

call for papers



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Boston

M a s s a c h u s e t t s

220th ECS Meeting

October 9-14, 2011

Westin Waterfront | Boston, MA

220th ECS Meeting — Call for Papers

The 220th ECS Meeting will be held from October 9-14, 2011. This major international conference offers a unique blend of electrochemical and solid-state science and technology; and serves as a major forum for the discussion of interdisciplinary research from around the world through a variety of formats, such as oral presentations, poster sessions, exhibits, and tutorial sessions.

Abstract Submission and Deadlines

Abstracts are due no later than April 29, 2011.

Note: Some abstracts may be due earlier than April 29, 2011. Please carefully check the symposium listings for any alternate abstract submission deadlines. For complete details on abstract submission and symposia topics, please see www.electrochem.org.

Submit one original meeting abstract electronically via www.electrochem.org, no later than **April 29, 2011**. Faxed abstracts, late abstracts, and abstracts more than one page in length (except for the A3 Electrochemical Energy Summit) will not be accepted. In June 2011, all presenting authors will receive an e-mail from ECS headquarters office notifying them of the date, time, and location of their presentation. Only authors with non-U.S. addresses will receive a hardcopy acceptance letter. Other hardcopy letters will be sent only upon request.

Meeting abstracts should explicitly state objectives, new results, and conclusions or significance of the work. Abstracts must be properly formatted. Please use the ideal preformatted two column template located at: http://www.electrochem.org/meetings/assets/abs_template.doc. Programming for this meeting will occur in May 2011, with some papers scheduled for poster presentation. Check the ECS website for further program details.

Paper Presentation

All authors selected for either oral or poster presentations will be notified in June of 2011. Oral presentations must be in English.

NOTE: Both LCD projectors and laptops will be provided for oral presentations for this meeting. **Presenting authors are no longer required to bring their own laptops to the meeting for presentation; however, you MUST bring your presentation on a USB flash drive to be used with the laptop that will be provided in each technical session room.** If a presenting author would like to use his/her own laptop for the presentation, we strongly suggest that authors verify laptop/projector compatibility in the speaker ready room prior to the presentation at the meeting. Speakers requiring additional equipment must make written request to the ECS headquarters office at least one month prior to the meeting and appropriate arrangements will be worked out, subject to availability, and at the expense of the author. Poster presentations should be displayed in English, on a board approximately 3 feet 10 inches high by 3 feet 10 inches wide (1.17 meters high by 1.17 meters wide), corresponding to the abstract number and day of presentation in the final program.

Manuscript Publication

Meeting Abstracts — All meeting abstracts will be published both on the ECS website and in the Meeting Abstracts USB copyrighted by ECS, and become the property of ECS upon presentation.

ECS Transactions — All full papers presented at ECS meetings are eligible for submission to the online publication, *ECS Transactions* (ECST). Each meeting is represented by a "volume" of ECST, and each symposium is represented by an "issue."

Some symposia will publish their issue to be available for sale "AT" the meeting; some of these issues will also be available in a hard-cover edition. Please see each individual symposium listing in this Call to determine if there will be an "AT" meeting issue. In this case, submission to ECST is mandatory, and required in advance of the meeting.

Some symposia will publish their issue to be available "AFTER" the meeting. Even if an individual symposium listing does not specify publication of an ECST issue, all authors are still encouraged to submit their full papers. To determine acceptance in ECST, all submitted manuscripts will be reviewed, either by the symposium organizers or by the ECST Editorial Board. After the meeting, all accepted papers in ECST will be available for sale, either individually, or by issue.

Papers presented at the meeting, and papers submitted to ECST, may also be submitted to the Society's technical journals: the *Journal of The Electrochemical Society* or *Electrochemical and Solid-State Letters*. Full manuscripts must be submitted within six months of the symposium date. "Instructions to Authors" are available from the ECS headquarters office, the journals, or the ECS website.

Please visit the ECST website (<http://ecsd.org/ECST/>) for additional information, including overall guidelines, deadlines for submissions and reviews, author and editor instructions, a manuscript template, and much more.

If publication is desired elsewhere after presentation, written permission from ECS is required.

Financial Assistance

Financial assistance is very limited and generally governed by the symposium organizers. Individuals may inquire directly to the symposium organizers of the symposium in which they are presenting their paper to see if funding is available. Individuals requiring an official letter of invitation should write to the ECS headquarters office; such letters will not imply any financial responsibility of ECS. Students seeking financial assistance should consider awarded travel grants (see pages 90-91).

Hotel Reservations

The 220th ECS Meeting will be held at the Westin Boston Waterfront located at 425 Summer Street, Boston, MA, USA. Please refer to the 220th ECS Meeting site for the most up to date information on hotel availability and a block of rooms where special rates have been reserved for participants attending the 220th ECS Meeting. **The hotel reservation deadline is September 9, 2011.** Please refer to ECS website for rates and reservations.

Meeting Registration

All participants, including authors and invited speakers of the 220th ECS Meeting, are required to pay the appropriate registration fees. Hotel and meeting registration materials will be made available in June 2011 on the ECS website (www.electrochem.org). **The deadline for early bird registration is September 9, 2011.**

Short Courses

A number of short courses will be offered on Sunday, October 9, 2011 from 9:00 AM-4:30 PM. Short Courses **require advance registration** and may be cancelled if enrollments are too low. As of press-time, the following Short Courses are planned for the meeting: Advanced Impedance Spectroscopy (M. Orazem, Instructor), Scientific Writing for Scientists and Engineers (D. N. Buckley, Instructor), Grid Scale Energy Storage (J. P. Meyers, Instructor), Polymer Electrolyte Fuel Cells (H. Gasteiger and T. J. Schmidt), and Electrochemical Capacitors (J. Miller, Instructor). Please check the ECS website for the final list of offerings.

Technical Exhibit

The 220th ECS Meeting will also include a Technical Exhibit, featuring presentations and displays by over 30 manufacturers of instruments, materials, systems, publications, and software of interest to meeting attendees. Full exhibit booths manned by company representatives cost \$2,000 and include one free meeting registration. Literature display tables (unmanned by company representatives; no meeting registration included) will also be available for \$1,000. Parties interested in exhibiting should contact Tim Fest at the ECS headquarters office for more information. Coffee breaks are scheduled each day in the exhibit hall along with evening poster sessions to increase traffic.

Sponsorship Opportunities

ECS biannual meetings are wonderful chances to market your company through sponsorship. Sponsors will be recognized by level in *Interface*, the Meeting Program, meeting signage, and on the ECS website. The Levels are: Platinum: \$5,000+, Gold: \$2,500+, Silver: \$1,000+, and Bronze: \$500.

In addition, sponsorships are available for the plenary talks and other special events. These opportunities include the recognition stated above along with additional personalized packages. Special event sponsorships will be assigned by the Society on a first-come, first served basis.

Advertising opportunities—in the meeting program as well as in *Interface*—are available. For more information on any sponsorship opportunity, contact Tim Fest at ECS headquarters.

Contact Information

If you have any questions or require additional information, contact ECS, 65 South Main Street, Pennington, New Jersey, 08534-2839, USA, tel: 609.737.1902, fax: 609.737.2743, e-mail: ecs@electrochem.org; Web: www.electrochem.org.

SYMPOSIUM TOPICS

A — General Topics

- A1 — General Student Poster Session
- A2 — Nanotechnology General Session
- A3 — Electrochemical Energy Summit — An International Summit in Support of Societal Energy Needs
- A4 — Grand Challenges in Energy Conversion and Storage
- A5 — Pioneering Women in Electrochemistry

B — Batteries, Fuel Cells, and Energy Conversion

- B1 — Battery / Energy Technology Joint General Session
- B2 — Battery Safety and Abuse Tolerance
- B3 — Challenges for Transportation Batteries
- B4 — Electrochemical Utilization of Solid Fuels
- B5 — Electrochemical Capacitors: Fundamentals to Applications
- B6 — Intercalation Compounds for Rechargeable Batteries
- B7 — Large Scale Energy Storage for Smart Grid Applications
- B8 — Lead-Acid Batteries and Capacitors, New Designs, and New Applications
- B9 — Mathematical Modeling of Lithium Ion Batteries and Cells
- B10 — Polymer Electrolyte Fuel Cells 11
- B11 — Rechargeable Lithium and Lithium Ion Batteries
- B12 — Electrochemical Processes for Fuels

D — Corrosion, Passivation, and Anodic Films

- D1 — Corrosion General Poster Session
- D2 — Coatings for Corrosion Protection
- D3 — Corrosion on Land, Sea, and Air
- D4 — Critical Factors in Localized Corrosion 7
- D5 — High Temperature Corrosion and Materials Chemistry 9 — A Symposium in Honor of Professor Robert A. Rapp
- D6 — Where Metals Meet Human Tissue

E — Dielectric and Semiconductor Materials, Devices, and Processing

- E1 — Solid State Topics General Session
- E2 — Atomic Layer Deposition Applications 7
- E3 — Semiconductors and Plasmonics — Active Nanostructures for Photonic Devices and Systems 2
- E4 — High Dielectric Constant and Other Dielectric Materials for Nanoelectronics and Photonics 9
- E5 — Processing Materials of 3D Interconnects, Damascene and Electronics Packaging

- E6 — Photovoltaics for the 21st Century 7

- E7 — Semiconductor Cleaning Science and Technology 12 (SCST 12)

- E8 — State-of-the-Art Program on Compound Semiconductors 53 (SOTAPCS 53)

- E9 — ULSI Process Integration 7

- E10 — GaN and SiC Power Technologies

F — Electrochemical / Chemical Deposition and Etching

- F1 — Current Trends in Electrodeposition — An Invited Symposium
- F2 — Electrodeposition of Nanoengineered Materials and Devices 4
- F3 — Fundamentals of Electrochemical Growth: From UPD to Microstructures 2
- F4 — Semiconductors, Metal Oxides, and Composites: Metallization and Electrodeposition of Thin Films and Nanostructures 2

G — Electrochemical Synthesis and Engineering

- G1 — Industrial Electrochemistry and Electrochemical Engineering General Session
- G2 — Nanostructured Materials: Chemistry & High-Temperature Applications

H — Fullerenes, Nanotubes, and Carbon Nanostructures

- H1 — Carbon Nanotubes and Nanostructures: From Fundamental Properties and Processes to Applications and Devices

I — Physical and Analytical Electrochemistry

- I1 — Physical and Analytical Electrochemistry General Session
- I2 — Advances in Trace Analysis
- I3 — Bioelectroanalysis
- I4 — Electrochemistry at Nanoscale Dimensions 2
- I5 — Electrochemical Quartz Crystal Microbalance
- I6 — Electron Transfer Reactions at Organic/Metal Interfaces 2
- I7 — Physical and Analytical Electrochemistry in Ionic Liquids 2

J — Sensors and Displays: Principles, Materials, and Processing

- J1 — Sensors, Actuators, and Microsystems General Session
- J2 — Impedance Techniques: Diagnostics and Sensing Applications
- J3 — Luminescence and Display Materials: Fundamentals and Applications
- J4 — Luminescence Materials and Processes for Energy Efficiency
- J5 — Microcantilever and Mass Based Microsensors
- J6 — Sensors Based on Fluorescence, SERS, SPR, and Photoelectrochemistry

A — General Topics

A1

General Student Poster Session (All Divisions)

This poster session provides a forum for graduate and undergraduate students to present research results of general interest to ECS. The purpose of this session is to foster and promote work in both electrochemical and solid-state science and technology, and to stimulate active student interest and participation in ECS. A competition for the two best posters will be part of the session. Cash prizes will be given to the presenting student author on each winning paper; the amounts are awarded at the discretion of the organizers and judges. The awards will be made without regard to gender, citizenship, race, or financial need.

