

**Call for Papers**

**Vienna**

**216<sup>th</sup> ECS Meeting**

◆ **Vienna, Austria** ◆  
**October 4-9, 2009**

**Abstract Deadline: April 24, 2009**  
**EUROCVD ONLY: April 3, 2009**



## Abstracts are due no later than April 24, 2009.

**NOTE:** Some abstracts are due earlier than April 24, 2009. Please carefully check the symposium listing for any alternate abstract submission deadlines. For complete details on abstract submission and symposium topics, please see [www.electrochem.org](http://www.electrochem.org).

## General Information

The 216th ECS Meeting will be held October 4-9, 2009. 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

Submit one original meeting abstract electronically via [www.electrochem.org](http://www.electrochem.org), no later than **April 24, 2009**. Faxed abstracts, late abstracts, and abstracts more than one page in length will not be accepted. In June 2009, all presenting authors will receive an e-mail from the ECS headquarters office notifying them of the date and time of their presentation. Only authors with a non-U.S. address 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 preformatted two column template located at: [http://www.electrochem.org/meetings/assets/abs\\_template.doc](http://www.electrochem.org/meetings/assets/abs_template.doc). Programming for this meeting will occur in May and June of 2009, with some papers scheduled for poster presentations. Check the ECS website for further program details.

## Paper Presentation

All authors selected for either oral or poster presentations will be notified in June of 2009. Oral presentations must be in English. Only LCD projectors will be provided for oral presentations. **Presenting authors will be required to bring their own laptops to the meeting.** We strongly suggest that presenting authors verify laptop/projector compatibility in the speaker ready room prior to their presentation at the meeting. Speakers requiring additional equipment must make written request to the ECS headquarters office at least one month prior to the meeting and appropriate arrangements will be worked out, subject to availability, and at the expense of the author. Poster presentations should be displayed in English, on a board approximately 4 feet high by 8 feet wide (1.22 meters high by 2.45 meters wide), corresponding to the abstract number and day of presentation in the final program.

## Manuscript Publication

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

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

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

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

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

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

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

## Financial Assistance

Financial assistance is very limited and generally governed by the symposium organizers. Individuals may inquire directly to the symposium organizers of the symposium in which they are presenting their paper to see if funding is available. Individuals requiring an official letter of invitation should write to the ECS headquarters office; such letters will not imply any financial responsibility of ECS. Students seeking financial assistance should consider awarded travel grants (see page 94 of this issue of *Interface*).

## Hotel Reservations

Several hotel options will be available on the ECS website for the 216th ECS Meeting. Special rates will be reserved at these select hotels for participants attending this meeting. The reservation deadline is September 4, 2009. Please refer to ECS website for rates and reservations.

## Meeting Registration

All participants, including authors and invited speakers of the 216<sup>th</sup> Meeting, are required to pay the appropriate registration fees. Hotel and meeting registration materials will be distributed in July of 2009 and will also be available on the ECS website ([www.electrochem.org](http://www.electrochem.org)). The deadline for advance registration is **September 4, 2009**.

## Short Courses

A number of short courses will be offered on Sunday, May 24, 2009, from 9:00 AM-4:30 PM. Short Courses require advance registration and may be cancelled if enrollments are too low. The following Short Courses are planned for the meeting: Basic Impedance Spectroscopy (M. Orazem), Basics of Cleaning Processing for Integrated Circuit Manufacturing (K. Reinhardt, J. Butterbaugh, and R. Small), PEM Fuel Cells (E. Stuve and H. Gasteiger), Fundamentals of Solid-State Devices (1/2 day, T. Ning), Operation and Applications of Electrochemical Capacitors (J. Miller), and Lithium Ion Battery Materials (instructor TBA). Please check the ECS website for the final list of offerings.

## Technical Exhibit

The 216th ECS Meeting will also include a Technical Exhibit, featuring presentations and displays by over 30 manufacturers of instruments, materials, systems, publications, and software of interest to meeting attendees. Full exhibit booths manned by company representatives cost \$1,900 and include one free meeting registration. Literature display tables (unmanned by company representatives; no meeting registration included) will also be available for \$900. Parties interested in exhibiting should contact [sponsorship@electrochem.org](mailto:sponsorship@electrochem.org) at the ECS headquarters office for more information. Coffee breaks are scheduled each day in the exhibit hall along with evening poster sessions to increase traffic.

## Sponsorship Opportunities

ECS biannual meetings are wonderful chances to market your company through sponsorship. Sponsors will be recognized by level in *Interface*, the Meeting Program, the Exhibit Guide, on registrant bags, and on the ECS website.

The Levels are: Platinum: \$5,000+, Gold: \$2,500+, Silver: \$1,000+, and Bronze: \$1,000.

In addition, sponsorships are available for the plenary talks and other special events. These opportunities include the recognition stated above along with additional personalized packages. Special event sponsorships will be assigned by the Society on a first-come, first served basis. For more information, contact [sponsorship@electrochem.org](mailto:sponsorship@electrochem.org) at ECS headquarters.

## 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](mailto:ecs@electrochem.org); Web: [www.electrochem.org](http://www.electrochem.org).

# SYMPOSIUM TOPICS

## **A** General Topics

- A1 — General Student Poster Session
- A2 — Nanotechnology General Session
- A3 — Michael Faraday: The First Nanotechnologist? - An Invited Symposium
- A4 — Tutorials in Nanotechnology: Focus on Physical and Analytical Electrochemistry - An Invited Symposium

## **B** Batteries, Fuel Cells, and Energy Conversion

- B1 — Battery / Energy Technology Joint General Session
- B2 — Alkaline Electrochemistry in Fuel Cells
- B3 — Dynamic Process Control and Optimization of Batteries Based on Modeling
- B4 — Intercalation Compounds for Lithium Batteries
- B5 — Rechargeable Lithium and Lithium Ion Batteries
- B6 — Novel Approaches for Energy Efficient Lighting and Electrochromics for Energy Efficiency 2
- B7 — Photovoltaics for the 21st Century 5
- B8 — Proton Exchange Membrane Fuel Cells 9 (PEMFC 9)
- B9 — Semiconductor Electrolyte Interface and Photoelectrochemistry
- B10— Solid Oxide Fuel Cells, Eleventh International Symposium (SOFC XI)

## **C** Biomedical Applications and Organic Electrochemistry

- C1 — Organic and Biological Electrochemistry General Poster Session
- C2 — New Biomimetic Materials for Electrochemical Sensing
- C3 — Synthetic and Mechanistic Organic Electron Transfer Reactions

## **D** Corrosion, Passivation, and Anodic Films

- D1 — Corrosion General Session
- D2 — Coatings for Corrosion Protection
- D3 — Corrosion of Electronic and Magnetic Materials
- D4 — High Temperature Corrosion and Materials Chemistry 8
- D5 — Surface Treatment for Biomedical Applications 2
- D6 — Oxide Films

## **E** Dielectric and Semiconductor Materials, Devices, and Processing

- E1 — Analytical Techniques for Semiconductor Materials and Process Characterization 6
- E2 — Atomic Layer Deposition Applications 5
- E3 — Cleaning Technology in Semiconductor Device Manufacturing 11
- E4 — High Dielectric Constant Materials and Gate Stacks 7

- E5 — Processing, Materials, and Integration of Damascene and 3D Interconnects
- E6 — One-Dimensional Nanoscale Electronic and Photonic Devices 3
- E7 — Organic Semiconductor Materials, Devices, and Processing 2
- E8 — Semiconductor and Plasmonics-Active Nanostructures for Photonic Devices and Systems
- E9 — State-of-the-Art Program on Compound Semiconductors 51 (SOTAPOCS 51) and Wide-Bandgap Semiconductor Materials & Devices 10
- E10— ULSI Process Integration 6

## **F** Electrochemical / Chemical Deposition and Etching

- F1 — Current Trends in Electrodeposition, an Invited Symposium
- F2 — Electrodeposition of Nanoengineered Materials and Devices 3
- F3 — EuroCVD 17 and CVD 17
- F4 — Fundamentals of Electrochemical Growth: From UPD to Microstructures – Symposium in Memory of Prof. Evgeni Budevski
- F5 — Semiconductors, Metal Oxides, and Composites: Metallization and Electrodeposition of Thin Films and Nanostructures

## **H** Fullerenes, Nanotubes, and Carbon Nanostructures

- H1 — Carbon Nanotubes and Nanostructures: From Fundamental Properties and Processes to Applications and Devices
- H2 — Nanostructure and Function of Fullerenes

## **I** Physical and Analytical Electrochemistry

- I1 — Physical, Electroanalytical, and Bioanalytical Electrochemistry
- I2 — Electrochemistry: Symposium on Interfacial Electrochemistry in Honor of Brian E. Conway
- I3 — Physical and Analytical Electrochemistry in Ionic Liquids

## **J** Sensors and Displays: Principles, Materials, and Processing

- J1 — Sensors, Actuators, and Microsystems General Session
- J2 — Impedance Techniques: Diagnostics and Sensing Applications
- J3 — Smart Sensing and Sensor Networks for Independent Living, Medical, Industrial, and Aerospace Applications
- J4 — Physics and Chemistry of Luminescence Materials, W. M. Yen Memorial Symposium



## A — General Topics

### A1 General Student Poster Sessions (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. A cash prize of \$250 and a scroll will be awarded to the winning student authors. In the case of coauthors, a maximum award of \$750 per winning poster will be divided equally between student coauthors. 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 November 6, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.**

Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Watanabe**, Yokohama National University, e-mail: mwatanab@ynu.ac.jp; and **V. Desai**, New Mexico State University, e-mail: vimalc@nmsu.edu.

### A2 Nanotechnology General Session (All Divisions)

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

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

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

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **C. Bock**, National Research Council of Canada, Institute for Chemical Processes and Environmental Technologies, e-mail: Christina.Bock@nrc-cnrc.gc.ca; **J. Li**, NASA Ames Research Center, e-mail: jingli@mail.arc.nasa.gov; **Z. F. Liu**, Peking University, e-mail: zfliu@pku.edu.cn; and **E. Traversa**, University of Rome Tor Vergata, e-mail: traversa@uniroma2.it.

### A3 Michael Faraday: The First Nanotechnologist? - An Invited Symposium (All Divisions)

The symposium will provide a forum for the presentation of original research concerned with the nature and reception of Michael Faraday's (1791-1867) research on what are now known as the nanosciences. Apprenticed as a boy to a bookbinder, Faraday is often celebrated for his "rags to riches" ascent in the sciences. Entirely self-educated, Faraday gained a position as Humphry Davy's research assistant at the Royal Institution, and quickly rose to a position eclipsing that of his mentor. His many discoveries (electromagnetic induction, the substance now known as benzene, paramagnetic and diamagnetic phenomena, and the rotation of a plane polarized light beam by a dense optical glass, and many others) are justly honored. The symposium will concentrate on those of his theories and findings that are relevant yet today on the nanosciences.

