



227th ECS Meeting

May 24-28, 2015

Chicago, Illinois, USA

Hilton Chicago



On behalf of the officers, Board of Directors, volunteer leadership and staff of ECS, it is my pleasure to share highlights from the 227th ECS meeting. The 227th ECS meeting will be held at the historic Hilton Chicago. Located in downtown Chicago, the Hilton offers the ideal location for convenient access to many of the city's iconic attractions. This profound international conference includes more than 2,200 technical presentations, guest and award-winning lecturers, full-day short courses, professional development workshops and career opportunities, a dynamic technical exhibit, and our *Free the Science*TM 5K, with proceeds benefitting the ECS publications endowment. We encourage meeting attendees to participate in the technical program as well a variety of social events throughout the meeting.

On **Monday, May 25th** at 1700h the plenary session will wrap up the first full day of the 227th meeting. **John Turner** will deliver the highly anticipated ECS Lecture, "Hydrogen from Photoelectrochemical Water Splitting – What's It Gonna Take?" and all ECS award recipients will be honored. This can't miss awardee line-up includes **Henry White**, recipient of the first ECS Allen J. Bard Award, established in 2013 to recognize distinguished contributions to electrochemical science, and **Yue Kuo**, recipient of the ECS Gordon E. Moore Medal for Outstanding Achievement in Solid State Science and Technology, established in 1971 for distinguished contributions to the field of solid state science. In addition to Dr. White and Dr. Kuo, ECS will honor the Division and Section award winners. The Society, Division, and Section award talks are scheduled in various symposia throughout the week.

Short courses are offered on Sunday, May 24th in addition to professional development sessions throughout the week which provide essential information on enhancing career opportunities and networking. Between the award lectures, technical sessions, exciting events in the technical exhibit hall, general Society and student poster sessions the 227th ECS meeting provides the perfect opportunity to get together with colleagues and associates from around the world, discuss important research, and discover new initiatives.

We hope that each one of our guests will take advantage of all the educational, networking and technical sessions that will take place in Chicago.

Paul A. Kohl
ECS President



Early-bird Registration

Early-bird registration pricing is available until April 24, 2015.

To register today or to review full information for the 227th ECS meeting please visit

www.electrochem.org/chicago



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Meeting Events-at-a-Glance

Sunday, May 24

- 0900h Short Course #1: Nanotechnology for Bioenergy:
Biofuels to Fuel Cells
- 0900h Short Course #2: Fundamentals of Electrochemistry
– Basic Theory and Thermodynamic Methods
- 0900h Short Course #3:
Scientific Writing for Scientists and Engineers
- 1300h Technical Sessions
(Check Technical Program for exact time)
- 1400h Professional Development Series Part 1:
Essential Elements for Employment Success
- 1700h Sunday Evening Get-Together

Monday, May 25

- 0700h Session Chair Orientation Breakfast
- 0800h Professional Development Series Part 1:
Essential Elements for Employment Success
- 0800h Technical Sessions
(Check Technical Program for exact time)
- 0930h Technical Session Coffee Break
- 1200h Professional Development Series Part 2:
Resume Review
- 1530h Allen J. Bard Award Lecture
- 1700h Plenary Session
- 1930h Student Mixer (By invitation only; contact
customerservice@electrochem.org for details)

Tuesday, May 26

- 0800h Technical Sessions
(Check Technical Program for exact time)
- 0800h Professional Development Series Part 2:
Resume Review
- 0930h Technical Session Coffee Break
- 1215h Annual Society Business Meeting and Luncheon
- 1300h Technical Exhibit
- 1730h Gordon E. Moore Award Lecture
- 1800h Technical Exhibit and General and Student Poster
Session

Wednesday, May 27

- 0700h Free the Science 5K & 1 mile walk
- 0800h Technical Sessions
(Check Technical Program for exact time)
- 0800h Professional Development Series Part 2:
Resume Review
- 0900h Technical Exhibit
- 0930h Technical Session Coffee Break in Exhibit Hall
- 1800h Technical Exhibit and General Poster Session
- 1815h Author Info Session in the Edison Theatre

Thursday, May 28

- 0800h Technical Sessions
(Check Technical Program for exact time)
- 0900h Technical Exhibit
- 0930h Technical Session Coffee Break in Exhibit Hall



Exhibit Hall Events

Don't miss these exciting events in the Exhibit Hall!

- Coffee Breaks
- Breakfast with Princeton Applied Research & Solartron
- General & Student Poster Sessions
- Exhibitor Workshop with Pine Research



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Plenary and Awards Program

The Plenary Session will be held on **Monday, May 25 at 1700h** in the Grand Ballroom where ECS President **Paul Kohl** will wrap up the first full day of the 227th meeting by welcoming the ECS meeting attendees. Meeting attendees will then turn their attention to **John Turner** who will deliver the highly anticipated ECS Lecture, “Hydrogen from Photoelectrochemical Water Splitting – What’s It Gonna Take?” and all ECS Award recipients will be honored.

