



Call for papers

TORONTO

223rd ECS Meeting • May 12-17, 2013 • Toronto, ON, Canada

223rd ECS Meeting—Call for Papers—May 12-17, 2013

General Information

The 223rd ECS Meeting will be held from May 12-17, 2013. This major international conference offers a unique blend of electrochemical and solid-state science and technology; and serves as a major forum for the discussion of interdisciplinary research from around the world through a variety of formats, such as oral presentations, poster sessions, exhibits, and tutorial sessions.

Abstract Submission and Deadlines

Abstracts are due no later than November 16, 2012.

Note: Some abstracts may be due earlier than November 16, 2012. Please carefully check the symposium listings for any alternate abstract submission deadlines. For complete details on abstract submission and symposia topics, please see www.electrochem.org.

Submit one original meeting abstract electronically via www.electrochem.org, no later than November 16, 2013. Faxed abstracts, emailed abstracts, late abstracts, and abstracts more than one page in length will not be accepted. In January 2013, all presenting authors will receive an email from ECS headquarters office notifying them of the date, time, and location of their presentation. Only authors with non-U.S. and non-Canadian addresses will receive a hardcopy acceptance letter. Other hardcopy letters will be sent only upon request.

Meeting abstracts should explicitly state objectives, new results, and conclusions or significance of the work. Abstracts must be properly formatted and no more than one page in length. Please use the ideal preformatted two column template located at: http://www.electrochem.org/meetings/assets/abs_template.doc. Programming for this meeting will occur in December 2012, with some papers scheduled for poster presentation. Check the ECS website for further program details.

Paper Presentation

All authors selected for either oral or poster presentations will be notified in January 2012. Oral presentations must be in English. Both LCD projectors and laptops will be provided for oral presentations. Presenting authors are no longer required to bring their own laptops to the meeting for presentation; however, you MUST bring your presentation on a USB flash drive to be used with the laptop that will be provided in each technical session room. If a presenting author would like to use his/her own laptop for presentation, we strongly suggest that the author verify laptop/projector compatibility in the presentation room prior to the start of the session or all other presentations. Speakers requiring additional equipment must make written request to the ECS headquarters office at least one month prior to the meeting and appropriate arrangements will be worked out, subject to availability, and at the expense of the author. Poster presentations should be displayed in English, on a board approximately 3 feet 10 inches high by 3 feet 10 inches wide (1.17 meters high by 1.17 meters wide), corresponding to the abstract number and day of presentation in the final program.

Manuscript Publication

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

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

Some symposia will publish their issue to be available for sale “AT” the meeting. Please see each individual symposium listing in this Call to determine if there will be an “AT” meeting issue. In this case, submission to ECST is mandatory, and required in advance of the meeting.

Some symposia will publish their issue to be available “AFTER” the meeting, and all authors are encouraged to submit their full papers. To determine acceptance in ECST, all submitted manuscripts will be reviewed, either by the symposium organizers or by the ECST Editorial Board. After the meeting, all accepted papers in ECST will be available for sale, either individually, or by issue.

Papers presented at ECS meetings and manuscripts submitted to ECST may also be submitted to the Society’s technical journals: the *Journal of the Electrochemical Society*, *ECS Journal of Solid State Science and Technology*, *ECS Electrochemistry Letters*, or *ECS Solid State Letters*. Although there is no hard deadline for the submission of these papers, it is considered that six

months from the date of the symposium is sufficient time to revise a paper to meet the stricter deadlines of the journals. “Instructions to Authors” are available from the ECS headquarters office, the journals, or the ECS website.

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

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

Financial Assistance

Financial assistance is very limited and generally governed by the symposium organizers. Individuals may inquire directly to the symposium organizers of the symposium in which they are presenting their paper to see if funding is available. Individuals requiring an official letter of invitation should write to the ECS headquarters office; such letters will not imply any financial responsibility of ECS. Students seeking financial assistance should consider awarded travel grants (see page 131).

Hotel Reservations

The 223rd ECS Meeting will be held at the Sheraton Centre Toronto located at 123 Queen Street West, Toronto, ON M5H 2M9, Canada. Please refer to the 223rd ECS Meeting website for the most up to date information on hotel availability and a block of rooms where special rates have been reserved for participants attending the 223rd ECS Meeting. The hotel reservation deadline is April 12, 2013. Please refer to ECS website for rates and reservations.

Meeting Registration

All participants—including authors and invited speakers of the 223rd ECS Meeting—are required to pay the appropriate registration fees. Hotel and meeting registration information will be posted on the ECS website (www.electrochem.org) as it becomes available. The deadline for early bird registration is April 12, 2013.

Short Courses

A number of short courses will be offered on Sunday, May 12, 2013 from 9:00 AM-4:30 PM. Short Courses require advance registration and may be cancelled if enrollments are too low. As of press-time, the following Short Courses are tentatively planned for the meeting: Basic Impedance Spectroscopy; Scientific Writing for Scientists and Engineers; Fundamentals of Electrochemistry; Advanced Microscopy Methods for Studying PE Fuel Cell Materials; Scanning Probe Microscopy; and Thermal Analysis and Calorimetry of Li-Ion Batteries and Battery Materials. Please check the ECS website for the final list of offerings.

Technical Exhibit

The 223rd ECS Meeting will also include a Technical Exhibit, featuring presentations and displays by over 40 manufacturers of instruments, materials, systems, publications, and software of interest to meeting attendees. Coffee breaks are scheduled each day in the exhibit hall along with evening poster sessions to increase traffic. Please see the ECS website for further details.

Sponsorship Opportunities

ECS biannual meetings are wonderful chances to market your company through sponsorship. Sponsors will be recognized by level in *Interface*, the Meeting Program, meeting signage, and on the ECS website. The levels are: Platinum: \$5,000+, Gold: \$3,000, Silver: \$1,500, and Bronze: \$1,000.

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

Advertising opportunities—in the Meeting Program as well as in *Interface*—are available. Please see the ECS website for further details.

Contact Information

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

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SYMPOSIUM TOPICS

A General Topics

- A1 — General Student Poster Session
- A2 — Nanotechnology General Session

B Batteries, Fuel Cells, and Energy Conversion

- B1 — Energy Technology/Battery - Joint General Session
- B2 — Battery Electrolytes
- B3 — Alkaline Electrochemical Systems for Energy Conversion and Fuel Production
- B4 — Design and Modeling of Battery Materials
- B5 — Hydrogen Production, Conversion and Storage 4
- B6 — Stationary and Large Scale Electrical Energy Storage 2
- B7 — Nanoarchitectures for Energy Storage 1
- B8 — Next Generation of Supercapacitors
- B9 — Solar Fuels 2

C Biomedical Applications and Organic Electrochemistry

- C1 — Innovations and New Directions in Organic Electrochemistry

D Corrosion, Passivation, and Anodic Films

- D1 — Corrosion General Session
- D2 — Corrosion in Nuclear Energy Systems: From Cradle to Grave

E Dielectric and Semiconductor Materials, Devices, and Processing

- E1 — Bioelectronics, Biointerfaces, and Biomedical Applications 5
- E2 — Graphene, Ge/III-V, and Emerging Materials for Post CMOS Applications 5
- E3 — Nanocrystal Embedded Dielectrics for Electronic and Photonic Devices
- E4 — Organic Semiconductor Materials, Devices, and Processing 4
- E5 — Silicon Compatible Materials, Processes, and Technologies for Advanced Integrated Circuits and Emerging Applications 3
- E6 — Advanced Semiconductor-on-Insulator Technology and Related Physics 16
- E7 — Symposium on Processes at the Semiconductor Solution Interface 5
- E8 — Thermal and Plasma CVD of Nanostructures and Their Applications
- E9 — Wide-Bandgap Semiconductor Materials and Devices 14

F Electrochemical / Chemical Deposition and Etching

- F1 — Green Electrodeposition 3
- F2 — Novel Design and Electrodeposition Modalities

G Electrochemical Synthesis and Engineering

- G1 — Advances in Low Temperature Electrolyzer and Fuel Cell Technology: In Honor of Anthony B. (Tony) LaConti
- G2 — Educational Needs and Approaches for Electrochemistry and Electrochemical Engineering
- G3 — Electrochemical Engineering for the 21st Century: 3
- G4 — Tutorials in Electrochemical Technology: Impedance Spectroscopy

