Special Meeting Section

218th ECS Meeting

las vegas

October 10-15, 2010 **Nevada**

Riviera Hotel, Las Vegas, Nevada

218th ECS Meeting

las vegas

October 10-15, 2010 Nevada

Welcome to Las Vegas! *We are pleased to venture into this city for the 218th ECS Meeting. This major international conference will be held at the Riviera Hotel and Casino, and will include 43 topical symposia consisting of 2,394 technical presentations. You are invited to participate not only in the technical program, but also in the other social events planned for the meeting.*

Featured Speakers

Plenary Session and The ECS Lecture

Current and Future Status of Nitride-based Solid State Lighting

by Shuji Nakamura

Monday, October 11
1700h
Grande E, 1st Floor

In his plenary talk Shuji Nakamura will describe the current status of III-nitride based light emitting diodes (LEDs) and laser diodes. Recently, nitride-based white LEDs have been used for many application such as LCD TV backlight, lighting for inside/outside applications and others. The efficiency of those white LEDs are around 150 lumen/W. On the laser diodes, high efficient and high power blue laser diodes have been developed. On the green laser diodes, the output power is still not as high at the wavelength of around 525 nm.

Shuji Nakamura obtained BE, MS, and PhD degrees in electrical engineering from the University of Tokushima, Japan in 1977, 1979, and 1994, respectively. He joined Nichia Chemical Industries Ltd. in 1979. In 1988, he spent a year at the University of Florida as a visiting research associate. In 1989 he started research on blue LEDs using group-III nitride materials. In 1990, he developed a novel MOCVD system for GaN growth, which was named Two-Flow MOCVD. Using this system, he was able to grow the highest crystal quality of GaN-based materials.

In 1991, Dr. Nakamura obtained p-type GaN films by thermal annealing for the first time and was able to clarify hydrogen passivation as a hole compensation mechanism. For many researchers, working since the beginning of GaN research in 1960s, this hydrogen passivation of the acceptors had hindered the ability to obtain p-type GaN films. In 1992, he was also able to grow the first InGaN single crystal layers, which showed the first band-to-band emission in PL and EL at room temperature. These InGaN layers have been used for an emitting layer in all blue/green/white LEDs and all violet/blue/green semiconductor lasers. Without his invention of InGaN layers, there would have been no blue/green/white LEDs and no violet/blue/green semiconductor laser diodes.

In 1993 and 1995, Dr. Nakamura developed the first group-III nitride-based high-brightness blue/green LEDs. He also developed the first group-III nitride-based violet laser diodes (LDs) in 1995. In 1996, his former company, Nichia, started selling white LEDs using his invention of blue LEDs. These white LEDs have been used for all kinds of lighting applications in order to save energy consumption. The electric consumption of white LEDs is about one tenth that of conventional incandescent bulb lamps. In 1999, Nichia started selling violet laser diodes for the application of blue-ray DVDs. Without his invention of violet laser diodes, the blue ray DVD would not have been realized.

Dr. Nakamura moved to the U.S. from Japan in 2000 where he became a professor in the Materials Department at the University of California at Santa Barbara (UCSB). In 2007, he and his coworkers at UCSB succeeded in the first lasing of nonpolar/semipolar GaN-based semiconductor laser diodes. In 2009, they achieved green semiconductor laser

diodes using semipolar GaN-based materials. The nonpolar/semipolar GaN-based materials are key in obtaining high efficient blue and green laser diodes.

Dr. Nakamura has received many awards, including: the Nishina Memorial Award (1996), the MRS Medal Award (1997), the IEEE Jack A. Morton Award, the British Rank Prize (1998), and the Benjamin Franklin Medal Award (2002). He was elected to the U.S. National Academy of Engineering in 2003. He received the Millennium Technology Prize in 2006. In 2008, he received the Asturias Award from Spain. He received the Harvey Prize of Israel Institute of Technology in 2010. He holds more than 100 patents and has published more than 450 papers in this field.

Edward Goodrich Acheson Award Lecture

Energy Storage

by John S. Newman

Monday, October 11
1440h
Capri 103, 1st Floor
and Grande C, 1st Floor

Prof. Newman's talk will include examples used to illustrate the essentials of modeling electrochemical systems for energy applications, with a focus on energy and power as well as life and failure. The modeling has a clear basis in chemical and physical principles, and covers length scales from molecules to the continuum in the context of both thermodynamics and transport, although the continuum scale is stressed. The examples to be discussed include discharge curves, the construction of optimized Ragone plots, modeling battery size and capacity use in a hybrid- or plug-in hybrid electric vehicle, molecular modeling of battery electrolytes, and the physics of Zn shape change and Li dendrite growth.

John S. Newman earned his BS in chemical engineering in 1960 from Northwestern University. While at Northwestern, Dr. Newman was an engineering co-op student at Oak Ridge National Laboratory and worked on diffusion in ion exchangers and solvent extraction. Prof. Newman obtained his master's degree in 1962 at the University of California, Berkeley, on current distribution in porous electrodes, under the guidance of Charles Tobias. In 1963, he obtained his doctorate, on steady laminar flow past a circular cylinder at high Reynolds numbers. While a PhD student, Dr. Newman contributed to the preparation of major portions of the English edition of Levich's book, *Physicochemical Hydrodynamics*, published in 1962. Shortly after receiving his doctorate, Prof. Newman joined the faculty at UC Berkeley. He became a full professor in 1970, and is still an active member today. Dr. Newman's book, *Electrochemical Systems*, published in 1973, with a second printing in 1991, and a third in 2004 (with co-author Karen E. Thomas-Alyea), is used throughout the world as a monograph and graduate text in electrochemical engineering.

Dr. Newman is an ECS Fellow, who twice earned the Young Author's Prize: in 1966, for his work on current distribution on a rotating disk below the limiting current; and in 1969, for his work with his student William Parrish on modeling channel electrochemical flow cells. Other ECS awards include the David C. Grahame Award of the Physical and Analytical Electrochemistry Division in 1984, the Henry B. Linford Award for Distinguished Teaching in 1990, the Olin Palladium Medal in 1991, the Battery Division Research Award in 2004, and the Vittorio de Nora Award Medal in 2008. In 1999, Newman was elected to the National Academy of Engineering. In recognition of his outstanding contributions to The Electrochemical Society, Dr. Newman became an Honorary member in 2007.

Prof. Newman was associate editor for the *Journal of The Electrochemical Society* for 10 years, starting in 1990. In addition to his numerous publications, reviews, and lectures, Prof. Newman has made many contributions to electrochemical technology through his consulting work. He is also a Faculty Senior Scientist and Principal Investigator in the Environmental Energy Technologies Division at Lawrence Berkeley National Laboratory, where he is in charge of the Batteries for Advanced Transportation Technologies program. Lithium/polymer batteries and polymer-electrolyte fuel cells have been highlights of recent work. In 2002, Newman spent a semester as the Onsager Professor at the Norwegian University of Science and Technology in Trondheim, Norway.

Charles W. Tobias Young Investigator Award Lecture

Diagnostics of Membrane Electrode Assemblies

by Thomas J. Schmidt

Wednesday, October 13
1400h
Grande F, 1st Floor

The commercialization of hydrogen fuel cells is key for enabling a sustainable hydrogen-based economy. Low and high temperature polymer electrolyte fuel cells (PEFCs) are promising, and far-developed, technologies for automotive, stationary, and small portable applications. Although lots of component development and system field testing have been performed over the years, durability of stack and stack components, such as membrane electrode assemblies (MEAs), membranes, electrodes, gaskets, or bipolar plates is still a major concern.

One of the challenges in the development of membrane electrode assemblies is the impossibility to perform significant numbers of durability tests in the laboratory on a component basis for the required lifetimes, mainly due to time and test station constraints. It is impossible to test for several thousands of hours in order to find out if specific component advancements can last as long. That is, rapid or accelerated aging tests are necessary, which study specific degradation modes in short time periods, and being able to correlate these results with findings from realistic lifetime tests. For proper correlation between accelerating and realistic conditions, the degradation mode to be studied needs to be mechanistically well understood. This in turn is a prerequisite in order to design *in situ* and *ex situ* diagnostic methods, which are able to give insight into the related physical property of the membrane electrode assembly or its components. This contribution will discuss some diagnostic methods for MEAs and the MEA components with respect to their usefulness and limits.

Thomas J. Schmidt is R&D Director at BASF Fuel Cell GmbH in Frankfurt/Main, Germany. He received his University Diploma in chemistry from the University of Ulm/Germany in 1996 and his PhD in chemistry from the same university in 2000. That same year he joined the group of P. N. Ross at Lawrence Berkeley National Laboratory as a Chemistry Postdoctoral Fellow. During this period, he intensively studied the fundamentals of electrocatalysis of fuel cell reactions. He continued to work with G. G. Scherer at Paul Scherrer Institute in Villigen/Switzerland on the development of membrane electrode assemblies (MEAs) using radiation-grafted membranes and on oxygen electrocatalysis with oxide containing catalysts. Since fall 2002, he has been working in the industrial development of high temperature membrane electrode assemblies and its components (membranes, catalysts, electrodes) using

polybenzimidazole based membranes at BASF Fuel Cell GmbH. During these eight years with BASF Fuel Cell GmbH, Dr. Schmidt led the high-temperature MEA R&D activities and helped to successfully commercialize the BASF Fuel Cell Celtec® MEAs. In parallel since 2009, Dr. Schmidt has been working as lecturer for physical chemistry at Provadis School of International Management and Technology, University of Applied Sciences in Frankfurt/Germany.

