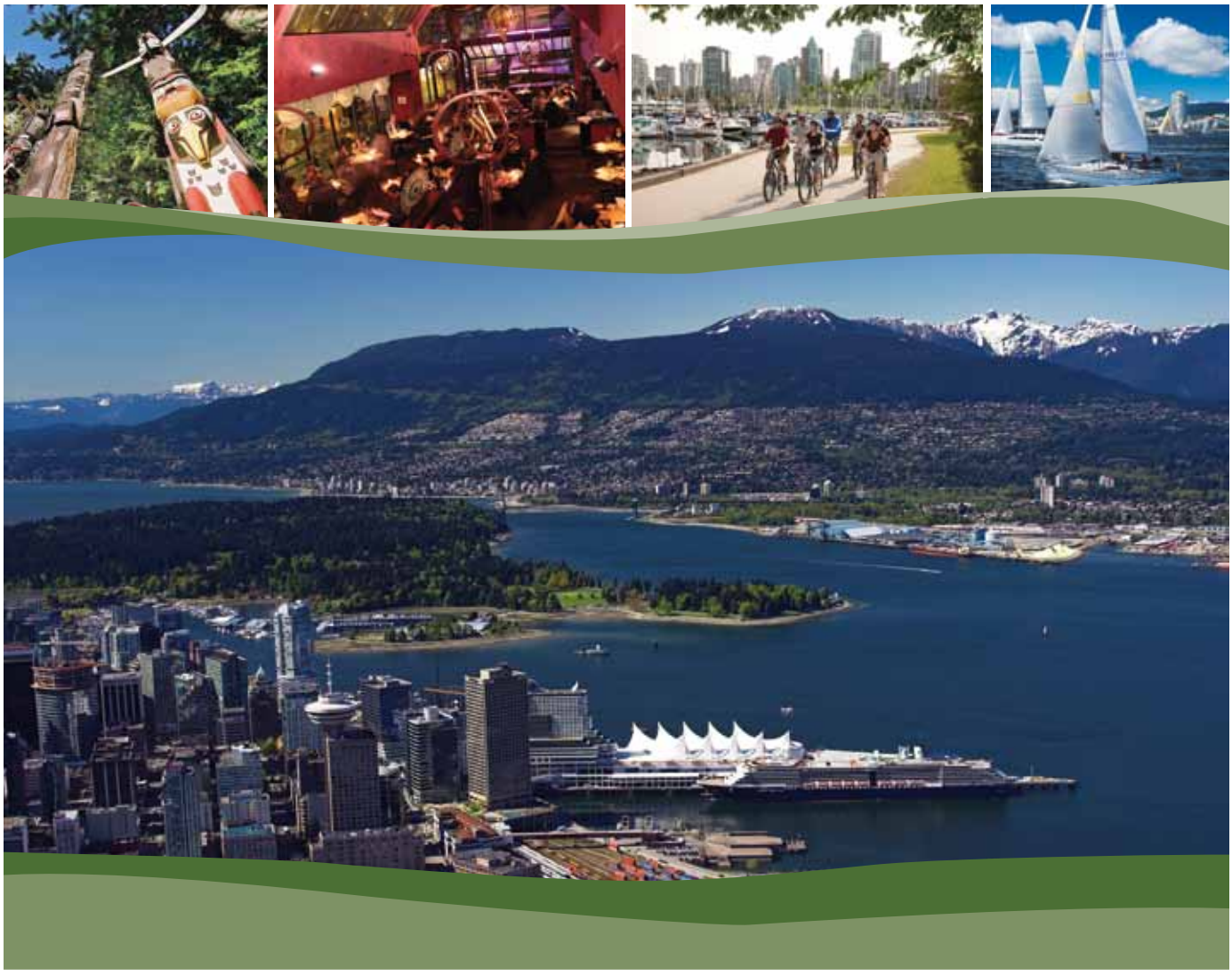
special meeting section



217th ECS Meeting

VANCOUVER, CANADA

April 25-30, 2010

Fairmont Hotel Vancouver ✻ Hyatt Regency Vancouver

217th ECS Meeting

VANCOUVER

CANADA ❊ April 25-30, 2010

VANCOUVER ❊ Special Meeting Section

Welcome to Vancouver— host of the 2010 Olympic & Paralympic Winter Games. We are pleased to venture into this city for the 217th ECS Meeting. This major international conference will be held at the Hyatt Regency Vancouver and the Fairmont Hotel Vancouver, and will include 42 topical symposia consisting of 1,849 technical presentations. You are invited to participate not only in the technical program, but also in the other social events planned for the meeting.

Featured Speakers

Plenary Session

Monday, April 26, 1700h

Regency D/E/F, 3rd Floor, Hyatt

The ECS Lecture

The Future of Energy Conversion: A Perspective from the Chemical Industry

by William F. Banholzer

The ideal energy future requires 100% sustainable sources of energy in adequate amounts to support a high standard of living for all. The key to reaching our sustainable energy goal is optimizing efficiency at every step of energy conversion and storage—whether cultivating food crops, propelling passenger vehicles, or synthesizing polymers for durable goods. Each application will require a different solution and there are major debates on the details.

Which new pathways and technologies will emerge to transform our energy situation? This question is addressed from the perspective of the chemical industry, which was built on oil, natural gas, and coal. These have served as the major raw material feedstocks and energy sources for driving reactions and separations. The industry is now shaping its transformation to sustainable energy and is developing new materials and solutions for energy supply and conversion.

This talk will consider the mass and energy balances of several key conversion pathways, as well as capital investment and land requirements. What can we expect as entitlement from optimizing biomass, fuel cells, wind power, or photovoltaics? At each stage of an energy conversion pathway, there are thermodynamic limits—for instance in the Carnot cycle of an engine or the inherent maximum efficiency of photosynthesis. These considerations determine where we can expect realistic progress toward sustainable energy in both the short and long term, and where we should place our investments.