H Fullerenes, Nanotubes, and Carbon Nanostructures

- H1 — Tutorials in Nanotechnology
- H2 — Fullerenes - Chemical Functionalization, Electron Transfer, and Theory
- H3 — Endofullerenes and Metallofullerenes
- H4 — Carbon Nanotubes - From Fundamental Processes to Devices
- H5 — Fundamentals of Graphene Related Structures
- H6 — Focus Session: Carbon Nanostructures in Energy Applications and Energy Storage
- H7 — Carbon Nanostructures in Medicine and Biology
- H8 — Porphyrin and Supramolecular Assemblies
- H9 — Nanostructures for Energy Conversion

I Physical and Analytical Electrochemistry

- I1 — Climate Change 4
- I2 — Computational Chemistry
- I3 — Ethanol Oxidation
- I4 — Grahame Award Symposium and Physical and Analytical Electrochemistry General Session
- I5 — Ion Conduction in Polymers
- I6 — State of the Art Tutorial on Membranes and MEAs for Low Temperature Fuel Cells

J Sensors and Displays: Principles, Materials, and Processing

- J1 — Environmental, Water Quality and Safety Monitoring
- J2 — Nano/Bio Sensors
- J3 — Sensors, Actuators and Microsystems General Session

A — General Topics

A1 General Student Poster Session All Divisions

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

An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are obligated to submit their full text manuscript for the issue no later than June 21, 2013. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **V. Subramanian**, Washington University in Saint Louis, e-mail: vsubramanian@seas.wustl.edu; **M. P. Foley**, United States Naval Academy, e-mail: foley@usna.edu; **K. B. Sundaram**, University of Central Florida, e-mail: sundaram@mail.ucf.edu; and **V. Chaitanya**, New Mexico State University, e-mail: vimalc@nmsu.edu.

A2 Nanotechnology General Session All Divisions / New Technology Subcommittee

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

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

Areas of interest include: heterogeneous functional materials for energy systems; semiconductor and metal nanoparticles and metal/semiconductor nanocomposites; size quantization effects in semiconductor nanoparticles; fundamentals of nucleation and growth of nanoparticles/nanowires/nanotubes; novel synthesis methods of nanostructured materials; processing of nanostructured materials; advanced characterization techniques for nanostructured materials; modeling and tailoring of nanostructured materials; nanocomposites and interfacial phenomena; photo-induced charge separation and interfacial charge transfer; photoelectrochemistry of nanostructured films; photo-catalysis and environmental applications; nano-ionics; nanostructured catalysts for fuel cells, electrolyzers, batteries and supercapacitors; nanostructured sensor surfaces; and biological applications of nanomaterials.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **W. Mustain**, University of Connecticut, e-mail: mustain@enr.uconn.edu; **F. Chen**, University of South Carolina, e-mail: chenfa@cec.sc.edu; and **O. Leonte**, Berkeley Polymer Technologies, Inc., e-mail: odleonte@comcast.net

B — Batteries, Fuel Cells, and Energy Conversion

B1 Energy Technology/Battery— Joint General Session Energy Technology Division / Battery Division

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

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **A. Manthiram**, University of Texas, e-mail: rmanth@mail.utexas.edu; **A. Manivannan**, Department of Energy, e-mail: amanivana@netl.doe.gov; and **Sanjeev Mukerjee**, Northeastern University, e-mail: s.mukerjee@neu.edu.

B2 Battery Electrolytes Battery Division / Energy Technology Division / Physical and Analytical Electrochemistry Division

Electrolytes are a crucial component of electrochemical systems. Challenging topics of research for battery electrolytes include stabilizing the cycling of high-voltage electrodes to increase the cell energy capacity; improved rate (power) capability; improved cell stability and safety; and reduced cost. This symposium welcomes contributions of papers that can shed light on these challenging areas of research. Areas of interests sought include (1.) electrolytes, additives, and novel compositions that can increase the battery stability, safety, abuse tolerance, and performance; (2.) characterization techniques that can quantitatively measure improvements in battery performance through novel electrolyte concepts; (3.) processing and synthesis methods for new electrolyte compositions and additives that can reduce costs and manufacturing complexity; and (4.) novel approaches to improving electrolyte stability and performance.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **F. Alamgir**, Georgia Institute of Technology, e-mail: faisal.alamgir@mse.gatech.edu; **W. Henderson**, North Carolina State University, e-mail: whender@ncsu.edu; **R. Jow**, Army Research Laboratory,

e-mail: t.r.jow.civ@mail.mil; **S. Mukerjee**, Northeastern University, e-mail: s.mukerjee@neu.edu; **V. Thangadurai**, University of Calgary, e-mail: vthangad@ucalgary.ca; and **P. Trulove**, USNA, e-mail: trulove@usna.edu.

B3

Alkaline Electrochemical Systems for Energy Conversion and Fuel Production

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

This symposium will feature oral and poster presentations on research dealing with the fundamental and applied aspects of energy conversion and fuel production employing alkaline electrochemical systems. Symposium interests include polymeric alkaline-ion exchange membrane electrolytes, electrocatalysts for oxygen reduction and oxygen evolution in alkaline media, electrocatalysts for oxidation of fuels in alkaline media, alkaline water electrolysis, electrolytic conversion of carbon dioxide to fuels in alkaline aqueous systems, materials and processes in aqueous alkaline metal-air batteries, and performance/durability of alkaline fuel cells. Abstracts have to be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to symposium organizers: Sri Narayan, University of Southern California, sri.narayan@usc.edu; Peter Pintauro, Vanderbilt University, peter.pintauro@vanderbilt.edu; Vijay Ramani, Illinois Institute of Technology, ramani@iit.edu; and P. Kulesza, University of Warsaw, Poland, pkulesza@chem.uw.edu.pl.

An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are obligated to submit their full text manuscript for the issue no later than June 21, 2013. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **SR Narayanan**, University of Southern California, e-mail: smaraya@usc.edu; **Peter Pintauro**, Vanderbilt University, e-mail: peter.pintauro@vanderbilt.edu; **Bor Yann Liaw**, University of Hawaii, e-mail: bliaw@hawaii.edu; **Vijay Ramani**, IIT Chicago, e-mail: ramani@iit.edu; and **P. Kulesza**, University of Warsaw, e-mail: pkulesza@chem.uw.edu.pl.

B4

Design and Modeling of Battery Materials

Battery Division / Energy Technology Division

To accelerate the pace of materials discovery, development and optimization for electrochemical energy storage systems, it is necessary to apply a combined computational and experimental approach. In this symposium, we hope to gather many researchers around the world to discuss new advances in computational materials design and modeling of battery materials. The emphasis of the symposium will be on the new promising electrode materials and systems, their electrochemical properties and reaction mechanisms.

The topics of the sessions will include (but not be limited to): (1.) New electrochemical systems, including lithium, sodium, magnesium chemistries; (2.) Electrode/electrolyte interfacial phenomena in new materials and new systems; (3.) High throughput materials design by first principles; (4.) Computational materials diagnostics; (5.) Multi-scale modeling of energy storage materials and systems; and (6.) Experimental techniques that can provide *in situ* characterization to understand and derive proper and useful information for the modeling.

An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are obligated to submit their full text manuscript for the issue no later than June 21, 2013. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. Meng**, University of California, San Diego, e-mail: shmeng@ucsd.edu; **B. Y. Liaw**, University of Hawaii, e-mail: bliaw@hawaii.edu; **S. Calabrese Barton**, Michigan State University, e-mail: scb@msu.edu; and **G. Ceder**, Massachusetts Institute of Technology, e-mail: gceder@mit.edu.

B5

Hydrogen Production, Conversion and Storage 4

High Temperature Materials Division

Sustainable economic growth and high quality of life require an abundant supply of clean and affordable energy. Heavy dependence on finite fossil fuels has recently highlighted energy and environmental concerns. Energy generated from sustainable sources has to be stored and converted in an efficient and eco-friendly way. Hydrogen has been considered to be a leading candidate as an energy carrier due to its clean, storable and transportable characteristics. Fundamental breakthroughs in hydrogen production, storage and conversion lie in large part in the design and development of new materials with superior properties and performances.