Dr. Schmidt has co-authored more than forty peer-reviewed journal articles and eleven peer-reviewed book chapters in the field of electrochemistry, including electrocatalysis and surface electrochemistry; synthesis and characterization of electrochemically active materials for electrochemical power sources, and general electrochemical materials science. He is also the inventor on 17 patent applications in the field of high-temperature PEFC technology. He recently served as co-editor of the book entitled *Polymer Electrolyte Fuel Cell Durability*. Since fall 2009, he has been serving also as co-instructor of the ECS Short Course PEM Fuel Cells being held again at the 2010 ECS fall meeting in Las Vegas. For this conference, Dr. Schmidt also acts as co-organizer of the Polymer Electrolyte Fuel Cells 10 Symposium.

For the Rest of Us...

Status and Outlook on the Photovoltaic Solar Industry Based on Solar Cell R&D

by Bolko von Roedern

Sunday, October 10
1830h
Grande D, 1st Floor

Bolko von Roedern is a Senior Project Leader at the National Center for Photovoltaics at the National Renewable Energy Laboratory (NREL). Dr. von Roedern received his physics diploma (Dipl. Phys.) from Clausthal Technical University, Germany, in 1975. He received his PhD in physics (Dr. Rer. Nat.) from Stuttgart University, Germany, and did research at the Max Planck Institute for Solid State Research in Stuttgart (1979).

Dr. von Roedern moved to Colorado in 1983 when he was hired by NREL (then SERI), after working on a SERI subcontract as a postdoctoral fellow at Harvard University. As a senior scientist, he developed amorphous-silicon-based (a-Si) solar cells within SERI's in-house amorphous silicon group. In 1985, he joined a start-up company, Glasstech Solar, Inc. (GSI) in Wheat Ridge, CO, managing all aspects of the technology developments as well as the day-to-day operations. GSI developed a turnkey a-Si photovoltaic module manufacturing line. GSI was formed by the same investors that founded the precursor to First Solar, Solar Cells Incorporated (SCI).

In 1990, he returned to SERI as a Project Manager in the Amorphous Silicon Research Project. This project was merged into the Thin Film Partnership Project, and since 1992, he has been part of a three-person team responsible for supporting, through subcontracts, amorphous and crystalline Si, cadmium telluride, and copper indium diselenide thin-film photovoltaic R&D and technology. Together with his colleagues, he was among the finalists of the 1999 World Technology Award for Energy, the Thin Film Partnership; and in collaboration with NREL subcontractors has also won several awards and recognitions (RD100, etc.).

From 1992 to 2006, he was involved in national R&D teams supporting the work of the Thin Film Partnership, and from 1996 to 2006, he managed the a-Si national team. Since 2007, he has been the technical monitor for some major Technology Pathway Partnership programs financed through DOE (Golden Office), as well as managing some NREL PV incubator subcontracts. Scientifically, he pursues an evaluation of how material quality will affect solar cell performance, and he is intimately familiar with many techniques used to evaluate semiconductor properties of bulk and thin film semiconductor materials and devices. Since 2008, he has also been involved as the photovoltaic liaison for the Solar Advisory Model (SAM).

Short Courses & Tutorials

Five Short Courses will be offered in conjunction with the 218th ECS Meeting. These courses will be held on Sunday, October 10, 2010 from 0900h to 1630h. Fees are $425 for ECS members and $520 for nonmembers; students are offered a 50% discount. The registration fee for the Short Course covers the course, text materials, continental breakfast, luncheon, and refreshment breaks; it does not cover meeting registration fees nor any other activities of the meeting. All courses and tutorial are subject to cancellation pending an appropriate number of advance registrants and therefore, pre-registration is required. **The deadline for registration for ALL Short Courses is September 10, 2010**. Written requests for refunds will be honored only if received at Society headquarters before September 17, 2010. **Before making any flight or hotel reservations, please check to make sure the course is running!**

Visit the ECS website for full course descriptions and instructor biographies.

Short Course #1

Polymer Electrolyte Fuel Cells

Hubert Gasteiger and Thomas Schmidt, Instructors

This short-course develops the fundamental thermodynamics and electrocatalytic processes critical to polymer electrolyte fuel cells (PEFCs). In the first part, we will discuss the relevant half-cell reactions, their thermodynamic driving forces, and their mathematical foundations in electrocatalysis theory (*e.g.*, Butler-Volmer equations). Subsequently, this theoretical framework will be applied to catalyst characterization and the evaluation of kinetic parameters like activation energies, exchange current densities, reaction orders, etc. In the second part of the course, we will illuminate the different functional requirements of actual PEFC components and present basic *in situ* diagnostics (Pt surface area, shorting, H_2 crossover, electronic resistance, etc.). This will be used to develop an in-depth understanding of the various voltage loss terms that constitute a polarization curve. Finally, we will apply this learning to describe the principles of fuel cell catalyst activity measurements, the impact of uncontrolled-operation events (*e.g.*, cell reversal), and the various effects of long-term materials degradation. To benefit most effectively from this course, registrants should have completed at least their first two years of a bachelor's program in physics, chemistry, or engineering; or have several years of experience with PEFCs.

Short Course #2

Scientific Writing for Scientists and Engineers

D. Noel Buckley, Instructor

This course is intended for scientists and engineers with an interest in improving their skills in writing scientific documents including journal papers, conference proceedings papers, abstracts, reports, theses, and proposals. The course is best suited to attendees who have some experience of writing technical documents and want to improve their skills. It will address elements of good writing in science and engineering, including standard practices, terminology, and formatting. It will teach attendees how to present information using

properly structured sentences, paragraphs, sections, and chapters and how to organize experimental results and analysis in a format suitable for publication in the scientific literature as well as in reports, theses, etc.

Short Course #3
Fundamentals of Electrochemistry
James J. Noël, Instructor

This course is suited to people with a physical sciences background who have not been trained as electrochemists, but who want to add electrochemical methods to their repertoire of research approaches. There are many fields in which researchers originally approach their work from another discipline but then discover that it would be advantageous to understand and use some electrochemical methods to complement the other work that they are doing. The course will cover the following areas. (1.) Introduction and Overview of Electrode Processes. (2.) Chemical vs. Electrochemical Thermodynamics (cell potentials, Nernst equation, electrode-solution interface, double-layer structure, and adsorption; applications in analytical electrochemistry and sensors). (3.) Chemical Stoichiometry vs. Faraday's Law (coulometry, bulk electrolysis). (4.) Chemical vs. Electrochemical Kinetics (electrode reactions, rates, mechanisms and rate constants, mass transport, Butler-Volmer, Tafel, and Levich equations). (5.) Kinetic Methodology (potential step and sweep methods, polarography, controlled-current techniques, controlled mass transport approaches, rotating electrodes, microelectrodes, electrochemical impedance spectroscopy). (6.) Electrochemical Instrumentation (voltmeters, potentiostats, cells). (7.) Scanning Probe Techniques (scanning electrochemical microscopy, AFM, etc.). (8.) Coupled Characterization Methods (modified electrodes, spectro-electrochemistry, *in situ* neutron scattering, surface analysis, etc.).

Short Course #4
Grid Scale Energy Storage
Jeremy Meyers, Instructor

This course is intended for chemists, physicists, materials scientists, and engineers to better understand the specific requirements for energy storage on the electric grid. The course will introduce students to the concepts associated with the "smart grid" and the demands that intermittent renewable power sources place on the grid from the perspective of distribution. We will then examine some of the key technologies under consideration for energy storage and the technical targets and challenges that must be addressed. Students will be brought up to date with the current state of the art, and review data from demonstration systems, experimental data from prototype designs, and some modeling and analysis. The following areas will be covered in this short course: (1.) introduction to the electric grid and renewable power sources; (2.) current role of energy storage on the grid; (3.) location and deployment of energy storage on the "smart grid"; (4.) existing technologies for energy storage on the grid; (5.) adaptation of secondary batteries for grid-based storage applications; (6.) redox flow batteries; (7.) high-temperature batteries for energy storage; (8.) novel battery concepts; (9.) materials and engineering challenges for grid storage; and (10.) diagnostics and characterization techniques.

Short Course #5
Electrodeposition Fundamentals and Applications
Sudipta Roy, Instructor

Electrodeposition is a simple but powerful film deposition technique that is increasingly being used in the fabrication of materials systems and devices, also in many instances by those who have limited formal preparation in the subject. This course will offer the opportunity to students and researchers alike to either be introduced to or to refresh the fundamentals of the subject. The approach will be rigorous but geared toward applications. Attendees will have the opportunity to learn practical aspects of this technology; in particular, lectures on the electrodeposition of magnetic materials, their alloys, and compositionally modulated materials. Four lectures in the morning and four in the afternoon are planned. Each will last about 45 minutes. The lectures are planned so as to develop fundamental concepts in the morning session, which then form the basis of lectures related to practical applications in the afternoon. Answers to queries of attendees will be discussed during the sessions, breaks, and lunch period.

Professional Development Workshops
John R. Susko, Instructor

ECS will sponsor the following three professional development workshops at no extra cost to meeting registrants. All workshops will be held in Capri 109, 1st Floor.

Writing an Effective Cover Letter and Resume—The need for a cover letter, how to write it, the many "do's" and "don'ts" in preparing such a letter, and tips for drafting an effective resume.

