Biomedical Engineering, ETH Zürich, Swiss Light Source, Paul Scherrer Institut), T. J. Schmidt (Laboratory of Physical Chemistry, ETH Zürich, Electrochemistry Laboratory, Paul Scherrer Institut), and F. N. Büchi (Electrochemistry Laboratory, Paul Scherrer Institut)

15:00 **1357** 3D Failure Analysis of PEM Fuel Cell Catalyst Layers Using Multi-Length Scale X-Ray Computed Tomography – A. Pokhrel, E. Kjeang (Simon Fraser University), M. Dutta (Ballard Power Systems), F. Orfino, and M. El Hannach (Simon Fraser University)

15:20 **1358** Statistical Analysis of Salt Deposition inside PEFC GDL from X-Ray Tomography – C. J. Banas (University of Connecticut, Center for Clean Energy Engineering) and U. Pasaogullari (Center for Clean Energy Engineering)

15:40 **1359** Operando Sub-Second Tomographic Imaging of Water in PEFC Gas Diffusion Layers – J. Eller, F. Marone, and F. N. Büchi (Paul Scherrer Institut)

16:00 Break

16:20 **1360** Analysis of so_2 Contamination Effects on PEFC Performance and Water Distribution By in-Situ Soft X-Ray Microscopy – T. Sasabe, T. C. Jao, T. Yamaguchi, S. Uemura, and S. Hirai (Tokyo Institute of Technology)

212-B, Phoenix Convention Center
B1-3 Alternative Fuel Fuel-cell Systems – 14:00 – 17:20
Co-Chairs: Piotr Zelenay and Trent M. Molter

14:00 **1361** Sustainable Innovations Electrochemical Technologies – T. M. Molter (Sustainable Innovations, LLC)

14:40 **1362** Solid Acid Reforming Methanol Fuel Cells and Hydrogen Generators – C. Chisholm, S. Gregoire, S. Zecevic, J. Hou, R. Fan, and H. H. Duong (SAFCell Inc.)

15:20 **1363** Progress Towards Commercial Solid Hydrogen Storage Systems – A. M. Fisher (Cella Energy)

16:00 Break

16:20 **1364** Effects of Reactant Gases on HT-PEM Fuel Cells – M. Rastedt, F. J. Pinar, N. Pilinski (NEXT ENERGY • EWE Research Centre for Energy Technology), and P. Wagner (NEXT ENERGY)

16:40 **1365** High-Performance Direct Dimethyl Ether Fuel Cell Operating with an Advanced Activation Process – D. C. Ua Cearnaigh (Los Alamos National Laboratory, University of New Mexico), J. H. Dumont (University of New Mexico, Los Alamos National Laboratory), H. T. Chung, and P. Zelenay (Los Alamos National Laboratory)

17:00 **1366** A Urine/Cr(VI) Fuel Cell: Electrical Power from Processing Heavy Metal and Human Excretion – W. Xu, Z. Fan, X. Wu, and Z. Wu (Zhejiang Univerisity)

212-A, Phoenix Convention Center
E1-2 Alkaline Catalysis – 14:00 – 17:40
Co-Chairs: Kaido Tammeveski and Svitlana Pylypenko

14:00 **1377** Making Economical MOF-Based Precious-Metal Free Oxygen Reduction Reaction Catalysts – G. McCool (Pajarito Powder, LLC), J. Li (Northeastern University), E. De Castro (Advent Technologies, Inc.), S. Mukerjee (Northeastern University), and B. Halevi (Pajarito Powder, LLC)

14:40 **1378** High Surface Area Perovskite Oxide-Based Oxygen Reduction Reaction Electrocatalysts – S. Pylypenko, J. M. Christ, T. Batson, C. A. Cadigan, J. Tong, and R. O'Hayre (Colorado School of Mines)

15:00 **1379** Platinum Deposited on Boron Doped Diamond Nanoparticles By the Rotating Disc Slurry Electrode (RoDSE) As a Catalyst for Alkaline Fuel Cell – R. Acevedo (University of Puerto Rico at Río Piedras) and C. R. Cabrera Jr. (University of Puerto Rico at Rio Piedras)

15:20 **1380** Efficient Fe, Co-Containing, Nitrogen-Doped Carbon Nanomaterials for Oxygen Reduction Reaction – S. Ratso, I. Kruusenberg (Institute of Chemistry, University of Tartu), U. Joost (Institute of Physics, University of Tartu), A. Sarapuu, and K. Tammeveski (Institute of Chemistry, University of Tartu)

15:40 Intermission

16:00 **1381** Effects of Functionalize Carbon Nanofibers Supported Catalysts on Oxygen Reduction Reaction in Alkaline Medium – W. Huang, J. M. Ahlfield, P. A. Kohl (Georgia Institute of Technology), and X. Zhang (East China University of Science and Technology)

16:20 **1382** Instability Of Commercial Pt/C And Pd/C Electrocatalysts In Alkaline Media – A. Zadick (LEPMI (Grenoble-INP)), M. Chatenet (Grenoble Institute of Technology, Phelma), L. Dubau (LEPMI-Grenoble), A. Serov, P. Atanassov (University of New Mexico), and U. Demirci (European Institut of Membranes)

16:40 **1383** Doped and Decorated Graphene Foam Electrocatalysts – S. M. Lyth (I2CNER, Kyushu University, Energy Engineering Group, University of Sheffield), J. Liu (Faculty of Engineering, Kyushu University), A. Mufundirwa (Kyushu University), K. Sasaki (Int. Res. Center for Hydrogen Energy, Kyushu University, Next-Generation Fuel Cell Resarch Center), and T. Daio (Kyushu University)

17:00 **1384** Ordered Hierarchically Porous Carbon Codoped with Iron and Nitrogen As Electrocatalyst for the Oxygen Reduction Reaction – C. Deng, H. Zhong, L. Yao, S. Liu, Z. Xu, and H. Zhang (Dalian Institute of Chemical Physics)

17:20 **1385** Rotating Disk Slurry Electrochemically Modified Platinum Carbon Nano-Onion Anode Material for Polymer Electrolyte Membrane Fuel Cells – R. Guzman-Blas (University of Puerto Rico at Río Piedras), A. Suleiman (University of Puerto Rico), L. Echegoyen (The University of Texas at El Paso), M. Jose-Yacaman (University of Texas at San Antonio), and C. R. Cabrera Jr. (University of Puerto Rico at Rio Piedras)

211-A, Phoenix Convention Center

D1-2 Activity and Durability of Pt-Based Cathode Catalysts 2 – 14:00 – 18:00

Co-Chairs: Andrew J. Steinbach and Hideo Daimon

14:00 **1367** Modeling Platinum Oxide Growth of PEMFC Cathode Catalysts – S. Arisetty (General Motors, Fuel Cell Activities), Y. Liu (ConocoPhillips Company), W. Gu (General Motors), and M. Mathias (General Motors, Fuel Cell Activities)

14:20 **1368** Recent Progress in Nanostructured Thin Film (NSTF) ORR Electrocatalyst Development for PEM Fuel Cells – A. J. Steinbach, D. van der Vliet, A. E. Hester (3M Company), J. Erlebacher (Johns Hopkins University), C. Duru, I. Davy, M. Kuznia (3M Company), and D. A. Cullen (Oak Ridge National Laboratory)

15:00 **1369** Magnetic Annealing of Pt-Alloy Nanostructured Thin Film Catalysts – D. A. Cullen, C. A. Bridges, O. Rios, H. M. Meyer III, K. Odbadrakh (Oak Ridge National Laboratory), J. Zack, and S. S. Kocha (National Renewable Energy Laboratory)

15:20 **1370** Binary and Ternary Catalysts Based on Pt, Au and Ni for the Oxygen Reduction Reaction – S. Lankiang, S. Baranton, and C. Coutanceau (Université de Poitiers, IC2MP, UMR CNRS 7285)

15:40 **1371** Pt, Pd, Au Binary and Ternary Catalysts for the Oxygen Reduction Reaction – S. Baranton (Université de Poitiers, IC2MP, UMR CNRS 7285), M. Chiwata (University of Yamanashi), S. Lankiang, and C. Coutanceau (Université de Poitiers, IC2MP, UMR CNRS 7285)

16:00 Intermission

16:20 **1372** Activity, Stability and Degradation of Carbon Supported Palladium (Pd/C) Fuel Cell Electrocatalysts for the Oxygen Reduction – T. Mittermeier, A. Weiß, F. Hasché, and H. A. Gasteiger (Technische Universität München)

16:40 **1373** Pdpt Alloy Nanocubes As Electrocatalysts for Oxygen Reduction Reaction in Acid Media – K. Jukk, N. Kongi, K. Tammeveski (Institute of Chemistry, University of Tartu), J. Solla-Gullón, and J. Feliu (Instituto de Electroquímica, Universidad de Alicante)

17:00 **1374** Effects of Core-Shell Interface Structures on ORR Activities: a Model Catalyst Study of Pt/Pd(111) – N. Todoroki, Y. Bando, H. Watanabe, and T. Wadayama (Tohoku University)

17:20 **1375** High Activation Protocol for Pd Core-Pt Shell Structured Catalyst – H. Daimon, K. Okuno, K. Mizoue, Y. Matsui, S. Higuchi (Doshisha University), N. Aoki, H. Inoue (Ishifuku Metal Industry), T. Doi, and M. Inaba (Doshisha University)

17:40 **1376** Large Scale Synthesis of Pd Core/Pt Shell Structured Catalyst and Their Electrochemical Properties – N. Aoki (Ishifuku Metal Industry), T. Nishikawa, K. Koga (Ishihuku Metal Industry), H. Daimon, M. Inaba (Doshisha University), and H. Inoue (Ishifuku Metal Industry)

212-C, Phoenix Convention Center

C1-2 Characterization of Fuel Cell Membranes – 14:20 – 17:40

Co-Chairs: Min Soo Kim and Stephen Matthew Lyth

14:20 **1386** Gas Crossover in Polymer Electrolyte Membranes – A. Jung and M. S. Kim (Seoul National University)

15:00 **1387** Proton Conductivity and Gas Barrier Properties of Graphene Oxide for PEMFC Membranes – T. Bayer (WPI-I2CNER, Department of Mechanical Engineering, Kyushu University), R. Selyanchyn, S. Fujikawa (WPI-I2CNER, Kyushu University), K. Sasaki (Next-Generation Fuel Cell Resarch Center, WPI-I2CNER, Kyushu University), and S. M. Lyth (Energy Engineering Group, University of Sheffield, I2CNER, Kyushu University)

15:20 **1388** Proton Conductivity of Graphene-Based Polymer Electrolyte Membrane – A. Khan, R. Asmatulu, and G. Hwang (Wichita State University)

15:40 **1389** Demonstration of Multiscale Proton Transport in Hybrid Organic-Inorganic Membrane – L. Dos Santos (Laboratoire de Chimie de la Matière Condensée de Paris), M. Marechal (CNRS, INAC-SPRAM, CEA), A. Guillermo (CNRS, INAC-SPRAM,CEA), S. Lyonnard (UMR SPrAM 5819 - INAC - CEA Grenoble - France), O. Sel, H. Perrot (CNRS - UPMC), and C. Laberty-Robert (Laboratoire Chimie de la Matière Condensée de Paris, UPMC, UMR7574- Collège de France)

16:00 Break

16:20 **1390** Ionomer Self-Assembly in Dilute Solution: A Molecular Dynamics Study – M. Ghelichi (Simon Fraser University, Department of Chemistry), K. Malek (Simon Fraser University), and M. Eikerling (Simon Fraser University, Department of Chemistry)

16:40 **1391** Molecular Simulation of Proton Conductivity in Nafion Membrane Contaminated with Ferrous Ion – K. Kawai, T. Mabuchi, and T. Tokumasu (Tohoku University)

17:00 **1392** Immobilized, Water Stable, Heteropoly Acid Functionalized Fluoroelastomer: Analysis of Structure and Proton Transport – A. R. Motz, J. L. Horan, M. C. Kuo, and A. M. Herring (Colorado School of Mines)

17:20 **1420** Imaging Phosphoric Acid Migration in High Temperature Polymer Electrolyte Fuel Cells By X-Ray Tomographic Microscopy – S. H. Eberhardt (Electrochemistry Laboratory, Paul Scherrer Institut), F. Marone (Paul Scherrer Institut), M. Stampanoni (Swiss Light Source, Paul Scherrer Institut, Institut of Biomedical Engineering, ETH Zürich), F. N. Büchi (Electrochemistry Laboratory, Paul Scherrer Institut), and T. J. Schmidt (Laboratory of Physical Chemistry, ETH Zürich, Electrochemistry Laboratory, Paul Scherrer Institut)

West Hall 1, Phoenix Convention Center

I05 Poster Session – 18:00 – 20:00

Co-Chairs: Thomas J. Schmidt and James M. Fenton

- **1393** Pt-decorated TiO2 Electrocatalysts for PEFCs – M. Iwami (Kyushu university), D. Horiguchi, Z. Noda, A. Hayashi (Kyushu University), and K. Sasaki (Int. Res. Center for Hydrogen Energy, Kyushu University)
- **1394** Preparation Procedures of Pt-Decorated SnO_2 Electrocatalysts on Conductive Fillers – D. Horiguchi, Z. Noda, A. Hayashi (Kyushu University), and K. Sasaki (Int. Res. Center for Hydrogen Energy, Kyushu University)
- **1395** Effect of Alloy Composition on Electrocatalytic Activity of PdAu Core/ Pt Shell Nanoparticle Catalysts for Oxygen Reduction Reaction – T. Kuwahara, M. Chiku, E. Higuchi, and H. Inoue (Osaka Prefecture University)
- **1396** Change in ORR Activity of Pd Core-Pt Shell Structured Catalyst with Different Pt Shell Coverage – K. Mizoue (Doshisha University), N. Aoki, H. Inoue (Ishifuku Metal Industry), T. Doi, H. Daimon, and M. Inaba (Doshisha University)
- **1397** ORR Activities for Various-Monolayer-Thick Pt Shells on $PtxNi_{100-x}(111)$ – M. Asano, R. Kawamura, N. Todoroki, and T. Wadayama (Tohoku University)
- **1398** Oxygen Reduction Reaction on a Titanium Suboxide Possessing Anatase or Rutile Structure – K. Iwata and T. Saida (Meijo University)
- **1399** Synthesis of Pt-Cu Bimetallic Alloys and Their Electrocatalytic Activities for Oxygen Reduction Reaction – S. Fu, C. Zhu, D. Du, and Y. Lin (Washington State University)
- **1400** Facile Synthesis of Three-Dimensional Graphene Nanomaterials Via Supercritical Fluid for Oxygen Reduction Reaction – C. Zhu, Y. Zhou, S. Fu, D. Du, and Y. Lin (Washington State University)
- **1401** Development of Free-Metal Electrocatalyst from Inexpensive Sources of Carbon: A Novel Electrode Material for Cathode Reaction in PEM Fuel Cells – I. L. Alonso-Lemus (CINVESTAV UNIDAD SALTILLO, Cátedra CONACyT), D. Lardizabal (Centro de Investigación en Materiales Avanzados S.C.), F. J. Rodríguez-Varela (Cinvestav Unidad Saltillo), L. de la Torre Saenz (Centro de Investigación en Materiales Avanzados S.C.), and M. E. Sanchez-Castro (CINVESTAV UNIDAD SALTILLO)
- **1402** Nanoengineered Catalysts for Fuel Cells – S. Fu, C. Zhu, Y. Zhou, D. Du, and Y. Lin (Washington State University)
- **1403** Effect of Potential on Dissolution of Pt-Fe Alloys Studied By Channel Flow Multi Electrode – A. Ooi (Mater. & Sci., Tokyo Institute of Techonology), E. Tada, and A. Nishikata (Tokyo Institute of Technology)
- **1404** Investigation of Pt-Co/Graphene and Pt-Co-Ru/Graphene Catalysts for Oxygen Reduction Reaction – V. Kepeniene, R. Stagniunaite, L. Tamasauskaite-Tamasiunaite, and E. Norkus (Center for Physical Sciences and Technology)
- **1405** Enhancement of ORR Activity of PtPd/C Alloy Catalyst with Accelerated Durability Test and Chemical De-Alloying – K. Okuno (Doshisha University), N. Aoki, H. Inoue (Ishifuku Metal Industry), H. Daimon, T. Doi, and M. Inaba (Doshisha University)
- **1406** Electrochemical Evaluation of Pt Catalysts Supported on Nb-Doped SnO_2 in Membrane-Electrode Assemblies for PEFCs – Y. Chino (University of Yamanashi), Y. Senoo (Engineered Materials Sector R&D Center), K. Kakinuma (Fuel Cell Nanomaterials Center,University of Yamanashi), M. Watanabe (Fuel Cell Nanomaterials Center, University of Yamanashi), and M. Uchida (Fuel Cell Nanomaterials Center,University of Yamanashi)
- **1407** Third-Body Effects of Surfactants Adsorbed on Pt Electrocatalysts in Proton Exchange Membrane Fuel Cells – Y. H. Chung (Korea Institute of Science and Technology (KIST)), J. H. Jang (Korea Institute of Science and Technology (KIST), Korea University), S. J. Kim (Korea Institute of Science and Technology (KIST)), D. Y. Chung (Seoul National University (SNU), Institute for Basic Science (IBS)), H. Y. Park, I. Y. Cha (Korea Institute of Science and Technology (KIST)), Y. E. Sung (Seoul National University (SNU), Institute for Basic Science (IBS)), S. J. Yoo, H. J. Kim, D. Henkensmeier, and J. Y. Kim (Korea Institute of Science and Technology (KIST))

- **1408** Investigation of Stability Reduction in Pt-Co-Mn Ternary Alloy Catalyst for PEFCs – M. Ishida (Tanaka Kikinzoku Kogyo K.K.) and K. Matsutani (Tanaka Kikinzoku Kogyo K. K.)
- **1409** Electrochemical Structural Stability of Au-Modified Pt Nanoparticles Prepared By Arc-Plasma Deposition – S. Takahashi, H. Chiba, N. Todoroki, and T. Wadayama (Tohoku University)
- **1410** High Formic Acid Oxidation Activity and Stability of Pd Catalyst Supported By Nanoparticle-Embedded Carbon Nanofiber – R. Onishi (Kanazawa University), T. Tsujiguchi (College of Science and Engineering, Kanazawa University, JST, PREST), Y. Osaka, and A. Kodama (College of Science and Engineering, Kanazawa University)
- **1411** Structure-Controlled Rh/Sn/Pt Catalysts for Complete Oxidization of Ethanol to Carbon Dioxide – T. P. Mai, M. Chiku, E. Higuchi, and H. Inoue (Osaka Prefecture University)
- **1412** Improvement for the Mass Transfer in the Anode Electrode of Direct Formic Acid Fuel Cell Fabricated By Ultrasonic Spray – F. Matsuoka (Kanazawa University), T. Tsujiguchi (College of Science and Engineering, Kanazawa University, JST, PREST), Y. Osaka, and A. Kodama (College of Science and Engineering, Kanazawa University)
- **1413** Optimized Direct Formic Acid Fuel Cells Anodes – J. W. Cisco, C. Burke, and C. A. Rice (Tennessee Technological University)
- **1414** Molecular Simulation of Oxygen Solubility and Diffusivity in Ionomer on Pt Surface – Y. Kurihara, T. Mabuchi, and T. Tokumasu (Tohoku University)
- **1415** Investigation of Durability of Meas at Higher Temperature – M. Kitamura, Z. Noda, J. Matsuda, A. Hayashi, and K. Sasaki (Kyushu University)
- **1416** A FIB-SEM Study on Correlations Between PEFC Electrocatalyst Microstructure and Cell Performance – M. Okumura, Y. Nagamatsu, Z. Noda (Kyushu University), Y. Tachikawa (WPI-I2CNER, Kyushu University), T. Daio, A. Hayashi (Kyushu University), and K. Sasaki (Int. Res. Center for Hydrogen Energy, Kyushu University)
- **1418** Structural and Chemical Analysis By Transmission Electron Microscopy of Pt-Ru Membrane Precipitates in Proton Exchange Membrane Fuel Cell Aged Under Reformate – S. Escribano, L. Guetaz, P. A. Henry, and P. A. Jacques (CEA, LITEN)
- **1419** Analysis of Dispersion State of Catalyst Inks for PEFC – Y. Aoki (Toray Research Center, Inc.), J. Tsuji, K. Okada, and H. Hasegawa (Toray Research Center, inc.)
- **1421** Effects of Water Structure on Proton Transport in Nafion Thin Films with Molecular Dynamics Simulations – J. Aochi, T. Mabuchi, and T. Tokumasu (Tohoku University)
- **1422** Molecular Dynamics Study of Proton Transport in Modeled Water Cluster Structure of Polymer Electrolyte Membrane – T. Mabuchi and T. Tokumasu (Tohoku University)
- **1423** Multiscale Model of Proton Transport in Perfluorosulfonic-Acid Membrane – A. R. Crothers (Lawrence Berkeley National Laboratory, University of California, Berkeley), C. J. Radke (University of California, Berkeley), and A. Z. Weber (Lawrence Berkeley National Laboratory)
- **1424** Heterogeneous Substrate Effects on Perfluorosulfonic-Acid Thin Films – P. Dudenas (University of California, Berkeley, Lawrence Berkeley National Laboratory), A. Kusoglu, and A. Z. Weber (Lawrence Berkeley National Laboratory)
- **1425** Durability and Degradation Analysis of a Hydrocarbon Membrane in PEFC Accelerated Stress Evaluation – R. Shimizu (University of Yamanashi), Y. Sakiyama (Toray Research Center, Inc.), J. Takano, S. Itami (Honda R&D Co., Ltd., Automobile R&D Center), M. Kusakabe (Kaneka Corporation), K. Miyatake (Clean Energy Research Center, University of Yamanashi, Fuel Cell Nanomaterials Center, University of Yamanashi), M. Watanabe (Fuel Cell Nanomaterials Center, University of Yamanashi), and M. Uchida (Fuel Cell Nanomaterials Center,University of Yamanashi)
- **1426** Improved Performance of Alkaline Membrane Fuel Cells – S. Watanabe, Y. Kikkawa, K. Oda, and T. Okamura (Tokuyama Corporation)
- **1427** Nano-Scale X-Ray Computed Tomography of Micro-Porous Layers – M. Andisheh-Tadbir, A. Pokhrel, Y. Singh, R. White, M. E. Hannach, F. Orfino (Simon Fraser University), M. Dutta (Ballard Power Systems), and E. Kjeang (Simon Fraser University)
- **1428** Effect of Hydrophilic Micro-Porous Layer Structure on Microscopic Water Distribution and Cell Performance in PEFC – Y. Aoyama, K. Suzuki, Y. Tabe, T. Chikahisa (Hokkaido University), and T. Tanuma (Asahi Glass Co., Ltd.)
- **1430** PEMFC Subzero Cold Start in a Quasi-Adiabatic Single Cell Fixture – C. Koudelka (Tennessee Tech University) and C. A. Rice (Tennessee Technological University)
- **1431** Enhanced Ir-Ru-Ox Electro-Catalysts for Oxygen Evolution in Proton Exchange Membrane Water Electrolysis – G. Monforte, S. Siracusano, V. Baglio, and A. S. Aricò (CNR-ITAE)

J01 Physics and Chemistry of Luminescent Materials

Luminescence and Display Materials
Phoenix West, Hyatt Regency

Phosphor Synthesis and Processing – 08:00 – 12:00
Co-Chairs: Madis Raukas and Rong-Jun Xie

08:00 **1571** Synthesis of Phosphor Materials By New Low-Temperature Solid-State Reaction Method Showing Abnormally High Diffusion – K. Toda, T. Hasegawa, T. Kaneko, A. Toda, S. W. Kim, K. Uematsu, T. Ishigaki (Niigata University), J. Koide, M. Toda (N-Luminescence corporation), Y. Kudo (N-Luminescence Corporation), and M. Sato (Niigata University)

08:40 **1572** Thermal & Humidity Stability of Mn^{4+} Doped Complex Fluoride Phosphors – S. P. Sista, J. Murphy, F. Garcia-Santamaria, and A. A. Setlur (GE Global Research)

09:00 **1573** Engineering of Rare-Earth-Metal Oxysulfate ($RE_2O_2SO_4$) Hollow Nanospheres for Upconversion – G. Chen, L. Yan, and H. Luo (New Mexico State University)

09:20 **1574** Cooperative and White Light Emission from Yb- and Yb,Er-Doped $Y_2Si_2O_7$ Nanopowders – B. Di Bartolo (Department of Physics, Boston College), M. Erdem (Marmara University, Istanbul, Turkey), J. Collins (Wheaton College), B. Sitt (Boston Colelge, Chestnut Hill, MA USA), and J. Ligouri (Boston College, Chestnut Hill, MA USA)

09:40 **1575** Influence of the Starting Solution on the Growth and Morphology of Rare Earth-Doped Yttrium Oxide Spherical Particles By the Urea Precipitation Method – J. Silver, T. Ireland, and G. R. Fern (Brunel University London)

10:00 Break

10:30 **1576** Controlling Particle Size and Luminescence in Mn^{4+} Activated K_2SiF_6 – P. K. Nammalwar (GE Global Research, Bangalore), D. G. Porob (GE India Technology Centre), R. Hanumantha (GE Global Research, Bangalore), A. A. Setlur, and J. Murphy (GE Global Research)

10:50 **1577** Improvement of Luminescence Properties and Particle Growth of AlN Phosphors By Si-Doping – Y. Cho (National Instittute for Materials Science, University of Tsukuba), B. Dierre, N. Fukata, N. Hirosaki, K. Takahashi, T. Takeda (National Institute for Materials Science), and T. Sekiguchi (National Institute for Materials Science, University of Tsukuba)

11:10 **1578** Tuning the Luminescence Properties of Organometal Halide Perovskites for Light-Emitting Applications – H. Zhong (Beijing Institute of Technology)

Fundamental Chemistry and Physics I – 14:00 – 17:00
Co-Chairs: Anant A. Setlur and Mikhail G. Brik

14:00 **1579** Luminescence Quenching of $[M]NbO_4:Pr^{3+}$ [M=La, Lu, Gd] Under UV Excitation – J. Collins, E. Labovitis (Wheaton College), M. Bettinelli (Department of Biotechnology, University of Verona), A. Sutton, and K. Dauphinais (Wheaton College)

14:40 **1580** Inverse Nephelauxetic Effect in the Pressure Dependence of R-Line Energy of Ruby – K. Ogasawara and M. Novita (Department of Chemistry, Kwansei Gakuin University)

15:00 **1581** Assessing Spatial Resolution of Cathodo-Luminescence Imaging and Spectroscopy at the Nanoscale for Inorganic Phosphor Powders – G. R. Fern, P. G. Harris, T. Ireland, and J. Silver (Brunel University London)

15:20 Break

15:40 **1582** Concentration Dependency of Eu^{2+} Doped $La_{4-X}Ca_xSi_{12}O_{3+X}N_{18-X}$ Phosphors and the Energy Levels of the Rare-Earth Ions – O. M. ten Kate, R. J. Xie, S. Funahashi, T. Takeda, and N. Hirosaki (National Institute for Materials Science)

16:00 **1583** Cathodoluminescence Studies of Phosphor Particles – P. G. Harris, D. D. Engelsen, and J. Silver (Brunel University London)

16:20 **1584** Electronic Structures and Optical Properties of Aluminum in Bulk, Thin Film and Nanoparticulate Forms – K. C. Mishra, A. Piquette (OSRAM SYLVANIA), P. C. Schmidt (Universität Darmstadt), and K. H. Johnson (Massachusetts Institute of Technology)

West Hall 1, Phoenix Convention Center
J01 Poster Session – 18:00 – 20:00
Co-Chairs: Anant A. Setlur and Madis Raukas

• **1585** Inorganic-Organic Hybrid Phosphor Layer for Si Solar Cells – H. Okura (Merck Ltd.), R. Sakata, N. Doi, T. Ishigaki, R. Komiyama, H. Miyashita, S. S. Lee, and K. Ohmi (Tottori University)

• **1586** Upconversion Luminescence of HfO_2 Phosphors Embedded into Polyester FILMS – S. Carmona (IF-UNAM), L. Mariscal B. (Cinvestav), J. M. Hérnandez (IF-UNAM), G. Alarcón-Flores (CICATA-IPN), H. Murrieta (IF UNAM), and C. Falcony (Cinvestav)

• **1587** Luminescent Properties of $Al_2O_3:Tb^{3+}$ Powders Embedded in Polyethylene Terephthalate Films – L. Mariscal B. (CINVESTAV, IPN), S. Carmona-Tellez (Instituto de Física, UNAM), C. Falcony (CINVESTAV, IPN), and H. Murrieta Sánchez (Instituto de Física, UNAM)

L01 Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry General Session

Physical and Analytical Electrochemistry
Borein B, Hyatt Regency

Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry III – 08:00 – 09:20
Co-Chairs: Luke M. Haverhals and Alanah Fitch

08:00 **1610** Thin TiO_2 Overlayers As Catalysts for Oxygen Reduction and Evolution Reactions – H. Tavassol and S. M. Haile (Northwestern University, California Institute of Technology)

08:20 **1611** Biomimetic O2 Reduction at MN4 Catalysts Adsorbed on Carbon Nanotubes and on Pyridine Grafted Carbon Nanotubes – J. H. Zagal (University of Santiago de Chile (USACh)), F. Tasca (Universidad de Santiago de Chile), M. Viera, C. Zuniga (University of Santiago de Chile (USACh)), R. A. Venegas, and F. J. Recio (Universidad de Santiago de Chile)

08:40 **1612** Novel Methanol-Tolerant Metal Selenide Based Chalcogenide Electrocatalysts for Oxygen Reduction in Alkaline Solution – J. Masud, A. Swesi, and M. Nath (Missouri University of Science & Technology)

09:00 **1613** Nickel Selenide As High-Efficiency Catalyst for Oxygen Evolution Reaction – A. Swesi, J. Masud, and M. Nath (Missouri University of Science & Technology)

Charge Transfer in Biological Systems – 09:40 – 12:20
Co-Chairs: Plamen Atanassov and David Cliffel

09:40 **1614** Combined Experimental and Computational Approach for Rational Design of Bio-Nano Interfaces – S. Babanova, I. Matanovic, M. S. Chavez, and P. Atanassov (University of New Mexico)

10:00 **1615** Enrichment of Novel Electroactive Bacteria from Equatorial Climate Sediments Via Potentiostatic Growth and Subsequent Characterisation Via Metagenomics, Metatranscriptomics, Voltammetry and Electrochemical Impedance Spectroscopy – L. E. Doyle, P. Y. Yung (SCELSE, Nanyang Technological University), S. Wuertz (SCELSE, University of California, Davis), R. B. H. Williams (SCELSE, National University of Singapore), and E. Marsili (SCELSE, Nanyang Technological University)

10:20 **1616** Selective Patterning on Pyrocarbon Interdigitated Electrodes for Bienzymatic Sensing of Glutamate – K. C. Morton and S. Semancik (National Institute of Standards and Technology)

10:40 **1617** Naphthoquinone Derivatives As Low-Potential Electron Mediators of Fad-Dependent Glucose Dehydrogenase – D. P. Hickey, R. D. Milton, S. Abdellaoui, K. Lim, B. Tan, and S. D. Minteer (University of Utah)

11:00 **1618** Bioelectrochemical and Spectroscopic Study during Interfacial Biooxidation Process of Chalcopyrite Mediated By Sulfur and Iron Oxidizing Microorganisms – M. I. Lopez-Cazares, J. V. Garcia-Meza (Universidad Autonoma de San Luis Potosi), E. R. Larios Duràn (Universidad de Guadalajara), and R. Cruz-Gaona (Universidad Autonoma de San Luis Potosi)

11:20 **1619** Enhanced Photo-Bioelectrochemical Energy Conversion By Genetically Engineered Cyanobacteria – N. Sekar and R. P. Ramasamy (College of Engineering, University of Georgia, Athens)

11:40 **1620** Simultaneous Impedance Spectroscopy and Optical Microscopy to Investigate Cells Attachment and Spreading – M. Parviz, J. J. Gooding (The Australian Centre for NanoMedicine, School of Chemistry, UNSW Australia), and K. Gaus (Single Molecule Laboratory, UNSW Australia)

12:00 **1621** Light-Harvesting Proteins and Biofilms on Iron Oxide Photoelectrodes – A. Braun, D. K. Bora, G. Faccio, K. Schrantz (Empa), and E. Rozhkova (ANL)

Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry IV – 14:00 – 17:20
Co-Chairs: R. L. Calhoun and Graham T. Cheek

14:00 **1622** Mediator-Less Direct Electron Transfer and Oxygen Reduction By Bilirubin Oxidase Adsorbed on to a Bucky Paper Electrode – C. Walgama, A. Pathirana, N. Means (Oklahoma State University), A. L. Goff, S. Cosnier (Grenoble University), and S. Krishnan (Oklahoma State University)

14:20 **1623** Synchrotron Based Structural Investigations of Mass-Selected PtxGd Nanoparticles and a Gd/Pt(111) Single Crystal for Electrochemical Oxygen Reduction – A. F. Pedersen, A. A. Velázquez-Palenzuela, F. Masini, M. Escudero-Escribano, E. T. Ulrikkeholm, D. Deiana, P. Malacrida (Technical University of Denmark), D. Friebel, A. Nilsson (SLAC National Accelerator Laboratory), I. E. L. Stephens, and I. Chorkendorff (Technical University of Denmark)

14:40 **1624** Synthesis of 3D Cos/CNF Electrode for Efficient Oxygen Evolution – J. Zhang, R. Chen, Q. Liu, and Q. Wang (Tianjin University)

15:00 **1625** Influence of Temperature on the Shape Evolution of IrO_2-SiO_2 coating and Its Electrochemical Activity for Oxygen Evolution – Q. Wang (Tianjin University, School of Chemical Engineering and Technology), X. Zhang, L. Wang (Tianjin University), and R. Yangzhang (school of Chemical Engineering and Technology, Tianjin University)

15:20 **1626** Electrochemical Characterisation of Cobalt-Oxide Catalysts with Different Cobalt Loading for Oxygen Reduction Reaction in Alkaline Media – L. M. Uhlig (NEXT ENERGY • EWE Research Centre for Energy Technology), A. Dyck (NEXT ENERGY), G. W. Sievers, V. Brüser (Leibniz Institute for Plasma Science and Technology), and G. Wittstock (Carl von Ossietzky University of Oldenburg)

15:40 Intermission

16:00 **1627** Electrochemical Reduction of CO_2 to Useful Fuels on Molybdenum and Molybdenum Oxide Thin-Film Catalysts – A. A. Permyakova, J. Durst, J. S. Herranz, Y. Paratcha (Electrochemistry Laboratory, Paul Scherrer Institut), and T. J. Schmidt (Electrochemistry Laboratory, Paul Scherrer Institut, Laboratory of Physical Chemistry, ETH Zürich)

16:20 **1628** Electroreduction of Oxygen on Carbon Supported Palladium Nanocubes – H. Erikson, A. Sarapuu, K. Tammeveski (Institute of Chemistry, University of Tartu), J. Solla-Gullón, and J. Feliu (Instituto de Electroquímica, Universidad de Alicante)

16:40 **1629** Electrochemical Investigations of Aromatic Hydrocarbons in Adiponitrile – G. T. Cheek (United States Naval Academy)

17:00 **1630** Organized Light Harvesting Photosystem I Layers on a Cytochrome *C* for the Construction of New Photobioelectrodes – S. C. Feifel, K. Stieger (Technical University of Applied Sciences), H. Lokstein (University of Glasgow), and F. Lisdat (University of Applied Sciences Wildau)

L04 Electrode Processes 10

Physical and Analytical Electrochemistry / Energy Technology / Industrial Electrochemistry and Electrochemical Engineering
213-B, Phoenix Convention Center

Electrode Processes 10 – 08:00 – 12:20
Co-Chair: Andrew Campion Hillier

08:00 **1654** Modeling Multi-Scale Carbon Fiber Supports for Thin Film Bioelectrodes – D. V. T. Do, H. Wen, C. Gumeci, and S. Calabrese Barton (Michigan State University)

08:20 **1655** Modeling and Optimization of Porous Electrodes for Alkaline Oxygen Evolution – T. Kadyk and M. Eikerling (Simon Fraser University, Department of Chemistry)

08:40 **1656** Insights from the Rigid-Band Model: Tuning Perovskite Electronic Structure for the Oxygen Evolution Reaction – W. T. Hong, K. A. Stoerzinger (Massachusetts Institute of Technology), A. Grimaud (Massachusetts Institute of Technology, College de France), Y. L. Lee (Massachusetts Institute of Technology), W. Yang (Lawrence Berkeley National Laboratory), and Y. Shao-Horn (Massachusetts Institute of Technology)

09:00 **1657** DFT-Based Screening for a New Electro-Catalyst to Convert Nitrigen to Ammonia at Room Temperature and Ambient Pressure – Y. Abghoui and E. Skulason (University of Iceland)

09:20 **1658** Development of Screen Printed Electrodes Chemically Modified with Schiff Base Films for Application in Forensic Chemistry – M. F. de Oliveira (Universidade de São Paulo)

09:40 **1659** Using Scanning Electrochemical Microscopy to Control Boundary Layer Chemistry during Nickel Electrodeposition – N. L. Ritzert, R. Wang, and T. P. Moffat (National Institute of Standards and Technology)

10:00 Break

10:20 **1660** Nano-Structured Pd-Sn Catalysts for Alcohol Electro-Oxidation in Alkaline Medium – A. Zalineeva (Université de Poitiers, IC2MP, UMR CNRS 7285), A. Serov, M. Padilla, U. Martinez, K. Artyushkova (University of New Mexico), S. Baranton, C. Coutanceau (Université de Poitiers, IC2MP, UMR CNRS 7285), and P. Atanassov (University of New Mexico)

10:40 **1661** Novel System Based on Divalent Silver for Mediated Electrochemical Oxidation of Persistent Organic Pollutants – P. Polczynski (Department of Chemistry, University of Warsaw), R. R. Jurczakowski (University of Warsaw, Department of Chemistry), and W. Grochala (Centre for New Technologies, University of Warsaw)

11:00 **1662** Formic Acid Oxidation on Platinum- a Simple Mechanistic Study – K. Schwarz (National Institute of Standards and Technology), R. Sundararaman (The Joint Center for Artificial Photosynthesis), T. Moffat, and T. Allison (National Institute of Standards and Technology)

11:20 **1663** Electrochemical Oxidation of Dibenzothiophene in Acetonitrile and Acetonitrile-Water Mixtures – E. Méndez, M. González Fuentes, A. Becerra (Benemérita Universidad Autónoma de Puebla), and F. J. González (Centro de Investigación y de Estudios Avanzados del IPN)

11:40 **1664** Electrochemical Reduction of Carbon Dioxide on Silver Nanostructures and the Role of Oxygen – M. S. Jee (Korea Institute of Science and Technology, Korea University), B. K. Min (Green School, Korea University), and Y. J. Hwang (Korea Institute of Science and Technology)

12:00 **1665** Optimizing Gas Diffusion Electrode for Electrochemical Reduction of CO2 to CO – B. Kim (University of Illinois at Urbana-Champaign), F. Hillman (University of Illinois at Urban-Champaign), S. Fujikawa (WPI-I2CNER, Kyushu University), and P. J. A. Kenis (University of Illinois at Urbana-Champaign)

L05 Nanoscale Electrochemistry

Physical and Analytical Electrochemistry / Energy Technology

Russell C, Hyatt Regency

Nanoscale Electrochemistry – 10:00 – 17:00
Co-Chairs: Ahmet Kusoglu and Takashi Ito

10:00 **1666** Electrochemical Studies of Thin Films of Side-Chain Ferrocene-Containing Diblock Copolymers – T. Ito, G. Ghimire (Department of Chemistry, Kansas State University), Y. Yi, M. A. Derylo, and L. A. Baker (Department of Chemistry, Indiana University)

10:20 **1667** Single-Step Coelectrodeposition of Hybrid Silica Nanocomposite Directs the Fabrication of Free-Standing and Transferal Conducting Polymer Thin Films – A. A. Farghaly (Virginia Commonwealth University, Assiut University) and M. M. Collinson (Virginia Commonwealth University)

10:40 **1668** Electrochemical Detection of Colloidal Semiconductor Nanoparticles: From Single Nanoparticles to Aggregates – M. A. Alpuche-Aviles, P. Chhetri, K. K. Barakoti, and A. Recinos (University of Nevada, Reno)

11:00 **1669** Nano-Impact Electrochemistry for Assessing the Chemical Reactivity of Nanoparticles – A. Karimi, D. Andreescu, and S. Andreescu (Clarkson University)

11:20 **1670** Nanolayered Supramolecular Protein Clusters on Electrodes: A Switchable Cascadic Reaction Scheme for Dual-Analyte Detection – S. C. Feifel, A. Kapp (Technical University of Applied Sciences), R. Ludwig (University of Natural Resources and Life Science, Austria), and F. Lisdat (University of Applied Sciences Wildau)

11:40 **1671** Nickel (III) Salt Dispersed Poly-aniline film: Preliminary SECM Examination – I. U. Haque (University of Engineering and Technology Lahore Pakistan)

12:00 Lunch Break

14:00 **1672** Novel Electrocatalysts for Generating Oxygen from Acid Water Electrolysis – K. Chatterjee (MSNE, Rice University, Houston, TX, Dept. of Physics, VU, Midnapore, India), J. Wu (MSNE, Rice University, Houston), J. Shen, K. Hackenberg, R. Vajtai, J. Lou (MSNE, Rice University, Houston, TX), and P. M. Ajayan (Rice University)

14:20 **1673** In-Situ TEM Study of $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_3$ for Oxygen Evolution Electrocatalysis – B. Han, K. A. Stoerzinger (Massachusetts Institute of Technology), V. Tileli (Imperial College London), A. Gamalski, E. A. Stach (Brookhaven National Laboratory), and Y. Shao-Horn (Massachusetts Institute of Technology)

14:40 **1674** Low-Temperature Electrochemical Ammonia Synthesis with Nanoscale Fe-Ni Bimetallic Catalysts – L. F. Greenlee, N. S. Rentz (National Institute of Standards & Technology), J. N. Renner, K. E. Ayers (Proton OnSite), and N. Bedford (National Institute of Standards & Technology)

15:00 **1675** Processing and Properties of Nanocomposite Thin Films for Micro-Solid Oxide Fuel Cell Applications – M. Rottmayer (Air Force Research Laboratory), R. Singh (Oklahoma State University), and H. Huang (Wright State University)

15:20 Break

15:40 **1676** Origin of Catalytic Activity in MoS2 Nanostructures upon Chemical Transformation – G. Gupta (Los Alamos National Laboratory), D. R. Cummins (Los Alamos National Lab), U. Martinez, A. Mohite (Los Alamos National Laboratory), M. Chhowalla (Rutgers University), and M. K. Sunkara (University of Louisville)

16:00 **1677** Tuning the Composition and Structure of Metallic Nanotubes for Electrocatalysis – A. B. Papandrew, R. W. Atkinson III, S. St. John (University of Tennessee), R. R. Unocic (Oak Ridge National Laboratory), and T. A. Zawodzinski (University of Tennessee, Oak Ridge National Laboratory)

16:20 **1678** The Suppression Effect of 830nm Laser Irradiation on Porous Silicon Formation – C. C. Chiang, Y. C. Huang (National Central University), P. C. Juan (Ming Chi University of Technology), F. S. Lo, and T. H. Lee (National Central University)

16:40 **1679** Aligning Silicon Nanopillar Formed in Electroless HF/H_2O_2 Etching through Pre-Forming Porous Layer – C. C. Chiang, D. Xu, Y. C. Huang (National Central University), P. C. Juan (Ming Chi University of Technology), F. S. Lo, H. Q. Hu, C. L. He, and T. H. Lee (National Central University)

