

Early Bird Registration



All photos (except bottom left) are by Greater Boston Convention & Visitors Bureau. Bottom left photo by Dinia Agrawala.

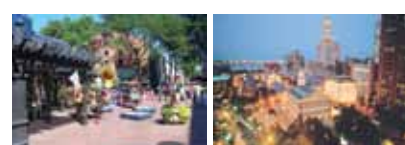
Boston
M a s s a c h u s e t t s



**220th ECS Meeting
& Electrochemical Energy Summit**

October 9-14, 2011

Westin Boston Waterfront and Boston Convention & Exhibition Center | Boston, MA



Featured Speaker



2011 Olin Palladium Award Lecture

Monday, October 10

The Use of Renewable Energy in the Form of Methane via Electrolytic Hydrogen Generation

by Koji Hashimoto

A look at world energy consumption from 1980 to 2008 indicates that the continuation of increases in energy consumption will lead to complete exhaustion of petroleum, natural gas, uranium, and coal reserves by the middle of this century. In order to avoid a situation of no fuel and intolerable global warming, we must immediately establish new technology to use only renewable energy, through which all of the world's population can survive.

For more than 20 years, we have been proposing global carbon dioxide recycling. Global carbon dioxide recycling consists of power generation by solar cells in deserts, hydrogen production by seawater electrolysis and methane production by the reaction of hydrogen with carbon dioxide at nearby desert coasts, methane combustion and carbon dioxide capture by energy consumers, and transportation of carbon dioxide to desert coasts.

Among systems in global carbon dioxide recycling, seawater electrolysis and methane formation from carbon dioxide have not been industrially performed. We have created anodes for oxygen evolution without toxic chlorine formation in

seawater electrolysis, energy-saving cathodes for hydrogen production, and catalysts for methane formation with almost 100% selectivity by the rapid reaction of carbon dioxide with hydrogen. In 1995, we constructed a prototype plant for global carbon dioxide recycling, and in 2003, constructed an industrial scale pilot plant consisting of hydrogen production by seawater electrolysis and carbon dioxide methanation. The improvement of materials and systems and the construction of larger test plants are in progress.

Created materials, systems, and the current status of global carbon dioxide recycling will be presented.

KOJI HASHIMOTO'S research interests include creation of corrosion-resistant amorphous and other novel materials, electrodes for electrolysis of aqueous solutions and catalysts for fuel production, applications of modern surface-analytical techniques, passivity, role of corrosion-resistant elements, and the effect of nanocrystalline heterogeneity on corrosion resistance.

The latter study is focused on key materials and systems for a supply of renewable energy in the form of methane. The key materials are the cathode for hydrogen production and the anode for only oxygen formation without chlorine evolution in seawater electrolysis and the catalyst for methanation of carbon dioxide with hydrogen. Dr. Hashimoto built a prototype plant at Tohoku University in 1995 and industrial scale plants of seawater electrolysis and carbon dioxide methanation at Tohoku Institute of Technology in 2003. Recent efforts have been concentrated in decreasing the price of methane by improvement of materials and systems in addition to construction of larger systems.



Come see the Toyota Fuel Cell Hybrid Vehicle-Advanced (FCHV-adv) on display at the Westin Boston Waterfront from Sunday, October 9 through Tuesday, October 11, 2011. (Photos courtesy of Toyota, SunHydro, and Proton OnSite)

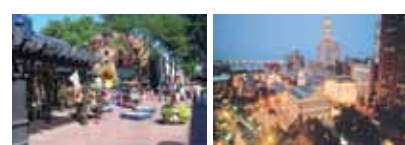


Register Today
and take advantage of
early bird discounts—
All of the events of the

Electrochemical Energy Summit are included with your meeting registration!

ECS welcomes you to its **first-ever international Electrochemical Energy Summit, October 9-11**, being held in conjunction with the 220th ECS Meeting from at the Westin Boston Waterfront and the Boston Convention and Exhibition Center.

A special opening session, 3-day poster session, receptions, and a panel discussion are all included with your Meeting Registration—see pages 3-4 for more details about this dynamic event.



ELECTROCHEMICAL ENERGY SUMMIT: AN INTERNATIONAL SUMMIT IN SUPPORT OF SOCIETAL ENERGY NEEDS

In conjunction with the 220th ECS Meeting

ECS is proud to present our first-ever international Electrochemical Energy Summit from October 9-11, being held in conjunction with the 220th ECS Meeting at the Westin Boston Waterfront and the Boston Convention and Exhibition Center.