Sunday.....1500-1545h
Monday 1200-1245h

Job Interviewing Tips—How to improve your chances of impressing the interviewer; key questions to ask; and other important pointers for the interviewing process.

Sunday.....1600-1645h
Monday 1300-1345h

Resume Round Table—Designed to provide feedback on resumes by publicly critiquing participants' resumes and offering suggestions on ways to make them more effective. To take full advantage of the workshop, please bring a copy of your current professional resume.

Monday 1400-1700h

Award Winners

NOTE: *For complete biographies of the award recipients, and the schedule of their presentations, please see the General Meeting Program on the ECS website: www.electrochem.org/meetings/biannual/218/218.htm.*

2010 Class of ECS Fellows

Established in 1989, the designation of Fellow of The Electrochemical Society is awarded for individual contributions and leadership in the achievement of science and technology in the area of electrochemistry and solid-state sciences and current active participation in the affairs of ECS.

Rudolph G. Buchheit is Professor and Chair of Materials Science and Engineering at Ohio State University. His research is in the area of corrosion science and engineering with emphasis on localized corrosion, corrosion protection, and corrosion prediction, mainly of light metals. He has also worked extensively in the area of corrosion inhibition, surface modification, and corrosion resistant coatings. He has published 185 technical articles (100 peer-reviewed) on these subjects with students and colleagues, and holds eight patents related to surface

treatments and coatings. He has contributed seven chapters to books, edited three technical proceedings, and co-authored one book. He earned a BS in engineering science at Loyola University of Maryland in 1985, and MS and PhD degrees in materials science from the University of Virginia in 1987 and 1991.

Dr. Buchheit was a Senior Member of the Technical Staff in the Materials and Process Sciences Directorate at Sandia National Laboratories (New Mexico) from 1990 until joining the faculty in the Fontana Corrosion Center in Materials Science and Engineering at Ohio State in 1997. He is a Fellow of NACE International, and past Chair of the Research Committee. He is a member of the ECS, and serves on the Executive Committee for the Corrosion Division. He has served on the editorial board for *Corrosion Engineering, Science and Technology* and is a former editorial board member for *Corrosion* and for the *Journal of Materials Research*. He is the recipient of the H. H. Uhlig Educator's Award from NACE, and the Morris Cohen Award from the ECS Corrosion Division. He is also the recipient of the Stanley E. Harrison Faculty Award from the College of Engineering at Ohio State, and is a two-time recipient the Charles Ellison MacQuigg Award for outstanding teaching.

Francis D'Souza received his BS and MS from Mysore University, Mysore, India, and a PhD from the Indian Institute of Science, Bangalore, India in 1992, under the direction of V. Krishnan. After completing postdoctoral work at the University of Houston under Karl Kadish and at the Université de Bourgogne, Dijon, France, under Roger Guilard, he joined the faculty of Wichita State University in 1994 where he moved up to the ranks of professor in 2003.

Prof. D'Souza's research is aimed toward developing molecular recognition of directed supramolecular compounds for various chemical/biochemical applications, especially supramolecular porphyrin/phthalocyanine and carbon nanomaterial systems for electron transfer, light energy harvesting, and sensor applications. Development of biomimetic supramolecular solar cells is a specialty of his research group. He has published nearly 200 research papers in peer reviewed, high impact journals, five book chapters, and over 200 conference presentations including several key note and plenary presentations. He has won several awards including National Merit Scholarship, University Grants Commission Research Fellow, University Board of Trustees Young Faculty Scholar Award, Excellence in Research Award, and Japan Society of Promotion of Science (JSPS) Professorship. He is an associate editor of the *Journal of Porphyrins and Phthalocyanines* and on the editorial board of several other journals.

Prof. D'Souza has been an active member of ECS since 1993. He has served as Secretary, Vice-Chair, and Chair of the Fullerenes, Nanotubes, and Carbon Nanostructures (FNCN) Division (1999-2008) and is well recognized within the FNCN Division and across the ECS community. For more than a decade he has served diligently to put the FNCN Division in a position to gain national and international recognition. He was instrumental in establishing the Smalley Research Award and Young Investigator Award of FNCN Division and seeking monies to establish endowments. His enthusiasm for organizing symposia (more than 18 since 1998) at the ECS meetings demonstrates his sustained commitment to the success of the Society.

Toshio Fuchigami received a BE degree from Gunma University in 1969, and ME (1971) and PhD degrees (1974) from Tokyo Institute of Technology. He was an assistant professor at Tokyo Institute of Technology from 1974 to 1986, was promoted to associate professor in 1986, and promoted to full professor in 1998. He is currently a councilor of Tokyo Institute of Technology.

Dr. Fuchigami has made outstanding and remarkable contributions to the field of synthetic organic electrochemistry over the past thirty years. By using fluorine as a key element and employing mediators, he has developed new organic electrosynthesis methods for hetero-atom compounds containing sulfur, nitrogen, iodine, silicon, and boron atoms, based on their characteristics. His main work, "Selective Electrochemical Fluorination of Organic Compounds" is widely and internationally recognized. He developed methods for volatile organic compound (VOC) free organic electrosynthesis in ionic liquids. Thus, he has developed the new hybrids fields, "Organofluorine Electrochemistry," and "New Electrolytic Systems Toward Green Sustainable Chemistry."

Dr. Fuchigami has published over 280 technical papers, 48 review articles, and 40 book chapters. He has organized numerous symposia at ECS meetings and other international meetings, and he currently serves as an officer of the ECS Organic & Biological Electrochemistry Division and as a Chair of the ECS Japan Section. He is also a Chair of the Organic Electrochemistry Division of The Electrochemical Society of Japan. He has served as Editor-in-Chief of *Electrochemistry* (Japan) and as an Associate Editor of the *Bulletin of the Chemical Society of Japan*. He also has served on the editorial boards of the *Journal of Synthetic Organic Chemistry of Japan* and the *Journal of Oleo Science* (Japan). He is a recipient of the Takeda Award for International Achievement (2006), the Excellent Papers Award of The Electrochemical Society of Japan (2007), The Electrochemical Society of Japan Award (2008), and ECS Manuel M. Baizer Award (2010).

Michel Houssa is as an Associate Professor in the Department of Physics and Astronomy at the University of Leuven (Belgium). He received MS and PhD degrees in physics from the University of Liège (Belgium), in 1993 and 1996, respectively. From 1997 to 1999, he was a researcher at IMEC, working on the characterization and modeling of the electrical properties of ultra-thin gate oxides. From 1999 to 2001, he was a Postdoctoral Fellow of the Fund for Scientific Research - Vlaanderen (FWO), working at the Semiconductor Physics Laboratory of the University of Leuven on the characterization and modeling of the electrical properties of high-k gate dielectrics. From 2001 to 2003, he was an Assistant Professor of physics at the University of Provence. From 2003 to 2008, he worked at IMEC, first as a Senior Scientist, and then as Principal Scientist, on the electrical characterization of Ge-based MOS devices, as well as on the first principles modeling of Ge and III-V surfaces and interfaces.

Prof. Houssa's current research interests include the characterization and first-principles modeling of various semiconductor/insulator heterostructures and two dimensional materials such as graphene and related systems. He has authored or co-authored about 280 publications, including seven book chapters and six invited review articles. He has also edited a review book on high-k gate dielectrics, published by the Institute of Physics Publishing (2004). He is co-organizer of the International Symposiums on High

Dielectric Constant Materials and Gate Stacks of ECS since 2003. He is also a member of the executive committee of the IEEE Semiconductor Interface Specialists Conference (SISC) and currently serves as arrangements chair of this conference.

Robert G. Kelly is a professor of materials science and engineering at the University of Virginia (UVa). Professor Kelly's research centers on the corrosion of materials with a focus on understanding the underlying mechanisms and developing approaches to management of corrosion damage by applying new experimental methods and computational approaches. He received his BES (1984), MS (1986), and PhD (1989) from the Johns Hopkins University. His PhD work was performed under the guidance of Patrick Moran, Jerome Kruger, and Eliezer Gileadi. He then spent two years at the University of Manchester Institute of Science and Technology (UK) as a Fulbright Scholar with Roger Newman before joining the faculty of the University of Virginia in 1990.

Prof. Kelly's past efforts have included work on the corrosion of metals and alloys in marine environments, non-aqueous and mixed solvents, as well as stress-corrosion cracking and other forms of localized corrosion. Prof. Kelly is currently working with his students and colleagues at UVa and elsewhere on studies of intergranular corrosion of marine aluminum alloys, development of improved accelerated testing, as well as corrosion sensing systems for reinforced concrete and intergranular corrosion, and modeling of corrosion processes over many size scales.

Prof. Kelly has co-authored over seventy papers, presented fifty invited talks and is the Co-Director of the Center for Electrochemical Science and Engineering at UVa. He was selected as the recipient of the 1997 A. B. Campbell Award for the best paper by an author 35 years old or younger and the 1999 H. H. Uhlig Award for young corrosion educators from NACE International. He is also a Fellow of NACE International. He has won several teaching awards while at UVa, including an All University Teaching Award in 2004. He was the 2001 recipient of the Robert T. Foley Award from the National Capital Section of ECS. He has rendered technical assistance to the NRC and DOE concerning the Yucca Mountain Project, the USAF Aging Aircraft Program, the NASA Safety and Engineering Center, and the 9/11 Pentagon Memorial design team. Professor Kelly is a member of ECS, NACE, and ASM. He has been active in ECS for over 15 years, including holding all of the offices in the ECS Corrosion Division Executive Committee and the National Capital Section. In addition, he has served on numerous committees for ECS.