Specific topics to be covered by invited speakers will include: (1.) Faraday's electrochemical researches from the early 1830s (which resulted in the "Faraday's Law"), and his transcendence of simple visualization in the conduct of this work; (2.) His preparation of the first metallic colloids and the discovery of the "Faraday/Tyndall Effect;" (3.) The social context of his research, including the important transition in the 20th century from his public characterization as a chemist to that of a physicist; (4.) His work as a materials scientist; and (5.) The role of his theoretical conceptions of fields in the development of his views on the nature of matter. Faraday's research strategies will be discussed in detail, including his use of visual representations, and the role of "play" in his exploratory work. The speakers are known for their historical and cognitive research on Faraday, and will describe replications of some of his experiments. Relationships to current research in the nanosciences will be discussed.

Contributed papers on all aspects on nanoscience and technology involving metal (and specifically, gold) colloids would also be welcome.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **R. Tweney**, Bowling Green State University, e-mail: tweney@bgnet.bgsu.edu; **D. Misra**, New Jersey Institute of Technology, e-mail: dmisra@adm.njit.edu; and **K. Rajeshwar**, University of Texas, e-mail: rajeshwar@uta.edu.

## **A4** Tutorials in Nanotechnology: Focus on Physical and Analytical Electrochemistry - An Invited Symposium (All Divisions)

Nanotechnology has played a revolutionary role in physical and analytical electrochemistry over the last decade. These tutorials will cover the fundamental physical chemistry of nanotechnology, along with the application and incorporation of nanotechnology into electrochemical systems as well as the employment of electrochemistry as a tool for the characterization of nanomaterials. These tutorials are expected to cover both theories of nanotech systems as well as synthetic production of these materials.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **H. De Long**, Air Force Office of Scientific Research, e-mail: hugh.delong@afosr.af.mil; **R. Mantz**, Army Research Office, e-mail: robert.a.mantz@us.army.mil; **S. Minteer**, Saint Louis University, e-mail: minteers@slu.edu; and **P. Trulove**, US Naval Academy, e-mail: trulove@usna.edu.

## **B — Batteries, Fuel Cells, and Energy Conversion**

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

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

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **Z. Ogumi**, Kyoto University, e-mail: ogumi@scl.kyoto-u.ac.jp; and **S. R. Narayanan**, Jet Propulsion Laboratory, e-mail: s.r.narayanan@jpl.nasa.gov.

### **B2** Alkaline Electrochemistry in Fuel Cells (Energy Technology / Physical and Analytical Electrochemistry / Battery)

Alkaline electrochemical power sources have the possibility to offer significantly improved performance over those using acid electrolytes, such as the proton exchange membrane fuel cell (PEMFC). For example, in favorable circumstances the alkaline fuel cell (AFC) may allow a much higher performance than the PEMFC due to its faster cathode reaction and lower Tafel slope. Moreover, non-precious metal catalysts have sufficient activity to be used in AFCs, decreasing system cost.

This symposium covers all aspects of alkaline electrochemical power sources (alkaline fuel cells, direct borohydride fuel cells, alkaline membrane direct methanol fuel cells, alkaline batteries, and alkaline supercapacitors).

Topics of interest include, but are not limited to: (1.) electrocatalysts and fundamental aspects of redox processes; (2.) alkaline electrolytes (liquid alkaline electrolytes, anion conducting membranes, and cation conducting membranes); (3.) advanced electrode materials and structures; (4.) cell and system design, including reactant supply, product elimination, means of cooling, and materials; (5.) electrochemical performance and cell characterization; (6.) modeling and simulation of electrochemical phenomena and processes; and (7.) applications including the use of fuels containing carbon-carbon bonds.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **D. Chu**, U.S. Army Research Laboratory/SEDD, e-mail: deryn.chu@us.army.mil; **R. Mantz**, U.S. Army Research Office, e-mail: robert.a.mantz@us.army.mil; and **C. Wang**, University of Maryland, e-mail: cswant@umd.edu.

### **B3** Dynamic Process Control and Optimization of Batteries Based on Modeling (Battery / Industrial Electrochemistry and Electrochemical Engineering)

Lithium-ion chemistry has been identified as a good candidate for high-power/high-energy secondary batteries. Several problems persist with Lithium-ion batteries – capacity fade, underutilization, abuse caused by overcharging, thermal runaway caused by operation outside the safe window. Though first principles-based models have been discussed in detail in the literature for Lithium-ion batteries; attempts to estimate parameters have been minimal. As of today, literature on dynamic optimization or control of Lithium-ion batteries based on physics-based models is non-existent.

In a hybrid environment (in which batteries operate in series-parallel combination with fuel cells or other devices), energy or power might be specified which is typically delivered by operating the battery at a particular current, power or voltage profile. While existing models can be used for offline analysis and simulation purposes, these models are unsuitable for robust dynamic optimization or parameter estimation. This is an unexplored area requiring model reformulation and approximations for efficient simulation of nonlinear coupled partial differential equations and application of control theory to optimize both material design and operating conditions.

Papers of interest include but are not restricted to the following: Real-time simulation of state of charge and state of health, nonlinear model predictive control, dynamic optimization, parameter estimation to understand capacity fade, design of new electrodes, multiscale simulation of lithium-ion batteries, approximation methods, order reduction, parallel computing, novel numerical solvers, comparison of numerical methods, stack models, etc.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **V. R. Subramanian**, Tennessee

Tech University, e-mail: vsubramanian@tntech.edu; **P. Arora**, DuPont, e-mail: pankaj.arora@usa.dupont.com; and **R. Spotnitz**, Battery Design LLC, e-mail: rspotnitz@batdesign.com.

## **B4** Intercalation Compounds for Lithium Batteries (Battery / Energy Technology)

This symposium will provide an international forum to discuss recent progress that has been made in the development of intercalation compounds for energy conversion and storage. The symposium will focus on both basic and applied research findings that have led to improved materials and to the understanding of the fundamental processes that determine and control electrochemical performance. A major (but not exclusive) theme of the symposium will be intercalation anodes and cathodes for batteries based on lithium ion transport. Specific topics of interest include: (1.) synthesis and characterization; (2.) materials processing and engineering; (3.) structure and reaction mechanisms; (4.) electrochemical properties and cell performance; (5.) structural stability as a function of state-of-charge and cycling; (6.) fundamental aspects of redox processes and charge transfer; (7.) characterization of intercalation processes, including NMR, electronic, magnetic, spectroscopic and other methods; and (8.) theoretical modeling of intercalation compounds and electrochemical processes.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. S. Whittingham**, State University of New York at Binghamton (SUNY), e-mail: stanwhit@binghamton.edu; **P. G. Bruce**, University of St. Andrews, email: pgb1@st-andrews.ac.uk; **C. M Julien**, Université P. et M. Curie, e-mail: cjul@ccr.jussieu.fr; **M. Rosa Palacin**, Institut de Ciència de Materials de Barcelona (ICMAB), e-mail: rosa.palacin@icmab.es; **J. Prakash**, Illinois Inst. Of Technology, e-mail: prakash@iit.edu; and **M. Thackeray**, Argonne National Laboratory, e-mail: thackeray@anl.gov.

## **B5** Rechargeable Lithium and Lithium Ion Batteries (Battery)

Lithium ion batteries play a vital role in our everyday life as they are the prominent power sources for cell phones, laptop computers, digital cameras and many other consumer products. Recently, lithium ion batteries are attracting more interest for automotive and stationary applications as well. Consequently a symposium to present and discuss the most recent results is timely. Papers are solicited on both fundamental and applied aspects of lithium ion batteries. Specific areas to be covered include but are not limited to: (1.) alternative and traditional anode and cathode active materials design, preparation, characterization and performance; (2.) electrode processing and cell design; (3.) studies of the interfaces; (4.) design and characterization of electrolytes; (5.) materials and cell modeling; and (6.) performance, safety and failure mechanisms of cells and batteries.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Winter**, Westfaelische Wilhelms University Muenster, e-mail: martin.winter@uni-muenster.de; **K. M. Abraham**, Northeastern University, Boston, Massachusetts, e-mail: kmabraham@comcast.net; **D. Doughty**, Sion Power Corporation, e-mail: dhdoughty@gmail.com; **Z. Ogumi**, Kyoto University, e-mail: ogumi@sci.kyoto-u.ac.jp; and **K. Zaghbi**, Hydro-Quebec, e-mail: Zaghbi.karim@ireq.ca.

## **B6** Novel Approaches for Energy Efficient Lighting and Electrochromics for Energy (Luminescence and Display Materials / Energy Technology)

The purpose of this symposium is to highlight recent advances in phosphors for energy efficient lighting including inorganic and organic light emitting diodes (LED and OLED), compact and standard fluorescent lamps and other devices, and to provide a forum for discussion and presentation of fundamental and applied aspects of electrochromic materials and their device applications particular for energy efficiency.

Through this symposium, we intend to cover a wide range of topics in order to generate discussions between interdisciplinary participants to favor the exchange of new ideas. We are thus soliciting contributions in areas ranging from the synthesis of challenging phosphor materials and the characterization of luminescence behavior of new phosphor materials to lighting applications. Submission of papers is encouraged in the following topics: (1.) synthesis and characterization of new phosphor materials for lighting; (2.) design of luminescence properties for next generation lighting applications; (3.) integration of new phosphors into next generation lighting applications; and (4.) new lighting devices and applications. The second focus of this symposium will be on the synthesis, characterization and performance of inorganic, organic and polymeric materials, including windows, eyewear, mirrors, displays, renewable paper, and variable emissive surfaces.

Presentations should involve the physics, chemistry, and/or engineering of energy efficient lighting. Selected abstracts will be also chosen by the organizers for longer invited talks.

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## **B7** Photovoltaics for the 21st Century 5 (Energy Technology / Dielectric Science and Technology / Electronics and Photonics)

Today's photovoltaic technologies for terrestrial applications are based on various forms of crystalline silicon. These technologies, the result of innovative and breakthrough research 40 years ago, have enabled a 20-billion-dollar global industry marketing mainly to non-grid-connected applications. Marketing in grid-connected applications, however, requires substantial cost reductions. Thin film technologies, considered the next generation to crystalline silicon technologies, came into being 30 years ago as another consequence of breakthrough and innovative research. These



technologies are based on metal chalcogenide or amorphous/polycrystalline silicon materials. There is no reason to believe that photovoltaic innovation has gone as far as it can or that new viable photovoltaic technologies don't exist beyond the horizon of our present knowledge. Fundamental and applied research is needed to make breakthroughs in silicon-based technologies, thin film technologies, as well as totally new photovoltaic concepts.