West Hall 1, Phoenix Convention Center

L05 Poster Session – 18:00 – 20:00
Co-Chairs: Ahmet Kusoglu and Takashi Ito

• **1680** Platinum-Based Alloy and Ionic Liquid Composites Dispersed on Carbon Black As a Synergistic Catalyst for Oxygen Reduction Reaction – Q. C. Tran and H. S. Choi (Chungnam National University)

L06 Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 6

Energy Technology / Physical and Analytical Electrochemistry / Sensor

104-B, Phoenix Convention Center

Integrated Approaches for Solar Fuel Generation – 08:15 – 10:00
Co-Chairs: Gregory S. Jackson and Nicolas Gaillard

08:15 **1691** Dye-Sensitized Solar Cell with Electrophoretic Deposited Photocatalytic Carbon Nanotube Counter Electrode: Nanotube Density and Cell Performance – S. Das (Mechanical Engineering Department Iowa State University, Microelectronics Research Center Iowa State University), S. Logsdon, D. Caneff, R. Kinser (Iowa State University), and S. Hu (Mechanical Engineering Department Iowa State University, Microelectronics Research Center Iowa State University)

08:35 **1692** Multicomponent Electrocatalytic Systems for Solar Fuels Generators – F. A. Houle, F. M. Toma (Lawrence Berkeley National Laboratory, Joint Center for Artificial Photosynthesis), D. Friebel (SLAC National Accelerator Laboratory, Joint Center for Artificial Photosynthesis), J. A. Haber (Joint Center for Artificial Photosynthesis-Caltech), I. D. Sharp, and A. T. Bell (Lawrence Berkeley National Laboratory, Joint Center for Artificial Photosynthesis)

09:05 **1693** Efficient Solar-to-Hydrogen Production Materials and Devices – H. Wang (National Renewable Energy Laboratory), J. W. Ager III (Joint Center for Artificial Photosynthesis), N. Gaillard (University of Hawaii), and E. L. Miller (U.S. Department of Energy)

09:35 Break

New Insights into Solar Energy Conversion-Invited Talks – 10:00 – 12:00
Co-Chairs: Nianqiang (Nick) Wu and A. Manivannan

10:00 **1694** Changes in Photoanodes during Solar Water Oxidation, the Wet Part of Artificial Photosynthesis – A. Braun (Empa)

10:30 **1695** Electronic Band Structure and Charge Transfer in Semiconductors – N. Wu and S. K. Cushing (West Virginia University)

11:00 **1696** Emerging Semiconductor Materials for Direct Photoelectochemical Water Splitting – K. Sivula (EPFL)

11:30 **1697** Metal Organic Framework Solar Cells: A New Class of Sensitized Light Harvesting Devices – W. A. Maza and A. J. Morris (Virginia Tech)

Metal Oxide Photocatalysts-Invited Talks – 14:00 – 15:50
Co-Chairs: Nicolas Gaillard and Eric Lars Miller

14:00 **1698** Metal Oxide Nanosurfaces and Hetero-Interfaces for Solar Harvesting Applications – S. Mathur, Y. Gonullu, and T. Fischer (University of Cologne)

14:30 **1699** Hexavalent Chromium Removal in Industrial Relevant Water Matrices Using Metal Oxide Photocatalysts – C. K. Chan (Arizona State University)

15:00 **1700** Rational Design of Semiconductor for Photoelectrochemical Water Splitting – S. H. Wei (National Renewable Energy Laboratory)

15:30 Break

Solar Fuel Generation by Materials Beyond Oxides-III: Invited Talks – 15:50 – 17:20
Co-Chairs: Eric Lars Miller and Nicolas Gaillard

15:50 **1701** Photoelectrochemical Solar Energy Conversion and Electrocatalysis Using Earth-Abundant Nanomaterials – S. Jin (Department of Chemistry, UW-Madison)

16:20 **1702** Wide Bandgap Copper Indium Gallium Disulfide Thin Film Materials for Photoelectrochemical Hydrogen Production – N. Gaillard (University of Hawaii)

16:50 **1703** Extremely Thin Photoelectrode Architectures for Photocatalysis – I. Thomann (Rice University)

Heinz Gerischer Award Address – 17:30 – 18:15
Co-Chair: Enrico Traversa

17:30 Introductory Remarks

17:35 **1704★** (Europe Section Heinz Gerischer Award) A Perspective of Photoelectrochemistry: Past Expectations and Present Realities – A. Heller (The University of Texas at Austin)

M01 Sensors, Actuators, and Microsystems General Session

Sensor

106-C, Phoenix Convention Center

Gas Sensors for Monitoring Vehicle Emission and Other Applications – 08:15 – 12:20
Co-Chairs: Rangachary Mukundan and Gary W. Hunter

08:15 Introductory Remarks

08:20 **1766** Effective Design and Fabrication of Harsh Environment and Biomedical Gas Sensors – P. Dutta (The Ohio State University)

09:00 **1767** Field Trials Testing of a Mixed Potential Electrochemical Hydrogen Safety Sensor at a Commercial Hydrogen Filling Station – E. L. Brosha, C. J. Romero (Los Alamos National Laboratory), D. Poppe, M. Strada (Hydrogen Frontier Inc.), T. L. Williamson, and R. Mukundan (Los Alamos National Laboratory)

09:30 Break

10:00 **1768** Digital Voltage-Current Time Differential Method for Operating Zirconia-Based NOx Gas Sensors – L. Woo, F. Bell, M. Boettcher, J. Chee, J. Fitzpatrick, B. Henderson, L. Sorensen, V. Wang (EmiSense Technologies, a CoorsTek Sensors Company), R. Novak, and J. Visser (Ford Motor Company)

10:30 **1769** Zirconia-Based Electrochemical Oxygen Sensor to Infer Fuel Ethanol Content in Flex Fuel Vehicles – R. E. Soltis, D. Makled, M. McQuillen, and G. Surnilla (Ford Motor Company)

11:00 **1770** Performance Evaluation of Mixed-Potential HC, NO_x and NH_3 Sensors in Diesel and Lean Gasoline Engine Exhaust – C. R. Kreller, E. L. Brosha, R. Mukundan (Los Alamos National Laboratory), V. Prikhodko, J. Pihl, S. Curran, and J. E. Parks II (Oak Ridge National Laboratory)

11:20 **1771** Doped ZnO Nanorod Array for Ultra Low NO_2 Sensing – R. Jain (Center for Clean Energy Engineering, University of Connecticut), V. Manthina (Fraunhofer Center for Energy Innovation), and R. Maric (Center for Clean Energy Engineering, University of Connecticut)

11:40 **1772** CO_2 Gas Sensing Response of YPO_4 Nanobelts Produced By a Colloidal Method – C. R. Michel, A. H. Martinez, and C. D. Rivera-Tello (Universidad de Guadalajara CUCEI Departamento de Fisica)

12:00 **1773** Response Characteristics of a Stable Mixed Potential Ammonia Sensor in Simulated Diesel Exhaust – E. L. Brosha (Los Alamos National Laboratory), J. Pihl (Oak Ridge National Laboratory), C. R. Kreller (Los Alamos National Laboratory), V. Prikhodko, S. Curran, J. E. Parks II (Oak Ridge National Laboratory), and R. Mukundan (Los Alamos National Laboratory)

Biosensors for Health Care and Food Safety Applications – 13:55 – 18:10
Co-Chairs: Nianqiang (Nick) Wu and Leyla Soleymani

13:55 Introductory Remarks

14:00 **1774** Nanomaterials-Based Biosensors for Biomedical and Food Safety Applications – Y. Song, H. Li, C. Zhu, D. Du, and Y. Lin (Washington State University)

14:40 **1775** Electrical/ Electrochemical Impedance Measurement for Biological Applications – L. Yang (North Carolina Central University)

15:10 **1776** Multiplexed DNA Biomarker Detection with Phase Change Nanoparticles – M. Su (Northeastern University)

15:40 Break

16:00 **1777** Highly Selective Detection of Glucose, Cholesterol and Urea with Integrated ZnO Nanorods Field-Effect Transistors Array Biosensors – R. Ahmad, J. H. Park, and Y. B. Hahn (Chonbuk National University)

16:30 **1778** (Invited) Personalized Breath-Based Health Monitors – P. Gouma (SUNY Stony Brook)

17:00 **1779** Developing Fully-Integrated Biosensing Systems on the Laboratory Benchtop – L. Soleymani, C. Gabardo, A. Hosseini, S. Woo, C. Adams-McGavin, A. Kwong, and O. Vanderfleet (McMaster)

17:30 **1780** Graphene Oxide Based Electrochemical Biosensor – A. A. Rodriguez-Silva, O. Movil-Cabrera (Ohio University), and J. A. Staser (Chemical Engineering)

17:50 **1781** Facile Detection of Troponin I Using Dendritic Platinum Nanoparticles and Glass Capillary Tube Indicators – S. Lee, D. Kwon, C. Yim, and S. Jeon (Department of Chemical Engineering, POSTECH)

West Hall 1, Phoenix Convention Center
M01 Poster Session – 18:00 – 20:00 :

- **1782** Sensor Units to Measure Multi-Direction Seebeck Coefficient of Micro-Scale Film – Y. Kim (Sungkyunkwan University, ME), S. W. Kang (Korea Research Institute of Standards and Science), H. U. Kim (SKKU Advanced Institute of Nanotechnology), and T. Kim (Sungkyunkwan University, SAINT & ME, SKKU Advanced Institute of Nanotechnology)
- **1783** A Study on Contamination Control of Oxygen Analyzer By Applying Purifier – J. H. Yun (Samsung Institute of Technology, Samsung Electronics), S. G. Park (Samsung Institute of Technology), Y. H. Lee, C. Y. Lee, J. S. An, and I. S. Cho (Samsung Electronics)
- **1784** In-Situ Characterization of Microfluidic Redox Battery with Dual-Pass Architecture – O. Ibrahim, M. A. Goulet, and E. Kjeang (Simon Fraser University)
- **1785** The High Photo-Sensitivity of Low-Temperature Poly-Silicon Lateral p-I-n Diode Utilizing Reflective Layers – Y. C. Wei Sr., I. C. Lee Sr., and H. C. Cheng Sr. (National Chiao Tung University)
- **1786** Voltammetric Sensing of Endocrine Disruptor (Bisphenol A) Based on a Reduced Graphene Oxide/Carbon Nanotube/Gold Nanoparticles Nanocomposite Modified Screen-Printed Electrode – Y. C. Wang (University of Wisconsin-Madison), D. Cokeliler (Baskent University), and S. Gunasekaran (University of Wisconsin-Madison)
- **1787** Biosensing Application of Electrodeposited Nanoparticles As an Electron Transfer Facilitator for Protein Immobilization – A. Bayandori Moghaddam (College of Engineering, University of Tehran)
- **1788** Fabrication of Low-Invasive Patch Glucose Sensors – J. Li (The University of Tokushima), K. Hiura (Tokushima University), M. Yasuzawa (The University of Tokushima), and Y. Fuchiwaki (Health Research Institute, AIST)
- **1789** Detection of *Salmonella Enterica* Typhimurium in Chicken Meat Using Phage Coated Magnetoelastic Sensors – I. H. Chen (Departmet of Biological Science, Auburn University), S. Horikawa (Materials Research & Education Center, Auburn University, Auburn University), B. A. Chin (Materials Research & Education Center, Auburn University), and J. M. Barbaree (Auburn University, Department of Biological Sciences, Auburn University)
- **1790** Synthesis and Characterization of Nanoporous SnO_2 Thin Film – W. Jiang, S. J. Hao, Y. Z. Zhang (North China University of Science and Technology), and Y. Ling (Tsinghua University)

- **1791** Electrochemical Biosensor for Early Diagnosis of Alpha-1-Antitrypsin Deficiency – B. G. Adams, B. E. Materi, J. Rice, J. Sanders, and C. A. Rice (Tennessee Technological University)
- **1792** Highly Sensitive Detection of Small Molecule Markers By Surface Plasmon Resonance Imaging – Z. H. Al Mubarak, G. Premaratne, C. Rodenbaugh, and S. Krishnan (Oklahoma State University)

M03 Sensors for Agriculture

Sensor

West Hall 1, Phoenix Convention Center

M03 Poster Session – 18:00 – 20:00

- **1824** Pulse Excitation Method for Magnetoelastic Biosensors – H. C. Wikle III, S. Du, S. Horikawa, and B. A. Chin (Auburn University)
- **1825** Exploration of Metal Oxide Catalysts for Direct Urine Fuel Cell and Gas Sensors for Its Condition Monitoring – Y. Chung, H. Park, E. Lee, S. Lee (Auburn University), S. Woo (Yonsei University), Y. Yoon (Gachon University), and D. J. Kim (Auburn University)
- **1826** Optimization of Phage and Surface Blocker Loading for the Magnetoelastic Biosensor – J. Hu (Changzhou University, Materials Research & Education Center, Auburn University), S. Horikawa (Auburn University), F. Wang (Shandong Academy of Agriculture Sciences), Y. Chai (Auburn University), S. Du (Materials Research & Education Center, Auburn University), Y. Liu, B. A. Chin (Auburn University), and J. Hu (Changzhou University)
- **1827** Layer-By-Layer Assembled Carbon Nanotube Immobilized Enzyme Cascade for Sucrose/O_2 Biofuel Cell Utilization – Y. Zhang, M. Arugula, S. Williams, and A. Simonian (Auburn University)
- **1828** The Dynamic Characterization of Electrochemical Proximity Assay with a Multi-Parametric/Multimodal Spectroscopy Apparatus – L. Zhou, M. Arugula, C. J. Easley, C. Shannon, and A. Simonian (Auburn University)
- **1829** Electrochemical Sensing System for Detection of Tricresyl Phosphate (TCP) in Aqueous Solution and Air – A. N. Chanysheva, M. A. Arugula, and A. L. Simonian (Auburn University)
- **1830** Optimization of Nanoporus Anodic Aluminum Sensor-Based Lspr for Methicillin-Resistant *Staphylococcus Aureus* detection – M. K. Park, R. Momna, H. M. Byeon, S. H. Park, J. H. Park, Y. J. Kim, I. Y. Choi, S. W. Kim, and S. W. Kang (Kyungpook National University, Daegu , South Korea)
- **1831** Real-Time Detection of Salmonella on Fresh Apples Using Magnetoelastic Biosensors Operating Under Multi-Harmonic Resonance Modes – S. Du (Materials Research & Education Center, Auburn University), S. Horikawa (Auburn University), J. Hu (Materials Research & Education Center, Auburn University), F. Wang (Shandong Academy of Agriculture Sciences), Y. Liu, and B. A. Chin (Auburn University)
- **1832** Silica-Coated Magnetostrictive Biosensors for Real-Time Detection of *Campylobacter Jejuni* in Washing Water – L. Zhang (Materials Engineering, Auburn University), O. Wang, Z. Y. Cheng, and T. S. Huang (Auburn University)
- **1833** Wireless Sensors and Actuators Based on Magnetostrictive Resonators – K. Zhang (Auburn University, Taiyuan University of Science and Technology), L. Zhang (Materials Engineering, Auburn University), and Z. Y. Cheng (Auburn University)
- **1834** Novel Sensing System for in-Situ Monitoring Soil Water Content – L. Zhang (Materials Engineering, Auburn University) and Z. Y. Cheng (Auburn University)
- **1835** Development of on-Site Applicable Immunosensor Combined with Light Microscopic Imaging System for the Detection of *Salmonella* in Poultry – J. H. Oh (Sangmyung University) and M. K. Park (Kyungpook National University)
- **1836** Enhanced Pathogen Detection on Fresh Produce Using Micron-Scale Magnetoelastic Biosensors – S. Horikawa, Y. Chai, H. C. Wikle III, S. J. Suh, J. M. Barbaree, and B. A. Chin (Auburn University)
- **1837** Multilayer Scanning Coil Detector for Improved Detection of Surface Pathogen Contamination – Y. Liu (Auburn University), S. Du (Materials Research & Education Center, Auburn University), S. Horikawa, H. C. Wikle III (Auburn University), J. Hu (Materials Research & Education Center, Auburn University), F. Wang (Shandong Academy of Agriculture Sciences), and B. A. Chin (Materials Research & Education Center, Auburn University)
- **1838** Rapid and Sensitive Detection of Salmonella Typhimurium on Plastic Food Processing Plates By Using Wireless Biosensors – Y. Liu, S. Horikawa (Auburn University), S. Du (Materials Research & Education Center, Auburn University), Y. Chai (auburn university), J. Hu (Materials Research & Education Center, Auburn University), F. Wang (Shandong Academy of Agriculture Sciences), and B. A. Chin (Auburn University)
- **1839** Detection of Multiple Pathogens on Fresh Produce Using a Surface-Scanning Coil – F. Wang (Shandong Academy of Agriculture Sciences), S. Horikawa, Y. Chai (Auburn University), J. Hu, S. Du (Materials Research & Education Center, Auburn University), Y. Liu, H. C. Wikle III (Auburn University), and B. A. Chin (Materials Research & Education Center, Auburn University)
- **1840** Novel Magnetostrictive Fe-Co-B Thin Film Sensors for Food Safety Detection – Z. Sheng and Z. Y. Cheng (Auburn University)
- **1841** VOC Gas Sensors Fabricated with Graphene Oxide Composites for Food Safety and Quality – H. Park, E. Lee, Y. Chung, S. Lee, and D. J. KIM (Auburn University)
- **1842** ZnO Nanostructures with Different Morphologies and Their Combinatorial Optimization with Graphene Oxide for Gas Sensor Properties – E. Lee (Auburn University)

- **1843** Amperometric Detection of Plant Volatiles Using Metal Oxide Nanoparticles – Y. Fang and R. P. Ramasamy (College of Engineering, University of Georgia)

Z01 General Student Poster Session

All Divisions

West Hall 1, Phoenix Convention Center

Z01 Poster Session – 18:00 – 20:00

- **1844** Theory and Experiments for Generalization of the Scanning Bipolar Cell for Patterning of Diverse Metals – T. M. Braun and D. T. Schwartz (University of Washington)
- **1845** The Studies of Interfacial Property and Water Dynamic Process within Self-Humidifying Confined PFSA-Zeolite Composite Membrane – V. Sim, R. Deng, W. Han, and K. L. Yeung (The Hong Kong University of Science and Technology)
- **1846** Formation of $CuInSe_2$ Printable Solar Cell Using Aqueous Phase Synthesized CuIn Alloy Nanoparticles – H. Takahashi, S. Yokoyama, and K. Tohji (Tohoku University)
- **1847** Understanding the Electrochemical Induction of Urea to Ammonia on Nickel Based Catalyst in Alkaline Medium – F. Lu and G. G. Botte (Department of Chemical and Biomolecular Engineering, Ohio University)
- **1848** Effect of Oxygen Impurity on Nitrogen Radicals in Post-Discharge Flows – Y. Shiba, A. Teramoto, T. Suwa (Tohoku University), K. Watanabe, S. Nishimura (Toshiba Mitsubishi-Electric Industrial Systems Corp.), Y. Shirai, and S. Sugawa (Tohoku University)
- **1849** Functionality Supports Synthesis of Tungsten Carbides for Catalytic Applications By Arc Plasma Deposition Process – J. W. Oh (Korea University), H. Na (Yonsei University), K. H. Kim, S. H. Son (Korea Institute of Industrial Technology), S. Nahm (Korea University), and H. Choi (Korea Institute of Industrial Technology)
- **1850** Manipulation of Nanoscale 3 Dimensional Architecture: Graphitic Carbon/Nickel Core-Shell Structured Nanoparticles Dispersed on Carbon Black Support – H. Na (Yonsei University), J. W. Oh (Korea University), Y. S. Cho (Yonsei University), and H. Choi (Korea Institute of Industrial Technology)
- **1851** Proton-Coupled Electron Transfer in an Electroactive Three Hydrogen Bond Dda Array Capable of Binding an Aad Guest – R. He and D. K. Smith (San Diego State University)
- **1852** Photocatalytic Decomposition of Various Organic Compounds over WO3 Supported Ordered Intermetallic Ptpb Co-Catalyst – T. Gunji, T. Tanabe, S. Kaneko, and F. Matsumoto (Kanagawa University)
- **1853** Development of Mirco-Machine Moving with Glucose and Hydrogen Peroxide – K. Yamazaki, S. Kaneko, T. Tanabe, T. Gunji, and F. Matsumoto (Kanagawa University)
- **1854** Agarose Based Biopolymer Gel Electrolyte for Electrochemical Applications – R. Singh (Sharda University)
- **1855** The Role of Pre Hydrogen Flow in Nucleation of Graphene on Silicon Nitride – S. Park (Samsung Electronics Co., Ltd, Sungkyunkwan University), D. Kang, and Y. Roh (Sungkyunkwan University)
- **1856** Microelectrochemical Property of Precipitates in Al-Mg Alloy – Y. Sakaizawa, I. Muto (Department of Materials Science, Tohoku University), Y. Oya, T. Koyama (UACJ Corporation, Research & Development Division), Y. Sugawara, and N. Hara (Department of Materials Science, Tohoku University)
- **1857** Focused Ion Beam Milling Technique for Plan-View TEM Sampling of DRAM Capacitor – S. Lee (Sungkyunkwan University), J. Kang (Samsung Electronics, Sungkyunkwan University), and C. W. Yang (Sungkyunkwan University)
- **1858** Synthesis and Characterization of $Na_3V_2(PO_4)_2F_3$ Based Cathode Material for Sodium Ion Batteries – R. Väli (Institute of Chemistry, University of Tartu), A. Jänes, and E. Lust (University of Tartu)
- **1859** Chemical Deposition of Vanadium Oxide Electrode for Electrochemical Capacitors – H. Wu and K. Lian (University of Toronto)
- **1860** Formulation of Ionic Liquid Electrolyte to Expand the Voltage Window of Supercapacitors – K. L. Van Aken, M. Beidaghi, and Y. Gogotsi (Drexel University)
- **1861** Reaction Energies for Electrode Surface Atom Insertion into R-H Bonds and Their Dependence on Electrode Potential: Application to Pt(111) – M. Zhao and A. B. Anderson (Case Western Reserve University)
- **1862** Fabrication of Ag-Deposited Silicon Nanoparticles for a Lithium Ion Battery Anode Prepared By Alkaline Immersion Plating – Y. Sugawara and S. Arai (Shinshu University)
- **1863** Fabrication of Copper / Single-Walled Carbon Nanotube Composite Plating Films By Electrodeposition – K. Kirihata (Shinshu Univercity), S. Arai (Shinshu University), M. Uejima, and M. Hirota (ZEON CORPORATION)
- **1864** Fabrication By Electrodeposition of a New Tin Anode Reinforced with Carbon Nanotubes for Lithium Ion Batteries – K. Matsunaga (Faculty of Engineering, Shinshu University) and S. Arai (Shinshu University)
- **1865** Fabrication of a New Tin Anode for a Lithium-Ion Battery Using a Three-Dimensional Copper Nanostructure – M. Munkhbat and S. Arai (Shinshu University)
- **1866** Inter-Particle Aggregation and Breakage in Taylor-Reactor Using CFD – H. K. Lee (School of Mechanical Eng., Seoul National University), D. H. Jeon (Dep. of Mechanical System Eng., Dongguk University), J. P. Hong (Laminar Co., Ltd), and J. H. Song (Secondary Battery Research Team, RIST)
- **1867** Activated Graphene-Derived Porous Carbon with Exceptional Gas Adsorption Properties – A. Ganesan (IISER Thiruvananthapuram, Kerala, INDIA) and M. M. Shaijumon (IISER, Thiruvananthapuram, Kerala, INDIA)

- **1868** Anomalous Mobility Improvement in Ultra-Low-Temperature Polycrystalline-Silicon Thin-Film Transistors on Flexible Substrate after Laser Lift-Off Process – Y. C. Wei Sr., I. C. Lee Sr., and H. C. Cheng Sr. (National Chiao Tung University)
- **1869** A New Nasicon-Structure Phosphor As a Blue Component for White LED – Y. H. Kim and W. B. Im (School of Materials Science and Engineering)
- **1870** Anion Conductive Multiblock Copolymers with Long Side Chains for AEM Fuel Cells – L. Liu, J. M. Ahlfield, and P. A. Kohl (Georgia Institute of Technology)
- **1871** *In Situ* Observation of Electrodeposition of Li on Pt and Ni Substrates in Organic Electrolyte – N. Munemura (Department of Materials Science,Tohoku University), I. Muto, Y. Sugawara, and N. Hara (Department of Materials Science, Tohoku University)
- **1872** The Study of Abnormal Degradation in High-Voltage P-Type Mosfets with N+ Polysilicon Gate during AC Stress – D. Lee (Samsung Electronics Co., Sungkyunkwan University), C. Lee, S. Hur, D. Song (Samsung Electronics Co.), and B. Choi (Sungkyunkwan University)
- **1873** A New Silica-Based Anode Using Three-Dimensional Nanostructured Copper As a Current Collector for Lithium Ion Batteries – R. Ara and S. Arai (Shinshu University)
- **1874** Improved Performance and Stability of Ni-Free Anode Materials for Intermediate Temperature-Solid Oxide Fuel Cells – S. Y. Jo and J. Y. Park (Sejong University)
- **1875** Durability Study of Double Perovskite Cathode Materials for Intermediate Temperature-Solid Oxide Fuel Cells – J. Y. Yang and J. Y. Park (Sejong University)
- **1876** Electrospun Porous Nanorod Perovskite Oxide/Ionic Conductor Composite As an Electrochemical Catalyst for Water Splitting – I. S. So (HMC & Green Energy Research Institute) and J. Y. Park (Sejong University)
- **1877** Electrochemical Oscillations during Reduction of Nitrate and Nitrite Ions at High Overpotential – T. Kuge, Y. Yamada (Tokyo Denki University), S. Nakanishi (Osaka University), and Y. Mukouyama (Tokyo Denki University)
- **1878** Alkali Metal Ions Induced Electrochemical Oscillations in H_2O_2 - H_2so_4 - Pt System – H. Kawasaki, D. Hara, M. Kikuchi, Y. Yamada (Tokyo Denki University), S. Nakanishi (Osaka University), and Y. Mukouyama (Tokyo Denki University)
- **1879** Chaotic Oscillations in H_2O_2 - H_2so_4 - Pt Electrochemical System – D. Hara, H. Kawasaki, M. Kikuchi, Y. Yamada (Tokyo Denki University), S. Nakanishi (Osaka University), and Y. Mukouyama (Tokyo Denki University)
- **1880** Specimen Preparation Method to Dual-Axis TEM Analysis Technique – S. G. Park (Samsung Institute of Technology) and S. Lee (Sungkyunkwan University)
- **1881** Bipolar Membrane Fabrication for Fuel Cells – J. M. Ahlfield, L. Liu, and P. A. Kohl (Georgia Institute of Technology)
- **1882** Surface Functionalized Carbon Nanofiber Supports for Alkaline ORR Catalysts – W. Huang, J. M. Ahlfield, P. A. Kohl (Georgia Institute of Technology), and X. Zhang (East China University of Science and Technology)
- **1883** Approaches to the Molecular Recognition of Lanthanides Using Azulenyl-, Phenyl-, Beta-Naphtyl- and Vinyl-Malonate Derivatives – C. A. Amarandei (Politehnica University of Bucharest), E. Saint-Aman (Université Joseph Fourier - Grenoble), L. Birzan (C. D. Nenitzescu Organic Chemistry Institut Bucharest), and E. M. Ungureanu (Politehnica University of Bucharest)
- **1884** C-Doped TiO_2-B Nanowires Derived from TiC As an Anode Materials for Lithium Ion Batteries with High Rate Performance – S. Goriparti (Istituto Italiano di Tecnologia, Universita Degli Studi di Genova), R. P. Zaccaria (Istituto Italiano Di Technologia), and C. Capiglia (Istituto Italiano di Tecnologia)
- **1885** Synthesis of Lanthanum Telluride Thin Films By Electrodeposition from Ionic Liquids – Y. Snow, T. D. Pounds, S. L. Farias, and R. C. Cammarata (Johns Hopkins University)
- **1886** Effect of Br_2 Complexation on a Hydrogen-Bromine Flow Battery Performance – R. P. Dowd Jr., M. Zeets (University of Kansas), and T. V. Nguyen (UNIVERSITY OF KANSAS)
- **1887** The Effect of Change in Solution Chemistry of Bulk Solution on Crevice Corroson Propagation of Stainless Steel – T. Aoyama, Y. Sugawara, I. Muto, and N. Hara (Department of Materials Science, Tohoku University)
- **1888** Synergistic Effect of Cobalt Nanoparticles Embedded in Nitrogen-Doped Carbon As a Pt Alternative Electrocatalyst for Dye-Sensitized Solar Cells – S. H. Ahn (Hanyang university)
- **1889** Preparation Conditions of Polypyrrole Film on Sulfur-Based Cathode to Prevent Polysulfide Dissolution in Lithium Secondary Batteries – N. Nakamura (Grad School of Adv. Sci. & Eng., Waseda University), T. Yokoshima, H. Nara, T. Momma, and T. Osaka (Faculty of Science and Engineering, Waseda University)
- **1890** Oxygen Evolution Reaction on Zirconium Oxide Film in Alkaline Medium – A. Oishi, K. Matsuzawa, Y. Kohno (Green Hydrogen Research Center, Yokohama Nat. Univ.), A. Ishihara (IAS, Yokohama National University), and S. Mitsushima (Institute of Advanced Sciences, Yokohama Nat. Univ., Green Hydrogen Research Center, Yokohama Nat. Univ.)
- **1891** Effect of Thermal Treatment of Poly(amide imide) Binder on Cycling Performance of Silicon Alloy-Based Anode for Lithium-Ion Battery – S. H. Kim, H. S. Yang, S. H. Yook (Department of Chemical Engineering, Hanyang University), S. K. Kim, C. H. Park (ILJIN Electric), H. Y. Choi (Korea Electrotechnology Research Institute), and D. W. Kim (Department of Chemical Engineering, Hanyang University)

- **1892** Composite Polymer Electrolyte Containing Core-Shell Structured $SiO_2(Li^+)$ Particles for Suppressing Lithium Dendrite Growth and Improving High Temperature Cycling Stability of $LiNi_{0.5}Mn_{1.5}O_4$ – W. K. Shin, S. M. Park, and D. W. Kim (Department of Chemical Engineering, Hanyang University)
- **1893** Relaxation Structure Analysis of Li_xNiO_2 (x=0.09) after Li-Extraction – A. Tamura, S. Takai, T. Yabutsuka (Graduate School of Energy Science, Kyoto University), and T. Yao (Kagawa National College of Technology, Institute of Advanced Energy, Kyoto University)
- **1894** All-Nanosheet Electrochemical Capacitors Assembled By Laminating Redox-Active Nanosheets and Ion-Conductive Nanosheets – S. Uchida, S. Ito, S. Suzuki, and M. Miyayama (School of Engineering, The University of Tokyo)
- **1895** Preparation and Performance Evaluation of $Pt/SnO_2/KB$ As Cathode Catalyst of PEMFC – S. Kitayama, T. Kinumoto, M. Matsuoka, T. Tsumura, and M. Toyoda (Oita University)
- **1896** Preparation of $LaMnO_3$-CNF and Activity for Oxygen Electrode Reaction in KOH Aqueous Solution – K. Ono, T. Kinumoto, T. Tsumura, and M. Toyoda (Oita University)
- **1897** Numerical Simulations of Rechargeable Lithium-Ion Batteries with Porous Positive Electrodes: Local Reaction Rate Distribution – D. Ito, M. Motoyama, and Y. Iriyama (Graduate School of Engineering, Nagoya University, JST-ALCA)
- **1898** Carbon Dioxide Absorption Behavior and Carbonate Ion Transport of Lithium Orthosilicate / Potassium Carbonate Coexistence System Prepared By Ball Milling – K. Kanki, H. Maki, and M. Mizuhata (Kobe University)
- **1899** Single Particle Measurement Technique Using Tweezers-Type Probe for Insertion Materials – Y. Yamada, T. Ohmura, H. Munakata, and K. Kanamura (Tokyo Metropolitan University)
- **1900** Effect of Epitaxial Growth of Gold Nanoparticles on Silicon Substrates on Adhesion of Electrolessly Deposited Metal Films – N. Yamada, H. Atsushiba, S. Sakamoto, N. Fukumuro, and S. Yae (University of Hyogo)
- **1901** Mechanism for Alpha-PbO2 formation on the Cathode of Lead Acid Battery – T. Iwai, T. Yabutsuka, S. Takai (Graduate School of Energy Science, Kyoto University), and T. Yao (Institute of Advanced Energy, Kyoto University, Kagawa National College of Technology)
- **1902** Effect of Nickel Content on the Corrosion Behaviour of Stainless Steel at 80 °C – D. Guo, L. Wu, A. Y. Musa, V. Subramanian (University of Western Ontario), D. Li (CANMET Materials Technology Laboratory), and J. C. Wren (University of Western Ontario)
- **1903** Carbon Nanomaterials Doped with Sulfur for ORR in Alkaline Media – E. Montiel-Macias (Instituto Tecnologico de Cancun), P. B. Balbuena (Texas A&M University), R. Gauvin (McGill University), G. Rosado, and Y. Verde Gomez (Instituto Tecnologico de Cancun)
- **1904** Studies of Electrode/Electrolyte Interfaces – D. Parr IV, J. Chrestenson, K. Malik, and L. M. Haverhals (Bradley University)
- **1905** Studies of Mass Transport in Semiconducting Thin Film Electrodes – D. Parr IV, C. Meunier, E. Roberts, E. E. Remsen, and L. M. Haverhals (Bradley University)
- **1906** Novel Potentiometric Sensors Based on Nanostructured TiO2 Electrodes for Selective Determination of Biologically Relevant Transition Metals – M. Hariri and S. Morin (York University)
- **1907** Investigation of Effect of Zinc on Alloy 600 Passive Layers Formed in High Temperature Primary Water – Y. Jiang and T. Devine (University of California Berkeley)
- **1908** Biomolecule Detection Using a Resonant Capacitive Sensor – D. Bane, G. Subramanyam, and K. M. Hansen (University of Dayton)
- **1909** XPS and FTIR Studies of Dual Target Sputtered Bcn Thin Films – A. Prakash and K. B. Sundaram (University of Central Florida)
- **1910** Irrigation System Using Photovoltaics and Lithium Ion Batteries for Energy Storage – E. N. Moss Jr. (Department of Electrical and Computer Engineering), C. Oladimeji (FAMU-FSU College of Engineering, Department of Electrical and Computer Engineering), P. L. Moss (Florida A&M University - Florida State University), and M. H. Weatherspoon (Department of Electrical and Computer Engineering)
- **1911** Carbon Coated MoO2 Deposited through an Economical Polymer-Assited Solution Method on Nickel Foam As Anodes for Lithium-Ion Batteries – B. Patterson and H. Luo (New Mexico State University)
- **1912** Nanogaps Fabricated from Electrodeposited Fe-Ni-Co Nanowires – X. Geng and E. J. Podlaha (Northeastern University)
- **1913** Engineering Optical Properties of Nanorods Fabricated By Physical Vapor Deposition – M. A. Uddin (Department of Mechanical Engineering, University of Connecticut) and U. Pasaogullari (Center for Clean Energy Engineering, University of Connecticut)
- **1914** Cyclic Voltammetric Analysis of 1-Methyl-4-Nitroimidazole Under Biological Conditions – A. D. Nguyen, G. M. Darzi, and D. K. Smith (San Diego State University)
- **1915** 3D Architected Si-Cu Core-Shell Nanolattices As Mechanically Robust, Binder-Free Li-Ion Battery Electrodes – X. Xia (California Institute of Technology), X. W. Gu (University of California, Berkeley), and J. R. Greer (California Institute of Technology)
- **1916** Analysis of a Four H-Bond Array Using Cyclic Voltammetry: Introducing a New Redox Center to Strengthen Dimerization – B. T. Tamashiro and D. K. Smith (San Diego State University)
- **1917** Evaluation of Dynamic Hydrophobicity of Nanoporous Silicon Surfaces Prepared By Metal-Assisted Chemical Etching – K. Machida (Graduate School of Engineering, Kogakuin University), H. Asoh, N. Yoshida, T. Okura, and S. Ono (Department of Applied Chemistry, Kogakuin University)

- **1918** Electrochemical Properties of Transition Metal-Doped LiCoPO4 Synthesized By Hydrothermal Method – Y. Noda, Y. Yamada, S. Miyamoto, H. Munakata (Tokyo Metropolitan University), K. Ohira, S. Yoshida, D. Shibata (DENSO CORPORATION), and K. Kanamura (Tokyo Metropolitan University)
- **1919** Proton-Coupled Electron Transfer in an Electroactive Three Hydrogen Bond Dda Array Capable of Binding an Aad Guest – R. He and D. K. Smith (San Diego State University)
- **1920** Effect of Etchant Composition on Surface Morphology of GaAs during Anisotropic Chemical Etching – H. Asoh, S. Ono (Department of Applied Chemistry, Kogakuin University), and D. Ito (Graduate School of Engineering, Kogakuin University,)
- **1921** Opaque White Anodic Oxide Film Formed on Aluminum – A. Kurihara (Graduate School of Engineering, Kogakuin University.), H. Asoh, and S. Ono (Department of Applied Chemistry, Kogakuin University)
- **1922** The Effect of the Angle of Incident of the Light upon the Optical Reflactance on Silicon Nanowires Grown By Electroless Etching – V. H. Velez, R. G. Mertens, and K. B. Sundaram (University of Central Florida)
- **1923** Studies on the Effects of Angle of Incidence on the Optical Reflecftance Properties of Silicon Nanowires Grown By Electroless Etching – V. H. Velez, R. G. Mertens, and K. B. Sundaram (University of Central Florida)
- **1924** Electrochemical Synthezis of Co-Rh Alloys – K. Mech, P. Zabinski, R. Kowalik, and M. Wojnicki (AGH University of Science and Technology)

Z04 Electrochemical Energy Summit (E2S)

All Divisions

101-C, Phoenix Convention Center

Electrochemical Energy Summit Session 4 - EFRC Talks – 08:00 – 10:10
Co-Chair: Esther S. Takeuchi

08:00 **1956** The Center for Electrochemical Energy Science (CEES): An Overview – P. Fenter (Argonne National Laboratory)

08:40 **1957** Center for Mesoscale Transport Properties: Probing the Limits of Electron and Ion Transport over Multiple Length Scales – A. C. Marschilok (Stony Brook University)

09:10 **1958** Surface Reaction, Solvent Inhomogeneity, and Ion Transport in Electric Double Layers: Predictions from a Classical Density Functional Theory – C. Lian and J. Wu (University of California, Riverside)

09:30 **1959** Advancing Operando Tools to Probe Multiscale Complexity in Chemical Energy Storage – K. W. Chapman (NECCES at Argonne National Laboratory), C. P. Grey (NECCES at University of Cambridge), P. J. Chupas (NECCES at Argonne National Laboratory), P. Batson, F. Cosandey (NECCES at Rutgers University), J. Cabana (NECCES at University of Illinois at Chicago), S. Meng (NECCES at University of California, San Diego), and G. Zhou (NECCES at University of Binghamton)

09:50 **1960** A Single Material Battery – C. Wang (University of Maryland College Park) and F. Han (University of Maryland, College Park)

Electrochemical Energy Summit Session 5 - EFRC Talks – 10:30 – 12:20
Co-Chairs: David J. Wesolowski

10:30 **1961** Structures, Devices, and Architectures for Nanoscale Solutions in Electrical Energy Storage – G. W. Rubloff and S. B. Lee (Nanostructures for Electrical Energy Storage (NEES))

11:10 **1962** Electrochemical Stiffness in Anodes and Cathodes for Lithium Ion Batteries – A. A. Gewirth (University of Illinois at Urbana-Champaign), H. Tavassol (University of Illinois), E. M. C. Jones (University of Illinois at Urbana-Champaign), J. Esbenshade (University of Illinois, Urbana-Champaign), and N. R. Sottos (University of Illinois at Urbana-Champaign)

11:40 **1963** Atomic Force Microscopy Applications for Energy Storage: Detecting the Structure and Dynamics of Fluid/Electrode Interfaces – J. Come, J. Black, S. V. Kalinin, and N. Balke (Oak Ridge National Laboratory)

12:00 **1964** Understanding the Layered Oxides for High-Voltage Intercalation in Alkaline Ion Batteries – S. Meng (University of California San Diego)

Electrochemical Energy Summit Session 6 - EFRC Talks – 14:00 – 15:50
Co-Chair: Paul Fenter

14:00 **1965** Northeast Center for Chemical Energy Storage (NECCES) – M. S. Whittingham (Binghamton University)

14:40 **1966** The Evolution of a High Capacity Electrode – Y. Wang and C. F. Sun (University of Maryland)

15:10 **1967** Ionic Liquid Structure and Dynamics at Charged Graphene Interface – A. Uysal (Argonne National Laboratory)

15:30 **1968** The Role of Ultrathin Coatings on the Interfacial Reactions at $LiMn_2O_4$ Surfaces – J. W. Elam, K. Amine, M. M. Thackeray (Argonne National Laboratory), L. Curtiss (Materials Science Division, Argonne National Laboratory), M. C. Hersam, V. Dravid, C. Wolverton (Northwestern University), and A. A. Gewirth (University of Illinois at Urbana-Champaign)

Wednesday, October 14

Highlights

0800h..... Electrochemical Energy Summit – Sessions Begin, 101-C, Phoenix Convention Center
0800h..... ECS Battery Division Technology Award Lecture, 105-B, Phoenix Convention Center
0900h..... Technical Exhibit opens, West Hall 1, Phoenix Convention Center
0930h..... Technical Session Coffee Break, West Hall 1, Phoenix Convention Center
1400h..... ECS Electrodeposition Division Research Award Lecture, 103-A, Phoenix Convention Center
1800h..... Technical Exhibit & General & Student Poster Session, West Hall 1, Phoenix Convention Center

A01 Joint General Session: Batteries and Energy Storage -and- Fuel Cells, Electrolytes, and Energy Conversion

Battery / Energy Technology
106-A, Phoenix Convention Center

Flow Batteries I – 08:00 – 12:00
Co-Chairs: Matthew M. Mench and Wei Wang

08:00 **93** Towards High Performance Non-Aqueous Flow Cells – J. D. Milshtein (Massachusetts Institute of Technology), R. M. Darling (United Technologies Research Center), and F. R. Brushett (Massachusetts Institute of Technology)

08:20 **94** Next-Generation Redox Flow Battery Technologies – W. Wang, T. Liu, and V. Sprenkle (Pacific Northwest National Laboratory)

08:40 **95** Neutron Radiography Applied to All-Vanadium Redox Flow Batteries for Side Reaction Detection – J. T. Clement, D. Aaron (University of Tennessee), D. S. Hussey, D. L. Jacobson (NIST), and M. M. Mench (University of Tennessee)

09:00 **96** Influence of Convection and Material Properties in Vanadium Redox Flow Batteries – J. Houser, M. M. Mench (University of Tennessee), A. Pezeshki (Oak Ridge National Laboratory, University of Tennessee), J. T. Clement, and D. Aaron (University of Tennessee)

09:20 **97** Comprehensive Impedance Analysis of Carbon Electrode Materials in Vanadium Redox Flow Batteries – A. Pezeshki, D. Aaron (University of Tennessee), Z. Tang, T. A. Zawodzinski (University of Tennessee, Knoxville, TN), and M. M. Mench (University of Tennessee)

09:40 Break

10:00 **98** Investigation of Reaction Distribution in Carbon Electrodes in Vanadium Redox Flow Batteries with an Interdigitated Flow Field – S. Tsushima (Osaka University, JST-PRESTO), Y. Matsui, and T. Suzuki (Osaka University)