This symposium provides an international forum for the presentation and discussion of the latest developments on hydrogen production, storage, conversion and related topics. The emphasis of this symposium is on recent advances in new materials with enhanced performance. Specific topics to be covered include, but not limited to: hydrogen or syn-gas production by electrochemical and thermo-chemical routes (e.g., electrolysis, fossil fuels and biomass conversion); hydrogen storage materials and technology; proton/hydrogen transport materials and processes; oxide proton conductors; and electrochemical hydrogen conversion devices (e.g., fuel cells).

An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are obligated to submit their full text manuscript for the issue no later than June 21, 2013. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **E. Fabbri**, Paul Scherrer Institut, e-mail: emiliana.fabbri@psi.ch; **E. DiBartolomeo**, Università di Roma Tor Vergata, e-mail: dibartolomeo@uniroma2.it; **F. Chen**, University of South Carolina, e-mail: chenfa@cec.sc.edu; and **T. Norby**, University of Oslo, e-mail: truls.norby@kjemi.uio.no.

B6

Stationary and Large Scale Electrical Energy Storage 2

Energy Technology Division / Battery Division / Industrial Electrochemistry and Electrochemical Engineering Division

Large scale electrical energy storage (EES) systems have significant roles to play in the future grid modernization when more intermittent renewable energy productions, such as wind and solar, continue to penetrate today's grid systems. EES also enhances the utilization efficiency in the energy use over the grid systems and will contribute to maintaining the integrity of energy transmission and distribution systems. As the interest in the EES systems continues to grow, we call for papers that can contribute to the development of EES, particularly the large scale applications, from novel concepts to system integration and implementation. Papers that discuss approaches and challenges of various large scale storage systems, including flow batteries, to issues related to the grid integration and functionalities are welcome. Papers on improving performance and understanding of the system and of individual components and materials, including theoretical and experimental methods for their investigation are appropriate. Papers that discuss new energy storage chemistries, solvent systems, and novel designs are welcome.

A hard-cover issue of *ECS Transactions* is planned to be available "AT" the meeting. All authors accepted for presentation are obligated to submit their full text manuscript for the issue no later than February 8, 2013. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **J. Meyers**, EnerVault, e-mail: jmeyers@enervault.com; **B. Y. Liaw**, University of Hawaii, e-mail: bliaw@hawaii.edu; and **B. Savinell**, Case Western Reserve University, e-mail: rfs2@case.edu.

B7 Nanoarchitectures for Energy Storage 1 Battery Division / Energy Technology Division / Physical and Analytical Electrochemistry Division

The focus of this symposium is on nanoscale architectures that can support high-energy, high-power batteries, and other storage devices. Batteries will include the following: Li-ion, Na-ion, multivalent, Li-S, Li-air, and redox flow systems. Three-dimensional (3D) battery architectures have the advantages to achieve large areal energy capacities without sacrificing power density, and hierarchical structures that are composed of nanosized elements that grow into a full system. Structural stability and electrical connectivity are the hallmarks of these technologies. Topics of this symposium will include all types of rationally synthesized nano-objects for energy storage such as nanowires, nanotubes, nanoribbons, spheres (both hollow and solid), and other types of nanostructured and 3D electrode materials. This symposium will include modeling, new concepts, and novel types of physical and electrochemical characterization methods for nanoarchitected materials.

An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are encouraged to submit their full text manuscript for the issue no later than June 21, 2013. All manuscripts will be submitted online, and must be in either MS Word or PDF format.

Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **C. S. Johnson**, Argonne National Laboratory, e-mail: cjohnson@anl.gov; **P. Atanasov**, University of New Mexico, e-mail: plamen@unm.edu; **C. Chan**, Arizona State University, e-mail: candace.chan@asu.edu; and **T. Van Nguyen**, University of Kansas, e-mail: cptvn@ku.edu.

B8 Next Generation of Supercapacitors Energy Technology Division

Electrochemical capacitors (i.e., supercapacitors or ultracapacitors) as a class of energy storage devices have witnessed significant interest over the past few years from the academic research level to the commercial sector. This symposium seeks to capture the state-of-the art in the electrochemical capacitor field and solicits papers covering all fundamental and applied aspects including: (1.) electrochemical double-layer and/or pseudocapacitance aspects of nano-structured carbons/graphene/carbon nanotubes (CNTs)/activated carbon, etc.; (2.) materials that exhibit primarily redox pseudocapacitance, including metal oxides, metal non-oxides, and other advanced inorganic materials, and conducting polymers; (3.) mechanistic studies of the operational charge-storage processes in electrochemical capacitors; (4.) development and optimization of practical electrochemical capacitor components, including current collectors, electrodes, electrolytes, separators, and packaging; (5.) performance of new device designs (including hybrid battery-capacitor devices) and configurations using symmetric and asymmetric electrode constructions; (6.) theory and modeling as tools for performance prediction and materials design; and (7.) application tests of electrochemical capacitors in stand-alone or hybrid configurations.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **J. Long**, Naval Research Laboratory, e-mail: jeffrey.long@nrl.navy.mil; **P. Kumta**, Univ of Pittsburgh, e-mail: pkumta@pitt.edu; **A. Manivannan**, NETL, e-mail: manivana@netl.doe.gov; **N. Wu**, West Virginia University, e-mail: nick.wu@mail.wvu.edu; and **W. Zhang**, Hongkong University of Science and Technology, e-mail: keazhang@ust.hk

B9 Solar Fuels 2 Energy Technology Division / Industrial Electrochemistry and Electrochemical Engineering Division / Physical and Analytical Electrochemistry Division

This symposium will provide an international and interdisciplinary forum to present the latest research on production of fuels (e.g., hydrogen), conversion CO₂ and environmental disinfection by utilizing solar energy. Topics of interest include but not limited to: (1.) exploring novel methods for production of fuels such as hydrogen, ethanol and other fuels; (2.) conversion of renewable energy resources such as biomass to fuels; (3.) capture or conversion of CO₂ to fuels; (4.) photocatalytic disinfection and environmental remediation; (5.) synthesis and characterization of photocatalysts; (6.) exploring new solar energy materials; (7.) development of photoelectrochemical cells (PECs); (8.) construction of solar thermal panels and solar reactors; (9.) simulation and modeling of materials, devices and systems for solar energy applications; and (10.) corrosion and durability of solar energy materials.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **N. Wu**, West Virginia University, e-mail: nick.wu@mail.wvu.edu; **D. Chu**, US Army Research Laboratory, e-mail: deryn.chu@us.army.mil; **H. Dinh**, National Renewable Energy Laboratory, e-mail: huyen_dinh@nrel.gov; **P. J. Kulesza**, University of Warsaw, e-mail: pkulesza@chem.uw.edu.pl; **Jae-Joon Lee**, Konkuk University, Korea, e-mail: jjlee@kku.ac.kr; **A. Manivannan**, Department of Energy, e-mail: amanivana@netl.doe.gov; **M. Salazar Villalpando**, DOE/NETL, e-mail: maria.salazar@netl.doe.gov; **R. Subramanian**, University of Nevada, e-mail: ravisv@unr.edu; and **H. Wang**, National Renewable Energy Lab, e-mail: heli_wang@nrel.gov.

C — Biomedical Applications and Organic Electrochemistry

C1 Innovations and New Directions in Organic Electrochemistry Organic and Biological Electrochemistry Division / Physical and Analytical Electrochemistry Division

This symposium will continue the tradition of the ECS spring meeting as the principal venue for presentation of new results in organic electrochemistry, broadly defined. As such, contributions are invited describing new organic electrode reactions, environmentally benign electroorganic processes, novel solvent systems, organometallic

electrochemistry, organic electrode applications involving photochemistry, electrochemistry at surface-modified electrodes, and mechanistic organic electrochemistry.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **A. Fry**, Wesleyan, e-mail: afry@wesleyan.edu; and **R. Mantz**, U.S. Army, e-mail: robert.a.mantz@us.army.mil.

D — Corrosion, Passivation, and Anodic Films

D1 Corrosion General Session Corrosion Division

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

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **R. S. Lillard**, University of Akron, e-mail: lillard@uakron.edu.