This symposium will focus on conventional and non-conventional technologies for solar-to-electric energy conversion that could be deployed on the terawatt scale in the 21st century. Contributed publications of both fundamental and applied nature leading to low cost and highly efficient solar-to-electric conversion are solicited. Topics of interest include but not limited to: (1.) Solar-grade silicon: purification, ingot growth, wafering, defects, and energy efficient and high throughput processes; (2.) Novel techniques and structures for highly efficient and low cost crystalline silicon cells; (3.) Material, process, and device improvements for higher efficiency and lower cost thin film cells; (4.) New materials that are abundant, low cost, and non-toxic, including inorganic materials, nanoscale materials, biomimetic materials, organic materials, and composite materials; (5.) New structures or concepts that promise a much higher efficiency/cost ratio than today's solar cell technologies, including multijunction materials and devices; (6.) Device modeling combining optical, optoelectronic, and electronic modeling; and (7.) Photovoltaics-specific material and device characterization.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Tao**, University of Texas at Arlington, e-mail: mtao@uta.edu; **J. Brownson**, Pennsylvania State University, e-mail: nanomech@psu.edu; **P. Chang**, Northrop Grumman, e-mail: pablo.chang@ngc.com; **C. Claeys**, IMEC, e-mail: claeys@imec.be; **K. Kakimoto**, Kyushu University, e-mail: kakimoto@riam.kyushu-u.ac.jp; **K. Rajeshwar**, University of Texas at Arlington, e-mail: rajeshwar@uta.edu; **M. Sunkara**, University of Louisville, e-mail: mahendra@louisville.edu; and **D. Yang**, Zhejiang University, e-mail: mseyang@zju.edu.cn.

## **B8** Proton Exchange Membrane Fuel Cells 9 (PEMFC 9)

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

This international symposium is devoted to all aspects of research, development, and engineering of proton exchange membrane (PEM) fuel cells and stacks, as well as low-temperature direct-fuel cells. The intention is to bring together the international community working on the subject and to enable effective interactions between research and engineering communities. The symposium is coordinated by means of four different sections as outlined below. Abstracts for oral and poster contributions must be submitted to the symposium via the ECS website.

**Section A:** Fuel Cell Systems, Cell Stack, and Component Hardware  
T. Fuller, C. Hartnig, and V. Ramani

Presentations that discuss: 1. new cell and stack structures, including new types of bipolar plates and flow fields; 2. novel gas diffusion medium substrates and micro-porous layer

designs; 3. modeling and diagnostic methods to characterize mass- and heat-transport related phenomena (e.g., water flooding); 4. in-situ measurement or visualization of reactants and products, and 5. design and specifics of complete power systems in the context of transportation and stationary power generation applications as well as for micro-fuel cell systems.

**Section B:** Durability  
H. Uchida, H. Gasteiger, and S. Cleghorn

Presentations that discuss: (1.) fundamental degradation mechanisms of fuel-cell materials (e.g., materials corrosion, decomposition, and contamination); (2.) the durability of complex fuel-cell components (e.g., voltage degradation mechanisms); (3.) the impact of transient operating conditions on fuel cell durability/reliability; and (4.) the reliability of fuel cell systems for power generation (e.g., maintenance, and reliability of ancillary components).

**Section C:** New Materials and Electrode Processes  
P. Strasser, D. Jones, P. Shirvanian, and T. Zawodzinski

Presentations that discuss: (1.) electrocatalysis of fuel cell reactions, particularly at the catalyst/ionomer interface and methods to increase anode and cathode performance; (2.) computational approaches and experiments with idealized model surfaces used toward the design of novel catalysts and/or catalyst supports; (3.) ionomeric membrane thermodynamics and transport characteristics; (4.) new ionomeric membrane development, especially for high temperature, and (5.) *in situ* materials diagnostics

**Section D:** Direct Fuel Cells  
C. Lamy, T. Jarvi, P. Zelenay, and P. Bele

Presentations that discuss: (1.) mechanisms of fuel-cell reactions occurring by direct oxidation fuels other than hydrogen, including alcohols, hydrogen carriers, such as borohydrides, ammonia, and ethers; (2.) new materials addressing specific challenges for direct fuel cells, e.g., crossover and oxidation catalysts; (3.) general operational aspects of direct fuel cells; and (4.) development of new membranes with lower rates of crossover, such as anionic ionomers.

In order to encourage active participation of new and talented researchers in the field, we anticipate awarding **Travel Grants** of at least \$500 in support of outstanding abstract submissions made by **graduate students** and **postdoctoral fellows** to the symposium. Awards will be made based on originality of the work and importance to the field. If you would like to apply for the travel grant, please submit your abstract, your resume, and your publication list to the organizers listed for your section. To be eligible for a student travel award, you must submit a manuscript for the transactions. Again submission of a manuscript is required. A **Short Course** on fundamental catalysis and how it can be applied to low-temperature fuel cell diagnostics and kinetic studies will be held the Sunday of the meeting. Papers will be accepted for oral presentation only.

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

Section A: **T. Fuller**, Georgia Institute of Technology, e-mail: tom.fuller@gtri.gatech.edu; **C. Hartnig**, Zentrum fuer Sonnenenergie-und Wasserstoff-Forschung, e-mail: christoph.hartnig@zsw-bw.de; and **V. Ramani**, Illinois Institute of Technology, e-mail: ramani@iit.edu.

Section B: **H. Uchida**, University of Yamanashi, e-mail: h-uchida@yamanashi.ac.jp; **H. A. Gasteiger**, Acta, e-mail: hubert.gasteiger@gmail.com; and **S. Cleghorn**, W. L. Gore & Associates, e-mail: scleghorn@wlgore.com.

Section C: **P. Strasser**, University of Houston, e-mail: PStrasser@uh.edu; **T. Zawodzinski**, CWRU, e-mail: taz5@po.cwru.edu; **D. Jones**, Universite Montpellier, email: ; and **P. Shirvanian**, Ford Motor Co., e-mail: ashirvan@ford.com.

Section D: **T. Jarvi**, UTC Power, e-mail: Tom.Jarvi@UTCPower.com; **P. Zelenay**, Los Alamos National Laboratory, e-mail: zelenay@lanl.gov; **C. Lamy**, Universite de Poitiers; e-mail: claude.lamy@univ-poitiers.fr; and **P. Bele**, University of Munich, e-mail: pbele@ph.tum.de.

## **B9** Semiconductor Electrolyte Interface and Photoelectrochemistry

(Energy Technology / Physical and Analytical Electrochemistry)

This symposium will address all fundamental and applied aspects of inorganic and organic semiconductor-electrolyte interfaces (SEIs). Topics of interest include but are not limited to the following: (1.) Charge transfer across SEIs in the dark and under irradiation; (2.) Role of traps and surface states in mediating charge transfer; (3.) Chemical modification and passivation of SEIs; (4.) Semiconductor nanoparticle-electrolyte interfaces; (5.) Semiconductor nanotubes, nanorods and other configurations; (6.) Mild and energy-efficient methods for preparing semiconductor films, nanoparticles, and other morphologies listed above; (7.) Novel methods for characterizing SEIs; (8.) Use of SEIs for photoassisted hydrogen generation; (9.) Dye-sensitized solar cells; (10.) Use of SEIs for storing solar energy; (11.) Use of SEIs in third generation solar cells; and (12.) Photocatalysis and environmental remediation aspects coupled with energy conversion or storage (e.g., hybrid dye destruction and hydrogen generation schemes).

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **K. Rajeshwar**, University of Texas at Arlington, e-mail: rajeshwar@uta.edu; **A. Ryan**, Jet Propulsion Laboratory, e-mail: mryan@jpl.nasa.gov; and **T. Zawodzinski**, Case Western Reserve University, e-mail: taz5@po.cwru.edu.

## **B10** Solid Oxide Fuel Cells, Eleventh International Symposium (SOFC XI)

(High Temperature Materials / Battery / Energy Technology)

This eleventh symposium (SOFC XI) will provide an international forum for the presentation and discussion of the latest developments on solid oxide fuel cells (SOFCs) and related topics. Papers are solicited on all aspects of solid oxide fuel cells. Following is a partial list of topics to be addressed: (1.) materials for cell components (e.g. electrolyte, electrodes, interconnection, and seals); (2.) fabrication methods for cell components, complete cells, and stacks; (3.) cell designs, electrochemical performance, and modeling; (4.) stack designs and their performance; (5.) utilization of different fuels with or without reformation; (6.) stationary power generation, transportation, and military applications; and (7.) prototype SOFC systems, field test experience, cost, and commercialization plans.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. C. Singhal**, Pacific Northwest National Laboratory, e-mail: singhal@pnl.gov; and **H. Yokokawa**, AIST, e-mail: h-yokokawa@aist.go.jp.

## **C** — Biomedical Applications and Organic Electrochemistry

### **C1** Organic and Biological Electrochemistry General Poster Session

(Organic and Biological Electrochemistry)

Submissions are solicited in all area of organic, organometallic, and biological electrochemistry. Areas of interest include synthetic and mechanistic electrochemistry as well as industrial and educational applications.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **J. Burgess**, Case Western Reserve University, e-mail: jdb22@case.edu.

### **C2** New Biomimetic Materials for Electrochemical Sensing

(Organic and Biological Electrochemistry / Sensor / Physical and Analytical Electrochemistry)

The specificity of most chem/bio-sensors relies on a molecular recognition interface combined with an appropriate molecular linker and transduction element such as e.g. electrodes, MEMS devices, optical waveguides or mass sensitive platforms. Biological recognition elements deployed in sensing are frequently limited in robustness, availability, long-term stability and involve high costs if isolation and purification steps are required. Consequently, synthetic and semi-synthetic receptors (including truncated recombinant analogues) mimicking biological recognition promise significant advantages compared to their natural counterparts. In recent years biomimetic recognition schemes including aptamers, synthetic oligonucleotides, peptides, molecularly imprinted polymers and sol gels as well as first attempts at designing synthetic proteins and enzymes are gaining broad interest.

This symposium will focus on recent advances in biomimetic recognition schemes and sensor architectures designed at the molecular level for chemical and biological sensors. Besides the development and synthesis of biomimetic recognition elements, the symposium will also focus on sensor characterization and performance in real-world applications including but not limited to food analysis, environmental monitoring, and clinical test beds.

Areas of special interest include: (1.) aptamers; (2.) synthetic oligonucleotides; (3.) peptides; (4.) molecularly imprinted polymers; (5.) sol gels; (6.) apoenzymes; (7.) novel sensor concepts; (8.) sensor systems and arrays for on-line monitoring; and (9.) advanced micro-and nanosystems.



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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **C. Kranz**, University of Ulm, e-mail: Christine.kranz@uni-ulm.de; **M. Bayachou**, Cleveland State University, e-mail: m.bayachou@csuohio.edu; and **H. De Long**, Air Force Office of Scientific Research, e-mail: hugh.delong@afosr.af.mil.