Global energy needs continue to grow with population and industrialization. Economic, political, and environmental issues are largely dictated by energy needs. The first Electrochemical Energy Summit—An International Summit in Support of Societal Energy Needs—brings together policy makers and researchers to educate about the critical issues of energy needs and the pivotal research in electrochemical energy that can address societal needs. As a participant, you will learn about these societal energy needs and electrochemical energy technologies and outline your own pathways to implement electrochemical energy solutions.

Gather together with policy makers, program managers, and energy experts at the Electrochemical Energy Summit . . .

- Attend the opening session on Sunday, October 9, 2011.
- Participate in a three-day poster session and associated reception.
- A Directory of Electrochemical Energy Research will be generated from the poster attendees and an electronic version will be made available at no cost.
- Engage in a panel discussion designed to integrate the questions of energy with the solutions that electrochemical power systems can provide.

Meet the Electrochemical Energy Summit Panel Participants. . .



Krishnan Rajeshwar
Distinguished University Professor and Associate Dean of the College of Science, University of Texas at Arlington

KRISHNAN RAJESHWAR is the panel Moderator. Prof. Rajeshwar is a Distinguished University Professor and Associate Dean of the College of Science at the University of Texas at Arlington. He is the Editor of *Interface*. His research interests

include photoelectrochemistry; solar energy conversion; renewable energy; materials chemistry; semiconductor electrochemistry; and environmental chemistry. Prof. Rajeshwar is an ECS Fellow and received the ECS Energy Technology Division Research Award in 2009. He has edited books, special issues of journals, and conference proceedings and is the author of over 450 refereed publications.



Eric D. Isaacs
Director, Argonne National Laboratory

ERIC D. ISAACS, a prominent University of Chicago physicist with a PhD from the Massachusetts Institute of Technology in the area of magnetic semiconductors, is the President of UChicago Argonne, LLC, and Director of Argonne National Laboratory.

He previously served as Argonne's deputy laboratory director for programs, leading the laboratory's strategic planning process and overseeing the laboratory-directed research and development program and educational programs, and Director of Nanoscale Materials. He was a professor of physics in the University of Chicago's James Franck Institute, and spent 13 years at Bell Laboratories, where he was a member of the technical staff, Director of the Materials Physics Research Department, and Director of the Semiconductor Physics Department. As a postdoctoral fellow at Bell Laboratories he studied magnetism and correlated electronic systems, mostly with synchrotron-based X-ray techniques. Dr. Isaacs is a fellow of the American Physical Society and has served on a number of national scientific advisory committees, including the Basic Energy Sciences Advisory Committee, and has authored or coauthored more than 140 scientific papers and presentations.



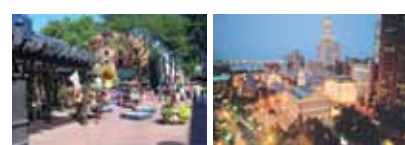
Tatsuya Shinkawa
Chief Representative, New Energy and Industrial Technology Development Organization (NEDO)

TATSUYA SHINKAWA is the Chief Representative, Washington, DC international office, of New Energy and Industrial Technology Development Organization (NEDO), Japan. Previously he worked on the electricity policy, nuclear safety policy, and economic and industrial policy in Japan's Ministry of Economy, Trade, and Industry (METI) and was in charge of the electricity policy from 2000 to 2004. He designed the LLP law of Japan and also was formerly Director, Human Resource Policy Office, Economic and Industrial Policy Bureau, METI. He earned his master's degree at Kyushu University, Interdisciplinary Graduate School of Engineering Sciences, Japan, and was a visiting researcher in Stanford University.



Detlef Stolten
Director of the Institute of Energy Research/ Fuel Cells, Juelich Research Center

DETLEF STOLTEN received his doctorate in Ceramics from the University of Technology at Clausthal, Germany and served as a research scientist with Robert Bosch, and group and project leader with Daimler Benz/Dornier prior to joining the Juelich Research Center. He is a full Professor for Fuel Cell Technology at the University of Technology (RWTH) at Aachen, Germany. Professor Stolten chaired the Strategic Research Agenda for Hydrogen and Fuel Cells of the EU until 2005 and is the current chairman of the Executive Committee of the IEA Annex Advanced Fuel Cells and the cochairman of IEA's Expert Group on Science for Energy. The author of two books and member of the



advisory board of *Fuel Cells*, Professor Stolten's research focuses on fuel cells and hydrogen comprising electrochemistry, stack technology and energy process engineering of SOFC, DMFC, high temperature PEM, liquid fuel reforming systems and auxiliary power units as well as water electrolysis. Additionally, he heads a group working on carbon separation in power plants.