D2 Corrosion in Nuclear Energy Systems: From Cradle to Grave Corrosion Division

The viability of nuclear power requires not only the safe operation of presently commissioned reactors but the optimization of the fuel cycle, the development of new, more efficient, reactor designs, and the safe management of nuclear wastes. One of the most important factors in all these areas is the understanding and control of a wide range of corrosion issues, many occurring under extreme exposure conditions. This symposium will focus on all corrosion issues related to nuclear power including the following: degradation processes encountered during uranium mining and refining; in-reactor corrosion in existing systems including primary and secondary circuits and reactor vessels and fuel channels, and the design and function of in-reactor sensors; the corrosion of materials for advanced reactor designs; degradation processes in fuel storage and reprocessing systems and waste tanks; and the corrosion and leaching of radioactive wastefoms and permanent disposal containers and packages. The submission of experimental, theoretical and computational papers dealing with all aspects of the area is encouraged, including those that deal with issues such as high temperatures, super-critical conditions, radiation effects and extreme timescales.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **R. S. Lillard**, University of Akron, e-mail: lillard@uakron.edu; **J. Noel**, University of Western Ontario, e-mail: jjnoel@uwo.ca; **R. Newman**, University of Toronto, e-mail: roger.newman@utoronto.ca.

dwshoesm@uwo.ca; and **S. Fujimoto**, Osaka University, e-mail: fujimoto@mat.eng.osaka-u.ac.jp.

E — Dielectrics and Semiconductor Materials, Devices, and Processing

E1 Bioelectronics, Biointerfaces, and Biomedical Applications 5 Physical and Analytical Electrochemistry Division / Electronics and Photonics Division / Organic and Biological Electrochemistry Division / Sensor Division

This symposium is intended to bring together scientists and technologists working at the forefront of chemistry, physics, biology, and materials science to focus on the critical aspects of the electrode interfaces in biomedical devices and their applications. It will provide invaluable links between those investigating and characterizing the basic chemical, physical, and biological phenomena and those developing the latest biomedical applications. Potential topics include quantum wires and quantum dots; immunosensing; molecular diagnostics; amperometric and potentiometric biosensors, development of chemically modified electrode for sensing metabolites, inhibitors, and other biological molecules, self powered sensors, amperometric sensing on a microchip, and spectroelectrochemical techniques for understanding biology.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **D. Cliffl**, Vanderbilt University, e-mail: d.cliffl@vanderbilt.edu; **Z. Aguilar**, Ocean NanoTech, e-mail: gracefuldance@yahoo.com; **J. Burgess**, Case Western Reserve University, e-mail: jdb22@case.edu; **A. Hoff**, USF, e-mail: hoffe@usf.edu; and **A. Suroviev**, Berry University, e-mail: asuroviev@berry.edu.

E2 Graphene, Ge/III-V, and Emerging Materials for Post CMOS Applications 5 Dielectric Science and Technology Division / Electronics and Photonics Division

In its fifth year of highly successful conference, the symposium will focus on science, technologies and applications related to Graphene, Ge/III-V and Emerging Materials that can be applied to enhance the performance of CMOS, nano-structures, or post-CMOS devices. This year, the symposium will also expand to all types of nano-wires for similar applications.

Special emphasis will be placed on Beyond CMOS integration schemes/technology development and on the impact of non-traditional materials such as Optical, Laser, RF and other non-conventional devices into nanoelectronics. Papers will be solicited in the following areas: (1.) graphene material properties, preparation, synthesis, and growth, including equipment, processes and mechanism of growth; (2.) metrology and characterization of graphene including defects and wrinkle characterization; (3.) graphene devices and integration to RF applications and novel device concept; (4.) graphene transport and mobility enhancement related to electronic, photonic and other transport mechanism in different devices; (5.) thermal behavior of graphene and graphene based devices including thermal transport, thermal conductivity and heat transfer management in devices and nano-structures; (6.) Ge and SiGe devices for PMOS mobility

enhancement for next generation CMOS and other devices beyond strain engineering; (7.) InGaAs, GaAs, and other compound semiconductor devices for NMOS mobility enhancement for next generation CMOS and other devices beyond strain engineering; (8.) III-V heterostructures on Si substrates; (9.) processes, equipment, and characterization of Group IV and Group III-V films including defect characterization; (10.) nano-wires for next generation device performance enhancement and modeling; (11.) simulation of properties of all devices based on Ge, III-V, nano-wires and graphene; and (12.) introduction to a “More than Moore – Beyond CMOS” integration schemes/technology.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **D. Misra**, New Jersey Institute of Technology, e-mail: dmisra@njit.edu; **S. Albin**, Norfolk State University, salbin@nsu.edu; **Z. Karim**, Aixtron, zkarim@axitron.com; **P. Srinivasan**, Texas Instruments, e-mail: psrinivasan@ti.com; **Y. Obeng**, NIST, e-mail: yaw.obeng@nist.gov; **S. DeGendt**, IMEC, e-mail: degendt@imec.be; and **C. Claeys**, IMEC, e-mail: Claeys@imec.be.

E3 Nanocrystal Embedded Dielectrics for Electronic and Photonic Devices

Dielectric Science and Technology Division /
Electronics and Photonics Division /
Sensor Division

This symposium will address the science and technology of nanocrystals – both of elemental and compound semiconductors – embedded in dielectric films and structures, with emphasis on applications in electronics and photonics. Research fields of interest are related but not necessarily limited to the following topics: (1.) Fabrication of nanocrystalline structures: deposition processes, implantation protocols, annealing strategies; (2.) Characterization of nanocrystals: optical and electrical characteristics, photo- and electroluminescence, size distributions, crystalline structure; (3.) Charge trapping characteristics of nano-particles in a dielectric medium; (4.) Device issues: contacts to n- and p-type structures, light extraction, breakdown issues; (5.) Doping for photonic applications: doping concentrations, energy transfer, co-doping, multi-layer structures; and (6.) Integration of photonic devices with existing silicon-based electronic platforms. Invited and contributed papers will discuss both the fundamental aspects underlying certain applications and the particular challenges regarding technology, fabrication processes, and reliability.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **P. Mascher**, McMaster University, e-mail: mascher@mcmaster.ca; **P. Joshi**, Oak Ridge National Laboratory, e-mail: joshipc@ornl.gov; **M. E. Overberg**, Sandia National Laboratories, e-mail: meoverb@sandia.gov; and **Y. Kuo**, Texas A&M University, e-mail: yuekuo@tamu.edu.

E4 Organic Semiconductor Materials, Devices, and Processing 4

Electronics and Photonics Division /
Dielectric Science and Technology Division

This is the fourth symposium in this series and the objective is to link processing and materials studies to devices and technological applications. The symposium will cover a wide range of topics related to broadly understood science and technology of organic/polymeric semiconductor materials, processes, devices and applications. The list of topics of interests includes, but is not limited to, the following: (1.) Chemistry of organic semiconductors and its impact on material and device characteristics; organic and polymer semiconductors; (2.) Physical phenomena underlying operation of organic/polymeric semiconductor devices; (3.) Deposition methods: PVD, solution processing, printing and others; (4.) Substrates: conductive and non-conductive, mechanically rigid and flexible; (5.) Electronic devices: TFTs; ohmic contacts, dielectric-organic semiconductor material systems, charge transport, modeling; (6.) Photonic devices: light emitting diodes and solar cells; (7.) Display and lighting applications; (8.) Patterning of organic semiconductors to create desired device geometries; (9.) Large area organic semiconductor electronics and photonics; roll-to-roll processing; and (10.) Reliability, stability, reproducibility of device characteristics.

To be considered for inclusion into the symposium program, a one-page abstract must be submitted electronically to ECS by the posted deadline. A copy of the abstract must also be submitted to the lead symposium organizer Prof. Jamal Deen, and be accompanied by a cover letter with full contact details of the presenting author. This abstract should clearly indicate the purpose of the work, the approach, the manner and the degree to which the work advances the field, and specific results and their significance. All submitted abstracts will be peer-reviewed. Instructions for preparing ECS meeting abstract and other relevant information are available on the ECS website.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **J. M. Deen**, McMaster University, e-mail: jamal@mcmaster.ca; **D. Gundlach**, National Institute of Standards and Technology, e-mail: David.Gundlach@NIST.gov; **B. Iniguez**, Univ of Rovira I Virgili, e-mail: benjamin.iniguez@urv.cat; and **H. Klauk**, Max Planck Institute for Solid State Research, e-mail: H.Klauk@fkf.mpg.de.