This can’t miss awardee line-up includes **Henry White**, recipient of the first ECS Allen J. Bard Award; established in 2013 to recognize distinguished contributions to electrochemical science, and **Yue Kuo**, recipient of the ECS Gordon E. Moore Medal for Outstanding Achievement in Solid State Science and Technology, established in 1971 for distinguished contributions to the field of solid state science. In addition to Dr. White and Dr. Kuo, ECS will honor the Division and Section award winners. The Society, Division, and Section award talks are scheduled in various symposia throughout the week.



ECS Lecture Monday, May 25, 1700h Grand Ballroom

Hydrogen from Photoelectrochemical Water Splitting – What’s It Gonna Take?

by John A. Turner



JOHN A. TURNER, PhD, has made an immense impact on the field of electrochemistry, through his research in hydrogen production, and innovation in fuel cells.

Dr. Turner has studied under highly notable pillars of electrochemistry, such as Fred Anson and Heinz Gerischer. He joined the National Renewable Energy Laboratory in 1979 – where he is now a Research Fellow – and began his work on photoelectrochemical water spilling for hydrogen production. Among his

many honors and awards, Turner received the U.S. Department of Energy Office of Science Outstanding Mentor Award for his work with undergraduate students.

He has also received awards from the Midwestern Research Institute, Hydrogen Technical Advisory Panel, and Idaho State University. With over 160 peer-reviewed publications, Dr. Turner’s work focuses on direct conversion (photoelectrolysis) systems for hydrogen production from sunlight and water, catalysts for the hydrogen and oxygen reactions, materials for advanced fuel cell membranes, and corrosion studies of the fuel cell metal bipolar plates. His lecture is set to focus on hydrogen from photoelectrochemical water splitting.



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Society Awards

ECS Gordon E. Moore Medal for Outstanding Achievement in Solid State Science and Technology

Tuesday, May 26, 1730-1810h

Williford Room B

Research on Nano and Giga Electronics – Breakthroughs Along the Path

by Yue Kuo



YUE KUO is currently the holder of the Dow Professorship at Texas A&M University of Chemical Engineering. Through his extensive experience and research in solid state science, Dr. Kuo has established the Thin Film Nano & Microelectronics Research Laboratory, which is dedicated to solid state research and education.

Among his many honors, Dr. Kuo has been awarded ECS's Electronics & Photonics Division Award (2007) and the prestigious ECS Fellow Award (1999). He has authored many papers and edited many journals, including the *Journal of The Electrochemical Society* from 2003 to 2012. Dr. Kuo's research is focused on the interdisciplinary nano and microelectronics area, especially the understanding of the complicated relationship among device performance, material properties, and fabrication processes of TFTs, ICs, and novel applications.

Dr. Kuo's work in solid state science has yielded many innovations and has provided a great impact in the scientific community. In his award address, Dr. Kuo will talk about breakthroughs in research on nano and giga electronics.

ECS Allen J. Bard Award

Monday, May 25, 1530-1600h

Williford Room C

The Electrochemical Nucleation and Physical Behavior of Hydrogen Nanobubbles

by Henry White, Q. Chen, S. R. German, H. Wiedenroth, L. Luo, and S. W. Feldberg



HENRY WHITE is a world leader in the field of electrochemistry, performing pioneering research in energy storage and fundamental studies of reduction-oxidation reactions and electron-transfer reactions, and the structure of interfaces between metals and solutions.

Professor White worked under Allen J. Bard while obtaining his PhD, where he researched electrogenerated chemiluminescence, transport in Nafion modified electrodes, and solar energy conversion using transition metal

dichalcogenide photoelectrodes. Since joining the Society in 1985, Prof. White has been presented with ECS's Carl Wagner Award (2010) and David Grahame Award (2005).

Prof. White currently serves as Dean of the College of Science at the University of Utah. Here, he and his research team have made advances in new methods to determine the structure of biological polymers such as DNA, the development of novel batteries with increased storage capacity and investigations of drug delivery through human skin using electrical currents. In his award address, Prof. White will talk about the electrochemical nucleation and physical behavior of hydrogen nanobubbles.



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Division and Section Awards

Electronics and Photonics Division Award

H04 Symposium

Monday, May 25, 0900-0930h

Hilton Chicago, Conference Room 4G

Dielectrics for III-V Materials

by D. C. R. Abernathy



CAMMY R. ABERNATHY started her journey through electrochemical science at the Massachusetts Institute of Technology in 1980, where she received her SB degree in materials science and engineering. From there, she went on to Stanford University where she received her MS and PhD degrees in materials science and engineering in 1982 and 1985 respectively. Dr. Abernathy then joined the University of Florida, where she became a professor in the Department of Materials

Science and Engineering. She was appointed the College's Associate Dean for Academic Affairs in 2004, and currently holds the position of Dean of the College of Engineering.

Among her many honors, Dr. Abernathy has been presented the prestigious ECS Fellowship Award, and is a fellow of both AVS and APS.

Dr. Abernathy's research interests are in synthesis of thin-film electronic materials and devices using metal organic chemical vapor deposition and molecular beam epitaxy. She is the author of over 500 journal publications, over 430 conference papers, one co-authored book, seven edited books, eight book chapters, and seven patents.