Roger C. Newman joined the University of Toronto in 2004 as Professor and Senior Industrial Research Chair in the Department of Chemical Engineering and Applied Chemistry. Prior to joining the University of Toronto, he spent twenty years in the Corrosion and Protection Centre, UMIST, Manchester (UK). Before that he was a staff scientist at Brookhaven National Laboratory. Dr. Newman has a range of electrochemical interests, including aspects of sensors, coatings, and membranes. However, the majority of his (published) research deals with the mechanisms of localized corrosion and stress corrosion cracking of metals.

He has received a number of international awards for corrosion research, including Fellow of the Institute of Materials (UK) in 1994, the Third triennial Helmuth Fischer Medal of DECHEMA (Frankfurt) for "outstanding contributions to fundamental aspects of electrochemistry relevant to corrosion" (1994), Fellow of NACE International (1997), T. P. Hoar Prize of the Institute of Corrosion (best paper in Corrosion Science during 1997; jointly with N. J. Laycock) in 1998, the W. R. Whitney Award of NACE International (2001), U. R. Evans Award of the Institute of Corrosion (2003), the T. P. Hoar Prize of the Institute of Corrosion (best paper in Corrosion Science during 2002; jointly with P. Ernst) in 2003, and the T. P. Hoar Prize of the Institute of Corrosion (best paper in Corrosion Science during 2006; jointly with M. H. Moayed) in 2007. He has held many memberships including Member of the Scientific Advisory Board of the Max Planck Institute for Iron and Steel Research (2007) and Member of the National Academies ROCSE (Research Opportunities in Corrosion Science and Engineering) committee, Washington DC (2008). In recognition of his excellence in corrosion research and his outstanding technical contributions to the field of corrosion science and technology, Dr. Newman was named the 2004 recipient of the H. H. Uhlig Award of the ECS Corrosion Division.

Peter N. Pintauro is the H. Eugene McBrayer Professor of Chemical Engineering and Chair of the Department of Chemical and Biomolecular Engineering at Vanderbilt University, Nashville, TN. He received BS (1973) and MS (1975) degrees in chemical engineering from the University of Pennsylvania, and a PhD degree in 1980 from the University of California, Los Angeles, under the supervision of Douglas Bennion. From 1981 through 1986 he was a postdoctoral scholar and then Research Assistant Professor in the Chemical Engineering Department at UCLA, working primarily in the area of organic electrochemistry with Manuel M. Baizer. He joined the Chemical Engineering Department at Tulane University in August 1986, where he rose to the rank of Professor in 1994. In July 2002, he moved to Case Western Reserve University as Chair of the Department of Chemical Engineering and was appointed Kent Hale Smith Professor of Engineering in October 2004. Professor Pintauro has been at Vanderbilt University since July 2008.

Professor Pintauro's research interests are in the areas of electrochemical engineering, membrane fabrication and separations, organic electrochemical synthesis, membrane transport modeling, and fuel cells. He has developed and tested space-charge ion uptake and transport for Nafion cation-exchange membranes, with a special emphasis on multicomponent salt systems. His electro-organic synthesis work has focused on the use of low hydrogen overpotential catalytic cathodes for the electrochemical hydrogenation of organic substrates, where such reactions are carried out in a PEM fuel cell reactor with no aqueous electrolyte, using either water or H_2 gas at the source of hydrogen. Most recently, Dr. Pintauro has been working on new membrane materials and new membrane morphologies for proton-exchange membrane and alkaline fuel cells. He has fabricated and tested ion-exchange membranes from polyphosphazene-based materials as well as modified forms of DuPont's Nafion®. He has also developed an entirely new type of proton-exchange membrane, where an electrospun nanofiber mat of a proton conducting polymer is embedded in an inert polymer matrix.

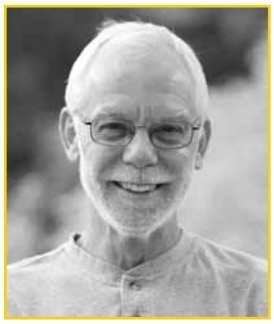
Professor Pintauro is the author or co-author of more than 100 scientific publications (refereed journals, conference proceedings papers, and book chapters) and is a listed inventor on eight patents. In 2001, he was the recipient of the Outstanding Researcher Award from the School of Engineering at Tulane University. From 1997 through 2002, he was North American Editor of the *Journal of Applied Electrochemistry* and is currently on the editorial advisory board for that journal. Since 2003, he has been on the Board of Directors of the North American Membrane Society, where

he served as Society President from 2006-2008. In 2008, he co-chaired the Gordon Research Conference on Membranes: Materials and Processes.

Professor Pintauro has been a member of the ECS since 1980. He is active in the IE&EE and Energy Technology Divisions. He has co-chaired numerous symposia over the years and has been a member of the Finance Committee and the deNora Award and M. M. Baizer Award Subcommittees.

Peter C. Searson received his PhD from the University of Manchester Institute of Science and Technology in 1982 and was a post-doctoral associate at the Massachusetts Institute of Technology. Prof. Searson is the Reynolds Professor of Materials Science and Engineering at Johns Hopkins University, and is Director of the Johns Hopkins Institute for Nanobiotechnology. He also holds appointments in the Department of Chemical and Biomolecular Engineering, the Department of Physics and Astronomy, and the Department of Oncology. Searson is a Fellow of American Physical Society and a Fellow of the American Association for the Advancement of Science.

Searson's group has made contributions in several areas of electrochemistry, in particular in materials electrochemistry. Significant accomplishments include pioneering work in magnetic nanowires, the demonstration of ultra-high magnetoresistance in electrodeposited bismuth films, the first *in situ* transmission electron microscope studies of island growth in electrodeposition, advancing the understanding of nucleation and growth in electrodeposition, the use of electrodeposition to fabricate novel materials and architectures, and more recently in bilayer membranes. By bridging the gap between chemistry, physics, and materials science, Searson has been active in promoting electrochemistry to other communities and engaging researchers from other disciplines. Furthermore, his materials science approach to electrochemical processing, based on structure-property relations, has influenced many researchers in the electrochemistry community and served to strengthen the link between electrochemistry and materials science.



David Shoesmith is a professor in the Department of Chemistry at the University of Western Ontario (London, Canada) specializing in research on the electrochemistry and corrosion of materials. He has held this appointment since June 1, 1998. He was appointed to the Natural Sciences and Engineering Research Council and Nuclear Waste Management Organization (Toronto) (NSERC/NWMO) Industrial Research Chair in Nuclear Fuel Disposal Chemistry in November 2000. Initially a five-year appointment, this chair was renewed for a further five years in November 2005, and is presently under review for a further five year extension. Previously, he worked for Atomic Energy of Canada Ltd for 25 years, achieving the rank of principal scientist.

Since 1980, Dr. Shoesmith has been an active researcher in the Canadian Nuclear Waste Disposal Program, and is an international expert on waste form and waste container issues, and presented the "XYZ for the Rest of Us" address on these topics at the 216th ECS Meeting in Vienna (October 2009). He specializes in the generation of analytical databases to support and verify corrosion models. This has involved the development and/or application of a range of analytical methods such as scanning electrochemical microscopy, *in situ* and micro Raman spectroscopy, current-sensing atomic force microscopy and neutron reflectometry for the study of surface electrochemical and corrosion processes. He has also constructed a number of corrosion models based on deterministic and probabilistic approaches.

Dr. Shoesmith is an elected Fellow of the International Association of Corrosion Engineers (NACE International, 1996) and the Canadian Society for Chemistry (1985). He has won awards from ECS (Canadian Section, 2010 and Lash Miller, 1979), the Canadian Society for Chemistry, The Canadian Institute of Mining and Metallurgy (Cohen Award, 2001), Atomic Energy of Canada (Discovery Award, 1994), and a University of Western Ontario Distinguished Professorship (2004). His research is currently funded by waste management organizations in Canada, the United States, Sweden, and Switzerland. He has served on program review boards for all these international organizations, and as a consultant on corrosion issues for both nuclear and non-nuclear companies. He has written 370 publications, 230 of which are in refereed journals and conference proceedings.

Bernard Tribollet is a Director of Research at the Centre National de la Recherche Scientifique (CNRS) and Associate Director of the Laboratoire Interfaces et Systèmes Electrochimiques (LISE) at Pierre et Marie Curie Université (Paris 6).

In 1973, after his graduation from the Ecole Supérieure d'Electricité, Bernard Tribollet joined the laboratory of I. Epelboin where he prepared a PhD under his supervision. In 1977 he held a CNRS position as Assistant de Recherche in the same laboratory, and he received his PhD in physical sciences in 1978. In 1981, with the support of am NSF fellowship, he spent one year as a visiting scientist at the University of California, Berkeley under the supervision of John Newman.

Tribollet has over 200 refereed publications and has presented more than thirty invited talks in international conferences. In particular, he gave the "XYZ for the Rest of Us" talk on impedance for at the ECS meeting in fall 2003.