E5 Silicon Compatible Materials, Processes, and Technologies for Advanced Integrated Circuits and Emerging Applications 3

Electronics and Photonics Division /
Dielectric Science and Technology Division

This symposium will focus on emerging materials, processes and technologies that can be applied to large area silicon wafers either to enhance the performance of analog and digital integrated circuits or to enable revolutionary device structures with entirely new functionalities. Topics of particular interest include:

(1.) Materials and processes needed to realize advanced transistor structures with high mobility channels based on either strain engineering or emerging high-mobility channel materials such as strained Si, compound semiconductors and graphene that can be synthesized on large area silicon wafers by epitaxial or other innovative methods. Papers focusing on synthesis of the new channel materials as well as processes that are essential for the realization of successful device structures are of particular interest. Examples

include high performance gate stacks and low-resistivity junctions and contacts formed on new, silicon compatible materials. The symposium also invites abstracts on new materials and processes for 3-D (TSV) integration.

(2.) Synthesis of nano-structures including wires, pores and membranes of silicon compatible materials as well as novel MEMS/NEMS structures and their integration with the mainstream silicon integrated circuit technology. Abstracts on applications of these new devices in all relevant fields including electronics, optics and biology are welcome.

(3.) New technologies and equipment for synthesis and characterization of the materials and processes listed above.

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E6

Advanced Semiconductor-on-Insulator Technology and Related Physics 16

Electronics and Photonics Division

This historical symposium is renamed and will restart in 2013. The symposium covers recent significant advances in SOI technologies, SOI-based nanoelectronics and innovative applications including scientific interests. It will be of interest to materials and device scientists, as well as to process and applications oriented engineers and scientists. Theoretical and experimental contributions are solicited.

Specific topics will include, but are not limited to: (1.) synthesis of advanced semiconductor-on-insulator (SOI) wafers and materials evaluation, including strained layers on insulator and SOI-like heterostructures formed by bonding, wafer screening, electrical properties, defect and stress identification, interface quality, properties of ultrathin films and buried oxides, tools for quality control; (2.) SOI MOSFETs, high performance CMOS and bipolar devices: process integration, low power/voltage and RF circuits, memories, high power/voltage devices, high/low temperature devices; and (3.) innovative devices: ultra-thin-BOX FD-SOI MOSFETs, FinFETs and various multiple-gate devices, quantum and tunneling transistors, photonic SOI devices, optical interconnects, various intelligent sensors and MEMS/NEMS, etc. Each session will be introduced by keynote speakers and a special session for students is planned.

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E7

Symposium on Processes at the Semiconductor Solution Interface 5

Electronics and Photonics Division / Energy Technology Division / Physical and Analytical Electrochemistry Division

This symposium will address the most recent developments in processes at the semiconductor/solution interface including etching, oxidation, passivation, film growth, electrochemical and photoelectrochemical processes, electrochemical surface science, electroluminescence, photoluminescence, surface texturing, and compound semiconductor electrodeposition, for photovoltaics, energy conversion and related topics. It will include both invited and contributed papers on both fundamental and applied topics of both bulk and nanoscale materials.

The following areas are of particular interest: (1.) Chemical, electrochemical and photoelectrochemical etching and surface texturing of III-V and II-VI semiconductors; (2.) Surface film growth, multilayer deposition and surface passivation; (3.) Porous semiconductor formation; (4.) Electroanalytical measurements on both elemental and compound semiconductors including silicon, germanium, both bulk and epitaxial II-VI, III-V, IV-IV and organic materials in aqueous and non-aqueous electrolytes; (5.) Electronic and optical processes at the semiconductor/solution interface; (6.) Electroluminescence at the semiconductor/solution interface; (7.) Photoluminescence spectroscopy including in situ potential-dependant measurements; (8.) Electrochemical impedance spectroscopy and investigations of flat-band potential; (9.) Combined electrochemical and surface analytical and spectroscopic measurements; (10.) Microscopic and surface analytical measurements on chemically and electrochemically modified semiconductor surfaces; (11.) Chemical, electrochemical and photoelectrochemical techniques of device processing including etching, passivation, oxide growth and metallization; (12.) Electrochemical techniques of semiconductor characterization. (13.) Nanoscale electrochemical devices; and (14.) Electrochemical analytical techniques for semiconductor analysis and processing.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **C. O'Dwyer**, University of Limerick, e-mail: colm.odwyer@ul.ie; **D. N. Buckley**, University of Limerick, e-mail: noel.buckley@ul.ie; **A. Etcheberry**, IREM, Institut Lavoisier, e-mail: etcheber@chimie.uvsq.fr; **A. Hillier**, Iowa State University, e-mail: hillier@iastate.edu; and **M. Salazar Villalpando**, NETL, e-mail: maria.salazar@netl.doe.gov.

E8

Thermal and Plasma CVD of Nanostructures and Their Applications

Dielectric Science and Technology Division / High Temperature Materials Division/ Sensor

CVD, plasma enhanced CVD, and various related deposition techniques have enjoyed success in microelectronics industry. Based on their success and experience, these techniques have recently found their way into preparation of nanostructured materials. Some examples include growth of inorganic nanowires such as silicon, germanium, various oxides (zinc, indium and tin oxides), nitrides (GaN), etc. Vapor-liquid-solid (VLS) and related techniques, template assisted techniques (CVD, electrodeposition), and planar deposition are some of the popular approaches in nanowire/nanotube growth for applications into electronics, sensors, and thermoelectrics. Carbon nanotube preparation is now widely done using CVD and PECVD for patterned growth for applications in nanoelectronics, nanodevices, sensors, and field emission. A variety of other nanostructured

materials such as nanopowders and nanocrystals are also prepared by these versatile techniques. The topics for this symposium include, but not limited to the above mentioned materials and applications. Papers focusing on growth mechanisms, modeling, process diagnostics, materials characterization, and advances in applications are strongly encouraged.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Sunkara**, University of Louisville, e-mail: Mahendra@louisville.edu; **J. Li**, NASA Ames Research Center, e-mail: Jing.Li-1@nasa.gov; **M. Meyyappan**, NASA Ames Research Center, e-mail: m.meyyappan@nasa.gov; and **M. Sankaran**, Case Western Reserve University, e-mail: mohan@case.edu.

E9 Wide-Bandgap Semiconductor Materials and Devices 14

Electronics and Photonics Division / Dielectric Science and Technology Division / Sensor Division

This symposium will focus on issues pertinent to the development of wide-bandgap semiconductor materials and devices. All wide-bandgap semiconductor materials are of interest, including III-nitrides, II-oxides, SiC, diamond, II-VI, and emerging materials. The following technical areas are of particular interest: (1.) emitters: light emitting diodes, light emitting transistors, laser diodes, displays, and devices for solid state lighting; (2.) detectors: including solar cells and avalanche photodiodes; (3.) high temperature, high power, and high frequency electronics; (4.) sensor applications; (5.) substrates for wide bandgap material epitaxy; (6.) material characterization: synthesis, defect structure and luminescence; (7.) nanoscale wide band gap materials; (8.) transparent conducting oxide films and devices, including ZnO and IGZO thin film transistors. The goal of this symposium is to bring together the wide-bandgap crystal growth, material processing, circuit design, and device application communities to review current issues and present state of the art developments in wide-bandgap semiconductor technology. This symposium will consist of invited and contributed papers and posters.