10:20 **99** Microporous Polymer Membranes Tailored for Redox Flow Batteries – B. A. Helms, C. Li, A. Ward (The Molecular Foundry), S. E. Doris (Department of Chemistry, Univ. of California, Berkeley), T. Pascal, and D. Prendergast (Lawrence Berkeley National Laboratory)

10:40 **100** Hydrogen-Bromine RFB :Electrochemical Measurements and Cell Performance of a 40cm² H/Br-RFB System – M. Küttinger (Fraunhofer Institute for Chemical Technology), J. Noack (Fraunhofer ICT), R. Elazari, R. Costi (Electrochemistry Lab , R&D, ICL-IP), and J. Tübke (Fraunhofer Institute for Chemical Technology ICT)

11:00 **101** Fundamental Studies of Iron Redox Flow Battery Electrochemistry in a Deep Eutectic Solvent – M. A. Miller, J. S. Wainright (Case Western Reserve University, Cleveland, Ohio, USA), L. T. Thompson (University of Michigan), and R. F. Savinell (Case Western Reserve University, Cleveland, Ohio, USA)

11:20 **102** Rota-Hull Cell Study on Pulse Charging of Zinc/Air Redox Flow Batteries – C. Zelger (Graz University of Technology, CEST GmbH), J. Laumen, and B. Gollas (Graz University of Technology)

11:40 **103** An Electrochemical Analogy to the Fuel Injector: The Electrochemical Direct Injection Reactor – G. Davies (MAE/ACEE Princeton University), A. Hsieh, and D. A. Steingart (Princeton University)

106-B, Phoenix Convention Center
Batteries: Systems II – 08:00 – 12:00
Co-Chairs: Daniel A. Steingart and Bor Yann Liaw

08:00 **83★** (Battery Division Technology Award) Lead-Carbon Ultracapacitors: How, Why and Where is the Technology – A. K. Shukla (Indian Institute of Science)

08:40 **84** In Operando Electrochemical-Acoustic Time-of-Flight Analysis: Correlating Physical Dynamics within Batteries to States of Charge and Health – A. Hsieh, S. Bhadra (Princeton University), B. J. Hertzberg (MAE/ACEE Princeton University), P. J. Gjeltema, and D. A. Steingart (Princeton University)

09:00 **85** Investigating Failure of Li-Ion Batteries Using in Operando Electrochemical-Acoustic Time-of-Flight Analysis – A. Hsieh, S. Bhadra, P. J. Gjeltema, and D. A. Steingart (Princeton University)

09:20 **86** Interrogation of Alkaline AA Batteries Using *in Operando* Electrochemical ¬ Acoustic Time-of-Flight Analysis and *in Operando* energy Dispersive X-Ray Diffraction – S. Bhadra, D. A. Steingart (Princeton University), B. J. Hertzberg (MAE/ACEE Princeton University), A. Hsieh, and P. J. Gjeltema (Princeton University)

09:40 **87** In-Situ Visualization of Li-Ion Secondary Battery Using Soft X-Ray Microscopy – S. Uemura, S. Tanaka, T. Sasabe (Tokyo Institute of Technology), Y. Tabuchi, T. Aoki (Nissan Motor CO., LTD.), H. Miyakubo, J. Kurihara (Automotive Energy Supply Corporation), and S. Hirai (Tokyo Institute of Technology)

10:00 Break

10:20 **88** Current Response at Grain and Grain Boundaries in $LiFePO_4$ Thin Films By Nano-Scanning Electrochemical Cell Microscopy – A. Kumatani (AIMR, Tohoku University), Y. Takahashi (AIMR, Tohoku University, Grad. School of Environmental Studies, Tohoku University), H. Inomata, T. Watanabe (Grad. School of Environmental Studies, Tohoku University), K. Yamamoto, M. Haruta, S. Shiraki (AIMR, Tohoku University), H. Shiku (Grad. School of Environmental Studies, Tohoku University), T. Hitosugi (AIMR, Tohoku University), and T. Matsue (AIMR, Tohoku University, Grad. School of Environmental Studies, Tohoku University)

10:40 **89** First Observation of the Pore Dynamics in Ordered Mesoporous Electrode Materials By *in Operando* Small Angle X-Ray Scattering – G. O. Park, J. Yoon (Department of Energy Science, Sungkyunkwan University), E. Park (Hanyang University), Y. Kim, H. Kim (Department of Energy Science, Sungkyunkwan University), H. Kim (Hanyang University), W. S. Yoon (Department of Energy Science, Sungkyunkwan University), and J. M. Kim (Department of Chemistry, Sungkyunkwan University)

11:00 **90** Quantitative *In Operando* Spectroscopic Measurements of Species Concentrations in a Sodium-Halide Cell – J. L. Wheeler and J. M. Porter (Colorado School of Mines)

11:20 **91** Simultaneous Neutron and x-Ray Tomography for Advanced Battery Research – J. M. LaManna, D. S. Hussey, D. L. Jacobson, and E. Baltic (NIST)

11:40 **92** Advances in HE3DA® Thick Electrode Technology Platform for Energy Storage-Performance and Safety Testing – J. Prochazka, R. Stary, J. Pavlik (HE3DA s.r.o.), and M. Zukalova (J. Heyrovsky Institute of Physical Chemistry)

Batteries: Anodes – 14:00 – 16:00
Co-Chairs: Bor Yann Liaw and M. Stanley Whittingham

14:00 **105** Lithium Ion Dynamics in Amorphous Li-Si Electrochemically Prepared from Semiconductor Grade, Monocrystalline Silicon - an NMR Study about Local Structures and Li+ Self-Diffusivity – A. Dunst, M. Sternad, V. Epp, and M. Wilkening (CD-Laboratory for Li Ion Batteries, TU-Graz)

14:20 **106** Bulk Silicon/Graphite Alloy Anode Material for High Energy Density Li-Ion Batteries – M. Lee, P. Feng, V. Mahajan (XALT Energy, LLC), K. Dahlberg (Energy Power Systems, LLC), L. David, and F. Albano (XALT Energy, LLC)

14:40 **107** Nano Silicon (Si_{NP}) Based Carbon Composite: Flexible Anode System in Lithium Ion Batteries – B. Gattu (Dept of Chemical Engineering, University of Pittsburgh), P. P. Patel (Department of Chemical and Petroleum Engineering), P. Jampani (Dept. of Bioengineering, Univ. of Pittsburgh), M. K. Datta (Department of Bioengineering, University of Pittsburgh), and P. N. Kumta (University of Pittsburgh, Pittsburgh, PA 15261)

15:00 **108** Carbon-Coated Mesoporous SiO_x Using an Oil Templating As a High Capacity Anode Material for Lithium-Ion Battery – E. Park (Hanyang University), J. Lee (Korea Electronics Technology Institute), D. S. Kim (Hanyang University), G. Jeong, M. S. Park, Y. J. Kim (Korea Electronics Technology Institute), and H. Kim (Hanyang University)

15:20 **109** A Design of Spherical Skein-like Si/C Composite Structure for Large-Volume-Change Lithium Battery Anodes – S. Jeon (Samsung Electronics), M. J. Park (Samsung Fine Chemicals), M. Kim (Samsung Electronics), T. Yu (Samsung Fine Chemicals), and S. G. Doo (Samsung Electronics)

15:40 **110** Electrochemical Preparation of CNTs-Coated Cu Substrate for Si-O-C Composite Deposition and Characteristics of Si-O-C/CNTs/Cu As an Anode of Li Secondary Batteries – S. Ahn (Graduate School of Advanced Science and Engineering, Waseda University), M. Jeong (Research Organization for Nano and Life Innovation, Waseda University), H. Nara, T. Yokoshima (Faculty of Science and Engineering, Waseda University), T. Momma (Faculty of Science and Engineering, Waseda University, Waseda University), and T. Osaka (Faculty of Science and Engineering, Waseda University)

106-A, Phoenix Convention Center
Flow Batteries II – 14:00 – 18:00
Co-Chairs: Robert F. Savinell and Donghai Wang

14:00 **111** High Surface Area Multi-Wall Carbon Nanotube Electrodes for H_2-Br_2 fuel Cells – V. Yarlagadda (The University of Kansas) and T. V. Nguyen (UNIVERSITY OF KANSAS)

14:20 **112** Characterization of Carbon Black Particles for Use in Aqueous Slurry Electrodes – N. C. Hoyt, E. Agar, E. A. Nagelli, R. F. Savinell, and J. S. Wainright (Case Western Reserve University)

14:40 **113** Techno-Economic Materials-Selection Criteria for Non-Aqueous Flow-Battery Chemistries – K. C. Smith and R. D. Dmello (University of Illinois at Urbana-Champaign)

15:00 **114** Dilithium Benzenediacrylate As Organic Electrode Material: Life, Death and Rise of the Lithium Phoenix – S. Renault (Department of Chemistry - Ångström Laboratory, Uppsala), A. Oltean (Department of Chemistry- Ångström Laboratory, Uppsala), and D. Brandell (Department of Chemistry - Ångström Laboratory, Uppsala)

15:20 **115** Manganese-Based Redox Flow Batteries for Grid Energy Storage – C. R. Swartz, S. M. Lipka, K. F. Long (University of Kentucky), and T. Kodenkandath (ITN Energy Systems)

15:40 **116** Solid Particle Flow Battery Design and Characterization – G. Koenig and Z. Qi (University of Virginia)

16:00 Break

16:20 **117** A Novel Ambipolar Nonaqueous All-Organic Redox Flow Battery and Its State of Charge Detection By FTIR – R. S. Vemuri, D. Hu, W. Duan, W. Wang (Pacific Northwest National Laboratory), F. R. Brushett (Massachusetts Institute of Technology), X. Wei, and J. Liu (Pacific Northwest National Laboratory)

16:40 **118** Precision Engineering of Co-Laminar Flow Cells for Electrochemical Energy Conversion – M. A. Goulet and E. Kjeang (Simon Fraser University)

17:00 **119** Cost-Effective All-Copper Flow Battery Using Flowable Slurry Electrode for Large-Scale Energy Storage – E. Agar, E. A. Nagelli, N. S. Sinclair, N. C. Hoyt, E. A. Stricker, R. F. Savinell, and J. S. Wainright (Case Western Reserve University)

17:20 **120** A Novel Titanium/Manganese Redox Flow Battery – Y. R. Dong, H. Kaku, K. Hanafusa, K. Moriuchi, and T. Shigematsu (Power System R & D Center, Sumitomo Electric Industries, Ltd.)

17:40 **121** Feasibility of All-Copper Hybrid Redox Flow Battery for Large Scale Energy Storage – E. A. Stricker (Case Western Reserve University), R. F. Savinell, and J. S. Wainright (Case Western Reserve University, Cleveland, Ohio, USA)

106-B, Phoenix Convention Center

Batteries: System III – 16:00 – 17:20
Co-Chair: Bor Yann Liaw

16:00 **41** Non-Destructive High-Resolution Conductivity Mapping of Thin-Film Battery Electrodes – A. A. Riet, J. S. Sedgewick, J. E. Vogel, D. Clement, A. D. Cutler, B. A. Mazzeo, and D. R. Wheeler (Brigham Young University)

16:20 **42** Low - voltage FIB/SEM Tomography for 3D Microstructure Evolution of $LiFePO_4$/C Electrode – R. Scipioni, P. S. Jørgensen, D. T. Ngo, S. B. Simonsen (Technical University of Denmark), J. Hjelm (DTU Energy, Technical University of Denmark), P. Norby, and S. H. Jensen (Technical University of Denmark)

16:40 **43** Characterisation of 3-D Microstructural Evolution within Electrode Materials during Lithium-Ion Battery Operation – O. O. Taiwo (University College London), J. M. Paz-García (Lund University), R. Mokso (Paul Scherrer Institut, Villigen), D. Eastwood, P. Lee (Research Complex at Harwell), D. J. Brett (University College London), S. Hall (Lund University), and P. R. Shearing (University College London)

17:00 **44** Metal Halides in Li-Ion Batteries – C. A. Bridges (Oak Ridge National Laboratory), J. M. Powell (University of Tennessee), G. M. Veith, A. Banerjee, S. E. Nagler, and S. Dai (Oak Ridge National Laboratory)

A02 Batteries - Theory, Modeling, and Simulation

Battery

101-B, Phoenix Convention Center

Modeing of Electrochemisty and Interfaces I – 08:00 – 12:00
Co-Chairs: Kisuk Kang and Gyeong S. Hwang

08:00 **175** (Invited) Computational Design of Electrolytes for Lithium-Ion Batteries – S. P. Ong, Z. Deng, B. Radhakrishnan (University of California, San Diego), L. Cheng (Argonne National Lab), X. Qu (Joint Center for Energy Storage Research (JCESR)), R. Assary (Materials Science Division, Argonne National Laboratory), A. Jain (Lawrence Berkeley National Laboratory), N. N. Rajput (Joint Center for Energy Storage Research), K. A. Persson (Joint Center for Energy Storage Research (JCESR)), and L. Curtiss (Materials Science Division, Argonne National Laboratory)

08:40 **176** Modeling the Mechanical and Electrochemical Response of All-Solid-State Lithium-Ion Batteries – G. Bucci, T. Swamy, X. Chen, Y. M. Chiang, and W. C. Carter (Massachusetts Institute of Technology)

09:00 **177** Electrolyte Properties of $Li_4P_2S_6$ -- Simulations and Comparison with Experiment – N. A. W. Holzwarth (Wake Forest University), Z. D. Hood, and M. J. Kirkham (Oak Ridge National Laboratory)

09:20 **178** Theory and Simulation of Space Charge Layers in All Solid State Batteries – A. Latz (Helmholtz Institute Ulm (HIU), German Aerospace Center (DLR)), C. Yada (Toyota Motor Corporation), and S. Braun (German Aerospace center (DLR), Germany, Helmholtz Institute Ulm)

09:40 Break

10:00 **179** (Invited) Applications of the Reaxff Force Field for Identifying Reactive Properties for Complex Battery Materials and Interfaces – A. C. T. van Duin, M. M. Islam, A. Ostadhossein (Penn State), M. Raju (Penn State, Stanford), S. Zhang (Penn State), E. Kaxiras (Harvard), and O. Borodin (US Army Research Laboratory)

10:40 **180** Simulating an Applied Voltage in Molecular Dynamics Using Charge Optimized Many Body (COMB3) Potentials – A. C. Antony (University of Florida), S. A. Akhade (The Pennsylvania State University), T. Liang (University of Florida), M. J. Janik, J. K. Maranas (The Pennsylvania State University), and S. B. Sinnott (University of Florida)

11:00 **181** Dielectric Properties of Ethylene Carbonate and Propylene Carbonate Using Molecular Dynamics Simulations – M. Chaudhari (Sandia National Laboratories), X. You (Tulane University), S. Rempe (Sandia National Laboratories), and L. R. Pratt (Tulane University)

11:20 **182** Effective Diffusivity of Electrolyte in Porous Structure Using a Three-Dimensional Random Pore Network Model – S. Ahamad (IIT Delhi) and A. Gupta (Indian Institute of Technology Delhi)

11:40 **183** First-Principles Study of Li-Ion Diffusion Mechanism in Highly Concentrated Li-Salt Electrolye – K. Sodeyama (Kyoto University, National Institute for Materials Science (NIMS)), Y. Yamada (The University of Tokyo, Kyoto University), A. Yamada (The University of Tokyo, ESICB, Kyoto University), and Y. Tateyama (National Institute for Materials Science (NIMS), Kyoto University)

Modeing of Electrochemisty and Interfaces II – 14:00 – 17:40
Co-Chairs: Perla B. Balbuena and Oleg Borodin

14:00 **184** (Invited) Predicting the Properties of Interfaces Between Electrolytes and Electrodes: Condensed Matter Physics Meets Electrochemistry – G. Galli (University of Chicago)

14:40 **185** (Invited) Bias Potential Controlled First-Principles Calculations in Batteries and Energy Storage Devices – M. Otani (AIST)

15:20 **186** (Invited) Computational Insight and Design of Cathode Materials and Electrolytes for Li-O2 Batteries – L. Curtiss (Materials Science Division, Argonne National Laboratory), K. C. Lau (Argonne National Laboratory), R. Assary (Materials Science Division, Argonne National Laboratory), M. Welland, L. Liang, P. Redfern, and D. Wolf (Argonne National Laboratory)

16:00 Break

16:20 **187** (Invited) Density Functional Theory Modeling of Coupled Mechanical/Electrochemical Interfacial Processes during Li-Insertion into Silicon Anode – K. Leung (Sandia National Laboratories), F. Soto, and P. B. Balbuena (Texas A&M University)

17:00 **188** Compare the Electronic Insulating Abilities of Inorganic Components in Solid Electrolyte Interphase (SEI): A First Principles Study – Y. Lin and Y. Qi (Michigan State University)

17:20 **189** First-Principles Based Modeling of Li-Metal/Solid-Electrolyte Interfaces in Application to Li-Batteries – T. Cheng, B. V. Merinov (California Institute of Technology), B. Kozinsky (Robert Bosch Research and Technology Center), and W. A. Goddard III (California Institute of Technology)

A03 Batteries Beyond Lithium-Ion

Battery / Energy Technology
102-C, Phoenix Convention Center

Magnesium and Mg-Ion Batteries – 08:00 – 12:40
Co-Chairs: Daniel A. Steingart, Venkataraman Thangadurai, Yangchuan Xing, and Vito Di Noto

08:00 **301** A Study of Mg Intercalation Mechanism of a Prospective Mg Full Cell Design – N. Sa (Argonne National Lab), A. K. Burrell (Joint Center for Energy Storage Research (JCESR)), T. L. Kinnibrugh, H. Wang (Argonne National Laboratory), B. Key (Joint Center for Energy Storage Research), K. W. Chapman (NECCES at Argonne National Laboratory), J. T. Vaughey, D. L. Proffit (Argonne National Laboratory), P. J. Chupas (NECCES at Argonne National Laboratory), and T. Fister (Argonne National Laboratory)

08:20 **302** Charge-Discharge Performance of Rechargeable Organic-Magnesium Batteries Using Glyme-Based Electrolytes – H. Senoh (AIST, University of Yamanashi), H. Sakaebe (AIST), H. Tokiwa, M. Uchida (University of Yamanashi), H. Sano, M. Yao (AIST), and T. Kiyobayashi (AIST, University of Yamanashi)

08:40 **303** Discharge and Recharge Characteristics in an Mg/O_2 Battery with a Mixed-Phase Discharge Product – G. Vardar, A. Sleightholme, D. J. Siegel, and C. W. Monroe (University of Michigan)

09:00 **304** Electrolyte Solutions for Magnesium Rechageable Batteries – T. Abe, A. Inoo, K. Miyazaki, and T. Fukutsuka (Graduate School of Engineering, Kyoto University)

09:20 Break

09:40 **305** High Capacity Magnesium Metal Rechargeable Battery Enabled By Dual Ion Chemistry – T. Gao (University of Maryland, College Park), M. Noked (University of Maryland), L. Suo, F. Han, Y. Zhu, C. Luo (University of Maryland, College Park), K. Xu (Battery Material Research Center), and C. Wang (University of Maryland College Park)

10:00 **306** Highly Stable and Phenoxide/Alkoxide-Based All Magnesium Electrolytes for Rechargeable Magnesium-Ion Batteries – B. Pan (Argonne National Laboratory, Joint Center for Energy Storage Research (JCESR)), A. K. Burrell (Joint Center for Energy Storage Research (JCESR)), Z. Zhang (Argonne National Laboratory), and C. Liao (Joint Center for Energy Storage Research (JCESR))

10:20 **307** Novel Mg Electrolytes for Rechargeable Mg Batteries Based on $[Mg_2(\hat{I}¼\text{-}Cl)_2]^{2+}$ Cation – G. Li, Y. Cheng, R. M. Stolley, K. Han, Y. Shao, J. Liu, and V. Sprenkle (Pacific Northwest National Laboratory)

10:40 **308** Origins of Nonideal Coulombic Efficiency in Magnesium Electrodeposition and Electrodissolution – K. R. Zavadil and N. T. Hahn (Joint Center for Energy Storage Research)

11:00 Break

11:20 **309** Enabling Rechargeable Magnesium Batteries through Bottom up Design Strategies – R. Mohtadi, O. Tutusaus, T. S. Arthur, and F. Mizuno (Toyota Research Institute of North America)

11:40 **310** The Electrochemical Behavior of Magnesium Metal Negative Electrode in Rechargeable Hybrid-Ion Cells – T. Koketsu and P. Strasser (Technical University Berlin)

12:00 **311** The $Mg\text{-}V_2O_5$ Intercalation Phase Diagram First Principles – G. S. Gautam, P. Canepa, A. Abdellahi, A. Urban, R. Malik, and G. Ceder (Massachusetts Institute of Technology)

12:20 **312** Understanding the Initial Stages of Reversible Mg Deposition and Stripping in Non-Aqueous Electrolytes – P. Canepa, G. S. Gautam, R. Malik, Z. Rong (Massachusetts Institute of Technology), K. R. Zavadil (Joint Center for Energy Storage Research), K. A. Persson (Lawrence Berkeley National Laboratory), S. Jayaraman, and G. Ceder (Massachusetts Institute of Technology)

Multivalent Ion Systems – 14:00 – 16:20
Co-Chair: Benjamin Joseph Hertzberg

14:00 **313** First-Principles Molecular Dynamics Simulation on Glyme-Based Electrolyte – T. Ohwaki (Device-functional analysis Department, NISSAN ARC, Ltd.), K. Kamiguchi, K. Kubobuchi (Device-functional analysis Department, NISSAN ARC Ltd.), C. Yogi (Device-functional analysis Department, NISSAN ARC, Ltd.), T. Ikeshoji (AIST), T. Ozaki (ISSP, the University of Tokyo), M. Otani (AIST), and H. Imai (Device-functional analysis Department, NISSAN ARC Ltd.)

14:20 **314** Multivalent Ion Storage Mechanism New Strategy for Storing Enormous Energy at a Fast Rate – C. Xu (Tsinghua University) and P. Shi (Zhejiang SCI-TECH University)

14:40 **315** Materials Design Rules for Multi-Valent Ion Mobility in Intercalation Structures – Z. Rong, R. Malik, P. Canepa, G. S. Gautam (Massachusetts Institute of Technology), M. Liu, A. Jain, K. A. Persson (Lawrence Berkeley National Laboratory), and G. Ceder (Massachusetts Institute of Technology)

15:00 **316** Thianthrene-Functionalized Polymers As High-Voltage Materials for Organic Cathode-Based Dual-Ion Batteries – M. Kolek (MEET Battery Research Center, University of Muenster), M. E. Speer (Institut für Organische Chemie, Universität Freiburg, Kekulé-Institut für Organische Chemie, Universität Bonn), J. J. Jassoy (Institut für Physikalische Chemie,Universität Bonn, Institut für Organische Chemie, Universität Freiburg), J. Heine, M. Winter, P. Bieker (MEET Battery Research Center, University of Muenster), and B. Esser (Institut für Organische Chemie, Universität Freiburg, Kekulé-Institut für Organische Chemie, Universität Bonn)

15:20 Break

15:40 **317** Novel Organic Positive Electrode Materials for a New Generation of Greener Batteries : Design and Electrochemical Properties – D. Guyomard (CNRS-IMN), E. Deunf, P. Moreau, E. Quarez (IMN), F. Dolhem (LG2A, RS2E), and P. Poizot (IMN, IUF)

16:00 **318** Progress Towards a Rechargeable Multivalent Battery – A. L. Lipson, D. L. Proffit, B. Pan, S. Lapidus, C. Liao, A. K. Burrell, J. T. Vaughey, and B. J. Ingram (Argonne National Laboratory)

A04 Battery Safety

Battery / Industrial Electrochemistry and Electrochemical Engineering
Remington A, Hyatt Regency

Failure Mechanisms and Design – 09:00 – 11:40
Co-Chair: D. H. Doughty

09:00 **350** Coupled Mechanical-Electrochemical-Thermal Modeling of Li-Ion Batteries – S. Santhanagopalan, C. Zhang, L. Cao, and A. Pesaran (National Renewable Energy Laboratory)

09:30 **351** Integrated Multiscale Multiphysics Modeling of Dynamic Short Circuit Behavior in Large Lithium-Ion Batteries – G. H. Kim, C. Yang, and A. Pesaran (National Renewable Energy Laboratory)

10:00 **352** Measurement of Energy Distributed Between Cell Mass and Hot Ejecta during Thermal Runaway of Lithium Ion Cells at Varying State of Charge – S. Yayathi (NASA), D. H. Doughty (Battery Safety Consulting Inc.), and W. Q. Walker (NASA)

10:20 Break

10:40 **353** Improve Battery Safety for Hybrid Electric Vehicles through Multi-Objective Optimization of Battery Design and Hybridization Level – C. Liu and L. Liu (The University of Kansas)

11:00 **354** Mechanism of Gas Generation in Lithium Ion Batteries By Overdischarge – M. Hashimoto, M. Yamashiro (Smart Energy Research Laboratories, NEC Corp.), T. Ichihashi (Tokyo University of Science), A. Toda (Smart Energy Research Laboratories, NEC corp.), T. Miyazaki, and S. Fujieda (Smart Energy Research Laboratories, NEC Corp.)

11:20 **355** Failure Mechanism Investigation of Commercial LiFePO4 Cells in Different Operating Conditions – Y. Liu, Q. Liu (Indiana University Purdue University Indianapolis), Z. F. Li, F. Yang (Indiana University-Purdue University Indianapolis), Y. Ren, W. Lu (Argonne National Laboratory), and J. Xie (Indiana University-Purdue University Indianapolis)

A05 Electrolytes and Electrochemical Interfaces in Energy Storage Systems

Battery / Energy Technology
101-A, Phoenix Convention Center

Electrolytes and Additives – 09:00 – 12:20
Co-Chairs: Brett L. Lucht and Kang Xu

09:00 **382** Simultaneous Acquisition of Differential Electrochemical Mass Spectrometric and Infrared Spectroscopic Data for in Situ Characterization of Gassing Processes in Lithium-Ion Batteries – B. B. Berkes, A. Jozwiuk (Karlsruhe Institute of Technology, INT-BELLA), H. Sommer (Karlsruhe Institute of Technology, INT-BELLA, BASF SE), T. Brezesinski (Karlsruhe Institute of Technology, INT-BELLA), and J. Janek (Karlsruhe Institute of Technology, INT-BELLA, Justus-Liebig-Universität Gießen, Gießen, Germany)

09:20 **383** Electrochemical Stabilization of Self-Extinguishing Electrolyte Solutions with Trimethyl Phosphate By Adding Potassium Salts – S. Tsubouchi, S. Suzuki, K. Nishimura, and T. Okumura (Hitachi, Ltd., Research&Development Group)

09:40 Break

10:00 **384** (Invited) Expanding Electrochemical Stability Window of Electrolytes – K. Xu, A. V. Cresce, S. M. Russell (U.S. Army Research Laboratory), and C. Wang (University of Maryland College Park)

10:40 **385** Phenyl Carbonates As Low Cost and Competitive Additive for Li-Ion Batteries – R. Petibon (Dalhousie University), L. M. Rotermund (Dept. of Physics, Dalhousie University), and J. R. Dahn (Dalhousie University, Physics and Atomospheric Scinece)

11:00 **386** Controlled Release of Encapsulated Additives for Enhanced Performance of Lithium-Ion Batteries – T. Lim (University of Illinois at Urbana-Champaign, Beckman Institute for Advanced Science and Technology), S. R. White (Beckman Institute for Advanced Science and Technology, University of Illinois at Urbana-Champaign), and N. R. Sottos (University of Illinois at Urbana-Champaign, Beckman Institute for Advanced Science and Technology)

11:20 **387** Anodic Stability of New Electrolyte Containing Cyano-Substituted Benzimidazole Derivative Lithium Salt: New Insights By in-Situ Drifts Analysis – M. A. Teshager, S. D. Lin, B. J. Hwang, Y. T. Chern, and S. Hy (National Taiwan University of Science and Technology)

11:40 **388** Selective Application of Electrolyte Additives on Anode or Cathode Investigated By on-Line Electrochemical Mass Spectrometry – M. Metzger, B. Strehle, S. Solchenbach, and H. A. Gasteiger (Technische Universität München)

12:00 **389** Investigating the Fate of an Electrolyte Additive: A Combined Theoretical and Experimental Study of Prop-1-Ene-1,3 Sultone (PES) in Li-Ion Cells – D. S. Hall, J. Self, L. Madec, R. Petibon (Dalhousie University), and J. R. Dahn (Dalhousie University, Physics and Atomospheric Scinece)

Solid Electrolytes – 14:00 – 18:00
Co-Chairs: Yifei Mo, Nitash P. Balsara, and Peter N. Pintauro

14:00 **390** Towards Aging Resistant Lithium Polymer Batteries for Wide Temperature Applications – J. R. Nair (Politecnico di Torino), L. Porcarelli (POLITECNICO DI TORINO), F. Bella, F. Colo (Politecnico di Torino), G. Meligrana, C. Gerbaldi (POLITECNICO DI TORINO), and R. Lin (Solvionic)

14:20 **391** Membranes from Blended Ionomer/PVDF Nanofibers: II. Interplay Between Properties and Electric Response – G. Nawn (Department of Chemical Sciences - University of Padova), K. Vezzù (Veneto Nanotech S.C.p.a.), E. Negro, F. Bertasi, V. Di Noto (Department of Chemical Sciences - University of Padova), L. Dos Santos, J. W. Park, R. Wycisk, and P. N. Pintauro (Vanderbilt University)

14:40 **392** Lithium-Ion Polymer Batteries Assembled with a Cross-Linked Composite Polymer Electrolyte Using a Vinyl-Functionalized SiO_2 Nanoparticles – W. K. Shin, J. Cho, J. H. Yoo (Department of Chemical Engineering, Hanyang University), Y. S. Lee (Center for Energy Convergence, KIST), and D. W. Kim (Department of Chemical Engineering, Hanyang University)

15:00 **393** Structural Analysis for Lithium Ion Conduction in Li-P-S Solid Electrolyte – A. Mitsui (Toyota Motor Corp.), K. Ohara, M. Mori, Y. Onodera, Y. Koyama, H. Arai, Y. Uchimoto, and Z. Ogumi (Kyoto University)

15:20 **394** Problems at the Electrolyte-Electrode Interfaces in All-Solid-State Li-Ion Batteries : Insight from First-Principles Computation – Y. Mo (University of Maryland, College Park)

15:40 **395** Study of the Interface Layer Between Lithium Metal and a Single Ion Conductor Ceramic, Based on Block Copolymer, for Lithium Air Batteries – L. Frenck (EETD Lawrence Berkeley National Laboratory, LEPMI UMR 5279 CNRS Grenoble INP), R. Bouchet (LEPMI UMR 5279 CNRS Grenoble INP), P. Stevens (Electricité de France, R&D division), and N. P. Balsara (Joint Center for Energy Storage Research)

16:00 **396** Atomic Structure Modeling of Li-P-S Solid Electroryte Glass with RMC and DFT Calculations – M. Mori, K. Ohara (Kyoto University), A. Mitsui (Toyota Motor Corp.), Y. Koyama, H. Arai, Y. Uchimoto, and Z. Ogumi (Kyoto University)

16:20 **397** Structure and Li^+ Dynamics of the Single-Ion Conducting Polymer Electrolyte P(STFSI)-Ran-PEGMA – J. L. Schaefer (University of Notre Dame, National Institute of Standards and Technology), S. V. Orski, R. C. Nieuwendaal, V. P. Oleshko (National Institute of Standards and Technology), L. R. Middleton (University of Pennsylvania), and C. L. Soles (National Institute of Standards and Technology)

16:40 **398** Sintering Effects on the Resistivity of $LiNi_{1/3}Mn_{1/3}Co_{1/3}O_2$/Ceramic-Solid-Electrolyte Interface in an All-Solid-State Battery – T. Kato, M. Motoyama, and Y. Iriyama (Graduate School of Engineering, Nagoya University, JST-ALCA)

17:00 **399** Coating Li_xNbO_y on the Surface of Cathode Materials for All Solid State Batteries Using ALD (Atomic Layer Deposition) – Y. Shindo, H. Koga (Battery Research Division, Toyota Motor Corporation), S. Nakanishi (Toyota Motor Corporation), and H. Iba (Battery Research Division, Toyota Motor Corporation)

17:20 **400** A Novel Class of All Inorganic Solid State Lithium Ion Conductors – I. S. Klein, S. K. Davidowski, and C. A. Angell (Arizona State University)

17:40 **401** Optimizing Sintering Conditions of Garnet Electrolytes for Scalable All Solid State Li-Ion Batteries – D. W. McOwen, G. Hitz, Y. Wen, Y. Gong, T. Hamann, and E. D. Wachsman (University of Maryland Energy Research Center)

West Hall 1, Phoenix Convention Center
A05 Poster Session – 18:00 – 20:00
Co-Chairs: Brett L. Lucht and Robert Kostecki

• **402** Organic Analysis of Electrolyte Reactions Containing Additives – T. Akiyama, T. Aoki, M. Oda, Y. Aoki, and H. Moriwaki (Toray Research Center, Inc.)

• **403** Exceptionally Stable, Non-Aqueous, Sodium-Based Electrolytes for High Energy Electrochemical Capacitors – C. N. Sun, R. E. Ruther, F. Delnick, and J. Nanda (Oak Ridge National Laboratory)

• **404** Determining the Transport Properties of Electrolyte Solutions By in-Situ NMR Imaging and Inverse Modeling – I. C. Halalay (General Motors Global Research & Development), A. K. Sethurajan (McMaster University), B. Protas (Mc Master University), S. Krachkovskiy, and G. Goward (McMaster University)

- **405** Structural Transition Behavior of LMO-NMC Composite Used for Cathode of Li Ion Battery at High Voltage Operation – T. Fujimoto (Mitsubishi Motors Co., Ltd.), K. Kitada (Kyoto University), K. Yamaura (Mitsubishi Motors, Co., Ltd.), H. Murayama, K. Ohara, K. Fukuda, H. Arai, E. Matsubara, Y. Uchimoto, and Z. Ogumi (Kyoto University)
- **406** Highly Concentrated Electrolytes for 5 V-Class Positive Electrodes in Lithium-Ion Batteries – R. Masuhara, M. Hashinokuchi, T. Doi, M. Inaba (Doshisha University), H. Inoue, H. Nakagawa, T. Inamasu, and H. Yoshida (GS Yuasa International Ltd.)
- **407** Impact of FEC Additive on SEI Structure Formed on a Carbon Negative Electrode Studied By Hard X-Ray Photoelectron Spectroscopy – M. Matsumoto, T. Sanada (Device-functional analysis Department, NISSAN ARC Ltd.), N. Takao (Device-functional analysis Department, NISSAN ARC, Ltd.), M. Mogi (NISSAN ARC Ltd.), T. Matsuda, K. Ando, D. Imamura (Japan Automobile Research Institute), and H. Imai (Device-functional analysis Department, NISSAN ARC Ltd.)
- **408** Degradation Behavior in Lithium Iron Phosphate Secondary Cells Under High Rate Pulsed Discharge – D. A. Wetz Jr. and D. N. Wong (The University of Texas at Arlington)

A06 High-Energy Li-Ion Intercalation Materials

Battery

105-A, Phoenix Convention Center

Cathode IV – 08:00 – 12:00
Co-Chairs: John T. Vaughey and Chunsheng Wang

08:00 **470** (Invited) High Electrochemical Performance of High Voltage LiNi0.5Mn1.5O4 By Decoupling the Ni/Mn Disordering from the Presence of Mn3+ ions – B. Kang (Pohang University of Science and Technology, MSE)

08:30 **471** Low-Temperature Prepared Lithium-Cobalt-Nickel-Oxide Spinels – E. Lee, J. R. Croy, J. S. Park, C. Johnson, and M. M. Thackeray (Argonne National Laboratory)

08:50 **472** Intrinsic Electrochemical Properties of LiNi0.5Mn1.5O4 Synthesized By Flux Method for High Energy Density Li-Ion Batteries – K. Nishikawa (CREST, JST, National Institute for Materials Science), N. Zettsu, K. Teshima (CREST, JST, Shinshu University), and K. Kanamura (National Institute for Materials Science, Tokyo Metropolitan University)

09:10 **473** Use of Swcnts to Increase the Energy Density of Li-Ion Batteries – O. Bobrenok, A. Kosolapov, K. Tikhonov, and K. Notman (OCSiAl)

09:30 **474** Improvement of Electrochemical Properties of Pyroxene-Type $LiFeSi_2O_6$ – N. Ishida, K. Sakatsume, N. Kitamura, and Y. Idemoto (Tokyo University of Science)

09:50 Break

10:10 **475** (Invited) Li Intercalation into Multi-Layers Transition Metal Carbides and Carbonitrides "Mxenes"in Li-Ion Batteries – M. Naguib (Oak Ridge National Laboratory)

10:40 **476** Physical and Electrochemical Characterization of $Li_2FeP_2O_7$/C Nanocomposites Prepared By a Combination of Spray Pyrolysis and Wet Ball Milling Followed By Heat Treatment – I. Taniguchi and H. Nagano (Tokyo Institute of Technology)

11:00 **477** The Mechanisms of Lithium Insertion into Quaternary Lithium Metal Fluorides $LiM^{II}M^{III}F_6$ (M^{II} = Ca, Ni, Mn and M^{III} = Fe) – L. de Biasi (Helmholtz Institute Ulm, KIT - Institute for Applied Materials), G. Lieser (KIT - Institute for Applied Materials), J. Rana (Helmholtz-Zentrum Berlin für Materialien und Energie), S. Indris, C. Dräger, S. Glatthaar, R. Mönig (KIT - Institute for Applied Materials), H. Ehrenberg (KIT - Institute of Applied Materials, Helmholtz Institute Ulm), J. R. Binder (KIT - Institute for Applied Materials), and H. Geßwein (Helmholtz Institute Ulm, KIT - Institute for Applied Materials)

11:20 **478** Enable High Energy-Density Lithium-Ion Battery Conversion Cathodes Based on Iron Fluorides Using Integrated in Situ Experimental and Computational Approaches – S. Jin (Department of Chemistry, UW-Madison)

11:40 **479** Probing Electrochemically-Induced Structural Changes and Defects Affecting Li-Ion Intercalation and De-Intercalation in High Capacity Orthosilicate Cathodes – X. Lu (Institut de recherche d'Hydro-Québec (IREQ)), H. C. Chiu (McGill University), Z. Arthur (University of Guelph), J. Zhou (Canadian Light Source), H. Wei (McGill University), N. Chen (Canadian Light Source), R. Gauvin (McGill University), D. T. Jiang (University of Guelph), K. Zaghib (IREQ), and G. P. Demopoulos (McGill University)

Cathode V and Anode I – 14:00 – 18:00
Co-Chairs: Michael Naguib and Byoungwoo Kang

14:00 **480** (Invited) Side Reactions and Cycling Efficiency with Silicon Electrode Surfaces – J. T. Vaughey, F. Dogan, A. A. Hubaud (Argonne National Laboratory), and D. J. Schroeder (Northern Illinois University)

14:30 **481** Li_4MeWO_6 (Me=Ni, Mn, Co) As Positive Electrode Materials for Li-Ion Batteries – S. Kumakura (Umicore Japan, Tokyo University of Science), S. Komaba, and K. Kubota (Tokyo University of Science, ESICB-Kyoto University)

14:50 **482** Probing the Electrochemical Mechanism of Li_5FeO_4 (LFO) Cathodes in Li-Ion Cells – C. K. Lin, X. Wang, V. A. Maroni, M. N. Krumpelt (Argonne National Laboratory), Y. Ren (Argonne National Laboratory, Advanced Photon Source), and C. Johnson (Argonne National Laboratory)

15:10 **483** High Performance Pillared Vanadium Oxide Xerogel Cathode for Lithium Ion Batteries – K. L. Hawthorne, S. O. Tung (University of Michigan), J. Mainero, Y. Ding (U.S. Army, TARDEC), and L. T. Thompson (University of Michigan)

15:30 **484** Lithium Iron Phosphate Nanosheet Nests As Cathode Material for Li-Ion Batteries – R. J. Wainright and R. P. Ramasamy (The University of Georgia)

15:50 Break

16:10 **485** (Invited) Improving Cycle Life of High Capacity Alloy Anodes for Li-Ion and Na-Ion Batteries – C. Wang (University of Maryland College Park), X. Fan, Y. Zhu (University of Maryland, College Park), J. Wang (Jiamusi University), and J. Mao (University of Maryland)

16:40 **486** Interrogation of Active Battery Material Intrinsic Properties – E. S. Takeuchi (Brookhaven National Laboratory), A. C. Marschilok, and K. J. Takeuchi (Stony Brook University)

17:00 **487** Mixed Metal Phosphorous Oxides: Prospects for Secondary Lithium Based Batteries – A. C. Marschilok, K. J. Takeuchi (Stony Brook University), and E. S. Takeuchi (Brookhaven National Laboratory)

17:20 **488** *In Situ* solvothermal synthesis of High-Energy Cathodes for Lithium-Ion Batteries – J. Bai (Brookhaven National Laboratory), L. Wang, and F. Wang (Brookhaven National Lab)

17:40 **489** Influence of Core and Shell Properties in Core-Shell Positive Electrode Materials for Li Ion Batteries – R. Senthil Arumugam, R. Shunmugasundaram (Dalhousie University), and J. R. Dahn (Dept. of Chemistry and Physics, Dalhousie University)

A07 Intermetallic Anodes

Battery

Russell B, Hyatt Regency

Intermetallic Anodes – 07:55 – 17:00
Co-Chairs: Kristina Edstrom, Donghai Wang, and Vito Di Noto

07:55 Welcoming Remarks

08:00 **511** Impact of Electrolyte on the Cycling of Si-Based Materials – V. L. Chevrier (3M Corporate Research Materials Laboratory), C. Aiken (3M, Electronic Materials Solutions Division), R. Petibon (Dalhousie University), X. Ma, D. B. Le (3M, Electronic Materials Solutions Division), J. R. Dahn (Department of Physics, Dalhousie University), K. W. Eberman (3M, Electronic Materials Solutions Division), and L. J. Krause (3M, Corporate Research Materials Laboratory)

08:40 **512** Micron-Sized *a*-Silicon-Fe-Cu Ternary Composite Anode Material for High Energy Libs – S. Chae and J. Cho (UNIST)

09:00 **513** Failure Mechanisms of Siox- Vs. Sife-Graphite Composite Anodes in Li-Ion Batteries – S. Sim and J. Cho (UNIST)

09:20 Break

10:20 **515** Rapid Milling of Alloy Anodes – T. Hatchard, A. Genkin (Dalhousie University, Department of Chemistry), and M. N. Obrovac (Department of Chemistry, Dalhousie University)

10:40 **516** Study of Molecular Layer Deposition Coating for Silicon-Based Lithium-Ion Anodes – C. Ban, D. Molina Piper (National Renewable Energy Laboratory), J. J. Travis (University of Colorado at Boulder), Y. Lee (University of Colorado), S. B. Son (National Renewable Energy Lab), S. M. George (University of Colorado), and S. Lee (University of Colorado at Boulder)

11:00 **517** Pulsed Laser Deposited Sns-Snse Composite Thin Film As a New Anode Material for Lithium Storage – X. Liu, J. Liu (Institute of Electronic Engineering,CAEP), and Y. Cui (Institute of Electronic Engineering,CAEP)

11:20 **518** Multiwalled Cabon Nanotubes Functionalized Magnetic Fepd Alloy with Enhanced Activity for Ethanol Oxidation Reaction – Y. Wang (University of Tennessee Knoxville), Q. He (University of Tennessee Knoville), H. Wei (Lamar University), J. Guo (University of Tennessee Knoxville), S. Wei (Lamar University), and Z. Guo (University of Tennessee Knoxville)