Energy Technology Division Research Award

I03 Symposium

Tuesday, May 26, 0800-0840h

Hilton Chicago, Boulevard Room A

PEM Fuel Cell Electrode Layer Degradation

by R. L. Borup, R. Mukundan, J. D. Fairweather, D. Spernjak, D. A. Langlois, K. L. More, G. Maranzana, A. Lamibrac, J. Dillet, S. Didierjean, O. Lottin, L. Guétaz, R. Ahluwalia, S. Arisetty, and K. Rau

MPA-11: Materials Physics and Applications: Materials Synthesis and Integrated Devices

SPO-AE: Science Program Office - Applied Energy Distributed Program manager for Fuel Cell and Vehicle Technologies



RODNEY L. BORUP is noted for his work in fuel cell transportation with such corporate and academic organizations such as General Motors and Los Alamos National Laboratory (LANL). He joined LANL in 1994 as a post-doctoral researcher, where he would eventually move on to become the Program Manager for the Fuel Cells and Vehicle Technologies Program and Team Leader for fuel cells – titles which he currently holds.

He received degrees from the University of Iowa and the University of Washington. Additionally, Dr. Borup has been awarded 13 U.S. patents, authored roughly 100 papers related to fuel cell technology and presented over 100 oral papers at international and national meetings.

Dr. Borup has been a member of ECS since 1995 and is currently a member of the DOE/US Drive Fuel Cell Technical team, along with being co-chair of the DOE Fuel Cell Technologies Office Durability Working Group. His work in fuel cells has been highly recognized with the presentation of the Principal Investigator for the 2004 Fuel Cell Seminar Best Poster Award and the 2005 DOE Hydrogen Program R&D Award.

Energy Technology Division Supramaniam

Srinivasan Young Investigator Award

A01 Symposium

Tuesday, May 26, 0940-1000h

Hilton Chicago, Continental Room A

Near Room Temperature Conversion of Methane to Methanol

by T. J. Omasta, W. A. Rigdon, C. A. Lewis, R. J. Stannis, R. Lui, C. Q. Fan, and W. E. Mustain



WILLIAM MUSTAIN earned a PhD in Chemical Engineering at the Illinois Institute of Technology in 2006, followed by two years as a Postdoctoral Fellow in ECS President Paul Kohl's research group at Georgia Tech. He went on to join the Department of Chemical & Biomolecular Engineering at the University of Connecticut in 2008. Over the past twelve years, Prof. Mustain has worked in several areas related to electrochemical energy generation and storage, including: catalysts

and supports for proton exchange membrane and anion exchange membrane fuel cells and electrolyzers, high capacity materials for Li-ion batteries, the purposeful use of carbonates in low temperature electrochemical systems, and the electrochemical conversion and utilizations of methane and CO₂.

Prof. Mustain has been the PI or Co-PI on over \$5M of externally funded research projects. He has published over 50 peer-reviewed articles, authored two book chapters, has three pending U.S. patents, and has over 70 invited and conference talks.

Among his many honors and recognitions, Prof. Mustain has received the 2013 U.S. Department of Energy Early Career Award and the Illinois Institute of Technology Young Alumnus Award.

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Energy Technology Division Graduate Student Award

A02 Symposium

Monday, May 25, 1400-1440h

Hilton Chicago, Salon A-1

All-Graphene Energy Storage Device for High Energy and Power Density

by H. Kim, H. D. Lim, J. Hong, and K. Kang



HAEGYEOM KIM is a PhD candidate at the Department of Materials Science and Engineering at Seoul National University. Here he studies developing carbon based electrode materials and graphite derivative materials for energy storage devices such as Li rechargeable batteries, Na rechargeable batteries, and hybrid supercapacitors. Kim received his BS from Hanyang University and his MS from the Korea Advanced Institute of Science and Technology. While obtaining his

MS, Kim studied developing graphene based electrode materials for lithium rechargeable batteries including anodes and cathodes.

Since 2010, he has authored 16 published papers and co-authored 18. Kim's accomplishments have been recognized by the Korea Section of ECS, where he was presented with the Student Award (2014). Kim has also received the 20th Humantech Paper Award, the Global PhD Fellowship, and has been funded by the Korean government for his research.

Energy Technology Division Graduate Student Award

L10 Symposium

Monday, May 25, 1040-1110h

Conference Room 4D

Plasmonic Light Absorption Enhancement Mechanisms in Semiconductors Above and Below the Band Edge

by S. K. Cushing, J. Li, A. D. Bristow, and N. Wu



SCOTT CUSHING is currently finishing his PhD dissertation in Physics at West Virginia University, where he is advised by Prof. Nianqiang (Nick) Wu and Prof. Alan D. Bristow. Through his research, Cushing aims to gain a fundamental understanding of plasmon-enhanced solar energy conversion processes. His thesis involves understanding how plasmonics can improve light absorption above and below the band edge in solar materials. Cushing's investigations on energy

and charge transfer also span into semiconductor heterostructures, fluorophores, and plasmonics to improve application such as water splitting and optical bio-sensors – focusing on how these processes occur on coherent and ultrafast time-scales.

Cushing's research on the plasmonic enhancement of solar energy conversion was featured in an ECS Interface special issue. Cushing is also a Goldwater Scholar, NSF Graduate Fellow, and SPIE D.J. Lovell Scholar.