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F — Electrochemical/Chemical Deposition and Etching

F1 Green Electrodeposition 3 Electrodeposition Division

Chemical and electrochemical technologies for the production of films and coatings have been developed in the past mainly in pursuit of good performance, long-term reliability and limited cost. With the growing importance of environmental, energy and sustainability issues however, it becomes paramount that the viability of such products and processes be assessed on a more comprehensive basis, including not only their environmental footprint, but also their energy intensity and ecological impact. The symposium will provide a forum to discuss the current environmental impact of electrodeposition processes as well as novel approaches and alternatives. Contributions are sought, but not limited to, the following topics: (1.) Novel, low impact processes and novel chemistries; (2.) Alternative materials and products; (3.) Monitoring of electrochemical processes and new electrochemical sensors; (4.) Electrochemical recovery for recycling of materials, products and waste chemicals; (5.) Toward zero emission, entirely sustainable electrochemical processes

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F2 Novel Design and Electrodeposition Modalities Electrodeposition Division

Experimental and theoretical aspects of novel electrodeposition processes, cell design and deposition methodologies are addressed. Papers of interest include, but are not limited to: pulse plating to affect deposit composition and morphology, current distribution of electrodes, analysis of high-throughput combinatorial data and materials informatics, impedance spectroscopy, and precision synthesis of materials by control of the process environment. Novel alloys, composites, biomaterials, thin film and earth abundant PV materials, and porous electrodes materials pertaining to novel design and electrodeposition modalities are welcome.

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G — Electrochemical Synthesis and Engineering

G1 Advances in Low Temperature Electrolyzer and Fuel Cell Technology: In Honor of Anthony B. (Tony) LaConti

Industrial Electrochemistry and Electrochemical Engineering Division / Energy Technology Division

This symposium is being organized to honor the memory of Tony LaConti. His passing in 2011 was a great loss to the field of electrochemical engineering, and all those who were in some way touched by his strong work ethic, his devotion to his coworkers, and his community. Dr. LaConti was a longtime member of the Electrochemical Society, and published numerous papers dealing with proton exchange membranes and their use in fuel cells and electrolyzers. He was an inventor on 57 U.S. patents dealing with multiple aspects of electrochemistry, ranging from gas generators and sensors to fuel cells.

Early in his career at General Electric, Tony was instrumental in the development of fuel cells for the Gemini and Apollo programs and early polymer electrolyte membrane electrolyzers. Tony also worked on extending the use of PEMs to chlor-alkali electrolysis, water purification and artificial kidneys. He twice received (1974 and 1979) the Aerospace Instrument Department's Engineer of the Year Award. He followed the GE electrochemical group when it was acquired by United Technologies, where he was the Engineering Manager for Hamilton-Standard Electro-Chem Products. While there he continued his work in fuel cells and electrolyzers and their application in aeronautic and sub-sea applications, receiving awards for business development (1985) and inventorship (1986).

Dr. LaConti joined Giner, Inc. in 1986 and subsequently applied his PEM expertise to sensors, capacitors, and direct methanol fuel cells while continuing his contributions to hydrogen fuel cells and water electrolyzers. In the process he co-authored numerous reports, papers, and chapters in electrochemical texts. Friends, colleagues, scientists and engineers are invited to submit abstracts to topics in which Dr. LaConti contributed. Papers related to low temperature fuel cells and electrolyzers (catalysts, membranes) can also be submitted under this symposium.

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G2 Educational Needs and Approaches for Electrochemistry and Electrochemical Engineering

Industrial Electrochemistry and Electrochemical Engineering Division / Battery Division / Physical and Analytical Electrochemistry Division / Electrodeposition Division

This symposium focuses on the educational aspects of electrochemistry and electrochemical engineering. Topics including development of lecture courses, laboratory courses, classroom

demonstrations, curriculum, assessment methods, and web-based instructional modules are welcomed. Educational approaches could range from quantum to molecular-level aspects to more traditional discussions of thermodynamics, kinetics, and transport phenomena. Discussions could extend to how these phenomena influence the design and operation of electrochemical systems. Systems can include, but are not limited to, batteries and fuel cells, photovoltaics, energy conversion and storage, electrodeposition, corrosion, sensors, and organic and biological electrochemistry.

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G3 Electrochemical Engineering for the 21st Century: 3

Industrial Electrochemistry and Electrochemical Engineering Division

Future trends in electrochemical engineering will be influenced by the need to control processes and insure quality at the molecular scale. Transfer of molecular-scale understanding and discoveries into new and improved products and processes requires integration of system behavior across a range of length and time-scales. New engineering approaches are needed that couple traditional current- and potential-distribution approaches to molecular-scale events in order to accurately describe and design systems to meet the needs of the next century. For example, such an approach will open the way to exploiting self-assembly during processing.

This symposium focuses on the role of molecularly coupled electrochemical engineering in addressing future technology challenges of the 21st century. Topics include: (1.) experimental and theoretical methods for understanding and describing behavior in electrochemical systems at the molecular level; (2.) new engineering methods and simulation algorithms with improved computational efficiency and quantification of uncertainty that enable coupling to molecular-scale processes for the design, control and optimization of entire, realistic systems, including those where stochastic events influence quality; and (3.) use of molecular understanding, design and/or control to address 21st century electrochemical engineering applications such as NEMS, MEMS, and electronic device fabrication; systems and materials for stationary power (from photovoltaic systems and fuel cells to energy storage devices and hydrogen generation); power systems for transportation; electrochemically enabled devices, systems, and products for medical technology; and corrosion systems, among many others. Both fundamental and applied papers that address the symposium topics are encouraged.

The symposium may also include a few invited speakers who will give historical and future perspectives of the underlying science in various fields and its anticipated implementation in technology. For this meeting, the multi-scale modeling symposium offered in spring meetings has been merged with this symposium. Papers related to multi-scale modeling should therefore be submitted under this symposium.

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G4

Tutorials in Electrochemical Technology: Impedance Spectroscopy

Industrial Electrochemistry and Electrochemical Engineering Division

This symposium provides a forum for tutorial presentations concerning all aspects of electrochemical impedance spectroscopy. Contributions related to both fundamentals and applications are encouraged. Papers are solicited as well in the development of novel experimental methods, mathematical models, and methods for interpretation of data. The tutorials should be useful for students and for professionals seeking to diversify their background or break into new technological areas. The symposium will consist of both invited and contributed papers.

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H — Fullerenes, Nanotubes, and Carbon Nanotubes

H1

Tutorials in Nanotechnology

Fullerenes, Nanotubes, and Carbon Nanostructures Division / New Technology Subcommittee

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

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

Areas of interest include: heterogeneous functional materials for energy systems; semiconductor and metal nanoparticles and metal/semiconductor nanocomposites; size quantization effects in semiconductor nanoparticles; fundamentals of nucleation and growth of nanoparticles/nanowires/nanotubes; novel synthesis methods of nanostructured materials; processing of nanostructured materials; advanced characterization techniques for nanostructured materials; modeling and tailoring of nanostructured materials; nanocomposites and interfacial phenomena; photo-induced charge separation and interfacial charge transfer; photoelectrochemistry of nanostructured films; photo-catalysis and environmental applications; nano-ionics; nanostructured catalysts for fuel cells, electrolyzers, batteries and supercapacitors; nanostructured sensor surfaces; and biological applications of nanomaterials.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **F. D'Souza**, University of North Texas, e-mail: Francis.DSouza@UNT.edu; **D. M. Guldi**, Friedrich-Alexander-Universität, e-mail: dirk.guldi@chemie.uni-erlangen.de; and **R. B. Weisman**, Rice University, e-mail: weisman@rice.edu.

H2

Fullerenes—Chemical Functionalization, Electron Transfer, and Theory

Fullerenes, Nanotubes, and Carbon Nanostructures Division

Papers are invited in the following areas of fullerene science: electrochemistry, photochemistry, electron transfer chemistry, photoelectrochemistry, photovoltaic applications, catalysis, sensor studies, chemical functionalization of fullerenes and related nanocarbons (nanotubes, organofullerenes, electroactive fullerenes, supramolecular fullerenes, organometallic fullerenes, endohedral fullerenes, fullerene films, and composites), and theoretical studies.

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H3

Endofullerenes and Metallofullerenes

Fullerenes, Nanotubes, and Carbon Nanostructures Division

Original papers are solicited on all aspects of endofullerenes such as endohedral metallofullerenes and endohedral rare-gas and other types of fullerenes. Papers on carbon nanocapsules and metal encapsulates are also welcome. The topics of this symposium include synthesis, characterization, and properties of different types of endofullerenes and carbon nanocapsules.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **T. Akasaka**, University of Tsukuba, e-mail: akasaka@tara.tsukuba.ac.jp; **A. Balch**, University of California, e-mail: albalch@ucdavis.edu; and **L. Echegoyen**, University of Texas, El Paso, e-mail: echegoyen@utep.edu.