John A. Turner
Research Fellow, National
Renewable Energy Laboratory

JOHN A. TURNER, holds a PhD from Colorado State University, served a postdoctoral appointment at the California Institute of Technology, and is a Fellow of the Renewable and Sustainable Energy Institute. He is currently a Research Fellow at the National Renewable Energy

Laboratory, conducting research with enabling technologies for the implementation of hydrogen systems into the energy infrastructure. His research includes the direct conversion (photoelectrolysis) systems for hydrogen production from sunlight and water, catalysts for the hydrogen and oxygen reactions, materials for advanced fuel cell membranes, and corrosion studies of fuel cell metal bipolar plates. Other work involves the study of electrode materials for high energy density lithium batteries and fundamental processes of charge transfer at semiconductor electrodes. He is a two-time recipient of the Midwestern Research Institute President's Award for Exceptional Performance in Research, and has received several other awards including six Outstanding Mentor Awards from the U.S. Department of Energy for his work with undergraduate students. He is the author or coauthor of over 130 peer-reviewed publications and coeditor of the *Journal of Renewable and Sustainable Energy*.



Mark Verbrugge
Director of Chemical Sciences and Materials
System Laboratory,
General Motors

After receiving his doctorate in chemical engineering from the College of Chemistry at the University of California (Berkeley), **MARK VERBRUGGE** began his nearly 25-year General Motors career with the GM Research Labs. During his time at GM he was awarded a Sloan Fellowship to the Massachusetts Institute of Technology, where he received an MBA. He then returned to join GM's Advanced Technology Vehicles (ATV) as Chief Engineer for Energy Management Systems. He later rejoined the GM Research Labs (now the Chemical Sciences and Materials Systems Laboratory) as Director of the Materials and Processes Lab, which maintains global research programs ranging from chemistry, physics, and materials science to the development of structural subsystems and energy storage devices. Having published and patented in a variety of technical areas, early into his career he received the Norman Hackerman Young Author Award and the ECS Energy Technology Award. Honored with several internal GM awards, he also received a Lifetime Achievement Award from the United States Council for Automotive Research and was elected to the National Academy of Engineering.

Hotel Reservations Information



The 220th ECS Meeting and Electrochemical Energy Summit will be held at the Westin Boston Waterfront and the Boston Convention and Exhibition Center (Summer Street, Boston, Massachusetts 02210). We strongly encourage you to stay at the meeting headquarters hotel, the Westin Boston Waterfront,

where your stay will be most enjoyable and convenient. Reservations can be made online from the ECS website at special discounted meeting rates: \$219 Single / \$229 Double. See the ECS website for more details and to make your reservation.

The deadline for reservations is September 9, 2011. Reservations attempted after September 9 will be accepted on a space and rate availability basis.

Companion Registrant Program

Guests of Technical Registrants are invited to register for the 220th Meeting as a "Companion Registrant." The companion registration fee of \$25 (Early-Bird) or \$30 (after September 9) includes admission to non-ticketed social events, an exclusive lounge with beverage service, Monday through Thursday, 0800-1000h, and a special "Welcome to Boston" orientation presented by the Greater Boston

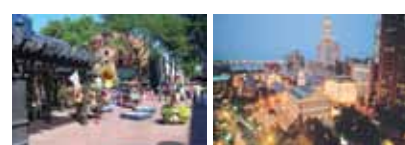
Convention and Visitors Bureau on Monday, October 10 at 0900h in the Companion Registrants Lounge.

Please note that online registration is not available for Companion Registrants. For your convenience, you may register using the attached Early-Bird Registration Form.

Short Courses and Workshops

Six Short Courses will be offered in conjunction with the 220th ECS Meeting. These courses will be held on Sunday, October 9, 2011, from 0900h to 1600h. The registration fee is \$425 for ECS members and \$520 for nonmembers. **Students are offered a 50% discount.** The registration fee for the course covers the course, text materials, continental breakfast, luncheon, and refreshment breaks; it is not applicable to any other activities of the meeting. **The deadline for registration for a course is September 9, 2011.** Interested parties may register using the Early-Bird Registration Form in this brochure. Written requests for refunds will be honored only if received at ECS headquarters before September 16, 2011. **Pre-registration is required.** All courses are subject to cancellation pending an appropriate number of advance registrants. Before making any flight or hotel reservations, please check to make sure the course is running.