Industrial Electrochemistry & Electrochemical Engineering Division New Electrochemical Technology (NET) Award

F02 Symposium

Monday, May 25, 1400-1440h

Hilton Chicago, PDR 3

Development of Large Scale Commercial PEM Electrolysis

by K. E. Ayers, B. Carter, L. Dalton, K. Dreier, C. Ebner, and L. Moulthrop, of Proton OnSite

PROTON OnSITE is the world leader in commercializing proton exchange membrane (PEM) electrolysis. Founded almost two decades ago, Proton has built a successful, profitable and sustainable commercial business around this technology, providing reliable and cost effective products to industrial, laboratory, and military customers around the world. The company's product portfolio spans hundreds of watts to nearly 200 kW of input power. Leveraging this strong commercial base, Proton is now poised to capitalize on the new emerging hydrogen markets in energy storage and mobility.

The 2015 New Electrochemical Technology (NET) award for outstanding work in electrochemistry and electrochemical engineering is awarded to Proton Onsite for the development of their C Series Hydrogen Generator. The recognized technical team below represents a broader cross-functional effort of many Proton personnel in bringing this product to market. The C Series is a key advance in Proton's product portfolio, with an output capacity of up to 65 kg/day of hydrogen.

This product represents a 5-fold increase in output (over previously available generators) with only a 1.5-fold increase in product footprint. This new system, introduced as a commercial product in 2011, has high strategic importance in that it continues to validate the technological advantage of PEM-based electrolysis at a scale similar to alkaline liquid based systems, without the disadvantages of the caustic electrolyte and high-pressure oxygen generation.

Additionally, there has recently been significant interest in megawatt (MW)-scale PEM-based electrolyzers for renewable energy capture, especially in Europe, with several recent announcements poised to dramatically change the energy storage landscape. The C Series is a key stepping stone for this market and its demonstrated track record is providing confidence MW-scale PEM can compete in this market. This 65-kg/day system also is at an appropriate size for the next generation of fueling stations for fuel cell bus demonstrations, and for the refueling of small fleets of cars, or forklift trucks. Proton has delivered hydrogen generation equipment for several fueling stations, based on this new C Series hydrogen generator.

To date, this product has supplied hydrogen to support over 2500 successful high-pressure fills and while dispensing more than 7000 kg of hydrogen at the fueling station on site at our headquarters, which has been in operation for over three years. This serves as testament to the robustness and longevity of this platform.

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Proton OnSite Contributors



KEN W. DREIER specializes in PEM electrolyzer systems integration and electrolysis-based hydrogen fueling stations. Dreier is currently a Principal Mechanical Engineer at Proton OnSite, and has previously led the mechanical systems development effort for the C Serious product. He holds a MOT degree from Georgia Tech and a BSME from the University of Illinois at Urbana-Champaign.



CURT C. EBNER is a Senior Mechanical Engineer at Proton OnSite. Ebner is an expert in hydrogen and thermal management systems and has applied this knowledge to several of Proton's product development efforts including the C Series. He also has experience in designing sophisticated laboratory testing facilities for sound, psychrometric and electrical testing of HVAC equipment. Ebner holds a Bachelor of Science Degree in Manufacturing Engineering Technology from Midwestern State University.



BLAKE D. CARTER currently serves as the Project Manager for Commercial Cell Stacks, facilitating sustaining engineering and manufacturing efforts for legacy electrolyzer cell stack platforms as well as bringing new designs into production. He holds a BS in Mechanical Engineering from Worcester Polytechnic Institute and has served as a commercial product design and development engineer for over 11 years. Past work includes the development of a 5,000 psig differential

pressure PEM electrolyzer cell stack platform.



LUKE T. DALTON is Manager, Advanced Technologies and Systems and has served as engineer and program manager for a number of key R&D initiatives including high pressure electrolysis cell stacks and systems, closed-loop regenerative fuel cells, and alkaline membrane system development. He currently manages the Navy and NASA oxygen generation stack programs, electrochemical hydrogen compressor research, and contributed to the C Series product development through

the cell stack design and cost reduction. Luke received AB, BE, and MS degrees from Dartmouth College.



KATHERINE E. AYERS is Director of Research where she is responsible for Proton's advanced technology strategy, and has built a portfolio of projects to support Proton's existing and future electrochemical products. She works with many universities and national labs to develop advanced materials for PEM electrolysis and other electrochemical devices. She was named one of the 2014 Rising Stars by the ACS Women Chemists Committee.



LAWRENCE C. MOULTHROP is the Vice President Hydrogen Systems and Co-founder of Proton OnSite, has over 36 years experience in PEM-based systems. Mr. Moulthrop works with Proton's engineering teams to develop packaged hydrogen generator systems for fueling, renewable energy capture, and backup power. Larry actively contributes to key H₂ standards such as ISO22734-1 (Water Electrolyzers), DTR/ISO19880 (Hydrogen Fueling Stations), and NFPA2 Hydrogen

Technologies Code, and is on the DoE Hydrogen Safety Panel. He holds 22 patents in PEM cell design and system architecture.