An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are encouraged to submit their full text manuscript for the issue no later than November 18, 2011. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **V. R. Subramanian**, Washington University, e-mail: vsubramanian@seas.wustl.edu; **V. Chaitanya**, New Mexico State University, e-mail: vimalc@nmsu.edu; and **K. Sundaram**, Univ. of Central Florida, e-mail: sundaram@mail.ucf.edu.

A2

Nanotechnology General Session (All Divisions)

The emergence of nanotechnology as a major field of research has touched almost every scientific discipline. The number of applications for materials that are prepared on a nanometer scale is expanding rapidly. The advancement of these applications is made possible by the new methods of preparation and characterization of materials and composites on a nanometer scale. Examples include catalysts for fuel cell applications, semiconductors for photovoltaic and photoelectrochemical solar energy conversion, and chemical and biological sensors.

This symposium will focus on critical issues and state-of-the-art developments in the science and technology of nanostructured materials for electrochemistry applications. Papers are solicited in all areas related to materials including metals, ceramics, semiconductors, molecular electronics, and organic compounds and polymers, and to devices including molecular/nano electronics, chemical and biological sensors, and actuators.

Areas of interest include: semiconductor and metal nanoparticles and metal/semiconductor nanocomposites; size quantization effects in semiconductor nanoparticles; fundamentals of nucleation and growth of nanoparticles/nanowires/nanotubes; novel synthesis methods of nanostructured materials; processing of nanostructured materials; advanced characterization techniques for nanostructured materials; modelling and tailoring of nanostructured materials; nanocomposites and interfacial phenomena; photoinduced charge separation and interfacial charge transfer; photoelectrochemistry of nanostructured films; photocatalysis and environmental applications; nano-ionics; nanostructured catalysts for fuel cells; nanostructured sensor surfaces; and biological applications of nanomaterials.

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November 18, 2011. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **O. M. Leonte**, Berkeley Polymer Technologies, Inc., e-mail: odleonte@comcast.net; **F. Chen**, University of South Carolina, e-mail: chenfa@cec.sc.edu; **J. Li**, NASA Ames Research Center, email: Jing.Li-1@nasa.gov; and **W. Mustain**, University of Connecticut, e-mail: mustain@engr.uconn.edu.

A3

Electrochemical Energy Summit — An International Summit in Support of Societal Energy Needs (All Divisions)

ECS is an organization of scientists and engineers with high technical and scientific standards and long standing expertise in all fields of electrochemical energy. Electrochemical systems address societal energy needs with renewability, high efficiency, portability, and domestic and novel materials and fuels.

The Electrochemical Energy Summit is a societal event to bring together policy makers and technical experts in electrochemical energy systems. The Summit provides a forum for interaction to develop effective pathways to implementable electrochemical energy systems that scale from small to large scale applications. The event is designed to foster exchange between policy makers and energy experts about societal needs and technological energy solutions.

The Energy Summit provides an exceptional opportunity to direct the expertise of ECS toward important societal problems. A panel discussion among policy makers, government officials, and technical experts will identify existing roadblocks to advance effective technologies and will map pathways to implement realistic energy solutions. Panelists will include international experts on societal energy needs and electrochemical energy technologies. Plenary, topical symposia, a directory of electrochemical energy expertise, and a poster session are planned.

The poster session is an opportunity for technical presenters to demonstrate novel and effective solutions to societal energy needs. Electrochemical energy systems include but are not limited to batteries, fuel cells, solar cells, photovoltaics, supercapacitors, high energy grids, fuel generators, and hybrid systems. **Each two-page abstract will be compiled into a directory of electrochemical energy expertise.** The directory will be broadly disseminated and an electronic version made available at no cost to the public at the ECS website. **Enter keywords upon submission.** One or more publications may result from this symposium. Please limit submissions to one per group.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **C. Bock**, National Research Council – Canada, e-mail: christina.bock@nrc.ca; and **J. Leddy**, University of Iowa, email: johna-leddy@uiowa.edu.

A4

Grand Challenges in Energy Conversion and Storage

(Electrodeposition / Energy Technology / Physical and Analytical Electrochemistry / Battery / Industrial Electrochemistry and Electrochemical Engineering / High Temperature Materials / Sensor)

The symposium will provide a forum for the presentation of new and exciting research of interest to the energy science, electrochemical, and materials chemistry communities. The global energy issues cover many interdisciplinary fields including carbon-free generation of energy (photovoltaics and wind), affordable energy storage for automotive traction, and scalable storage solutions for large stationary applications

(including grid-level needs as well as the intermittency of solar and wind). New electrochemical approaches to primary extraction or recycling of critical materials, e.g., silicon for PVs, hydrogen for PEM fuel cells, etc., are also of interest.

The hope is to run a symposium lasting two days and comprised of 40-minute invited lectures. Our intent is to highlight the most recent and perhaps controversial research topics and to promote discussion in these areas.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **D. R. Sadoway**, MIT, e-mail: dsadoway@mit.edu; **Y. Fukunaka**, JAXA & Waseda University, e-mail: hirofukunaka@gmail.com; **R. Mukundan**, Los Alamos National Laboratory, e-mail: mukundan@lanl.gov; and **X-D. Zhou**, University of South Carolina, e-mail: zhox@cec.sc.edu.

A5 Pioneering Women in Electrochemistry (All Divisions)

The focus of this symposium is to showcase the major impact that women are making in the electrochemical field. We invite contributions from women researchers, working in any technical area within electrochemistry and electrochemical engineering. We expect for this unique symposium to provide a venue for women from all over the world to share both technical information as well as their experiences in academia, industry and national laboratories that will encourage other women to enter into the world of electrochemistry and science in general.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **C. Korzenewski**, Texas Tech University, e-mail: carol.korzeniewski@ttu.edu; and **H. Martin**, Case Western Reserve University, e-mail: hbm@case.edu.

B — Batteries, Fuel Cells, and Energy Conversion

B1 Battery / Energy Technology Joint General Session (Battery / Energy Technology)

Papers are solicited on the fundamental and applied aspects of energy storage and energy conversion not covered by other symposia at this meeting. Of particular interest are new materials and designs, performance studies, and modeling of all types of batteries and fuel cells including aqueous, non-aqueous, polymer electrolyte, ionic liquids, and solid electrolyte systems.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to

the symposium organizers: **M. Doeff**, Lawrence Berkeley National Laboratory, e-mail: mmdoeff@lbl.gov; **N. Dudney**, Oak Ridge National Laboratory, e-mail: dudney@ornl.gov; **A. Manivannan**, NETL, e-mail: manivana@netl.doe.gov; and **S. R. Narayan**, University of Southern California, e-mail: srnaraya@usc.edu.

B2 Battery Safety and Abuse Tolerance (Battery)

Safety and abuse tolerance need to be improved to assure commercial acceptance of many advanced renewable energy storage systems. Safety lapses have caused higher scrutiny of advanced batteries by regulatory agencies. Higher energy content and high power capability of today's batteries make achieving these goals more challenging.

This symposium invites papers that describe improved safety of materials, cell designs, and energy storage systems for all battery chemistries. Cathodes that are more stable at high temperature, electrolytes and additives that exhibit reduced reactivity at the electrode surfaces as well as more stable anodes are topics on which this symposium will focus. Additionally, reviews of regulatory initiatives and test standard development, as well as reports of safety testing at the battery level, improved abuse tolerance due to cell and battery pack design and development are invited. Studies of battery control systems and algorithms that increase safety of energy storage systems are also welcome.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **D. H. Doughty**, Battery Safety Consulting Inc., e-mail: dhoughty@batterysafety.net; **K. M. Abraham**, E-KEM Sciences, e-mail: kmabraham@comcast.net; **J. Jeevarajan**, NASA, e-mail: judith.a.jeevarajan@nasa.gov; and **C. Orendorff**, Sandia National Laboratory, e-mail: corendo@sandia.gov.

B3 Challenges for Transportation Batteries (Battery / Energy Technology)

High-energy, high-power advanced batteries are needed for both transportation and energy storage applications; including plug-in hybrid electric vehicles (PHEV), electric vehicles (EV), and grid-connect storage systems. As compared to small consumer portable batteries, large format batteries require a challenging set of requirements such as a long lifetime, low cost, high energy-density, acceptable specific power, and high abuse tolerance. The type of positive and negative electrode materials, electrolytes, and design of the battery influences these decisions. This symposium invites papers that address the research, development, and implementation of all types of batteries for transportation and stationary storage applications. Presentation topics will include new chemistries and materials, performance and abuse testing, electrode and material processing, pack-module-battery designs modeling, and specialized testing.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **C. S. Johnson**, Argonne National

Laboratory, e-mail: cjohnson@anl.gov; **B. Y. Liaw**, Hawaii Natural Energy Institute, SOEST, University of Hawaii, e-mail: bliaw@hawaii.edu; and **K. Zaghib**, Hydro-Quebec, e-mail: Zaghib.Karim@ireq.ca.

B4 Electrochemical Utilization of Solid Fuels (High Temperature Materials / New Technology Subcommittee)

Our increasingly carbon-constrained world makes it imperative to devise new ways to utilize solid fuels, particularly coal, in an environmentally responsible manner with reduced CO₂ emissions.

This new symposium series focuses on efficient conversion and utilization of solid fuels in electrochemical systems such as fuel cells with or without gasification. All forms of solid fuels including coal, carbon, biomass, and waste utilized or converted in all forms of fuel cells including solid oxide, molten carbonate, molten alkali, molten metal anode, alkaline, and others are of interest. The symposium also covers other forms of solid fuel utilization or conversion processes, for example, electrochemical production of hydrogen including chemically assisted electrolysis, and other gaseous or liquid fuels from solid fuels for energy storage. All aspects of materials issues, including catalytic electrodes, materials tolerant to contaminants in solid fuels, electrolyte materials, catalysts for gasification, and materials for capture and removal of contaminants; electrode kinetics and catalysis; solid fuel pretreatment for utilization in fuel cells; characterization and testing of cell performance; and stack and systems issues including modeling and economics are of interest for this symposium.

Electrochemical conversion and utilization of solid fuels hold the potential to change the playing field for electrical power generation, CO₂ capture and mitigation, and also for large-scale energy storage. This symposium offers a new interdisciplinary and international platform, and aims to contribute towards advancing the fundamental understanding of these challenges and issues, and solicit original contributions from researchers in this critically important area.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **T. M. Gür**, Department of Materials Science and Engineering, Stanford University, e-mail: turgut.gur@stanford.edu; **S. Gopalan**, Department of Mechanical Engineering & Division of Materials Science and Engineering, Boston University, e-mail: sgopalan@engc.bu.edu; **W. Mustain**, University of Connecticut, e-mail: mustain@engr.uconn.edu.