H4 Carbon Nanotubes—From Fundamental Processes to Devices

Fullerenes, Nanotubes, and Carbon Nanostructures Division

This symposium is focused on fundamental properties, processes, and applications involving the physics, chemistry, and materials science of carbon nanotubes and closely related materials. Topics include but are not limited to: methods for sample preparation and characterization; mechanical, thermal, optical, and electronic properties; chemical and electrochemical behavior; novel applications in the areas of electronic devices, sensors, materials development; and theoretical studies.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. Doorn**, Los Alamos National Lab, e-mail: skdoorn@lanl.gov; **Y. Gogotsi**, Drexel University, e-mail: gogotsi@drexel.edu; **R. Martel**, University of Montreal, e-mail: r.martel@umontreal.ca; **S. V. Rotkin**, Lehigh University, e-mail: rotkin@lehigh.edu; **R. B. Weisman**, Rice University, e-mail: weisman@rice.edu; and **M. Zheng**, National Institute of Standards and Technology, e-mail: ming.zheng@nist.gov.

H5 Fundamentals of Graphene Related Structures

Fullerenes, Nanotubes, and Carbon Nanostructures Division

The symposium focuses on the synthesis, functionalization, characterization, and physical and chemical properties of graphene and graphene-based 2D nanostructures. Papers that describe optical, electrical, and electrochemical properties and applications of these carbon nanostructures and composites are welcome.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **H. Grebel**, New Jersey Institute of Technology, e-mail: grebel@njit.edu; **R. Haddon**, UC Riverside, haddon@ucr.edu; **L. Huang**, Notre Dame Radiation Laboratory, e-mail: lhuang2@nd.edu; and **S. V. Rotkin**, Lehigh University, e-mail: rotkin@lehigh.edu.

H6 Focus Session: Carbon Nanostructures in Energy Applications and Energy Storage

Fullerenes, Nanotubes, and Carbon Nanostructures Division / Battery Division

The symposium will focus on the use of graphene, carbon nanotubes, and fullerenes in composites with semiconductors/oxides/metals for application in photovoltaics, photocatalysis, solar fuel production, Li-ion storage batteries, etc. Papers that deal with synthetic approaches, mechanistic insights, spectroscopic studies and device performance will be considered.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **J. Blackburn**, NREL, e-mail: jeffrey.blackburn@

nrel.gov; **F. D’Souza**, University of North Texas, e-mail: Francis.DSouza@UNT.edu; **D. M. Guldi**, Friedrich-Alexander-Universität, e-mail: dirk.guldi@chemie.uni-erlangen.de; and **R. Martel**, University of Montreal, e-mail: r.martel@umontreal.ca.

H7 Carbon Nanostructures in Medicine and Biology

Fullerenes, Nanotubes, and Carbon Nanostructures Division

Original papers are solicited on all aspects of pharmaceutical, biological, biotechnological, and medical applications of fullerenes, metallofullerenes, carbon nanotubes, and graphene.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **Z. Aguilar**, Ocean NanoTech., LLC, e-mail: zapaguilar@yahoo.com; **T. Da Ros**, Università di Trieste, e-mail: daros@univ.trieste.it; **H. Dorn**, Virginia Tech Carilion Research Institute, e-mail: hdorn@vt.edu; **A. Simonian**, Auburn University, e-mail: als@eng.auburn.edu; and **L. Wilson**, Rice University, e-mail: durango@ruf.rice.edu.

H8 Porphyrin and Supramolecular Assemblies

Fullerenes, Nanotubes, and Carbon Nanostructures Division

This symposium will highlight recent advances in porphyrin chemistry. We intend to cover a wide range of topics in order to generate discussions between interdisciplinary participants and favor the exchange of new ideas. We therefore solicit high quality contributions in areas ranging from the synthesis of challenging porphyrinic devices to the characterization of electrochemical and physicochemical behavior of new porphyrinic materials. Submissions are encouraged on the following topics: (1.) new challenging multiporphyrinic devices; (2.) electronic properties of porphyrinic arrays; (3.) photoinduced processes in molecular and supra-molecular porphyrinic assemblies; and (4.) novel porphyrin-modified electrodes.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **K. Kadish**, University of Houston, e-mail: kkadish@uh.edu; **R. Paolesse**, University of Rome Tor Vergata, e-mail: Roberto.paolesse@uniroma2.it; and **N. Soladie**, LCC-CNRS, deChimie de Coordination-G2SP, solladie@lcc-toulouse.fr.

H9 Nanostructures for Energy Conversion

Fullerenes, Nanotubes, and Carbon Nanostructures Division / Energy Technology Division

Metal and semiconductor nanoparticles play important roles in fuel cells, solar energy conversion, catalysis and hydrogen production. Recent advances in the area of nanostructured materials have led to new understanding of the catalytic and photoelectrochemical properties of these nanostructures. Optically functional nanostructures, which can collect and localize photon energy into an ultra-small space, can efficiently excite molecules using an extremely low number of photons. Papers are invited in the following areas: synthesis and characterization of metal nanoparticles and nanostructures; functionalization with chromophores, strong photon-molecule coupling fields for chemical reactions, bimetallic particle,

and semiconductor metal composites; size and shape dependent catalytic properties; hydrogen evolution reactions; photochemical solar cells; and photocatalysis and electron transfer processes that are relevant to energy conversions.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **H. Imahori**, Kyoto University, e-mail: imahori@sci.kyoto.u.ac.jp; **P. V. Kamat**, University of Notre Dame, e-mail: pkamat@nd.edu; and **K. Murakoshi**, Hokkaido University, e-mail: kei@sci.hokudai.ac.jp.

I — Physical and Analytical Electrochemistry

11 Climate Change 4 Physical and Analytical Electrochemistry Division / Energy Technology Division

This symposium targets electrochemical and solid-state research that leads to a better understanding of climate change effects and technologies to mitigate them. The symposium seeks to bring together scientists and engineers from different perspectives to share their research results, concerns, arguments, and solutions regarding this pressing problem. Presentations are solicited that describe relevant research advances in chemical analysis, energy technology, and environmental remediation. Topics of interest include chemical sensing in the environment (e.g. atmosphere, water, or earth), energy scavenging, conversion and storage, fuel and biofuel cells, electrocatalysis, solar energy conversion, electrochemical and photoelectrochemical conversion of carbon dioxide and other greenhouse gases, and related topics. Both experimental and theoretical studies are welcomed.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. Minteer**, University of Utah, e-mail: minteer@chem.utah.edu; and **A. Herring**, Colorado School of Mines, e-mail: aherring@mines.edu.

12 Computational Chemistry Physical and Analytical Electrochemistry Division

The goal of this symposium is to bring together scientists working in diverse areas of computational electrochemistry, in order to stimulate their awareness of common problems and group interests, facilitate exchange of ideas and opinions, and enable global, unifying views on this emerging interdisciplinary branch of electrochemistry and computational science.

The symposium will be devoted to all aspects of computer and computational method uses in electrochemistry, including (but not necessarily limited to): quantum chemical and molecular simulations in electrochemistry (*ab initio*, Monte-Carlo, molecular dynamics, etc.); digital simulations of electrochemical transport and kinetic/electroanalytical problems (continuum modeling, including PDE/ODE/DAE solving); multi-physics and multi-scale simulations in electrochemistry; computer-aided data analysis in electrochemical kinetics and electroanalysis; engineering simulations and other

computations relevant to electrochemical engineering; software, problem-solving environments, expert systems, databases, web-based programs, grid applications, etc. for electrochemistry.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **S. Paddison**, University of Tennessee, Knoxville, e-mail: spaddison@utk.edu.

13 Ethanol Oxidation Physical and Analytical Electrochemistry Division / Energy Technology Division

This symposium will cover all topics associated with ethanol electrocatalysis, including both experimental and theoretical investigations. The meeting aims at providing an interdisciplinary forum for discussion of new results and major achievements in the science and technology of electrocatalytic oxidation of ethanol both in acid and alkaline media. Typical session topics will cover fundamental and applied aspects of fabrication and characterization of novel electrocatalytic systems including nanostructured materials, experimental and theoretical studies of their properties, mechanisms and dynamics of charge propagation, reactivity (toward oxidation of alcohols) as well as applications to fuel cells.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **P. Kulesza**, University of Warsaw, pkulesza@chem.uw.edu.pl; and **S. Mukerjee**, Northeastern University, s.mukerjee@neu.edu.