Industrial Electrochemistry and Electrochemical Engineering Division Student Achievement Award 103 Symposium

Tuesday, May 26, 0840-0900h

Hilton Chicago, Boulevard Room A

Anhydrous High-Proton Conductor Based on Ionic Nanopeapods

by M. M. Hasani-Sadrabadi, E. Dashtimoghdam, G. Bahlakeh, and K. I. Jacob



MOHAMMAD MAHDI HASANI-SADRABADI is currently a graduate researcher studying bioengineering at the Georgia Institute of Technology. Prior to joining Georgia Tech, Hasani-Sadrabadi attended the Swiss Federal Institute of Technology in Lausanne, where he received the Excellence Scholarship that enabled him to develop microfluidic platforms for controlled synthesis of polymeric nanoparticles. Hasani-Sadrabadi's fuel cell research began in 2007 at Amirkabir University

of Technology. In 2010, he established the Biologically-Inspired Developing Advanced Research (BiDAR) group as an international collaborative research team. His main research area of interest is the development of bio-inspired nanomaterials for energy and biomedical applications.

Hasani-Sadrabadi has published more than 40 peer-reviewed papers and has an h-index of 15. He has received many honors and recognitions, including the National Scientific Prize for Elites and the IFIA Top Inventor Award.

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Industrial Electrochemistry and Electrochemical Engineering Division H. H. Dow Memorial Student Achievement Award

F02 Symposium

Monday, May 25, 1440-1520h

Hilton Chicago, PDR 3

An Investigation of the Growth Mechanism of Coal Derived Graphene Films

by S. H. Vijapur, D. Wang, D. C. Ingram, and G. G. Botte



SANTOSH VIJAPUR is a PhD candidate in the Department of Chemical and Biomolecular Engineering at Ohio University, working under the guidance of ECS's Dr. Gerardine G. Botte. Santosh's doctoral research work involves development of graphene and amorphous carbon films using coal as a carbon source, with focus on detailed investigation of the growth mechanism by utilizing various spectroscopy, crystallography and chromatography techniques. He has also

demonstrated the utilization of these carbon films in various electrochemical applications. Apart from his dissertation work, Santosh is involved in coal electrolysis project for hydrogen production and synthesis of various nickel based nanocomposites for urea electrolysis.

Santosh has received degrees from Ohio University and Dr. Babasaheb Ambedkar Technological University. His master's thesis focused on enhancing the collection efficiency of pollutants containing particulate matter with diameter less than 2.5 μm .

Santosh has published five peer-reviewed papers, two conference proceedings, and has given five oral presentations. Further, he founded the Ohio University ECS Student Chapter and served as its secretary.

Nanocarbons Division Richard E. Smalley Research Award

B01 Symposium

Wednesday, May 27, 1000-1040h

Hilton Chicago, Lake Huron

Nanocarbons for Optoelectronic Applications

by D. M. Guldi



DIRK M. GULDI is known for his outstanding contributions to the areas of charge-separation in donor-acceptor materials and construction of nanostructured thin film for solar energy conversion. Dr. Guldi joined ECS in 2008, where he served as Chair of the Fullerenes, Nanotubes, and Carbon Nanostructures Division and was named a Society Fellow in 2014. His career has a robust background in academia and research. Dr. Guldi has held

positions at Notre Dame Radiation Laboratory, and has also served as the Associate Editor of the journal *Nanoscale*. Since 2004, Dr. Guldi has authored or co-authored more than 300 peer-reviewed articles and has been named among the world's 2014 Highly Cited Researchers by Thomas Reuters. Dr. Guldi is currently a Professor in the Department of Chemistry and Pharmacy at the Friedrich-Alexander University in Erlangen, where his research topics of interest include efficiencies of solar energy conversions.

Dr. Guldi completed both his undergraduate and PhD at the University of Cologne, followed by postdoctoral appointments at the National Institute of Standards and Technology, the Hahn-Meitner Institute Berlin, and Syracuse university.

Since 2004, he has authored or co-authored more than 300 peer-reviewed articles on the fundamental structural and electronic requirements for ultrafast charge transport and optical gating in carbon nanostructure arrays of donor-acceptor ensembles and in nanostructured thin films to address aspects that correspond to the optimization and fine-tuning of dynamics and / or efficiencies of solar energy conversion.

Physical and Analytical Electrochemistry Division David C. Grahame Award

L04 Symposium

Tuesday, May 26, 0800-0840h

Hilton Chicago, Williford Room A

Kinetics of the Hydrogen Oxidation in Alkaline and Acid Electrolytes

by H. A. Gasteiger, J. Durst, J. Herranz, A. Siebel, F. Hasché, P. J. Rheinländer, and C. Simon



HUBERT A. GASTEIGER has touched many aspects of electrochemical science, from academia to industry. He received his PhD in Chemical Engineering from UC Berkeley in 1993, where he was mentored by Elton Cairns, Phil Ross, and Nenad Markovic in the field of electrochemistry. He went on to do a one-year postdoctoral fellowship at the Lawrence Berkeley National Laboratory, followed by academic research with Jürgen Behm at Ulm University – where he established a research

group in heterogeneous gas-phase catalysis and electrocatalysis. After nine years of academic research, he spent ten years working in industry with organizations such as GM, Opel, and Acta S.p.A.

He returned to the academic realm in 2009 when he accepted a one-year Visiting Professorship at MIT, working on lithium-air batteries and fuel cell electrocatalysis – focusing on materials, electrodes, and diagnostics development for fuel cells and batteries.