B5 Electrochemical Capacitors: Fundamentals to Applications (Battery / Energy Technology)

Electrochemical capacitors (*i.e.*, "supercapacitors" or "ultracapacitors") as a class of energy storage devices have experienced a recent resurgence in interest over the past few years from the academic research level to the commercial sector. This symposium seeks to capture the state-of-the art in the electrochemical capacitor field and solicits papers that cover all fundamental and applied aspects including: (1.) double-layer and/or pseudocapacitance aspects of nanostructured carbons; (2.) materials that exhibit primarily redox pseudocapacitance, including metal oxides and other advanced inorganic materials, and conducting polymers; (3.) mechanistic studies of the operational charge-storage processes in electrochemical capacitors; (4.) development and optimization of practical electrochemical capacitor components, including current

collectors, electrodes, electrolytes, separators, and packaging; (5.) performance of new device designs (including hybrid devices) and configurations using symmetric and asymmetric electrode constructions; (6.) theory and modeling as tools for performance prediction and materials design; and (7.) application tests of electrochemical capacitors in stand-alone or hybrid configurations. Keynote speakers will present critical perspectives covering recent advances and future directions for electrochemical capacitor technology.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **D. Bélanger**, Université du Québec à Montréal, e-mail: belanger.daniel@uqam.ca; **R. Brodd**, Kentucky Argonne Battery Manufacturing R&D Center, e-mail: rbrodd@gmail.com; **T. Brousse**, Laboratoire de Génie des Matériaux et Procédés Associés, Polytech Nantes (France) at University of Nantes, e-mail: thierry.brousse@univ-nantes.fr; **P. Kumta**, University of Pittsburgh, e-mail: pkumta@pitt.edu; **J. W. Long**, U.S. Naval Research Laboratory, e-mail: jeffrey.long@nrl.navy.mil; **P. Simon**, Université Paul Sabatier, LCMIE/CIRIMAT, France, e-mail: simon@chimie.ups-tlse.fr; and **W. Sugimoto**, Shinshu University, e-mail: wsugi@shinshu-u.ac.jp.

An ECS Short Course on Electrochemical Capacitors will be held on Sunday, October 9, taught by John Miller. The course is targeted at technologists interested in advancing and/or exploiting electrochemical capacitor technology. It will provide basic understanding, necessary tools, and general information needed to successfully use capacitor products. It will include a summary of the present status of electrochemical capacitor technology, available commercial and near-commercial products, manufacturers of these products, and projections of future performance levels.

B6 Intercalation Compounds for Rechargeable Batteries (Battery / Energy Technology)

Lithium intercalation/deintercalation into/from host lattices is the basis of current lithium-ion battery technology. Lithium-ion batteries have revolutionized the portable electronics market, and they are being intensively pursued for vehicle and stationary storage applications. This symposium provides a forum for recent advances in intercalation compounds that serve as cathode or anode materials in lithium-ion batteries or other rechargeable systems such as magnesium-ion and aluminum-ion batteries. The symposium focuses on new or improved intercalation materials as well as a fundamental understanding of the processes that control the electrochemical performances. Specific areas to be covered include but not limited to (1.) design of cathode and anode materials, (2.) novel chemical synthesis and processing, (3.) advanced materials and electrode characterization including *in situ* and *ex situ* methods, (4.) electrochemical properties and performances, (5.) electrode-electrolyte interfacial chemistry including SEI layer, (6.) computational modeling of intercalation compounds, and (7.) redox processes, electronic and ionic transport, and reaction mechanisms.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **R. Kanno**, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute

of Technology, Japan, e-mail: kanno@echem.titech.ac.jp; **S. Meng**, University of California at San Diego, e-mail: shirleymeng@ucsd.edu; and **K. Zaghib**, Hydro-Quebec, e-mail: Zaghib.Karim@ireq.ca.

B7

Large Scale Energy Storage for Smart Grid Applications

(Industrial Electrochemistry and Electrochemical Engineering / Battery / Energy Technology / Electronics and Photonics)

There is an imminent need to increase grid efficiency through peak shaving and grid management, and to integrate energy from renewable sources into the overall electricity grid. Also, there will be demands from plug-in hybrid automobiles and smart grid controls in the near term. Thus, the new electricity grid will require large scale energy storage systems to smooth out variability, support ramp rates, and provide off-peak storage. Papers are sought in the area of energy conversion and storage technology that can support these grid-scale applications. The energy storage systems include rechargeable batteries of all types, fuel cells and electrolyzers, fuel production systems, heat to electricity, thermal storage, and hybrid storage systems.

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An ECS Short Course on Grid Scale Energy Storage will be held on Sunday, October 9, taught by Jeremy Meyers. The course is intended for chemists, physicists, materials scientists, and engineers to better understand the specific requirements for energy storage on the electric grid. It will introduce concepts associated with the "smart grid" and the demands of intermittent renewable power sources. It will look at some key technologies under consideration for energy storage and their technical targets and challenges. Includes a look at the current state-of-the-art, and will review data from demonstration systems, experimental data from prototype designs, and some modeling and analysis.

B8

Lead-Acid Batteries and Capacitors, New Designs, and New Applications (Battery)

New lead-acid battery designs are required to provide affordable energy storage for emerging technologies such as hybrid electric vehicles and other motive power equipment, off-grid and on-grid renewable energy storage, and hybrid power system regulation. The lead-acid system was the first rechargeable battery, but ongoing research to modify and improve materials, designs, and systems for new applications continues to increase battery life and improve performance.

Topics of interest include, but are not limited to: (1.) lead cell designs with carbons and/or other additives added to or in parallel with the negative plate to increase cell performance and life of designs in new use modes; (2.) material studies to improve cell components for lead-based batteries. (Improved carbon materials are of interest, whether developed for batteries, capacitors, or PEMFCs, if applicable in lead battery environments); (3.) analyses of failure modes in modern applications; (4.) mechanisms that explain use mode results; (5.) models developed and/or used to predict cell and battery

performance in specific applications; (6.) data on battery and/or capacitor field trials in new applications (for example in high-rate, partial state-of-charge (HRPSOC) cycling); and (7.) charging and monitoring algorithms for new applications.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **K. Bullock**, Coolohm, Inc., e-mail: coolohm@verizon.net; and **P. Moseley**, Advanced Lead-Acid Battery Consortium, e-mail: pmoosey@ilzro.org.

B9

Mathematical Modeling of Lithium Ion Batteries and Cells

(Battery / Industrial Electrochemistry and Electrochemical Engineering)

Lithium ion is rapidly becoming the chemistry of choice for many applications. This system is finding uses from the terrestrial arena to earth orbiting and planetary satellites. The government and commercial users all have similar concerns: safety and life predictions. Qualifying a battery/cell design for a 10-year mission for the ultra conservative aerospace industry requires seven year of real time testing. The transportation sector needs real-time testing for battery warranties.

The symposium will focus on all modeling techniques related to the lithium ion chemistry. Papers are solicited in all areas of optimization techniques, safety, thermal modeling of large format batteries, new methods to reduce computational speed, insights into degradation mechanisms, rapid determination of battery state-of-charge, and life predictions. Areas of particular interest include physics-based models that contain degradation mechanisms and/or extract parameters from test data.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **V. R. Subramanian**, Washington University, e-mail: vsubramanian@seas.wustl.edu; and **J. F. Stockel**, Quandary Solutions LLC, e-mail: quandarysoln@gmail.com.

B10

Polymer Electrolyte Fuel Cells 11

(Energy Technology / Physical and Analytical Electrochemistry / Battery / Industrial Electrochemistry and Electrochemical Engineering / Corrosion)

This international symposium is devoted to all aspects of research, development, and engineering of polymer electrolyte fuel cells (PEFCs), as well as low-temperature direct-fuel cells using either anion or cation exchange membranes. The intention is to bring together the international community working on the subject and to enable effective interactions between research and engineering communities. The symposium is structured as five different sections: diagnostic techniques and systems design/components for both acid and alkaline fuel cells, catalysts and membranes for acid fuel cells, and catalysts and membranes for alkaline fuel cells.

Abstracts for oral or poster contributions must be submitted to the symposium via the ECS website; please send a copy of your abstract to the respective Section Organizers (please cc the Lead Editor). Since the number of time slots for oral presentations are limited, we would appreciate if research groups that submit

several abstracts could seek a reasonable balance between oral and poster contributions. *If you are submitting multiple abstracts for oral contribution to the same Section*, please send a prioritized list to the Section Organizers of that Section, since in this case we might have to move one or more of the oral contributions into the Poster Session, depending on how closely the papers overlap.

Section A: Diagnostics/Characterization Methods, MEA Design/Model

Organizers: H. A. Gasteiger, F. Büchi, V. Ramani, A. Weber

Presentations related to acid and alkaline fuel cells that discuss: (1.) novel gas diffusion medium substrates and micro-porous layer designs; (2.) modeling and diagnostic methods to characterize mass- and heat-transport related phenomena (e.g., water flooding) in cells and membrane electrode assemblies; (3.) CO₂ tolerance modeling of anion-exchange membrane fuel cells; (4.) *in situ* measurement or visualization (X-ray tomography, neutron scattering, etc.); (5.) advanced *ex situ* characterization methods (TEM, STM); (6.) AC-impedance methods; and (7.) electrode and MEA electrochemical modeling.

Section B: Fuel Cell Systems, Stack/BOP Design, Gas Processing
Organizers: P. Shirvanian, T. Fuller, S. R. Narayanan, A. J. Davenport

Presentations related to acid and alkaline fuel cells that discuss: (1.) hydrogen or hydrogen-reformate fuel cells; (2.) direct-fuel fuel cells (DMFC, borohydride, etc.); (3.) alkaline (membrane) fuel cells; (4.) portable fuel cells; (5.) new cell and stack structures, including new types of bipolar plates and flow fields; (6.) degradation of fuel cell components and the influence of degradation products on component and system performance, including corrosion of bipolar plates and BOP, and degradation of sealing materials and other components; (7.) hydrogen-reformate synthesis; (8.) balance-of-plant (BOP) components; and (9.) design and specifications of complete power systems in the context of transportation and stationary power generation applications as well as for micro-fuel cell systems.

Section C: Cation-Exchange Membrane Performance & Durability

Organizers: H. Nakagawa, M. Edmundson, D. Jones

Presentations related to acid fuel cells that discuss: (1.) advanced cation-exchange membranes and ionomers (PFSA, hydrocarbon-based, etc.); (2.) high-temperature membranes; (3.) physical-chemical properties of fuel cell membranes; (4.) structural characterization of membranes; (5.) degradation/aging of membranes (chemical and mechanical); and (6.) molecular modeling of membrane properties.

Section D: Catalyst Activity/Durability for Acid Fuel Cells

Organizers: H. Uchida, C. Lamy, S. Mukerjee, P. Strasser

Presentations related to acid fuel cells that discuss: (1.) fuel cell electrocatalysts for hydrogen and hydrogen-reformate fuel cells; (2.) fuel cell electrocatalysts for direct-fuel fuel cells (e.g., methanol, ethanol, etc.); (3.) novel catalyst supports; (4.) degradation of fuel cell electrocatalysts and catalyst supports; and (5.) *ab initio* computational studies of catalytic mechanisms and for the design of novel catalysts.