14 Grahame Award Symposium and Physical and Analytical Electrochemistry General Session Physical and Analytical Electrochemistry Division

In honor of the Grahame Award recipient, Richard L. McCreery, papers associated with his research are invited to present. In addition, for the general session, papers concerning any aspect of physical electrochemistry not covered by topic areas of other specialized symposia at this meeting are welcome. Contributed papers will be programmed in some related order, depending on the titles and contents of the submitted abstracts.

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15 Ion Conduction in Polymers Physical and Analytical Electrochemistry Division / Battery Division / Energy Technology Division

Polymer electrolytes, either dry or swollen, are at the center of a wide range of electrochemical systems. Recent interest in extending the application range of such systems has led to the need for a renewed focus on ion conduction processes and the influence of the

surrounding medium on those processes. This symposium will focus on fundamental aspects of ion conduction processes in polymer-based electrolytes for electrochemical devices such as batteries, fuel cells, sensors and other systems. In addition to proton and lithium ion conductors, these include anion conductors, conduction involving multivalent species, ionic liquid-based membranes and so on.

Topics of interest include (1.) thermodynamics of ion conduction materials, including elucidation of interaction energetics between components; (2.) new compositions of electrolytes and separators, including new polymers, new fixed site compositions, new composites, new additives to promote conduction; (3.) strategies to control the conduction process and coupled transport processes, for example to mitigate cross-over or osmotic flow effects; (4.) characterization of materials leading to enhanced insight into transport processes; (5.) computational or theoretical characterization of ion conduction processes and processes underlying conduction; and (6.) polymer physics applied to understanding these processes.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **T. Zawodzinski**, University of Tennessee-Knoxville, e-mail: tzawodzi@utk.edu; **A. Herring**, Colorado School of Mines, e-mail: aherring@mines.edu; and **G. Liu**, Lawrence Berkeley National Laboratory, e-mail: gliu@lbl.gov.

16

State of the Art Tutorial on Membranes and MEAs for Low Temperature Fuel Cells

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

This symposium will feature invited talks on membranes. Topics of interest include: (1.) new membranes; (2.) properties of state of the art membranes; (3.) membranes for alkaline FCs; (4.) nanostructured and nanocomposite materials; (5.) new characterization methods; and (6.) computational chemistry and modeling of transport processes.

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

J1

Environmental, Water Quality and Safety Monitoring

Sensor Division / Physical and Analytical
Electrochemistry Division

Sensors and sensor systems are being used increasingly in vast range of applications to assure environmental quality, as well as human health and safety. There is increased public awareness of the environmental effects of various pollutants emitted by a range of power, transportation, and industrial sources. Water quality monitoring for human consumption is a fundamental public health concern that is complicated by increasing public use, a diversity of application environments, and new sources of naturally and human generated contaminants. Assuring human health and safety in the complex environment of the modern world is in general a broad field including the ability to detect low levels of toxins and impurities, maintain safe handling of fuel and energy sources, maintain air quality and limit environmental impact, and in general achieve better situational awareness of the local and global environment. Improvements to currently available sensor technology are critical in improving capabilities in these areas.

This symposium will provide a forum for the discussion of the latest advancements in chemical sensor research and development. The primary focus will be on sensor and sensor systems used in environmental, water quality, and safety monitoring applications. Researchers from industry, academia, and national laboratories that work in the field of chemical sensors are invited to participate. Papers on all sensing mechanisms (e.g. electrochemical, resistive/semiconductive, acoustic, optical, gravimetric, and thermal) that address novel materials, synthesis, device configuration, evaluation techniques, and system design are welcome.

Papers are solicited, but not limited to the following topics of interest: (1.) Sensors for the monitoring of pollutants, automotive and jet engine emissions, as well as fuel and fuel cell handling with the measurement of species such as hydrogen, oxygen nitrogen oxides, sulfur oxides, carbon dioxide, and hydrocarbons; (2.) Sensors for water safety monitoring including the measurement of salinity, pH, nutrients, and a range of water contaminants; (3.) Sensors for measuring the environment and safety conditions including the measurement of toxins and trace contaminants, as well as the overall quality and safety of an environment; (4.) Novel processing methods used in the manufacture of electrochemical, resistive/semiconductive, optical, thermal, and acoustic-based sensors for these applications; (5.) The development and analysis of sensor arrays for the simultaneous detection of multiple analytes; and (6.) Biosensing approaches to monitoring toxic organisms.

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J2 Nano/Bio Sensors

Sensor Division / Physical and Analytical
Electrochemistry Division

This symposium will address all aspects of Nano/Bio Sensors using nanomaterials as well as other materials. Nanomaterials have structural features and properties in between those of single atoms/molecules and continuous bulk materials. Nanomaterials have at least one dimension in the nanometer range ($1 \text{ nm} = 1 \times 10^{-9} \text{ m}$). The nanoscale dimensions of nanomaterials bring optical, electronic, magnetic, catalytic and other properties that are distinct from those of atoms/molecules or bulk materials. In order to exploit the special properties that arise due to the nanoscale dimensions, researchers must control and manipulate the size, shape, and surface functional groups of nanomaterials and structure them into periodically ordered assemblies to create new products, devices and technologies or improve existing ones. The art of controlling/manipulating the properties and utilizing these nanomaterials for the purpose of building microscopic machinery is termed as nanotechnology.

Papers are solicited in nanostructure technology that has opened up a new perspective for the development of improved bio sensors. These sensors are employed in the areas of medicine, food, agriculture, industry, and environmental monitoring. These technological innovations have improved the sensitivity, accuracy, and flexibility for the analysis of chemical and biochemical compounds. Moreover, the recent progress in micro and nanotechnology allows a cost effective production of miniaturized devices in various types of materials. Progress in polymer micro technology providing the opportunity of using disposable devices in various fields of application is also solicited. As a result, life sciences research and development methods are becoming faster, more automated, and less subjective or error prone. Furthermore, nano/biosensors that are used as novel tools for the analysis of genetic structures and their influence on cellular functions that allows the entire focus of medicine to shift from diagnosis and treatment to identification and prevention are amongst the current hot topics in sensors. These technologies may also augment drug discovery with diagnostics that could eventually allow widespread production of individually tailored patient-specific treatments and therapies.

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J3 Sensors, Actuators and Microsystems

General Session

Sensor Division

This symposium addresses all aspects of sensor, actuator and microsystems research and development. The inclusion of sensors and actuators into a range of application environments has been significantly increasing in order to provide improved system capabilities such as increased performance, decreased environmental impact, or higher efficiency. Sensors and actuators are often integrated into smart microsystems: microfabricated sensors and/or actuators combined with electronics which enable, for example, signal conditioning and data processing. The need for multifunctional, smart technologies, which depend on sensors, actuators and electronics is expected to increase in coming years as further demands and expectations are placed on systems and devices. This general session welcomes papers on all aspects of sensors,

actuators and microsystems not covered in other sessions. Both basic and applied aspects of sensor R&D are of interest in this symposium.

This symposium intends to bring together a range of interdisciplinary topics and covers all materials aspects of sensors, actuators and microsystems. Primary emphasis will be placed upon applied aspects of the materials, synthesis, evaluation and development strategies of novel materials/device configurations for sensing and actuating functions as well as integrated microsystems. High temperature and low temperature applications will be discussed.

Papers are solicited in, but not limited to, the following areas: (1.) physics and chemistry of sensor and actuator materials, fabrication and characterization of novel compositions; (2.) novel routes for the synthesis of materials with grain (pore) size control and distributions; (3.) novel sensor and actuator concepts, design, modeling and verification; (4.) sensing systems that include sampling systems and actuators, for example sensor arrays, electronic noses and tongues; (5.) physical, chemical and biological sensors and actuators, such as gas and liquid phase sensors, humidity, ion or molecular sensors, their system integration and actuating functions; (6.) optical, RF and wireless sensors and actuators, such as fiber optic sensors, microwave sensors, and optical and wireless integrations; (7.) emerging technologies and applications including sensors based on nanotechnology; and (8.) novel techniques to expand and ensure sensor stability and reliability.

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