Dr. Gasteiger has been with ECS since 1989, where he has received the ECS Norman Hackerman Young Author Award and was named an ECS Fellow in 2011. He has published 94 refereed articles (h-index 53, 15,000 citations), 15 book chapters, and 33 patent applications/patents.



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Dielectric Science and Technology Division

Thomas D. Callinan Award

Z03 Symposium

Wednesday, May 27, 0845-0930h

Hilton Chicago, PDR 7

Boron Carbon Nitride Thin Films for Low-k Dielectric Interconnect and Optical Applications

by K. B. Sundaram, A. Prakash, and S. W. King



KALPATHY B. SUNDARAM has provided the foundation of thin film technology for low-k and high-k dielectric materials. His technical contributions in non-traditional low-k materials are cited as the original works. Prof. Sundaram's contributions in this field are well known and highly regarded by both academic and industrial researchers and engineers for solving fundamental problems with high-k materials.

Since joining ECS in 1994, Prof. Sundaram has served various leadership roles in the Dielectric Science Division of the Society, as well as being awarded the ECS Fellow Award. His efforts in education have resulted in four "University for Excellence in Teaching Awards" given by the Board of Trustees.

Prof. Sundaram has received degrees from the University of Kerala, Indian Institute of Science, and the Indian Institute of Technology. After he obtained his PhD, Prof. Sundaram joined McMaster University as a Post-Doctoral Research Fellow. He went on to join Opto-Electronics Inc. as a Research Scientist, and then the Department of Electrical and Computer Engineering at the University of Central Florida, where he currently holds the title of Senior Professor and Graduate Coordinator in the Department of Electrical and Computer Engineering.

Europe Section Alessandro Volta Medal

L01 Symposium

Tuesday, May 26, 1400-1440h

Hilton Chicago, Williford Room C

Electrochemical SERS on Nanostructured Surfaces and its Application to DNA Detection and Discrimination

by P. N. Bartlett



PHILIP N. BARTLETT is highly recognized among the scientific community for his research in bioelectrochemistry, template electrodeposition of nanomaterials and chemical sensors. After receiving his B.A. in Chemistry from the University of Oxford, he was awarded a British Petroleum Scholarship to study for a PhD in Photoelectrochemistry under the supervision of Professor W. John Albery FRS at Imperial College. From this, he went on to work on modified electrodes with

the help of a Research Fellowship from the Royal Society for the Exhibition of 1851. He went on to pursue a career in academia at the University of Warwick and the University of Bath. In 1993 Prof. Bartlett joined the University of Southampton, where he is currently the Professor of Electrochemistry.

Prof. Bartlett has been presented many awards and honors, including ECS's Electrodeposition Division Research Award (2005) and the Carl Wagner Memorial Award (2007).

He is currently the President Elect of the International Society for Electrochemistry and holds many fellowships, including the Royal Society of Chemistry.





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ECS thanks our 227th meeting sponsors for their generous support

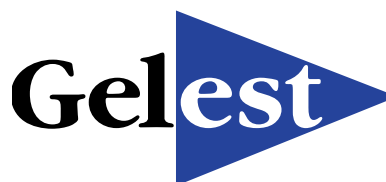
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Technical Exhibit

Hilton Chicago, Salon C

Exhibit Hours

Tuesday, May 26, 2015

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

Wednesday, May 27, 2015

0900-1400h Technical Exhibit
 0930-1000h Coffee Break in Exhibit Hall
 0930-1030h Hydrodynamic Electrochemistry Using Rotating Electrodes with *Pine Research Instrumentation*
 1100-1200h Potential Exhibitor Workshop in Exhibit Hall
 1800-2000h Technical Exhibit & General Poster Session

Thursday, May 28, 2015

0900-1200h Technical Exhibit
 0930-1000h Coffee Break in Exhibit Hall
 0930-1030h Potential Exhibitor Workshop in Exhibit Hall
 1100-1200h Potential Exhibitor Workshop in Exhibit Hall
 1200-1600h Technical Exhibit Tear Down

Please visit,
www.electrochem.org/227exhibitors
 to review a full listing of the
 227th Meeting exhibitors!

Thank you!

ECS Thanks our Exhibitors

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Hilton Chicago

Symposium Topics and Organizers

(Bold symposia titles denote an issue of ECST that will be available in advance of or at the meeting; see page 33 for details.)

A — Batteries and Energy Storage

- A01** — Joint General Session: Batteries and Energy Storage -and- Fuel Cells, Electrolytes, and Energy Conversion — A. Manivannan, T. R. Jow, K. Edstrom, V. Kalra, B. Liaw
Energy Technology / Battery
- A02** — Lithium-Ion Batteries and Beyond — B. L. Lucht, K. Amine, J. Muldoon
Battery
- A03** — Stationary and Large-Scale Electrical Energy Storage Systems 5 — S. Narayan, J. St-Pierre, T. V. Nguyen, S. Mukerjee
Energy Technology / Battery / Industrial Electrochemistry and Electrochemical Engineering