11:40 **519** Identification of Multiple Failure Mechanisms in Si-Based Electrodes for Li-Ion Batteries – S. D. Beattie, M. Loveridge (Warwick University), B. J. Polzin (Argonne National Laboratory), M. J. Lain (Warwick University), and I. Rubio (WMG)

12:00 Intermission

14:00 **520** Impact of the Film Storage Conditions on the Performance of Si-Based Anodes for Li-Ion Batteries – C. Reale Hernandez (INRS-EMT), Z. Karkar (CNRS-IMN; INRS-EMT), D. Guyomard, B. Lestriez (CNRS-IMN), and L. Roué (INRS-EMT)

14:40 **521** $FeSn_5$@Graphene Anodes for Li-Ion and Na-Ion Batteries – W. Han, F. Xin (NingBo Inst. Mater. Tech. Engi. CAS), and H. Tian (Ningbo Inst. Mater. Tech. Engi. CAS)

15:00 **522** NixSi1-x Alloy Negative Electrodes for Li-Ion Batteries – Z. Du (Dalhousie University), R. A. Dunlap (Dalhousie university), and M. N. Obrovac (Department of Chemistry, Dalhousie University)

15:20 **523** Pre-Lithiated Silicon As the Anode Material for the Next Generation of Lithium Ion Batteries – Y. Yang and X. Li (Colorado School of Mines)

15:40 **524** Nanoporous Structure Formatioon in Dealloying of Li Alloys – Q. Chen (Harvard School of Engineering and Applied Science), K. Geng, and K. Sieradzki (Arizona State University)

16:00 **525** Electrochemical Insertion Process of Li into n-Si(111) – T. Kondo, N. Aoki (Ochanomizu University), and K. Uosaki (National Institute for Materials Science)

16:20 **526** A New Design and Fabrication of Si-C Composite for Lithium-Ion Batteries Anodes – K. Ogata (Samsung Research Institute of Japan, Samsung Advanced Institute of Technology), K. Takei, B. S. Lee, K. H. Lee (Samsung Advanced Institute of Technology), T. H. Yu (Samsung Fine Chemicals), and S. Doo (Samsung Advanced Institute of Technology)

A08 Materials and Cell Designs for Flexible Energy Storage and Conversion Devices

Battery / Energy Technology

213-B, Phoenix Convention Center

Micro Batteries and Conductive Polymers – 08:30 – 12:10
Co-Chairs: Guihua Yu and Mark A. Allen

08:30 **539** Flexibleâ€"Stretchable Micro Lithium Ion Batteries for Implantable, Wearable and Embedded Electronics – M. M. Hussain and A. T. Kutbee (KAUST)

09:05 **540** Aerospace Applications of Conductive Polymers – P. Kinlen and W. Schuette (Boeing)

09:25 **541** Proton-Conducting Polymer Electrolytes for Solid Flexible Supercapacitors – H. Gao and K. Lian (University of Toronto)

09:45 **542** Synthesis of MoO2 and Nitrogen-Doped Carbon Nanotubes Composite Materials By Electrodeposition As Binder-Free Electrode for Lithium-Ion Batteries – Y. Cui (Institute of Electronic Enineering, CAEP) and H. Zhang (Institute of Electronic Engineering, CAEP)

10:05 Break

10:25 **543** A Soft Approach for Energy Storage and Mobile Healthcare – S. Xu (University of Illinois at Urbana/Champaign)

11:00 **544** Pyro Synthesis of Functional Nanocrystals for Energy Storage Devices – J. Gim, J. Song, S. Kim, V. Mathew, S. Kim, Y. Oh, M. H. Alfaruqi, and J. Kim (Chonnam National University)

11:20 **545** Influence of Charge Transportation in Nitroxyl-Radical Polymer Gel on Charging Characteristics for Organic Radical Batteries – S. Iwasa, T. Nishi, and T. Shimoyama (Smart Energy Research Laboratories, NEC Corporation)

11:40 **546** Design and Performances of Three-Dimensional Lithium-Ion Battery – H. J. Yang, H. Y. Park, K. H. Cho, J. S. Heo, S. Nam, and H. Jeong (Samsung Electronics)

Flexible Energy Storage: General – 13:30 – 17:10
Co-Chairs: James Wu and Guihua Yu

13:30 **547** Bio-Templated and Bio-Tethered Materials for a Flexible Lithium Ion Battery – M. A. Allen, S. J. Riley, E. Barannikova, and A. Winton (University of Maryland Baltimore County)

14:05 **548** Improving Lto Performance: Gassing, Impedance and Cycling Study – C. L. Margez, B. Tan, S. Tokuoka (SAFT America), and T. A. Greszler (Saft Batteries)

14:25 **549** A Low-Losses Topology for Vrfb Stacks – D. Maggiolo, D. Fauri (University of Padua), S. Da Lio (ENEL SpA), A. Bertucco, D. Del Col, and M. Guarnieri (University of Padua)

14:45 **550** Effect of Glass Transition Temperature on the Energy Storage Properties of Nitroxide Radical Containing Polymers – W. A. Braunecker, B. K. Hughes, D. C. Bobela, and T. Gennett (National Renewable Energy Laboratory)

15:05 Break

15:30 **551** Preparation and Electrochemical Characterization of Polyaniline/Carbon Fiber Binary Composite Film Obtained with Carbon Fiber Treated at Different Temperatures – D. A. L. Almeida (Instituto Nacional de Pesquisas Espaciais), C. P. Fonseca (IQX Inove Qualyx Tecnologia e Desenvolvimento em Resinas), and N. G. Ferreira (Instituto Nacional de Pesquisas Espaciais)

15:50 **552** A Study on the Conductivity and Selectivity of Lithiated Nafion Membranes in Non-Aqueous Electrolytes – L. Su (Massachusetts Institute of Technology), R. M. Darling (United Technologies Research Center, Joint Center for Energy Storage Research), K. G. Gallagher (Joint Center for Energy Storage Research, Argonne National Laboratory), W. Xie (United Technologies Research Center, Joint Center for Energy Storage Research), J. L. Thelen, N. P. Balsara (Joint Center for Energy Storage Research, University of California Berkeley), and F. R. Brushett (Massachusetts Institute of Technology)

16:10 **553** Baseline Si Electrode Fabrication and Performance for the Battery for Advanced Transportation Technologies Program – Z. Jia (Lawrence Berkeley National Laboratory)

16:30 **554** Developing Emulsion-Templated Silicon/Carbon Anodes with Reduced Graphene Oxide for Lithium Ion Batteries – Y. Zhang, Y. Pan, Y. Chen, C. Chen, B. L. Lucht, and A. Bose (University of Rhode Island)

B01 Carbon Nanostructures: Fullerenes to Graphene

Nanocarbons / Dielectric Science and Technology / Physical and Analytical Electrochemistry
Borein B, Hyatt Regency

Morning Session – 08:20 – 12:00
Co-Chairs: R. Bruce Weisman and Steven Stevenson

08:20 **596** Fullerene Biomaterials for PDT or MRI: Effects of Derivatization on Activities – Y. Yamakoshi, E. G. V. Tiu, and S. Aroua (ETH Zuerich)

08:40 **597** Graphite-Based Non Precious Metal Catalyst for Oxygen Reduction Reaction – J. H. Dumont (University of New Mexico), U. Martinez, A. Mohite, G. M. Purdy (Los Alamos National Laboratory), P. Atanassov (University of New Mexico), P. Zelenay, and G. Gupta (Los Alamos National Laboratory)

09:00 **598** Non-Chromatographic Isolation of Mixed-Metal Nitride Clusters in Larger Carbon Cages – S. Stevenson (Indiana-Purdue University at Fort Wayne (IPFW))

09:20 **599** Easily Fabricated Carbon Nanotube Electrodes for Low-Ppb-Level Chromium(VI) Detection – C. Wang, M. J. O'Connell, and C. K. Chan (Arizona State University)

09:40 **600** Preparation and Characterization of Porous CNTs@Fe-C Pellets – S. J. Hao, Y. J. Hao (North China University of Science and Technology), H. Q. Hao (Northeastern University), W. F. Jiang, and Y. Z. Zhang (North China University of Science and Technology)

10:00 Break

10:20 **601** Resonant Raman Scattering Studies of SWCNT Templated Extreme Nanowires of Hgte and Pbi – D. C. Smith, J. Spencer (University of Southampton), J. Sloan (University of Warwick), and E. Faulques (University of Nantes CNRS)

10:40 **602** The Origins and Characteristics of the Threshold Voltage Variability of Quasi-Ballistic Single-Walled Carbon Nanotube Field-Effect Transistors – Q. Cao (IBM T.J. Watson Research Center)

11:00 **603** Isolation of Adsorbent-Free Long Semiconducting Single-Walled Carbon Nanotubes Using a Hydrogen-Bonding Supramolecular Polymer – N. Nakashima (Kyushu University, WPI-I2CNER, Kyushu University, Department of Applied Chemistry) and F. Toshimitsu (Kyushu University)

11:20 **604** Engineering Chemical Functionality in Graphene – S. C. Hernandez, P. Sheehan (Naval Research Laboratory), S. Tsoi (Naval Research Laboratory, Chemistry Division), P. Dev, J. Robinson, C. Junkermeier, K. Whitener, W. Lee, T. Reinecke, and S. Walton (Naval Research Laboratory)

11:40 **605** Improvement of Surface Enhanced Raman Spectroscopy By Analyte Molecules Covering with Graphene – K. Girel, H. Bandarenka, N. Kovalchuk, I. Komissarov, and V. Bondarenko (BSUIR)

Afternoon Session – 13:40 – 18:00
Co-Chair: R. Bruce Weisman

13:40 **606** *In Situ* Synchrotron X-Ray Diffraction Characterization of the Synthesis of Graphene Oxide and Reduced Graphene Oxide – M. M. Storm (DTU energy,Technical University of Denmark), R. E. Johnsen, and P. Norby (Technical University of Denmark)

14:00 **607** Nondestructive Production of Magnetic Graphene Towards Energy Applications – T. Imae, M. M. M. Ahmed, and M. Ujihara (NTUST)

14:20 **608** Graphene Quantum Dots Prepared from Graphene Hydrogels Basing on Hydrothermal Method – H. Qin (Sungkyunkwan University, SAINT), T. Gong (SKKU Advanced Institute of Nano Technology (SAINT)), J. Liu (SungKyunKwan Univerisity), Y. Jin (SKKU Advanced Institute of Nano Technology (SAINT)), Y. Cho (School of Mechanical Eng.,Sungkyunkwan University.), C. Shin (School of Mechanical Eng.,Sungkyunkwan University), C. Lee (SKKU Advanced Institute of Nano Technology (SAINT), School of Mechanical Eng.,Sungkyunkwan University), and T. Kim (Sungkyunkwan University, SAINT & ME, SKKU Advanced Institute of Nanotechnology)

14:40 **609** Graphene Synthesis on Electrodeposited Substrates and Its Integration in MEMS for Sensor Applications – L. Pedrazzetti, R. Bernasconi, L. Nobili, and L. Magagnin (Politecnico di Milano)

15:00 **610** Graphene-Supported ' Core-Shell '□ Carbon Nitride Fe- and Sn-Based Electrocatalysts for the Oxygen Reduction Reaction (ORR) – A. Bach Delpeuch, E. Negro (Department of Chemical Sciences - University of Padova), K. Vezzù (Veneto Nanotech S.C.p.a.), G. Nawn, F. Bertasi, G. Pagot, and V. Di Noto (Department of Chemical Sciences - University of Padova)

15:20 Break

15:40 **611** Structure-Dependent Thermal Defunctionalization of Single-Walled Carbon Nanotubes – S. Ghosh, F. Wei, S. M. Bachilo, R. Hauge, W. E. Billups, and R. B. Weisman (Rice University)

16:00 **612** Nonvolatile Memory Based on Polymer-Suspended Graphene Nanoplatelets with Fractional and Integer Quantum Conductance at 300K and Zero Magnetic Field – Y. Kang (ECE Department Virginia Tech), H. Ruan (NanoSonic, Inc), and M. K. Orlowski (ECE Department Virginia Tech)

16:20 **613** Nanostructured Carbon Fibers for the Oxygen Reduction Reaction – U. Martinez (Los Alamos National Laboratory), S. Simotwo (Drexel University), J. H. Dumont, A. Mohite (Los Alamos National Laboratory), V. Kalra (Drexel University), and G. Gupta (Los Alamos National Laboratory)

16:40 **614** Impedance Spectroscopy of a Nanocomposite Fabric Thermistor to Determine Its Dielectric Sensing Structure – N. J. Blasdel and C. N. Monty (The University of Akron)

17:00 **615** Nanostructured Carbon As Electrocatalyst Supports for Solid Acid Fuel Cells – R. A. Elgammal (University of Tennessee-Knoxville), G. M. Veith, B. L. Armstrong, W. D. Tennyson (Oak Ridge National Laboratory), O. Dyck (University of Tennessee), I. N. Ivanov (Oak Ridge National Laboratory), G. Duscher (University of Tennessee), T. A. Zawodzinski (University of Tennessee, Knoxville, TN), and A. B. Papandrew (University of Tennessee)

17:20 **616** Surface Tailored Acetylene Black for High Voltage Lib Application – T. Sonoda, Y. Nako, T. Nagai, A. Yoda, T. Itoh, Y. Takeuchi, and H. Yokota (Denki Kagaku Kogyo Kabushiki Kaisha)

West Hall 1, Phoenix Convention Center
B01 Poster Session – 18:00 – 20:00

• **617** Fabrication and Characterization of Pyrrole/Multi-Walled Carbon Nanotubes Composite Electrodes – T. Dushatinski (Christopher Newport University) and T. M. Abdel-Fattah (Christopher Newport University, Applied Research Center, Jefferson National Lab)

C01 Corrosion General Poster Session
Corrosion

C01 Poster Session – 18:00 – 20:00
Co-Chairs: Rudolph Buchheit and Sannakaisa Virtanen

• **618** Non-Destructive Evaluation Method to Measure the Degree of Sensitization – T. Koketsu (IHI Corporation)

• **619** Inhibitory and Bactericidal Properties of a Number of Dihydroxyazo Compounds – V. Vigdorovich, L. Tsygankova (Derzhavin State University), T. Nazina (Winogradsky Institute of Microbiology), M. Esina (Derzhavin State University), and N. Shel (Tambov State Technical University)

• **620** Constant-Phase Element Characteristics Caused By Resistivity Distribution in High Performance Anti-Corrosion Organic Coating Applied to Oil Storage Tank – K. Tokutake, H. Nishi (National Research Institute of Fire and Disaster), D. Ito (Faculty of Engineering, Yokohama National University), S. Okazaki (EST committee,High Pressure Institute of Japan), and Y. Serizawa (Japan Oil, Gas and Metals National Corporation)

• **621** The Effect of Atomic Hydrogen on the Kinetics of Iron Passivation in Neutral Solutions – A. Rybkina and A. Marshakov (Institute of Physical Chemistry and Electrochemistry)

• **622** Degradation of Anticorrosive Organic Coating Applied to Inner Bottom Plate of Oil Storage Tank By a Large Scale Earthquake – T. Konishi (Yokohama National University), N. Kasai, S. Okazaki (EST committee, High Pressure Institute of Japan), and T. Kondo (High Pressure Institute of Japan)

• **623** Corrosion Inhibition of Carbon Steel By Some Nonionic Surfactants in 1M H2so4 – F. Branzoi (Institute of Physical Chemistry), V. Branzoi (University Politehnica of Bucharest), C. Pacuretu (Institute of Physical Chemistry), and A. Stanca (Energy Research and Modernizing Institute)

- **624** Corrosion Protection of Silicon Micro Systems with Ultra-Thin Barrier Films for Miniaturized Medical Devices – J. M. Herrera Morales (Univ. Grenoble Alpes), J. C. Souriau (CEA, LETI, Minatec Campus, Univ. Grenoble Alpes), and G. Simon (CEA, LETI, MINATEC Campus)
- **625** Hydrogen Entry into Steel Under an Aqueous NaCl Droplet – S. Kaneko, E. Tada, and A. Nishikata (Tokyo Institute of Technology)
- **626** Evaluation of Dezincification Corrosion of Brass By Complex Capacitance – K. Tabei, Y. Hoshi, I. Shitanda, and M. Itagaki (Tokyo University of Science)
- **627** Corrosion Behavior of Casing Steels in Cement Synthetic Pore Solution Exposed to High Pressure CO_2 and H_2S – R. Feng, J. Beck, D. M. Hall, A. Buyuksagis (The Pennsylvania State University), M. Ziomek-Moroz (DOE/ NETL), and S. N. Lvov (The Pennsylvania State University)
- **628** Anticorrosive and Morphological Properties of Polyaniline/Polyvinyl Chloride Blend on AA7075-T6 – R. M. Bandeira, F. A. D. S. Ferreira, U. P. Rodrigues Filho (Universidade de São Paulo), and G. Tremiliosi-Filho (university of São Paulo)
- **629** A Novel Coupling Between Atomic Emission Spectroelectrochemistry and Electrochemical Impedance Spectroscopy: Application to Zn, Zn-Cu and Zn-Al-Mg Alloys – K. Ogle, V. Shkirskiy, P. Volovitch, P. Zhou, and A. Maltseva (Insitut de Recherche de Chimie-Paris)
- **630** Effect of Tropical Atmosphere on Corrosion of Different Metals: Corrosivity Measurements of Singapore – S. L. Wijesinghe and Z. Tan (Singapore Institute of Manufacturing Technology,)

C02 Coating and Surface Modification for Corrosion Protection

Corrosion

102-A, Phoenix Convention Center

Morning Session – 08:00 – 12:40
Co-Chairs: Hamilton Neil McMurray and Kevin Ogle

08:00 **631** (Keynote) Corrosion Protection of Galvanized Steel Using Smart-Release Inhibitive Pigments Containing Organic Anions – G. Williams, P. Dodds, and P. Ansell (Swansea University)

08:40 **632** Intelligent Self-Healing Coatings: Investigating the Role of Self-Healing Kinetics at the Delaminating Interface – M. Rohwerder (Max-Planck-Institut für Eisenforschung GmbH)

09:00 **633** High-Resolution Microscopy of Substrate/ Coating Interfacial Regions of a Non-Chromate Organic Coating System on AA2024-T3 after Blister Formation – K. Holguin, F. Scheltens, and G. Frankel (Fontana Corrosion Center, The Ohio State University)

09:20 **634** A Rapid Assessment of Non-Chromate Primers for Zn/Ni Plated Steel By Electrochemical Techniques – W. Zhang, M. A. Kryzman, M. R. Jaworowski, and G. S. Zafiris (United Technologies Research Center)

09:40 Coffee Break

10:00 **635** Inhibition of Corrosion-Driven Organic Coating Delamination on Zinc By Graphene Nano-Pigments – H. N. McMurray, G. Williams, C. F. Glover (Swansea University), and C. Richards (SPECIFIC)

10:20 **636** Inhibition of Corrosion-Driven Organic Coating Delamination on Cold-Rolled Steel By Graphene Nanoplatelets – C. F. Glover, R. Subramanian (Swansea University), C. Richards (SPECIFIC), G. Williams, and H. N. McMurray (Swansea University)

10:40 **637** The Effects Functionalized Graphene Nano-Particles Have on the Corrosion Inhibition of Iron and Galvanised Steel – C. Richards (SPECIFIC), C. Glover, H. N. McMurray, and G. Williams (Swansea University)

11:00 **638** Micron Scale Cathodically Coated Graphene Impedes Corrosion on Ti, Cube, and Stainless Steel – P. A. Staley (University of California, San Diego), J. Metzger (San Diego State University), D. Griffo (Luminit, LLC), E. Simmons (San Diego State University), C. Griffo (Luminit, LLC), M. Bennahmias (Bennahmias Consulting), R. Kurtz (Luminit, LLC), and D. K. Smith (San Diego State University)

11:20 **639** A Comparative Study of Mussel Adhesive Proteins As Flash Rust Inhibitors on High Strength Low Alloy Steel – D. C. Hansen (University of Dayton Research Institute) and W. F. Nelson (DePuy Orthopedics, Inc Warsaw, IN 46582)

11:40 **640** Fabrication and Characterization of Superhydrophobic Poly(vinylidene fluoride-co- hexafluoropropylene)/TiO_2 Nanocomposite Coating for Corrosion Protection Applications – A. Bahgat, A. M. Abdullah, A. M. A. Mohamed, and M. Almaadeed (Center for Advanced Materials, Qatar University)

12:00 **641** Non-VOC Water-Based Nanocomposite Sol-Gel Thin Films for Corrosion Protection of Commercial Magnesium Alloys – F. Garcia-Galvan (Centro Nacional de Investigaciones Metalúrgicas (CSIC)), A. Jiménez-Morales (Universidad Carlos III de Madrid), S. Feliu Jr (1Centro Nacional de Investigaciones Metalúrgicas (CSIC)), and J. C. Galván (Centro Nacional de Investigaciones Metalúrgicas (CSIC))

12:20 **642** A Study of Anticorrosion Coatings for Surface Modification of Biodegradable Magnesium Alloy – J. Wang (Institute of Oceanology, Chinese Academy of Sciences)

Afternoon Session – 14:00 – 18:20
Co-Chairs: Douglas C. Hansen and Michael Rohwerder

14:00 **643** (Keynote) The Pretreatment of 2000 Series Al Alloy: In Situ Measurement of the Selective Dissolution & Film Formation – K. Ogle and O. Gharbi (Insitut de Recherche de Chimie-Paris)

14:40 **644** Al_2O_3 Coatings Deposited By ALD on Al Alloys – P. Marcus, J. Tao, J. Swiatowska, S. Zanna (CNRS – Chimie ParisTech/IRCP/ PCS), A. Seyeux (CNRS – Chimie ParisTech), E. Harkonen, and M. Ritala (University of Helsinki, Finland)

15:00 **645** Atmospheric Corrosion of Zinc Coated Steel- Results from a Worldwide Outdoor Exposure Program – D. Thierry (French Corrosion Institute) and D. Persson (Swerea Kimab)

15:20 **646** Corrosion Protection of Low Carbon Steels By Electrodeposited Aluminum Alloys – A. Bund, A. Ispas, C. A. Vlaic (Technische Universitaet Ilmenau), A. Foerg, and P. J. Masset (Fraunhofer Umsicht)

15:40 **647** The Photogenerated Cathodic Protection of Steel Using the Thin Layers of Photoactive Nanocomposite Fabricated By Electrophoretic Deposition – J. H. Park (POSCO Technical Research Laboratory)

16:00 **648** Photocathodic Protection of TiO_2 Composite Material on 304 Stainless Steel – X. Wang, H. Li, Q. Wei, Q. Zhang, and B. Hou (Institute of Oceanology, Chinese Academy of Sciences)

16:20 Coffee Break

16:40 **649** Copper Nanoparticles Effect on the Corrosion Behavior of Different Types of Nickel-Based Super Alloys – A. M. Abdullah, A. M. A. Mohamed (Center for Advanced Materials, Qatar University), and M. H. Sliem (Center for Advanced Materials, Qatar University, Qatar)

17:00 **650** Electrical Resistance-Emission Spectroscopy for Determining the Electrochemical Behavior of Anodized Aluminum in Aqueous Solutions – K. Habib (KISR)

17:20 **651** The Effects of Hydrophobic Coatings on an Insulative Skirt Layer to Decouple Galvanic Corrosion Between Mechanically-Coupled Aluminum Alloy and Carbon-Fiber Reinforced Polymer-Matrix Composites – R. Srinivasan, L. H. Hihara, and J. Nelson (University of Hawaii at Manoa)

17:40 **652** Reaction Mechanism of Lanthanide Zirconate Thermal Barrier Materials in Exposure to CMAS – H. Wang, X. Zhang, E. Tarwater, V. Agubra, and J. W. Fergus (Auburn University)

18:00 **653** RF Sputtering Thermal Barrier Coating for Enhance Corrosion Efficiency of Aero-Engines Components – J. Y. Achem Calahorra (Universidad Autónoma de Nuevo León), H. E. Esparza Ponce (Centro de Investigación en Materiales Avanzados S.C.), J. A. C. Miramontes, F. A. Calderón, and C. G. Tiburcio (Universidad Autónoma de Nuevo León)

C03 Contemporary Aspects of Corrosion and Protection of Magnesium and Its Alloys

Corrosion

Russell A, Hyatt Regency

Corrosion Mechanisms – 09:00 – 14:00
Co-Chair: Sannakaisa Virtanen

09:00 Introductory Remarks

09:05 **654** Gravimetric Measurement of Hydrogen Evolution on Magnesium – S. Fajardo and G. Frankel (Fontana Corrosion Center, The Ohio State University)

09:25 **655** Theory for the Enrichment Limit Associated with Noble Metal Impurities on Corroding Mg Anodes – T. Cain (University of Virginia), N. Birbilis (Monash University), and J. R. Scully (University of Virginia)

09:45 **656** Cathodic Activation of Magnesium – N. Birbilis (Monash University)

10:05 Coffee break

10:25 **657** The Use of EDTA As a Mechanistic Probe of Magnesium Corrosion in Chloride Containing Electrolyte – G. Williams, R. Subramanian, C. F. Glover, S. John, and H. N. McMurray (Swansea University)

10:45 **658** Towards Unravelling the Source of Cathode-Activated Corrosion Filaments Formed on Corroding Mg Alloy Surfaces – J. Kish, Z. Cano, and J. McDermid (McMaster University)

11:05 **659** Interpretation of Inductive Loop in Electrochemical Impedance of Magnesium Dissolving in Sodium Sulfate Solution – K. Umetsu, Y. Hoshi, I. Shitanda, and M. Itagaki (Tokyo University of Science)

11:25 **660** Hydrogen Evolution Behavior of Dissolving Magnesium Investigated By EIS and Gas Chromatography – R. Takemiya, Y. Hoshi, I. Shitanda, and M. Itagaki (Tokyo University of Science)

11:45 **661** Dealloying of Magnesium Alloys – A. Wingersky, A. Handler, J. Fisher, A. Weiss, and K. Sieradzki (Arizona State University)

12:05 **662** Corrosion Mechanisms of Fusion Welded Magnesium Alloys As a Function of Microstructure – L. G. Bland, J. Fitz-Gerald, and J. R. Scully (University of Virginia)

12:25 Lunch break

Application Aspects & Corrosion Protection – 14:00 – 17:20
Co-Chair: Nick Birbilis

14:00 **663** Corrosion of Galvanically Coupled Magnesium – D. R. Banjade, J. Harb, and S. Porter (Brigham Young University)

14:20 **664** Corrosion Behavior of Friction Stir Welded Hpdc AM60B Lap Joints – S. Zhang, Z. Cano, B. Wilson, J. McDermid, J. Kish (McMaster University), C. F. Glover, and G. Williams (Swansea University)

14:40 **665** Corrosion Protection of Friction Stir Spot Welds Made in Magnesium Alloys – Y. Savguira, S. Busef, T. H. North, and S. J. Thorpe (University of Toronto)

15:00 **666** Galvanic Corrosion Between Weld Zones As Seen in Fusion Welded AZ31B – L. G. Bland, J. Fitz-Gerald, and J. R. Scully (University of Virginia)

15:20 Coffee break

15:40 **667** Formation of Calcareous Deposition Layers on AM50 Magnesium Alloy in Presence of Ca2+ in De-Icing Salt Solutions: Immersion Vs. Salt Spray Test – M. W. Grabowski (University of Erlangen-Nuremberg, AUDI AG), D. B. Blücher (SINTEF Materials and Chemistry), M. Korte (AUDI AG), and S. Virtanen (University of Erlangen)

16:00 **668** Inhibition Performance Study of Aqueous Vanadate Species on Mg Alloys – J. Li, B. Hurley, and R. Buchheit (Fontana Corrosion Center, The Ohio State University)

16:20 **669** Effect of Al Content on the Microstructure and Corrosion Resistance of Plasma Electrolytic Oxidation (PEO) Coatings on Mg-Al Alloys – T. Zhang (Institute of Metal Research, Chinese Academy of Sciences)

16:40 **670** Mg Corrosion Control By Biopolymer-Polyelectrolyte Membranes – B. P. Wilson, K. Yliniemi (Aalto University), F. Singer, S. Höhn (Friedrich-Alexander-Universität Erlangen-Nürnberg), E. Kontturi (Aalto University, Imperial College London), L. Murtomäki (Aalto University), and S. Virtanen (University of Erlangen)

17:00 **671** Influence of Proteins and Cells on Corrosion of Mg – S. Virtanen (University of Erlangen)

C06 Pits & Pores 6: Nanomaterials - In Memory of Yukio H. Ogata

Corrosion / Luminescence and Display Materials
102-B, Phoenix Convention Center

Selforganized Nanostructures I – 08:00 – 09:50
Co-Chairs: François Ozanam and Shinji Yae

08:00 **746** (Invited) Inhomogeneity of Barrier Layer Inducing Irregularity of Porous Anodic Oxide Film on Aluminum – S. Ono and H. Asoh (Department of Applied Chemistry, Kogakuin University)

08:30 **747** Role of Oxide Stress in the Initial Growth of Self-Organized Porous Aluminum Oxide – K. Hebert, O. O. Capraz, P. Shrotriya (Iowa State University), P. Skeldon, and G. Thompson (University of Manchester)

08:50 **748** Semi-Metallic TiO2 Nanotubes: Growth, Properties and Applications – R. Hahn and P. Schmuki (FAU)

09:10 **749** Mechanism Study of Lithium Ion Insertion into Titania Nanotubes – T. Djenizian (Aix-Marseille University)

09:30 **750** Ordered and Ultra-High Aspect Ratio Nanocapillary Arrays As a Model System – M. L. Solomon (Florida Institute of Technology, Mainstream Engineering Corp.), P. Cox, N. R. Schwartz, G. E. Chester, and J. J. Hill (Mainstream Engineering Corp.)

Corrosion and Metal Alloys – 10:00 – 12:00
Co-Chairs: Kazuhiro Fukami and Gael Gautier

10:00 **751** Electrochemical Corrosion Behavior of Nanocrystalline Metal Thin Film Prepared By Magnetron Sputtering -- a Recent Work Report – L. Liu (Institute of Metal Research, Chinese Academy of Sciences)

10:20 **752** Pd-Pt Catalyst Layer Formation Based on Porous Si – M. Hayase (Tokyo University of Science)

10:40 **753** Dealloying of Few Coating: From Disorder to Order – Y. Ling, J. Zhang, S. Yu, and W. Liu (Tsinghua University)

11:00 **754** Switching from Homogeneous to Localized Corrosion in Stainless-Type Amorphous and Nano-Crystalline Steels – F. U. Renner (Hasselt University) and M. J. Duarte (MPI Eisenforschung)

11:20 **755** Corrosion Product Structures of Steel Samples Exposed to Amine Solutions Used for H_2s Removal. – M. A. Alpuche-Aviles (University of Nevada, Reno), S. Waite (MPR Services, Inc.), R. Malkiewich, S. Parajuli, M. Muñoz, and P. Chhetri (University of Nevada, Reno)

Selforganized Nanostructures II – 14:00 – 16:00
Co-Chairs: Petra Granitzer and Nobuyoshi Koshida

14:00 **756** (Invited) Formation of Self-Organized Porous Anodic Films on Iron and Stainless Steels – H. Habazaki, T. Hiraga, K. Shahzad, E. Tsuji, and Y. Aoki (Hokkaido University)

14:30 **757** Nanoporous α-Alumina Membranes with Pore Diameters Tunable over Wide Range of 30-350 nm – H. Asoh (Department of Applied Chemistry, Kogakuin University, Research Institute for Sci. and Tech., Kogakuin Univ.), T. Masuda (Research Institute for Sci. and Tech., Kogakuin Univ.), and S. Ono (Department of Applied Chemistry, Kogakuin University, Research Institute for Sci. and Tech., Kogakuin Univ.)

14:50 **758** Electrochemical and Thermal Contributions to Ultra-Deep AAO Growth: Aspect Ratio $>10^4$ – M. L. Solomon (Florida Institute of Technology, Mainstream Engineering Corp.), N. R. Schwartz, P. Cox, and J. J. Hill (Mainstream Engineering Corp.)

15:10 **759** Functional Optical Devices Based on Highly Ordered Metal Nanostructures Obtained Using Anodic Porous Alumina – T. Kondo, T. Yanagishita, and H. Masuda (Tokyo Metropoliatn University)

15:30 **760** Silicon Nanowires Self-Purification By Metal-Assisted Chemical Etching of Metallurgical Silicon – S. L. Schweizer, X. Li, A. Sprafke (Martin Luther University Halle-Wittenberg), R. B. Wehrspohn (Martin-Luther-University Halle-Wittenberg), and J. Wang (Martin Luther University Halle-Wittenberg)

15:50 Concluding Remarks

D02 Nonvolatile Memories

Dielectric Science and Technology
Curtis B, Hyatt Regency

ReRAM-1 – 08:00 – 09:40
Co-Chairs: Hisashi Shima and Shoso Shingubara

08:00 **761** (Keynote) Oxide based Resistive Memories for Low Power Embedded Applications and Neuromorphic Systems – E. Vianello, D. Garbin, N. Jovanovic, O. Thomas (CEA Leti), O. Bichler (CEA List), B. de Salvo (CEA-LETI), and L. Perniola (CEA, LETI, MINATEC Campus)

08:40 **762** (Invited) Current Filamentation in Rram As Measured By High Speed Electrical Thermometry – J. A. Bain, A. Sharma, and M. Skowronski (Carnegie Mellon University)

09:10 **763** (Invited) Nano-Porous Structure and Electrochemistry in Conducting-Bridge Random Access Memory – K. Kinoshita (Tottori University)

ReRAM-2 – 10:00 – 12:00
Co-Chairs: Blanka Magyari-Kope and Gennadi Bersuker

10:00 **764** (Invited) Simulation and Modeling of the Switching Dynamics in Resistive Switching Devices – S. Menzel (Forschungszentrum Jülich)

10:30 **765** (Invited) Simulating the Behavior of a Bipolar Filamentary Reram Cell for Upcoming Memory Devices – S. Wicklein (SanDisk)

11:00 **766** Modulating the Anionic-Electronic Transport Kinetics to Trigger Memristance for Resistive Switching Non-Volatile Memories: New Materials, Structering and Methods – J. L. M. Rupp, F. Messerschmitt, S. Schweiger, R. Schmitt (Electrochemical Materials ETH Zurich), and M. Kubicek (Electrochemical Materials, ETH Zurich)

11:20 **767** Multilevel Resistive Switching with Oxygen Vacancy Filaments in Pt/TaO_x/Cu and Pt/TaO_x/Pt Devices – Y. Kang, G. Ghosh, and M. K. Orlowski (ECE Department Virginia Tech)

11:40 **768** Multi Level Operation of CuO Based Cbram with Cute Electrode – D. W. Kim, K. C. Kwon, M. J. Song, K. H. Kwon, H. J. KiM, S. M. Jin, Y. J. Son, and J. G. Park (Hanyang University)

Emerging Memories – 14:00 – 16:00
Co-Chairs: Kiyoteru Kobayashi and Zia Karim

14:00 **769** (Keynote) Nanoscale Memories: What Does Physics Have to Say? – V. V. Zhirnov (Semiconductor Research Corporation)

14:40 **770** (Invited) Compatibility and Integratability Challenges of Ferroelectric Hafnium Oxide Based Embedded Memory Solutions – J. Müller, P. Polakowski, M. Drescher, J. Paul, R. Hoffmann, S. Riedel (Fraunhofer IPMS-CNT), S. Müller, S. Slesazeck, U. Schröder, T. Mikolajick (NaMLab gGmbH), S. Flachowsky, E. Erben, E. Smith, R. Binder, J. Metzger, D. Triyoso, and S. Kolodinski (GLOBALFOUNDRIES)

15:10 **771** (Invited) Large Crossbar Arrays for Storage Class Memory and Non-Von Neumann Computing – K. Virwani, G. W. Burr, R. M. Shelby, and P. Narayanan (IBM Research - Almaden)

15:40 **772** Lead Free Metal-Ferroelectric-Insulator-Semiconductor Devices for Non-Volatile Memory Appliactions – R. Medwal (University of Puerto Rico), S. Gupta (Department of Physics, University of Puerto Rico), S. P. Pavunny, R. K. Katiyar (Dept. of Physics, University of Puerto Rico), R. Thomas (Centre Énergie, Matériaux et Télécommunications), and R. S. Katiyar (University of Puerto Rico, University of Puerto Rico, Rio Piedras Campus)

West Hall 1, Phoenix Convention Center
D02 Poster Session – 18:00 – 20:00
Co-Chair: Shoso Shingubara

• **773** Characterization of Low-Dielectric Constant Silicon Carbonitride (SiCN) Dielectric Films for Charge Trapping Nonvolatile Memories – S. R. A. Ahmed, S. Naito, and K. Kobayashi (Tokai University)

• **774** Resistance Switching Phenomenon Associated with Anisotropic Magnetoresistance of the Reram Device with Ferromagnetic Electrodes – D. Ito, H. Yoshida (Kansai Univ.), T. Shimizu, and S. Shingubara (Kansai University)

D03 Photovoltaics for the 21st Century 11

Dielectric Science and Technology / Electrodeposition / Electronics and Photonics / Energy Technology / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry
Ellis West, Hyatt Regency

DSS & Organic I – 08:30 – 10:00
Co-Chairs: Jea-Gun Park and Seigo Ito

08:30 **805** (Invited) Advance of Dye-Sensitized Solar Cells with Organic Dyes – T. N. Murakami and N. Koumura (Advanced Industrial Science and Technology (AIST))

09:00 **806** PTB7:PC71BM Bulk Heterojunction Solar Cells with Multiple Additives – Y. Nishioka, M. Ohzeki, J. Qiu (College of Science and Technology, Nihon University), S. Fujii, and H. Kataura (Nat. Inst. of Advanced Industrial Science and Technology)

09:20 **807** Study of Nano-Filtration and Solvent Effects for Improving Efficacy of Organic Photovoltaic – T. M. Abdel-Fattah (Applied Research Center, Jefferson National Lab), E. M. Younes (Damanhour University), G. Namkoong (Applied Research Center), E. M. El-Maghraby (Damanhour University), A. Elsayed, and A. H. Abo Elazm (Alexandria University)

09:40 **808** Ternary Blend Bulk-Heterojunction Solar Cells Based on Active Layers of PTB7, PC71BM, and PC61BM – J. Qiu, K. Kiriishi, K. Hashiba (College of Science and Technology, Nihon University), S. Fujii, H. Kataura (Nat. Inst. of Advanced Industrial Science and Technology), and Y. Nishioka (College of Science and Technology, Nihon University)

DSS & Organic II – 10:30 – 12:10
Co-Chairs: Seigo Ito and Jea-Gun Park

10:30 **809** (Invited) Nanometer-Distance Control in Plasmonic Dye-Sensitized Solar Cells and Applications of Localized Surface Plasmon to Next Generation of Solar Cells – M. Ihara (Tokyo Institute of Technology)

11:00 **810** Solution-Derived NiO Hole Transport Layers on the PTB7:PC71BM Organic Solar Cells – K. Kiriishi, J. Qiu, K. Hashiba (College of Science and Technology, Nihon University), S. Fujii, H. Kataura (Nat. Inst. of Advanced Industrial Science and Technology), and Y. Nishioka (College of Science and Technology, Nihon University)

11:20 **811** Inverted Organic Solar Cells Based on PTB7:PC71BM with Pfn Electron Transport Layer on ITO-Free Flexible Pen Substrate – K. Hashiba, R. Nagata, K. Kiriishi (College of Science and Technology, Nihon University), S. Fujii, H. Kataura (Nat. Inst. of Advanced Industrial Science and Technology), and Y. Nishioka (College of Science and Technology, Nihon University)

D04 Semiconductors, Dielectrics, and Metals for Nanoelectronics 13

Dielectric Science and Technology / Electronics and Photonics
105-B, Phoenix Convention Center

Ge, SiGe, GeSn Channel – 08:40 – 12:00
Co-Chairs: Akira Toriumi and Takayoshi Shimura

08:40 **842** CMOS Compatible Growth of High Quality Ge, SiGe and SiGeSn for Photonic Device Applications – M. A. Alher (University of Arkansas, University of Kerbala), A. Mosleh (University of Arkansas), L. Cousar (Arktonics, LLC), W. Dou, P. Grant, S. A. Ghetmiri, S. Al-Kabi, W. Du, M. Benamara (University of Arkansas), B. Li (Arktonics, LLC), M. Mortazavi (University of Arkansas at Pine Bluff), S. Q. Yu, and H. A. Naseem (University of Arkansas)

09:00 **843** Enhancement of Material Quality of (Si)Gesn Films Grown By SnCl4 Precursor – A. Mosleh (University of Arkansas), M. A. Alher (University of Kerbala), L. Cousar, H. Abusafe (Arktonics, LLC), W. Dou, P. Grant, S. Al-Kabi, S. A. Ghetmiri, B. Alharthi, H. Tran, W. Du, M. Benamara (University of Arkansas), B. Li (Arktonics, LLC), M. Mortazavi (University of Arkansas at Pine Bluf), S. Q. Yu, and H. A. Naseem (University of Arkansas)

09:20 **844** Influence of Hydrogen Post-Implantation on Threading Dislocation Density in Strain-Relaxed Sige Layer – J. S. Park, I. H. Kim, G. S. Lee, T. H. Shim, and J. G. Park (Hanyang University)

09:40 Intermission

10:00 **845** (Invited) Effects of Ge Substrate Annealing in H_2 on Electron Mobility and on Junction Leakage in n-Channel Ge Mosfets – A. Toriumi, C. Lee, and T. Nishimura (The University of Tokyo)

10:30 **846** Non-Thermal Equilibrium Formation of $Ge_{1-x}Sn_x$ ($0 \leq x \leq 0.2$) Crystals on Insulator By Pulsed Laser Annealing – K. Moto, R. Matsumura, H. Chikita, T. Sadoh (Department of Electronics, Kyushu University), H. Ikenoue (Department of Gigaphoton Next GLP, Kyushu University), and M. Miyao (Department of Electronics, Kyushu University)

10:50 **847** Ultra-Low Temperature (~180°C) Solid-Phase Crystallization of Gesn on Insulator Triggered By Laser-Anneal Seeding – R. Matsumura, K. Moto, Y. Kai, T. Sadoh (Department of Electronics, Kyushu University), H. Ikenoue (Department of Gigaphoton Next GLP, Kyushu University), and M. Miyao (Department of Electronics, Kyushu University)

11:10 **848** (Invited) Fabrication of High-Quality Ge-on-Insulator Structures By Lateral Liquid Phase Epitaxy – T. Shimura, Y. Suzuki, M. Matsue, K. Kajimura, K. Tominaga, T. Amamoto, T. Hosoi, and H. Watanabe (Osaka University)

11:40 **849** Electrical Characterization of Dry and Wet Processed Interface Layer in Ge/High-K Devices – Y. M. Ding, D. Misra, M. Bhuyian (New Jersey Institute of Technology), K. Tapily, R. D. Clark, S. Consiglio, C. S. Wajda, and G. J. Leusink (TEL Technology Center, America, LLC)

2D Channel – 13:30 – 17:20
Co-Chairs: Mark C. Hersam and Tetsuroh Shirasawa

13:30 **850** (Invited) Excellent Wetting Behavior of Yttria on 2D Materials – R. Addou (University of Texas at Dallas), M. Batzill (University of South Florida), and R. M. Wallace (University of Texas at Dallas)

14:00 **851** (Invited) Is the Silicene the 2D Dirac Material? – T. Shirasawa (The University of Tokyo)

14:30 **852** (Invited) Solution Processing and Device Integration of Two-Dimensional Black Phosphorus – M. C. Hersam (Northwestern University)

15:00 **853** (Invited) Initial State of Graphene Growth on Ge(001) Surfaces – J. Dabrowski, G. Lippert, and G. Lupina (IHP)

15:30 Intermission

15:50 **854** (Invited) Vertical Field Effect Transistor Based on Graphene/Transition Metal Dichalcogenide Van Der Waals Heterostructure – R. Moriya, T. Yamaguch, Y. Inoue, Y. Sata, S. Morikawa, S. Masubuchi, and T. Machida (University of Tokyo)

16:20 **855** (Invited) Non-Covalent Functionalization of Epitaxial Graphene for Atomic Layer Deposition of Dielectric Oxides – J. D. Emery (Argonne National Laboratory, Northwestern University), J. M. P. Alaboson, H. J. Karmel, M. C. Hersam, and M. J. Bedzyk (Northwestern University)

16:50 **856** (Invited) Electronic Properties of Self-Assembled Trimesic Acid Monolayer on Graphene Layers – F. Shayeganfar (école polytechnique de montreal)

West Hall 1, Phoenix Convention Center
D04 Poster Session – 18:00 – 20:00
Co-Chairs: Samares Kar and Dolf Landheer

• **857** Utilization of a Non-Ionic Surfactant in the Fabrication of Water-Borne Nanoparticle of Polymeric Semiconductors for Producing High Performance and Green Organic Electronics – D. S. Chung, J. Cho, S. Yoon, and J. Ha (Chung-Ang University)

• **858** Enhanced Charge-Transport Behavior on PbS Nanocrystals Capped With Atomic Ligands – S. Yoon, J. U. Ha, J. Cho, and D. S. Chung (Chung-Ang University)

• **859** A Study on Chamber Contamination Control of Rapid Thermal Nitridation Process By Applying Quartz Liner – J. H. Yun (Samsung Institute of Technology, Samsung Electronics), S. G. Park (Samsung Institute of Technology), B. J. Kang, Y. H. Lee, J. S. An, and I. S. Cho (Samsung Electronics)

• **860** The Improvement Magnet Plate on a Reticle Stage of Lithography Equipment through Analyzing Adhesive and Roughness of Plate – I. H. Yu (Samsung Institute of Technology, Samsung Electronics Co., Ltd), G. R. Kim (Samsung Institute of Technology), H. S. Jung, and J. S. Bae (Samsung Electronics Co., Ltd.)