William F. (Bill) Banholzer is Executive Vice-President for Ventures, New Business Development, and Licensing, and Chief Technology Officer for The Dow Chemical Company, where he has responsibility for driving innovation, value creation, and Dow's research and development activities around the world.

Dr. Banholzer joined Dow in 2005, following a 22-year career with General Electric Company, beginning as a staff engineer in 1983 and ultimately serving as the Vice-President of global technology in GE's Advanced Materials business. He earned numerous awards while at GE including Bronze, Silver, and Gold Patent Awards and election to the Whitney Gallery of Technical Achievers.

Dr. Banholzer serves as a presidential nominee to the MIT Corporation Visiting Committee for Chemistry and Chemical Engineering and sits on the advisory board for chemistry and chemical engineering at UC Berkeley, and the NRC's Board on Energy and Environmental Systems. In 2002, Banholzer was elected to the U.S. National Academy of Engineering.

Dr. Banholzer earned a bachelor's degree in chemistry from Marquette University and master's and doctorate degrees in chemical engineering from the University of Illinois. He is a certified Six Sigma Master Black Belt, holds 16 U.S. patents, and has over 80 publications, which have received more than 1800 citations.

Vittorio de Nora Award Address

Monday, April 26, 0800h

Industrial Electrochemistry and Electrochemical Engineering General Session
Garibaldi, Conference Floor, Fairmont

Toward Energy Storage for Renewable Generation

by Derek Pletcher

There is now widespread acceptance of the need to define a sustainable, long term supply of energy and to control global warming, as well as to identify a power source for transportation not based on fossil fuel. Electrochemical technology can contribute in several ways to energy storage in such an economy. Unfortunately, all proposed solutions based on batteries and fuel cells still face substantial obstacles before they can be implemented. Dr. Pletcher will review the performance sought in devices for large scale energy storage. For example, the scale of plant required is generally underestimated while energy efficiency, safety, reliability, and cost targets are not being achieved. Such an analysis led to a program in Southampton to investigate the soluble lead flow battery. This flow battery has only a single electrolyte and avoids the inclusion of a membrane; hence, the cell design is less complex and potentially much cheaper. It does, however, require the

control of the deposition and dissolution of thick layers of solids on both electrodes. Both fundamental studies and battery performance data during the scale-up of the battery from a single cell with electrode areas of 2 cm^2 and to a bipolar unit with 5 cells and a total electrode area of 0.4 m^2 will be discussed.

Derek Pletcher obtained his BSc and PhD in chemistry from the University of Sheffield during the 1960s and has been a member of the Electrochemistry Group in Southampton since 1967. His research has covered a wide range of fundamental and applied electrochemistry and has resulted in over 300 papers and 30 reviews. Presently, his group is largely concerned with large scale energy storage (flow batteries, fuel cells, and water electrolysis) and the application of such technology to an energy economy based on renewable sources. He is the author of four books: *Industrial Electrochemistry*, *Instrumental Methods in Electrode Kinetics*, *A First Course in Electrode Processes*, and *A First Course in Ion Permeable Membranes*. Derek Pletcher was elected as an ECS Fellow in 2005 and was awarded the ECS Henry B. Linford Distinguished Teaching Award in 2006.

Outside the University, Derek Pletcher's consulting activities in Europe and North America have related to the manufacture of inorganics, H_2 generation, the synthesis of tonnage organics and fine chemicals, effluent treatment, the purification of water, batteries and fuel cells, electroplating, minimizing corrosion, sensors, the design of cells, and the development of high performance membranes/electrodes.

Henry B. Linford Award for Distinguished Teaching Award Address

Tuesday, April 27, 1400h

Electrochemical Engineering for the 21st Century Symposium (dedicated to Richard C. Alkire)
Georgia B, 2nd Floor, Hyatt

Preparing Electrochemical Engineers for the 21st Century

by Daniel T. Schwartz

The context for engineering education has evolved since the "New Horizons" report, with a more globalized industrial economy, the proliferation of high quality engineering education worldwide, and greater expectations for understanding technology impacts beyond the fiscal bottom line. Dr. Schwartz's talk will examine innovative ways that engineers can be endowed with the tools and knowledge to create solutions that address the "triple bottom line" of economic, environmental, and societal impact. He also will explore the provocative idea that it is time for electrochemical engineering education to shift focus.

Daniel T. Schwartz is Boeing-Sutter Professor and Chair of Chemical Engineering at the University of Washington (UW), Seattle. He joined the UW in 1991 after postdoctoral studies at Lawrence Berkeley National Laboratory, and a PhD at UC Davis. Dan's educational activities seek to have an impact on learners of all ages, from middle schoolers participating in his group's wildly popular electrochemistry-oriented engineering open house activity to PhD student teams that work collaboratively with Northwest Native Americans on applied energy research projects. He is also active in more traditional electrochemical education, having established a technology-oriented electrochemical engineering laboratory for undergraduates and supervising 16 completed PhD graduates. Dan's service to the Society includes creating the founding documents for forming ECS Student Chapters and as guest co-editor for the Education issue of *Interface* (fall 2006).

For the Rest of Us...