### **C3 Synthetic and Mechanistic Organic Electron Transfer Reactions** (Organic and Biological Electrochemistry / Physical and Analytical Electrochemistry)

Papers are invited in all areas of investigations involving synthetic and mechanistic organic electrochemistry. Topic areas include organic, organometallic, and bio-organic electrochemistry, and industrial and educational applications are also welcome.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **T. Fuchigami**, Tokyo Institute of Technology, e-mail: fuchi@chem.titech.ac.jp; **G. Cheek**, US Naval Academy, e-mail: cheek@usna.edu; **D. Evans**, University of Arizona, e-mail: dhevans@email.arizona.edu; and **F. Maran**, University of Padova, e-mail: flavio.maran@unipd.it.

## **D — Corrosion, Passivation, and Anodic Films**

### **D1 Corrosion General Session** (Corrosion)

Oral 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. Note that this session will consist of both oral and poster presentations.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **D.C. Hansen**, University of Dayton, e-mail: douglas.hansen@udri.udayton.edu.

### **D2 Coatings for Corrosion Protection** (Corrosion)

This symposium invites contributions on topics covering any aspect of the science of protective coatings. Coating systems of interest include organic layers such as paint, corrosion protective compounds, Langmuir-Blodgett layers, and self-assembled monolayers; galvanic coatings including advanced galvanizing concepts; anodized coatings; coatings deposited by physical deposition processes, including artificial passivation layers. Of particular interest are papers on smart coatings, coatings with enhanced protective or adhesive properties, the mechanisms of improved protection, and advanced techniques for evaluating coating properties such as improved accelerated test methods that are well correlated to field exposure behavior.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **G. Frankel**, Ohio State University, e-mail: frankel@matsceng.ohio-state.edu; **G. Grundmeier**, University of Paderborn, e-mail: g.grundmeier@tc.upb.de; **H. McMurray**, University of Wales, Swansea, e-mail: h.n.mcmurray@swan.ac.uk; and **T. Shinohara**, National Institute for Materials Science, e-mail: shinohara.tadashi@nims.go.jp.

### **D3 Corrosion of Electronic and Magnetic Materials** (Corrosion)

We invite members of academia, industry and government laboratories to submit work dealing with the fundamental and applied aspects of corrosion, reliability, and materials degradation in the design, manufacture, and use of electronic, electro-mechanical and optoelectronic devices and equipment. Of particular interest are those papers dealing with the reliability of new 'environmentally friendly' devices (RoHS compliant).

The specific areas to be covered include: (1.) Mechanistic studies of corrosion, reliability, and performance degradation; (2.) Degradation caused by processing and the processing environment, including processing variables and procedures, thermal effects, humidity effects, and the effects of airborne contaminants; (2a.) effects of magnetic fields on corrosion (3.) Materials performance degradation inherent in the design or operational characteristics of devices, including diffusion, electromigration, loss of surface insulation resistance, and thermal expansion mismatch; (4.) Surface modification and passivation techniques for improved resistance to degradation; (5.) Methods for evaluating reliability, improving yield and decreasing failure rate through appropriate materials selection, coatings, and other means of environmental protection; (6.) Environmental testing methods and strategies, including temperature-humidity-bias studies, mixed flowing corrosive gas and particle exposures, ion migration studies, and investigations relating environmental parameters to materials degradation; (7.) Packaging methods and strategies for high reliability applications; (8.) Solutions to problems related to the conversion to more environmentally friendly devices; (9.) Models describing the effect of corrosion in micro-electronic devices.

The scope of this symposium will include: (1.) Fundamental corrosion and materials degradation studies of bulk and thin film metals, hard and soft magnetic materials, magnetic shape memory alloys, semiconductors, and optoelectronic devices;

(2.) Design and materials selection for components and ICs, including bipolar, MOS, high voltage devices, and photonic devices; (3.) Packaging and interconnect technologies, connector designs, and contact materials.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **L. Garfias**, DNV/CC Technologies, Inc., e-mail: Luis.Garfias@DNV.com; **A. Gebert**, Leibniz-Institute for Solid State and Materials Research, e-mail: A.Gebert@ifw-dresden.de; and **N. Missert**, Sandia National Laboratories, e-mail: namisse@sandia.gov.

## **D4** High Temperature Corrosion and Materials Chemistry 8 (High Temperature Materials / Corrosion)

This symposium will focus on the fundamental thermodynamic and kinetic aspects of high temperature oxidation and corrosion, as well as other chemical reactions involving inorganic materials at high temperatures. Both theoretical and experimental papers are encouraged. Specifically, contributions on the following topics in the area of oxidation/corrosion are solicited: (1.) fundamental mechanisms of high temperature oxidation, (2.) reactions in complex environments and/or ultra high temperatures (>1500°C) and, (3.) response of protective coatings in high temperature environments. In the area of high temperature chemistry, papers on the following topics are solicited: (4.) thermodynamic property determination, (5.) phase equilibria and phase transformations, (6.) solid state diffusion, and (7.) volatilization reactions.

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Abstracts should be submitted electronically to ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **E. Wuchina**, Naval Surface Warfare Center, e-mail: eric.wuchina@navy.mil; **J. Fergus**, Auburn University, e-mail: jwfergus@eng.auburn.edu; **T. Markus**, Institute for Energy Research (IEF-2), e-mail: T.Markus@fz-juelich.de; **T. Maruyama**, Tokyo Institute of Technology, e-mail: maruyama@mtl.titech.ac.jp; **P. Massett**, Karl-Winnacker-Institut, e-mail: masset@dechema.de; **E. Opila**, NASA Glenn Research Center, e-mail: opila@nasa.gov; and **D. Shifler**, Office of Naval Research, e-mail: shifled@onr.navy.mil.

## **D5** Surface Treatment for Biomedical Applications 2 (Electrodeposition / Corrosion / Sensor)

Understanding and manipulating the physical and chemical properties of various surfaces is very important for a variety of applications in the biomedical field. Applications may include various implants, dressings for wound healing and different skin diseases, surfaces for immunodiagnostic devices, patches for a continuous drug release and surfaces used for the prevention of biofilm formation or corrosion inhibition. The aim of this symposium is to bring together scientists, researchers, and engineers with a multidisciplinary approach of the treatments of surfaces which may increase our knowledge related to various biomedical applications. Treatments of interest include, but are not limited to: (1.) All

methods of electrodeposition of thin films of various metals (Ag, Au, Cu, Pd, Pt, etc.), oxides, polymers, or salts that are used for implants and devices for wound healing applications, treatment of various skin diseases or the inhibition of corrosion processes; (2.) Production of composite coatings (metallic, polymeric, or oxide matrices containing biologically active ingredients) via electrodeposition, electroless deposition or other available methods (e.g. PVD or CVD), which may be useful in devices for a continuous drug release, implants, catheters immunodiagnostic devices, or surfaces for biofilm or corrosion prevention; (3.) Production of thin films via electrochemical or chemical oxidation, which may have unusual properties (antimicrobial, adsorption, high surface area, to allow a continued release of desired chemicals or biologicals, etc.) and as such may be useful in the production of various biomedical devices or surfaces for the prevention of biofilm formation or corrosion.

Substrates of interests may include metals, textile materials (natural or synthetic), foams, polymers, ceramics, etc. Devices of interest are wound dressings, catheters, implants, and devices for continuous drug release, surgical instruments, immunodiagnostic devices, etc. Papers dealing with the behavior both *in vitro* and *in vivo* are very much encouraged.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. Djokic**, Elchem Consulting, Ltd., e-mail: sdjokic@telus.net; **Z. Aguilar**, Vegrandis, LLC, e-mail: zapaguilar@yahoo.com; **D. C. Hansen**, University of Dayton Research Institute, e-mail: douglas.hansen@udri.udayton.edu; and **S. Virtanen**, Univ. of Erlangen-Nuremberg, e-mail: virtanen@ww.uni-erlangen.de.

## **D6** Oxide Films (Corrosion)

The oxide films present on metal and alloy surfaces play a key role in the corrosion resistance for metals and alloys protected by a passive film as well as for metals and alloys protected by a polymer coating.

The scope of the symposium will include the following topics: (1.) experimental and theoretical approaches of surface oxide growth; (2.) oxide nanostructure; (3.) electronic properties of thin oxide layers; (4.) effect of water on the oxide surface composition (hydroxylation); (5.) defects in thin passive films; (6.) mechanisms of passivity breakdown and initiation of pits and pores; (7.) cathodic reactions on oxide surfaces; (8.) the role of the interfacial oxide in the stability/degradation of polymer-metal systems; and (9.) the role of oxide films in stress corrosion cracking mechanisms.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **P. Marcus**, University of Pierre et Marie Curie, e-mail: Philippe-Marcus@enscp.fr; **H. Terryn**, Vrije University of Brussels, e-mail: htterrinn@vub.ac.be; and **S. Fujimoto**, Osaka University, e-mail: fujimoto@mat.eng.osaka-u.ac.jp..

## E — Dielectric and Semiconductor Materials, Devices, and Processing

### E1 Analytical Techniques for Semiconductor Materials and Process Characterization 6 (Electronics and Photonics)

This symposium will address recent developments and applications of analytical techniques and characterization methods in the field of semiconductor materials (Si, SiGe, Ge, SOI, etc.) processes and devices. It will cover new techniques and improvements of existing techniques illustrating their strengths and weaknesses, as well as time and cost aspects regarding routine applications in the monitoring of materials and device manufacturing.

Papers are solicited in the field of elemental/structural analysis and characterization/monitoring of parameters for: (1.) Bulk impurities and defects; (2.) Surfaces, interfaces and thin films; (3.) Process chemicals, gases and materials; (4.) Device failures; (5.) *In-situ*/in-line process control; and (6.) Novel tools in these fields of application.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **B. Kolbesen**, Institute für Anorganische und Analytische Chemie, e-mail: kolbesen@chemie.uni-frankfurt.de; **M. Bersani**, ICT-IRST, e-mail: bersani@itc.it; **C. Claeys**, IMEC, claeys@imec.be; and **L. Fabry**, Wacker AG, e-mail: laszlo.fabry@wacker.com.

### E2 Atomic Layer Deposition Applications 5 (Dielectric Science and Technology / Electronics and Photonics)

Recent advances in nanotechnology have created a need for precise, conformal, atomic level deposition of thin film materials. Atomic Layer Deposition (ALD) can enable the precise deposition of ultra-thin, highly conformal coatings over complex 3D topography, with controlled composition and properties. Consequently, ALD has become a technology of choice for a large variety of applications for and beyond the semiconductor industry, as proven from the countless applications emerging. Over the past three years, this symposium has earned a leading position among the technology symposia where atomic layer deposition is being discussed. This symposium offers an excellent forum for sharing of cutting edge research on emerging and non-mainstream ALD applications, as well as fundamental aspects of ALD technologies.