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



SHORT COURSE #1

Advanced Impedance Spectroscopy

Mark E. Orazem, Instructor

This course is intended for chemists, physicists, materials scientists, and engineers with an interest in applying electrochemical impedance techniques to study a broad variety of electrochemical processes. The course is best suited for an attendee who has some experience with making impedance measurements and wants to develop a deeper understanding of the technique. The attendee will develop a basic understanding of the technique, the sources of errors in impedance measurements, the manner in which experiments can be optimized to reduce these errors, and the use of regression to interpret measurements in terms of meaningful physical properties. The topics to be covered include:

- the motivation for using impedance spectroscopy advantages as compared to other transient techniques and the conditions under which its use is ideally suited,
- the type of information that can be extracted from impedance measurements, including the limitations of the technique,
- proper selection of experimental parameters,
- the types of errors expected in impedance measurements, and methods to assess the importance of these errors and to reduce their magnitude,
- use of the Kramers-Kronig relations as a tool for evaluating impedance data,
- use of regression techniques and appropriate selection of weighting strategies,
- application of electrical circuit analogues,
- development of mathematical models appropriate for interpretation of impedance spectra in terms of physical properties, and
- applications to different systems including corrosion, fuel cells, characterization of electronic materials, transport through membranes such as skin.

This course is the second in a two course sequence offered at alternating ECS meetings by Prof. Orazem. This course provides a summary of the material presented in the "Basic Impedance Spectroscopy" course and then adds model development based on proposed reaction mechanisms, statistical analysis of impedance data, and regression analysis.

SHORT COURSE #2

Scientific Writing for Scientists and Engineers

D. Noel Buckley, Instructor

This course is intended for scientists and engineers with an interest in improving their skills in writing scientific documents including journal papers, conference proceedings papers, abstracts, reports, theses, and proposals. The course will be of particular interest to researchers and graduate students as well as to university faculty who want to improve both their own writing and that of their students. It will address elements of good writing in science and engineering, including standard practices, terminology, and formatting. It will teach attendees how to present information using properly structured sentences, paragraphs, sections, and

chapters and how to organize experimental results and analysis in a format suitable for publication in the scientific literature as well as in reports, theses, etc. The topics to be covered include:

- structure of documents: papers, theses, reports, etc.;
- standard practices in presentation of scientific information: introduction, experimental, results, analysis, discussion, and conclusions;
- standard writing practices, terminology and formatting: titles, table and figure captions, references;
- structure of textual material, sentences, and paragraphs;
- grammar, punctuation, abbreviations, and acronyms;
- organizing and communicating the experimental details; levels of detail in reporting of procedures; essential principles of measurements and equipment; description of equipment and procedures used;
- presentation of results: standards in the use of graphs and tables for data presentation; quantitative results; accuracy and internal consistency; schematics, micrographs, and pictures;
- references; consistency with the relevant literature; and
- mathematical descriptions, dimensions, and units.

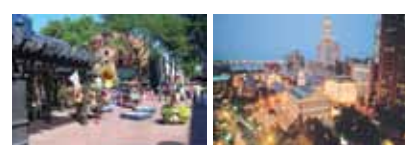
SHORT COURSE #3

Grid Scale Energy Storage

Jeremy P. Meyers, Instructor

This course is intended for chemists, physicists, materials scientists, and engineers to better understand the specific requirements for energy storage on the electric grid. The course will introduce students to the concepts associated with the "smart grid" and the demands that intermittent renewable power sources place on the grid from the perspective of distribution. We will then examine some of the key technologies under consideration for energy storage and the technical targets and challenges that must be addressed. Students will be brought up to date with the current state of the art, and review data from demonstration systems, experimental data from prototype designs, and some modeling and analysis. The following areas will be covered in this short course:

- introduction to the electric grid and renewable power sources;
- current role of energy storage on the grid;
- location and deployment of energy storage on the "smart grid";
- existing technologies for energy storage on the grid;
- adaptation of secondary batteries for grid-based storage applications;
- redox flow batteries;
- high-temperature batteries for energy storage;
- novel battery concepts;
- materials and engineering challenges for grid storage; and
- diagnostics and characterization techniques.



SHORT COURSE #4

Operation and Exploitation of Electrochemical Capacitor Technology

John R. Miller, Instructor

Electrochemical Capacitors (ECs), sometimes called supercapacitors or ultracapacitors, are receiving increased attention for use in power sources of many applications because they offer extraordinarily high reversibility, provide unexcelled power density, and have exceptional cycle-life. Combination systems, including those with batteries and capacitors, IC engines and capacitors, and fuel cells with capacitors are now appearing and being used to increase the energy efficiency of vehicles and industrial equipment like fork lifts, trams, and overhead cranes by capturing energy that is normally wasted. Systems developed specifically for grid power quality applications are now appearing.

This tutorial is targeted at technologists interested in understanding and exploiting electrochemical capacitor technology. The basics are covered first, including a description of the nature and significance of electric double layer charge storage, the general design of such products, and the similarities and differences between these devices and traditional capacitors and batteries. Two-terminal electrical measurement techniques are discussed and test data is used to develop equivalent circuit models. Power/energy behavior and tradeoffs are presented along with reliability design. Many example applications are covered in detail. The goal of the tutorial is to provide basic understanding, necessary tools, and sufficient operating information to allow direct and successful advancement and/or exploitation of electrochemical capacitor technology.