During the first twenty years of his career, he worked in collaboration with Claude Deslouis on electro-diffusion flow diagnostics and mass transport in electrochemical systems. He generalized the electrochemical impedance to other perturbations, such as the rotation speed of a rotating disk electrode (EHD impedance), magnetic field (MHD impedance), and temperature (thermal impedance). He has applied electrochemical impedance spectroscopy to different problems concerning mass transport, conducting polymers, electrodissolution, and corrosion by developing models with clear physical meaning. For the past several years, he has collaborated with many groups in different countries, in particular with Mark Orazem (USA), Oscar Mattos (Brazil), and Marco Musiani (Italy).

Prof. Tribollet serves on the ECS Editorial Advisory Committee, he is president of the bio-deterioration group at the French CEFRACOR, he is the chair of the 2010 Annual Meeting of the International Society of Electrochemistry, and he is the French Regional Representative of ISE. Since 1989 he has delivered an annual short course on Impedance Spectroscopy at the University Paris 6. He co-authored, with Mark Orazem of the University of Florida, a textbook on impedance spectroscopy published in 2008 as part of The Electrochemical Society Series (Wiley).

John W. Weidner is Associate Department Chair and Campaign for Excellence Professor of Chemical Engineering at the University of South Carolina (USC). He received his BS degree in chemical engineering from the University of Wisconsin-Madison in 1986 and his PhD in chemical engineering from NC State University under the direction of Peter S. Fedkiw in 1991. That same year he joined USC as an assistant professor as part of their Center for Electrochemical Engineering. In the summer of 1992 he was a NASA Summer Faculty Fellow in the Energy Storage Systems Group at the Jet Propulsion Laboratory in Pasadena modeling nickel batteries. He spent a sabbatical at the University of California-Berkeley working with John Newman in the fall of 1999 studying the nickel electrode, and at Los Alamos National Laboratory working with Tom Zawodzinski in the spring of 2000 modeling impedance in porous electrode. His next sabbatical in 2007-08 was spent at the Fraunhofer Institute for Solar Energy Systems in Freiburg, Germany developing advanced catalysts for proton exchange membrane (PEM) electrolyzers.

Professor Weidner has published 74 refereed journal articles in the field of electrochemical engineering. His research group has created novel synthesis routines for battery materials and electrocatalysts, and they have used a variety of electroanalytical techniques and developed sophisticated mathematical models to advance the fields of advanced batteries, electrochemical capacitors, fuel cells, and electrolyzers. As a graduate student he received an ECS Energy Research Summer Fellowship and the Student Research Award from the Battery Division for his dissertation work on the nickel electrode. In 2009 he received the Research Award from the ECS Energy Technology Division for his work on his patented PEM electrolyzer for the large-scale production of hydrogen from gaseous SO_2 as part of the hybrid sulfur process.

Dr. Weidner has been active in ECS for over 20 years, including two three-year terms as Member-at-Large for the Battery Division's Executive Committee, three years as Advisor to the Energy Technology Division, five years as Chair of the Battery Division's Student Research Award committee, four years as Chair of the Young Authors Award committee, and six years on the *Interface* Advisory Board. He is past Chair of the Industrial Electrochemistry and Electrochemical Engineering (IE&EE) Division and is currently Editor of *ECS Transactions*.

David Young was educated at Melbourne University, graduating with a PhD in physical chemistry in 1969. He then moved to Canada, working in research positions at the University of Toronto (Chemistry), McMaster University (Materials Science & Engineering), and the National Research Council of Canada (Applied Chemistry). He returned to Australia to take a position with BHP Steel Research. Subsequently he moved to the University of New South Wales, initially in Chemical Engineering & Industrial Chemistry, later as Head of Materials Science & Engineering for 15 years, and now in a purely research role.

Dr. Young's research has been mainly in the area of high temperature corrosion, with a strong emphasis on the mass transport processes that support solid-gas reactions. The work has focused on corrosion by mixed gases, leading to complex mixed products of oxides, carbides, sulfides, and/or nitrides. Internal oxidation, carburization, and metal dusting reaction mechanisms have been examined in detail. His subsidiary interest has been in the field of selective dissolution (dealloying) reactions.

Dr. Young's work has led to two books, *Diffusion in the Condensed State* (co-authored by J. S. Kirkaldy), Institute of Metals, 1987, and *High Temperature Oxidation and Corrosion of Metals*, Elsevier, 2008. His work has been recognized by the U. R. Evans Award (Institute of Corrosion Science & Technology), the Outstanding Achievement Award of the ECS High Temperature Materials Division, the Corrosion Medal of the Australasian Corrosion Association, and election as a Fellow of the Australian Academy of Technological Sciences and Engineering.

Battery Division Research Award

Dominique Guyomard received his PhD in 1985 in the field of semiconductor electrochemistry from the Université Pierre et Marie Curie in Paris. He joined the Institut des Matériaux Jean Rouxel (IMN, Nantes, France) in 1986. From 1990 to 1992, he was a visiting scientist with J. M. Tarascon in Bellcore (NJ, USA), where he launched the carbon/spinel manganese oxide Li-ion battery project. After returning to IMN in 1993, he created a new lab to conduct research on Li battery materials. He is now Director of Research at CNRS (DR1) and Head of the Electrochemical Energy Storage and Transformation Department of IMN, supervising about 30-35 researchers (permanents, post-docs, and PhDs) on Li batteries, moderate and high temperature fuel cells, and advanced spectroscopic techniques.

Prof. Guyomard's expertise is built upon basic solid state electrochemistry and material and surface science for applications on Li-ion and Li metal polymer batteries. His research is focused on the design of new families of electrode materials; the use of innovative fabrication techniques; and the characterization of the physical, chemical, structural, spectroscopic, morphologic, interface, and electrochemical properties of battery electrodes for better understanding of their reaction mechanism with lithium. Recent developments include composite electrodes and interfaces.

Dr. Guyomard is involved in several local, national, and international committees on energy storage (including the European Commission and the U.S. DOE). He serves in the advisory boards of several international conferences (including International Battery Association, Lithium Battery Discussion, Pacific Power Source Symposia), and is organizer or co-organizer of several national and international symposia (including ICC3 Osaka in November 2010, MRS Boston in November 2010, and ICACC Florida in January 2011). He will chair the next Lithium Battery Discussion in Arcachon, France, in June 2011.

Recently, Prof. Guyomard received the 2007 International Battery Association Research Award and the 2008 French Academy of Science Award for transfer of science to industry. He is the author or co-author of 165 journal papers, six book chapters, and 18 patents.

Battery Division Technology Award

Khalil Amine is a Senior Scientist and the Manager of the Advanced Battery Technology group at Argonne National Laboratory. He is responsible for directing the research and development of advanced materials and battery systems for HEV, PHEV, EV, satellite, military, and medical applications. His main interest lies on the development of advanced cathodes, anodes, polymers, electrolytes, electrolyte additives, and redox shuttles for use in lithium batteries for automotive applications. Dr. Amine currently serves as an Advisor to the U.S. National Research Council on battery related technologies.

Dr. Amine is the founder and the lead organizer of the International Conference on Advanced Lithium Batteries for Automotive Applications. Among his many awards, Dr. Amine is a 2003 recipient of Scientific American's Top 50 Worldwide Research Leader Award, he is a 2010 recipient of the International Battery Association award, and a 2009 recipient of the U.S. Federal Laboratory Award for Excellence in Technology Transfer. He is also a three-time recipient of the R&D 100 Award. He holds or has filed over 130 patents, patent applications, and inventions and has over 200 publications. According to Science Watch, Dr. Amine was the most cited scientist in the field of battery technology from 1998-2008 (http://sciencewatch.com/ana/fea/08novdecFea/).

Corrosion Division H. H. Uhlig Award

Gerald S. Frankel is the DNV Chair, Professor of Materials Science and Engineering, and Director of the Fontana Corrosion Center at the Ohio State University. He earned the ScB degree in materials science engineering from Brown University and the ScD degree in materials science and engineering from MIT. Prior to joining OSU, he was a post-doctoral researcher at the Swiss Federal Technical Institute in Zurich and then a Research Staff Member at the IBM Watson Research Center in Yorktown Heights, NY.

Dr. Frankel's primary research interests are in the passivation and localized corrosion of metals and alloys, corrosion inhibition, and protective coatings. He is past chair of the ECS Corrosion Division, past chair of the Research Committee of NACE, and a member of the editorial board of the journals *Corrosion*, *Materials and Corrosion*, and *Corrosion Reviews*.

Dr. Frankel is a fellow of ECS, NACE International, and ASM International. He has received the OSU Distinguished Scholar Award, the Alexander von Humboldt Foundation Research Award for Senior U.S. Scientists, the 2007 T. P. Hoar Prize from the UK Institute of Corrosion, the Uhlig Award from NACE, and the Harrison Faculty Award from the OSU College of Engineering. He was on sabbatical at the Max Planck Institute for Iron Research in Dusseldorf in 2005 and a visiting professor at the University of Paris in 2008. In 2009 he was named adjunct professor, Pohang Institute of Science and Technology, Graduate Institute of Ferrous Technology, Pohang, Korea.

Electrodeposition Division Research Award

Takayuki Homma is Professor of Applied Chemistry and Associate Dean of the Faculty of Science and Engineering at Waseda University, Tokyo, Japan. He received his BE, ME, and PhD degrees in applied physical chemistry from Waseda University in 1987, 1989, and 1992, respectively. He has been a member of the faculty of that university since 1991. From 1997 to 1998, he was a Visiting Associate Professor at Stanford University. He is an active member of ECS (currently serving as an Associate Editor of *Journal of The Electrochemical Society*), the International Society of Electrochemistry (Chair-Elect of Division 5: Electrochemical Process Engineering and Technology), The Electrochemical Society of Japan (a member of the executive board), the Surface Finishing Society of Japan (a councilor), and the Japan Institute of Electronics Packaging (a member of the executive board).