Sunday, April 25, 1830h

Regency E/F, 3rd Floor, Hyatt

Carbon Nanotubes and Graphene: Prospects in Electronics and Photonics

by Phaedon Avouris

The ECS "For the Rest of Us" talks help to educate meeting attendees about areas outside of their immediate domain and to promote discussion and cross-discipline interactions. In the Vancouver edition, Dr. Avouris will discuss how nanoscience/nanotechnology is currently one of the most active areas of research. At the nanometer scale, and in reduced dimensionality, materials acquire novel properties. This motivates the synthesis, manipulation, study, and search for new applications of nanostructures. Graphene and carbon nanotubes are strongly bound, covalent materials, with the carbon atoms arranged in a hexagonal honeycomb lattice to form two-dimensional and one-dimensional nanostructures, respectively. As a result of their structure and low dimensionality, these one-atom thick structures have some rather unique electrical and optical properties that recommend them for a host of different applications in electronics and photonics. The talk will examine these properties and also demonstrate model electronic devices such as ultra-fast transistors and optical detectors, infrared light emitters, and simple integrated circuits. The advantages of these devices will also be discussed, as well as the hurdles that remain before they can be integrated into mature, competitive technologies.

Phaedon Avouris is an IBM Fellow and manager of Nanoscience & Nanotechnology at the IBM, T. J. Watson Research Center in Yorktown Heights, NY (USA). He received his BSc at the Aristotle University in Greece and his PhD in Physical Chemistry at Michigan State University in 1974. He did postdoctoral work at UCLA and was a Research Fellow at AT&T Bell Laboratories before joining the staff of IBM's Research Division at the Watson Research Center in 1978.

Over the years, he has worked in a wide range of research areas: laser spectroscopy, surface physics/chemistry, scanning tunneling microscopy, atom manipulation, and nanoelectronics. His current research focuses on experimental and theoretical studies of the electronic and photonic properties of carbon nanotubes and graphene. The work also includes the design, fabrication, and study of nanoelectronic and optoelectronic devices based on these materials.

Dr. Avouris has been elected Fellow of the American Academy of Arts and Sciences, the American Physical Society, the Institute of Physics of the UK, the Academy of Athens (National Academy of Greece), the IBM Academy of Technology, American Association for the Advancement of Science, New York Academy of Sciences, and the American Vacuum Society. He has received many awards including the APS Irving Langmuir Prize for Chemical Physics, the AVS Medard W. Welch Award for Surface Science, the Julius Springer Award for Applied Physics, the Richard E. Smalley Research Award of ECS, and the Richard Feynman Nanotechnology Prize. He has also received many IBM Corporation "Outstanding Technical Achievement" awards.

Short Courses & Tutorials

Six **Short Courses** will be offered in conjunction with the 217th ECS Meeting. These courses will be held on Sunday, April 25, 2010 in the Hyatt. Full-day courses run from 0930h to 1630h; the half-day course runs from 1400-1700h. Full course fees are $425 for ECS members and $520 for nonmembers; students are offered a 50% discount. The fees for the half-day course are $212.50 for all ECS members (including students) and $260 for all nonmembers (including students). The registration fee for the Short Course covers the course, text materials, continental breakfast, luncheon (full-day courses only), and refreshment breaks; it does not cover meeting registration fees nor any other activities of the meeting. The **Corporate Tutorial** runs from 1400-1700h; please complete the registration form and return it to ECS via fax or e-mail (do not register online for this one course). The fees are $212.50 for all ECS members (including students); and $260 for all nonmembers (including students). If you are an employee of an ECS Corporate Member organization, you are entitled to a complimentary registration to this tutorial. **The deadline for registration for all programs is March 26, 2010**. Written requests for refunds will be honored only if received at Society headquarters before April 8, 2010. Pre-registration is required. All courses and tutorial 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
M. 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. Ideally, the attendee should have some experience with making impedance measurements. 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.

Short Course #2
Biofuels for Electrochemical Systems
S. Minteer and S. Calabrese Barton, Instructors

This course is intended for chemists, physicists, materials scientists, and engineers to better understand biofuels and their use in electrochemical systems. This course will first introduce the student to biofuels and the importance and controversy surrounding biofuel production and use. The course will then discuss use of biofuels in traditional fuel cells, biofuel cells, and biobatteries. This multidisciplinary short course will provide the student with a deeper knowledge in the areas of biochemistry, electrochemistry, and engineering as they apply to electrochemical conversion of biofuels.

Short Course #3
Organic and Molecular Electronics
R. McCreery and D. Frisbie, Instructors

Organic electronics has experienced rapid recent growth, due to the promise of low cost, low power consumption, and flexible formats. Organic light emitting diodes, organic thin film transistors, and novel display technologies have been commercialized, and the wide range of available organic structures promise many new electronic functions. As the dimensions of the devices approach the 1-10 nm range, unusual phenomena such as electron tunneling, high electric fields, and solid state redox reactions become important, and there is a major potential for new device behaviors. "Molecular electronics" refers to organic electronic devices which are nanoscale in at least one dimension, consisting of molecular monolayers or single molecules acting as active electronic devices. Promising objectives for molecular and organic electronics include chemical sensors, high density nonvolatile memory, conductance switching, and photonics.

Short Course #4
Interfaces, Traps, and Defects in Gate Stacks
S. Kar, Instructor

This course is designed to accommodate a diverse group of attendees: chemists, physicists, material scientists, chemical engineers, and electrical engineers; hence it will begin with the basics, and end with a discussion of the current issues and the future directions. The objective of this course is to provide the participants the basic principles and the practical aspects of the large variety of interfaces occurring in gate stacks on silicon, germanium, and III-V compound semiconductor substrates, and the defects and electron/hole traps likely to be found in the different interfaces and the bulk layers of the gate stack, and the channel.

Short Course #5
Scientific Writing for Scientists and Engineers
D. N. Buckley, Instructor

This course is intended for scientists and engineers with an interest in improving their skills in writing scientific documents including journal papers, conference proceedings papers, abstracts, reports, theses, and proposals. The course is best suited to attendees who have some experience of writing technical documents and want to improve their skills. It will address elements of good writing in science and engineering, including standard practices, terminology, and formatting. It will teach attendees how to present information using properly structured sentences, paragraphs, sections, and chapters and how to organize experimental results and analysis in a format suitable for publication in the scientific literature as well as in reports, theses, etc.