Contributions are solicited in the following areas: (1.) semiconductor mainstream CMOS applications: development and integration of ALD high-k oxides and metal electrodes; (2.) volatile and non volatile memory applications: extendibility, Flash, MIM, MIS, RF capacitors, etc.; (3.) interconnects and contacts: integration of ALD films with Cu and low-k materials; (4.) fundamentals of ALD processing; (5.) productivity enhancement of ALD equipment and processes; (6.) precursor and delivery systems development for ALD; (7.) advanced and novel integration schemes of ALD films; (8.) ALD for optical and photonic applications; (9.) coating of nanoporous materials by ALD; (10.) selective area ALD for patterning of nanoscale films; and (11.) applications for ALD

in other areas, such as disk drives, MEMS, nanotechnology, deposition on polymers, fuel cells, and other novel energy applications, etc.

In order to encourage active student participation we anticipate to cover the registration fee for all students who are the presenting authors of accepted presentations, both oral and posters, provided that the manuscript is submitted by the deadline.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. De Gendt**, IMEC, e-mail: Stefan.Degendt@imec.be; **S. F. Bent**, Stanford University, e-mail: sbent@stanford.edu; **A. Delabie**, IMEC, e-mail: Annelies.Delabie@imec.be; **F. J. Elam**, Argonne National Laboratory, e-mail: jelam@anl.gov; **S. B. Kang**, Samsung Electronics, e-mail: sbkangh@samsung.com; **A. Londergan**, Qualcomm MEMS Technologies, e-mail: alondergan@qualcomm.com; and **O. van der Straten**, IBM Research, email: ovander@us.ibm.com.

### E3 Cleaning Technology in Semiconductor Device Manufacturing 11 (Electronics and Photonics)

This symposium has been organized under the auspices of the Electrochemical Society, biannually since 1989. This 11<sup>th</sup> edition will cover a wide range of topics related to the removal of contaminants from and conditioning of Si/SOI, SiC, Ge, SiGe, III-V and II-VI semiconductor surfaces; cleaning media, including non-aqueous cleaning methods and tools; front- and back-end cleaning operations; integrated cleaning; cleaning of MEMS; photomasks (reticles); high-k and porous low-k dielectrics; post-CMP cleaning; wafer bevel cleaning/polishing; photoresist and residue removal, characterization, evaluation, and monitoring of cleaning; correlation with device performance; cleaning of equipment and storage/handling hardware; as well as other issues within the broadly understood scope of this symposium, including those involved in large-area electronics and photonics, both non-organic and organic TFT technology, compound semiconductor device processing, nanowire, nanotubes and nanodots cleaning, and surface conditioning related aspects of "self-assembly-monolayer" processing.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **J. Ruzyllo**, Penn State University, e-mail: jruzylo@psu.edu; **P. Besson**, CEA-LETI, e-mail: pascal.besson@cea.fr; **T. Hattori**, Hattori Consulting/Hanyang University, e-mail: x.hattori@gmail.com; **P. Mertens**, IMEC vzw, e-mail: mertensp@imec.be; and **R. Novak**, AKrion, e-mail: richnovak@aol.com.



## **E4 High Dielectric Constant Materials and Gate Stacks 7** (Dielectric Science and Technology / Electronics and Photonics)

Papers are solicited in all areas related to advanced gate stacks for CMOS and Memory applications in sub 45 nm feature size integrated circuits, including the following: (1.) **Substrates:** Higher mobility semiconductors such as strained Si, (110) and (111) Si, SiGe, Ge, GaAs, and other III-V compounds, GeOI, GaAs-on-insulator, and SOI. Passivation of non-Si surfaces. (2.) **High k Gate Dielectric Materials:** Trends in high K gate dielectric technologies for 45 nm and beyond targeting logic, non-volatile memory, and DRAM capacitor technologies. Novel high and higher-k materials. Advanced oxynitrides for 45 nm and beyond. (3.) **Gate Electrode Materials:** Trends in gate electrode technologies for 45 nm and beyond targeting logic, non-volatile memory, and DRAM capacitor technologies. Poly-Si, silicided, and metal gate electrodes. Band-edge and midgap work-function materials. Gate electrode deposition methods. (4.) **Deposition Techniques:** Growth and deposition techniques for high k dielectric and metal gates. Advanced precursors for CVD. Alternative deposition techniques. (5.) **Bulk Material Properties:** Thermal stability of novel materials. Ternary dielectric and metal gate compounds. Effects of composition on material properties. Material interactions. (6.) **Interfaces:** Silicon/high-K and high-K/gate-electrode interfaces. Oxygen diffusion and mechanisms of interface layer formation. Interface preparation, passivation, engineering, and control. Bottom and top electrode/dielectric chemical interactions. Interface modification by monolayer/capping layer. Thermal stability of interfaces. (7.) **Advanced Gate Stack Reliability:** Identification of main reliability problems in low voltage application and new reliability. Models. Bias temperature instability. Metallic cross-contamination across layers. Mechanisms of mobility degradation. Thermal stability of new materials. (8.) **Characterization and Methodologies for High-k Gate Dielectrics and Metal Gates:** Advanced physical, chemical, and electrical characterization of gate stacks. Accurate determination of layer composition and depth profiles. Accurate determination of dielectric capacitance. Trap parameter extraction. Non-contact electrical characterization. Work-function extraction methodologies. Determination of tunneling electron/hole mass.

**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 May 29, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.**

Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. Kar**, Indian Institute of Technology, e-mail: skar@iitk.ac.in; **M. Houssa**, Ge and III-V CMOS, IMEC vzw, e-mail: houssa@imec.be; **H. Iwai**, Tokyo Institute of Technology, e-mail: iwai.h.aa@m.titech.ac.jp; **D. Landheer**, Institute for Microstructural Sciences, National Research Council, e-mail: dolf.landheer@nrc.ca; **D. Misra**, New Jersey Institute of Technology, e-mail: dmisra@njit.edu; and **S. Van Elshocht**, IMEC, e-mail: sven.vanelshocht@imec.be.

## **E5 Processing, Materials and Integration of Damascene and 3D Interconnects** (Dielectric Science and Technology)

This symposium focuses on issues pertinent to advances in traditional damascene interconnects and new materials and integration methods for 3D interconnects.

An emerging technology or device architecture called 3-D integration is based on the system performance gains that can be achieved by stacking and vertically interconnecting distinct device layers. The 3-D concept of replacing long 2-D interconnects with shorter vertical (3-D) interconnects has the potential to alleviate interconnect (RC) delay problems facing the semiconductor industry today. Additional benefits of the 3-D process include reduced die size and the ability to optimize distinct technologies (analog, logic, RF, etc.) on separate vertically interconnected layers. An application area where large performance gains can be obtained is high-density device/sensor arrays where processing power is placed within each individual device/sensor element. The aim of this symposium topic is to discuss the proposed architectures and applications of 3-D integration, and the various enabling materials and processes that are required to bring the technology into full commercialization. Broadly, the enabling process technologies include: wafer/die thinning, wafer/die bonding, and vertical interconnect fabrication. Each of these process technologies will leverage novel materials, and much of the emphasis of this symposium will be on the materials science of these 3-D integration materials. Ideally, this symposium topic will bring together researchers to discuss the various merits of the presented 3-D device architectures, materials, and fabrication methodologies.

Suggested topics in the area of interest include (but are not limited to): 3-D design and architectures; 3-D process integration methodologies; Materials for vertical interconnects (TSV): insulators, barriers, and metals; Vertical interconnect fabrication technology; Reliability of 3-D interconnects; Simulation and modeling of 3-D integrated devices; Novel test and measurement of 3-D integrated devices; Materials and techniques for die and wafer bonding; Processing and handling of thin wafers and dice; Materials for temporary die and wafer bonding; Thermal management in 3-D integrated devices; Epitaxial and recrystallization approaches to 3-D integration; 3-D integration of heterogeneous materials; 3-D MEMS integration.

Damascene copper interconnects, introduced at the 0.25 $\mu$ m node, have spanned six technology nodes, and are expected to be used for the foreseeable future. Despite the history of success, there are several new challenges including: increases in effective resistivity, electromigration and stress migration resistance, and the integration of porous low-k dielectrics and air-gaps. This symposium topic will bring together researchers to discuss the challenges and solutions to extend damascene copper interconnects well beyond the 45nm node.

Suggested topics in the area of interest include (but are not limited to): Methods to reduce increases in effective resistivity; Methods to mitigate electromigration and stress migration issues; Advanced barrier /seed processes including ALD and electroless films; Porous low-k ILDs and air gap processing (including deposition and etching); and Novel electrodeposition and CMP processes.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **J. Flake**, Louisiana State University, e-mail: johnflake@lsu.edu; **O. Leonte**, Lam Research, e-mail: odleonte@comcast.net; **G. S. Mathad**, S/C Technology Consulting, e-mail: swami\_mathad@

hotmail.com; **P. Ramm**, Fraunhofer Institute IZM Munich, e-mail: peter.ramm@izm-m.fraunhofer.de; **H. S. Rathore**, IBM Microelectronics, e-mail: rathore@us.ibm.com; and **F. Roozeboom**, NXP Semiconductors Research, e-mail: fred.roozeboom@nxp.com.

## **E6** One-Dimensional Nanoscale Electronic and Photonic Devices 3 (Electronics and Photonics / Sensor / Corrosion)

The third NODEPD symposium will address the most recent developments in nanoscale electronic and photonic devices, encompassing one dimensional novel devices, processing, device fabrication, reliability, and other related topics. Papers on both practical issues and fundamental studies are solicited. The symposium will consist of both invited and contributed papers.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **L-J. Chou**, National Tsing-Hua University, Taiwan, e-mail: ljchou@mx.nthu.edu.tw; **G. Duesberg**, Trinity College, Dublin, e-mail: duesberg@tcd.ie; **S. Jin**, University of Wisconsin-Madison, e-mail: jin@chem.wisc.edu; **J. Li**, NASA Ames Research Center, jingli@mail.arc.nasa.gov; **S. Roth**, Max-Planck-Institute für Festkörperforschung, Heisenbergstr, e-mail: S.Roth@fkf.mpg.de; and **Z. L. Wang**, Georgia Institute of Technology, e-mail: zhong.wang@mse.gatech.edu.