E01 Current Trends in Electrodeposition - An Invited Symposium

Electrodeposition
103-A, Phoenix Convention Center

Current Trends in Electrodeposition - An Invited Symposium – 14:00 – 17:00
Co-Chairs: Christian Bonhôte and Elizabeth J. Podlaha

14:00 **883★** (Electrodeposition Division Research Award) The Scanning Bipolar Cell: Design Principles for Patterning of Diverse Metals without Contact to the Substrate – T. M. Braun and D. T. Schwartz (University of Washington)

14:40 **884** Potential and Adsorbate Effects in Electrodeposition: Lessons Learned from Atomic-Scale in Situ and Operando Studies – O. M. Magnussen (University Kiel)

15:20 Break

15:40 **885** Electrodeposition of Nanowires and Nanostructures from Supercritical Fluids – D. C. Smith (University of Southampton)

16:20 **886** Electrodeposition from Liquid Metal Salts – J. Fransaer (KU Leuven)

E03 Novel Design and Electrodeposition Modalities 2

Electrodeposition

West Hall 1, Phoenix Convention Center

E03 Poster Session – 18:00 – 20:00

- **916** Electrodeposition of Zn Alloys with Cu and Sn from Citrate Electrolytes – S. Zahmi and E. J. Podlaha (Northeastern University)
- **917** Latest Proofs of Validity of the Phenomenon of Phase Formation through a Stage of Liquid State in Metals Being Electrodeposited – O. B. Girin (Ukrainian State University of Chemical Technology)
- **918** Nanostructured Zinc Electrodeposited from Protic Ionic Liquids: Comparison with Zinc Aqueous Electrodeposition Processes – R. Ortega (Centro de Inv y Des Tecnol en Electroquimica, CIDETEQ), G. Brisard (Université de Sherbrooke), and F. Rivas Esquivel (Centro de Inv y Des Tecnol en Electroquimica (CIDETEQ))

E04 Semiconductors, Metal Oxides, and Composites: Metallization and Electrodeposition of Thin Films and Nanostructures 3

Electrodeposition

103-A, Phoenix Convention Center

Compound Semiconductors – 09:50 – 12:00
Co-Chairs: Gerko Oskam, Philippe M. Vereecken, and Jan Fransaer

09:50 **919** (Invited) The Electrodeposition of Crystalline Gallium Antimonide Using Electrochemical Liquid-Liquid Solid Deposition (ec-LLS) – J. J. DeMuth, L. Ma, and S. Maldonado (University of Michigan)

10:30 **920** Electrodeposition of Ordered Copper Germanide from an Alkaline Tartrate-Complexed Electrolyte – F. Zhao, M. Mibus, L. K. Tsui, and G. Zangari (University of Virginia)

10:50 **921** Electrodeposition of Cu-Zn-Sn Precursors from an Acidic Solution for Cu_2ZnSnS_4 Absorber Layers – B. Unveroglu and G. Zangari (University of Virginia)

11:10 **922** On the Applications of Newly Architectured CdTe Nanostructures from Ionic Liquid Medium – K. R. Chauhan, D. B. Patel, and I. Mukhopadhyay (Pandit Deendayal Petroleum University)

11:30 **923** Dry Electrochemical Etching of MoS_2 Thin Films Using Plasma System – C. Ahn, M. H. Jeon, H. U. Kim (Sungkyunkwan University, SAINT), K. N. Kim (Sungkyunkwan University, AMSE), H. Qin (Sungkyunkwan University, SAINT), Y. Kim (Sungkyunkwan University, ME), G. Y. Yeom (Sungkyunkwan University, SAINT & AMSE), and T. Kim (Sungkyunkwan University, SAINT & ME)

West Hall 1, Phoenix Convention Center

E04 Poster Session – 18:00 – 20:00

- **924** Electropolymerization of Poly(phenylene oxide) Films with Variable Thickness – M. Timmermans (imec, Leuven), S. Deheryan (imec), F. Mattelaer, C. Detavernier (Ghent University), and P. M. Vereecken (imec, University of Leuven, B-3001 Leuven, Belgium)
- **925** Electrodeposition and Characterization of Selective Coatings Based on Black Cobalt for the Conversion of Solar-to-Thermal Energy – D. M. Herrera Zamora, F. I. Lizama-Tzec, O. E. Arés Muzio, and G. Oskam (CINVESTAV-IPN)
- **926** Electrodepotision of Metallic Silicon in P13TFSI Ionic Liquids Containing $SiCl_4$ – A. Tsuruta (Hokkaido Univ.), H. Matsushima (Hokkaido University), M. Ueda (Hokkaido Univ.), T. Fujii, and H. Date (Nippon Steel & Sumitomo Metal Corporation)
- **927** Electrodeposition of Cu-Ag Alloy Thin Films Directly on W Diffusion Barrier By Controlling Complexing Agents and Organic Additives – S. Kim and K. O. Kim (University of Ulsan)
- **928** Properties of Pulse Electrodeposited $CuInGaSe_2$ Films – K. R. Murali (University of Madras) and V. Chitra (Ramakrishna Engineering College)
- **929** Properties of Pulse Electrodeposited $AgGaS_2$ Films – K. R. Murali (University of Madras), S. Venkatachalapathy (Shree Venkateshwara Hi-Tech Engineering College,), and R. K (Vidyaa Vikas College of Engineering and Technology)
- **930** Characteristics of Pulse Electrodeposited $CuAlSe_2$ Films – K. R. Murali (University of Madras), M. Thirumoorthy (Shree Venkateshwara Hi-Tech Engineering College), and K. Ramesh (Vidyaa Vikas College of Engineering and Technology)
- **931** Metal Oxide Conductivity and Nanomechanical Properties of ZnO/Mo/ZnO Multilayer Thin Films Deposited By RF Magnetron Sputtering – S. H. Wang (KUAS), Y. J. Hsiao (National Nano Device Laboratories), and T. H. Fang (National Kaohsiung University of Applied Sciences (KUAS))
- **932** Study of Aminosilane-Compound Modification Condition on Polished Silicon Wafer and Its Influence on the Adhesion of Electroless Nickel/Phosphorous Film – W. Y. Wang, C. W. Hsu (National Tsing-Hua University), T. C. Wei (National Tsing Hua University), C. M. Chen, and K. C. Lai (National Chung-Hsing University)
- **933** Effect of Different Palladium Nanoparticles on the Adhesion Between Electroless-Deposited Nickel-Phosphorus Film and Silane-Compound-Modified Silicon Surface – C. W. Hsu, W. Y. Wang, T. C. Wei (National Tsing-Hua University), K. C. Lai, and C. M. Chen (National Chung-Hsing University)
- **934** Electrochemical Deposition of Hybrid Material Based on Polyindole and CdTe/CdS – M. E. Osial (University of Warsaw)

F03 Membrane-based Electrochemical Separations

Energy Technology / High Temperature Materials / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry

F03 Poster Session – 18:00 – 20:00
Co-Chair: Hui Xu

- **974** Recovery Cyanide from Cyanide-Containing Wastewater By Selective Electroconcentration – Y. Yang, Y. Tian (Zhejiang University), Z. Fan, X. Wu, and Z. Wu (Zhejiang Univerisity)
- **975** Hybrid Films Deposition for Nanochannel Membranes with Functional Surfaces – J. H. Kim (Korea Institute of Machinery and Materials(KIMM), Korea University of Science and Technology(UST)), S. W. Lee, S. A. Jung (Korea Institute of Machinery and Materials(KIMM)), J. S. Yoon, and Y. E. Yoo (Korea Institute of Machinery and Materials(KIMM), Korea University of Science and Technology(UST))

G01 Atomic Layer Deposition Applications 11

Electronics and Photonics / Dielectric Science and Technology

Phoenix East, Hyatt Regency

New Materials and Processes I – 09:00 – 10:00
Co-Chairs: Stefan De Gendt and Paul Raymond Chalker

09:00 **989** (Invited) Atomic Layer Deposition of Metals and Oxides on Graphene for Future Nanoelectronics – A. A. Bol, R. H. J. Vervuurt, N. F. W. Thissen, A. Sharma, and W. M. M. Kessels (Eindhoven University of Technology)

09:40 Intermission

New Materials and Processes II – 10:00 – 12:20
Co-Chairs: O. van der Straten and Stefan De Gendt

10:00 **990** (Invited) ALD Materials for the Integration of III-V Based Transistors – M. Givens, F. Tang (ASM America), Q. Xie, and J. W. Maes (ASM Belgium)

10:40 **991** Improving graphene conductivity through selective atomic layer deposition – C. Liu (Department of Materials Science and Engineering), X. Han (University of Maryland), W. Bao (University of Maryland, college park), A. J. Pearse (University of Maryland), L. Hu (University of Maryland, college park), and G. W. Rubloff (Department of Materials Science and Engineering)

11:00 **992** Synthesis of Transition Metal Dichalcogenide WSe_2thin Films By Atomic Layer Deposition – K. Zhang, X. Chen, P. Lin (Applied Research Center, Old Dominion University), Q. Rice, M. Abdel-Fattah, F. J. Seo (Hampton University), Q. Li (George Mason University), and H. Baumgart (Old Dominion University, Applied Research Center)

11:20 **993** (Invited) Vacuum Ultraviolet Photochemical Atomic Layer Deposition of Alumina and Titania Films – P. R. Chalker, P. A. Marshall, K. Dawson, C. J. Sutcliffe, I. F. Brunell, N. Sedghi, S. Hall, and R. J. Potter (University of Liverpool)

12:00 **994** New Insights into Sequential Infiltration Synthesis – J. W. Elam, M. Biswas, S. Darling, J. D. Emery, Y. C. Tseng, A. Yanguas-Gil, J. Klug, S. Seifert, T. Proslier, A. B. F. Martinson (Argonne National Laboratory), Q. Peng (Duke University), M. S. Weimer, H. S. Adam (Illinois Institute of Technology), P. F. Nealey, and T. Segal-Peretz (University of Chicago)

Metal Deposition and Applications I – 14:00 – 15:40
Co-Chairs: O. van der Straten and Sean Barry

14:00 **995** (Invited) Ru-Based Binary or Ternary Thin Films By Atomic Layer Deposition for a Seedless Cu Interconnects – S. H. Kim (Yeungnam University)

14:40 **996** ALD TaN Barrier for Enhanced Performance with Low Contact Resistance for 14nm Technology Node Cu Interconnects – J. Nag, B. Cohen, S. Choi, A. Ogino, M. Oh, Y. Yan, J. Liang (IBM Semiconductor Research and Development Center), C. Christiansen (IBM Corporation), A. Kim (IBM Semiconductor Research and Development Center), B. Li (IBM Corporation), P. DeHaven, A. Madan, S. Krishnan, and A. H. Simon (IBM Semiconductor Research and Development Center)

15:00 **997** On the Growth of Silver Thin Films By Atmospheric-Plasma Spatial ALD – A. Mameli (Eindhoven University of Technology), F. van den Bruele (TNO Eindhoven), W. M. M. Kessels, and F. Roozeboom (Eindhoven University of Technology)

Metal Deposition and Applications II – 15:40 – 16:40
Co-Chairs: O. van der Straten and Soo-Hyun Kim

15:40 **998** (Invited) Metallic Nanocoatings on Optical Fibres As a Sensor Platform – S. T. Barry, D. J. Mandia, A. Wells, W. Zhou, and J. Albert (Carleton University)

16:20 **999** Atomic Layer Deposition of Ultrathin TaN and Ternary $Ta_{1-X}Al_XN_y$ Films for Cu Diffusion Barrier Applications in Advanced Interconnects – S. Consiglio, K. Yu (TEL Technology Center, America, LLC), S. Dey (SUNY Polytechnic Institute), K. Tapily, R. D. Clark, T. Hasegawa, C. S. Wajda, G. J. Leusink (TEL Technology Center, America, LLC), and A. C. Diebold (SUNY Polytechnic Institute)

West Hall 1, Phoenix Convention Center
G01 Poster Session – 18:00 – 20:00
Co-Chair: Fred Roozeboom

- **1000** Proposal of Integrated Sensitized Solar Cell Films Based on Sputtered ZnO Thin Films – A. Jassim, S. Takizawa, C. Yoshino, and T. Yoshimura (Tokyo University of Technology)
- **1001** Synthesis of ALD Tungsten Trioxide Thin Films from $W(CO)_6$ and H_2o Precursors – K. Zhang, P. Lin, X. Chen (Applied Research Center, Old Dominion University), F. J. Seo (Hampton University), and H. Baumgart (Old Dominion University, Applied Research Center)
- **1002** Synthesis of Noble Metal Nanoparticles By Atomic Layer Deposition Utilizing Self-Assembled Monolayers Templates – Q. Zhu, K. Cao, B. Shan, and R. Chen (Huazhong University of Science and Technology)

- **1003** Spectroscopic Ellipsometry Characterization of Pd Thin Film Grown by Atomic Layer Deposition – Y. Zhang, X. Zhou, K. Cao, X. Chen, S. Liu, B. Shan, and R. Chen (Huazhong University of Science and Technology)
- **1004** Sensitization of ZnO in Stacked Structures Containing Multiple Dyes Grown Using Liquid Phase Molecular Layer Deposition – T. Liu, Y. Matsumura, and T. Yoshimura (Tokyo University of Technology)

G02 Semiconductor Cleaning Science and Technology 14 (SCST 14)

Electronics and Photonics

104-A, Phoenix Convention Center

Non-Silicon Materials: Etching, Cleaning, and Conditioning – 09:00 – 12:30
Co-Chairs: Paul W. Mertens and Anthony J. Muscat

09:00 Introductory Remarks

09:05 **1045** (Invited) Reaction Mechanisms on Binary III-V Semiconductor Surfaces during Etching, Passivation, and Deposition – A. J. Muscat (University of Arizona)

09:45 **1046** Surface Chemistry of III-V Semiconductors After Wet Etching with HCl and H_2O_2 – P. Mancheno-Posso and A. J. Muscat (University of Arizona)

10:05 **1047** Nanoscale Etching: Dissolution of III-As and Ge in HCl/H_2O_2 Solutions – D. H. van Dorp (IMEC), D. Weinberger (University of Gent), S. Van Wonterghem (KUL), S. Arnauts (Imec), K. Strubbe (University of Gent), F. Holsteyns, and S. De Gendt (imec)

10:25 **1048** Chemical Treatments for Native Oxides Removal of GaAs Wafers – M. Rebaud, M. C. Roure, V. Loup, E. Martinez, P. Rodriguez (CEA, LETI, MINATEC Campus), and P. Besson (STMicroelectronics)

10:45 **1049** Cleaning of InGaAs and InP Layers for Nanoelectronics and Photonics Contact Technology Applications – P. Rodriguez, L. Toselli (CEA LETI), E. Ghegin (CEA LETI, STMicroelectronics), M. Rebaud, N. Rochat, N. Chevalier, E. Martinez, and F. Nemouchi (CEA LETI)

11:05 **1050** Chemical Passivation of $In_{0.53}Ga_{0.47}As$(100) using Ammonium Sulfide and Thiols – Y. Contreras and A. J. Muscat (University of Arizona)

11:25 **1051** Wet Processing for Post-epi & Pre-furnace Cleans in Silicon Carbide Power MOSFET Fabrication – J. J. McMahon (General Electric Global Research Center), M. Jahanbani (State University of New York Polytechnic Institute), S. Arthur, D. Lilienfeld, P. Gipp, T. Gorczyca (General Electric Global Research Center), J. Formica, L. Shen (Rigaku Americas Corporation), M. Yamagami (Rigaku Corporation), B. Hillard, and J. Byrnes (Semilab USA LLC)

11:45 **1052** Study on the Dissolution of Germanium in Sulfuric Acid Based Solution – N. Gan, Y. Ogawa, T. Nagai, T. Masaoka (Kurita Water Industries LTD.), K. Wostyn, F. Sebaai, F. Holsteyns, and P. W. Mertens (imec)

12:05 Concluding Remarks

12:10 Cofee Break

G03 Thermoelectric and Thermal Interface Materials 2

Electronics and Photonics / High Temperature Materials

Remington C, Hyatt Regency

Thermoelectrics and Thermal Transport I – 08:10 – 12:40
Co-Chairs: Colm O'Dwyer and Robert Wang

08:10 **1063** (Invited) Thin Film Thermoelectric Metal-Organic Framework with High Seebeck Coefficient and Low Thermal Conductivity – A. A. Talin, K. Erickson, F. Léonard (Sandia National Laboratories), V. Stavila (Sandia.National Labs), M. E. Foster (Sandia National Laboratories, Livermore, CA 94551-0969), C. Spataru, R. Jones (Sandia National Laboratories), B. Foley, P. Hopkins (University of Virginia, Charlottesville), and M. D. Allendorf (Sandia National Laboratories, Livermore, CA 94551-0969)

08:50 **1064** (Invited) Nano-Length-Scale Inorganic/Organic Hybridization for Thermoelectric Materials – K. Koumoto (Toyota Physical and Chemical Research Institute), C. Wan (Tsinghua University), R. Tian (Toyota Physical and Chemical Research Institute), and R. Yang (University of Colorado)

09:30 Break

10:00 **1065** (Invited) Phonon Transport in Holey Silicon Nanostructures – J. Lee (Lawrence Berkeley National Laboratory, University of California, Irvine) and P. Yang (University of California, Berkeley, Lawrence Berkeley National Laboratory)

10:40 **1066** (Invited) The Landauer Approach to Electron and Phonon Transport – J. Maassen and M. Lundstrom (Purdue University)

11:20 **1067** (Invited) Electrodeposited Micro Thermoelectric Module Design for Hybrid Semiconductor Laser Cooling on a Silicon Photonics Platform – R. Enright, S. Lei, I. Mathews, G. Cunningham, R. Frizzell (Bell Labs Ireland), and A. Shen (III-V Lab, Bell Labs France)

12:00 **1068** (Invited) Thermal Energy Conduction in a Surface Phonon Polariton Crystal – B. Cola (Georgia Institute of Technology)

Thermoelectrics and Thermal Transport II – 14:30 – 16:30
Co-Chairs: Kafil M. Razeeb and Baratunde Cola

14:30 **1069** (Invited) Reducing the Thermal Conductivity By Driving PbTe to a Phase Transition Via Strain and/or Alloying – I. Savic (Tyndall National Institute, Cork, Ireland)

15:10 **1070** (Invited) Phonon Dispersion Engineering and Thermal Transport in Si Membranes – F. Alzina, J. S. Reparaz, B. Graczykowski (Institut Catala de Nanociencia i Nanotecnologia (ICN2)), A. El Sachat (Institut Catala de Nanociencia i Nanotecnologia (ICN2), Dept. of Physics, Universitat Autònoma de Barcelona), M. Sledzinska, E. Chávez-Ángel, M. R. Wagner (Institut Catala de Nanociencia i Nanotecnologia (ICN2)), A. Shchepetov, M. Prunnila, J. Ahopelto (VTT Technical Research Centre of Finland), and C. M. Sotomayor Torres (Institució Catalana de Recerca i Estudis Avançats (ICREA), Institut Catala de Nanociencia i Nanotecnologia (ICN2))

15:50 **1071** (Invited) Tuning of Heat Transport across Thin Films of Polycristalline AlN via Multiscale Structural Defects – J. Jaramillo-Fernandez (KTH Royal Institute of Technology), J. Ordonez-Miranda (CentraleSupelec), E. Ollier (CEA), R. Sanatinia (KTH Royal Institute of Technology), H. Kataria (KTH-Royal Institute of Technology), E. Chávez-Ángel (Institut Catala de Nanociencia i Nanotecnologia (ICN2)), S. Volz (CentraleSupelec), and C. M. Sotomayor Torres (Catalan Institute for Nanoscience and Nanotechnology, KTH Royal Institute of Technology)

G04 ULSI Process Integration 9

Electronics and Photonics

103-B, Phoenix Convention Center

Graphene and 2D Devices – 08:00 – 10:00
Co-Chair: Simon Deleonibus

08:00 **1098** (Invited) Advanced CMOS Device Technologies Discussed Also with Transition-Metal Di-Chalcogenide (TMDC) Channel – H. Wakabayashi (Tokyo Institute of Technology)

08:30 **1099** (Invited) Silicene As a 2D Material Candidate – P. Vogt (Technische Universität Berlin), G. Le Lay (Aix-Marseille University), and P. De Padova (CNR-ISM Rome)

09:00 **1100** (Invited) Performance of Graphene and Beyond Graphene 2D Semiconductor Devices – F. Schwierz (Technische Universitaet Ilmenau)

09:30 Coffee Break

MEMS Applications – 10:00 – 11:40
Co-Chairs: Shinichi Takagi

10:00 **1101** (Keynote) Heterogeneous Integration of MEMS By Adhesive Bonding – M. Esashi and S. Tanaka (Tohoku University)

10:40 **1102** CMOS and Nems Hybrid Architectures – T. Ernst, I. Ouerghi, W. Ludurczak, J. Arcamone, L. Duraffourg, E. Ollier, J. Philippe, and S. Hentz (Univ. Grenoble Alpes,CEA-LETI)

11:10 **1103** (Invited) Observation of Stress Responses of Bacteria Confined in a MEMS Microfluidic Chip – Y. Nishimura, M. Ishida, K. Sawada, H. Ishii (Toyohashi University of Technology), K. Machida (NTT Advanced Technology Corporation, Tokyo Institute of Technology), K. Masu (Tokyo Institute of Technology), C. Wang, K. Iida, M. Saito, and S. Yoshida (Graduate School of Medical Sciences, Kyushu University)

Memory Technologies – 13:30 – 16:00
Co-Chairs: Anthony O'Neill and Hiroshi Iwai

13:30 **1104** Innovative Embedded Non-Volatile Memories: Flexibility and Reliability – G. Navarro, E. Vianello, G. Molas, V. Sousa, and L. Perniola (CEA, LETI, MINATEC Campus)

14:00 **1105** Increase in Oxide Trap Density Due to the Implementation of High-k and Al2O3 Cap Layers in Thick-Oxide Input-Output Transistors for DRAM Applications – E. Simoen (imec), R. Ritzenthaler, M. J. Cho, T. Schram (Imec), N. Horiguchi (imec), M. Aoulaiche, A. Spessot, P. Fazan (Micron Technology Belgium), and C. Claeys (Imec)

14:20 **1106** Resistive Switching Characteristics of Si-Rich Oxides with Embedding Ti Nanodots – Y. Kato (Nagoya University)

14:40 **1107** (Invited) Visualization of Conductive Filament of ReRAM during Resistive Switching by in-situ TEM – Y. Takahashi (Hokkaido University), M. Kudo (Kyusyu University), and M. Arita (Hokkaido University)

15:10 **1108** (Invited) An Investigation of the InGaAs MOS System for Future High Mobility Channel Applications – P. K. Hurley, Y. Gomeniuk, J. Lin, S. Monaghan, I. M. Povey, M. E. Pemble, B. J. Hutchinson, B. Sheehan (Tyndall National Institute), V. Djara, E. O'Connor (IBM Zurich Research Laboratory), and K. Cherkaoui (Tyndall National Institute)

15:40 Concluding Remarks

West Hall 1, Phoenix Convention Center
G04 Poster Session – 18:00 – 20:00

• **1109** Dummy Poly Gate Removal Process Optimization with Hybrid Pulsing Scheme – S. L. Ji, R. X. Huang, and C. L. Zhang (Semiconductor Manufacturing International Corporation)

G05 GaN & SiC Power Technologies 5

Electronics and Photonics / Dielectric Science and Technology

Ellis East, Hyatt Regency

Power Switching Devices 2 – 09:00 – 10:00
Co-Chairs: Balaji Raghothamachar and Ron Green

09:00 **1127** (Invited) Vertical GaN Pin Diodes Formed By Mg Ion Implantation – T. J. Anderson (Naval Research Laboratory), J. D. Greenlee (NRC Postdoctoral Fellow Residing at NRL), B. Feigelson, J. K. Hite, K. D. Hobart, and F. J. Kub (Naval Research Laboratory)

09:30 **1128** (Invited) Ion Implantation into GaN and Implanted GaN Power Transistors – K. Nomoto (University of Notre Dame), K. Takahashi, O. Takuya, H. Ogawa (Dept. of Electrical Engineering, Hosei University), T. Nishimura, T. Mishima (Research Center of Ion Beam Technology, Hosei University), T. Nakamura (Dept. of Electrical Engineering, Hosei University), and H. G. Xing (School of ECE, Cornell University, Department of MSE, Cornell University)

Power Semiconductor Switch Reliability 2 – 10:30 – 12:30
Co-Chairs: Kenneth A. Jones and Robert J. Kaplar

10:30 **1129** (Invited) Radiation-Induced Defect Mechanisms in GaN Hemts – A. D. Koehler, T. J. Anderson (Naval Research Laboratory), P. Specht (University of California, Berkeley), B. D. Weaver (Naval Research Laboratory), J. D. Greenlee (NRC Postdoctoral Fellow Residing at NRL), M. J. Tadjer (Naval Research Laboratory), D. I. Shahin (University of Maryland), K. D. Hobart, and F. J. Kub (Naval Research Laboratory)

11:00 **1130** Vertical Buffer Leakage and Temperature Effects on the Breakdown Performance of GaN/AlGaN HEMTs on Si Substrate – F. Benkhelifa, S. Müller, V. Polyakov, S. Breuer, H. Czap, C. Manz, M. Mikulla, and O. Ambacher (Fraunhofer IAF)

11:30 **1131** Leakage Current Mechanisms in Reverse Biased High-Voltage 4H-SiC Power Diodes – K. Shenai (LoPel Corporation), B. Raghothamachar, and M. Dudley (Stony Brook University)

12:00 **1132** (Invited) Reliability and Pulsed I-V Analysis of Vertically-Scaled GaN MIS-Hemts – D. J. Meyer, B. P. Downey, J. A. Roussos, D. S. Katzer, M. G. Ancona (U.S. Naval Research Laboratory), M. Pan, and X. Gao (IQE RF LLC)

Power Switching Devices 3 – 14:00 – 15:40
Co-Chairs: Michael Dudley and Srabanti Chowdhury

14:00 **1133** 4H-SiC JFET Multilayer Integrated Circuit Technologies Tested up to 1000 K – D. J. Spry, P. G. Neudeck (NASA Glenn Research Center), L. Chen (Ohio Aerospace Institute), C. W. Chang, D. Lukco (Vantage Partners, LLC), and G. M. Beheim (NASA Glenn Research Center)

14:30 **1134** (Invited) Characteristics of a Wire-Bonding-Less SiC Power Module Operating in a Wide Temperature Range – S. Sato, H. Tanisawa (AIST, Sanken Electric Co., Ltd.), T. Anzai (AIST, Calsonic Kansei Corp.), H. Takahashi (AIST, FUJI ELECTRIC CO., LTD.), Y. Murakami (AIST, NISSAN MOTOR CO., LTD.), F. Kato, K. Watanabe, and H. Sato (AIST)

15:00 **1135** Short-Circuit rRggedness of SiC JFETs – M. Berthou, S. Niu (Ampere Laboratory), D. Tournier, and D. Planson (Laboratoire Ampère)

15:30 Concluding Remarks

H01 Low-Dimensional Nanoscale Electronic and Photonic Devices 8

Electronics and Photonics / Dielectric Science and Technology / Sensor
105-C, Phoenix Convention Center

Two Dimensional Materials 2 – 08:00 – 10:20
Co-Chairs: Qiliang Li and Liwei Chen

08:00 **1166** (Invited) Microscopic Studies of Black Phosphorus and Its Field-Effect Transistors – M. Pan, H. Yuan (Huazhong University of Science and Technology), Y. Q. Xu (Vanderbilt University), Z. Zhou (Wayne State University), and V. Meunier (Rensselaer Polytechnic Institute)

08:30 **1167** Fast and Patternable Synthesis of Graphene and Transition Metal Dichalcogenide Materials Via Laser Annealing on Insulating Substrates – H. Medina, Y. Z. Chen, C. C. Huang, and Y. L. Chueh (Dept. of Mater. Sci. and Eng., NTHU)

08:50 **1168** (Invited) Interface and Dielectric Engineering for High-Performance Top-Gated MoS_2 Field Effect Transistors – X. Zou and L. Liao (School of Physics and Technology, Wuhan University)

09:20 **1145** (Invited) Hybrid Two-Dimensional Nanosheet Materials for Energy Storage Devices – L. Peng, Y. Zhu, and G. Yu (The University of Texas at Austin)

09:50 **1170** (Invited) Probing Metal-Graphene Interactions with Raman Spectroscopy – G. Cheng, I. Calizo, and A. R. Hight Walker (National Institute of Standards and Technology)

Low-Dimensional Nanoscale Electronic and Photonic Devices 3 – 10:30 – 12:15
Co-Chairs: Chuan Wang and Edward T. Yu

10:30 **1171** (Invited) A Metal Oxide Antifuse-Diode Device – Y. Kuo (Texas A&M University)

11:00 **1172** (Invited) Transistors without Semiconductors By Functionalized Boron Nitride Nanotubes – Y. K. Yap (Michigan Technological University)

11:30 **1173** (Invited) Oxide Interface Is the Device: Properties of Two-Dimensional Electron Gas – T. Wu (KAUST)

12:00 **1174** Growth of InGaAsP Alloy Nanowires for Emission from Visible to Mid-Infrared Wavelengths – S. E. Hashemi Amiri, S. Turkdogan, Z. Liu, F. Fan, and C. Z. Ning (Arizona State University)

Energy Harvesting and Storage 3 – 14:00 – 15:45
Co-Chairs: Jang-Ung Park and Lain-Jong Li

14:00 **1175** (Invited) Triboelectric Nanogenerators for Self-Powering Small Electronics – S. W. Kim (Sungkyunkwan University (SKKU))

14:30 **1176** (Invited) Low Dimensional Materials Used for Solar Cells – M. Li (North China Electric Power University)

15:00 **1177** Micropatterned P(VDF-TrFE) Film Based Piezoelectric Nanogenerators for Highly Sensitive Self-Powered Pressure Sensing System – H. J. Yoon, J. H. Lee (Sungkyunkwan university), and S. W. Kim (Sungkyunkwan University (SKKU))

15:15 **1178** (Invited) Electrochemical Nanowire Devices for Energy Storage – L. Mai, L. Zhou, X. Tian, R. Sun, and M. Yan (Wuhan University of Technology)

Energy Harvesting and Storage 4 – 16:00 – 17:50
Co-Chairs: Zhiyong Fan and Meicheng Li

16:00 **1179** (Invited) Imprinted Functional Nano-Structures for Highly Efficient Photonic Devices – H. Lee (Korea University)

16:30 **1180** (Invited) Mesoporous Anatase Single Crystals for Efficienct $Co^{(2+/3+)}$ Based Dye-Sensitized Solar Cell – J. H. Kim (University of Wollongong)

17:00 **1181** A Controllable and Widely Applicable Electrochemical Anodization Process to Fabricate Porous Anodic Aluminum Oxide Membrane – Y. Lin, Q. Lin, X. Liu, Y. Gao, and Z. Fan (HKUST)

17:15 **1182** Lift-Off Patterning of Nano-Crystalline Quantum Dot Films – A. Sabeeh, Y. Thakur (The Pennsylvania State University), and J. Ruzyllo (The Pennsylvania State University, Department of Electrical Engineering,)

H02 Solid-State Electronics and Photonics in Biology and Medicine 2

Electronics and Photonics / Sensor
West Hall 1, Phoenix Convention Center

H02 Poster Session – 18:00 – 20:00
Co-Chair: Zong-Hong Lin

• **1198** Application of Modified Carbon Nanotube Materials for Enzymatic Biofuels Cells Based on Direct Enzyme-Electrode Contacts – G. Göbel (University of Apllied Sciences Wildau), V. Scherbahn, M. Putze (University of Applied Sciences Wildau), B. Dietzel (Institute for Thin Film and Microsensoric Technology), T. Heinlein (Technical University Darmstadt), J. J. Schneider (Technical University Darmstadt), and F. Lisdat (University of Applied Sciences Wildau)

• **1199** Bioelectrocatalysis of Fructose Dehydrogenase at Polyanilline-Modified Electrodes – D. Sarauli (Technical University Wildau, Biosystems Technology), B. Schulz (University of Potsdam, Institute of Chemistry), D. Fattakhova-Rohlfing (University of Munich (LMU), Centre of NanoScience), and F. Lisdat (University of Applied Sciences Wildau)

• **1200** Electrochemical Synthesis of Magnetic Core-Shell Nanoparticles – Y. F. Huang (National Tsing Hua University)

H03 State-of-the-Art Program on Compound Semiconductors 58 (SOTAPOCS 58)

Electronics and Photonics

Curtis A, Hyatt Regency

Radiation Effects – 08:00 – 10:20
Co-Chair: Erica Douglas

08:00 **1222** Simulating RF Performance of Proton Irradiated AlGaN/GaN High Electron Mobility Transistors (HEMT)s – S. Mukherjee, E. Patrick, and M. E. Law (University of Florida)

08:40 **1223** Effect of Proton Irradiation Energy in Al_2O_3/AlGaN/GaN Metal-Oxide-Semiconductor High Electron Mobility Transistors – S. Ahn, L. Le, C. Dong, W. Zhu, B. J. Kim, Y. H. Hwang, F. Ren, S. J. Pearton, K. S. Jones, A. G. Lind (University of Florida), and I. Kravchenko (Oak Ridge National Laboratory)

09:00 **1224** Cathodoluminescence Studies of Gamma-Irradiation Effects on AlGaN/GaN High Electron Mobility Transistors (HEMTs) – A. Yadav, M. Antia, E. Flitsiyan, L. Chernyak (University of Central Florida), I. Lubomirsky (Weizmann Institute of Science), and J. Salzman (Israel Institute of Technology)

09:40 **1225** Effects of 340 Kev Proton Irradiation on InGaN/GaN Blue Light-Emitting Diodes – B. J. Kim, S. Ahn, Y. H. Hwang, F. Ren, S. J. Pearton (University of Florida), J. Kim (Korea University), and M. L. Zhang (Hebei University of Technology)

10:00 Break

Group IV Materials and Devices – 10:20 – 11:40
Co-Chair: Colm O'Dwyer

10:20 **1226** Measurement of Recombination Lifetimes in Gesn Alloys – E. Erdman (Electro-Optics Graduate Program, University of Dayton), C. Senaratne (Dept. of Chemistry and Biochemistry, Arizona State Univ.), J. Menendez (Department of Physics, Arizona State Univ.), J. Kouvetakis (Dept. of Chemistry and Biochemistry, Arizona State Univ.), and J. Mathews (Department of Physics, University of Dayton, Electro-Optics Graduate Program, University of Dayton)

10:40 **1227** Measurement of Optical Emission from Gesn Waveguides – Y. Zhao (Electro-Optics Graduate Program, University of Dayton), J. Gallagher (Dept. of Chemistry and Biochemistry, Arizona State Univ.), Z. Li (Electro-Optics Graduate Program, University of Dayton), I. Agha (Department of Physics, University of Dayton, Electro-Optics Graduate Program, University of Dayton), J. Menendez (Department of Physics, Arizona State Univ.), J. Kouvetakis (Dept. of Chemistry and Biochemistry, Arizona State Univ.), and J. Mathews (Electro-Optics Graduate Program, University of Dayton, Department of Physics, University of Dayton)

11:00 **1228** Enhanced Performance Designs of Group-IV Light Emitting Diodes for Mid IR Photonic Applications – J. D. Gallagher (Department of Physics, Arizona State Univ.), C. Senaratne (Dept. of Chemistry and Biochemistry, Arizona State Univ.), C. Xu (Department of Physics, Arizona State Univ.), P. M. Wallace (Dept. of Chemistry and Biochemistry, Arizona State Univ.), J. Menendez (Department of Physics, Arizona State Univ.), and J. Kouvetakis (Dept. of Chemistry and Biochemistry, Arizona State Univ.)

11:20 **1229** Doping of Direct Gap $Ge_{1-y}Sn_y$ Alloys to Attain Electroluminescence and Enhanced Photoluminescence – C. L. Senaratne (Dept. of Chemistry and Biochemistry, Arizona State Univ.), J. D. Gallagher, C. Xu (Department of Physics, Arizona State Univ.), P. Sims (Dept. of Chemistry and Biochemistry, Arizona State Univ.), J. Menendez (Department of Physics, Arizona State Univ.), and J. Kouvetakis (Dept. of Chemistry and Biochemistry, Arizona State Univ.)

I02 Harnessing Multi-Step Electrochemical Reactions for Energy Conversion and Storage

Energy Technology / Physical and Analytical Electrochemistry

West Hall 1, Phoenix Convention Center

I02 Poster Session – 18:00 – 20:00

• **1240** Hydrogen Generation from the Hydrolysis of Sodium Hypophosphite Using CoB_2O_4 Catalyst for Fuel Cell Operation – G. Gorelishvili, P. Nikoleishvili, G. Tsutsumia, V. Kveselava, R. Kurtanidze (Ivane Javakhishvili Tbilisi State University), N. Koiava (Ivane Javakhishvili Tblisi State University), and D. Sharabidze (Ivane Javakhishvili Tbilisi State University)

I04 Ionic Conducting Oxide Thin Films

High Temperature Materials

Remington B, Hyatt Regency

Fundamental Studies 3 – 08:20 – 10:00
Co-Chairs: Enrico Traversa and Turgut M. Gur

08:20 **1265** Proton Conducting Micro-Solid Oxide Fuel Cells with Nanoscale Palladium Interlayers – S. Adam and S. Ramanathan (Harvard University)

09:00 **1266** Highly Confined Electronic and Ionic Conduction in Oxide Heterostructures – N. Pryds (DTU)

09:40 Break

General Session – 10:00 – 12:00
Co-Chairs: Cortney R. Kreller and Shriram Ramanathan

10:00 **1267** Stress Engineering in Developing Mixed Conducting Si-Ge Solutions for Lithium Ion Batteries – K. Mishra, M. Geppert, and X. D. Zhou (University of South Carolina)

10:20 **1268** Effect of Fuel Utilization on the Durability of Direct Methane SOFC – S. Georges, M. C. Steil (LEPMI), S. D. Nóbrega (LEPMI, France), Y. Bultel (LEPMI), J. P. Viricelle (EMSE), P. Gelin, S. K. Cheah (IRCELYON), and M. Rieu (EMSE)

10:40 **1269** Development of Ceria-Based Microtubular Solid Oxide Fuel Cells – H. Sumi, T. Yamaguchi, H. Shimada, K. Hamamoto, and T. Suzuki (National Institute of AIST)

11:00 **1270** Temperature Distribution Responses of a Micro-Tubular SOEC after an Electric Load Change – T. Mizusawa, T. Araki (Yokohama National University), and M. Mori (Central Research Institute of Electric Power Industry)

11:20 **1271** Alloy Element Effects on Corrosion Resistance and Electrical Conductivity of Stainless Steels for Molten Carbonate Fuel Cells – K. Kim, J. Kim, and K. Jo (POSCO Technical Research Laboratories)

11:40 **1272** Study of the Effect of Calcination Temperature on the Catalyst-Substrate interaction, Morphology and Activity of Iridium Oxide Electrocatalyst Supported on Antimony Tin Oxide (ATO) for PEM Electrolyser Technology – F. Karimi, B. A. Peppley (Queen's University), and A. Bazylak (University of Toronto)

West Hall 1, Phoenix Convention Center
I04 Poster Session – 18:00 – 20:00

• **1273** Effect of Ni in the Anode on the Performance of Pulse-Jet Rechargeable Direct Carbon Fuel Cells – S. Hattori, S. Sugiyama, X. Li, Y. Iida, and M. Ihara (Tokyo Institute of Technology)

I05 Polymer Electrolyte Fuel Cells 15 (PEFC 15)

Energy Technology / Battery / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry
211-A, Phoenix Convention Center

D2-1 Cathode Catalyst Layers 1: Design and Analysis – 08:00 – 12:00
Co-Chairs: Stève Baranton and Hiroyuki Uchida

08:00 **1432** Suppression of Oxygen Reduction Reaction on Pt-Based Electrocatalysts from Ionomer Interaction – S. S. Kocha (National Renewable Energy Laboratory) and K. Shinozaki (National Renewable Energy Laboratory, Toyota Central R&D Labs., Inc.)

08:20 **1433** Adsorption Behavior of Nafion Ionomers on Au and Pt Surfaces – T. Masuda and K. Uosaki (National Institute for Materials Science)

09:00 **1434** Pt/Ionomer Interface Analyses with the Combination of Voltammetry and Spectroscopy – K. Kodama (Toyota Central R&D Labs., Inc.), K. Motobayashi (Catalysis Research Center, Hokkaido University), A. Shinohara, N. Hasegawa, K. Kudo, R. Jinnouchi, H. Murata, T. Hatanaka, Y. Morimoto (Toyota Central R&D Labs., Inc.), and M. Osawa (Catalysis Research Center, Hokkaido University)

09:20 **1435** In Situ ATR-FTIR Analysis of the Structure of Nafion-Pt/C Interface By Use of MEA-Type Cell – M. Hara, K. Kunimatsu, M. Watanabe (Fuel Cell Nanomaterials Center, University of Yamanashi), and H. Uchida (Clean Energy Research Center, University of Yamanashi, Fuel Cell Nanomaterials Center, University of Yamanashi)

09:40 Intermission

10:00 **1436** Controlled Ionomer Deposition into the Cathode Catalyst Layer By Inkjet Printer for PEM Fuel Cells – A. Aziznia (AFCC Automotive Fuel Cell Cooperation Corp.), M. S. Saha, M. Tam, S. McDermid, D. Susac, and J. Stumper (Automotive Fuel Cell Cooperation Corp.)