Short Course #6 (1/2 day)
Fundamentals of Modern Si- and SiGe-based Bipolar Transistors
T. H. Ning, Instructor

This special, half-day course (1400-1700h) is intended for physicists, chemists, materials scientists, and electrical engineers with an interest in understanding the basic physics of modern Si- and SiGe-based bipolar transistors. The attendee is assumed to have an introductory understanding of the transport of electrons and holes in a semiconductor. The course will cover the basic properties of a p-n diode that are relevant to bipolar transistors. The attendee will develop an understanding of the key device parameters and factors that govern the performance of a bipolar transistor. A portion of the course is devoted to the discussion of the heterojunction nature of a SiGe-based bipolar transistor and the design tradeoffs of the Ge profile in the SiGe base. The course concludes with a comparison of the fundamental differences between a SiGe-based bipolar transistor and a III-V compound semiconductor HBT, and a comparison of the scaling limits of the two transistors.

Corporate Tutorial

Intellectual Property—An Introduction for Research Scientists, Engineers, and Technologists

E. J. Taylor, Instructor

This half-day tutorial (1400-1700h) will provide an introduction to the various forms of intellectual property, trade secrets, trademarks, and copyrights with an emphasis on patents. The objective of the tutorial is to provide the electrochemist/engineer an appreciation of the patenting process and not to replace legal counsel. To register for this Tutorial, please complete the registration form and return it to ECS via fax or e-mail (do not register online for this course). If you are an employee of an ECS Corporate Member organization, you are entitled to a complimentary registration to this tutorial.

Professional Development Workshops

John R. Susko, Instructor

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

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

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

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

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

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

Monday 1400-1700h

Award Winners

In addition to the Vittorio de Nora Award being presented to **Derek Pletcher**, and the Henry B. Linford Award being presented to **Daniel T. Schwartz** (see above), the following awards will also be presented in Vancouver. For complete biographies of the award recipients, and the schedule of their presentations, please see the General Meeting Program on the ECS website: www.electrochem.org/meetings/biannual/217/217.htm.

Electronics & Photonics Division Award

Lih J. Chen is the President of National Tsing Hua University, where he is also a professor. He was the Deputy Minister of National Science Council from May 2008 to January 2010. He received his BS degree in physics from National Taiwan University in 1968 and his PhD degree in physics from the University of California, Berkeley, in 1974. He became a professor at the National Tsing Hua University in 1979 and continued on to become the MSE Department Chair and Dean of the College of Engineering. From 2006 to 2008, he served as the Vice-Chancellor for the University System of Taiwan. His professional service included the President of Materials Research Society of Taiwan and Microscopy Society of Taiwan; Second Vice-President, International Union of Materials Research Societies; and Editor of *Materials Chemistry and Physics*.

Professor Chen has conducted extensive research on advanced metallization in integrated circuits. In recent years, he has focused on the investigation of low-dimensional nanostructured materials. He has published more than 420 papers in SCI journals. He has won almost every major award and prize from National Science Council and Ministry of Education in Taiwan. He became a member of Asia-Pacific Academy of Advanced Materials in 1998 and a fellow of AVS in 2001. He was elected to be a member of Academia Sinica in 2006. He received the TMS Hume-Rothery Award for his contributions to thin film science in 2008. He was elected to be a member of Academy of Science of Developing World in 2009.

Energy Technology Division Research Awards

John W. Weidner is Associate Department Chair and Campaign for Excellence Professor of Chemical Engineering at the University of South Carolina (USC). He received his BS degree in chemical engineering from the University of Wisconsin-Madison in 1986 and his PhD in chemical engineering from NC State University under the direction of Peter S. Fedkiw in 1991. That same year he joined USC as an assistant professor as part of their Center for Electrochemical Engineering. In the summer of 1992 he was a Summer Faculty Fellow in the Energy Storage Systems Group at the Jet Propulsion Laboratory in Pasadena. He spent a sabbatical at the University of California-Berkeley working with John Newman in the fall of 1999 and at Los Alamos National Laboratory working with Tom Zawodzinski in the spring of 2000. His next sabbatical in 2007-08 was spent at the Fraunhofer Institute for Solar Energy Systems in Freiburg, Germany on electrolytic hydrogen production. His is currently chair of the ECS Industrial Electrochemistry & Electrochemical Engineering Division and Editor of *ECS Transactions*.

Professor Weidner has published 72 refereed journal articles in the field of electrochemical engineering, including the mathematical modeling of electrochemical power sources; the synthesis and characterization of electrochemically active materials; and the analysis, design, and operation of electrochemical reactors. His most recent work involves the development of his patented proton exchange membrane electrolyzer for the large-scale production of hydrogen from gaseous SO_2 as part of the hybrid sulfur process.

Karim Zaghib obtained his MS in 1987 and his PhD in 1990, both in electrochemistry from the Institut National Polytechnique de Grenoble, France under the direction of Bernadette Nguyen. In 2002, he received the HDR (Habilitation à Diriger la Recherche) in materials science from the Université de Pierre et Marie Curie, Paris, France.

From 1986 to 1990, Dr Zaghib developed Al-Mn alloys

in molten salts as negative electrodes for Li-ion batteries. In 1990, Dr Zaghib published a new method to enhance the electrodeposition of metals. He was a post-doctoral fellow (1990-1992) under a Saft-DGA contract. From 1992 to 1995, Dr. Zaghib was guest researcher for the Japanese Ministry of International Trade and Industry (METI) where he joined the New Sunshine project at ONRI (Osaka, National Research Institute) to develop new materials for lithium-ion batteries. Following his research in Japan, Dr. Zaghib joined Hydro-Quebec's ACEP project where he was instrumental in introducing Li-ion technology to the company. Dr. Zaghib is currently the Project Manager of the Conversion and Storage of Energy Group. At Hydro-Québec, he started a collaboration with Michel Armand on new materials and electrolytes. In 1998, Dr. Zaghib started a collaboration with Kim Kinoshita at LBNL to understand the oxidation and irreversible capacity loss versus the particle size of natural graphite. During the last 15 years, Dr. Zaghib has actively collaborated with John Goodenough (University of Texas, Austin), and Christian Julien and Alain Mauger (Paris 6 University, France) to develop the olivine cathode materials for Li-ion batteries.