Prof. Homma's current research interests include creating thin films and nanostructured surfaces with novel electronic/magnetic properties by utilizing electrochemical approaches, investigating their deposition processes and reaction mechanisms, performing *ab initio* molecular orbital (MO) and density functional theory (DFT) studies of those processes, developing new methods for evaluating structural and functional properties of nanostructured surfaces, and applying such surfaces to the development of devices and systems such as sensing devices, electrochemical micro reactors, and ultra high-density data storage systems. In addition, Prof. Homma conducts research to obtain atomistic and electrochemical understanding of the surface chemistry of silicon under device processing conditions. He has published 142 original papers, thirty-five review papers, and fifteen book chapters.

High Temperature Materials Division Outstanding Achievement Award

Harry L. Tuller is a member of the faculty of the Department of Materials Science and Engineering at MIT, where he serves as Professor of Ceramics and Electronic Materials and Director of the Crystal Physics and Electroceramics Laboratory. He obtained his BS and MS in electrical engineering and his EngScD in solid state science and engineering at Columbia University School of Engineering. His research has emphasized the modeling, processing, characterization, and optimization of energy related devices (sensors, batteries, fuel cells, solar/photolysis cells); and the integration of sensor, actuator, and photonic materials into microelectromechanical (MEMS) systems. This work has been extensively published in the form of 335 articles, twelve co-edited books, and 22 patents.

Prof. Tuller has received many honors including Docteur Honoris Causa Univ. Oulu, Finland (2009) and Université Aix-Marseille (2004); Fellow of American Ceramic Society; Fulbright-Awardee/Visiting Professor Univ. Paris; von Humboldt Fellow (Germany); and member of World Academy of Ceramics. Prof. Tuller is Editor-in-Chief of the *Journal of Electroceramics* and co-founder of Boston MicroSystems, Inc. with a focus on development of MEMS-based harsh environment compatible devices to detect explosives, toxic chemicals, and automotive emissions.

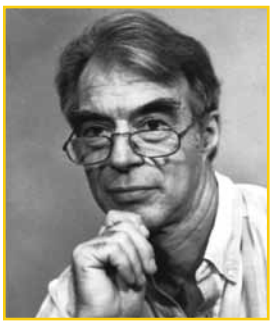
Luminescence and Display Materials Division Centennial Outstanding Achievement Award

David J. Lockwood obtained his PhD in physics from Canterbury University, New Zealand in 1969, was awarded a DSc in 1978 from Edinburgh University, UK, and a DSc from Canterbury University in 2000 for his work on the electronic, optical, and magnetic properties of solids. He carried out post-doctoral work in physical chemistry at Waterloo University, Canada (1970-1971), and was a research fellow in physics at Edinburgh University (1972-1978), before joining the National Research Council (NRC) of Canada in 1978 where he is presently a Principal Research Officer.

At NRC Dr. Lockwood's research has centered on the optical properties of low dimensional materials and recently has focused on Group IV and III-V semiconductor quantum dots and transition-metal magnetic nanostructures. Dr. Lockwood has published more than 500 scientific articles in journals and books and holds six U.S. patents.

Dr. Lockwood is a Fellow of ECS, the American Physical Society, and the Royal Society of Canada, and he serves on the editorial boards of five physics journals as well as being the founding editor of the book series *Nanostructure Science and Technology*. In 2005 he was awarded the Brockhouse Medal of the Canadian Association of Physicists for outstanding achievement in condensed matter and materials physics and the Tory Medal of the Royal Society of Canada for outstanding research in any branch of astronomy, chemistry, mathematics, physics, or an allied science. In 2008, he was the recipient of the Exact and Natural Sciences Award of the Academy of Sciences of Cuba.

Physical and Analytical Division Max Bredig Award in Molten Salt Chemistry



C. Austen Angell holds BSc and MSc degrees from the University of Melbourne, and a PhD degree from London University, Imperial College of Science where he was a Stanley Elmore Fellow and also the winner of the Armstrong Medal for Research Excellence. He has held positions at the University of Melbourne, Argonne National Laboratory, and Purdue University, before moving to Arizona State University in 1989 where he presently holds the position of Regents Professor of Chemistry.

Prof. Angell has made many significant contributions over his distinguished career as evidenced by his almost 500 publications and his awards including: the MRS Turnbull Lecture (2006), the ACS Joel Henry Hildebrand award for the study of liquids (2004), the Neville Mott award of the *Journal of Non-Crystalline Solids* (1992), and the Morey Award of the American Ceramic Society (1990).

More importantly, Prof. Angell has been one of the pivotal researchers in the molten salt and ionic liquid community for the past 50 years, and he has led the way in the development of the fundamental science of these fascinating and important systems dating back to his very first publication in 1958. Professor Angell has consistently been the genesis for both the development of new classes of ionic liquids and innovative new ideas about how to understand them, and he has been instrumental in drawing upon concepts from other scientific communities and applying them to molten salts and ionic liquids to help explain their unique properties.

Sensor Division Outstanding Achievement Award

Thomas Thundat is a Canada Excellence Research Chair professor at the University of Alberta, Edmonton, Canada. Until recently he was an ORNL Corporate Fellow and group leader for the Nanoscale Science and Devices group at the Oak Ridge National Laboratory. He is also a research professor of physics at the University of Tennessee, Knoxville, and a distinguished professor at the Indian Institute of technology, Madras, India. He obtained his PhD in surface physics from the State University of New York at Albany in 1987, under the direction of Walter Gibson. He began working at Oak Ridge National Laboratory in 1991, where he remained until 2010.

Dr. Thundat's expertise includes physics and chemistry of interfaces, solid-liquid interface, biophysics, scanning probes, nanoscale phenomena, and quantum confined atoms. His research interests include nanomechanics, solid–liquid interface, nanomechanical sensors for physical, chemical, and biological detection, scanning probe microscopy, quantum confined atoms, and mid infrared spectroscopy of surface adsorbates. His current research focuses on developing chemical and biological sensors with extreme high sensitivity using micro and nanocantilever arrays.

Dr. Thundat has published over 260 publications in peer-refereed journals and 45 book chapters; his work has received over 7,300 citations; and he has given over 150 invited talks at international conferences and institutions. Dr. Thundat has been awarded 29 U.S. patents. He is currently on the editorial boards of the *Review of Scientific Instruments*, *Research Letters in Nanotechnology*, and the *Microscale Thermophysical Engineering Journal*.

Dr. Thundat is the recipient of many awards including the U.S. Department of Energy's Young Scientist Award (1996); three R&D 100 Awards (1996, 2004, 2010); a Discover Magazine Award (2000); three National Federal Laboratory Consortium Awards for Excellence in Technology Transfer (2000, 2003, 2005); the ASME Pioneer Award (2004); the Scientific American 50 Award (2004); the Jesse Beams Award (2004); the Indian Institute of Technology Madras Distinguished Alumnus Award (2004); and the Nano 50 Award (2007). He was recognized as a Battelle Distinguished Inventor in 2003. Dr. Thundat was named ORNL Inventor of the Year in 2000 and 2003. He is an elected Fellow of the American Physical Society (APS) and the American Association for the Advancement of Science (AAAS). Dr. Thundat was named an ECS Fellow in 2008.

Technical Exhibit

The Technical Session coffee break is scheduled for 0930h in Royale 2/3/4, 1st Floor, on Tuesday and Wednesday to allow meeting attendees additional time to browse through the exhibits. The exhibit will feature instruments, materials, systems, publications, and software of interest to attendees.

Exhibit Hours

Monday, October 11 ..... 1800-2000h
includes the Monday Evening Poster Session

Tuesday, October 12..... 0900-1400h
includes Technical Session Coffee Break

re-opening..... 1800-2000h
includes the Tuesday evening Poster Session

Wednesday, October 13 ..... 0900-1400h
includes Technical Session Coffee Break

Exhibitors as of Press-Time

ECS

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Event Highlights

NOTE: *For a list of Committee Meetings, please visit the Las Vegas meeting page: www.electrochem.org/meetings/biannual/218/218.htm.*

Sunday, October 10

0900h.....Short Courses begin

1730h.....ECS Student Mixer (offsite)

1830h.....For the Rest of Us: "Status and Outlook on the Photovoltaic Solar Industry Based on Solar Cell R&D," by Bolko von Roedern, Grande D, 1st Floor

1900h.....Electronics and Photonics Division Award Reception and General Meeting, Top of the Riv North

1930h.....Sunday Evening Get-Together, Royale Foyer, 1st Floor

Monday, October 11

0930h.....Technical Session Coffee Break, Grande and Royale Foyers, 1st Floor

1215h.....Battery Division Luncheon & Business Meeting, Grande G, 1st Floor (ticket required)

1215h.....High Temperature Materials Division Luncheon & Business Meeting, Capri 108, 1st Floor (ticket required)

1440h.....Edward Goodrich Acheson Award Lecture: "Energy Storage," by John S. Newman, Battery and Energy Technology Joint General Session, Capri 103, 1st Floor and Grande C, 1st Floor