Section E: Alkaline Fuel Cell Membranes and Catalysts

Organizers: R. Mantz, K. Swider-Lyons, T. J. Schmidt

Presentations related to alkaline fuel cells that discuss: (1.) electrocatalysts for hydrogen oxidation and oxygen reduction; (2.) catalysts for the direct electrooxidation of alternative fuels (e.g., methanol, ethanol, ammonia, etc.); (3.) catalysts for direct-borohydride applications; (4.) novel anion-exchange membranes; and (5.) degradation mechanisms of anion-exchange membranes.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers:

Section A: H. A. Gasteiger (Lead Editor), Technische Universität München, Germany, e-mail: hubert.gasteiger@tum.de; **F. N. Büchi**, Paul Scherrer Institut, Switzerland, e-mail: felix.buechi@psi.ch; **V. Ramani**, Illinois Institute of Technology, Chicago, USA, e-mail: ramani@iit.edu; and **A. Weber**, Lawrence Berkeley National Laboratory, USA, e-mail: azweber@lbl.gov.

Section B: P. Shirvanian, Ford Motor Co., USA, e-mail: ashirvan@ford.com; **T. Fuller**, Georgia Institute of Technology, Atlanta, USA, e-mail: tom.fuller@gtri.gatech.edu; **S. R. Narayanan**, Univ. of Southern California, Los Angeles, CA, USA, e-mail: srnaraya@college.usc.edu; and **A. J. Davenport**, Univ. of Birmingham, UK, e-mail: a.davenport@bham.ac.uk.

Section C: H. Nakagawa, AGC America, Inc., Mountain View, CA, USA, e-mail: hnakagawa@agcamerica.com; **M. Edmundson**, W. L. Gore & Associates, Elkton, MD, USA, e-mail: medmunds@wlgore.com; and **D. Jones**, Université Montpellier, France, e-mail: Deborah.Jones@univ-montp2.fr.

Section D: H. Uchida, University of Yamanashi, e-mail: h-uchida@yamanashi.ac.jp; **C. Lamy**, Université de Poitiers, France, e-mail: claudelamy@univ-poitiers.fr; **P. Strasser**, Technical University Berlin, Germany, e-mail: pstrasser@tu-berlin.de; and **S. Mukerjee**, Northeastern University, e-mail: S.Mukerjee@neu.edu.

Section E: R. Mantz, U.S. Army Research Office, USA, e-mail: robert.a.mantz@us.army.mil; **K. Swider-Lyons**, Navy Research Laboratory, USA, e-mail: karen.lyons@nrl.navy.mil; and **T. J. Schmidt**, BASF Fuel Cell GmbH, Germany, e-mail: schmidt_tj@web.de.

In order to encourage active participation of new and talented researchers in the field, we anticipate awarding **Student/Postdoc Travel Grants** of at least \$500 and free registration in support of outstanding **graduate students** and **postdoctoral fellows**. Awards will be made based on originality of the work and importance to the field. To be considered for the award, an abstract for an oral or poster presentation as well as a manuscript for the symposium proceedings must be submitted by the respective deadlines. If you would like to apply for the travel grant, please submit your abstract, your proceedings manuscript, your resume, your publication list, and a support letter from your advisor to **Adam Weber** (azweber@lbl.gov) before the deadline for the proceedings manuscript. **Student Poster Prizes** of a total of \$3,000 will be awarded with a \$1,000 top prize. Students who want to participate need to submit an abstract for a poster contribution to the ECS and send a copy of their abstract to **Jim Fenton** (jfenton@fsec.ucf.edu).

An **ECS Short Course on Polymer Electrolyte Fuel Cells** will be held on Sunday, October 9, taught by Thomas J. Schmidt and Hubert A. Gasteiger. It will cover relevant half-cell reactions, their thermodynamic driving forces, and their mathematical foundations in electrocatalysis theory. Different functional requirements of actual PEFC components and present *in situ* diagnostics will be covered. The course will describe the principles of fuel cell catalyst activity measurements, the impact of uncontrolled-operation events, and the various effects of long-term materials degradation. Materials challenges for Alkaline Membrane Fuel Cells (AMFCs) and Direct Methanol Fuel Cells (DMFCs) will also be reviewed.

B1 Rechargeable Lithium and Lithium Ion Batteries
(Battery Division)

This symposium is focused upon research involving both the basic and applied aspects of lithium metal and lithium-ion batteries. Papers are solicited in a number of technical areas, including: (1.) materials design, synthesis and development for electrodes and electrolytes; (2.) anode design, characterization, and performance, (3.) cathode design, characterization and performance, (4.) research involving electrolyte development

and characterization, (5.) electrode interfacial studies and diagnostic techniques, (6.) elucidation of failure modes and mechanisms, and (7.) performance and safety aspects of cells and batteries.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. K. Sunkara**, Conn Center for Renewable Energy Research, University of Louisville, e-mail: Mahendra@louisville.edu; **K. M. Abraham**, E-KEM Sciences, e-mail: kmabraham@comcast.net; **R. Brodd**, KY-ANL Battery Manufacturing R&D Center, e-mail: rbrodd@gmail.com; **R. Bugga**, Jet Propulsion Lab., Electrochemical Technology Group, e-mail: Ratnakumar.V.Bugga-103068@jpl.nasa.gov; and **M. C. Smart**, Jet Propulsion Lab., Electrochemical Technology Group, e-mail: Marshall.C.Smart@jpl.nasa.gov.

B12 Electrochemical Processes for Fuels (High Temperature Materials / New Technology Subcommittee / Physical and Analytical Electrochemistry / Energy Technology)

Sustainable economic growth and high quality of life require an abundant supply of clean and affordable energy. Future energy sources include solar, wind, and nuclear energy - all of which can produce electricity as the primary form of energy. The conversion of this electrical energy to fuels (e.g., hydrocarbon or hydrogen) using common chemicals such as carbon dioxide and water through electrochemical processes (e.g., electrolysis reactions), provides an opportunity to remove the temporal variation in the energy supply from solar and wind energy. Electrolysis reactions may involve protons, hydroxide, oxide or other ions. This symposium will provide an international forum for the presentation and discussion of the latest developments on electrolysis and related topics. The emphasis of this symposium is on recent advances relevant to the conversion and utilization of CO₂ and/or H₂O for synthesis of fuels and other chemicals. The application of the same cells as fuel cells is of special interest, because reversible cells that may be coupled with renewable or nuclear electric power production in order to increase efficiency through energy storage are of particular importance.

Papers are solicited on the following topics: (1.) materials for solid oxide electrolysis cells (SOECs) and solid oxide fuel cells (SOFCs), including electrolytes, electrodes, seals, and interconnects as well as proton conductor electrolysis cells (PCECs) and fuel cells (PCFC). Also contributions about cells with immobilized liquid electrolytes at elevated temperatures are solicited; (2.) electrochemical performance and stability of SOECs/SOFCs, PCEC/PCFC and other relevant cells; (3.) electrocatalytic phenomena in oxygen electrodes and fuel electrodes; (4.) photoelectrochemical approaches for conversion of CO₂ and/or H₂O; (5.) electrochemical and chemical technologies for CO₂ separation; and (6.) novel materials or concepts for CO₂ conversion and capture.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **X-D. Zhou**, University of South Carolina, e-mail: xiao-dong.zhou@sc.edu; **G. Brisard**, University of Sherbrooke, Canada, e-mail: Gessie.brisard@usherbrooke.edu; **M. Mogensen**, Risoe National Laboratory, e-mail: momo@risoe.dtu.dk; and **W. Mustain**, University of Connecticut, e-mail: Mustain@engr.uconn.edu.

D — Corrosion, Passivation, and Anodic Films

D1 Corrosion General Poster Session (Corrosion)

Presentations concerning all aspects of corrosion and associated phenomena in liquid and gaseous phases are welcome. Theoretical analyses, experimental investigations, descriptions of new techniques for the study of corrosion, and analyses of corrosion products and films are of interest.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **S. Fujimoto**, Osaka University, email: fujimoto@mat.eng.osaka-u.ac.jp.

D2 Coatings for Corrosion Protection (Corrosion)

Coatings are of the utmost importance when corrosion protection is considered. Although the use of coatings has been going on for so many years, recent advances have brought this subject to the verge of a new era. This symposium deals with coatings in the perspective of the novel materials and pre-treatments, application techniques, as well as with the fundamental understanding of the protection mechanisms. You are warmly invited to contribute on topics covering any aspect of corrosion protection by coatings, including organic layers, organic-inorganic hybrid coatings, corrosion protective additives, and self-assembled monolayers. Also of interest are novel galvanic coatings and coatings applied by PVD or CVD processes, smart coatings, and coatings with self-repair or self-healing properties, as well as advanced characterization techniques and new approaches for accelerated corrosion testing.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Rohwerder**, Max-Planck-Institut für Eisenforschung, e-mail: Rohwerder@mpie.de; and **V. Gelling**, North Dakota State University, V.J.Gelling@ndsu.edu.

D3 Corrosion on Land, Sea, and Air (Corrosion / Sensor)

The goal of the symposium is to address a wide spectrum of corrosion research on various environments existing on land, in and on the seas, and in the air. The meeting will provide a forum to examine the most recent ideas and advances in the understanding of corrosion processes, mechanisms, and means of corrosion prevention or control from ranging from fundamental electrochemistry through applied research. Applications may include bridges, buildings, underground water and sewage piping distribution systems, and general land-based infrastructure. Sea and air issues may speak about commercial and military platforms where corrosion leads to

materials degradation and impacts the safety and operational life such as the recent Icelandic volcanic clouds that have disrupted air travel.

Topic areas may include, but are not limited to: (1.) general corrosion mechanisms of steels, aluminum, stainless steels, and other structural materials employed for land, air, and sea applications; (2.) atmospheric corrosion of metals and alloys in urban, industrial, and marine locales; (3.) stray current corrosion from transportation systems; (4.) underground corrosion; (5.) design, processing variables, surface preparation, and pretreatments affecting corrosion and corrosion control; (6.) environmentally compliant inhibitors, biocides, and coatings; (7.) cathodic protection and innovative anode materials; (8.) composites and other advanced materials; (9.) use of electrochemical, surface analytical, and nondestructive detection methods; and (10.) predictive and mechanistic corrosion modeling.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **D. Shifler**, Office of Naval Research, e-mail: david.shifler@navy.mil; **Z. Aguilar**, Ocean Nanotech, LLC, e-mail: zapaguilar@yahoo.com; **B. Hinderliter**, Virginia Commonwealth University, e-mail: brian.hinderliter@gmail.com; and **F. Martin**, Naval Research Laboratory, e-mail: farrel.martin@nrl.navy.mil.

D4 Critical Factors in Localized Corrosion 7 (Corrosion)

This symposium will deal with all aspects of localized corrosion, including passivity. The purpose of the symposium is to provide a forum for the presentation and discussion of recent advances and research in one of the most active and challenging fields in corrosion science.

Both experimental and theoretical contributed papers are being solicited in the topics including, but not limited to: passive films and passivity loss on metals, alloys, and semiconductors; characterization of localized corrosion, microstructure-corrosion relationships; kinetics, stability, and morphology of localized corrosion; statistical analysis and modeling of localized corrosion; developments in understanding corrosion of engineering materials; and processes for the control of localized corrosion.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **N. Birbilis**, Monash University, e-mail: nick.birbilis@monash.edu; **A. J. Davenport**, University of Birmingham, e-mail: a.davenport@bham.ac.uk; and **G. S. Frankel**, The Ohio State University, e-mail: frankel.10@osu.edu; **J. R. Kish**, McMaster University, e-mail: kishjr@mcmaster.ca; and **K. R. Zavadil**, Sandia National Laboratories, e-mail: krzavad@sandia.gov.