10:20 **1437** Design of New Catalytic Architectures for Proton Exchange Membrane Fuel Cell – D. Dru (CEA), S. Baranton (Université de Poitiers, IC2MP, UMR CNRS 7285), P. Buvat (CEA), and C. Coutanceau (Université de Poitiers, IC2MP, UMR CNRS 7285)

10:40 **1438** Application of Modified-ACLS Electrodes on Low-platinum PEFCs – W. Mei (R&D center, Toshiba Corporation), T. Fukazawa, T. Yang, N. Yoshinaga, and Y. Kanai (R&D center, Toshiba Corporation)

11:00 **1439** Analysis of Kinetic Parameters and Effect of Pt Loading on Cell Performance of PEFC Electrodes Prepared by Inkjet Printing – S. Shukla, K. Domican, and M. Secanell (University of Alberta)

11:20 **1440** Analysis of Cathode Catalyst Layer Structure and Oxygen Transport Resistance Depending on Fabrication Condition in PEFC – Y. Tabe, S. Akabori, T. Hayashi, K. Suzuki, and T. Chikahisa (Hokkaido University)

11:40 **1441** Electrospun Nanofiber Fuel Cell Membrane-Electrode-Assemblies with Pt-Alloy Cathode Catalyst – J. J. Slack, R. Wycisk (Vanderbilt University), N. Dale, E. Niangar (Nissan Technical Center North America), and P. N. Pintauro (Vanderbilt University)

213-A, Phoenix Convention Center
F2-1 Electrocatalysis in Electrolysis Applications – 08:00 – 12:00
Co-Chairs: Hui Xu and Bryan S. Pivovar

08:00 **1452** Tailored DC-Sputtered Niobium Oxide Properties for PEM Electrolysis Application – D. Ion-Ebrasu, S. Enache (ICSI-Rm. Valcea), M. Filip, S. Preda (Institute of Phisical Chemistry, Romanian Academy), M. Varlam (ICSI-Rm. Valcea), V. Fruth (Institute of Phisical Chemistry, Romanian Academy), I. Stefanescu, and A. Rizoiu (ICSI-Rm. Valcea)

08:20 **1453** Highly active $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-\delta}$ single material electrode towards the oxygen evolution reaction for alkaline water splitting applications – E. Fabbri, X. Cheng (Electrochemistry Laboratory, Paul Scherrer Institut), and T. J. Schmidt (Laboratory of Physical Chemistry, ETH Zürich, Electrochemistry Laboratory, Paul Scherrer Institut)

08:40 **1454** Determining the Electrochemically Active Area of IrO_x Powder Catalysts in an Operating Proton Exchange Membrane Electrolyzer – S. Zhao (University of Connecticut), H. Yu (Center for Clean Energy Engineering), R. Maric (University of Connecticut), N. Danilovic, C. Capuano, K. E. Ayers (Proton OnSite), and W. E. Mustain (University of Connecticut)

09:00 **1455** Activity and Durability of Iridium Nanoparticles in Oxygen Evolution – S. M. Alia, S. S. Kocha, and B. S. Pivovar (National Renewable Energy Laboratory)

09:20 **1456** Activity and Durability of Iridium Nanoparticles in the Oxygen Evolution Reaction – S. M. Alia (National Renewable Energy Laboratory), S. Pylypenko (Colorado School of Mines), K. C. Neyerlin, S. S. Kocha, and B. S. Pivovar (National Renewable Energy Laboratory)

09:40 Break

10:00 **1457** NSTF Advances for PEM Electrolysis - the Effect of Alloying on Activity of NSTF Electrolyzer Catalysts and Performance of NSTF Based PEM Electrolyzers – K. A. Lewinski, D. van der Vliet, and S. M. Luopa (3M Company)

10:40 **1458** Water Splitting Ir Oxide-Based Electrocatalysts for Solar Fuel Production in Acid PEM and Acid PEC Devices – P. Strasser (Technical University Berlin)

11:00 **1459** PEM-Type Water Electrolysis/Fuel Cell Reversible Cell with Low PGM Catalyst Loadings – T. Ioroi and K. Yasuda (AIST)

11:20 **1460** PEM Water Electrolysis - New Approaches Towards Catalyst Separation, Recovery, and Recycling – M. Carmo (Forschungszentrum Juelich GmbH), D. Holtz (Forschungszentrum Jülich GmbH), W. Lüke, and D. Stolten (Forschungszentrum Juelich GmbH)

11:40 **1461** Electrocatalysis in Water Electrolysis – S. Gottesfeld (Cellera Technologies)

212-A, Phoenix Convention Center

E2-1 Direct Fuel Cells – 08:00 – 12:00

Co-Chairs: Carsten Cremers and Plamen Atanassov

08:00 **1442** Comparison of Electrocatalytic Properties of PtCo/Graphene Catalysts for Ethanol, Methanol and Borohydride Oxidation – V. Kepeniene, L. Tamasauskaite-Tamasiunaite, K. Antanaviciute, A. Balciunaite, and E. Norkus (Center for Physical Sciences and Technology)

08:20 **1443** Electrocatalyst for Direct Alcohol Fuel Cells – C. Cremers, T. Jurzinsky, A. Bach Delpeuch, C. Niether, F. Jung, K. Pinkwart, and J. Tübke (Fraunhofer Institute for Chemical Technology ICT)

09:00 **1444** Pt "Monolayer" Electrocatalysts Revisited: Structure, Lattice Geometry Effects, and Ethanol Oxidation Activity of Pt on Au – R. Loukrakpam (Technical University Berlin), S. R. Brankovic (University of Houston, Houston, Texas), and P. Strasser (Technical University Berlin)

09:20 **1445** Electrooxidation of Ethanol and Formic Acid on Model Systems Containing Noble Metals - Combined Spectroscopic and Electrochemical Studies – A. Lewera, M. T. Gorzkowski, J. Piwowar, and B. Gralec (University of Warsaw, Department of Chemistry)

09:40 Intermission

10:00 **1446** Preliminary Investigation on the Electrochemical Activity of Butanol Isomers as Potential Fuel for Direct Alcohol Fuel Cell – V. K. Puthiyapura (Queens University Belfast), D. J. Brett (University College London), A. E. Russell (University of Southampton), W. F. Lin, and C. Hardacre (Queens University Belfast)

10:20 **1447** Pd/3D-Graphene Electrocatalysts for Ethanol Oxidation – S. Kabir, A. Serov, and P. Atanassov (University of New Mexico)

10:40 **1448** Synthesis of High Pd-Loaded Pd/C Catalyst Using Ultrasonic Dispersions for the Direct Formic Acid Fuel Cells – T. Tsujiguchi (College of Science and Engineering, Kanazawa University, JST, PREST), R. Onishi (Kanazawa University), Y. Osaka, and A. Kodama (College of Science and Engineering, Kanazawa University)

11:00 **1449** Enhanced Ethanol Oxidation Activity for a Direct Fuel Cell with Silica-Carbon Composite Catalyst Support – H. Ishitobi, Y. Ino, and N. Nakagawa (Gunma University)

11:20 **1450** Microgravity Effect on Ammonia Oxidation at Platinum Nanoparticles Modified Mesoporous Carbon Supports – C. Poventud, R. Acevedo (University of Puerto Rico at Río Piedras), C. Morales (university of Puerto Rico at Río Piedras), L. E. Betancourt (University of Puerto Rico at Río Piedras), D. C. Diaz-Cartagena (University of Puerto Rico, Rio Piedras Campus), M. A. Rodriguez III, E. Larios, M. Jose-Yacaman (University of Texas at San Antonio), E. Nicolau (University of Puerto Rico at Río Piedras), M. Flynn (NASA, Mountain View, CA), and C. R. Cabrera Jr. (University of Puerto Rico at Rio Piedras)

11:40 **1451** Relating Direct Methanol Fuel Cell Performance to Measurements in a Liquid Half Cell – C. M. Pedersen, O. Tynelius, T. Lund-Olesen, J. H. Hales, L. H. Christensen (Danish Technological Institute), I. E. L. Stephens, and I. Chorkendorff (Technical University of Denmark)

212-C, Phoenix Convention Center

C2-1 Fuel Cell Membrane Development – 08:20 – 12:00

Co-Chairs: Andrew M. Herring and Benny D. Freeman

08:20 **1462** Influence of the Interfacial Water Transfer on the Analysis of Sorption and Desorption Experiments in Nafion® Membrane – S. Didierjean (LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy, LEMTA, CNRS, Vandoeuvre-lès-Nancy), J. C. Perrin (Université de Lorraine, LEMTA CNRS), F. Xu (LEMTA - Université de Lorraine - CNRS), G. Maranzana (LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy), J. Mainka (LEMTA, CNRS, Vandoeuvre-lès-Nancy, LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy), and O. Lottin (LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy)

08:40 **1463** Fundamental Studies of Ion Sorption, Diffusion and Transport in Polyelectrolyte Membranes – J. Kamcev, D. R. Paul, and B. D. Freeman (The University of Texas at Austin)

09:20 **1464** Direct Membrane Deposition with TiO_2 Reinforced Nafion$^{Â®}$ for Medium Temperature â€“ Polymer Electrolyte Membrane Fuel Cells – N. Wehkamp, M. Breitwieser, M. Klingele, R. Zengerle, and S. Thiele (IMTEK - University of Freiburg)

09:40 **1465** Electrospun Nafion/PVDF Blended Nanofiber Membranes for Regenerative H_2/Br_2 fuel Cells – J. W. Park, R. Wycisk (Vanderbilt University), G. Lin (TVN Systems, Inc.), T. V. Nguyen (UNIVERSITY OF KANSAS), and P. N. Pintauro (Vanderbilt University)

10:00 Break

10:20 **1466** Random and Triblock Copolymers with Phosphonium Cations for Alkaline Fuel Cells – Y. Liu (Colorado School of Mines), W. Zhang (University of Massachusetts Amherst), B. Zhang (Department of CBE, University of Delaware), Y. Yang (Colorado School of Mines), B. E. Coughlin (University of Massachusetts Amherst), Y. Yan (University of Delaware), M. W. Liberatore, and A. M. Herring (Colorado School of Mines)

10:40 **1467** Study of Polyphenylene Oxide Membranes Containing Long and Short Alkyl Side Chains – A. Amel and Y. Ein Eli (Technion)

11:00 **1468** Membranes from Blended Ionomer/PVDF Nanofibers: I. PFSA/PVDF and PFIA/PVDF Fiber Spinning and Membrane Fabrication – L. Dos Santos, J. W. Park, R. Wycisk, P. N. Pintauro (Vanderbilt University), G. Nawn (Department of Chemical Sciences - University of Padova), K. Vezzù (Veneto Nanotech S.C.p.a.), E. Negro (INSTM), F. Bertasi, and V. Di Noto (Department of Chemical Sciences - University of Padova)

11:20 **1469** Dual Nafion/Polyaniline Nanofibers Architecture for Applications in Fuel Cells Electrodes – S. Simotwo and V. Kalra (Drexel University)

11:40 **1470** Graft-Type Anion-Conducting Electrolyte Membranes Having Poly(2-imidazoliumylstyrene) Prepared By Radiation-Induced Grafting for Hydrazine Hydrate Fuel Cells – K. Yoshimura (QuBS, Japan Atomic Energy Agency), H. Shishitani, S. Yamaguchi, H. Tanaka (Daihatsu Motor Co., Ltd.), and Y. Maekawa (QuBS, Japan Atomic Energy Agency)

211-B, Phoenix Convention Center
A2-1 Catalyst Layer 2 – 09:00 – 11:40
Co-Chairs: Takahiro Suzuki and Kentaro Watanabe

09:00 **1471** Catalyst-Layer Ionomer Imaging of Fuel Cells – L. Guetaz (CEA, LITEN), M. Lopez-Haro (Univ Cadiz), S. Escribano, A. Morin, G. Gebel (CEA, LITEN), D. A. Cullen, K. L. More (Oak Ridge National Laboratory), and R. L. Borup (Los Alamos National Laboratory)

09:40 **1472** Investigation of Solvent and Carbon Particles Behavior during Drying Process from Catalyst Ink to Catalyst Layer – T. Suzuki (Osaka University), M. Kobayashi, H. Tanaka, M. Hayase (Tokyo University of Science), and S. Tsushima (Osaka University)

10:00 Intermission

10:20 **1473** In-Situ Analysis of Water Distribution within PEFC Catalyst Layer By Soft X-Ray Imaging – T. Sasabe, T. C. Jao, S. Uemura, and S. Hirai (Tokyo Institute of Technology)

10:40 **1474** Experimental Study of Thermal Conductivity of Catalyst Layer of Polymer Electrolyte Membrane (PEM) Fuel Cells – M. Ahadi (Simon Fraser University), M. Tam, M. S. Saha (Automotive Fuel Cell Cooperation Corp.), J. Stumper (Automotive Fuel Cell Cooperation Corporation), and M. Bahrami (Laboratory for Alternative Energy Conversion (LAEC))

11:00 **1475** In Situ Humidity Measurements at the CL Surface By MEMS-Based Sensors – J. Tsujikawa and T. Araki (Yokohama National University)

11:20 **1476** Simultaneous Measurements of Liquid Water Distributions and Catalyst Layer Surface Temperature inside Operating PEMFC – K. Watanabe, J. Tsujikawa (Yokohama National University), and T. Araki (PREST, JST, Yokohama National University)

212-B, Phoenix Convention Center
B2-1 Hydrogen Fuel Cell Systems – 10:00 – 12:20
Co-Chair: Karen Swider-Lyons

10:00 **1477** Autostack - CORE - Industry Led European Consortium to Develop Next Generation Automotive Stack Hardware – A. Martin (André Martin Consulting) and L. Jörissen (Zentrum für Sonnenenergie- und Wasserstoff-Forschung)

10:40 **1478** PEM Fuel Cells - Critical Power – R. Sookhoo (Hydrogenics)

11:20 **1479** Development of a Pure Oxygen Fuel Cell System for an Autonomous Underwater Vehicle with Focus on Fuel Starvation due to Inert Gas Accumulation on the Anode – M. Hitscherich, C. Cremers (Fraunhofer Institute for Chemical Technology ICT), D. Stolten (Chair for Fuel Cells, RWTH Aachen University), K. Pinkwart, and J. Tübke (Fraunhofer Institute for Chemical Technology ICT)

11:40 **1480** Status of Regenerative Fuel Cell Membrane Electrode Assembly Development for Space-Based Energy Storage1 – T. I. Valdez and K. J. Billings (Jet Propulsion Laboratory)

12:00 **1481** A CFD Simulation for an Air Breathing PEMFC for Power Source Portable Applications – E. Carcadea (ICSI Rm. Valcea), M. Varlam, I. Stefanescu (ICSI-Rm. Valcea), D. Ingham (University of Sheffield, UK), A. Marinoiu, L. Patularu, M. Raceanu, and D. Schitea (ICSI Rm. Valcea)

212-A, Phoenix Convention Center
E2-2 Alkaline Catalysis and Fuel Cells – 14:00 – 16:00
Co-Chair: Adam Z. Weber

14:00 **1509** Water Management in an Alkaline-Exchange-Membrane Fuel Cell – H. S. Shiau (Lawrence Berkeley National Laboratory), I. V. Zenyuk (Tufts University), and A. Z. Weber (Lawrence Berkeley National Laboratory)

14:20 **1510** Impact of Organic Cation Adsorption on the Hydrogen Oxidation Reaction of Pt in Alkaline Fuel Cells – H. T. Chung, U. Martinez, J. Chlistunoff, Y. S. Kim (Los Alamos National Laboratory), Y. K. Choe (AIST), and I. Matanovic (University of New Mexico)

14:40 **1511** The Effect of Carbonate and pH on Hydrogen Oxidation and Oxygen Reduction on Pt-Based Electrocatalysts in Alkaline Media – S. St. John, R. W. Atkinson III, A. L. Roy, O. Dyck (University of Tennessee), R. R. Unocic (Oak Ridge National Laboratory), A. B. Papandrew (University of Tennessee), and T. A. Zawodzinski (University of Tennessee, Oak Ridge National Laboratory)

15:00 **1512** Effective Nickel and Ruthenium Modified Palladium Anode Catalysts for Ethylene Glycol Oxidation in Alkaline Medium – R. G. Da Silva (Université de Poitiers, Universidade de São Paulo), A. R. De Andrade (Universidade de São Paulo), K. Servat, C. Morais, T. W. Napporn, and K. B. Kokoh (Université de Poitiers)

15:20 Intermission

212-C, Phoenix Convention Center

C2-2 Membrane Ageing and Durability – 14:00 – 17:40

Co-Chairs: Shanna Knights and Rod L. Borup

14:00 **1491** Membrane Durability in Heavy Duty Fuel Cells for Transit Bus Applications – E. Kjeang, K. H. Wong, N. Macauley, R. M.H. Khorasany (Simon Fraser University), M. Lauritzen, M. Watson, and S. Knights (Ballard Power Systems)

14:40 **1492** Modeling the Effect of Pt Precipitation on PEM Degradation – S. Burlatsky (United Technologies Research Center) and V. Atrazhev (Institute of Biochemical Physics, RAS)

15:20 **1493** Impact of Membrane Properties and Membrane Degradation on Cathode Catalyst Layer Degradation – M. Dutta, L. Ghassemzadeh, M. Lauritzen, D. Harvey, S. Wessel, A. P. Young, and S. Knights (Ballard Power Systems)

15:40 **1494** Probing the Morphological Changes of in-Situ Degraded Membranes in Polymer Electrolyte Fuel Cells – S. V. Venkatesan, S. Holdcroft, and E. Kjeang (Simon Fraser University)

16:00 Break

16:20 **1495** Cerium Migration during PEM Fuel Cell Assembly and Operation – A. M. Baker (Los Alamos National Laboratory, University of Delaware), D. Torraco, E. J. Judge, D. Spernjak, R. Mukundan, R. L. Borup (Los Alamos National Laboratory), S. G. Advani, and A. K. Prasad (University of Delaware)

16:40 **1496** Investigation of Wet/Dry Cycling of Polymer Electrolyte Membrane By Full-Cell Scale Numerical Simulation with Transient Load Profiles – T. Takayama, H. Yoshimura, H. Motegi, R. Takayama, N. Kariya, and M. Yoneda (Mizuho Information & Research Institute, Inc.)

17:00 **1497** Effect of Hygrothermal Ageing on PFSA Ionomers' Structure/Property Relationship – S. Shi (Lawrence Berkeley National Laboratory, Sch Chem Engn & Technol, Tianjin University), T. J. Dursch Jr. (Lawrence Berkeley National Laboratory), R. L. Borup (Los Alamos National Laboratory), A. Z. Weber, and A. Kusoglu (Lawrence Berkeley National Laboratory)

211-A, Phoenix Convention Center

D2-2 Cathode Catalyst Layers 2: Activity and Durability – 14:00 – 18:00

Co-Chairs: Rod L. Borup and Yu Morimoto

14:00 **1498** Assessment of Nanofiber Electrode MEA Durability By Analytical Electron Microscopy – K. L. More (Oak Ridge National Laboratory), M. Brodt, R. Wycisk, and P. N. Pintauro (Vanderbilt University)

14:20 **1499** Effects of Carbon Structures of Supported Pt Catalysts on the Performance of Polymer Electrolyte Fuel Cells – Y. C. Park (Fuel Cell Nanomaterials Center, University of Yamanashi), H. Tokiwa (University of Yamanashi), K. Kakinuma (Fuel Cell Nanomaterials Center,University of Yamanashi), M. Watanabe (Fuel Cell Nanomaterials Center, University of Yamanashi), and M. Uchida (Fuel Cell Nanomaterials Center,University of Yamanashi)

14:40 **1500** Accelerated Stress Tests on Fuel Cell Cathode Catalysts: A Material Balance Approach Combining Modeling and Experiment – C. A. Rice, P. Urchaga (Tennessee Technological University), J. Hu (Automotive Fuel Cell Cooperation Corporation), T. Kadyk, and M. Eikerling (Simon Fraser University, Department of Chemistry)

15:00 **1501** Online Mass Spectrometric Monitoring of Carbon Corrosion in PEMFC Electrodes Subjected to Accellerated Stress Testing – J. O. Meier, M. Joos, C. Cremers, K. Pinkwart, and J. Tübke (Fraunhofer Institute for Chemical Technology ICT)

15:20 **1502** Carbon Corrosion in PEM Fuel Cells during Drive Cycle Operation – R. L. Borup, R. Mukundan, D. Spernjak (Los Alamos National Laboratory), R. Ahluwalia, D. D. Papadias (Argonne National Laboratory), K. L. More (Oak Ridge National Laboratory), and S. Grot (Ion Power)

15:40 **1503** Mechanism and Kinetics of Carbon Corrosion in Polymer Electrolyte Fuel Cells during Drive Cycles – R. Ahluwalia, D. D. Papadias (Argonne National Laboratory), R. L. Borup, R. Mukundan, D. Spernjak, and D. A. Langlois (Los Alamos National Laboratory)

16:00 Intermission

16:20 **1504** Effects of Repeated Feed-Gas Exchange Processes on Degradation Processes of Pt-Based PEFC Cathode Catalysts Studied By In-situ XAFS, STEM-EDS and Electrochemical Methods – G. Samjeské, K. Higashi, S. Takao, O. Sekizawa, T. Kaneko, S. Nagamatsu, K. Nagasawa (The University of Electro-Communications), T. Uruga (JASRI/SPring-8, The University of Electro-Communications), and Y. Iwasawa (The University of Electro-Communications)

16:40 **1505** Activity and Durability of a Membrane Electrode Assembly Fabricated with Supportless Pt Hollow Spheres for Polymer Electrolyte Fuel Cells – S. Cho (Korea Institute of Energy Research (KIER), University of Science and Technology (UST)), E. J. Lim, T. H. Yang (Korea Institute of Energy Research (KIER)), and S. D. Yim (Korea Institute of Energy Research (KIER), University of Science and Technology (UST))

17:00 **1506** Impact of Cation Contamination on PEM Fuel Cell Performance – Y. Cai, A. Kongkanand, W. Gu, T. E. Moylan, and R. S. Kukreja (General Motors)

17:20 **1507** Effect of Caprolactam and Sulfate System-Derived Contaminants on Catalyst Activity and PEMFC Performanc – H. N. Dinh, G. Bender, H. Wang, C. S. Macomber (National Renewable Energy Laboratory), and L. McGovern (University of South Carolina)

17:40 **1508** Long Term Effects of Airborne Contaminants in PEMFC Cathode – Y. Zhai (University of Hawaii - Manoa), J. Ge (Changchun Institute of Applied Chemistry, CAS), and J. St-Pierre (University of Hawaii - Manoa)

213-A, Phoenix Convention Center

F2-2 Electrolyzer Components, Cells and Systems – 14:00 – 18:00
Co-Chairs: Wiebke Lüke and Katherine E. Ayers

14:00 **1513** Current State of the Art in Water Electrolysis Performance Based on Anion Exchange Membranes – K. E. Ayers (Proton OnSite), J. Parrondo (Illinois Institute of Technology), C. Capuano, M. George (Proton OnSite), V. K. Ramani (Illinois Institute of Technology), and C. Fujimoto (Sandia National Laboratory)

14:20 **1514** In-Operando Neutron Radiography Studies of Polymer Electrolyte Membrane Water Electrolyzers – M. A. Hoeh (Forschungszentrum Jülich GmbH), T. Arlt (Helmholtz-Zentrum Berlin), N. Kardjilov (Helmholtz Zentrum Berlin), I. Manke (Helmholtz-Zentrum Berlin), J. Banhart (Helmholtz-Zentrum Berlin für Materialien und Energie, Technische Universität Berlin), D. L. Fritz III, J. Ehlert, W. Lüke (Forschungszentrum Jülich GmbH), and W. Lehnert (Forschungszentrum Jülich GmbH, RWTH Aachen University, Germany)

14:40 **1515** Inhibiting the Swelling Behavior of Nafion Membranes for PEM Water Electrolysis – M. Carmo (Forschungszentrum Juelich GmbH), D. Henkensmeier (Korea Institute of Science and Technology (KIST)), W. Lüke, and D. Stolten (Forschungszentrum Juelich GmbH)

15:00 **1516** Studies of MEA Durability in Proton Exchange Membrane Water Electrolysis – H. Xu (Giner, Inc.), B. Rasimick (Giner Inc.), K. L. More (Oak Ridge National Laboratory), S. M. Alia, and B. S. Pivovar (National Renewable Energy Laboratory)

15:20 **1517** Investigation of Mass Transport Losses in Polymer Electrolyte Electrolysis Cells – M. Suermann (Electrochemistry Laboratory, Paul Scherrer Institut), T. J. Schmidt (Laboratory of Physical Chemistry, ETH Zürich, Electrochemistry Laboratory, Paul Scherrer Institut), and F. N. Büchi (Electrochemistry Laboratory, Paul Scherrer Institut)

15:40 **1518** Engineering Modeling of PEM Water Electrolysis – R. Hanke-Rauschenbach and B. Bensmann (University of Hannover)

16:10 Break

16:30 **1519** In-Situ Analysis of Gas Crossover in PEM Water Electrolysis - the Effect of Membrane Variation – W. Lüke, M. Carmo, M. Schalenbach (Forschungszentrum Juelich GmbH), and D. Stolten (Forschungszentrum Juelich GmbH, Chair for Fuel Cells, RWTH Aachen University)

17:00 **1520** Large Active Area PEM Electrolysis Stack Test Bed - Design, Data and Development – K. Harrison, O. Smith, M. Peters, and D. Terlip (National Renewable Energy Laboratory)

17:20 **1521** Unconventional Water Splitting Platforms – M. H. Hashemi, M. A. Modestino, and D. Psaltis (EPFL)

17:40 **1522** Internal Resistance Reduction of a Membrane Electrolyzer for Electrohydrogenation of Toluene As Hydrogen Carrier Synthesis – S. Mitsushima (Institute of Advanced Sciences, Yokohama Nat. Univ., Green Hydrogen Research Center, Yokohama Nat. Univ.), Y. Takakuwa, Y. Sawaguchi, K. Nagasawa, Y. Kohno, K. Matsuzawa (Green Hydrogen Research Center, Yokohama Nat. Univ.), Z. Awaludin, A. Kato, and Y. Nishiki (Permelec Electrode Ltd.)

211-B, Phoenix Convention Center

A2-2 Cell Level Characterization – 14:00 – 18:00
Co-Chairs: Roswitha Zeis and Daniel M. Peppin

14:00 **1482** Experimental Results with Fuel Cell Start-up and Shut-down. Impact of Type of Carbon for Cathode Catalyst Support – O. Lottin, J. Dillet, G. Maranzana, S. Abbou (LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy), S. Didierjean (LEMTA, CNRS, Vandoeuvre-lès-Nancy), A. Lamibrac (Paul Scherrer Institut), R. L. Borup, R. Mukundan, and D. Spernjak (Los Alamos National Laboratory)

14:40 **1483** Development of Accelerated Stress Tests for Polymer Electrolyte Membrane Fuel Cells – R. Mukundan, D. A. Langlois, D. Torraco, R. Lujan, K. Rau, D. Spernjak (Los Alamos National Laboratory), A. M. Baker (University of Delaware), and R. L. Borup (Los Alamos National Laboratory)

15:00 **1484** Electrochemical Impedance Spectroscopy as a Diagnostic Tool for High-Temperature PEM Fuel Cells – F. Mack, R. Laukenmann, S. Galbiati (Karlsruhe Institute of Technology, Helmholtz Institute Ulm), J. A. Kerres (University of Stuttgart, Institute of Chem. Proc. Eng.), and R. Zeis (Karlsruhe Institute of Technology, Helmholtz Institute Ulm)

15:20 **1485** The Importance of Diffusion Mechanisms in High Temperature Polymer Electrolyte Fuel Cells – Q. Cao, S. B. Beale, U. Reimer, D. Froning, and W. Lehnert (Forschungszentrum Jülich GmbH)

15:40 **1486** Large-Scale Optimization of Polymer Electrolyte Membrane Fuel Cells – P. Andrei (Florida State University, Florida A&M University) and M. Mehta (Aeropropulsion, Mechatronics and Energy Center, Florida State University)

16:00 Intermission

16:20 **1487** Resistance Measurements for Multilayer Supported Membranes – D. M. Peppin and M. Yandrasits (3M Company)

16:40 **1488** Current Density Distribution in the Lateral Direction of Conventional and Interdigitated Flow Field – U. N. Shrivastava and K. Tajiri (Michigan Technological University)

17:00 **1489** Method to Resolve Transport Distance for Oxygen Diffusion in the Land-Channel Geometry of a PEMFC – U. N. Shrivastava and K. Tajiri (Michigan Technological University)

17:20 ***1490*** Effect of Hydrophilic Treatment of Cathode Channel on Liquid Water Transport through Gas Diffusion Layer and Performance of PEFC – K. Nishida, Y. Kono, T. Nakamura, and R. Giga (Kyoto Institute of Technology)

212-A, Phoenix Convention Center

E2-3 Alkaline Membranes – 16:00 – 18:00
Co-Chairs: Michael Hickner and Yong Gao

16:00 **1523** Advancements in Anion Exchange Membrane Cations – M. R. Sturgeon, H. Long, and B. S. Pivovar (National Renewable Energy Laboratory)

16:20 **1524** Development of Alkaline Fuel Cells Using Hydroxide-Ion Conductive Layered Double Hydroxides – K. Tadanaga, K. Igarashi, T. Kubota, A. Miura, and M. Higuchi (Hokkaido University)

16:40 **1525** Proton and Metal Cage-Based Anion-Conductive Fluoropolymers for AMFCs – S. Xu (Southern Illinois University), R. Jiang (Midwest Energy Group, Inc.), and Y. Gao (Southern Illinois University)

17:00 **1526** New Polymer Structures for Anion Exchange Membranes – L. Zhu, J. Pan (Penn State University), and M. Hickner (The Pennsylvania State University)

J01 Physics and Chemistry of Luminescent Materials

Luminescence and Display Materials
Phoenix West, Hyatt Regency

Fundamental Chemistry and Physics II – 08:00 – 10:00
Co-Chairs: John Collins and Madis Raukas

08:00 **1588** 3d and 4f Ions in Solids: Description and Understanding of Optical Properties – M. G. Brik (University of Tartu, Chongqing University of Posts and Telecommunications), A. M. Srivastava (GE), and S. J. Camardello (University at Albany)

08:40 **1589** Thermal Properties of Mn^{4+}-Doped Complex Fluoride Phosphors – A. A. Setlur, J. Murphy, F. Garcia-Santamaria, and S. Sista (GE Global Research)

09:00 **1590** Thermal Degradation of Nitride Phosphors – R. J. Xie (National Institute for Materials Science), C. Wang (National Instiitute for Materials Science), T. Takeda (National Institute for Materials Science), Y. Cho (National Instittute for Materials Science), T. Suehiro, and N. Hirosaki (National Institute for Materials Science)

Applications of Luminescent Materials – 10:00 – 15:00
Co-Chairs: Kailash C. Mishra and Anant A. Setlur

10:00 **1591** The Exploration of Rare Earths Based Luminescence for Detection and Sensing in Radiation Security and Enhanced Oil Recovery – W. Chen (the University of Texas at Arlington), L. Ma (The University of Texas at Arlington), and S. Sahi (University of Texas at Arlington)

10:40 **1592** Amber Full Conversion Ceramics for LED Applications – Y. Zheng, J. Montaner, M. Raukas, C. Tarry (OSRAM SYLVANIA), J. Kechele, S. Tragl, J. Strube-Knyrim (OSRAM), D. Eisert, K. Ferstl, and B. Goeoetz (OSRAM Opto Semiconductors)

11:00 **1593** Chromium Doped Persistent Phosphors for Medical Imaging – D. Poelman, O. Q. De Clercq, P. F. Smet, and K. Braeckmans (Ghent University)

11:40 Break

14:00 **1594** Zncds:Cu, Al, Cl: A Near Infra-Red Emissive Phosphor for Marking, Coding, and Identification – P. J. Marsh, J. Silver, and G. R. Fern (Brunel University London)

14:20 **1595** Optical and Thermal Management of Phosphor-Converted LEDs – M. Raukas, J. Kelso, A. Lenef (OSRAM SYLVANIA), A. Linkov (OSRAM Opto Semiconductors), and M. Tchoul (OSRAM SYLVANIA)

L01 Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry General Session

Physical and Analytical Electrochemistry
West Hall 1, Phoenix Convention Center

L01 Poster Session – 18:00 – 20:00
Co-Chair: Alice H. Suroviec

- **1631** Square Wave Voltammetric Method for Simultaneous Determination of Bleaching Agents in Skin Cosmetics – G. N. Calaça, S. Machado, K. Wohnrath (State University of Ponta Grossa), C. A. Pessoa (Universidade Estadual de Ponta Grossa), and N. Nagata (Federal University of Paraná)
- **1632** Electron Transfer Studies Between New Fad-Dependent Glucose Dehydrogenase and Different Osmium Polymers (Applications in Biosensors and Biofuel Cells) – I. Aslam (Govt. College University Faisalabad, Pakistan), M. N. Zafar (University of Gujrat, Gujrat, Pakistan), R. Ludwig (University of Natural Resources and Life Science, Austria), D. Leech (National University of Ireland Galway, Ireland), and L. Gorton (Lund University, Lund, Sweden)
- **1633** Exploiting the Reaction of Cytochrome *C* with Fructose Dehydrogenase for a Multilayer Electrode Construction – F. Lisdat, C. Wettstein (TH Wildau), K. Kano (Kyoto University), and U. Wollenberger (University of Potsdam)
- **1634** The Study on the Synergistic Effect of Anti-Poisoning Electrocatalyst and Self-Humidifying Proton Exchange Membrane for Hydrogen Fuel Cell – R. Deng, V. Sim, W. Han, K. L. Yeung (The Hong Kong University of Science and Technology), M. V. Martínez-Huerta (Institute of Catalysts and Petroleochemistry, CSIC), and X. Ouyang (The Hong Kong University of Science and Technology, Nanyang Technological University)

- **1635** Modified Electrodes Obtained By Electrochemical Codeposition of Some Conducting Polymers and Carbon Nanotubes with Different Dopants – F. Branzoi (Institute of Physical Chemistry), V. Branzoi (University Politehnica of Bucharest), and C. Pacuretu (Institute of Physical Chemistry)
- **1636** Extensive Studies of the Electrochemical Behavior of Pt Ni/MWCNT Catalysts in Alkaline Media – A. M. Valenzuela-Muñiz, G. Rosado, and Y. Verde Gomez (Instituto Tecnologico de Cancun)
- **1637** Field-Dipole Interactions at p-GaAs (100) Electrode in Sodium Dodecyl Sulfate Acid Solution – V. Lazarescu, M. Enache, G. Dobrescu, M. Anastasescu (Institute of Physical Chemistry Ilie Murgulescu), C. Negrila, and M. F. Lazarescu (National Institute of Material Physics)
- **1638** Empirical Insights into the CO_2 Reduction Reaction Mechanism: A Study of the Reduction of CO_2, CO and Formaldehyde on Cu Electrodes By Differential Electrochemical Mass Spectrometry – A. Javier, B. Chmielowiec, J. Sanabria-Chinchilla, Y. G. Kim, J. H. Baricuatro, and M. P. Soriaga (California Institute of Technology)

L03 Electroactive and Redox Active Polymers

Physical and Analytical Electrochemistry / Energy Technology

Russell C, Hyatt Regency

Keynote Session – 08:05 – 09:50
Co-Chairs: Junhua Jiang and Joaquín Rodríguez-López

08:05 Welcoming Remarks

08:10 **1639** (Keynote) Biofilm-Supported Redox-Polymer-Type Materials for Electrocatalytic Oxygen Reduction of Importance to Biosensing and Bioenergetics – P. J. Kulesza (University of Warsaw)

08:50 **1640** (Keynote) Redox Active Polymers: A Size Selective Solution for Nonaqueous Redox Flow Batteries – E. C. Montoto, E. Chenard, N. Gavvalapalli, J. Hui, K. Cheng, M. Burgess, T. Lichtenstein, J. S. Moore, and J. Rodríguez-López (University of Illinois at Urbana-Champaign)

09:30 Intermission

Energy Session 1 – 09:50 – 11:50
Co-Chairs: Luke M. Haverhals and Junhua Jiang

09:50 **1641** (Invited) Understanding the Role of Organic Alloys in Polymer-Fullerene Solar Cells – B. C. Thompson (University of Southern California)

10:20 **1642** (Invited) Tailoring Polymer Structure and Composition for High-Power and High-Charge Capacity Redox Electrodes – M. E. Roberts (Clemson University)

10:50 **1643** (Invited) Nanostructured Electroactive Polymers for Energy Storage and Biosensors Technologies – Y. Shi and G. Yu (The University of Texas at Austin)

11:20 **1644** (Invited) Intermediate Tunnelling-Hopping Regime in DNA Charge Transport – L. Xiang, J. Palma, C. Bruot, V. Mujica (Arizona State University), M. A. Ratner (Northwestern University), and N. Tao (Arizona State University)

Energy Session 2 – 14:00 – 15:50
Co-Chairs: Andrew M. Herring

14:00 **1645** (Invited) Natural Fiber Welded Composites: Electrodes and Capacitors – L. M. Haverhals (Bradley University), D. P. Durkin (U. S. Naval Academy), K. Jost (A.J. Drexel Nanomaterials Inst., Mat. Sci. and Eng. Dept.), E. K. Brown (U. S. Naval Academy), G. Dion (Shima Seiki Haute Technology Laboratory), Y. Gogotsi (Drexel University), H. C. De Long (Air Force Office of Scientific Research), B. Tisserat (US Dept of Agriculture - NCAUR), and P. C. Trulove (U. S. Naval Academy)

14:30 **1646** (Invited) Functional Conductive Polymer Binders for High-Performance Silicon-Based Anodes in Lithium-Ion Batteries – Z. Jia, H. Zhao, and G. Liu (Lawrence Berkeley National Laboratory)

15:00 **1647** (Invited) Impact of Nafion Dispersion Morphology on Fuel Cell Performance and Durability – Y. S. Kim, C. Welch, R. Hjelm, N. Mack, C. Johnston, B. Choi, D. A. Langlois, K. S. Lee, E. B. Orler, A. Labouriau (Los Alamos National Laboratory), K. More (Oak Ridge National Laboratory), H. Xu (Giner, Inc.), J. Willey (Giner Inc), and C. K. Mittelsteadt (Giner, Inc.)