SHORT COURSE #5

Polymer Electrolyte Fuel Cells

Hubert Gasteiger and Thomas Schmidt, Instructors

This short-course develops the fundamental thermodynamics and electrocatalytic processes critical to polymer electrolyte fuel cells (PEFCs including direct methanol and alkaline membrane FCs). In the first part, we will discuss the relevant half-cell reactions, their thermodynamic driving forces, and their mathematical foundations in electrocatalysis theory (e.g., Butler-Volmer equations). Subsequently, this theoretical framework will be applied to catalyst characterization and the evaluation of kinetic parameters like activation energies, exchange current densities, reaction orders, etc.

In the second part of the course, we will illuminate the different functional requirements of actual PEFC (incl. DMFC and AMFC) components and present basic *in situ* diagnostics (Pt surface area, shorting, H₂ crossover, electronic resistance, etc.). This will be used to develop an in-depth understanding of the various voltage loss terms that constitute a polarization curve. Finally, we will apply this learning to describe the principles of fuel cell catalyst activity measurements, the impact of uncontrolled-operation events (e.g., cell reversal), and the various effects of long-term materials degradation.

To benefit most effectively from this course, registrants should have completed at least their first two years of a bachelor's program in physics, chemistry, or engineering; or have several years of experience with PEFCs.

SHORT COURSE #6

Electrodeposition: Fundamentals and Applications to Energy Conversion Systems

Stanko Brankovic and Giovanni Zangari, Instructors

Electrodeposition is increasingly being used in the fabrication of materials and devices, and most recently this technique has been successfully applied to the fabrication of various components in energy conversion systems. This course will offer the opportunity to students, researchers and practitioners with a variety of technical backgrounds to be introduced for the first time or to refresh their understanding of the fundamentals of the technique, as well as to gain a perspective of its potentials. In particular, in this course the attendees will gain practical knowledge of the methods and techniques used in the synthesis of catalysts for fuel cells, components for batteries, and thin film radiation absorbers for photovoltaic devices. The course will be structured in two modules.

- A. Fundamentals of Electrodeposition:
 - thermodynamics and kinetics
 - thin film formation: the art and science of controlling microstructure and morphology
 - proper selection of experimental parameters, and
 - electrochemical engineering aspects.
- B. Electrodeposition for Energy Conversion Devices:
 - recent techniques to control film formation down at the single atomic layer: surface limited replacement reaction and electrochemical atomic layer epitaxy,
 - electrodeposition of electrocatalyst materials,
 - how to produce interpenetrating structures: application to batteries and supercapacitors, and
 - thin film radiation absorbers for photovoltaic devices.

Professional Development Workshops

The three professional development workshops—Writing an Effective Cover Letter and Resume, Job Interviewing Tips, and Resume Roundtable—are free to all technical meeting registrants, and are taught by John Susko, retired corporate executive. If you plan to attend the Resume Roundtable, please bring a copy of your current resume.



Meeting Events-at-a-Glance

SUNDAY, OCTOBER 9

- 0900h Short Courses
- 1500h Writing an Effective Cover Letter and Resume Workshop
- 1600h Job Interviewing Tips Workshop
- 1630h The 220th Meeting and Electrochemical Energy Summit Lecture
- 1730h Sunday Evening Get-Together and Electrochemical Energy Summit Poster Session
- 1900h Electronics and Photonics Division Award Reception and General Meeting; no ticket required
- 1930h ECS Student Mixer

MONDAY, OCTOBER 10

- 0930h Coffee Break
- 1200h Writing an Effective Cover Letter and Resume Workshop
- 1215h Battery Division Luncheon & Business Meeting; non-refundable ticketed event
- 1215h High Temperature Materials Division Luncheon & Business Meeting; non-refundable ticketed event
- 1300h Job Interviewing Tips Workshop
- 1400h Resume Roundtable Workshop
- 1400h Electrochemical Energy Summit Poster Session
- 1415h 2011 Olin Palladium Award Lecture: "The Use of Renewable Energy in the form of Methane Via Electrolytic Hydrogen Generation" by K. Hashimoto
- 1630h Electrochemical Energy Summit Panel Discussion
- 1700h *ECS Transactions* Tutorial Session for Authors
- 1800h Monday Evening Mixer, Student Poster Session, and Technical Exhibit Opening
- 1830h Author Meet and Greet: Meet Mordechay Schlesinger