D5 High Temperature Corrosion and Materials Chemistry 9 — A Symposium in Honor of Professor Robert A. Rapp (High Temperature Materials / Corrosion)

Professor Robert A. Rapp of the Ohio State University is well known for his contributions to the understanding of high temperature corrosion and materials chemistry over the last five decades. His achievements have been recognized by ECS through the following awards: the High Temperature Materials Division Outstanding Achievement Award (1988), ECS Fellow (1993), the Henry B. Linford Award for Distinguished Teaching (1998), and the Olin Palladium Award (2005). In addition, Professor Rapp has been organizer or co-organizer for numerous ECS symposia. For this symposium, papers covering Professor Rapp's main research areas during his extensive teaching and research career are invited from his former students, post-docs, and associates, and as well as the many others active in the field who have been influenced by his work. The topics of the symposium include, but are not restricted to, research in the thermodynamic and kinetic study of high temperature corrosion and protection, diffusion coatings, scaling mechanisms, point defects in compounds, solid-state electrochemistry, evaporation phenomena, chemistry and electrochemistry of fused salts, reactions in the solid state, and interfacial reactions.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **J. Fergus**, Auburn University, jwfergus@eng.auburn.edu; **P. Gannon**, Montana State University, pgannon@coe.montana.edu; **M. Harper**, Gifford, Krass, Sprinkle, Anderson & Citkowski, P.C., mharper@patlaw.com; **T. Markus**, Forschungszentrum Jülich GmbH, T.Markus@fz-juelich.de; **T. Maruyama**, Tokyo Institute of Technology, maruyama@mtl.titech.ac.jp; **E. Opila**, University of Virginia, opila@virginia.edu; **V. Ravi**, California State Polytechnic University, ravi@csupomona.edu; **D. Shifler**, Office of Naval Research, david.shifler@navy.mil; and **E. Wuchina**, Naval Surface Warfare Center, eric.wuchina@navy.mil.

D6 Where Metals Meet Human Tissue (Corrosion / Organic and Biological Electrochemistry / New Technology Subcommittee / Sensor)

As the global population increases in age, there is a parallel increase in the number of implantation procedures. Recent estimates of world-wide sales of orthopedic implants alone have placed the market at \$17.9 billion (USD). Clearly, as new devices and technologies are developed, there will be a continuing need for the understanding and characterization of how metal surfaces of implants interact with their surrounding physiological environment. This symposium will examine all aspects of corrosion pertaining to implant alloy and device interaction with the surrounding biological environment of the host tissue. Topics of interest include but are not limited to: research that seeks to develop an understanding of the mechanisms of corrosion or degradation of material as a result of interaction of implants with the host tissue; surface treatment of materials to inhibit or control corrosion or enhance biocompatibility, *in vitro*, *in vivo*, and *ex vivo* testing methods, development of alloy systems, devices and constructs, and lifetime predictions and material/device monitoring.

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text manuscript for the issue no later than November 18, 2011. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. Virtanen**, University of Erlangen-Nuremberg, e-mail: Virtanen@ww.uni-erlangen.de; **D. Hansen**, University of Dayton, e-mail: douglas.hansen@udri.udayton.edu; **S. Hiromoto**, Biomaterials Center, National Institute for Materials Science (NIMS), e-mail: Hiromoto.Sachiko@nims.go.jp; **B. Shaw**, Pennsylvania State University, e-mail: bashaw@engr.psu.edu; and **A. Simonian**, Auburn University, e-mail: als@eng.auburn.edu.

E — Dielectric and Semiconductor Materials, Devices, and Processing

E1 Solid State Topics General Session (Dielectric Science and Technology / Electronics and Photonics / Energy Technology)

Original papers are solicited on all aspects of electronic materials, devices, and processing technologies not covered by specialized topical symposia at this meeting.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **K. Sundaram**, University of Central Florida, e-mail: sundaram@mail.ucf.edu; **H. Iwai**, Tokyo Institute of Technology, e-mail: iwai@ep.titech.ac.jp; **O. Leone**, Berkeley Polymer Technologies, Inc., e-mail: odleonte@comcast.net; **M. Tao**, University of Texas at Arlington, e-mail: mtao@uta.edu; **R. Todi**, IBM Microelectronics, e-mail: rmtodi@us.ibm.com; and **X. Wang**, Georgia Southern University, e-mail: xwang@georgiasouthern.edu.

E2 Atomic Layer Deposition Applications 7 (Dielectric Science and Technology / Electronics and Photonics)

Recent advances in nanotechnology have created a need for the precise, conformal deposition of thin film materials. Atomic Layer Deposition (ALD) enables the deposition of ultra-thin, highly conformal coatings over complex, 3D topographies, with precise control over thickness and composition. Consequently, ALD has become the technology of choice for a large variety of applications beyond microelectronics. Over the last six years, this symposium has earned a leading position among the technology symposia where ALD is discussed. This symposium offers an excellent forum for sharing cutting edge research on both existing and emerging ALD applications, as well as fundamental aspects of ALD technologies.

Contributions are solicited in the following areas: (1.) semiconductor CMOS applications: development and integration of ALD high-k oxides and metal electrodes with conventional and high-mobility channel materials; (2.) volatile and non-volatile memory applications: extendibility, Flash, MIM, MIS, RF capacitors, etc.; (3.) interconnects and contacts: integration of ALD films with Cu and low-k materials; (4.) fundamentals of ALD processing; (5.) productivity enhancement of ALD equipment and processes; (6.) precursor and delivery system development for ALD; (7.) ALD for optical and photonic applications; (8.) coating of nanoporous materials by ALD; (9.) selective area ALD for patterning of

nanoscale films; (10.) ALD coatings on nanoporous materials (e.g., (bio) templates); (11.) MLD and hybrid ALD/MLD; and (12.) applications for ALD in other areas, such as disk drives, MEMS, nanotechnology, deposition on polymers, fuel cells, photovoltaics, etc.

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E3 Semiconductors and Plasmonics — Active Nanostructures for Photonic Devices and Systems 2 (Electronics and Photonics)

This is the second time this symposium has been organized under the auspices of ECS. Its 2nd edition will cover a wide range of topics related to engineering of photonic devices based on semiconductor and plasmonics-active nanostructures. Papers will be sought on the novel optical and optoelectronic devices and systems based on active semiconductor nanostructures including photonic crystals, quantum dots, and nanowires. Emphasis will be on quantum confinement and/or photonic bandgap-enabled LEDs, photovoltaics, lasers and nonlinear optical devices as well as their system-level integration towards applications in display, photonic circuitry, optical storage and information processing. Plasmonics enhancements will also be a part of the program due to their tie to a number of nanostructured devices. Metallic nanostructures based on focused ion beam milling, electron beam lithography, and synthesis of colloidal nanoparticles are being used for plasmonics enhancement of luminescence and photodetection in both sensing and standard devices. Employing plasmonic design to LEDs and nanoscale lasers will be the subject of interest. Light trapping and enhancement in solar cells through nanostructures, plasmonics and photonic crystals are topics for consideration. Plasmonics enhancement of sensors due to regimes for localized surface plasmon resonance effects and localized electromagnetic field enhancements and designs incorporating two-photon or microcavity effects are sought. Sensing based on plasmonic-enhancement of luminescence or surface enhanced Raman scattering would be considered a part of this subject.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Gerhold**, Army Research Office, e-mail: mike.gerhold@us.army.mil; **J. S. Kwak**, Sunchon National University, e-mail: jskwak@sunchon.ac.kr; **X. Li**, University of Illinois Urbana-Champaign, e-mail: xiuling@illinois.edu; and **Jian Xu**, Pennsylvania State University, e-mail: jianxu@psu.edu.

E4 High Dielectric Constant and Other Dielectric Materials for Nanoelectronics and Photonics 9

(Dielectric Science and Technology / Electronics and Photonics)

Presentations at this symposium will cover the following topical areas: (1.) Ge, GaAs, InGaAs, InAs, InAlAs, InP, GaN, SeGe, strained-Si, graphene, and diverse high mobility substrates: interface modeling; band-offsets; interface passivation techniques, anomalous C-V and G-V characteristics; optimal high-k materials; sub-1-nm realization; high mobility FETs; (2.) high k materials: (doped, ternary) Hf-based and La-based and future generation higher-k materials; new gate insulators: e.g., Sc_2O_3 , Lu_2O_3 , NdON, YON, Er_2O_3 , ErTiO_5 , SrTiO_3 ; epitaxial gate insulators: e.g., Sm_2O_3 , Sc_2O_3 , LaScO_3 , Gd_2O_3 , SrHfO_3 ; materials for volatile, non-volatile, and novel (e.g., RRAM) memory applications: e.g., BaHfO_3 , BaNiWTiO , Y_2TiO_5 , SrTiO_3 , Nb_2O_5 , BiTaO_x , HfTiO_4 , SrTaO_3 , BaZrO_3 , NiO; nano-crystal embedded gate insulators: e.g., Au, Ag, TiN, ITO, Ge nano particles; *ab initio* models; (3.) metal gate electrode materials: work function tuning; novel metal electrodes; (4.) deposition techniques: discussion and understanding of the complexities associated with the deposition of the dielectric materials and metals targeted in this call: e.g., precursor interactions, low temperature processing, non planar substrates, surface sensitivity, sputter effects, intermixing; (5.) bulk material properties: thermal stability of new materials; effects of composition on material properties; material interactions; moisture sensitivity; fundamental understanding regarding device functionality; (6.) flat-band voltage issues and control: anomalous flat-band voltage shift; dipoles at high-k/ SiO_2 and high-k/metal interfaces; dipole formation models; role of oxygen vacancies; Schottky barrier modelling; (7.) interfaces: Si/SiO_2 , SiO_2 /high-k and high-k/metal interfaces; mechanisms of interface layer formation; interface engineering; thermal stability of interfaces; electrical properties and defects of/ at interfaces; interface passivation; (8.) gate stack reliability: defect generation mechanisms and models; charge trapping; new reliability testing techniques; bias temperature instability, dielectric breakdown; transport mechanisms through gate stack; metallic cross-contamination across layers; mechanisms of mobility degradation; (9.) electrical, chemical, and physical characterization: diverse electron microscope, X-ray, and AFM characterization; determination of layer composition and depth profiles; novel electrical characterization techniques; (10.) novel applications: carbon nanotubes; nanowire transistors; use of high-k nanosheets; organic FET and TFT with high-k dielectrics; new concepts in transistors, memory, and switching; new transistor concepts, structures, and configurations; (11.) high-k and diverse insulators for photonics: oxides and insulators for active layers, passivation, photon capture, and anti-reflection coating in solar cells, photo-transistors, lasers, and LEDs; and (12.) high-k processing/manufacturing: development and research of post deposition treatments, surface preparations, cleaning, etchability, etc. of high-k materials.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. Kar**, Indian Institute of Technology, e-mail: skar@iitk.ac.in; **M. Houssa**, University of Leuven, e-mail: michel.houssa@fys.kuleuven.be; **H. Iwai**, Tokyo Institute of Technology, e-mail: iwai@ae.titech.ac.jp; **K. Kita**, The Department of Materials Engineering, The University of Tokyo, e-mail: kita@adam.t.u-tokyo.ac.jp; **D. Landheer**, Surfaces and Interfaces Group, Institute for Microstructural Sciences, National Research Council, e-mail: dolf.landheer@

nrc.ca; **D. Misra**, New Jersey Institute of Technology, e-mail: dmisra@njit.edu; and **S. Van Elshocht**, Thin Film Deposition Group, IMEC, e-mail: sven.vanelshocht@imec.be.