## **E7** Organic Semiconductor Materials, Devices, and Processing 2 (Electronics and Photonics / Dielectric Science and Technology)

The International Symposium on Organic Semiconductor Materials and Devices (Symposium E7) will be held during the 216th ECS Meeting in Vienna, Austria. It will be the second 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; (10.) Reliability, stability, reproducibility of device characteristics.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. J. Deen**, McMaster University, e-mail: jamal@mcmaster.ca; **D. Gundlach**, National Institute of Standards and Technology, Semiconductor Electronics Division, e-mail: David.Gundlach@NIST.gov; **B. Iniguez**, Department of Electronic Engineering, Universitat Rovira i Virgili, e-mail: benjamin.iniguez@urv.cat; **H. Klauk**, Max Planck Institute for Solid State Research, e-mail: H.Klauk@fkf.mpg.de; and **K. Worhoff**, University of Twente, e-mail k.worhoff@el.utwente.nl.

## **E8** First International Symposium on Semiconductor and Plasmonics-Active Nanostructures for Photonic Devices and Systems (Electronics and Photonics)

This is the first time this symposium has been organized under the auspices of the Electrochemical Society. Its 1<sup>st</sup> edition will cover a wide range of topics related to engineering of photonic devices based on semiconductor and plasmonics-active nanostructures. Papers will be sought on the novel optical and optoelectronic devices and systems based on active semiconductor nanostructures including photonic crystals, quantum dots, and nanowires. Emphasis will be on quantum confinement and/or photonic bandgap-enabled LEDs, photovoltaics, lasers and nonlinear optical devices as well as their system-level integration towards applications in display, photonic circuitry, optical storage and information processing. Plasmonics enhancements will also be a part of the program due to their tie to a number of nanostructured devices. Metallic nanostructures based on focused ion beam milling, electron beam lithography, and synthesis of colloidal nanoparticles are being used for plasmonics enhancement of luminescence and photodetection in both sensing and standard devices. Employing plasmonic design to LEDs and nanoscale lasers will be the subject of interest. Light trapping and enhancement in solar cells through nanostructures, plasmonics and photonic crystals are topics for consideration. Plasmonics enhancement of sensors due to regimes for localized surface plasmon resonance effects and localized electromagnetic field enhancements and designs incorporating two-photon or microcavity effects are sought. Sensing based on plasmonic-enhancement of luminescence or surface enhanced Raman scattering would be considered a part of this subject.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **M. Gerhold**, Army Research Office, e-mail: mike.gerhold@us.army.mil; **D. Rogers**, Nanovation, e-mail: d.j.rogers@nanovation.com; **F. Teherani**, Nanovation, e-mail: fht@nanovation.com; and **Jian Xu**, Penn State University, e-mail: jianxu@psu.edu.

## **E9** State-of-the-Art Program on Compound Semiconductors 51 (SOTAPCS 51) and Wide-Bandgap Semiconductor Materials & Devices 10 (Electronics and Photonics / Sensor)

Compound and wide bandgap semiconductors are a significant enabler of numerous optoelectronic, high-speed, power, and sensor electronic materials, devices, and systems. The

SOTAPOCS 51 and Wide-Bandgap Semiconductor Materials & Devices 10 symposium will address the most recent developments in inorganic compound and wide bandgap semiconductor technology, including traditional III-V materials, III-nitrides, II-VI materials, silicon carbide, diamond, and other emerging materials. Papers on both practical and fundamental issues are solicited. The following areas are of particular interest: (1.) Advances in bulk and epitaxial growth technologies; (2.) Advances in device processing; (3.) Novel electronic, optoelectronic, and sensor devices; (4.) Schottky and ohmic contact technology; (5.) Dielectric properties and passivation; (6.) Wafer bonding and packaging; (7.) *In situ* and *ex situ* process monitoring; (8.) Material characterization and wafer level testing and mapping; (9.) Process induced defects; and (10.) Reliability and device degradation mechanisms.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **E. Stokes**, University of North Carolina at Charlotte, e-mail: ebstokes@uncc.edu; **O. Ambacher**, Fraunhofer Institute for Applied Solid State Physics IAF, e-mail: Oliver.Ambacher@iaf.fraunhofer.de; **R. Goldhahn**, Technical University of Ilmenau, e-mail: ruediger.goldhahn@tu-ilmenau.de; **J. Huang**, National Taiwan University, e-mail: jjhuang@cc.ee.ntu.edu.tw; **G. Hunter**, NASA Glenn Research Center, e-mail: ghunter@grc.nasa.gov; **E. Kohn**, University of Ulm, e-mail: erhard.kohn@uni-ulm.de; **C. O'Dwyer**, University of Limerick, e-mail: Colm.ODwyer@staffmail.ul.ie; and **M. E. Overberg**, Sandia National Labs, e-mail: meoverb@sandia.gov.

## **E10** ULSI Process Integration 6 (Electronics and Photonics)

The sixth symposium on ULSI Process Integration will provide a forum for reviewing and discussing all aspects of process integration. Contributed papers are solicited in the following areas: (1.) Trends in nanoscaled technologies, 45 nm and beyond on DRAM, SRAM, flash memory, high density logic/low power, RF, mixed analog/digital, high voltage, process integration yield; (2.) CMP chemistries, low-k process integration, gate stacks, metal gates, rapid thermal processing integration, silicides; (3.) Gate dielectrics (ultra-thin, high-k) and dual gates, stacks (barriers) electrode/dielectrics for memory capacitors and transistors, source-drain and channel processing, rapid thermal processing, novel isolation schemes, ultra shallow junction, plasma processing aspects, sub 45 nm transistor process/device integration issues; (4.) Multilevel integrated structures, copper interconnects and barriers, air-gap structures, metal fill technologies, optical interconnects, alternative metallization schemes; and (5.) Novel memory elements, emerging devices, carbon nanotubes, novel materials, vertical and 3D integration, alternative high mobility substrates (SOI, sSi, SiGe, GeOI...), strain engineering issues, hybrid III-V integration.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **C. Claeys**, IMEC, e-mail: claeys@imec.be; **S. Deleonibus**, CEA-LETI, e-mail:

sdeleonibus@cea.fr; **H. Iwai**, Tokyo Institute of Technology, e-mail: h.iwai@ieee.org; **J. Murota**, Tohoku University, e-mail: murota@riec.tohoku.ac.jp; and **M. Tao**, University of Texas, e-mail: mtao@uta.edu.

## **F** — Electrochemical / Chemical Deposition and Etching

### **F1** Current Trends in Electrodeposition, an Invited Symposium (Electrodeposition)

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

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **W. Schwarzacher**, University of Bristol, e-mail: W.Schwarzacher@bristol.ac.uk.

### **F2** Electrodeposition of Nanoengineered Materials and Devices 3 (Electrodeposition)

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

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **N. V. Myung**, University of California-Riverside, e-mail: myung@engr.ucr.edu; **S. Brankovic**, University of Houston, e-mail: stanko.brankovic@mail.uh.edu; **L. Deligianni**, IBM, T.J. Watson Research Center, e-mail: lili@us.ibm.com; **J. Mallett**, University of Virginia, e-mail: jon.mallett@nist.gov; **E. J. Podlaha**, Northeastern University, e-mail: e.podlaha-murphy@neu.edu; **J. F. Rohan**, Tyndall National Institute, University College Cork, e-mail: james.rohan@tyndall.ie; **J. Talbot**, University of California, e-mail: jtalbot@ucsd.edu; **N. J. Tao**, Arizona State University, e-mail: nongjian.tao@asu.edu; and **G. Zangari**, University of Virginia, e-mail: e-mail: gz3e@virginia.edu.



**F3****EuroCVD 17 and CVD 17**  
(High Temperature Materials / Dielectric Science  
and Technology / Electronics and Photonics)

EuroCVD 17 and CVD 17 will continue the long-standing tradition of joint ECS/EuroCVD Conferences begun in Paris in 1977. The last joint meeting was held in Paris in 2003, while EuroCVD-16 was organized in Den Haag, Netherlands (2007). The goal of these conferences is to highlight common areas of interest and particular challenges for scientists working in the field of chemical vapor deposition and related topics, from both fundamental and applied points of view.

In this context, EuroCVD 17 and CVD 17 will provide the opportunity to present **leading research activities in the field from both academic and industrial perspectives**, facilitating interactions and information exchange between people working in different sub-fields of the CVD community and providing opportunities to open up new directions for technology transfer.

CVD techniques are versatile and convenient processes for development and optimization of inorganic, organic and hybrid materials. The tremendous growth of related activities has been significantly fueled by the possibility of producing nano-organized architectures (such as composites, wires, and nanotubes) and to tailor their characteristics by design according to the specific process paths. As a result, CVD manufacturing of a wide range of products, from heterogeneous catalysts and micromechanical systems, through electronic and optical devices, to smart coatings and chemical sensors, has undergone remarkable development, opening up interesting possibilities for further improvement of functional performance in many areas.

Papers describing the use of CVD to deposit **innovative thin films and nanomaterials** (such as biomaterials, inorganic-organic polymers, nano-porous materials, sensing and luminescent devices) are particularly welcome, as are contributions focusing on **advanced routes** (plasma- or laser-assisted, hybrid strategies) and on the improvement of process control either by theoretical modeling or by the use of advanced characterization techniques.

On this basis, EuroCVD 17 and CVD 17 is intended to be focused on, but not limited to, the following general topics: (1.) Fundamentals (thermodynamics and kinetics, gas-phase and surface chemistry); (2.) Modeling and simulation (growth, process and precursor design); (3.) Innovative CVD strategies (plasma-assisted, ALD, iCVD, novel precursors, CVD techniques for large-scale applications); (4.) Novel materials and complex; (5.) Innovative processing tools and related equipment (reaction and gas delivery systems, process control and in-situ diagnostics, characterization); and (6.) Advanced applications (biomaterials, chemical sensors, nano-porous systems).

Further details, including a list of confirmed invited speakers, are available at: [www.eurocvd17.org](http://www.eurocvd17.org).

Papers accepted for presentation will be published in a proceedings volume that will be available at the meeting. Therefore, **the following deadlines must be strictly met.**

**Brief Abstract Submission** — A 100-word abstract and full author names, addresses, telephone and fax numbers, and e-mail addresses should be submitted by **February 13, 2009**, to Davide Barreca ([davide.barreca@unipd.it](mailto:davide.barreca@unipd.it)). **These preliminary abstracts should be sent only by e-mail as attached Word files.** They will be used for planning purposes, and authors will be notified of their acceptance by March 6, 2009.

**Full Abstract Submission** — Full abstracts should be submitted via the ECS web submission system, by **April 3, 2009**. **Note that this is earlier than the general ECS abstract deadline.**

**Manuscript Submission** — A **hard-cover issue of ECS Transactions will be available "AT" the meeting. All authors whose abstracts are accepted**

**for presentation (oral or poster) are obligated to submit their full text manuscript for the issue no later than May 8, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.** These manuscripts will be subjected to peer review, and an opportunity for revision will be provided.