TUESDAY, OCTOBER 11

- 0900h Technical Exhibit
- 0930h Coffee Break
- 1215h Corrosion Division Luncheon & Business Meeting; non-refundable ticketed event
- 1215h Sensor Division Luncheon & Business Meeting; non-refundable ticketed event
- 1400h Electrochemical Energy Summit Poster Session
- 1800h Corrosion Division Award Reception; non-refundable ticketed event
- 1800h Luminescence & Display Materials Division Reception and General Meeting (in lieu of Luncheon & Business Meeting)
- 1800h Technical Exhibit and General Poster Session

WEDNESDAY, OCTOBER 12

- 0900h Technical Exhibit
- 0930h Coffee Break
- 1215h Electrodeposition Division Luncheon & Business Meeting; non-refundable ticketed event
- 1800h General Poster Session
- 1900h Battery Division Award Reception; non-refundable ticketed event

THURSDAY, OCTOBER 13

- 0930h Coffee Break

FRIDAY, OCTOBER 14

- 0930h Coffee Break

www.electrochem.org



Summit Event Highlights

SUNDAY, OCTOBER 9

- 1630h – 1730h Plenary Session
- 1730h – 1930h Sunday Evening Get-Together & Poster Session

MONDAY, OCTOBER 10

- 1400h – 1600h Poster Session
- 1630h – 1830h Panel Discussion

TUESDAY, OCTOBER 11

- 1400h – 1600h Poster Session

All of the events of the Electrochemical Energy Summit are included with your meeting registration; plus a Directory of Electrochemical Energy Research will be generated from the poster presentations and an electronic version will be made available at no cost.



October 9-14, 2011

Symposium Topics

A — General Topics

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

B — Batteries, Fuel Cells, and Energy Conversion

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

B10 — Polymer Electrolyte Fuel Cells 11



B11 — Rechargeable Lithium and Lithium Ion Batteries

B12 — Electrochemical Processes for Fuels

D — Corrosion, Passivation, and Anodic Films

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

E — Dielectric and Semiconductor Materials, Devices, and Processing

- E1 — Solid State Topics General Session
- E2 — Atomic Layer Deposition Applications 7
- E4 — High Dielectric Constant and Other Dielectric Materials for Nanoelectronics and Photonics 9
- E5 — Processing Materials of 3D Interconnects, Damascene and Electronics Packaging
- E6 — Photovoltaics for the 21st Century 7
- E7 — Semiconductor Cleaning Science and Technology 12 (SCST 12)
- E8 — State-of-the-Art Program on Compound Semiconductors 53 (SOTAPOCS 53)
- E9 — ULSI Process Integration 7
- E10 — GaN and SiC Power Technologies

F — Electrochemical / Chemical Deposition and Etching

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

G — Electrochemical Synthesis and Engineering

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

H — Fullerenes, Nanotubes, and Carbon Nanostructures

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

I — Physical and Analytical Electrochemistry

- I1 — Physical and Analytical Electrochemistry General Session
- I3 — Bioelectroanalysis
- I4 — Electrochemistry at Nanoscale Dimensions 2
- I7 — Physical and Analytical Electrochemistry in Ionic Liquids 2

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

- J1 — Sensors, Actuators, and Microsystems General Session
- J2 — Impedance Techniques: Diagnostics and Sensing Applications
- J3 — Luminescence and Display Materials: Fundamentals and Applications
- J6 — Sensors Based on Fluorescence, SERS, SPR, and Photoelectrochemistry

ECS Transactions (ECST) – Symposia with issues available “at” the meeting are labeled with the following icons:

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

CD **Compact Disc (CD)** editions of *ECS Transactions* will be available for purchase and pick-up at the meeting; or you may pre-order your CD ECST issue using the meeting registration form in this brochure or when registering online. The CD edition of B10 (PEFC 11) also includes a 1 gigabyte USB drive containing the complete issue.

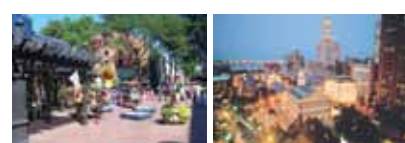
e **Electronic (PDF)** editions of *ECS Transactions* will be available ONLY via the ECS Digital Library (www.ecsdl.org). Electronic editions of the Boston “at” meeting issues will be available for purchase beginning September 30, 2011. Please visit the ECS website for all issue pricing and ordering information for the electronic editions.

ECS Transactions – Forthcoming Issues

In addition to those symposia that have committed to publishing an issue of *ECS Transactions*, all other symposia potentially will be publishing an issue of ECST approximately 16 weeks after the Boston meeting. If you would like to receive information on any of these issues when they become available, please e-mail ecst@electrochem.org. Please include your name, e-mail address, and all issues in which you are interested.