E5 Processing Materials of 3D Interconnects, Damascene and Electronics Packaging (Electrodeposition /Electronics and Photonics / Dielectric Science and Technology)

This symposium focuses on issues pertinent to advances in traditional damascene interconnects and new materials and integration methods for 3D interconnects. An emerging technology or device architecture called 3D integration is based on the system performance gains that can be achieved by stacking and vertically interconnecting distinct device layers. The 3D concept of replacing long 2D interconnects with shorter vertical (3D) interconnects has the potential to alleviate the well-known interconnect (RC) delay problem facing the semiconductor industry today. Additional benefits of the 3D process include reduced die size and the ability to optimize distinct technologies (analog, logic, RF, etc.) on separate vertically interconnected layers. Since electrochemical processes are the ultimate solution to create smaller size and lower cost devices, both practical and fundamental aspects of electrochemical processes are highly demanded in this area. Special interests are shape evolution and additive chemistry of high-aspect ratio, mathematical modeling of deposition.

Ideally, this symposium will bring together researchers to discuss the various merits of the presented 3D device architectures, materials, packaging, and fabrication methodologies. Topics of interest include, but are not limited to: (1.) 3D process integration methodologies; (2.) 3D design and architectures; (3.) simulation and modeling of 3D integrated devices; (4.) materials and techniques for die and wafer bonding; (5.) processing and handling of thin wafers and dice; (6.) materials for temporary die and wafer bonding; (7.) vertical interconnect fabrication technology; (8.) materials for vertical interconnects: insulators, barriers, and metals; (9.) reliability of 3D interconnects; (10.) novel test and measurement of 3D integrated devices; (11.) thermal management in 3D integrated devices; damascene copper interconnects, introduced at the 0.25 μm node, have spanned six technology nodes, and are expected to be used for the foreseeable future; (12.) advanced substrates and packaging, system in packaging (SIP), high speed and optical packaging, wireless and micro CSP; (13.) chip interconnect metallization; damascene plating, copper, copper-alloys, silver etc., seed/barrier layers, sputter seeding, metal migration and planarization; and (14.) chip-package interconnection; flip-chip (C4) technology, Pb-free C4s, wire bonding, TAB, compliant chip-package interconnection and room temperature joint.

This symposium topic will bring together researchers to discuss the challenges and solutions to extend damascene copper interconnects well beyond the 45 nm node. Suggested topics in the area of interest include (but are not limited to): (1.) methods to reduce increases in effective resistivity; (2.) methods to mitigate electromigration and stress migration issues; (3.) advanced barrier/seed processes including ALD and electroless films; (4.) porous low-k ILDs and air gap processing (including deposition and etching); and (5.) novel electrodeposition and CMP processes.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **G. S. Mathad**, S/C Technology Consulting, e-mail: swami_mathad@hotmail.com; **K. Kondo**, Chemical Engineering, Osaka Prefecture University, e-mail: kkondo@chemeng.osakafu-u.ac.jp; **R. Akolkar**, Intel Corporation Components Research

Portland, OR, USA, e-mail: rohan.n.ankolkar@intel.com; **D. P. Barkey**, University of New Hampshire, Department of Chemical Engineering, e-mail: dpb@cisunix.unh.edu; **M. Hayase**, Mechanical Engineering, Tokyo Science University, e-mail: mhayase@rs.noda.tus.ac.jp; **M. Koyanagi**, Tohoku University, e-mail: koyanagi@sd.mech.tohoku.ac.jp; **P. Ramm**, Fraunhofer Institute IZM Munich e-mail: peter.ramm@izm-m.fraunhofer.de; and **F. Roozeboom**, Dept. of Applied Physics, Eindhoven University of Technology, e-mail: f.roozeboom@tue.nl.

E6

Photovoltaics for the 21st Century 7 (Energy Technology / Dielectric Science and Technology / Electronics and Photonics / Industrial Electrochemistry and Electrochemical Engineering / Electrodeposition)

Today's terrestrial solar cells are based largely on various forms of crystalline silicon wafers. Thin-film technologies, with an expanding market share in recent years, are based on chalcogenide or silicon films. With the current global energy consumption at 15 TW and projected demand of 46 TW by 2100, solar cells need to be deployed at tens of TWp or they will have no noticeable impact on our future energy mix. Almost all of the current solar cell technologies are not capable of TWp-scale deployment due to natural resource limitations. For example, the huge electricity input for fabricating wafer-silicon solar cells makes it difficult to deploy wafer-silicon cells to a TWp scale. The known reserves of silver, which is used in wafer-silicon solar cells, will likely limit wafer-silicon cells to probably 1-2 TWp of maximum deployment. Other scarce materials in current solar cells include indium, tellurium, ruthenium, to name a few. These limitations have to be removed or new solar cell technologies, which do not suffer from resource limitations have to be developed, for solar electricity to become a significant source of energy in our future. On the other hand, the installation of solar cells reached ~20 GWp by the end of 2009. Compared to the tens of TWp required, both the potential and gap for solar cells are enormous.

Fundamental and applied research is needed to make breakthroughs in wafer-silicon technologies, thin-film technologies, as well as totally new photovoltaic concepts. This symposium will focus on conventional and non-conventional technologies for solar-to-electric conversion that could be deployed to a TWp scale in the 21st century. Contributions of both fundamental and applied nature leading to low-cost high-efficiency solar-to-electric conversion are solicited. Topics of interest include but not limited to: (1.) solar-grade silicon: purification, ingot growth, wafering, defects, and energy-efficient processing; (2.) wafer-silicon cells: multi- and mono-crystalline cells, processing, substitute for silver, and surface/grain boundary passivation; (3.) thin-film silicon cells: high-throughput deposition, micro- and poly-crystalline films, layer transfer, multi-junction cells, and light trapping; (4.) chalcogenide cells: processing, device structures, and substitutes for scarce materials; (5.) new materials that are abundant, low cost, and non-toxic: inorganic, nanoscale, biomimetic, organic, and composite materials; (6.) non-conventional structures or concepts that promise a much higher efficiency/cost ratio: 3-dimensional, nanostructured, and multi-junction devices; and (7.) cross-cutting issues: substrates, antireflective coatings, modeling/simulation, and module or alternative packaging.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Tao**, University of Texas at Arlington, e-mail: mtao@uta.edu; **C. Claeys**, IMEC, e-mail: claeys@imec.be; **L. Deligianni**, IBM Watson Research Center,

e-mail: lili@us.ibm.com; **J.-G. Park**, Hanyang University, email: parkjgl@hanyang.ac.kr; **K. Rajeshwar**, University of Texas at Arlington, e-mail: rajeshwar@uta.edu; and **M. Sunkara**, University of Louisville, e-mail: mahendra@louisville.edu.

E7

Semiconductor Cleaning Science and Technology 12 (SCST 12) (Electronics and Photonics)

This symposium has been organized under the auspices of ECS every other year since 1989. For its 12th edition the title has been modified, but its scope and overall objectives remain the same. The symposium will cover a wide range of topics related to the science and technology of contaminants removal from and conditioning of Si(SOI), SiC, Ge, SiGe, III-V, II-VI semiconductor and non-semiconductor (e.g., glass, ITO, plastic, sapphire) surfaces; cleaning media, including non-aqueous cleaning methods and tools; front- and back-end cleaning operations; integrated cleaning; cleaning of MEMS; photomasks (reticles); high-k and porous low-k dielectrics; post-CMP cleaning; wafer bevel cleaning/polishing; photoresist and residue removal, characterization, evaluation, and monitoring of cleaning; correlation with device performance; cleaning of equipment and storage/handling hardware; as well as other issues within the broadly understood scope of this symposium, including in particular solar cells manufacturing. Also, surface cleaning and conditioning topics involved in large-area electronics and photonics, both non-organic and organic TFT technology, compound semiconductor device processing, nanowire, nanotubes and nanodots cleaning, as well as surface conditioning related aspects of "self-assembly-monolayer" processing.

Depending on the number of accepted papers a poster session may be scheduled in addition to oral presentations.

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E8

State-of-the-Art Program on Compound Semiconductors 53 (SOTAPOCS 53) (Electronics and Photonics / Luminescence and Display Materials)

Compound and wide bandgap semiconductors are a significant enabler of numerous optoelectronic, high-speed, power, and sensor electronic materials, devices, and systems. The SOTAPOCS 53 symposium will address the most recent developments in inorganic compound and wide bandgap semiconductor technology, including traditional III-V materials, III-nitrides, II-VI materials, silicon carbide, diamond, and other emerging materials. Papers on both practical and fundamental issues are solicited. The following areas are of particular interest: (1.) advances in bulk and epitaxial growth technologies; (2.) advances in device processing; (3.) novel electronic, optoelectronic, and sensor devices; (4.) Schottky and ohmic contact technology; (5.) dielectric properties and passivation; (6.) wafer bonding and packaging; (7.) *in situ* and *ex situ* process monitoring; (8.) material characterization and wafer level testing and mapping; (9.) process induced defects; (10.) reliability and device degradation mechanisms; and (11.) PL and EL characterization of wide gap materials.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. E. Overberg**, Sandia National Laboratory, e-mail: meoverb@sandia.gov; **J. LaRoche**, Raytheon Integrated Defense Systems, e-mail: jeffrey_r_laroche@raytheon.com; and **K. Mishra**, Osram Sylvania, e-mail: Kailash.mishra@sylvania.com.

E9 ULSI Process Integration 7 (Electronics and Photonics / IEEE Electron Devices Society)

The symposium will provide a forum for reviewing and discussing all aspects of process integration. Contributed papers are solicited in the following areas: (1.) device technologies: trends in nanoscaled technologies, 22 nm and beyond on DRAM, SRAM, flash memory, high density logic/low power, RF, mixed analog/digital, high voltage, process integration yield, 3D integration, advanced SOI single and multi-gate; (2.) gate dielectrics (ultra-thin, high-k) and dual gates, stacks (barriers) electrode/dielectrics for memory capacitors and transistors, source-drain and channel processing, rapid thermal processing, novel isolation schemes, ultra shallow junction, plasma processing aspects, sub 32 nm transistor process/device integration issues; (3.) CMP issues, low-k dielectrics, multilevel integrated structures, copper interconnects and barriers, air-gap structures, metal fill technologies, optical interconnects, alternative metallization schemes, 3D integration novel packaging concepts for TSV based technologies and SIPs; (4.) Ge, III-V technologies, alternative high mobility substrates (sSOI, sSi, SiGe, GeOI) hybrid integration, new channel materials; and (5.) novel memory elements, emerging devices, carbon nanotubes, novel materials, vertical integration, graphene devices, polymer electronics, spin and quantum devices.