Questions and inquiries should be sent to the symposium organizers: **M. T. Swihart**, SUNY-Buffalo, USA, e-mail: [swihart@eng.buffalo.edu](mailto:swihart@eng.buffalo.edu); **R. Adomaitis**, U. of Maryland, USA, e-mail: [adomaiti@umd.edu](mailto:adomaiti@umd.edu); **D. Barreca**, ISTM-CNF, Padova, Italy, e-mail: [davide.barreca@unipd.it](mailto:davide.barreca@unipd.it); **C. Claeys**, IMEC, e-mail: [claeys@imec.be](mailto:claeys@imec.be); and **K. Worhoff**, University of Twente, e-mail [k.worhoff@el.utwente.nl](mailto:k.worhoff@el.utwente.nl).

**F4****Fundamentals of Electrochemical Growth:  
From UPD to Microstructures –  
Symposium in Memory of Prof. Evgeni  
Budevski**  
(Electrodeposition)

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

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **S. R. Brankovic**, University of Houston, e-mail: [stanko.brankovic@mail.uh.edu](mailto:stanko.brankovic@mail.uh.edu); **P. Allongue**, Ecole Polytechnique CNRS UMR, e-mail: [philippe.allongue@polytechnique.fr](mailto:philippe.allongue@polytechnique.fr); **M. Innocenti** Università di Firenze; e-mail: [m.innocenti@unifi.it](mailto:m.innocenti@unifi.it); **L. Peter**, Hungarian Academy of Sciences, e-mail: [lpeter@szfki.hu](mailto:lpeter@szfki.hu); **N. Vasiljevic**, University of Bristol. E-mail: [N.Vasiljevic@bristol.ac.uk](mailto:N.Vasiljevic@bristol.ac.uk); and **G. Zangari**, University of Virginia, e-mail: [gz3e@virginia.edu](mailto:gz3e@virginia.edu).

**F5****Semiconductors, Metal Oxides, and  
Composites: Metallization and  
Electrodeposition of Thin Films and  
Nanostructures**  
(Electrodeposition)

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

Specific topics of interest include, but are not limited to: (1.) Metal electrodeposition onto semiconductors, metal oxides, electronic materials and resistive substrates: solar cell applications, Ohmic and Schottky contact formation, metal gates, electrical connections, direct plating, etc. (2.) Electrochemical and electrophoretic deposition of nanoparticle coatings: electrochemical nucleation of high

density metal islands, effect of additives, chemical solution deposition, colloid chemistry, etc. (3.) Electrodeposition of metal oxides, semiconductors, and nanocomposites: solar cells, low-cost (thin film) transistors applications, particle reinforced composites, CNT/metal composites, etc. (4.) Nanofabrication by electrodeposition: quantum dots, nanowires, nanorods, nanotubes and complex architectures, template-assisted deposition, structure - properties relations, etc. (5.) Electrochemical modification and decoration of nanostructures: CNT with metal nanoparticles, surface selectivity, self assembled monolayers, etc.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **G. Oskam**, CINVESTAV-IPN, e-mail: oskam@mda.cinvestav.mx; **J. Fransaer**, KU Leuven, e-mail: jan.fransaer@mtm.kuleuven.be; **X. Shao**, IBM Thomas J. Watson Research Center, e-mail: shaox@us.ibm.com; and **P. M. Vereecken**, IMEC, Nano group, e-mail: Philippe.Vereecken@imec.be.

## H — Fullerenes, Nanotubes, and Carbon Nanostructures

H1

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

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

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **R. B. Weisman**, Rice University, e-mail: weisman@rice.edu; **S. De Gendt**, IMEC, Belgium, degendt@imec.be; **M. Kappes**, Institute for Physical Chemistry, University of Karlsruhe, e-mail: Kappes@chemie.uni-karlsruhe.de; **M. Meyyappan**, NASA Ames Research Center, CA, m.meyyappan@nasa.gov; and **M. Prato**, University of Trieste, e-mail: prato@units.it.

H2

## Nanostructure and Function of Fullerenes (Fullerenes, Nanotubes, and Carbon Nanostructures)

This symposium will focus on the nanostructure and function of fullerenes and related materials. Papers are invited in the following areas of fullerenes: (1.) functionalization of fullerene for nanostructure and functional material development. (2.) nanostructure, (photo-)electron transfer, spectroelectrochemistry and solid-state physics of fullerenes and metallofullerenes.

**An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are encouraged to submit their full text manuscript for the issue no later than November 6, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.**

Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **N. Martin**, Complutense University, e-mail: nazmar@quim.ucm.es; **D. M. Guldi**, Institute for Physical Chemistry, Friedrich-Alexander-Universität, e-mail: dirk.guldi@chemie.uni-erlangen.de; **A. Hirsch**, Institute for Organic Chemistry, Friedrich-Alexander-Universität, e-mail: andreas.hirsch@chemie.uni-erlangen.de; and **J. F. Nierengarten**, Groupe de Chimie des Fullerènes et des Systèmes Conjugués, e-mail: jfnierengarten@lcc-toulouse.fr.

## I — Physical and Analytical Electrochemistry

I1

### Physical, Electroanalytical and Bioanalytical Electrochemistry (Physical and Analytical Electrochemistry)

This symposium invites papers in the areas of physical, electroanalytical, and bioanalytical electrochemistry. Topics covered include kinetics of electron and ion transfer reactions, interfacial phenomena at solid/liquid and liquid/liquid interfaces, modified electrodes, fabrication and characterization of nanostructured electrode surfaces, adsorption and self-assembly, novel spectroscopic and surface imaging techniques.

Among other important topics we would like to address certain aspects of electrochemistry of biomolecules and biomacromolecules, hybridization, damage and denaturation of DNA, interactions of drugs with biomolecules, fundamental and applied aspects of electrochemical biosensors, biocells and bioelectrocatalysis, micro and nanoelectrodes, as well as new ideas in electroanalysis.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizer: **P. Kulesza**, University of Warsaw, e-mail: pkulesza@chem.uw.edu.pl; **M. Fojta**, Czech Academy of Sciences, fojta@ibp.cz; **A. Kuhn**, University of Bordeaux, Kuhn@enscpb.fr; **S. Minteer**, Saint Louis University, minteers@slu.edu; and **Z. Stojek**, University of Warsaw, stojek@chem.uw.edu.pl.

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## Electrochemistry: Symposium on Interfacial Electrochemistry in Honor of Brian E. Conway

(Physical and Analytical Electrochemistry / Energy Technology / Battery / Corrosion / Electrodeposition)

On July 9, 2005, the electrochemical community lost one of its most renowned scientists, Prof. Brian E. Conway. This Symposium is being organized to honor his many contributions to the field. For nearly 60 years, Dr. Conway sought to extend the frontiers of electrochemistry with contributions in numerous areas of physical and analytical electrochemistry. He played a key role in the understanding of the importance of interfacial phenomena and the electrical double layer in electrode kinetics. His contributions paved the way for new concepts and methodologies in the areas of electrocatalysis, pseudo-capacitance and supercapacitors, ionic hydration and double-layer effects, industrial Electrolysis, etc. He was a complete electrochemist, making contributions to both the ionic and electrochemical research areas, and drawing on his deep knowledge in both camps. In this symposium, the central theme will be "Interfacial Phenomena in Electrode Kinetics and Electrocatalysis."

Contributions are invited in the following research areas: (1.) Anodic Oxide Film Formation on Noble Metals, and their implications for reaction kinetics and mechanisms; (2.) Adsorption of Neutral and Ionic Solution Species on Electrode Surfaces, and their Role in Electrocatalysis (including Electrosorption Valency and Pseudocapacitive Effects); (3.) Electrochemical Supercapacitors and Batteries; (4.) Organic Electrocatalysis, including Fuel Cell Systems; (5.) Industrial Electrolysis – DSA and other Oxide Anodes; (6.) Use of AC Impedance Spectroscopy in Interfacial Electrochemistry; (7.) Electrocatalytic Properties of Electrodeposited Metals and Alloys; and (8.) Open Questions in Interfacial Electrochemistry, Especially Related to the Research of B. E. Conway.

**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 November 6, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.**

Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **B. MacDougall**, National Research Council of Canada, e-mail: barry.macdougall@nrc-cnrc.gc.ca; **C. Bock**, National Research Council of Canada, e-mail: Christina.bock@nrc-cnrc.gc.ca; **E. Gileadi**, Tel-Aviv University, gileadi@post.tau.ac.il; **S. Gottesfeld**, CellEra, e-mail: shimshon@cellera.biz; **D. Harrington**, University of Victoria, e-mail: dharr@uvic.ca; **J. Leddy**, University of Iowa, e-mail: johna-leddy@uiowa.edu; **W. Lorenz**, University of Karlsruhe, e-mail: wolfgang.lorenz@ihe.uka.de; **B. Scrosati**, Univ. of Roma "La Sapienza," e-mail: bruno.scrosati@uniroma1.it; **S. Trasatti**, Univ. Milan, e-mail: sergio.trasatti@unimi.it, and **S. Morin**, York University, e-mail: smorin@yorku.ca.

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## Physical and Analytical Electrochemistry in Ionic Liquids

(Physical and Analytical Electrochemistry)

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

liquids (e.g. conductivity, ion transport, electrochemical windows). (5.) Experimental aspects of electrochemistry in ionic liquids. (6.) The electrochemistry of solutes in ionic liquids. (7.) Electroanalytical determinations in ionic liquids. (8.) Electrodeposition in ionic liquids (e.g. nucleation, deposition of alloys, characterization of electroactive species, and surface characterization). (9.) Electrochemical aspects of biological materials and systems in ionic liquids.

**An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are encouraged to submit their full text manuscript for the issue no later than November 6, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.**

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

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

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

This symposium will address all aspects of sensor, actuator, and microsystems research and development. The inclusion of sensors and actuators into a range of application environments has been significantly increasing in order to provide improved system capabilities such as increased performance, decreased environmental impact, or 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 the 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.

This symposium intends to bring together a range of interdisciplinary topics and covers all materials aspects of sensors, actuators, and microsystems. Primary emphasis will be placed upon applied aspects of the materials, synthesis, evaluation, and development strategies of novel materials/device configurations for sensing and actuating functions as well as integrated microsystems. High temperature as well as low temperature applications will be discussed. Papers are solicited in, but not limited to, the following areas: (1.) physics and chemistry of sensor and actuator materials, fabrication and characterization of novel compositions; (2.) novel routes for the synthesis of materials with grain (pore) size control and distributions; (3.) novel sensor and actuator concepts, design, modeling, and verification; (4.) sensing systems that include sampling systems and actuators like sensor arrays, electronic noses and tongues; (5.) physical, chemical, and biological sensors and actuators, such as gas, humidity, ion or molecular sensors, their system integration and actuating functions; (6.) optical, RF and wireless sensors and actuators, such as fiber optic sensors, microwave sensors, optical and wireless integrations; (7.) emerging technologies and applications including sensors based on nanotechnology;



and (8.) novel techniques to expand and insure sensor stability and reliability.