Purchase a hardcover copy of ECS Transactions Volume 41, Issues 1*, 2, 3, 4, 5, 6, 7, or 8 with your Boston meeting registration and receive 10% off that issue’s list price! For ECS Members the 10% discount will be on top of your regular Member discount for these issues. Any discounted books or CDs purchased must be picked up at the Boston meeting. The discount does not apply to electronic editions of these issues. This discount is not valid on any other issues of ECST, Monographs, or Proceedings Volumes purchased at the meeting.

* The PEFC 11 issue of ECST (ECST 41-1) is not available in a hardcover edition, but as a CD-ROM with a USB flashdrive included.



Early-Bird Registration Instructions

Complete ALL sections of the Early-Bird Registration Form located on the adjacent page or the ECS website. Make check or money order payable to ECS. Payments must be made in U.S. funds drawn on a U.S. bank; MasterCard, Visa, American Express, or Discover are also accepted. **Completed registration forms along with payment must be received by September 9, 2011 to qualify for the Early-Bird rates.** All refunds are subject to a 10% processing fee. Written requests for refunds for **Short Courses** will be honored only if received at the ECS headquarters office by September 16, 2011. Written requests for refunds for **meeting registration** will be honored only if received at the ECS headquarters office by October 3, 2011.

Attendees prepaying by credit card may send their Early-Bird Registration forms to the ECS headquarters office by fax: 1.609.737.2743. If you send your Early-Bird Registration form by fax, please do not send another copy by mail, as this may result in duplicate charges. All Early-Bird registrations will be confirmed by mail.

A—REGISTRATION FEES

All technical registrations include a copy of the *Meeting Abstracts* on USB flashdrive only. Attendees who wish to have paper copies of abstracts should download and print them in advance of the meeting, from the ECS website, free of charge. Please note that paper copies of meeting abstracts will NOT be available. Additional copies of the Meeting Abstracts on USB flashdrive may be purchased by registrants; the cost is \$87 for members and \$107 for nonmembers.

All prices are in U.S. dollars.

	Early-Bird (by September 9)	Sept. 10 through Oct. 14
ECS Member	\$415	\$515
Nonmember	\$615	\$715
ECS Student Member	\$150	\$250
Student Nonmember	\$190	\$290
One Day ECS Member	\$275	\$375
One Day Nonmember	\$365	\$465
ECS Emeritus or Honorary Member	\$0	\$0
Companion Registrant	\$25	\$30

B—SUNDAY SHORT COURSES

Deadline for Short Course registration is September 9, 2011. **Pre-registration is required.** All courses are subject to cancellation pending an appropriate number of advance registrants. The registration fee is \$425 for ECS Members and \$520 for nonmembers. Students are offered a 50% discount. Includes admittance to Sunday Short Courses ONLY; not applicable to any other meeting activities.

C—LUNCHEONS & SPECIAL EVENTS

Tickets are non-refundable because ECS is required to pay the venue for all tickets ordered.

	Early-Bird (by September 9)	Sept. 10 through Oct. 14
Monday (October 10)		
Battery Division Luncheon & Business Meeting	\$27	\$32
High Temperature Materials Division Luncheon & Business Meeting	\$27	\$32

Tuesday (October 11)

Corrosion Division Luncheon & Business Meeting	\$27	\$32
Sensor Division Luncheon & Business Meeting	\$27	\$32
Corrosion Division Award Reception	\$14	\$16
LDM Division Reception & General Business Meeting (in lieu of luncheon)		no charge

Wednesday (October 12)

Electrodeposition Division Luncheon & Business Meeting	\$27	\$32
Battery Division Award Reception	\$14	\$16

The Electrochemical Energy Summit

All of the events of the Electrochemical Energy Summit are included with your meeting registration; plus a Directory of Electrochemical Energy Research will be generated from the poster presentations and an electronic version will be made available at no cost.

Early-Bird Registration Form

Boston, MA | October 9-14, 2011

Please complete using block capital letters and return to the following address.
 The Electrochemical Society, 65 South Main Street, Pennington, NJ 08534-2839, USA
 Tel: 609.737.1902 • Fax: 609.737.2743 • E-mail: ecs@electrochem.org • Web: www.electrochem.org

Early-Bird Registration Deadline: September 9, 2011



Name _____

Mailing Address _____

BADGE INFORMATION (use only the spaces available)

First Name (Given) _____ Last Name (Family) _____

Company or University _____

City, State/Country _____

A—Early-Bird Registration Fees

All technical registration fees include the Meeting Abstracts on USB flashdrive.
 All prices are in U.S. dollars.