1700h.....The ECS Lecture: "Current and Future Status of Nitride-based Solid State Lighting," by Shuji Nakamura, Grande E, 1st Floor

1800h.....Monday Evening Mixer, Student Poster Session, and Technical Exhibit Opening, Royale 1-4, 1st Floor

Tuesday, October 12

0900h.....Technical Exhibit, Royale 2/3/4, 1st Floor

0930h.....Technical Session Coffee Break, Royale 3/4, 1st Floor

1200h.....Student Poster Award Presentation, Royale 2/3/4

1215h.....Corrosion Division Luncheon & Business Meeting, Top of the Riv South (ticket required)

1215h.....Sensor Division Luncheon & Business Meeting, Room 206, 2nd Floor (ticket required)

1800h.....Technical Exhibit and General Poster Session, Royale 1-5, 1st Floor

Wednesday, October 13

0900h.....Technical Exhibit, Royale 2/3/4, 1st Floor

0930h.....Technical Session Coffee Break, Royale 3/4, 1st Floor

1215h.....Electrodeposition Division Luncheon & Business Meeting, Top of the Riv South (ticket required)

1215h.....Luminescence and Display Materials Division Luncheon & Business Meeting, Room 205, 2nd Floor (ticket required)

Thursday, October 14

0930h.....Technical Session Coffee Break, Grande and Royale Foyers, 1st Floor

Friday, October 15

0930h.....Technical Session Coffee Break, Grande and Royale Foyers, 1st Floor

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Hotel & Travel Information

The 218th ECS Meeting will be held at the Riviera Hotel and Casino (2901 Las Vegas Boulevard South in Las Vegas, NV 89109). Guest room reservations for the headquarters hotel can be made online from the ECS website at special discounted meeting rate of $79. See the ECS website for more details and to make your reservation.

Companion Registrant Program—Guests of Technical Registrants are invited to register for the 218th Meeting as a "Companion Registrant." The companion registration fee of $25 (Early-Bird) or $30 (after September 10) includes admission to non-ticketed social events; an exclusive lounge with beverage service, Monday through Thursday, 0800-1000h; and a special "Welcome to Las Vegas" orientation presented by the Las Vegas Convention and Visitors Authority on Monday, October 11 at 0900h in the Companion Registrants Lounge.

Technical Session Co-Chair Orientation—We encourage all Symposium Organizers and Technical Session Co-Chairs to attend this important informational session in Grande C, 1st Floor on Sunday from 1500-1600h. The Co-Chair Orientation will take place during the first 10 minutes of the meeting.

Oral Presentations and Audio-Visual—Oral presentations must be in English. Only LCD projectors will be available for oral presentations. **Authors will be required to bring their own laptop computers for presentation.** We strongly suggest that presenting authors verify laptop/projector compatibility in the speaker-ready rooms at the meeting. Speakers requiring special equipment must make written request to ECS headquarters (meetings@electrochem.org) no later than three weeks before the meeting, and appropriate arrangements will be made at the expense of the author.

Poster Presentations and Sessions—Poster presentations must be in English, on a board approximately 4 feet high by 8 feet wide (1.22 m by 2.45 m), corresponding to the abstract number and day of presentation in the final program. Please arrive approximately two to four hours before the start of your session to begin setting up your poster displays. Please do not begin setting up your poster until all the poster boards have been numbered.

Plan your display to fit on one upright panel approximately 4 feet high by 8 feet wide (1.22 m by 2.45 m). Present displayed information from left to right, starting at the top left of the panel. The paper title, number, names, and affiliations of all authors MUST be at the top of the display. The recommended print size for the title is approximately 1" to 2" (2.5 cm to 5 cm) high. Authors should minimize written text but use it when necessary to emphasize essential data and/or to stimulate discussion. All illustrations, drawings, charts, pictures, graphs, figures, and written text should be large enough to allow easy reading from a distance of 5' (1.5 m). Matted and finished photographs are recommended to enhance visibility. Pushpins and/or thumbtacks will be supplied at the meeting.

Commercial advertisements or publicity will NOT be permitted in poster presentations. Authors violating this regulation will be asked to remove their presentations immediately. Authors are responsible for setting up their displays, for being present during the entire scheduled poster session, and for removing their displays at the conclusion of the poster session. No posters will be displayed without author participation. NO EXCEPTIONS WILL BE GRANTED. Authors are responsible for the security of their displays and all items of value. ECS will not assume any responsibility for lost, stolen, or broken articles. Additional information or special requirements should be addressed to the individual symposium organizers prior to the meeting.

The **General Society Student Poster Session** will be held as a part of the Monday Evening Mixer and Technical Exhibit, which features instruments, materials, systems, publications, and software of interest to meeting attendees. All meeting registrants are invited to attend. Formal presentations will begin at 1800h. Students may start setting up their presentations at 1300h in Royale 1/2, First Floor; judging of the posters will begin at 1500h. **Participants are encouraged to attend the Technical Exhibit on Tuesday at 1200h in Royale 3/4, 1st Floor, where the winners will be announced and presented with their awards.**

Speaker-Ready Room—A Speaker-Ready Room will be available Sunday through Friday, in Room 201, 2nd Floor. This room is available to allow speakers the opportunity to preview and prepare for their presentations. We highly recommend that speakers verify their laptop's compatibility with the sample LCD projector that will be located in this room, prior to their presentation. Additionally, there will be audiovisual technicians available for your assistance.

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

No Recording Allowed—**Photographing and/or recording of presentations IS NOT PERMITTED unless specifically allowed by the speaker.** Anyone making unauthorized photographs or recordings will be asked to leave the session.

Registration & General Meeting Information

Meeting Registration—The meeting registration area will be located in the Foyer, 1st Floor. Registration will open on Monday and the technical sessions will be conducted Sunday through Friday.

Early-Bird Registration—Early-Bird registration is encouraged. Register online at www.electrochem.org, or fax your registration form to 609.737.2743. Attendees prepaying by credit card are encouraged to use our online system, or send the form by fax. If you send a registration by fax, please do not send another copy by mail, as this may result in duplicate charges. **The deadline for Early-Bird registration is September 10, 2010.** Refunds are subject to a 10% processing fee and will only be honored if written requests are received by September 17, 2010. **Regular registration rates are in effect online after September 10, 2010 and at the meeting.** All meeting participants are required to pay the appropriate registration fees. Early-Bird and post-September 10 registration payments must be made in U.S. Dollars via Visa, MasterCard, American Express, Discover Card, check, or money order payable to ECS.

Key Locations

Meeting Registration	Foyer, 1st Floor
Information/Message Center	Foyer, 1st Floor
ECS Headquarters Office	Capri 111, 1st Floor
ECS Book Store	Foyer, 1st Floor
Speaker Ready Room	Room 201, 2nd Floor

Book Store Hours

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

Registration Hours

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

***Registration Fees*—ALL PARTICIPANTS AND ATTENDEES ARE REQUIRED TO PAY THE APPROPRIATE REGISTRATION FEE LISTED BELOW.** Payment can be made by cash, check or travelers' checks in U.S. funds drawn on a U.S. bank. Visa, MasterCard, American Express, or Discover are also accepted.

Registration Fees

All technical registrations include a copy of the *Meeting Abstracts* on USB flashdrive only. Attendees who wish to have paper copies of abstracts should download and print them in advance of the meeting, from the ECS website, free of charge. Please note that paper copies of meeting abstracts will NOT be available. Additional copies of the *Meeting Abstracts* on USB flashdrive may be purchased by registrants; the cost is $74 for members and $92.50 for nonmembers.

All prices are in U.S. dollars.	Early-Bird (through Sept. 10)	Sep. 11 through Oct. 15
ECS Member	$405	$505
Nonmember	$615	$715
ECS Student Member	$150	$250
Student Nonmember	$190	$290
One Day ECS Member	$275	$375
One Day Nonmember	$365	$465
ECS Emeritus or Honorary Member	$0	$0
Companion Registrant	$25	$30

All students must send verification of student eligibility along with their registration.

***Financial Assistance*—**Financial assistance is limited ad 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.

***Employment Services*—**Companies desiring to recruit employees may place their announcements on a designated bulletin board in the registration area. Please note that these announcements should be no larger than 8 ½" by 11".

***ADA Accessibility*—**Special accommodations for disabled attendees will be handled on an individual basis provided that adequate notice is given to the ECS headquarters office.

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Web: www.electrochem.org

Attention
All Las Vegas Presenting Authors!

You are invited to submit a full-text manuscript of your Las Vegas presentation (invited, contributed, and/or poster) for publication in *ECS Transactions* (ECST), an online database of proceedings from ECS meetings and ECS-sponsored meetings.

The Las Vegas ECST manuscript submission site is scheduled to open on **October 25, 2010**. At that time, the corresponding authors of meeting abstracts will receive an e-mail inviting them to submit a full-text paper. This e-mail will contain the URL for the manuscript submission website and basic instructions on how to upload the paper. For detailed instructions on how to format manuscript(s) for submission, please read the ECST Author Instructions:

(http://www.electrochem.org/dl/ecst/ecst_a_inst.htm)

and follow the ECST Manuscript Template:

(http://www.electrochem.org/dl/ecst/assets/ecst_temp.doc).