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Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **R. Mukundan**, Los Alamos National Lab, e-mail: mukundan@lanl.gov; **Z. Aguilar**, Vegrandis, LLC, e-mail: zapaguilar@yahoo.com; **M. Carter**, Eltron Research Inc., e-mail: mtcarter@eltronresearch.com, **P. Hesketh**, Georgia Institute of Technology, e-mail: ph87@mail.gatech.edu, and **M. Josowicz**, Georgia Institute of Technology, e-mail: mira.josowicz@chemistry.gatech.edu.

## **J2 Impedance Techniques: Diagnostics and Sensing Applications**

(Sensor / Physical and Analytical Electrochemistry / Corrosion / Industrial Electrochemistry and Electrochemical Engineering)

The purpose of this symposium is to bring together leading experts with a variety of different experimental and theoretical skills working in area of electrochemical impedance technology. Electrochemical impedance can be employed for materials analysis and condition monitoring. In addition to determination of chemical states, it can be also used to monitor electrical parameters such mechanical variables as motion, pressure, acceleration, and fluid level. Impedance spectroscopy-based measurements represent a rich multi-discipline area of science that has been applied to a large number of important areas of research, such as: Corrosion studies and corrosion control; Monitoring of properties of electronic and ionic conducting polymers and coatings; Measurements in energy storage, batteries, and fuel cells-related systems; Mechanical measurements; Biological, biocellular, and biomedical sensors and drug delivery systems; Measurements in semiconductors, solid electrolytes, and electronic conductors; Studies of electrochemical kinetics, reactions and processes and their control.

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

**An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are encouraged to submit their full text manuscript for the issue no later than November 6, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.**

Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **V. Lvovich**, Lubrizol Corp., e-mail: vlvovich@ameritech.net; **D. C. Hansen**, University of Dayton Research Institute, e-mail: douglas.hansen@udri.udayton.edu; **M. E. Orazem**, University of Florida, e-mail: meo@che.ufl.edu; **B. Tribollet**, Université P. et M. Curie, e-mail: bernard.tribollet@upmc.fr; and **P. Vanyssek**, Northern Illinois University, e-mail: pvanysek@niu.edu.

## **J3 Smart Sensing and Sensor Networks for Independent Living, Medical, Industrial, and Aerospace Applications** (Sensor)

The introduction of silicon technology and processing techniques has enabled a potential revolution in sensing technology and applications. The ability to produce smart sensor systems within a single compact structure that include, e.g., sensors, a microprocessor, signal conditioning, data processing and storage, power, and communication vastly expands the information that can be provided from an individual sensor. Combining a number of these smart sensors to form a sensor network enables significantly broader and expanded understanding of the environments far beyond that which could be provided by any single measurement. This symposium examines a wide range of smart sensor technology and sensor networks that are being developed, as well as effects of this evolving technology on a range of application.

For example, one area where smart sensing technology can have a significant effect is in healthcare especially in enabling independent living for an aging population. The elderly segments of populations worldwide are increasing at a rate that, in some cases, is twice as fast as that for the rest of the population. The overwhelming challenge of how best deal with the problems associated with aging can be addressed with, e.g., smart sensor technologies that can provide on an individual basis the capability to diagnosis and manage disease as well as provide assisted workplace and living environments at an unprecedented level. Such technologies could not only improve the living conditions of individuals, but also significantly decrease the effect of an aging population on society as a whole.

Similar examples of the potential impact of smart sensor technology exist in a range of fields. Smart sensor systems and networks can have a profound impact on applications such as food safety and biological hazard detection; safety hazard detection and warning; environmental monitoring both locally and on a global scale; as well as industrial and aerospace applications. For example, smart sensors and sensor networks can enable intelligent systems which can monitor themselves and respond to changing conditions optimizing safety and performance. The approach is to have distributed sensor systems feeding information from a multiple locations to improve the overall understanding of system conditions.

Papers are accepted on all aspects of smart sensors and sensor networks, as well as their application. This includes the fundamental processes and engineering smart sensor system and networks including issues such as component fabrication, system integration, and communication infrastructure. Fields of use including independent living (as described above), as well as health care, industrial, aerospace, environment monitoring, safety, and security. We organize this symposium to bring visibility to this important enabling technology and its potential impact on a range of global issues.

**An issue of *ECS Transactions* is planned to be published "AFTER" the meeting. All authors accepted for presentation are encouraged to submit their full text manuscript for the issue no later than November 6, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.**

Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **G. Hunter**, NASA Glenn Research Center, e-mail: ghunter@grc.nasa.gov; **W. J. Buttner**, National Renewable Energy Laboratory, e-mail: William\_Buttner@NREL.gov; **J. Li**, NASA Ames Research Center, jingli@mail.arc.nasa.gov; **A. Simonium**, Auburn University, e-mail: als@eng.auburn.edu; **J. R. Stetter**, SRI International, joseph.stetter@sri.com; and **U. Weimar**, Tuebingen, e-mail: upw@ipc.uni-tuebingen.de.

**J4**

## Physics and Chemistry of Luminescence Materials, W. M. Yen Memorial Symposium (Luminescence and Display Materials)

This symposium is dedicated to the late Professor W. M. Yen, who was a leading figure in the field of solid state spectroscopy, and from the very beginning a strong supporter and leader of the Luminescence and Display Materials Division.

To commemorate Professor Yen's achievements, we are inviting presentations, both fundamental and applied, in the fields he worked in: (1.) identification of luminescent centers, loss centers and non-radiative processes; (2.) synthesis and characterization of novel phosphor materials; (3.) persistent phosphor materials; (4.) high energy (X-ray, gamma ray, cathode ray, VUV) excitation of luminescence, including scintillators; (5.) electroluminescence; (6.) luminescence

from glasses, and (7.) theoretical analysis of luminescence phenomena; and (8.) synthesis and characterization of luminescent nanoparticles. Selected contributions will be chosen for invited talks.

**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 May 29, 2009. All manuscripts will be submitted online, and must be in either MS Word or PDF format.**

Abstracts should be submitted electronically to the ECS headquarters, and questions and inquiries should be sent to the symposium organizers: **U. Happek**, The University of Georgia, e-mail: uhapek@physast.uga.edu; **J. Collins**, Wheaton College, e-mail: jcollins@wheatoncollege.edu; **D. Lockwood**, National Research Council, e-mail: David.Lockwood@nrc-cnrc.gc.ca; **A. M. Srivastava**, GE Global Research, e-mail: srivastava@crd.ge.com.



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- ▶ Biomedical Applications and Organic Electrochemistry
- ▶ Corrosion, Passivation, and Anodic Films
- ▶ Dielectric and Semiconductor Materials, Devices, and Processing
- ▶ Electrochemical/Chemical Deposition and Etching
- ▶ Electrochemical Synthesis and Engineering
- ▶ Fullerenes, Nanotubes, and Carbon Nanostructures
- ▶ Physical and Analytical Electrochemistry
- ▶ Sensors and Displays: Principles, Materials, and Processing
- ▶ Nanotechnology

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# Travel Grant Application Vienna, Austria

The Society's Battery, Corrosion, Dielectric, Electrodeposition, Electronics and Photonics, Energy Technology, High Temperature Materials (HTM), Industrial Electrochemistry and Electrochemical Engineering (IEEE), Organic and Biological Electrochemistry (OBE), Physical and Analytical Electrochemistry, and Sensor Divisions offer travel grants to students presenting papers at the Society's next meeting, in Vienna, Austria, October 4-9, 2009. To apply, complete this application and send it along with a copy of your transcript and a letter from an involved faculty member attesting both to the quality of the student's work and financial needs, and a copy of the student's meeting abstract. For additional information please contact the Division contact below, as requirements might differ between Divisions.

Meeting Site: \_\_\_\_\_

Name: \_\_\_\_\_

School Address: \_\_\_\_\_

Email: \_\_\_\_\_ Phone #: \_\_\_\_\_

Undergraduate Year (U) or Graduate Year (G) - circle one:    U3      U4      G1      G2      G3      G4      G5

Major Subject: \_\_\_\_\_ Grade point average: \_\_\_\_\_ out of possible: \_\_\_\_\_

(please provide a letter of recommendation from your faculty advisor and a copy of your transcript)

Symposium Title (#): \_\_\_\_\_

Title of paper to be presented at the meeting: \_\_\_\_\_

Are you an ECS Student Member of the Society?                       yes                       no

(if not, please additionally submit the Awarded Student Membership application)

Estimated meeting expenditures: \$ \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Check Division under which award is being applied for: (Applications made to multiple Divisions will be rejected)

- Battery-*Send to:* A. Manthiram, Univ. of Texas, ETC 9-104, Austin, TX 78712-0292, USA. E-mail: rmanth@mail.utexas.edu.
- Corrosion-*Send to:* N. Missert, Sandia National Labs, MS 1415, P.O. Box 5800, Albuquerque, NM 87185-0100, USA. E-mail: namisse@sandia.gov
- Dielectric Science & Technology-*Send to:* H. Rathore, IBM, Internal Mail Stop AE1,B/640, 2070 Rte 52, Hopewell Junction, NY 12533, USA. E-mail: rathore@us.ibm.com
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- Sensor-*Send to:* Y-L. Chang, Nanomix, Inc., 5980 Horton Street, Suite 600, Emeryville, CA 94608, USA. E-mail: ychang@nano.com

**Applications for Travel Grants for the Vienna, Austria meeting must be received no later than April 24, 2009.**





The Society's Battery and High Temperature Materials (HTM) Divisions offer travel grants to postdoctoral associates, junior faculty, and other young investigators presenting papers at the Society's meeting in Vienna, Austria, October 4-9, 2009. To apply, complete this application and send it along with a copy of your CV and a letter of recommendation from an established researcher attesting both to the quality of the applicant's work and financial needs, and a copy of the applicant's meeting abstract. For additional information please contact the Division contact below, as requirement might differ between Divisions.

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Name: \_\_\_\_\_

Organization: \_\_\_\_\_

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Symposium Title (#): \_\_\_\_\_

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Title of paper to be presented at the meeting: \_\_\_\_\_

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Estimated meeting expenditures: \$ \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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Battery--Send to: B. Y. Liaw, University of Hawaii Natural Energy Institute, 1680 East-West Road, Post 109, Honolulu, HI 96822, USA. E-mail: bliaw@hawaii.edu

HTM--Send to: Tim Armstrong, Carpenter Technology, Bldg. 68, PO Box 14662, Reading, PA 19612, USA. E-mail: tarmstrong@cartec.com

**Applications for Travel Grants for the Vienna, Austria meeting must be received no later than April 24, 2009.**