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E10 GaN and SiC Power Technologies (Dielectric Science and Technology / Electronics and Photonics)

There is a great deal of interest in developing GaN and SiC material and device technologies for power switching and power amplifier applications. You are hereby invited to contribute a paper to this new symposium. The symposium will cover a wide range of topics related to these technologies and their applications: bulk and thin film growth and characterization of materials; defect characterization and reduction techniques; growth chamber design and modeling; doping and carrier lifetime control techniques; high-frequency low-loss power magnetic materials; novel power devices and device structures; power device fabrication technologies; chip-scale capacitor, inductor and transformer structures and fabrication technologies; novel physical mechanisms including micro

plasma and current filamentation; short-term and long-term device degradation and failure mechanisms; novel accelerated stress testing and lifetime prediction methodologies; device characterization and modeling for performance and reliability; manufacturing cost and yield improvement approaches; homogeneous and heterogeneous chip-scale integration; power converters and power amplifiers; packaging and thermal management; and, cooling of power chips and modules. Poster sessions may be scheduled, and a panel discussion will cover the most critical issues on this topic. A whole session covering selected student papers will be organized and a **Best Student Paper** award is planned to be given at the symposium.

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F — Electrochemical / Chemical Deposition and Etching

F1 Current Trends in Electrodeposition – An Invited Symposium (Electrodeposition)

The symposium will provide a forum for the presentation of new and exciting research of interest to the electrodeposition community. This will be a single half-day session comprised of 40-minute invited lectures. Our intent is to highlight the most recent and perhaps controversial research topics and to promote discussion in these areas.

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F2 Electrodeposition of Nanoengineered Materials and Devices 4 (Electrodeposition / Sensor)

Nanoengineered materials, ranging from nanoparticles to nanowires, exhibit a plethora of interesting and novel phenomena, exploiting the quantum confinement effect. Potential technological applications range from electronic and optical devices to chemical and biological sensors. This symposium aims to address the electrodeposition methodology in the synthesis of nanoengineered materials including metals, alloys, composites, metal oxides, semiconductors, conducting polymers and provide fundamental understanding to their structure-property relationships. Topics also include the control of nanostructure growth, size/shape evolution of electrodeposited nanomaterials, and fabrication of nanodevices with electrodeposited steps.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **N. V. Myung**, University of California-Riverside, e-mail: myung@engr.ucr.edu; **S. Brankovic**, University of Houston, e-mail: stanko.brankovic@mail.uh.edu; **L. Deligianni**, IBM, T.J. Watson Research Center, e-mail: lili@us.ibm.com; **J. Harb**, Brigham Young University, e-mail: john_harb@byu.edu; **P. Hesketh**, Georgia Tech, e-mail: peter.hesketh@me.gatech.edu; **E. J. Podlaha**, Northeastern University, e-mail: e.podlaha-murphy@neu.edu; **J. F. Rohan**, Tyndall National Institute, University College Cork, e-mail: james.rohan@tyndall.ie; **J. Talbot**, University of California, e-mail: jtalbot@ucsd.edu; and **G. Zangari**, University of Virginia, e-mail: e-mail: gz3e@virginia.edu

F3 Fundamentals of Electrochemical Growth: From UPD to Microstructures 2 (Electrodeposition)

The symposium will provide a forum for discussions about different fundamental aspects of electrochemical phase formation including: nucleation and growth, electrochemical epitaxy, properties, structure and morphology of electrodeposited films. Original papers are solicited in the areas of: (1.) nucleation and growth, (2.) UPD and ultrathin films, (3.) electrodeposition kinetics and mechanisms, (4.) physical and chemical properties of deposits in relation with morphology and structure, (5.) modeling, and (6.) stress evolution in electrodeposited films.

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F4 Semiconductors, Metal Oxides, and Composites: Metallization and Electrodeposition of Thin Films and Nanostructures 2 (Electrodeposition)

Electrochemical deposition has evolved into a versatile method for the fabrication of functional coatings and nanomaterials. Not only control of size and architecture are central, but also the choices for substrate and deposited material have become more demanding, including semiconductors, oxides and composites with e.g., ceramic nanoparticles or nanotubes. To broaden the possibilities, combinations of chemical and electrochemical techniques are being exploited.

This symposium aims to provide a forum for current work on the deposition and characterization for functional coatings and nanostructures. Specific topics of interest include, but are not limited to: (1.) metal electrodeposition onto semiconductors, metal oxides, electronic materials and resistive substrates: solar cell applications, Ohmic and Schottky contact

formation, metal gates, electrical connections, direct plating, etc; (2.) electrochemical and electrophoretic deposition of nanoparticle coatings: electrochemical nucleation of high density metal islands, effect of additives, chemical solution deposition, colloid chemistry, etc.; (3.) electrodeposition of metal oxides, semiconductors, and nanocomposites: solar cells, low-cost (thin film) transistors applications, particle reinforced composites, CNT/metal composites, etc.; (4.) nanofabrication by electrodeposition: quantum dots, nanowires, nanorods, nanotubes and complex architectures, template-assisted deposition, structure-properties relations, etc; and (5.) electrochemical modification and decoration of nanostructures: CNT with metal nanoparticles, surface selectivity, self assembled monolayers, etc.

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G — Electrochemical Synthesis and Engineering

G1 Industrial Electrochemistry and Electrochemical Engineering General Session (Industrial Electrochemistry and Electrochemical Engineering)

Papers are solicited in areas of industrial electrochemistry and electrochemical engineering that are not covered by other symposia at this meeting. Of particular interest are papers concerning: design, operation, testing, and/or modeling of industrial electrochemical systems; electrochemical waste treatment technologies; methods for electrosynthesis; electrolytic recovery of process materials; new electrode materials; new electrochemical cell designs; and electrocatalysis. Presentations on industrially significant areas, such as chlor-alkali and fluorine production; manufacture of aluminum and other metals; the use of electrochemical methods in pulp and paper bleaching; and generation of environmentally-friendly bleaching chemicals and other active oxidants are also encouraged. Papers may contain both theoretical and experimental work, and papers dealing with either area will be considered. Contributed papers will be programmed in a related order, depending on the titles and content of the abstracts.

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G2 Nanostructured Materials: Chemistry & High-Temperature Applications (High Temperature Materials)

New nanostructured materials are now being created as a result of developments in synthetic chemistry and materials science. These include nanoporous materials such as: metal organic frameworks, aluminum and anodized aluminum oxide, carbon nanotubes, block copolymers, zeolites, nanostructured carbons and fullerenes. Nanostructured materials may be dense or have pores ranging in size from a few angstroms to tens of nanometers and exhibit many interesting properties: extremely high surface area; low density; gas storage capacity; selective molecular binding; remarkable high-temperature stability; luminosity; and ferro- or antiferromagnetism. Methods to control the nanostructure are improving and the application of high-level quantum chemistry methods are beginning to reveal the mechanisms behind some of their unusual properties. As a result, there is growing interest in a host of applications, including gas storage, separations, catalysis, drug delivery, and sensing.

Despite the numerous methods that allow the synthesis of nanostructured oxide particles and films, there are still problems in maintaining the structure at the nano-sized level after sintering and in the final device, especially for high temperature applications. For these applications thermal stability of nanostructured materials under operation is another important issue for their application.

This symposium will highlight the latest developments in the field of nanostructured materials, particularly their chemical aspects, but also critical issues in materials science required for the design, fabrication and performance of devices that utilize them. Papers are solicited in the following and related areas: (1.) synthetic and reaction chemistry of nanostructured materials; (2.) formation of nanostructured films or material hybrids on substrates or supports to enable gas- or liquid-phase separations and high-temperature applications such as catalysis; (3.) modeling and theory to predict and optimize the structure or reaction chemistry and environment; (4.) measurements and characterization, including gas sorption, diffusion, catalysis, and electro-optical properties; (5.) processing of nanostructured materials and investigation of their thermal and chemical stability; (6.) development of devices such as molecular sensors, separation membranes, solar cells, supercapacitors, batteries, and fuel cells; and (7.) novel applications such as targeted drug delivery.

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H — Fullerenes, Nanotubes, and Carbon Nanostructures

H1 Carbon Nanotubes and Nanostructures: From Fundamental Properties and Processes to Applications and Devices (Fullerenes, Nanotubes, and Carbon Nanostructures / Dielectric Science and Technology / Sensor / Energy Technology)

This symposium will be focused on fundamental properties and processes in physics, chemistry, and materials science. Topics may include methods for sample preparation and characterization; mechanical, thermal, optical, and electronic properties; chemical and electrochemical behavior; and theoretical studies. It also covers applications of carbon nanomaterials. In this context, topics may include novel applications in the areas of electronic devices, sensors, materials development, solar energy harvesting, catalysis, nano-mechanical devices, biomedicine, environmental remediation, etc.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **D. M. Guldi**, Institute for Physical Chemistry, Friedrich-Alexander-Universitat, e-mail: dirk.guldi@chemie.uni-erlangen.de; **S. De Gendt**, IMEC, Belgium, degendt@imec.be; **H. Klauk**, Max-Planck-Institute for Solid State Research, e-mail: H.Klauk@fkf.mpg.de; **J. Li**, NASA Ames Research Center, e-mail: Jing.Li-1@nasa.gov; **R. B. Weisman**, Rice University, e-mail: weisman@rice.edu; **K. Worhoff**, University of Twente, e-mail: k.worhoff@el.utwente.nl; and **K. Zaghib**, Hydro-Quebec, e-mail: Zaghib.Karim@ireq.ca.

I — Physical and Analytical Electrochemistry

I1 Physical and Analytical Electrochemistry General Session (Physical and Analytical Electrochemistry)

Papers concerning any aspect of physical electrochemistry not covered by topic areas of other specialized symposia at this meeting are welcome. Contributed papers will be programmed in some related order, depending on the titles and contents of the submitted abstracts.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **R. A. Mantz**, Army Research Office, e-mail: robert.a.mantz@us.army.mil.

12 Advances in Trace Analysis (Physical and Analytical Electrochemistry)

A variety of different techniques have been used for electroanalytical sensing at the trace level. This symposium will highlight recent advances in the field, with a special emphasis on bringing together researchers working with different approaches. Topics of interest include, but are not limited, to the use of voltammetry, chronopotentiometry, potentiometry, and related techniques for the analysis of redox-active and redox-inactive analytes.

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13 Bioelectroanalysis (Physical and Analytical Electrochemistry / Sensor)

Papers are solicited on fundamental and applied aspects of bioelectroanalysis: including the design, fabrication, and evaluation of biosensors and bioprobes as well as electrochemical lab-on-a-chip devices for bioanalysis and biomedical applications. All papers in electroanalytical techniques for biological molecules are invited, as well as papers focused on fundamental bioelectrocatalysis for sensing and analysis applications.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. Minteer**, Saint Louis University, e-mail: minteers@slu.edu; and **B. Chin**, Auburn University, e-mail: chinbry@auburn.edu.

14 Electrochemistry at Nanoscale Dimensions 2 (Physical and Analytical Electrochemistry)

Nanoscale materials and electrochemistry in nanospaces has been an ever expanding research area over the last decade. This symposium will focus on the electrochemistry of nanoscale materials including: carbon nanotubes, nanowires, and nanoparticles. It will also focus on nanoscale electrodes and electrochemistry in nanoscale volumes. Special interest in the area of characterization techniques for studying the nanoscale dimension are also of interest.