15:30 Intermission

Fundamental Session – 15:50 – 17:30
Co-Chairs: Chinbay Q. Fan and Heli Wang

15:50 **1648** (Invited) Solid-State Charge Transport in Redox-Active Radical Polymers – B. W. Boudouris (Purdue University)

16:20 **1649** (Invited) Electrically Switchable Surface Properties Using End-Charged Polymers and pH-Responsive Swelling of Polymer Brushes Via Self-Consistent Field Theory – D. Wu and R. Hu (Colorado School of Mines)

16:50 **1650** Radical Environments for Fast Charge Transport in the Stable Radical Polymer, Ptma – D. C. Bobela, B. K. Hughes, W. A. Braunecker, T. Kemper, R. E. Larsen, and T. Gennett (National Renewable Energy Laboratory)

17:10 **1651** Spectroelectrochemical Studies of Charge Transfer Processes in Stable Nitroxyl Radical-Containing Polymers – B. K. Hughes, W. A. Braunecker, J. C. Johnson, and T. Gennett (National Renewable Energy Laboratory)

West Hall 1, Phoenix Convention Center
L03 Poster Session: New Polymers – 18:00 – 20:00

- **1652** Conjugated Organophosphorus Materials As Electrodes for Organic Batteries – C. Reus and T. Baumgartner (University of Calgary)
- **1653** Characterization of the Time-Dependent Strain Behavior of Electroactive NCC-PEO Composite Polymers – P. Bass (Materials Research and Education Center, Auburn University), L. Blue, L. Zhang, E. Hofer, Z. Y. Cheng (Auburn University), and M. Tu (Forest Products Laboratory, Auburn University)

L06 Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 6

Energy Technology / Physical and Analytical Electrochemistry / Sensor

104-B, Phoenix Convention Center

Carbon Doxide Conversion-Invited Talks – 08:10 – 12:00
Co-Chairs: Deryn Chu and Heli Wang

08:10 **1705** Developing Catalysts for the Selective Electrochemical Reduction of Carbon Dioxide to C2 and C3 Products – B. S. Yeo (National University of Singapore)

08:40 **1706** Surface Chemistry of Electrocatalysts for CO_2 Reduction to Fuels – C. X. Kronawitter, Z. Chen, P. Zhao, and B. E. Koel (Princeton University)

09:10 **1707** Photocatalytic Coversion of CO_2 By H_2o As an Electron Donor Using Various Solid-State Photocatalysts – K. Teramura (Department of Molecular Engineering, Kyoto University)

09:40 Break

10:00 **1708** Development of Nanostructured Hybrid Materials for Electrocatalytic and Photoelectrocatalytic Reduction of Carbon Dioxide – P. J. Kulesza, A. Wadas (University of Warsaw), E. Szaniawska (University of Warsaw, Department of Chemistry), R. Solarska, K. Bienkowski, and I. A. Rutkowska (University of Warsaw)

10:30 **1709** Photocatalytic Reduction of CO2 with H2O By Engineered TiO2 Nanocomposites – Y. Li (Texas A&M University) and L. Liu (University of Wisconsin-Milwaukee)

11:00 **1710** Fuel Production from the Electroreduction of CO_2 – A. C. Co (The Ohio State University)

11:30 **1711** Photocatalytic Reduction of CO_2 to CO on TiO_2-Passivated InP at High Underpotentials in Ionic Liquids – G. Zeng and S. B. Cronin (University of Southern California)

Photoelectrochemical Cells for Water Splitting-Invited Talks – 14:00 – 15:50
Co-Chairs: Jae Joon Lee and Heli Wang

14:00 **1712** Enabling Unassisted Solar Water Splitting By Hematite – D. Wang (Boston College)

14:30 **1713** Development of New Photocatalysts for Solar-to-Fuel Conversion – K. Maeda (Tokyo Institute of Technology)

15:00 **1714** Mathematical Modeling of Solar-Fuel Generators – J. Stevens (Lawrence Berkeley National Laboratory), C. Xiang (California Institute of Technology), M. Singh (Lawrence Berkely National Laboratory), Y. Chen (California Institute of Technology), and A. Z. Weber (Lawrence Berkeley National Laboratory)

15:30 Break

New Structures and Catalysts for Water Splitting – 15:50 – 17:50
Co-Chairs: Pawel J. Kulesza, Huyen N. Dinh, and Renata Solarska

15:50 **1715** SnO_2 and F:SnO_2 Inverse Opal Based Photoelectrochemcial Water Splitting – S. H. Kang (Chonnam National University)

16:10 **1716** Fast Water Oxidation Kinetics in Li-Doped TiO_2 Nanotubes – L. K. Tsui and G. Zangari (University of Virginia)

16:30 **1717** Preparation of Nickel Tungstate (NiWO4) Nanoparticles and Characterization with Electrochemical Methods in Combination with Mott-Schottky Theory – S. Hosseini (Ball state University), H. Farsi, S. Moghiminia (University of Birjand), and Z. Li (Ball State university)

16:50 **1718** Guiding Practical Pathways for Photo-Electrochemical Solar-Hydrogen Generation – S. Haussener and M. Dumortier (LRESE, EPFL)

17:10 **1719** Atomic Layer Deposition of Epitaxial Iron Oxides for Photoelectrochemical Water Oxidation – J. D. Emery, C. M. Schlepütz (Argonne National Laboratory), P. Guo (Northwestern University), S. C. Riha (Argonne National Laboratory), R. P. H. Chang (Northwestern University), and A. B. F. Martinson (Argonne National Laboratory)

17:30 **1720** Silicon-Indium Tin Oxide Schottky Junction with Nickel Oxide Catalyst for Water Oxidation – S. Yoon (Hanyang University), J. H. Lim (Korea Institute of Materials Science), and B. Yoo (Hanyang University)

West Hall 1, Phoenix Convention Center
L06 Poster Session – 18:00 – 20:00
Co-Chairs: A. Manivannan and Nianqiang (Nick) Wu

- **1721** Benchmarking Nanoparticulate Metal Oxides for the Alkaline Water Oxidation – S. Jung (Joint Center for Artificial Photosynthesis-Caltech), C. C. L. McCrory, J. C. Peters, and T. F. Jaramillo (Joint Center for Artificial Photosynthesis)
- **1722** Electrodeposited WO3 Film on Various Metal Substrates and Its Morphological Effect for Photoelectrochemical Water Splitting – S. H. Kang (Chonnam National University)
- **1723** Photoelectrochemical Characteristics of Pulse Electrodeposited $AgIn_{0.5}Ga_{0.5}Se_2$ Thin FILMS – R. Murali (University of Madras)
- **1724** Photoelectrochemical Behaviour of Pulse Plated $CuIn_{0.6}Al_{0.4}Se_2$ Thin FILMS – K. R. Murali (University of Madras), T. M (Shree Venkateshwara Hi-Tech Engineering College), and R. K (Vidyaa Vikas College of Engineering and Technology)
- **1725** Photoelectrochemical Cells Studies with Pulse Electrodeposited CuInS2 Films – K. R. Murali (University of Madras)
- **1726** Photoelectrochemical Studies on Brush Plated $CuInSe_2$ Films – K. R. Murali (University of Madras) and S. Murugan (AVC College)
- **1727** Photoelectrochemical Cells Studies with Brush Electrodeposited $AgGaSe_2$ Films – K. R. Murali (University of Madras), J. Ashok Kumar (National Engineering College), and S. Perumal (ST Hindu College)
- **1728** Preparation of Thylakoid/Polyaniline/Reduced Graphene Oxide/Glassy Carbon Integrated System and Photocurrent Enhancement – J. Lee and S. Kim (Konkuk University)
- **1729** Solar Fuel Generation By 1D ZnO /QDs Heterostructures – Y. He, J. Li (West Virginia University), D. Chu (U.S. Army Research Laboratory), J. Bright, and N. Wu (West Virginia University)

- **1730** Enhanced Production of Solar-Fuels By Plasmonic Metal/Semiconductor Photocatalyst Heterostructures – J. Bright, J. Li, S. K. Cushing (West Virginia University), D. Chu (U.S. Army Research Laboratory), and N. Wu (West Virginia University)
- **1731** Spray Pyrolyzed TiO_2 / Sol Gel Dip Coated NiO Dye Sensitized Solar Cells – K. R. Murali (University of Madras)
- **1732** Sol Gel Dip Coated Yb and Tm Doped Indium Oxide Dye Sensitizrd Solar Cells – K. R. Murali (University of Madras)
- **1733** Preparation, Characterization and Photoelectrochemical Investigation of p-Type Nanostructured Cobalt Titanate – H. Farsi, S. Moghiminia, and H. Raissi (University of Birjand)
- **1734** Photoelectrochemical Treatment of Reject Brines from RO Plants – A. Rassoolkhani, K. Nguyen, A. McKee, M. Hemingway, S. Tentinger, W. Cheng, and S. Mubeen (University of Iowa)
- **1735** Photoelectrochemical Characterization of Spin-Coated $CuBi_2O_4$ Thin Films for Water Splitting – I. G. Rodríguez Gutiérrez, M. Flores Pinto, M. J. Rodríguez Pérez, G. Rodriguez-Gattorno, and G. Oskam (CINVESTAV-IPN)
- **1736** Low-Cost Synthetic Routes for Fabricating Tandem/Multi-Junction Photoelectrochemical Devices – W. Cheng (University of Iowa), A. M. Rassoolkhani (Chemical and Biochemical Engineering, University of Iowa), and S. Mubeen (University of Iowa)

L07 Physical and Analytical Electrochemistry in Ionic Liquids 4

Physical and Analytical Electrochemistry / Battery / Industrial Electrochemistry and Electrochemical Engineering / Sensor

Borein A, Hyatt Regency

Physical and Analytical Electrochemistry in Ionic Liquids – 08:00 – 12:20
Co-Chairs: Paul C. Trulove and Robert A. Mantz

08:00 **1752** Electrochemical Characterisation of Adsorption of Halide Ions at Bi(111) Electrode from Ionic Liquids and Their Mixtures – C. Siimenson, L. Siinor (Institute of Chemistry, University of Tartu), and E. Lust (University of Tartu)

08:20 **1753** Electrochemical Reactions at Ionic Liquid/ Gold Interface Probed By Electrochemical Surface Plasmon Resonance – N. Nishi, Y. Ikeda, K. I. Amano, and T. Sakka (Graduate School of Engineering, Kyoto University)

08:40 **1754** Potential-Dependent Structure of Ionic Liquids and Solvated Lithium Ions on a Gold Electrode: A Surface-Enhanced Infrared Study – K. Motobayashi, K. I. Uchida (Catalysis Research Center, Hokkaido University), K. Minami, N. Nishi, T. Sakka (Graduate School of Engineering, Kyoto University), and M. Osawa (Catalysis Research Center, Hokkaido University)

09:00 **1755** Electrochemical Characterization of the Interface Between Pyrolytic Graphite Electrode and 1-Butyl-3-Methylimidazolium Iodide – L. Siinor (Institute of Chemistry, University of Tartu) and E. Lust (University of Tartu)

09:20 **1756** Mechanistic Study of Energy Efficient Electrochemical Capture and Release of CO_2 in Ionic Liquid Complexes – P. Singh and D. A. Buttry (Arizona State University)

09:40 Break

10:00 **1757** On the Mechanism of Electrochemical Reduction of Niobium Halides in Ionic Liquids – A. Ispas and A. Bund (Technische Universitaet Ilmenau)

10:20 **1758** Mg Battery Electrolytes from Aluminate and Borate Complexes in Ionic Liquids – T. S. Watkins and D. A. Buttry (Arizona State University)

10:40 **1759** Effect of 1-Butyl-1-Methylpyrrolidnium Dicyanamide on the Structure of Pd Electrodeposit – S. Shrestha and E. J. Biddinger (The City College of New York)

11:00 **1760** Conductivity and Ionicity of Ionic Liquids Made By Ligand Assisted Ionization of Metal Halides – M. Hasani and C. A. Angell (Arizona State University)

11:20 **1761** Nanocomposite Semi-Solid Ionic-Liquid Electrolytes with Enhanced Charge-Transport and Redox Mediating Capabilities – P. J. Kulesza, I. A. Rutkowska (University of Warsaw), and J. M. Orlowska (University of Warsaw, Department of Chemistry)

11:40 **1762** Fundamental Characterization of Solvent Effects on Electrochemical Properties of Silylamine-Type Reversible Ionic Liquids – S. Jung, J. D. Jimenez (City College of New York), and E. J. Biddinger (The City College of New York)

12:00 **1763** Understanding Lithium Solvation in Ionic Liquids from First Principles Molecular Dynamics Simulations – A. Kachmar and M. A. Carignano (Qatar Environment and Energy Research Institute)

West Hall 1, Phoenix Convention Center
L07 Poster Session – 18:00 – 20:00
Co-Chairs: Paul C. Trulove and Robert A. Mantz

- **1764** Electrochemical Characterization of 1 Wt% Mixture of 1-Ethyl-3-Methylimidazolium Chloride and 1-Ethyl-3-Methylimidazolium Tetrafluoroborate|Bi(111) Interface – L. Läll (Institute of Chemistry, University of Tartu, Estonia), L. Siinor (Institute of Chemistry, University of Tartu), and E. Lust (University of Tartu)
- **1765** A Facial Liquid Plasma-Induced Polymerization of a Highly Ion-Conductive Polymeric Membrane – H. S. Choi and Q. C. Tran (Chungnam National University)

M01 Sensors, Actuators, and Microsystems General Session

Sensor

106-C, Phoenix Convention Center

New Paradigms in Sensor Technology – 08:10 – 10:00
Co-Chairs: Sushanta Mitra and Alex L. Simonian

08:10 **1793** Rapid Detection of Pathogenic Bacteria with the Naked Eye Using Magnetophoretic Chromatography Technique – D. Kwon, S. Lee, H. Lee, and S. Jeon (Department of Chemical Engineering, POSTECH)

08:30 **1794** 3D Printing the Way to Truly Remote, Autonomous, Solar Powered Sensor Networks for Environmental Monitoring of Trace Heavy Metals By Calibration-Less Anodic Stripping Coulometry of μl Sized Samples – M. M. Marei, T. J. Roussel Jr., R. P. Baldwin, and R. S. Keynton (University of Louisville)

08:50 **1795** Enzyme Functionalized Gold Nanoparticles for the Enhanced Electrochemical Detection of Lactate – P. Manickam, Y. Umasankar, and S. Bhansali (Florida International University)

09:10 **1796** Functional PDMS Composite Microbridges for Temperature Sensing Applications – M. Pallapa, J. C. K. Leung, and P. Rezai (York University)

09:40 Break

Optical Biosensors – 10:00 – 12:20
Co-Chairs: Jun Li and Liju Yang

10:00 **1797** Upconverting Nanoparticles for Sensing – F. Vetrone (INRS-EMT, Université du Québec)

10:30 **1798** Integration of Nanostructured Dielectrophoretic Device and Surface-Enhanced Raman Probe for Highly Sensitive and Rapid Pathogen Detection – F. Madiyar (Kansas State University), S. Bhana (The University of Memphis), L. Swisher (Kansas State University), X. Huang (The University of Memphis), C. Culbertson, and J. Li (Kansas State University)

11:00 **1799** Plasmonic Gold Nanohole Arrays for Surface-Enhanced Raman Scattering Biosensing – P. Zheng, X. Gao, and N. Wu (West Virginia University)

11:20 **1800** Towards Development of a Low-Cost and Sensitive Thermal Sensor for User-Independent Interpretation of Results from Lateral Flow Assay (LFA) Devices – M. Pallapa and P. Rezai (York University)

11:40 **1801** Magnetic Optical Microarray Imager for Diagnosing Type of Diabetes in Clinical Matrices – V. Singh and S. Krishnan (Oklahoma State University)

12:00 **1802** Bi-Tapered Optical Fibers: Signal Analysis for Sensing Applications – D. J. Jauregui (Universidad de Guanajuato), A. B. H. Negari (University of Dayton), J. M. Sierra Hernandez (Universidad de Guanajuato), D. Garcia Mina, B. J. King, P. E. Powers, J. W. Haus, and K. M. Hansen (University of Dayton)

Solid-Sate and Electrochemical Biosensors – 14:00 – 16:00
Co-Chairs: Alex L. Simonian and Larry A. Nagahara

14:00 **1803** A Comparison of the Sensor Performance of Electrochemical Peptide-Based Sensors Fabricated from 6- or 11-Carbon Self-Assembled Monolayers – A. L. Sutlief (University of Nebraska-Lincoln Department of Chemistry) and R. Y. Lai (University of Nebraska - Lincoln Department of Chemistry)

14:20 **1804** Amplification Strategy of FET Biosensor Signal for Sensitive Detection of Prion Proteins – S. Wustoni (Graduate School of Advanced Science and Engineering, Waseda University), S. Hideshima, S. Kuroiwa, T. Nakanishi, and T. Osaka (Research Organization for Nano & Life Innovation, Waseda University)

14:40 **1805** Enzyme Biosensor for Detection of Formaldehyde on Carbon Nanotube-Screen Printed Electrodes Modified with Pyrenyl Groups – G. Premaratne, S. Farias, and S. Krishnan (Oklahoma State University)

15:00 **1806** Electrochemical Biosensor for Faster Diagnosis of Alpha-1-Antitrypsin Deficiency – B. E. Materi, B. G. Adams, C. A. Rice, J. Rice, and J. Sanders (Tennessee Technological University)

15:20 **1807** Preparation of Glucose Oxidase-Immobilized Electrodes Using Cellulose Aqueous Solution – M. Yasuzawa, Y. Omura, K. Hiura, J. Li (Tokushima University), Y. Fuchiwaki, and M. Tanaka (Health Research Institute, AIST)

15:40 Break

Chemical Sensors for Environmental Monitoring – 16:00 – 18:30
Co-Chairs: Michael T. Carter and Raluca Ioana Stefan-van Staden

16:00 **1808** Simple, Inexpensive and Rapid Sensors for Commercial and Household Water Quality Monitoring – N. S. Gunda, R. Chavali, and S. Mitra (York University)

16:30 **1809** Performance Enhancements for Chemiresistive Electronic Noses Based upon Materials, Temperature Modulation and Signal Processing – K. D. Benkstein (National Institute of Standards and Technology), N. Katta, B. Raman (Washington University in St. Louis), and S. Semancik (National Institute of Standards and Technology)

16:50 **1810** Electrochemical Quantification of Vanadium By Novel Electroanalytical Technique – M. I. Salazar-Gastelum (Center for Electrochemical Engineering Research, Ohio University) and G. G. Botte (Department of Chemical and Biomolecular Engineering)

17:10 **1811** Electrochemical Sensors to Detect Heavy Metals and Carcinogenic Compounds: Inquiry-Based Modules to Meet Today's Interest – S. K. Lunsford, C. Spradlin, M. Sullivan, D. Dobson, and M. Hughes (Wright State University)

17:30 **1812** Self Assembled Chemical Field Effect Transistors for Heavy Metal Detection – H. Ruan (NanoSonic, Inc), Y. Kang, E. Gladwin, and R. O. Claus (NanoSonic, Inc.)

17:50 **1813** Gas Sensing Properties of Hierarchically Structured Zinc Oxide Films By Electrophoretic Deposition – Y. Chung, H. Park, E. Lee, S. Lee, and D. J. Kim (Auburn University)

18:10 **1814** Activation Free SAM-Assisted Silver Electroless Metallization of Textile for Strain Sensor Application – A. Molazemhosseini, E. Cattarinuzzi, D. Gastaldi, P. Vena, and L. Magagnin (Politecnico di Milano)

Z02 Nanotechnology General Session

All Divisions / Interdisciplinary Science and Technology Subcommittee
Remington B, Hyatt Regency

Nanotechnology General Session – 14:00 – 17:20
Co-Chairs: O. M. Leonte and Mahendra Kumar Sunkara

14:00 **1925** Analytical Study of the Band GAP and Optical Characteristics of Copper Sulphide Thin Film: Experiment and Computation – E. I. Ugwu (EBSU, Abakaliki), J. Okwo (Madonna University), D. U. Onah, and J. E. Ekpe (EBSU, Abakaliki)

14:20 **1926** Electroassisted Assembly of Alkylphosphonic Acids Monolayers on Nitinol – S. Devillers, A. Vanhooland, T. Issakova, J. Delhalle, and Z. Mekhalif (University of Namur - CES Laboratory)

14:40 **1927** Cellular Toxicity Assessment and Environmental Impact of Pre- and Post-CMP Nanoparticle Slurries – K. Kosaraju (University of North Carolina at Greensboro), M. Tarannum, S. Crawford, and S. Aravamudhan (North Carolina A&T State University)

15:00 **1928** Surface-Initiated ATRP of (hydroxyethyl) Methacrylate on Nitinol Modified By in Situ Generated Diazonium from Its Nitro Precursor – A. Jacques, J. Delhalle, and Z. Mekhalif (University of Namur - CES Laboratory)

15:20 **1929** Fabrication of Large Scale Silver Nanowire Network By Ion Beam Irradiation – S. Honey (UNESCO-UNISA Africa Chair in Nanosciences, Center of Excellence in Solid State Physics), F. T. Thema (UNESCO-UNISA Africa Chair in Nanosciences, iThemba Labs), I. Ahmad (National Centre for Physics), S. Naseem (Centre of Excellence in Solid State Physics), and M. Malik (UNESCO-UNISA Africa Chair in Nanosciences, iThemba Labs, Somerset West 7129, South Africa)

15:40 Break

16:20 **1931** Ultrasound Asissted $LiFePO_4$ Nano Plate Synthesis Via Subsequential Aqueous Precipitation Method – S. Dogu and M. K. Aydinol (Middle East Technical University)

16:40 **1932** Electrochemical Separation, Pumping, and Storage of Hydrogen or Oxygen into Nanocapillaries Via High Pressure MEA Seals – R. D. Reeves, N. R. Schwartz, G. E. Chester, D. S. Diez (Mainstream Engineering Corp.), M. L. Solomon (Mainstream Engineering Corp., Florida Institute of Technology), P. Cox, and J. J. Hill (Mainstream Engineering Corp.)

17:00 **1933** High Resolution 3-Dimensional Chemical and Morphological Imaging of Single Li_xFePO_4 Particles – Y. S. Yu (University of Illinois at Chicago, Lawrence Berkeley National Laboratory), D. Shapiro, M. Farmand (Lawrence Berkeley National Laboratory), C. Kim (Chungnam National University, University of Illinois at Chicago), Y. Liu (SLAC National Accelerator Laboratory, USA), and J. Cabana (NECCES at University of Illinois at Chicago)

West Hall 1, Phoenix Convention Center

Z02 Poster Session – 18:00 – 20:00

Co-Chair: O. M. Leonte

• **1934** Characterization of Lift Off Resist during Thermal Compression Wafer Bonding Based on Polydimethylglutarimide (PMGI) – T. Dushatinski (Christopher Newport University), T. Matsumae (Old Dominion University), T. M. Abdel-Fattah (Applied Research Center, Jefferson National Lab), A. D. Koehler (Naval Research Laboratory), J. D. Greenlee (NRC Postdoctoral Fellow Residing at NRL), T. J. Anderson (Naval Research Laboratory), H. Baumgart (Old Dominion University, Applied Research Center), K. D. Hobart, and F. J. Kub (Naval Research Laboratory)

Z03 Impedance Technologies, Diagnostics, and Sensing Applications

Physical and Analytical Electrochemistry / Corrosion / Industrial Electrochemistry and Electrochemical Engineering / Sensor

Borein A, Hyatt Regency

Impedance Methods and Applications – 14:00 – 17:40

Co-Chairs: Petr Vanýsek and Mark E. Orazem

14:00 **1935** Development of Equivalent Circuits for Litihum-Air Battery Impedance Using Mixed and Isolated Diffusion Models – R. Nelson (Department of Electrical and Computer Engineering, Florida A&M University - Florida State University) and M. H. Weatherspoon (Department of Electrical and Computer Engineering)

14:20 **1936** Covalently Cross-Linked Cholesterol Oxidase for an Indirect Detection Cholesterol Biosensor – J. N. Ashby (The University of Georgia) and R. P. Ramasamy (College of Engineering, University of Georgia)

14:40 **1937** Analysis of Shunt Currents and Associated Corrosion of Bipolar Plates in PEM Fuel Cells – V. Lvovich, W. Bennett, and M. Hoberecht (NASA Glenn Research Center)

15:00 **1938** Interpretation of Complex Capacitance Using Equivalent Circuit Involving Constant Phase Element – Y. Hoshi, K. Tabei, I. Shitanda, and M. Itagaki (Tokyo University of Science)

15:20 Break

15:40 **1939** Suitable Position of Reference Electrode in Three-Electrode Cell for Impedance Measurements in Lithium-Ion Rechargeable Battery Investigated By Finite Element Method – Y. Hoshi, Y. Narita, K. Honda, T. Ohtaki, I. Shitanda, and M. Itagaki (Tokyo University of Science)

16:00 **1940** Time Domain Analysis on Current Response of Equivalent Circuit Involving Constant Phase Element – M. Itagaki (Tokyo University of Science), S. Suzuki (Tokyo Unicersity of Science), Y. Hoshi, and I. Shitanda (Tokyo University of Science)

16:20 **1941** Influence of Probe Size and Probe Position for Local Electrochemical Impedance Spectroscopy – V. Vivier, M. D. A. Camila, C. P. Abreu (LISE - UMR 8235), I. Costa (IPEN/CNEN-SP, Brazil), H. G. de Melo (Metallurgical and Materials Engineering Department, USP), and M. Keddam (LISE - UMR 8235)

16:40 **1942** Finite Elements Approach to Predicting Impedance Response of Geometrically Convoluted Samples – P. Vanýsek (CEITEC - Central European Institute of Technology), P. Vyroubal (Brno University of Technology), J. Haňka (Brno Institute of Technology), V. Novák (CEITEC), and J. Maxa (Brno University of Technology)

17:00 **1943** On the Dielectric Properties of Human Skin – M. E. Orazem (University of Florida) and A. Bunge (Colorado School of Mines)

17:20 **1944** Contribution of Surface Roughness to Constant-Phase Element (CPE) Behavior – C. L. Alexander (University of Florida), B. Tribollet (CNRS-LISE), and M. E. Orazem (University of Florida)

West Hall 1, Phoenix Convention Center

Z03 Poster Session – 18:00 – 20:00

• **1945** Using Internal Pressure Measurements to Fundamentally Understand the Aging of Lithium-Ion Batteries – D. A. Wetz Jr., A. Matasso, and D. N. Wong (The University of Texas at Arlington)

• **1946** Development of Simultaneous Measurement Method of Potentiodynamic Polarization Curve and Impedance Spectra Determined By Wavelet Transformation – S. Kato, Y. Hoshi, I. Shitanda, and M. Itagaki (Tokyo University of Science)

Z04 Electrochemical Energy Summit (E2S)

All Divisions

101-C, Phoenix Convention Center

Electrochemical Energy Summit Session 7 - EFRC Talks – 08:00 – 10:10
Co-Chairs: Gary W. Rubloff

08:00 **1969** Center for Mesoscale Transport Properties: Molecular to Mesoscale (m2m) – E. S. Takeuchi (Brookhaven National Laboratory)

08:40 **1970** Addressing Fundamental Problems in Capacitive Energy Storage – M. Beidaghi, K. L. Van Aken, B. Dyatkin, K. B. Hatzell (Drexel University), D. J. Wesolowski (Oak Ridge National Laboratory), and Y. Gogotsi (Drexel University)

09:10 **1971** Computational Studies of Lithium Manganese and Nickel-Manganese Oxide Spinel Surfaces – H. Iddir, K. C. Lau, and L. Curtiss (Materials Science Division, Argonne National Laboratory)

09:30 **1972** Electronic Structure Calculations and Synergistic Experimental Work in the Nanostructures for Electrical Energy Storage (NEES) Energy Frontier Research Center – K. Leung (Sandia National Laboratories)

09:50 **1973** Electrochemical Evolution of the Surface and Subsurface Properties of Layered Nickel-Rich Oxide Cathodes – L. F. J. Piper, S. Sallis (NECCES at Binghamton University), N. Pereira (Rutgers University), P. Mukherjee, F. Cosandey (NECCES at Rutgers University), Y. Huang, N. F. Quackenbush, M. S. Whittingham (NECCES at Binghamton University), and G. G. Amatucci (Rutgers University)

Electrochemical Energy Summit Session 8 - EFRC Talks – 10:30 – 12:20
Co-Chair: M. Stanley Whittingham

10:30 **1974** The Fluid Interface Reactions, Structures and Transport (FIRST) Energy Frontier Research Center – D. J. Wesolowski (Oak Ridge National Laboratory)

11:10 **1975** An Integrated First Principles and Experimental Approach to Enabling Multi-Electron Lithium-Ion Battery Cathodes – S. P. Ong (NECCES at University of California, San Diego), Y. C. Lin (NECCES at Univeristy of California, San Diego), Y. Huang, B. Wen, N. F. Quackenbush, Y. Chung, N. Chernova (NECCES at Binghamton University), F. Omenya (State University of New York at Binghamton), L. F. J. Piper, and M. S. Whittingham (NECCES at Binghamton University)

11:40 **1976** The Challenge of 3D All Solid State Li-Ion Battery – A. A. Talin (Sandia National Laboratories), D. Ruzmetov (NIST), P. Haney, A. Kolmakov (NIST Gaithersburg), A. C. Kozen, A. Pearse, K. Gregorczyk, T. Schmitt, and G. W. Rubloff (University of Maryland)

12:00 **1977** Hybrid Li-Ion/Li-Oxygen Battery Materials – M. K. Y. Chan, A. Kinaci, Z. Yang, C. Zhan, C. K. Lin, V. A. Maroni, L. Trahey (Argonne National Laboratory), Z. Yao, J. Wu, F. Castro, Q. Li, V. Dravid, C. Wolverton (Northwestern University), C. Johnson, J. Lu, K. Amine, and M. M. Thackeray (Argonne National Laboratory)

Thursday, October 15

Highlights

0900h..... Technical Exhibit opens, West Hall 1, Phoenix Convention Center
0930h..... Technical Session Coffee Break , West Hall 1, Phoenix Convention Center

A01 Joint General Session: Batteries and Energy Storage -and- Fuel Cells, Electrolytes, and Energy Conversion

Battery / Energy Technology
106-A, Phoenix Convention Center

Batteries: System IV – 08:00 – 12:00
Co-Chairs: Kevin G. Gallagher and Matthieu Dubarry

08:00 **122** Model-Based Techno-Economic Analysis of Battery Function for Energy Storage of Solar Energy – M. T. Lawder (EECE Department, Washington University in St. Louis) and V. Subramanian (University of Washington, Seattle, Pacific Northwest National Laboratory)

08:20 **123** Cost Effective Electrochemical Energy Storage Today and Tomorrow: Promising Pathways to $100 per k Wh – K. G. Gallagher (Argonne National Laboratory) and G. Crabtree (University of Illinois at Chicago)

08:40 **124** Model-Based Investigation of Dual Energy Storage Selection for Advanced Start-Stop Vehicles – Z. Zhang, Z. Jin, and B. C. Sisk (Johnson Controls Power Solutions)

09:00 **125** Design Principles for Green Energy Storage Systems – M. Arbabzadeh, J. X. Johnson, and G. A. Keoleian (University of Michigan)

09:20 **126** Accelerated Materials Design of Solid Electrolyte Materials Using First Principles Computation – Y. Mo (University of Maryland, College Park)

09:40 Break

10:00 **127** Long-Term Aging of Commercial Automotive Lithium-Ion Cells at Various Conditions – A. Friesen, F. Schappacher (MEET Battery Research Center), and M. Winter (University of Muenster, MEET Battery Research Center)

10:20 **129** Intrinsic Degradation Variability in Commercial Lithium-Ion Batteries – A. Devie, M. Dubarry, and B. Y. Liaw (University of Hawaii, Hawaii Natural Energy Institute)

10:40 **128** State-of-Charge Determination in Imbalanced Battery Packs – M. Dubarry, A. Devie, P. Cabanel, and B. Y. Liaw (University of Hawaii, Hawaii Natural Energy Institute)

11:00 **130** dV/dQ Curve Analyses of Degraded Lithium-Ion Batteries with Composite Cathode – K. Ando, T. Matsuda, M. Myojin, and D. Imamura (Japan Automobile Research Institute)

11:20 **131** Estimate the States of Pseudo-Two-Dimensional (P2D) Reformulation Model Li-Ion Battery Management System Using Non-Linear Particle Filter (PF) Compared to Linear Kalman Filter (KF) – L. Morris Jr. (Department of Electrical and Computer Engineering, Florida A&M University - Florida State University), M. H. Weatherspoon (Department of Electrical and Computer Engineering), J. F. Stephens (FAMU-FSU College of Engineering, Department of Electrical and Computer Engineering), and P. L. Moss (Florida A&M University - Florida State University)

11:40 **132** Investigating the Aging Effect of High Frequency Current Ripple on Lithium-Ion Cells – A. Bessman, R. Soares, M. Behm, G. Lindbergh, O. Wallmark, M. Leksell (KTH Royal Institute of Technology), and P. Svens (Scania)

Batteries: System V – 14:00 – 18:00
Co-Chairs: Donghai Wang and Bor Yann Liaw

14:00 **133** Aluminium Rods As Current Collectors and Electrodes for 3D Li-Ion Micro-Batteries – G. Oltean, L. Nyholm, and K. Edström (Department of Chemistry - Ångström, Uppsala University)

14:20 **134** Challenges for Li-Ion Batteries Working at High Temperatures – G. Oltean and T. Gustafsson (Department of Chemistry - Ångström, Uppsala University)

14:40 **135** Organic Vs. Inorganic Cations of Alkali-Metal Halide Containing Ionic Liquids for Sodium-Ion Battery Applications – T. G. Tucker and C. A. Angell (Arizona State University)

15:00 **136** New Process of Synthesizing LiPF6 in Organic Solvent for Electrolyte – J. Kamiya, T. Mitsui, M. Ooe, and K. Sato (Central Glass Co., LTD. Chemical Research Center (Ube))

15:20 **137** Bi-Tortuous Anisotropic Graphite Electrodes for Fast Ion Transport in Li-Ion Batteries – K. C. Smith, V. P. Nemani (University of Illinois at Urbana-Champaign), and S. J. Harris (Lawrence Berkeley National Lab)

15:40 Break

16:00 **138** Surface Modified Activated Carbons Prepared from Orange Peel Waste As Potential Electrodes for Li-Ion Capacitors – A. A. Arie (Parahyangan Catholic University), J. K. Lee, M. Halim (Korea University of Science and Technology), and H. Kristianto (Parahyangan Catholic University)

16:20 **139** Electrochemical Properties of SnO_2 Electrode Fabricated By Liquid Phase Deposition Method – M. Mizuhata, Y. Shibata, and H. Maki (Kobe University)

16:40 **140** Investigation of the Reaction Mechanism of Cu(II)O Conversion Material As High Capacity Anode Material for Lithium-Ion Batterie – Y. Qian (MEET Battery Research Center), P. Niehoff (MEET Battery Research Center, University of Muenster), F. Schappacher (MEET Battery Research Center), and M. Winter (University of Muenster, MEET Battery Research Center)

17:00 **141** A New Method for Fabrication of Solid State Batteries – M. Isaacson, M. Hu, M. Sword, B. VanMuijen (KalpTree Energy, Inc.), R. Spotnitz (Battery Design LLC, KalpTree Energy, Inc.), A. A. Talin (Sandia National Laboratories), and D. Upadhaya (KalpTree Energy, Inc.)

17:20 **142** Fast Charging of Li-Ion Batteries in Extreme Cold – C. Y. Wang (Electrochemical Engine Center (ECEC), Penn State Univ., EC Power), G. Zhang (Electrochemical Engine Center (ECEC), Penn State Univ.), S. Ge, T. Xu, Y. Ji (EC Power), and X. G. Yang (Electrochemical Engine Center (ECEC), Penn State Univ.)

17:40 **143** High-Performance Aqueous Redox Flow Battery Using Non-Toxic Organic-Inorganic Electrolyte – K. Lin (Harvard Department of Chemistry and Chemical Biology), Q. Chen (Harvard School of Engineering and Applied Science), M. P. Marshak, M. R. Gerhardt (Harvard School of Engineering and Applied Sciences), L. Eisenach, R. G. Gordon (Harvard Department of Chemistry and Chemical Biology), and M. J. Aziz (Harvard School of Engineering and Applied Sciences)

A02 Batteries - Theory, Modeling, and Simulation

Battery

101-B, Phoenix Convention Center

Modeing of Electrochemisty and Interfaces III – 08:00 – 12:00
Co-Chairs: Kevin Leung and Yue Qi

08:00 **190** (Invited) Challenges with Quantum Chemistry-Based Screening of Electrochemical Stability of Lithium Battery Electrolytes – O. Borodin (U.S. Army Research Laboratory), M. Olguin, C. Spear, J. Knap, K. Leiter (US Army Research Laboratory), G. Yushin (Georgia Institute of Technology), K. Xu (Battery Material Research Center), and A. Childs (US Army Research Laboratory)

08:40 **191** Computational Analysis of Solvent Effects on Electron Transfer in Organic Radical Battery Cathode Materials – T. Kemper (NREL, National Renewable Energy Laboratory), R. E. Larsen, and T. Gennett (National Renewable Energy Laboratory)

09:00 **192** High Throughput Approach to Accelerate Electrolyte Discovery for Batteries – N. N. Rajput (Joint Center for Energy Storage Research, Lawrence Berkeley National Laboratory), X. Qu, and K. A. Persson (Joint Center for Energy Storage Research (JCESR))

09:20 **193** A Double-Layer Model for Describing the Effect of Solvation and Adsorption of Ions on Electrode Surfaces in Batteries – J. Lück and A. Latz (German Aerospace Center (DLR), Helmholtz Institute Ulm (HIU))

09:40 Break

10:00 **194** (Invited) Understanding Lithiation Mechanisms in Silicon-Based Nanomaterials from First Principles – G. S. Hwang (University of Texas at Austin)

10:40 **195** Simulation and Modelling of the Solid Electrolyte Interphase with Varying Porosity – F. Single, E. Karaca, B. Horstmann, and A. Latz (German Aerospace Center (DLR), Helmholtz Institute Ulm (HIU))

11:00 **196** Using Smoothed Boundary Method for Simulating Interfacial Transport in Electrochemical Dynamics – M. J. Choe, H. C. Yu (University of Michigan), and K. Thornton (Joint Center for Energy Storage Research)

11:20 **197** (Invited) What's New with Metal-Oxygen Batteries? a Multi-Scale Perspective – D. J. Siegel (University of Michigan)

Computational Materials Design and Mechanisms Understanding II – 14:00 – 16:40
Co-Chairs: Yue Qi and Ying Shirley Meng

14:00 **198** (Invited) Insights into Solvation, Dynamics and Stability of Electrolytes for the Design of Novel Multivalent Systems from Coupled Molecular Dynamics and First-Principles Modeling – K. A. Persson (Joint Center for Energy Storage Research (JCESR)), N. N. Rajput (Lawrence Berkeley National Laboratory, Joint Center for Energy Storage Research), and X. Qu (Joint Center for Energy Storage Research (JCESR))

14:40 **199** Computational Study of Li_2SnO_3 and Li_2SnS_3 – J. D. Howard and N. A. W. Holzwarth (Wake Forest University)

15:00 **200** Thermodynamics and Kinetics of the Multi-Electron ε-$VOPO_4$ cathode Across Two Lithium Insertion – Y. C. Lin (NECCES at Univeristy of California, San Diego), B. Wen, N. F. Quackenbush, L. F. J. Piper, M. S. Whittingham (NECCES at Binghamton University), and S. P. Ong (NECCES at University of California, San Diego)

15:20 **201** Mg Desolvation and Intercalation Mechanism at the Mo_6S_8 Chevrel Phase Surface – L. Wan (Lawrence Berkeley National Laboratory), B. R. Perdue (Sandia National Laboratories), C. A. Apblett (University of New Mexico), and D. Prendergast (Lawrence Berkeley National Laboratory)

15:40 **202** Effective Ionic Resistance in Battery Separators – J. Hattendorff, J. Landesfeind, A. Ehrl, W. A. Wall, and H. A. Gasteiger (Technische Universität München)

16:00 **203** (Invited) Reversible Co-Intercalation of Sodium and Solvent in Graphite – H. Kim, J. Hong (Seoul National University), G. Yoon (Seoul National University, Center for nanoparticle research, IBS), H. Kim (Department of Energy Science, Sungkyunkwan University), K. Y. Park (Seoul National University), M. S. Park (Korea Electronics Technology Institute), W. S. Yoon (Department of Energy Science, Sungkyunkwan University), and K. Kang (Center for Nanoparticles Research, IBS)

A03 Batteries Beyond Lithium-Ion

Battery / Energy Technology

102-C, Phoenix Convention Center

Lithium Sulfur Batteries – 08:00 – 15:50
Co-Chairs: Daniel A. Steingart, Venkataraman Thangadurai, Yangchuan Xing, and Vito Di Noto

08:00 **319** Tailored Carbon Nanotubes for High-Performance Lithium-Sulfur Batteries – Y. C. Jeong, S. J. Yang, K. Lee, T. Kim, J. H. Kim, H. Jung, Y. S. Cho, and C. R. Park (Seoul National University)

08:20 **320** Polysulfide Radicals Appearance in Partially Discharged Lithium-Sulfur Battery Analyzed By First-Principles Interpretations of X-Ray Absorption Spectra – N. P. Balsara (University of California Berkeley), K. Wujcik (University of California, Berkeley), T. Pascal, C. D. Pemmaraju, D. Devaux, W. C. Stolte, and D. Prendergast (Lawrence Berkeley National Laboratory)

08:40 **321** Aniline-Modified Ordered Mesoporous Carbon As an Insoluble Discharge Product Stabilizer for High Performance Li-S Batteries – J. H. Kim, S. J. Yang, T. Kim, Y. C. Jeong, K. Lee, K. T. Park, and C. R. Park (Seoul National University)

09:00 **322** Nanostructured Sulfur and Composites for Lithium-Sulfur Batteries – J. Cheng (Institute of Chemical Materials, CAEP) and B. Wang (Institute of Chemical Materials□, CAEP)

09:20 Break

09:40 **323** Facile Synthesis of Lithium Sulfide-Graphene Composite As Cathode Material for Lithium Batteries – Z. Li (Yokohama National University), S. Zhang (Yokohama National University,), K. Ueno (Yamaguchi University), K. Dokko, and M. Watanabe (Yokohama National University)

10:00 **324** High Conductive Carbon Nanofiber-Graphite Paper Electrodes with Ultrahigh Polysulfide-Loading for Advanced Lithium-Sulfur Batteries – J. Yan, B. Li, and X. Liu (West Virginia University)

10:20 **325** Sulfur Nanoparticles Coated with Polyelectrolyte Nanomembranes for Sulfur Cathode – N. Osada (TOYOTA MOTOR CORPORATION, TOYOTA Research Institute of North America), C. B. Bucur (TEMA Toyota), and J. Muldoon (Toyota Research Institute of North America)

10:40 **326** Understanding Li-S Chemistry with First-Principles Analysis – P. B. Balbuena, J. C. Burgos, Y. Ma, L. E. Camacho-Forero, T. Smith, and S. Bertolini Da Silva Oliveira (Texas A&M University)

11:00 Break

11:20 **327** A Hybrid Dual-Type Sulfur Cathode and a Lithiated Si/SiOx Nanosphere Anode for Li-Sulfur Full Cells – S. K. Lee, E. Park (Hanyang University), B. Scrosati (Istituto Italiano di Tecnologia, Genova, Italy), J. Hassoun (Sapienza University of Rome), M. S. Park, Y. J. Kim (Korea Electronics Technology Institute), H. Kim (Hanyang University), I. Belharouak (Qatar Environment and Energy Research Institute), and Y. K. Sun (Department of Energy Engineering, Hanyang University)

11:40 **328** Understanding the Electrochemical Activity of Electrolyte-Insoluble Solid Polysulfide Species in the Lithium-Sulfur Battery System – M. Klein and A. Manthiram (The University of Texas at Austin)

12:00 **329** An Elastic, Conductive, Electroactive Nanocomposite Binder for Lithium-Sulfur Batteries – C. Milroy (University of Texas at Austin) and A. Manthiram (The University of Texas at Austin)

12:20 **330** Composite of Two-Dimensional Titanium Carbonitride Mxene and Nano-Sulfur As Cathode for Li-S Batteries – M. Naguib, H. Wang, C. Liang, and J. Nanda (Oak Ridge National Laboratory)

12:40 Lunch

14:10 **331** Carbon Wrapped Sulfur Cathode Materials for Rechargeable Batteries – A. Kumar (University of Puerto Rico ,Mayaguez), M. M. Gallozzo (University of Puerto Rico, Physics, Mayaguez), and M. Tomar (University of Puerto Rico ,Mayaguez)

14:30 **332** Effect of Conductive Substrate Material on Li2S Electrodepositionkinetics in Li-S Batteries – F. Fan, M. Pan, and Y. M. Chiang (Massachusetts Institute of Technology)

14:50 **333** Rational Design of Cathode Structure in Li-S Batteries – L. Chen (Suzhou Institute of Nanotech and Nanobionics, CAS)

15:10 **334** High Areal Capacity Sulfur Cathodes for Lithium-Sulfur Batteries – X. Chen, J. Luo, and Y. M. Chiang (Massachusetts Institute of Technology)

15:30 **335** High Energy Density, Long-Life Li-S Batteries for Aerospace Applications – R. V. Bugga, S. C. Jones, J. Pasalic (Jet Propulsion Laboratory), D. Addison (LIOX Power, Inc.), and R. Thiallaiyan (Eagle Picher Technologies)

A05 Electrolytes and Electrochemical Interfaces in Energy Storage Systems

Battery / Energy Technology

101-A, Phoenix Convention Center

General Electrolytes and Interfaces – 08:00 – 12:00
Co-Chairs: Massimo Guarnieri and Fabio Albano

08:00 **409** Wetting of Nano-Confined Electrodes By Lithium-Ion Battery Electrolytes Using Multiple Beam Interferometry – B. Moeremans (Hasselt University), H. W. Cheng (Max-Planck-Institut f. Eisenforschung GmbH), H. Garces, N. Padture (Brown University), A. Hardy (imomec, imec), F. U. Renner (Hasselt University), and M. Valtiner (Max-Planck-Institut f. Eisenforschung GmbH)

08:20 **410** Phosphorus-Containing Electrolytes - Expansion to Include Phosphoranimines for Li-Ion Batteries – E. J. Dufek, J. R. Klaehn, J. S. McNally, and H. W. Rollins (Idaho National Laboratory)

08:40 **411** Engineered Ionic Diffusion Layers to Increase Rate Capability of NCA Cathode with Larger Particle Sizes in Lithium-Ion Cells – K. Dahlberg (Energy Power Systems, LLC), D. Mohanty (Oak Ridge National Laboratory), V. Mahajan, M. Lee, L. Stevenson, J. Stanley (XALT Energy, LLC), D. M. King (PneumatiCoat Technologies), D. L. Wood III (University of Tennessee), and F. Albano (XALT Energy, LLC)

09:00 **412** Realization of Stable Cathode-Electrolyte Interfaces in DMSO Based Li-Air Batteries: Experimental and Theoretical Perspectives – M. Noked, M. A. Schroeder (University of Maryland), N. Kumar (Sandia National Laboratories), A. J. Pearse (University of Maryland), K. Leung (Sandia National Laboratories), S. B. Lee (University of Maryland), and G. W. Rubloff (Department of Materials Science and Engineering)

09:20 **413** Elaboration and Characterization of Flexible Li^+ Conducting Membranes for Aqueous Li-Air Batteries – G. Lancel (Electricité de France, R&D division, UPMC), D. Bregiroux (UPMC), G. Toussaint, P. Stevens (Electricité de France, R&D division), and C. Laberty-Robert (UPMC)

09:40 Break

10:00 **414** Magnesium Metal Anode Interfaces and Performance in Chloride-Free Electrolytes – N. T. Hahn (Sandia National Laboratories, Joint Center for Energy Storage Research) and K. R. Zavadil (Joint Center for Energy Storage Research, Sandia National Laboratories)

10:20 **415** Speciation of Haloaluminate Electrolytes in Mg-Ion Batteries: A Combined Study of a*b Initio* Molecular Dynamics and Simulated X-Ray Absorption Spectroscopy – L. Wan and D. Prendergast (Lawrence Berkeley National Laboratory)

10:40 **416** Pd/MWNTs Nanocatalysts Toward Formic Acid Oxidation – Y. Wang (University of Tennessee Knoxville), Q. He (University of Tennessee Knoville), H. Wei (Lamar University), J. Guo (University of Tennessee Knoxville), S. Wei (Lamar University), and Z. Guo (University of Tennessee Knoxville)

11:00 **417** A Multiphysics Finite-Element Performance Model of a Vanadium Redox Flow Battery – M. Guarnieri, F. Moro, A. Bertucco, V. Fiorenzato, and M. Giomo (University of Padua)