Dr. Zaghib has published 131 papers, 85 patents, and served as editor or co-editor of 11 books. He was organizer or co-organizer of 37 symposia, meetings, workshops. In June 2010, he will be the General Chair of the International Meeting on Lithium Batteries (IMLB) in Montréal, Québec. He is very active in ECS, and recently completed his term as the Chair of the Energy Technology Division. Dr. Zaghib is the recipient of the International Electric Research Exchange (IERE) Research Award (2008) in Iguaçu, Brazil and the International Battery Association (IBA) Research Award in January 2010.

Fullerenes, Nanotubes, and Carbon Nanostructures Division SES Research Young Investigator Award (2010)

Mark C. Hersam is currently a professor of materials science and engineering and a professor of chemistry at Northwestern University. He earned a BS in electrical engineering from the University of Illinois at Urbana-Champaign (UIUC) in 1996, MPhil in physics from the University of Cambridge in 1997, and a PhD in electrical engineering from UIUC in 2000. In 1999, he also performed research at the IBM T. J. Watson Research Laboratory under the support of an IBM Distinguished Fellowship. His research interests include single molecule chemistry, nanofabrication, scanning probe microscopy, semiconductor surfaces, and carbon nanomaterials. As a faculty member, Dr. Hersam has received several awards including the Beckman Young Investigator Award, NSF CAREER Award, ARO Young Investigator Award, ONR Young Investigator Award, Sloan Research Fellowship, Presidential Early Career Award for Scientists and Engineers, TMS Robert Lansing Hardy Award, AVS Peter Mark Award, and three Teacher of the Year Awards. In recognition of his early career accomplishments, Dr. Hersam was directly promoted from assistant professor to full professor with tenure in 2006. In 2007, Dr. Hersam co-founded NanoIntegris, which is a start-up company focused on supplying high performance carbon nanomaterials.

Fullerenes, Nanotubes, and Carbon Nanostructures Division SES Research Young Investigator Award (2009)

Nikhil Koratkar joined the faculty of the Mechanical, Aerospace, and Nuclear Engineering Department at Rensselaer Polytechnic Institute in January 2001 as an assistant professor; he was promoted to associate professor in 2006; and to full professor in 2009. He received his doctorate from the University of Maryland at College Park. Professor Koratkar is a winner of the NSF CAREER Award, RPI Early Career Award, and AHS Francois-Xavier Bagnoud award. He has published over 60 archival journal papers in top nanoscience journals including *Nature*, *Nature Materials*, *Nano Letters*, *Advanced Materials*, and ACS *Nano* and *Small*. He has obtained over $6.2 million in research funding from various agencies including NSF, ONR, ARO, Benet Labs, AEC, and industry.

Professor Koratkar's research interests are focused on graphene and carbon nanotube synthesis and their integration into polymer and ceramic matrix composites. His group also works on the fabrication and patterning of metal and silicon-based nanostructures by oblique angle deposition and their application in energy conversion and storage devices. Other areas of research include development of nanoscale devices including sensors, actuators, and membranes. Koratkar's group is also actively engaged in understanding wetting and electro-wetting phenomena at the micro and nano scales and in the development of super-hydrophobic/super-hydrophilic surfaces and phase change phenomena at small scales.

Organic and Biological Electrochemistry Division Manuel M. Baizer Award

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

Dr. Fuchigami has made outstanding and remarkable contributions to the field of synthetic organic electrochemistry over the past 30 years. By using fluorine as a key element and employing mediators, he developed new organic electrosynthesis methods for hetero-atom compounds containing sulfur, nitrogen, iodine, and silicon atoms, based on their characteristics. His main work, "Selective Electrochemical Fluorination of Organic Compounds," is widely and internationally recognized. Furthermore, he developed methods for volatile organic compound (VOC) free organic electrosynthesis in ionic liquids. Thus, he has developed the new hybrids fields, "Organofluorine Electrochemistry" and "New Electrolytic Systems Toward Green Sustainable Chemistry."

Dr. Fuchigami has published over 270 technical papers, 47 review articles, and 35 book chapters. He has organized numerous symposia at ECS meetings and other international meetings, and he currently serves as an officer of the ECS Organic & Biological Electrochemistry Division and as a Chair of the ECS Japan Section. He is also a Chair of the Organic Electrochemistry Division of The Electrochemical Society of

Japan. He has served as Editor-in-Chief of *Electrochemistry* (Japan) and as an Associate Editor of the *Bulletin of the Chemical Society of Japan*. He also has served on the editorial boards of the *Journal of Synthetic Organic Chemistry of Japan* and the *Journal of Oleo Science* (Japan). He is a recipient of the Takeda Award for International Achievement (2006), the Excellent Papers Award of The Electrochemical Society of Japan (2007), and The Electrochemical Society of Japan Award (2008).

Technical Exhibit

The Technical Session coffee breaks are scheduled for 0930h in the Exhibit area (British Columbia Ballroom, Conference Floor, Fairmont), on Tuesday and Wednesday to allow meeting attendees additional time to browse through the exhibits. The exhibit will feature instruments, materials, systems, publications, and software of interest to attendees.