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15 Electrochemical Quartz Crystal Microbalance (Physical and Analytical Electrochemistry)

A quartz crystal microbalance (QCM) is powerful technique that has been successfully applied in numerous research fields. Additionally, QCM can be coupled with many other techniques and provide complex in-situ transient measurements. The solicitation calls for fundamental and applied aspects of a quartz crystal microbalance technique. Besides others, the fundamentals cover the acoustic wave theory, response of shear mode piezoelectric resonators, properties and behavior of viscoelastic thin films, behavior of the resonators exposed to various media, computer modeling and equivalent circuits of the associated physical phenomena. The applied research with QCM is very broad, examples might include study and control of catalysts, metal films, and polymers deposition, self-assembled monolayers, redox processes and intercalation in electrochemical sensors, energy storage and generation system. Other example might include biochemical study of proteins adsorption on quartz resonators, their stability and fouling, antibody affinity to antigens, cells growth and adhesion on resonators, further research of DNA and immunosensors. Highly welcomed are also applied presentations in which QCM became the critical technique for ground a breaking research, invention, or provided the required evidence to conclude on a proposed hypothesis.

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16 Electron Transfer Reactions at Organic/Metal Interfaces 2 (Physical and Analytical Electrochemistry / Organic and Biological Electrochemistry)

This symposium covers current issues related to the rates and mechanisms of heterogeneous electron transfer rate constants at metal and polymer coated (organic) interfaces. The reactions are not limited to electrode surfaces but may encompass the rates of electron transfer taking place at minerals substrates.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **A. Fitch**, Loyola University, e-mail: afitch@luc.edu; and **M. Foley**, US Naval Academy, e-mail: foley@usna.edu.

17 Physical and Analytical Electrochemistry in Ionic Liquids 2 (Physical and Analytical Electrochemistry)

This symposium will provide an international and interdisciplinary forum for researchers to present their latest research on topics involving physical and/or analytical electrochemistry in ionic liquids. Papers on both basic and applied research are encouraged. The topics will include, but are not limited to: (1.) electron transfer processes in ionic liquids; (2.) electrode kinetics in ionic liquids; (3.) the electrode/ionic liquid interface; (4.) electrochemical characterization of ionic

liquids (e.g., conductivity, ion transport, electrochemical windows); (5.) experimental aspects of electrochemistry in ionic liquids; (6.) the electrochemistry of solutes in ionic liquids; (7.) electroanalytical determinations in ionic liquids; (8.) electrodeposition in ionic liquids (e.g., nucleation, deposition of alloys, characterization of electroactive species, and surface characterization); and (9.) electrochemical aspects of biological materials and systems in ionic liquids.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **P. C. Trulove**, U.S. Naval Academy, Annapolis, MD, e-mail: trulove@usna.edu; **H. C. De Long**, Air Force Office of Scientific Research, Arlington, VA, e-mail: hugh.delong@afosr.af.mil; and **R. A. Mantz**, Army Research Office, Research Triangle, NC, e-mail: robert.a.mantz@us.army.mil.

J — Sensors and Displays: Principles, Materials, and Processing

J1 Sensors, Actuators, and Microsystems General Session (Sensor)

This symposium will address all aspects of sensor, actuator and microsystems research and development. The inclusion of sensors and actuators into a range of application environments has been significantly increasing in order to provide improved system capabilities such as increased performance, decreased environmental impact, or high efficiency. Sensors and actuators are often integrated into "smart" microsystems: microfabricated sensors and/or actuators combined with electronics which enable, for example, signal conditioning and data processing. The need for multifunctional, smart technologies, which depend on sensors, actuators and electronics, is expected to increase in coming years as further demands and expectations are placed on systems and devices. This general session welcomes papers on all aspects of sensors, actuators and microsystems not covered in other session. This symposium intends to bring together a range of interdisciplinary topics and covers all materials aspects of sensors, actuators and microsystems. Primary emphasis will be placed upon applied aspects of the materials, synthesis, evaluation and development strategies of novel materials/device configurations for sensing and actuating functions as well as integrated microsystems. High temperature as well as low temperature applications will be discussed. Papers are solicited in, but not limited to, the following areas: (1.) physics and chemistry of sensor and actuator materials, fabrication, and characterization of novel compositions; (2.) novel routes for the synthesis of materials with grain (pore) size control and distributions; (3.) novel sensor and actuator concepts, design, modeling, and verification; (4.) sensing systems that include sampling systems and actuators, like sensor arrays, and electronic noses and tongues; (5.) physical, chemical, and biological sensors and actuators, such as gas, humidity, ion or molecular sensors, their system integration and actuating functions; (6.) optical, RF, and wireless sensors and actuators, such as fiber optic sensors, microwave sensors, and optical and wireless integrations; (7.) emerging technologies and applications including sensors based on nanotechnology; and (8.) novel techniques to expand and ensure sensor stability and reliability.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Carter**, KJW Engineering, Inc., e-mail: mtcarter62@comcast.net; **Z. Aguilar**, Ocean Nano Tech, LLC, e-mail: zapaguilar@yahoo.com; **J. Li**, NASA Ames Research Center, email: Jing.Li-1@nasa.gov; and **B. Ward**, Makel Engineering, Inc., e-mail: bward@makelengineering.com.

J2 Impedance Techniques: Diagnostics and Sensing Applications (Sensor / Industrial Electrochemistry and Electrochemical Engineering / Corrosion)

The purpose of this symposium is to bring together leading experts with a variety of different experimental and theoretical skills working in areas of electrochemical impedance technology and analytical systems. Impedance can be employed for materials analysis and condition monitoring, directly determine a variety of variables such as motion, chemical composition or electric field and, indirectly, sense many other variables that can be converted into motion or permittivity, such as pressure, acceleration, fluid level, and fluid composition. Impedance spectroscopy-based measurements, represent a rich multi-discipline area of science that has been applied to a large number of important areas of research, such as: corrosion studies and corrosion control; monitoring of properties of electronic and ionic conducting polymers and coatings; measurements in energy storage, batteries, and fuel cells-related systems; mechanical measurements; biological, biocellular, and biomedical sensors; measurements in semiconductors, solid electrolytes, and electronic conductors; and studies of electrochemical kinetics, reactions, and processes and their control.

The aim is to show the power of electrochemical impedance spectroscopy for understanding electrochemical systems: characterizing homogeneous and heterogeneous materials by their charge transport and dielectric properties, recognizing effects and signatures of surface layers, studying space charge regions at the interfaces or in the bulk solution, determining kinetics of electrochemical and chemical reactions. The symposium also welcomes papers dedicated to fundamental research in electrochemical impedance devices and recent advances in the impedance instrumentation, data collection and processing, and process monitoring where it relates to electrochemistry.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **V. Lvovich**, The Cleveland Clinic, e-mail: lvovicv@ccf.org; **M. E. Orazem**, University of Florida, e-mail: meo@che.ufl.edu; **P. Vanysek**, Northern Illinois University, e-mail: pvanysek@niu.edu; and **Y. Yoon**, University of Dayton, e-mail: yoonyuhu@notes.udayton.edu.

An ECS Short Course on Advanced Electrochemical Impedance Spectroscopy will be held on Sunday, October 9, taught by Mark Orazem. This is the second of a two-course sequence, and introduces model development based on proposed reaction mechanisms, statistical analysis of impedance data, and regression analysis. 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. Ideally, the attendee should have some experience with making impedance measurements.

J3 Luminescence and Display Materials: Fundamentals and Applications (Luminescence and Display Materials)

This symposium will focus on physical and chemical aspects of luminescence in both organic and inorganic solids, and will address current and emerging technical and scientific issues in luminescence. Presentations at this meeting will include photoluminescent materials, cathodoluminescent materials, electroluminescent materials, scintillators, persistent phosphors, lasers, and their applications. This symposium will highlight a special session on ceramic luminescent materials and their applications in lighting, display, and laser technologies.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **J. Collins**, Wheaton College, e-mail: jcollins@wheatoncollege.edu; **B. Di Bartolo**, Boston College, e-mail: dibartob@bc.edu; **U. Happek**, The University of Georgia, e-mail: uhappek@physast.uga.edu; **D. Lockwood**, National Research Council, Canada, e-mail: david.lockwood@nrc-cnrc.gc.ca; **K. Mishra**, Osram Sylvania, email: kailash.mishra@sylvania.com; and **M. Raukas**, Osram Sylvania, e-mail: madis.raukas@sylvania.com.

J4 Luminescence Materials and Processes for Energy Efficiency (Luminescence and Display Materials / Energy Technology)

This symposium will highlight the role of luminescent materials for energy reduction and renewable energy sources. Significant energy savings are being accomplished through the introduction of energy efficient lighting, and presentations will include demonstrations of experimental and theoretical work on white LEDs, OLEDs, and fluorescent lighting. Examples of renewable energy sources include, but are not limited to, quantum cutting coatings for solar cells and related up/down conversion processes.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **A. Setlur**, GE Global Research, e-mail: setlur@crd.ge.com; **J. Collins**, Wheaton College, e-mail: jcollins@wheatoncollege.edu; **C. Hunt**, University of California, Davis, e-mail: hunt@ucdavis.edu; and **M. Tao**, University of Texas at Arlington, e-mail: mtao@uta.edu.

J5 Microcantilever and Mass Based Microsensors (Sensor)

This symposium has a special interest in advances in quartz crystal microbalance, surface acoustic wave and cantilever based microsensors. Recently, there has been a tremendous growth in the range of applications to which these devices have been applied. A wide range of materials have been developed

for chemically and biologically selective surface coatings for specific target analytes. The use of orthogonal sensors and sensor arrays offers new promise of further expanding chemical and biosensing capabilities. This symposium will address all aspects of sensor fabrication and surface modification and their use in chemical and biosensing, including advances in instrumentation to monitor multiple sensors in arrays, and novel aspects of signal processing from multiple sensors. A partial list of areas of interest include (1.) fabrication of novel mass based sensors; (2.) high specificity chemistry and methods for achieving uniform functionalization and immobilization of receptors; (3.) instrumentation for multiplexing sensor arrays; (4.) chemical sensing applications; (5.) biosensing applications; (6.) modeling of sensor behavior; (7.) sensing manipulations at the nanometer scale; and (8.) fluidics and preconcentration for sensor arrays.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **T. Thundat**, University of Alberta, Edmonton, Canada, e-mail: Thundat@ualberta.ca; **B. Chin**, University of Auburn, e-mail: bchin@eng.auburn.edu; **P. J. Hesketh**, Georgia Institute of Technology, e-mail: peter.hesketh@me.gatech.edu; and **S. Jeon**, Pohang University of Science and Technology, e-mail: jeons@postech.ac.kr.

J6 Sensors Based on Fluorescence, SERS, SPR, and Photoelectrochemistry (Sensor)

This symposium will provide an international and interdisciplinary forum to present the latest research on sensors based on fluorescence, surface-enhance Raman scattering (SERS), surface plasmon resonance (SPR), and photoelectrochemistry. Topics of interest include but not limited to: (1.) exploring novel methods for signal transduction; (2.) development and utilization of nanomaterials and nanostructures for enhancement of sensor performance; (3.) development of molecular recognition probes; (4.) integration of sensors into microfluidic devices and lab-on-chips; (5.) sensor optimum design, sensing data fusion, and simulation; and (6.) applications of sensors in real-world samples in the fields such as medical diagnosis, homeland security, environmental monitoring, and food safety.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **N. Wu**, West Virginia University, e-mail: nick.wu@mail.wvu.edu; **L. A. Nagahara**, National Cancer Institute, e-mail: larry.nagahara@nih.gov; and **A. Simonian**, Auburn University, e-mail: als@auburn.edu.