11:20 **418** Electrochemical Performance of Three Novel Bromine-Sequestering Agents for Zinc/Bromine Flow Battery Electrolytes – G. P. Rajarathnam, M. Schneider, M. Easton, and A. Vassallo (The University of Sydney)

11:40 **419** A Lattice-Boltzmann Model of Mass Transport in the Diffusion Layers of Vanadium Redox Flow Batteries – D. Maggiolo, F. Picano, and M. Guarnieri (University of Padua)

Ionic Liquids – 14:00 – 18:00
Co-Chairs: Shyue Ping Ong, Martin Winter, and Daniel Streich

14:00 **420** Soft Solid Crystals of LiCl. N,N-Dimethylformamide: A New Paradigm for Solid Electrolytes Based upon the Pearson Hard-Soft Acid-Base Concept – P. R. Chinnam, R. N. Clymer, A. A. Jalil, M. J. Zdilla, and S. Wunder (Temple University)

14:20 **421** Composition Optimization of the Lithium-Rich $Li_3OCl_{1-X}Brx$ Anti-Perovskite Superionic Conductors – Z. Deng, B. Radhakrishnan (University of California, San Diego), and S. P. Ong (NECCES at University of California, San Diego)

14:40 **422** Enhanced Lithium Ion Conductivity in Lithium Lanthanum Titanate Solid Electrolyte Nanowires Prepared By Electrospinning – T. Yang, Y. Li, and C. K. Chan (Arizona State University)

15:00 **423** All Solid-State Electrolytes for Lithium Microbatteries: Fabrication of an Ionic Liquid-Based Membrane – G. Piana, H. Porthault (CEA Grenoble - LETI/DCOS/SCPE/LMBE), S. Franger, and J. M. Duffault (ICMMO-ERIEE, UMR CNRS-UPS 8182, Université Paris Sud)

15:20 **424** Relationship Between the Rate Performance of Rechargeable Lithium-Sulfur Batteries and the Local Viscosity Change at the Interface Between the Electrode and $Li[N(CF_3SO_2)_2]$-Glyme Solvate Ionic Liquid – N. Serizawa (Central Research Institute of Electric Power Industry, Keio University), S. Seki (Central Research Institute of Electric Power Industry), A. Yamazaki (Yokohama National University), N. Tachikawa, K. Yoshii (Keio University), K. Takei (Central Research Institute of Electric Power Industry), K. Dokko (Yokohama National University), Y. Katayama (Keio University), and M. Watanabe (Yokohama National University)

15:40 **425** Effect of Cation Structure Modification of Ionic Liquids for Lithium-Ion Batteries – X. Cao (MEET Battery Research Center, Institute of Physical Chemistry, University of Münster), S. Röser, B. Rezaeirad (MEET Battery Research Center, University of Münster), M. Winter (University of Muenster, MEET Battery Research Center, Institute of Physical Chemistry, University of Muenster), and I. Cekic-Laskovic (MEET Battery Research Center, University of Muenster)

16:00 **426** Nucleation and Growth Behavior of Electrodeposited Lithium in Ionic Liquid – H. Sano, H. Sakaebe, H. Senoh, and H. Matsumoto (AIST)

16:20 **427** Complementary Operando Investigations of Graphite Cycled in Ionic Liquids By XPS and Raman Spectroscopy – D. Streich, P. Novák, and M. El Kazzi (Paul Scherrer Institute, Electrochemistry Laboratory)

16:40 **428** Lithium Coordination in Protic Ionic Liquid-Based Electrolytes – T. Vogl (MEET Battery Research Center, University of Muenster, Helmholtz Institute Ulm (HIU)), S. Menne (MEET Battery Research Center, University of Muenster), and A. Balducci (Helmholtz Institute Ulm (HIU), MEET Battery Research Centre, University of Muenster)

17:00 **429** Elucidating the Interfacial Structure at the Ionic Liquid-Solid Interface Using Atomic Force Microscopy and Molecular Dynamics – J. Black (Oak Ridge National Laboratory), G. Feng (Huazhong University of Science and Technology), Y. Zhang (Vanderbilt University), M. B. Okatan, P. Zhang, S. Dai, S. V. Kalinin (Oak Ridge National Laboratory), P. T. Cummings (Vanderbilt University), and N. Balke (Oak Ridge National Laboratory)

17:20 **430** In Situ XPS and FTIR Studies of Electrochemically Polarized Carbide Derived Carbon and Other Carbon Electrodes in RTILs – E. Lust (Institute of Chemistry, University of Tartu), A. Tõnisoo (Institute of Physics, University of Tartu), T. Romann, O. Oll, V. Ivaništšev, R. Kanarbik, J. Kruusma (Institute of Chemistry, University of Tartu), R. Pärna, A. Kikas, and E. Nõmmiste (Institute of Physics, University of Tartu)

17:40 **431** Thermotropic Ionic Liquid Crystalline **Polymers** for Lithium-Ion Battery Electrolytes – D. Bresser (UMR SPrAM 5819 - INAC- CEA-Grenoble - France), M. Leclere (CEA-Grenoble), P. Rannou (UMR SPrAM 5819 - INAC- CEA-Grenoble - France), H. Mendil-Jakani (UMR SPrAM 5819 - INAC - CEA-Grenoble - France), S. Lyonnard (UMR SPrAM 5819 - INAC - CEA Grenoble - France), and L. Picard (CEA- Grenoble, LITEN/ DEHT/ SCGE/ LGI, France)

A06 High-Energy Li-Ion Intercalation Materials

Battery

105-A, Phoenix Convention Center

Anode II – 08:00 – 12:00
Co-Chairs: Donghai Wang and Gary Koenig

08:00 **490** (Invited) Type I and Type II Silicon Clathrates As Novel Anodes for Lithium Batteries – C. K. Chan (Arizona State University)

08:30 **491** Interfacial Effects of Electrochemical Lithiation of Epsilon-VOPO4 and Evolution of the Electronic Structure – N. F. Quackenbush, L. Wangoh, B. Wen, R. Zhang, Y. Chung, N. Chernova, Z. Chen, S. Sallis (NECCES at Binghamton University), Y. C. Lin (NECCES at Univeristy of California, San Diego), S. P. Ong (NECCES at University of California, San Diego), M. S. Whittingham, and L. F. J. Piper (NECCES at Binghamton University)

08:50 **492** The Use of Reduced Cost and Purity Precursors in the Melt Preparation of $LiFePO_4$ – M. Talebi-Esfandarani, S. Rousselot, M. Gauthier (Department of Chemistry, University of Montreal), P. Sauriol (Chemical Engineering, Ecole Polytechnique de Montreal), G. Liang (Johnson Matthey Battery Materials Ltd, Canada), and M. Dollé (Department of Chemistry, University of Montreal)

09:10 **493** New High-Capacity Electrode Materials for Rechargeable Lithium Batteries: Li_3NbO_4-$LiMeO_2$ (Me = Mn^{3+}, Fe^{3+}, and V^{3+}) System with Cation Disordered Rocksalt Structure – N. Yabuuchi (Tokyo Denki University), M. Takeuchi, S. Komaba (Tokyo University of Science), M. Nakayama (Japan Science and Technology Agency, PRESTO, Nagoya Institute of Technology), H. Shiiba (CREST, JST), K. Sato (Tokyo Denki University), M. Ogawa (Ritsumeikan University), K. Yamanaka (SR center, Ritsumeikan University, Shiga 525-8577, Japan), and T. Ohta (Ritsumeikan University)

09:30 **494** Dilatometric Study of the Electrochemical Intercalation of Bis(trifluoromethanesulfonyl) Imide and Hexafluorophosphate Anions into Carbon-Based Positive Electrodes – J. M. Huesker (MEET Battery Research Center, University of Münster), M. Winter (University of Muenster, MEET Battery Research Center, MEET Battery Research Center, University of Muenster), and T. Placke (University of Muenster, MEET Battery Research Center)

09:50 Break

10:10 **495** High Capacity Hybrid Si-SWCNT Anode Structures for Li-Ion Batteries – O. Bobrenok, A. Kosolapov (OCSiAl), V. Shchukin, R. Sharafutdinov (Institute of Thermophysics SB RAS), M. Predtechensky, K. Tikhonov, and K. Notman (OCSiAl)

10:30 **496** Electrochemical Characterization of $Li_4Ti_5O_{12}$ By Single Particle Measurements Using a Particle - Current Collector Integrated Microelectrode – Y. Sakurai, S. Kawashiri, M. Utagawa, T. Tsuda, T. Tojo, and R. Inada (Toyohashi University of Technology)

10:50 **497** Molybdenum Substituted Vanadyl Phosphate Îμ-VOPO4 with Enhanced Two-Electron Transfer Reversibility and Kinetics for Lithium-Ion Batteries – B. Wen (NECCES at Binghamton University), Q. Wang (Physics Department, Yeshiva University), Y. C. Lin (NECCES at Univeristy of California, San Diego), N. Chernova, K. Karki, Y. Chung (NECCES at Binghamton University), F. Omenya (State University of New York at Binghamton), S. Sallis, L. F. J. Piper (NECCES at Binghamton University), S. P. Ong (NECCES at), and M. S. Whittingham (NECCES at Binghamton University)

11:10 **498** Ternary Type I Silicon Clathrates for Lithium-Ion Battery Anodes – Y. Li and C. K. Chan (Arizona State University)

11:30 **499** Mineral-Inspired, Nanostructured Polyanion Materials for Rechargeable Battery Electrodes – R. Zhao, Y. Li, and C. K. Chan (Arizona State University)

Anode III – 14:00 – 15:20
Co-Chair: Yue Qi

14:00 **500** Liquid Phase Exfoliation of Two Dimensional Transition Metal Oxides for Electrochemical Applications – S. O'Brien (School of Physics, CRANN,Trinity College Dublin) and V. Nicolosi (School of Physics, CRANN,Trinity College Dublin, School of Chemistry, CRANN,Trinity College Dublin)

14:20 **501** Graphene-like-Graphite for High Capacity and Fast Chargeable Anode Materials of Lithium Ion Batteries – Q. Cheng, Y. Okamoto, R. Yuge, S. Miyamoto, T. Murakami, N. Tamura (NEC Corp Ltd), and Y. Matsuo (University of Hyogo)

14:40 **502** Laser Battery with Outstanding Liquid Electrolyte Wetting and Performance – J. Pröll, H. J. Seifert (Karlsruhe Institute of Technology, IAM-AWP), and W. Pfleging (Karlsruhe Institute of Technology, IAM-AWP, Karlsruhe Nano Micro Facility, H.-von-Helmholtz-Platz)

15:00 **503** *Operando* high-Energy Synchrotron X-Ray Diffraction and Modeling of Alpha-MnO_2 Battery Materials upon Heat Treatment – Z. Yang, M. K. Y. Chan, Y. Ren, C. Johnson, and M. M. Thackeray (Argonne National Laboratory)

Cathode VI – 15:20 – 18:20
Co-Chairs: Candace Chan and Won-Sub Yoon

15:20 **504** (Invited) Ti-Substituted $Li[Li_{0.26}Mn_{0.6-x}TixNi_{0.07}Co_{0.07}]O_2$ Layered Cathode Material with Improved Structural Stability and Suppressed Voltage Fading – Z. Yu, S. Shang, A. Mousharraf, Z. K. Liu, and D. Wang (The Pennsylvania State University)

15:50 **505** The Thermal and Structural Behavior of Li-Rich Cathode Materials Investigated By Synchrotron-Based X-Ray Techniques – S. Muhammad, H. Kim, D. Jang, Y. Kim, J. Yoon, M. Jeong, G. H. Lew (Department of Energy Science, Sungkyunkwan University), J. Yoon, J. H. Park (Samsung Electronics), and W. S. Yoon (Department of Energy Science, Sungkyunkwan University)

16:10 **506** Domain Modeling of Lithium-Rich Manganese Nickel Oxide By Reverse Monte Carlo Method – N. Kitamura, Y. Kubo, N. Ishida, and Y. Idemoto (Tokyo University of Science)

16:30 Break

16:50 **507** (Invited) Mechano-Electro-Chemical Coupling in Lithium Intercalation Compounds – Y. Qi and C. James (Michigan State University)

17:20 **508** Change of Average and Local Crystal Structure and Electronic Structure of Li-Rich Solid Solution Cathode Material $0.4Li_2MnO_3$-$0.6LiMn_{1/3}Ni_{1/3}Co_{1/3}O_2$ during Charge-Discharge Process Using First-Principles Calculations and Neutron Beam and Synchrotron X-Ray Sources – Y. Idemoto, Y. Sera, N. Ishida, and N. Kitamura (Tokyo University of Science)

17:40 **509** Bulk Structure and Surface Properties of Lithium- and Manganese-Rich Layered Oxides and Their Impact on Electrochemical Performance – G. Chen, S. Kuppan, and A. K. Shukla (Energy Storage and Distributed Resources Division, LBNL)

C05 Critical Factors in Localized Corrosion 8

Corrosion

102-A, Phoenix Convention Center

Corrosion Numerical Modeling 2 – 08:00 – 12:00

Co-Chairs: Robert G. Kelly, Shinji Fujimoto, John Harb, and Christopher Taylor

08:00 **707** Effect of Crevice Length on Potential, Current and pH Distribution in the Crevice Formed in Galvanic Coupling Between AA7050-T7451 and SS316 – C. Liu, V. N. Rafla, J. R. Scully, and R. G. Kelly (University of Virginia)

08:20 **708** Modeling Aircraft Galvanic Stress Controlled By Kinetic Limitations – J. S. Lee (Naval Research Laboratory)

08:40 **709** 3D Corrosion Modeling of Coating Defects – C. A. Lueth (CD-adapco) and J. Harb (Brigham Young University)

09:00 **710** Mcb (Mass and Charge Balance) Model Simulation of Corrosion of Co-Cr Alloy Stellite-6 – M. Momeni, M. Behazin, and J. C. Wren (University of Western Ontario)

09:20 **711** Multidimensional Modeling of Nickel Alloy Corrosion inside High Temperature Molten Salt Systems – B. Tavakoli, S. Shimpalee, J. W. Weidner (University of South Carolina), H. S. Cho, J. W. Van Zee (University of Alabama), B. L. Garcia-Diaz, M. J. Martinez-Rodriguez, L. C. Olson, and J. R. Gray (Savannah River National Laboratory)

09:40 Break

10:00 **712** Modeling Trapping of Hydrogen Absorbed into Aluminum during Corrosion – K. Hebert (Iowa State University)

10:20 **713** Effect of Fluctuation of Electrolyte Flow Rate in Hydrogen Entry Cell on Hydrogen Permeation into Steel Sheet – K. Fushimi, Y. Yamamoto, M. Jin, Y. Kitagawa, T. Nakanishi, and Y. Hasegawa (Hokkaido University)

10:40 **714** Modeling of Cathode Efficiency of Stainless Steel Under Fully Immersed Conditions – J. Srinivasan, R. Burkley, C. Liu, M. T. Woldemedhin, and R. G. Kelly (University of Virginia)

11:00 **715** Effects of Temperature on the Corrosion Potential of Stainless Steel Under Gamma-Ray Irradiation – T. Satoh, C. Kato, and F. Ueno (Japan Atomic Energy Agency)

11:20 **716** The Modelling of Pitting Corrosion of Carbon Steel in High Level Nuclear Waste Supercontainer – P. Lu, S. Sharifi-Asl (University of California, Berkeley), B. Kursten (SCK.CEN), and D. D. Macdonald (University of California at Berkeley)

D02 Nonvolatile Memories

Dielectric Science and Technology

Curtis B, Hyatt Regency

MRAM-1 – 08:00 – 09:30

Co-Chairs: Hitoshi Kubota and Jea-Gun Park

08:00 **775** (Keynote) Status and Challenges in Spin-Transfer Torque Mram Technology – M. Krounbi, V. Nikitin, D. Apalkov, J. Lee, X. Tang, R. Beach, D. Erickson, and E. Chen (Samsung)

08:40 **776** (Invited) Low Power Stt-Mram and Its Application to Normally-Off Processor – N. Shimomura, D. Saida, T. Daibou, Y. Kato, C. Kamata, S. Kashiwada, Y. Osawa, H. Noguchi, J. Ito, S. Fujita, and H. Yoda (Toshiba Corporation)

09:10 **777** $Co_2Fe_6B_2$/MgO-Based Perpendicular Spin-Transfer-Torque Magnetic-Tunnel-Junction Spin-Valve without $[Co/Pt]_n$ lower Synthetic-Antiferromagnetic Layer – S. E. Lee, T. H. Shim (Hanyang University), and J. G. Park (Hangyang University)

MRAM-2 – 10:00 – 11:40

Co-Chairs: Hitoshi Kubota and Jea-Gun Park

10:00 **778** (Invited) Spin Torque Switching in Magnetic Random Access Memory – T. Taniguchi (Spintronics Research Center, AIST)

10:40 **779** Critical BEOL Aspects of the Fabrication of a Thermally-Assisted MRAM Device – E. J. O'Sullivan (IBM Research Division, T.J. Watson Research Center), D. Edelstein (IBM T.J. Watson Research Center), N. Marchack (IBM Research Division, T.J. Watson Research Center), M. Lofaro (IBM T. J. Watson Research Center), M. Gaidis, E. Joseph, A. Annunziata, D. Pfeiffer, P. L. Trouilloud (IBM Research Division, T.J. Watson Research Center), Y. Zhu (IBM T. J. Watson Research Center), S. Holmes, A. Galan, J. Gonsalves (IBM Research Division, T.J. Watson Research Center), E. Gapihan, K. M. Lau, G. Bertrais, D. Beery, M. Dydyk, R. Sharma, G. Sharma (Crocus Technology), and A. M. Pyzna (IBM Research Division, T.J. Watson Research Center)

11:00 **780** Thermal Stability Enhancement of Magnetic Perpendicular-Magnetic Tunnel Junctions Using Double MgO Interface Structure – Y. Takemura (SUMCO Corporation), D. Y. Lee, S. Lee, J. U. Baek, T. H. Shim (Hanyang University), and J. G. Park (Hangyang University)

11:20 **781** Effects of Radio-Frequency Sputtering Power of MgO Tunneling Barrier on Tunneling Magneto-Resistance Ratio for Cofeb/MgO-Based Perpendicular-Magnetic Tunnel Junctions – D. Y. Lee, G. S. Lee (Hanyang University), H. T. Seo (Ajou University), and J. G. Park (Hangyang University)

ReRAM-3 – 14:00 – 16:10
Co-Chairs: Blanka Magyari-Kope and Kiyoteru Kobayashi

14:00 **782** (Invited) Resistive Random Access Memory for Storage Class Applications – S. H. Jo and T. Kumar (Crossbar Inc.)

14:30 **783** (Invited) Direct Physical Understanding in Memristive Devices and Corresponding Device Models – J. P. Strachan (Hewlett-Packard Laboratories)

15:00 **784** (Invited) Mechanism Study of Reversible Resistivity Change in Oxide Thin Film – S. Hong, S. H. Chang, C. Phatak (Materials Science Division, Argonne National Laboratory), B. Magyari-Kope, Y. Nishi (Stanford University), S. Chattopadhyay (Elgin Community College), and J. H. Kim (Advanced Photon Source, Argonne National Laboratory)

15:30 **785** Set and Reset Voltage Interdependence in Resistive Switching Memory Cells – G. Ghosh and M. K. Orlowski (ECE Department Virginia Tech)

15:50 **786** Analysis of Resistive Switching Characteristics in Surface Anchored Metal Organic Framework (SURMOF) Films – D. M. Nminibapiel, P. Shrestha (National Institute of Standards and Technology (NIST), Old Dominion University), Z. Wang (Karlsruhe Institute of Technology (KIT)), K. P. Cheung (National Institute of Standards and Technology (NIST)), H. Baumgart (Old Dominion University, Applied Research Center), E. Redel (Karlsruhe Institute of Technology), and C. Wöll (Karlsruhe Institute of Technology (KIT))

E04 Semiconductors, Metal Oxides, and Composites: Metallization and Electrodeposition of Thin Films and Nanostructures 3

Electrodeposition
103-A, Phoenix Convention Center

Oxides – 09:40 – 11:00
Co-Chair: Gerko Oskam

09:40 **935** Copper Oxide Layers Obtained Via Anodization for Electrowetting on Dielectrics – R. Bernasconi, A. Bellantone, F. Liberale, and L. Magagnin (Politecnico di Milano)

10:00 **936** Electrodeposition of Thick MnO_2 Films on Restrictive Substrates – M. Timmermans (imec, Leuven), F. Mattelaer, C. Detavernier (Ghent University), and P. M. Vereecken (imec, KU Leuven)

10:20 **937** Influence of Structural Properties on the Performance of Dye-Sensitized Solar Cells Based on Electrodeposited ZnO – E. J. Canto Aguilar (CINVESTAV-IPN), J. A. Anta (Universidad Pablo de Olavide), and G. Oskam (CINVESTAV-IPN)

10:40 **938** Properties of Cabon Fibers with Electrochemically Formed ZnO Nanorods – K. H. Lee, D. Lim, and S. M. Choi (Korea Institute of Materials Science)

Nanostructured Composites – 11:00 – 12:20
Co-Chairs: Jan Fransaer and Philippe M. Vereecken

11:00 **939** (Invited) Toward the Formation of Ordered Nanoparticle Films By Electrophoretic Deposition and the Subsequent Assessment of Order Via Voronoi Tessellation Analysis – J. H. Dickerson II (Ctr for Functional Nanomaterials, BNL)

11:40 **940** Development of Silver-Carbon-Nanotube Metal Matrix Composites for Metal Contacts on Space Photovoltaic Cells – O. K. Abudayyeh, C. Nelson, S. Han (University of New Mexico), N. Gapp, and D. Wilt (Air Force Research Laboratories)

12:00 **941** Construction of Asymmetric Graphene Sandwiches: Decoration Using Semiconductor and Metal Nanostructures – P. S. Toth and R. A. Dryfe (School of Chemistry, University of Manchester)

Semiconductor Functionalization – 14:00 – 16:20
Co-Chair: Jan Fransaer

14:00 **942** (Invited) Electrochemical Processing of Metal-Insulator-Semiconductor (MIS) Photoelectrodes – D. Esposito and N. Y. Labrador (Columbia University)

14:40 **943** Hydrogen Atom Desorption Induced By Electron Bombardment on Si Surface – W. Li, S. Sato, H. Akima, and M. Sakuraba (Tohoku University)

15:00 **944** Electrochemical Doping As an Alternative to Ion Implantation in Oxide Semiconductor Thin Films – T. Yajima (JST-CREST, The University of Tokyo), G. Oike, T. Nishimura, and A. Toriumi (The University of Tokyo)

15:20 **945** Formation of Si Nanowires By Electroreduction of Porous Ni/SiO_2 Blocks in Molten $CaCl_2$ – S. Fang (General Research Institute for Non Ferrous Metals), J. Yang (General Research Institute for Nonferrous Metals,), H. Wang, B. Yu, and S. Lu (General Research Institute for Non Ferrous Metals)

15:40 **946** The Device-Perimeter Dependency in the Transient Current of a Metal-Insulator-Metal-Insulator-Semiconductor Capacitor with Anodic Oxide Films – C. S. Liao and J. G. Hwu (National Taiwan University)

16:00 Break

Metallization – 16:20 – 17:20
Co-Chair: Philippe M. Vereecken

16:20 **947** Electrodeposition of Cu on Nickel Seed Layer/p-Si in Buft Cell – D. Priyadarshani (Indian Institute of Technology Bombay), P. Goradia (Applied Materials), A. Contractor (Indian Institute of Technology), R. Gouk, S. Verhaverbeke, and R. Visser (Applied Materials, Inc.)

16:40 **948** Silane-Free Adhesive Electroless Deposition of a Nickel/Phosphorous Layer on Si Wafer – T. C. Wei, C. W. Hsu, W. Y. Wang (National Tsing-Hua University), C. M. Chen, and K. C. Lai (National Chung-Hsing University)

17:00 **949** Bottom-up Filling of Damascene Trenches with Cobalt By Electroplating Process – C. C. Wei, E. Chou, S. Shih, and S. M. Lin (BASF/AP/CME/Wet Deposition)

G01 Atomic Layer Deposition Applications 11

Electronics and Photonics / Dielectric Science and Technology

Phoenix East, Hyatt Regency

Atomic Layer Etching I – 08:00 – 10:00
Co-Chairs: Fred Roozeboom and Thorsten Lill

08:00 **1005** (Invited) An Industry Perspective on Atomic Layer Etching – S. Suri, C. T. Carver, R. Turkot Jr., P. E. Romero, T. A. Tronic, and J. Plombon (Intel Corporation)

08:40 **1006** Selective Removal of Native SiO_2 Using XeF_2 – A. Hinckley, P. Mancheno-Posso (University of Arizona), C. S. Lai (LAM Research), and A. J. Muscat (University of Arizona)

09:00 **1007** (Invited) Atomic Layer Etching Using Thermal Reactions: ALD in Reverse – Y. Lee, J. W. DuMont, and S. M. George (University of Colorado)

Atomic Layer Etching II – 10:00 – 11:40
Co-Chairs: Craig Huffman and Steven M. George

10:00 **1008** (Invited) Neutral Beam Technology – Defect-free Nanofabrication for Novel Nano-materials and Nano-devices – S. Samukawa (Tohoku University)

10:40 **1009** A Spatial ALD Oxide Passivation Module in an All-Spatial Etch-Passivation Cluster Concept – F. Roozeboom (Eindhoven University of Technology, TNO Eindhoven), F. van den Bruele, Y. Creyghton (TNO Eindhoven), P. Poodt (TNO/Solliance), and W. M. M. Kessels (Eindhoven University of Technology)

11:00 **1010** (Invited) Divide Et Impera: Towards New Frontiers with Atomic Layer Etching – T. Lill, K. J. Kanarik (Lam Research), S. S. H. Tan (Lam Research Corporation), M. Shen, Y. Pan (Lam Research), J. Marks (Lam Research Corporation), V. Vahedi, and R. A. Gottscho (Lam Research)

Panel Discussion on Atomic Layer Etching – 11:40 – 12:40
Co-Chair: Craig Huffman

11:40 Panel Discussion on Atomic Layer Etching

I05 Polymer Electrolyte Fuel Cells 15 (PEFC 15)

Energy Technology / Battery / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry

211-A, Phoenix Convention Center

D3-1 Pt-Based Cathode Catalysts with Durable Suppports 1 – 08:00 – 12:00
Co-Chairs: Denis Kramer and Kazunari Sasaki

08:00 **1527** Comparative and Comprehensive Studies of Tolerance to Airborne Contaminants of PEMFC with Pt and Non-Pt Cathodes Using Segmented Cell Approach and Spatial EIS – T. V. Reshetenko (Hawaii Natural Energy Institute, U of Hawaii - Manoa), A. Serov, S. Stariha, I. Matanovic, K. Artyushkova (University of New Mexico), J. St-Pierre (University of Hawaii - Manoa), and P. Atanassov (University of New Mexico)

08:20 **1528** Prediction Method for PEMFC Cathode Kinetic Losses Induced By Contaminants – J. St-Pierre, Y. Zhai (University of Hawaii - Manoa), and J. Ge (Changchun Institute of Applied Chemistry)

08:40 **1529** Pt Electrocatalyst Supported on a 3D-Nanoporous Carbon Shows a High Performance in a High-Temperature Polymer Electrolyte Fuel Cell – N. Nakashima (Kyushu University, WPI-I2CNER, Kyushu University, Department of Applied Chemistry), Z. Yang (Dept. Appl. Chem, Kyushu University), and I. Moriguchi (Nagasaki University)

09:00 **1530** Development of a Durable Cathode Material for PEFC By Encapsulating of Pt Particles into Carbon Mesopores – A. Hayashi, Y. Minamida, M. Kitamura, Z. Noda, and K. Sasaki (Kyushu University)

09:20 **1531** Carbonaceous Nanowire Supports for Polymer Electrolyte Membrane Fuel Cells – F. H. Garzon (University of New Mexico/ Sandia National Laboratory), M. S. Wilson (Los Alamos National Laboratory), D. Banham, S. Ye (Ballard Power Systems), and K. L. More (Oak Ridge National Laboratory)

09:40 Intermission

10:00 PEFC-15 Poster Award

10:20 **1532** On the Origin of Enhanced ORR Activity of RuO_2 Nanosheet Modified Pt Catalysts: An Impedance Spectroscopy Approach – W. Sugimoto, C. Chauvin (Shinshu University), D. Takimoto (Shinshu university), and M. Itagaki (Tokyo University of Science)

10:40 **1533** Conductivity Limits of Extrinsically Doped SnO_2 Supports – M. Worsdale (University of Southampton), A. Rabis, E. Fabbri (Paul Scherrer Institut), T. J. Schmidt (ETH Zürich, Paul Scherrer Institut), and D. Kramer (University of Southampton)

11:20 **1534** Indium Tin Oxide as Catalyst Support for PEM Fuel Cell: RDE and MEA Performance – G. Wang (Illinois Institute of Technology), E. Niangar, K. Huang, D. Atienza, A. Kumar, N. Dale, K. Oshihara (Nissan Technical Center North America), and V. K. Ramani (Illinois Institute of Technology)

11:40 **1535** $Sn0_2$ Aerogels: Towards Performant and Stable PEFC Catalyst Supports – G. Ozouf, C. Beauger (MINES ParisTech), G. Cognard, F. Maillard (LEPMI, UMR 5279 CNRS), L. Guetaz, and M. Heitzmann (CEA, LITEN)

211-B, Phoenix Convention Center

A3-1 Water Management – 09:00 – 12:00

Co-Chairs: Olivier Lottin and Dusan Spernjak

09:00 **1536** Understanding Liquid-Water Management in PEFCs Using X-Ray Computed Tomography and Modeling – I. V. Zenyuk (Lawrence Berkeley National Laboratory, Tufts University) and A. Z. Weber (Lawrence Berkeley National Laboratory)

09:40 Intermission

10:00 PEFC-15 Poster Award Session (room of Section D 3.1)

10:20 **1537** Impact of Water Management on Local Potential Evolutions during PEM Fuel Cell Operation with Dead-Ended Anode – S. Abbou, J. Dillet, G. Maranzana (LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy), S. Didierjean (LEMTA, CNRS, Vandoeuvre-lès-Nancy), and O. Lottin (LEMTA, Université de Lorraine, Vandoeuvre-lès-Nancy)

10:40 **1538** Characterization of Liquid Water Invasion in Gdls Using X-Ray Tomographic Microscopy – A. Lamibrac, J. Roth, J. Eller, F. Marone, and F. N. Büchi (Paul Scherrer Institut)

11:00 **1539** Influence of Thermal Conductivity and 2-D Temperature Distribution of Liquid Water Saturation – J. M. LaManna (University of Tennessee, NIST), D. S. Hussey, D. L. Jacobson (NIST), and M. M. Mench (University of Tennessee)

11:20 **1540** Water Management in PEM Fuel Cells with Non-Precious Metal Catalyst Electrodes – D. Spernjak, H. T. Chung, R. Mukundan, R. L. Borup (Los Alamos National Laboratory), D. S. Hussey, D. L. Jacobson (NIST), G. Wu (University at Buffalo, SUNY), and P. Zelenay (Los Alamos National Laboratory)

11:40 **1541** 3D Printed Flow Channel Fixture for Visualization of Water Condensation in PEFC By X-Ray Computed Tomography – R. White, M. E. Hannach, O. Luo, F. Orfino (Simon Fraser University), M. Dutta (Ballard Power Systems), and E. Kjeang (Simon Fraser University)

212-A, Phoenix Convention Center

E3-1 Direct Fuel Cells – 10:00 – 12:20

Co-Chairs: Antonino S. Aricò and Ernesto Rafael Gonzalez

10:00 PEFC-15 Poster Award Session (room of Section D 3.1)

10:20 **1542** Electrocatalysis of Direct Methanol and Ethanol Oxidation in Polymer Electrolyte Fuel Cells – A. S. Aricò (CNR-ITAE), D. Sebastian (CNR ITAE), S. Campagna Zignani, and V. Baglio (CNR-ITAE)

11:00 **1543** Nanostructured Transition Metal Nitride (MN) As a Potential Support for Pt(Ru) Anode Electro-Catalyst for Direct Methanol Fuel Cells (DMFCs) – P. P. Patel (Department of Chemical and Petroleum Engineering), M. K. Datta (Department of Bioengineering, University of Pittsburgh), P. Jampani (Dept. of Bioengineering, Univ. of Pittsburgh), and P. N. Kumta (University of Pittsburgh, Pittsburgh, PA 15261)

11:20 **1544** Development and Characterization of a Dithionite / Air Fuel Cell – J. Noack, J. Tübke (Fraunhofer ICT), and K. Pinkwart (Fraunhofer Institute for Chemical Technology ICT)

11:40 **1545** Electrochemical Oxidation of Borohydride for Direct Fuel Cells – C. Grimmer, M. Grandi, R. Zacharias, T. Friedrich, and V. Hacker (Graz University of Technology)

12:00 **1546** Influence of Structural Effects on Platinum Electrodes in the Preferential Adsorption of CO and Methanol in Acid Media – M. E. Paulino (Instituto de Quimica de Sao Carlos), F. Colmati Jr. (Universidade Federal de Goiás), and E. R. Gonzalez (Instituto de Quimica de Sao Carlos, USP)

211-A, Phoenix Convention Center

D3-2 Pt-Based Cathode Catalysts with Durable Suppports 2 – 14:00 – 17:20

Co-Chairs: Karen Swider-Lyons and Makoto Uchida

14:00 **1557** Oxide-Supported PEFC Electrocatalysts – K. Sasaki (Int. Res. Center for Hydrogen Energy, Kyushu University), Y. Nagamatsu, D. Horiguchi (Kyushu University), M. Iwami (Kyushu university), M. Okumura, Z. Noda, T. Daio (Kyushu University), S. M. Lyth (I2CNER, Kyushu University), and A. Hayashi (Kyushu University)

14:20 **1558** Characterization of Pt Catalysts Supported on Ta-SnO2 with Fused Aggregated Network Structure – K. Kakinuma (Fuel Cell Nanomaterials Center, University of Yamanashi), Y. Senoo, K. Taniguchi (Engineered Materials Sector R&D Center, Mitsui Mining and Smelting Co., Ltd.), M. Watanabe (Fuel Cell Nanomaterials Center, University of Yamanashi), and M. Uchida (Fuel Cell Nanomaterials Center, University of Yamanashi)

14:40 **1559** Effect of Added Graphitized Carbon Black on Both Performance and Durability of Pt/Nb-SnO_2 Cathodes for PEFCs – M. Uchida (Fuel Cell Nanomaterials Center,University of Yamanashi, University of Yamanashi), Y. Chino (University of Yamanashi), K. Taniguchi, Y. Senoo (Mitsui Mining and Smelting Co., Ltd., Engineered Materials Sector R&D Center), K. Kakinuma (Fuel Cell Nanomaterials Center, University of Yamanashi, University of Yamanashi), M. Hara, and M. Watanabe (Fuel Cell Nanomaterials Center, University of Yamanashi)

15:20 **1560** Mitigation of Cathode Catalyst Degradation during Air/Air Startup Cycling Via the Atmospheric Resistive Switching Mechanism of a Hydrogen Anode with a Pt Catalyst Supported on Ta-Doped TiO_2 – H. Shintani (Panasonic corporation), Y. Kojima (University of Yamanashi), K. Kakinuma, M. Watanabe (Fuel Cell Nanomaterials Center, University of Yamanashi), and M. Uchida (University of Yamanashi)

15:40 **1561** Corrosion Resistant Electrospun Niobium Carbide Nanotube Supports for PEMFC Cathodes – Y. Nabil-Moreau, S. Cavaliere, D. J. Jones, J. Rozière (CNRS - ICGM - AIME - University of Montpellier), I. Harkness, and J. Sharman (Johnson Matthey)

16:00 Intermission

16:20 **1562** Ta-Based Catalyst Support for Proton Exchange Membrane Fuel Cell Applications – A. D. Abhayawardhana and V. Birss (University of Calgary)

16:40 **1563** Electrospun Ni nanofibres as Pt supports for PEMFC electrodes – G. Ercolano, S. Cavaliere, D. J. Jones, and J. Rozière (CNRS - ICGM - AIME - University of Montpellier)

17:00 **1564** Fabrication and Performance of Membrane Electrode Assembly Using a Hydrophilic Pt/[$TaOPO_4$/VC] Electrocatalyst – Y. Garsany (EXCET Inc.), M. B. Sassin, B. D. Gould, and K. Swider-Lyons (US Naval Research Laboratory)

211-B, Phoenix Convention Center

A3-2 GDL and MPL – 14:00 – 18:00

Co-Chairs: Ugur Pasaogullari and Tatsumi Kitahara

14:00 **1547** GDL and MPL Characterization and their relevance to Fuel Cell Modelling – J. Haußmann, F. Wilhelm, S. Enz, M. Klages, A. Pournemat, C. Bergbreiter, J. S. Clark, K. Duraisamy, K. Seidenberger (Zentrum für Sonnenenergie- und Wasserstoff-Forschung), H. Markötter, I. Manke (Helmholtz-Zentrum Berlin), and J. Scholta (Zentrum für Sonnenenergie- und Wasserstoff-Forschung)

14:40 **1548** Novel Gas Diffusion Layers with Patterned Wettability – A. Forner-Cuenca, J. Biesdorf (Paul Scherrer Institut), L. Gubler (Electrochemistry Laboratory, Paul Scherrer Institut), T. J. Schmidt (Laboratory of Physical Chemistry, ETH Zürich), and P. Boillat (Paul Scherrer Institut)

15:00 **1549** Influence of the Gas Diffusion Layer Compression on the Oxygen Mass Transport in PEM Fuel Cells – C. Simon, F. Hasché, D. Müller, and H. A. Gasteiger (Technische Universität München)

15:20 **1550** Impact of Cell Compression on Resistance, Mass Transport, and Ultimate PEMFC Performance – M. B. Sassin (US Naval Research Laboratory), Y. Garsany (EXCET Inc.), B. D. Gould, and K. Swider-Lyons (US Naval Research Laboratory)

15:40 **1551** Influence of Hydrophilic and Hydrophobic Triple MPL Coated GDL on the Oxygen Transport Resistance in a PEFC under High Humidity Conditions – T. Kitahara, H. Nakajima, and K. Okamura (Department of Mechanical Engineering, Kyushu University)

16:00 Intermission

16:20 **1552** Effect of Pore Volume of Hydrophilic Microporous Layer (MPL) on PEFC Performance – T. Tanuma and M. Kawamoto (Asahi Glass Co., Ltd.)

16:40 **1553** *In-Situ* Measurement of Oxygen Particial Pressure on the Surface of a Cathode GDL with Automotive Compatible Operating Conditions – S. Hirano, J. Chen, M. Potocki, and G. Saloka (Ford Motor Company)

17:00 **1554** Influence of MPL Structure Modification on Fuel Cell Oxygen Transport Resistance – Z. Lu, J. Waldecker (Ford Motor Company), M. Tam (Automotive Fuel Cell Cooperation Corp.), and M. Cimenti (Automotive Fuel Cell Cooperation)

17:40 **1556** Characterization Studies of a New MEA Structure for Polymer Electrolyte Fuel Cells – J. Park, U. Pasaogullari, and L. J. Bonville (Center for Clean Energy Engineering, University of Connecticut)

L06 Photocatalysts, Photoelectrochemical Cells, and Solar Fuels 6

Energy Technology / Physical and Analytical Electrochemistry / Sensor

104-B, Phoenix Convention Center

Carbon Dioxide Conversion – 09:00 – 12:10

Co-Chairs: Vaidyanathan Subramanian and Ying Li

09:00 **1737** Graphene Oxides and Their Hybrids for CO_2 Conversion and Solar Fuels – L. C. Chen (Center for Condensed Matter Sciences, Natl Taiwan Univ) and K. H. Chen (Inst. of Atomic and Molecular Sci., Academia Sinica)

09:30 Break

09:50 **1738** Impact of Catalyst Performance on the Life-Cycle CO_2 Emissions of Methanol Production By Direct Electrocatalytic Reduction of CO_2 – M. Pellow (Global Climate and Energy Project, Stanford University) and S. Benson (Global Climate and Energy Project, Stanford University, Dept. of Energy Resources Engineering, Stanford Univ.)

10:10 **1739** Performance Modeling of Simultaneous CO_2 and Water Electrolysis By Practical Photo-Electrochemical Devices – R. R. Gutierrez Perez and S. Haussener (LRESE, EPFL)

10:30 **1740** Electroreduction of CO_2 to Synthesis Gas and Hydrocarbons on Doped Carbons – A. S. Varela and P. Strasser (Technical University Berlin)

10:50 **1741** Co-Electrolysis Cell Configurations for CO_2 Electrochemical Reduction – J. Durst, J. S. Herranz, Y. Paratcha, A. A. Permyakova (Electrochemistry Laboratory, Paul Scherrer Institut), and T. J. Schmidt (Paul Scherrer Institut, Laboratory of Physical Chemistry, ETH Zürich)

11:10 **1742** The Effect of Electrolyte on the Electrochemical Reduction of CO_2 to CO – S. Verma, X. Lu, S. Ma, and P. J. A. Kenis (University of Illinois at Urbana-Champaign)

11:30 **1743** Fully Integrated Stand-Alone Device for Gas-Phase CO_2 Reduction Using Sunlight: Proof of Concept – M. Arab, T. L. Church, X. Li, T. Maschmeyer, and A. I. Minett (The University of Sydney)

11:50 **1744** Magnetic Fields That Enhance the Rates of Multistep Reactions Important in Energy Storage and Conversion – W. L. Gellett, H. C. Lee, J. J. Reed, and J. Leddy (University of Iowa)

Photocatalysts & Photoelectrochemical Cells – 14:00 – 16:40
Co-Chairs: Renata Solarska and Huyen N. Dinh

14:00 **1745** Thermal Management in Photo-Electrochemical Hydrogen Generation Devices Using Concentrated Solar Irradaiton – S. Tembhurne and S. Haussener (LRESE, EPFL)

14:20 **1746** Electronic Structure and Optical Properties of Nb_2O_5 Photo-Catalyst Calculated By Density Functional Method – P. Shirvanian and M. Hao (Tennessee Tech University)

14:40 **1747** Cost Effective Inkjet Printing of Titania Nanoparticles for Photocatalytic Applications – R. Bernasconi and L. Magagnin (Politecnico di Milano)

15:00 **1748** Photoelectrochemistry of Nano Zerovalent Fe Based $CdFe_2O_4$ / FexOy Produced from Cd2+ Water Remediation – K. Soto (University of Puerto Rico at Río Piedras), E. O. Ortiz-Quiles (University of Puerto Rico), E. Larios, M. Jose-Yacaman (University of Texas at San Antonio), and C. R. Cabrera Jr. (University of Puerto Rico at Rio Piedras)

15:20 Break

15:40 **1749** Exfoliated Molybdenum Disulfide for TiO2 Based Dye Sensitized Solar Cells – E. O. Ortiz-Quiles (University of Puerto Rico) and C. R. Cabrera Jr. (University of Puerto Rico at Rio Piedras)

16:00 **1750** Methanol Photooxidation on Colloidal Anatase TiO_2: A Mechanistic Study – M. A. Alpuche-Aviles, K. K. Barakoti, and A. Recinos (University of Nevada, Reno)

16:20 **1751** Wettability Impact of Porous Current Supplier on Current Efficiency in Solid Polymer Water Electrolyzer – K. Ito (Department of Mechanical Engineering, Kyushu University, I2CNER, Kyushu University), Y. Tsuchiya (Graduate school of Engineering, Kyushu University), T. Sakaguchi, A. Inada (Kyushu University), and H. Nakajima (Department of Mechanical Engineering, Kyushu University)

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