Exhibit Hours

Monday, April 26 ..... 1800-2000h
includes the Monday Evening Poster Session

Tuesday, April 27 ..... 0900-1400h
includes complimentary lunch at noon for the first 300 attendees
re-opening 1800-2000h
includes the Tuesday evening Poster Session

Wednesday, April 28 ..... 0900-1400h
includes complimentary lunch at noon for the first 300 attendees

Exhibitors as of Press-Time

ECS
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Event Highlights

NOTE: *For a list of Committee Meetings, please visit the Vancouver meeting page: www.electrochem.org/meetings/biannual/217/217.htm.*

Sunday, April 25

0900h.....Full day Short Courses begin

1400h.....Half day Short Course and Corporate Tutorial begin

1730h.....5th ECS Student Mixer

1830h.....For the Rest of Us—"Carbon Nanotubes and Graphene: Prospects in Electronics and Photonics," Phaedon Avouris, Regency E/F, 3rd Floor, Hyatt

1900h.....Electronics and Photonics Division Award Reception and General Meeting, Balmoral, 3rd Floor, Hyatt

1930h.....Sunday Evening Get-Together, Pacific Ballroom, Conference Floor, Fairmont

Monday, April 26

0800h.....2010 Vittorio de Nora Award Lecture—"Toward Energy Storage for Renewable Generation," by Derek Pletcher, Industrial Electrochemistry and Electrochemical Engineering General Session, Garibaldi, Conference Floor, Fairmont

0930h.....Coffee Break, Regency Foyer, 3rd Floor, English Bay, 34th Floor Hyatt; British Columbia Foyer, Conference Floor, Fairmont

1215h.....Industrial Electrochemistry & Electrochemical Engineering Division Luncheon & Business Meeting, English Bay, 34th Floor, Hyatt (ticket required)

1215h.....Physical and Analytical Division Luncheon & Business Meeting, The Roof, 15th Floor Fairmont (ticket required)

1700h.....The ECS Lecture—"The Future of Energy Conversion: A Perspective from the Chemical Industry," by William Banholzer, Regency D/E/F, 3rd Floor, Hyatt

1800h.....Monday Evening Mixer, Student Poster Session, and Technical Exhibit Opening, British Columbia Ballroom, Conference Floor, Fairmont

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BRONZE

N.E. CHEMCAT

Tuesday, April 27

0900h..... Technical Exhibit, British Columbia Ballroom, Conference Floor, Fairmont

0930h..... Coffee Break, British Columbia Ballroom, Conference Floor, Fairmont

1215h..... Annual Society Luncheon & Business Meeting with Student Poster Award Presentation, The Roof, 15th Floor Fairmont (ticket required)

1700h..... F2 Symposium Reception in Honor of Richard C. Alkire (ticket required)

1700h..... Manuel M. Baizer Award Reception, The Roof, 15th Floor Fairmont (no ticket required)

1900h..... Technical Exhibit and General Poster Session, British Columbia Ballroom, Conference Floor, Fairmont

Wednesday, April 28

0900h..... Technical Exhibit, British Columbia Ballroom, Conference Floor, Fairmont

0930h..... Coffee Break, British Columbia Ballroom, Conference Floor, Fairmont

1215h..... Energy Technology Division Luncheon & Business Meeting, The Roof, 15th Floor, Fairmont (ticket required)

1215h..... Fullerenes, Nanotubes and Carbon Nanostructures Division Luncheon & Business Meeting, English Bay, 34th Floor, Hyatt (ticket required)

The Luncheon & Business Meetings for the Dielectric Science & Technology Division and the Organic & Biological Electrochemistry Division have been canceled for the Vancouver meeting.

Thursday, April 29

0930h..... Coffee Break, Regency Foyer, 3rd Floor, and 34th Floor, Hyatt

Friday, April 30

0930h..... Coffee Break, Regency Foyer, 3rd Floor, Hyatt

Hotel & Travel Information

The 217th ECS Meeting will be held at the Hyatt Regency Vancouver (655 Burrard St., Vancouver, BC, Canada, V6C 2R7) and the Fairmont Hotel Vancouver (900 West Georgia St., Vancouver, BC, Canada, V6C 2W6). Guest room reservations for each of the headquarters hotels can be made online from the ECS website at special discounted meeting rate of $189 CAD. See the ECS website for more details and to make your reservation.

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Symposium Topics and Organizers

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

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

e **Electronic (PDF)** editions of *ECS Transactions* issues will be available ONLY via the ECS Digital Library. Electronic editions of "at" meeting issues will be available for purchase beginning April 16, 2010. Please visit the ECS website for all issue pricing and ordering information for the electronic editions.

A — General Topics

A1 — General Student Poster Session (M) — *V. Desai Chaitanya, G. Botte, V. R. Subramanian, and K. Sundaram*

A2 — Nanotechnology General Session (Tu-Th) — *W. Van Schalkwijk, C. Bock, and E. Traversa*

B — Batteries, Fuel Cells, and Energy Conversion

B1 — Batteries and Energy Technology Joint General Session (M-F) — *W. Van Schalkwijk, A. Manivannan, and S. R. Narayan*

B2 — Advanced Organic and Inorganic Materials for Electrochemical Power Sources (M-W) — *X. Zhang, D. Chu, P. S. Fedkiw, and C. Wang*

B3 — Batteries for Renewable Energy Storage (M-W) — *D. H. Doughty, B. Liaw, S. R. Narayan, and V. Srinivasan*

B4 — Biological Fuel Cells 4 (Tu-Th) — *S. Calabrese Barton, P. Atanassov, K. Kano, S. Minteer, and I. Taniguchi*

B5 — Combinatorial Screening of Materials for Energy Conversion and Storage (Tu-W) — *V. Ramani, J. Dahn, and K. Rajeshwar*

B6 — Economics and Policy Issues in Energy Conversion, Transmission, and Storage (W) — *J. Whitacre, B. Liaw, and E. Traversa*