ECS Member	\$415
Nonmember	\$615
ECS Student Member	\$150
Student Nonmember	\$190
One Day ECS Member (Day: _____)	\$275
One Day Nonmember (Day: _____)	\$365
ECS Emeritus or Honorary Member	\$ 0
Companion Registrant	\$ 25
Companion Name: _____	

A—Enter Registration Fees Total \$ _____

B—Sunday Short Courses

Deadline for Short Course registration is September 9, 2011. Pre-registration is required. All courses are subject to cancellation pending an appropriate number of Early-Bird registrants. All course prices are \$425 for ECS Members and \$520 for nonmembers. Students receive 50% discount on all course prices.

1 — Advanced Impedance Spectroscopy	\$ _____
2 — Scientific Writing for Scientists and Engineers	\$ _____
3 — Grid Scale Energy Storage	\$ _____
4 — Operation and Exploitation of Electrochemical Capacitor Technology	\$ _____
5 — Polymer Electrolyte Fuel Cells	\$ _____
6 — Electrodeposition: Fundamentals and Applications to Energy Conversion Systems	\$ _____

B—Enter Short Course Total \$ _____

C—Luncheons & Special Events

Write the number of tickets desired for each event on the corresponding line and enter the total amount for all tickets on Line C. **Tickets are non-refundable.**

Monday, October 10

Battery Division Luncheon & Business Meeting	\$27
High Temperature Materials Division Luncheon & Business Meeting	\$27

Tuesday, October 11

Corrosion Division Luncheon & Business Meeting	\$27
Sensor Division Luncheon & Business Meeting	\$27
Corrosion Division Award Reception	\$14
LDM Division Reception & General Business Meeting (in lieu of luncheon)	\$ 0

Wednesday, October 12

Electrodeposition Division Luncheon & Business Meeting	\$27
Battery Division Award Reception	\$14

C—Enter Special Events Total \$ _____

D—Publications

The following issues of ECS Transactions will be published from symposia held during the Boston meeting and will be available for pick-up at the meeting. Discount prices shown are for ECS Members (M) and Nonmembers (NM). Please see the Symposium Topics section of this brochure for details about the discounted prices. **Electronic (PDF)** editions of these issues are available for purchase beginning September 30, 2011, and ONLY by visiting the ECS Digital Library (www.ecsdl.org). Please visit the ECS website for all issue pricing and ordering information for the electronic editions.

(Please see Symposium Topics page for a list of all issues that will be available after the meeting.)

		List Price	Member Discounted Price	Nonmember Discounted Price
HC Hard-cover				
CD Compact Disc and USB flashdrive				
CD Vol. 41 No. 1	Polymer Electrolyte Fuel Cells 11 Editors: H. A. Gastelger, et al.	\$265	\$186	\$239
HC Vol. 41 No. 2	Atomic Layer Deposition Applications 7 Editors: J. W. Elam, et al.	\$125	\$88	\$113
HC Vol. 41 No. 3	Physics and Technology of High-k Materials 9 Editors: S. Kar, et al.	\$143	\$100	\$129
HC Vol. 41 No. 4	Photovoltaics for the 21st Century 7 Editors: M. Tao, et al.	\$143	\$100	\$129
HC Vol. 41 No. 5	Semiconductor Cleaning Science and Technology 12 Editors: T. Hattori, et al.	\$125	\$88	\$113
HC Vol. 41 No. 6	State-of-the-Art Program on Compound Semiconductors 53 (SOTAPOCS 53) Editors: M. E. Overberg, et al.	\$120	\$84	\$108
HC Vol. 41 No. 7	ULSI Process Integration 7 Editors: C. Claeys, et al.	\$132	\$92	\$119
HC Vol. 41 No. 8	Gallium Nitride and Silicon Carbide Power Technologies Editors: K. Shenai, et al.	\$143	\$100	\$129

D—Enter Publications Total \$ _____

For questions concerning registration, please contact our Customer Service Department at customerservice@electrochem.org or (609) 737-1902, extension 104.

TOTAL (Add Lines A+B+C+D) \$ _____
 (All prices in U.S. Dollars)

Amex/MC/Visa/Discover # (only) _____ Exp. _____

Signature _____

Print Name of Cardholder _____

Phone # _____ Fax # _____

E-mail _____

Payment must be received by **September 9, 2011** to qualify for Early-Bird rates. Checks must be in U.S. funds drawn on a U.S. bank. Make checks payable to: **The Electrochemical Society.**

Written cancellation requests must be received by **October 3, 2011** and are subject to a 10% cancellation fee.

Written cancellation requests for Short Course registrations must be received by **September 16, 2011** and are subject to a 10% cancellation fee.