All papers submitted to ECST will be reviewed to ensure that they meet generally accepted scientific standards. Accepted papers will be published in an issue of ECST Volume 33 (Las Vegas, Nevada). The Las Vegas issues are currently scheduled to be published in January 2011. *Please note: some Las Vegas symposia (B7, E2, E3, E5, E6, E7, E9, E11, E12, E13, E14~22, I3, J1, and J3) will be publishing their proceedings at the October meeting in ECST Volume 33, Issues 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. No further papers for these issues will be solicited or accepted.*

Once published, full issues and individual articles are available for sale, delivered as Portable Document Format (PDF) files. Certain issues may also be available in a hardcover version. To purchase ECST content, please visit the ECS Digital Library (http://www.ecsdl.org/) or stop by the ECS Book Store in Las Vegas.

If you would like further information regarding manuscript submission or ECST in general, please e-mail the *ECS Transactions* staff at ecst@electrochem.org.

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SYMPOSIUM TOPICS

Sessions are marked to indicate if they run on Sunday **(S)**, Monday (**M**), Tuesday (**Tu**), Wednesday (**W**), Thursday (**Th**) and/or Friday (**F**).

HC **Hard-cover (HC)** editions of *ECS Transactions* will be available for purchase and pick-up at the meeting; or you may pre-order your hard-cover *ECS Transactions* issue using the meeting registration form in this brochure or when registering online.

e **Electronic (PDF)** editions of *ECS Transactions* issues will be available ONLY via the ECS Digital Library. Electronic editions of "at" meeting issues will be available for purchase beginning October 1, 2010. Please visit the ECS website for issue pricing and ordering information for the electronic editions.

A — General Topics

A1 — General Student Poster Session (M) — *V. R. Subramanian and V. Chaitanya*

A2 — Nanotechnology General Session (W-Th) — *O. Leonte, Z. P. Aguilar, C. Bock, and E. Traversa*

A3 — Tutorials in Nanotechnology: Focus on Luminescence and Display Materials (M) — *U. Happek*

B — Batteries, Fuel Cells, and Energy Conversion

B1 — Batteries and Energy Technology Joint General Session (M-Th) — *N. Dudney, C. S. Johnson, A. Manivannan, and S. Narayan*

B2 — Battery Safety and Abuse Tolerance (Tu-W) — *D. Doughty*

B3 — Electrochemistry of Novel Materials for Energy Storage and Conversion (M-Th) — *K. Zaghib, C. Julien, and V. Ramani*

B4 — Electrode-Electrolyte Interfaces in Li-Ion Batteries (M-Tu) — *B. Liaw and R. Kostecki*

B5 — Materials Design and Electrode Architecture for Batteries (Tu-Th) — *R. Kostecki and N. Dudney*

B6 — Non-Aqueous Electrolytes for Lithium Batteries (M-W) — *B. Lucht, W. Henderson, T. Jow, and M. Ue*

B7 — Polymer Electrolyte Fuel Cells 10 (M-F) — *H. Gasteiger, F. Buchi, D. Chu, S. Cleghorn, R. Darling, T. Fuller, M. Inaba, D. Jones, C. Lamy, R. Mantz, S. Narayan, V. Ramani, T. Schmidt, P. Shirvanian, P. Strasser, H. Uchida, A. Weber, and T. Zawodzinski* HC e

B8 — Rechargeable Lithium and Lithium Ion Batteries (M-F) — *A. Manthiram, K. M. Abraham, S. Meng, and C. Wang*

B9 — Solid State Ionic Devices 8 - NEMCA (M-W) — *E. D. Wachsman, C. Bock, G. Hunter, and E. Traversa*

D — Corrosion, Passivation, and Anodic Films

D1 — Corrosion General Session (Tu) — *D. Hansen*

D2 — Corrosion and Biofuels (W-Th) — *D. Hansen, G. S. Frankel, M. Iannuzzi, and N. Sekharipuram*

D3 — Corrosion Issues in Nuclear Waste Storage: A Symposium in Honor of the 65th Birthday of David Shoesmith (Tu-W) — *J. J. Noel, Z. P. Aguilar, and X. He*

D4 — Corrosion Modeling (W-Th) — *R. Kelly, F. Martin, and C. D. Taylor*

D5 — High Resolution Characterization of Corrosion Processes 2 (M-Tu) — *H. McMurray, B. Connolly, G. S. Frankel, D. Hansen, H. Masuda, P. Schmutz, and K. R. Zavadil*

D6 — Pits and Pores 4: New Materials and Applications - In Memory of Ulrich Gösele (M-W) — *R. Boukherroub, D. J. Lockwood, Y. Ogata, and P. Schmuki*

E — Dielectric and Semiconductor Materials, Devices, and Processing

E1 — Solid State Topics General Session (W) — *K. B. Sundaram, A. Baca, O. Leonte, R. Todi, and X. Wang*

E2 — Atomic Layer Deposition Applications 6 (M-W) — *J. Elam, S. F. Bent, S. De Gendt, A. Delabie, A. Londergan, F. Roozeboom, and O. Van der Straten* HC e

E3 — Chemical Mechanical Polishing 11 (M-Tu) — *G. Banerjee, V. Desai Chaitanya, Y. Obeng, and K. B. Sundaram* e

E5 — High Dielectric Constant and Other Dielectric Materials for Nanoelectronics and Photonics (M-W) — *S. Kar, M. Houssa, H. Iwai, K. Kita, D. Landheer, D. Misra, and S. Van Elshocht* HC e

E6 — High Purity Silicon 11 (W-Th) — *E. Simoen, C. Claeys, R. Falster, C. Mazure, and P. Stallhofer* e

E7 — Low-Dimensional Nanoscale Electronic and Photonic Devices 4 (M-Tu) — *L. Chou, G. Duesberg, S. Jin, M. Jo, M. Suzuki, and N. Wu* e

E8 — Photovoltaics for the 21st Century 6 (M-Tu) — *M. Tao and H. Deligianni*

E9 — Processing, Materials, and Integration of Damascene and 3D Interconnects (Tu-W) — *T. Ritzdorf, J. Flake, M. Koyanagi, O. Leonte, G. Mathad, P. Ramm, H. Rathore, and F. Roozeboom* e

E11 — Semiconductor Wafer Bonding 11: Science, Technology, and Applications, in Honor of Ulrich Gösele (Tu-Th) — *C. Colinge, J. Bagdahn, H. Baumgart, K. Hobart, H. Moriceau, and T. Suga* HC e

E12 — State-of-the-Art Program on Compound Semiconductors 52 (SOTAPOCS 52) (M-Tu) — *M. Overberg, J. Brown, P. Hesketh, W. Johnson, H. Ma, and P. Vanýsek* e

E13 — Thin Film Transistors 10 (TFT 10) (M-W) — *Y. Kuo, D. Ast, O. Bonnaud, S. Fonahs, H. Hamada, M. Hatano, J. Jang, W. Milne, A. Nathan, and M. Shur* HC e

E14 to E22 — SiGe, Ge, and Related Compounds: Materials, Processing, and Devices 4 (M-Th) — *D. Harame, S. Bedell, J. Boquet, M. Caymax, S. Koester, T. Krishnamohan, G. Masini, S. Miyazaki, A. Reznicek, B. Tillack, and Y. Yeo* HC e

F — Electrochemical / Chemical Deposition and Etching

F1 — Electroless Deposition Principles, Activation, and Applications (M-Tu) — *S. Djokic, L. Magagnin, M. Ryan, J. Stickney, and G. Zangari*

F2 — Electronics and 3-D Packaging 4 (M-Tu) — *K. Kondo, R. Akolkar, D. Barkey, M. Hayase, T. Ritzdorf*

F3 — Magnetic Materials, Processes, and Devices 11 (M-Tu) — *C. Bonhote, S. R. Brankovic, H. H. Gatzen, P. Hesketh, Y. Kitimoto, T. Osaka, W. Schwarzacher, and G. Zangari*

F4 — Molecular Structure of the Solid-Liquid Interface and Its Relationship to Electrodeposition 7 (Tu-W) — *R. Alkire and D. M. Kolb*

I — Physical and Analytical Electrochemistry

I1 — Physical and Analytical Electrochemistry General Session (M-Tu) — *S. Minteer*

I2 — Electrochemistry in Nanospaces (W) — *T. Ito and L. Baker*

I3 — Molten Salts and Ionic Liquids 17 (M-F) — *D. M. Fox, H. De Long, W. Henderson, R. Mantz, M. Mizihata, and P. Trulove* HC e

I4 — Oscillations and Pattern Formation in Electrochemistry (W) — *I. Z. Kiss and H. Varela*

I5 — Professor V. S. Bagotsky: 65 Years in Theoretical Electrochemistry, Electrocatalysis, and Applied Electrochemistry (Su, Tu) — *B. MacDougall, C. Bock, E. Shembel, and K. Zaghib*

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

J1 — Chemical Sensors 9: Chemical and Biological Sensors and Analytical Systems (M-Tu) — *G. Hunter, Z. P. Aguilar, M. Carter, J. Li, and A. Simonian* HC e

J2 — Luminescence and Energy Efficiency (Tu-W) — *U. Happek, A. Manivannan, A. Setlur, and A. Srivastava*

J3 — Microfabricated and Nanofabricated Systems for MEMS/NEMS 9 (Tu-W) — *P. Hesketh, J. Davidson, A. Londergan, S. Shoji, P. Srinivasan, and P. Vanýsek* HC e

J4 — Physics and Chemistry of Luminescence and Display Materials (W-Th) — *U. Happek, Z. P. Aguilar, and K. C. Mishra*