B7 — Electrode Processes Relevant to Fuel Cell Technology (M-Th) — *V. I. Birss, P. Kulesza, W. Mustain, K. Ota, and D. P. Wilkinson*

B10 — Intercalation Compounds for Energy Conversion and Storage (M-Tu) — *K. Zaghib, K. M. Abraham, C. Julien, and Z. Ogumi*

B11 — Ionic and Mixed Conducting Ceramics 7 (M-F) — *M. Mogensen, S. Adler, T. Armstrong, T. Gür, V. R. Subramanian, H. Yokokawa, and X. Zhou*

B12 — Metal/Air and Metal/Water Batteries (Tu) — *K. Zaghib, K. M. Abraham, and S. R. Narayan*

C — Biomedical Applications and Organic Electrochemistry

C1 — Electrochemistry in Medicine and Biomedical Applications (M-W) — *C. Bock, J. Burgess, B. Eggers, P. Hesketh, C. Holmes, and J. Mauzeroll*

C2 — Manuel M. Baizer Award Symposium on Organic Electrochemistry (S-M) — *A. J. Fry and J. Yoshida*

C3 — Organic and Biological Electrochemistry General Poster Session (Tu) — *J. Burgess*

D — Corrosion, Passivation, and Anodic Films

D1 — Corrosion General Session (Tu-Th) — *D. Hansen and A. Alfantazi*

E — Dielectric and Semiconductor Materials, Devices, and Processing

E1 — Advanced Gate Stack, Source / Drain, and Channel Engineering for Si-Based CMOS 6: New Materials, Processes and Equipment (M-Tu) — *E. P. Gusev, H. Iwai, D. Kwong, V. Narayanan, M. C. Ozturk, F. Roozeboom, and P. J. Timans* HC e

E2 — Dielectrics for Nanosystems 4: Materials Science, Processing, Reliability, and Manufacturing (M-W) — *D. Misra, D. Bauza, Z. D. Chen, T. Chikyow, H. Iwai, and Y. Obeng* HC e

E3 — Integrated Optoelectronics 5 (M-W) — *M. J. Deen, Q. Fang, C. Jagadish, and K. Ohashi*

E4 — Nanoscale Luminescent Materials (M-W) — *P. Mascher and D. Lockwood* HC e

E5 — Thermal and Plasma CVD of Nanostructures and their Applications (M-Tu) — *U. Cvelbar*

E6 — Wide-Bandgap Semiconductor Materials and Devices 11 (M-W) — *H. Kim, G. W. Hunter, S. Sarkozy, and E. B. Stokes* HC e

E7 — Graphene, Ge/III-V, and Emerging Materials for Post-CMOS Applications 2 (M-W) — *P. Srinivasan, S. De-Gendt, Z. Karim, D. Misra, Y. Obeng, and P. Srinivasan* HC e

F — Electrochemical / Chemical Deposition and Etching

F1 — Dealloying Process and Related Synthetic Opportunities (W-Th) — *T. P. Moffat, J. Erlebacher, and R. Newman*

F2 — Electrochemical Engineering for the 21st Century (Dedicated to Richard C. Alkire) (M-W) — *J. Harb, H. Deligianni, J. Fenton, K. Hebert, V. R. Subramanian, and R. Varijian*

G — Electrochemical Synthesis and Engineering

G1 — Industrial Electrochemistry and Electrochemical Engineering General Session (M-Tu) — *G. Pillay*

G3 — Electrochemical Technologies for Hydrogen Production (Tu-Th) — *S. N. Lvov, V. R. Subramanian, J. Weidner, and M. Williams*

G4 — Electrochemistry in Mineral and Metal Processing 8 (EMMP 8) (M-W) — *F. M. Doyle, G. Kelsall, and R. Woods* HC e

G5 — Fuel Cell Membranes, Electrode Binders, and MEA Performance (M-Tu) — *B. Pivovar, J. Muldoon, and P. Pintauro*

H — Fullerenes, Nanotubes, and Carbon Nanostructures

H1 — Electron Transfer and Applications of Fullerenes and Nanostructured Materials (Tu) — *F. D'Souza, S. Fukuzumi, and D. M. Guldi*

H2 — Molecular and Supramolecular Chemistry of Fullerenes and Carbon Nanotubes (M-Tu) — *N. Martín and J. F. Nierengarten*

H3 — Carbon Nanotubes and Nanostructures: Fundamental Properties and Processes (M-Tu) — *R. Weisman, S. Doorn, and M. Zheng*

H4 — Carbon Nanotubes and Nanostructures: Applications and Devices (Tu-Th) — *S. Rotkin, Y. Gogotsi, H. Grebel, M. Heben, and P. V. Kamat*

H5 — Endofullerenes and Carbon Nanocapsules (Tu-W) — *H. Shinohara, T. Akasaka, and A. L. Balch*

H8 — Porphyrins and Supramolecular Assemblies (M-Tu) — *N. Solladié, K. Kadish, and R. Paolesse*

H9 — Nanostructures for Energy Conversion (Tu-W) — *H. Imahori and P. V. Kamat*

I — Physical and Analytical Electrochemistry

I1 — Physical and Analytical Electrochemistry General Session (S,Tu) — *S. Minteer, Z. P. Aguilar, J. Burgess, and P. Tunon-Blanco*

I3 — Charge Transfer: Electrons, Protons, and Other Ions (M-Tu) — *S. Paddison and P. Trulove*

I4 — Progress in Spectro-Electrochemistry and Surface Science of Electrocatalytical Interfaces (In Memory of E. B. Yeager) (Tu-W) — *R. Holze and D. Gervasio*

I5 — In Situ Scanning Probe Microscopy and Spectroscopy in Electrochemistry (M-Tu) — *S. Morin, O. Magnussen, and N. Missert*

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

J1 — Sensors, Actuators, and Microsystems General Session (Tu-W) — *G. W. Hunter, Z. P. Aguilar, M. Carter, and J. Li*

J2 — Electrochemical Nano/Bio Sensors 2 (Th) — *J. Burgess, H. De Long, L. Nagahara, A. L. Simonian, I. Taniguchi, and E. Traversa*

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Companion Registrant Program—Guests of Technical Registrants are invited to register for the 217th Meeting as a "Companion Registrant." The companion registration fee of $25 (Advance) or $30 (Onsite) includes admission to non-ticketed social events, an exclusive lounge with beverage service, Monday through Thursday, 0800-1000h, and a special "Welcome to Vancouver" orientation presented by Tourism Vancouver on Monday, April 26 at 0900h in the Companion Registrants Lounge.