B — Carbon Nanostructures and Devices

- B01** — Carbon Nanostructures for Energy Conversion — J. L. Blackburn, P. Atanassov, J. Xiao, V. Di Noto, M. S. Arnold, S. K. Doorn
Nanocarbons / Battery / Energy Technology / Physical and Analytical Electrochemistry
- B02** — Carbon Nanostructures in Medicine and Biology — T. DaRos, H. C. De Long, R. I. Stefan-van Staden, L. J. Wilson, D. A. Heller, G. T. Cheek
Nanocarbons / Organic and Biological Electrochemistry / Physical and Analytical Electrochemistry / Sensor
- B03** — Carbon Nanotubes - From Fundamentals to Devices — S. Rotkin, S. K. Doorn, Y. Gogotsi, R. Weisman, M. Zheng, P. J. Kulesza
Nanocarbons / Dielectric Science and Technology / Physical and Analytical Electrochemistry
- B04** — Endofullerenes and Carbon Nanocapsules — T. Akasaka, L. Echegoyen, S. Yang
Nanocarbons
- B05** — Fullerenes - Chemical Functionalization, Electron Transfer, and Theory: In Honor of Professor Shunichi Fukuzumi — F. D'Souza, N. Martin, D. M. Guldi, D. Cliffl
Nanocarbons / Physical and Analytical Electrochemistry
- B06** — Graphene and Beyond: 2D Materials — H. Grebel, Y. S. Obeng, R. Martel, A. Hirsch, M. S. Arnold, V. Di Noto
Nanocarbons / Dielectric Science and Technology / Physical and Analytical Electrochemistry
- B07** — Inorganic/Organic Nanohybrids for Energy Conversion — H. Imahori, H. N. Dinh, S. Meng, P. J. Kulesza, P. V. Kamat
Nanocarbons / Battery / Energy Technology / Physical and Analytical Electrochemistry
- B08** — Porphyrins, Phthalocyanines, and Supramolecular Assemblies — K. M. Kadish, S. Mukerjee, N. Solladie, R. Paolesse, T. Torres
Nanocarbons / Physical and Analytical Electrochemistry / Energy Technology

C — Corrosion Science and Technology

- C01** — Corrosion General Session — R. Buchheit
Corrosion
- C02** — High Temperature Corrosion and Materials Chemistry 11 — E. J. Opila, J. W. Fergus, P. E. Gannon, T. Markus, T. Maruyama, E. Wuchina
High Temperature Materials / Corrosion

E — Electrochemical/Electroless Deposition

- E01** — Metallization of Flexible Electronics — L. Magagnin, Y. Shacham-Diamand, T. Homma, A. Hoff, P. Cojocaru, V. Arcella, G. Zangari
Electrodeposition / Electronics and Photonics
- E02** — Surfactant and Additive Effects on Thin Film Deposition, Dissolution, and Particle Growth — T. Moffat, R. Akolkar, Q. Huang, J. Zhang
Electrodeposition / Battery / Physical and Analytical Electrochemistry

F — Electrochemical Engineering

- F02** — Electrochemical Engineering General Session — V. K. Ramani, V. R. Subramanian, E. J. Taylor
Industrial Electrochemistry and Electrochemical Engineering
- F04** — High Rate Metal Dissolution Processes 2 — E. J. Taylor, G. Zangari
Industrial Electrochemistry and Electrochemical Engineering / Corrosion / Electrodeposition

G — Electronic Materials and Processing

- G01** — Organic Semiconductor Materials, Devices, and Processing 5 — M. J. Deen, D. J. Gundlach, B. Iniguez, H. Klauk
Electronics and Photonics / Dielectric Science and Technology
- G02** — Processes at the Semiconductor Solution Interface 6 — C. O'Dwyer, D. N. Buckley, A. Etcheberry, A. C. Hillier, R. P. Lynch, P. M. Vereecken, H. Wang, O. M. Leonte
Electronics and Photonics / Dielectric Science and Technology / Electrodeposition / Energy Technology / Physical and Analytical Electrochemistry

H — Electronic and Photonic Devices and Systems

- H01** — Advanced CMOS-Compatible Semiconductor Devices 17 — Y. Omura, J. A. Martino, J. Raskin, S. Selberherr, H. Ishii, F. Gamiz, B. Nguven
Electronics and Photonics
- H03** — Silicon Compatible Materials, Processes, and Technologies for Advanced Integrated Circuits and Emerging Applications 5 — F. Roozeboom, E. Gusev, K. Kakushima, V. Narayanan, P. Timans, S. De Gendt, Z. Karim
Electronics and Photonics / Dielectric Science and Technology
- H04** — State-of-the-Art Program on Compound Semiconductors 57 (SOTAPOCS 57) — Y. Wang, V. Chakrapani, T. J. Anderson, J. M. Zavada, D. C. Abernathy
Electronics and Photonics
- H05** — Wide Bandgap Semiconductor Materials and Devices 16 — S. Jang, K. Shenai, K. C. Mishra, G. W. Hunter, F. Ren, C. O'Dwyer
Electronics and Photonics / Dielectric Science and Technology / Luminescence and Display Materials / Sensor