Technical Program

Technical Session Co-Chair Orientation—We encourage all Symposium Organizers and Technical Session Co-Chairs to attend this important informational session in Oxford, 3rd Floor, Hyatt on Sunday from 1500-1700h. The Co-Chair Orientation will take place during the first 10 minutes of the meeting.

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

Poster Presentations and Sessions—Poster presentations must be in English, on a board approximately 4 feet high by 8 feet wide (1.22 m by 2.45 m), corresponding to the abstract number and day of presentation in the final program. Please arrive approximately two to four hours before the start of your session to begin setting up your poster displays. Please do not begin setting up your poster until all the poster boards have been numbered. Plan your display to fit on one upright panel approximately 4 feet high by 8 feet wide (1.22 m by 2.45 m). Present displayed information from left to right, starting at the top left of the panel. The paper title, number, names, and affiliations of all authors MUST be at the top of the display. The recommended print size for the title is approximately 1" to 2" (2.5 cm to 5 cm) high. Authors should minimize written text but use it when necessary to emphasize essential data and/or to stimulate discussion. All illustrations, drawings, charts, pictures, graphs, figures, and written text should be large enough to allow easy reading from a distance of 5′ (1.5 m). Matted and finished photographs are recommended to enhance visibility. Pushpins and/or thumbtacks will be supplied at the meeting.

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

The **General Society Student Poster Session** will be held as a part of the Monday Evening Mixer and Technical Exhibit, which features instruments, materials, systems, publications, and software of interest to meeting attendees. All meeting registrants are invited to attend. Formal presentations will begin at 1800h. Students may start setting up their presentations at 1300h in British Columbia Ballroom, Conference Floor, Fairmont; judging of the posters will begin at 1500h. Participants are encouraged to attend the Annual Society Luncheon and Business Meeting on Tuesday at 1215h (ticket required, except for winners) where the winners will be announced and given an award plaque.

Speaker-Ready Room—Two Speaker-Ready Rooms will be available Sunday through Friday, in King George Room, 3rd Floor, Hyatt, and Lions Room, Conference Floor, Fairmont. These rooms are available to allow speakers the opportunity to preview and prepare for their presentations. We highly recommend that speakers verify their laptop's compatibility with the sample LCD projector that will be located in this room, prior to their presentation. Additionally, there will be audiovisual technicians available for your assistance.

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

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

Registration & General Meeting Information

Meeting Registration—The meeting registration area will be located in the Regency Foyer, 3rd Floor, Hyatt. Registration will open on Sunday and the technical sessions will be conducted Sunday through Friday.

Advance Registration—Advance registration is encouraged. Register online at www.electrochem.org, or fax your registration form to +1 609.737.2743. Attendees prepaying by credit card are encouraged to use our online system, or send the form by fax. If you send a registration by fax, please do not send another copy by mail, as this may result in duplicate charges. **The deadline for advance registration is March 26, 2010.** Refunds are subject to a 10% processing fee and will only be honored if written requests are received by April 2, 2010. All meeting participants are required to pay the appropriate registration fees. Advance and onsite payments must be made in U.S. Dollars via Visa, MasterCard, American Express, Discover Card, check, or money order payable to ECS.

Key Locations

Meeting Registration	Regency Foyer, 3rd Floor, Hyatt
Information/Message Center	Regency Foyer, 3rd Floor, Hyatt
ECS Headquarters Office	Brighton Room, 4th Floor, Hyatt
ECS Book Store	Regency Foyer, 3rd Floor, Hyatt
Speaker Ready Rooms	King George Room, 3rd Floor, Hyatt & Lions Room, Conference Floor, Fairmont

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General Topics

- Batteries, Fuel Cells, and Energy Conversion
- 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

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Book Store Hours

Sunday, April 25	0700-1900h
Monday, April 26	0700-1900h
Tuesday, April 27	0700-1730h
Wednesday, April 28	0800-1600h
Thursday, April 29	0800-1600h
Friday, April 30	0800-1200h

Registration Hours

Sunday, April 25	0700-1900h
Monday, April 26	0700-1900h
Tuesday, April 27	0700-1730h
Wednesday, April 28	0800-1600h
Thursday, April 29	0800-1600h
Friday, April 30	0800-1200h

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

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

	Advance	Onsite
ECS Member	$405	$505
Nonmember	$615	$715
ECS Student Member	$150	$250
Student Nonmember	$190	$290
One Day ECS Member	$275	$375
One Day Nonmember	$365	$465
ECS Emeritus or Honorary Member	$0	$0
Companion Registrant	$25	$30

All students must send verification of student eligibility along with their registration. All technical registrations include a copy of Meeting Abstracts (on USB Flash Drive only). Attendees who wish to have paper copies of abstracts in advance of the meeting should download copies from the ECS website, free of charge.

***Financial Assistance*—**Financial assistance is limited ad generally governed by the symposium organizers. Individuals may inquire directly to the symposium organizers of the symposium in which they are presenting their paper to see if funding is available. Individuals requiring an official letter of invitation should write to the ECS headquarters office; such letters will not imply any financial responsibility of ECS.

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

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

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