I — Fuel Cells, Electrolyzers, and Energy Conversion

- I01** — Crosscutting Metrics and Benchmarking of Transformational Low-Carbon Energy-Conversion Technologies — H. N. Dinh, E. L. Miller
Energy Technology
- I02** — Electrochemical Synthesis of Fuels 3 — X. Zhou, G. Brisard, M. B. Mogensen, W. E. Mustain, T. M. Gur, M. C. Williams
High Temperature Materials / Energy Technology / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry
- I03** — Materials for Low-Temperature Electrochemical Systems 2 — M. Shao, P. N. Pintauro
Energy Technology / Industrial Electrochemistry and Electrochemical Engineering
- I05** — Solid-Gas Electrochemical Interfaces (SGEI 1) — M. B. Mogensen, E. Ivers-Tiffée, T. Kawada, S. B. Adler, P. J. Kulesza, S. Mukerjee
High Temperature Materials / Energy Technology / Physical and Analytical Electrochemistry
- I06** — State-of-the-Art Tutorial on Diagnostics in Low-Temperature Fuel Cells — A. Z. Weber, T. A. Zawodzinski, V. K. Ramani, F. N. Büchi, D. J. Myers, K. Shinohara
Energy Technology / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry



K — Organic and Bioelectrochemistry

- K01** — Mechanistic Organic Electrochemistry — D. G. Peters
Organic and Biological Electrochemistry

L — Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry

- L01** — Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry General Session — P. J. Kulesza, A. H. Suroviec
Physical and Analytical Electrochemistry

- L03** — Computational Electrochemistry — S. J. Paddison, S. Calabrese Barton
Physical and Analytical Electrochemistry / Energy Technology

- L04** — Electrocatalysis 7 — S. D. Minter, P. Atanassov, M. Shao
Physical and Analytical Electrochemistry / Energy Technology

- L05** — Electrochemistry at Primarily Undergraduate Institutions — A. H. Suroviec, D. M. Fox, R. L. Calhoun, J. Burgess, M. T. Carter, S. Calabrese Barton, J. A. Staser, M. R. Anderson
Physical and Analytical Electrochemistry / Energy Technology / Industrial Electrochemistry and Electrochemical Engineering / Organic and Biological Electrochemistry / Sensor

- L06** — Electrochromic and Chromogenic Materials — P. J. Kulesza, A. Rougier, C. Xu, A. Pawlicka
Physical and Analytical Electrochemistry

- L08** — Spectroelectrochemistry 3 — A. C. Hillier, S. Mukerjee
Physical and Analytical Electrochemistry

- L09** — Oxygen or Hydrogen Evolution Catalysts for Water Electrolysis — H. Xu, S. Mukerjee, V. K. Ramani, P. Atanassov, P. J. Kulesza
Industrial Electrochemistry and Electrochemical Engineering / Energy Technology / Physical and Analytical Electrochemistry

- L10** — Photocatalysts, Photoelectrochemical Cells and Solar Fuels 5 — N. Wu, D. Chu, H. N. Dinh, E. L. Miller, V. Subramanian, A. Manivannan, P. J. Kulesza, Z. Zou, H. Wang, J. Lee
Energy Technology / Physical and Analytical Electrochemistry / Sensor

- L11** — Structure and Relaxations in Soft Ion-Conducting Materials — V. Di Noto, G. Liu, K. Karan
Energy Technology / Battery / Physical and Analytical Electrochemistry

M — Sensors

- M01** — Nano/Biosensors and Actuators — A. Simonian, B. A. Chin, N. Wu, S. Mitra, L. A. Nagahara, D. Cliffl, Z. P. Aguilar, J. E. Koehne
Sensor / Physical and Analytical Electrochemistry

- M02** — Nano-Micro Sensors and Systems in Healthcare and Environmental Monitoring — A. Khosla, S. Mitra, P. K. Sekhar, A. Simonian, P. Vanysek, G. W. Hunter, P. Hesketh, H. Furukawa, A. K. Pradhan, V. K. Varadan, M. C. Almonte, S. Bhansali, A. M. Parameswaran, M. Yasuzawa, R. I. Stefan-van Staden, S. Kassegne, E. M. Sabolsky, M. Bayachou, J. Choi
Sensor / Organic and Biological Electrochemistry

- M04** — Sensors, Actuators, and Microsystems General Session (Chemical and Biological Sensors) — M. T. Carter, S. Mitra, B. A. Chin, J. Li, Z. P. Aguilar, A. Simonian
Sensor

Z — General

- Z01** — General Student Poster Session — V. R. Subramanian, M. P. Foley, V. Chaitanya, A. Khosla, P. Pharkya, K. B. Sundaram
All Divisions

- Z02** — Nanotechnology General Session — O. M. Leonte
All Divisions / Interdisciplinary Science and Technology Subcommittee

- Z03** — Solid State Topics General Session — K. B. Sundaram, O. M. Leonte, G. W. Hunter, K. Shimamura, H. Iwai
Dielectric Science and Technology / Electronics and Photonics / Energy Technology / Luminescence and Display Materials / Nanocarbons / Organic and Biological Electrochemistry / Sensor

- Z04** — Nature-Inspired Electrochemical Systems — W. E. Mustain, H. N. Dinh, H. Xu, S. D. Minter, A. Simonian, M. Bayachou, G. G. Botte
Energy Technology / Organic and Biological Electrochemistry / Industrial Electrochemistry and Electrochemical Engineering / Physical and Analytical Electrochemistry / Sensor / Interdisciplinary Science and Technology Subcommittee

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