Special Meeting Section

San Francisco, CA | Hilton San Francisco

May 24-29, 2009

Welcome to San Francisco— *Northern California's urban hub and home to cable cars, bustling Chinatown, Fisherman's Wharf, and the Golden Gate Bridge. A few hours away, Napa Valley and Santa Cruz offer a taste of the city's rich surroundings. We are pleased to venture into this city again for the 215th ECS Meeting. This major international conference will be held at the Hilton San Francisco and will include 47 topical symposia consisting of 1,579 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

Sunday, May 24
1830h
For the Rest of Us…

Development of Organic Sensors and Electronics in Medicine and for Point-of-Care Patient Health Monitoring in Real Time

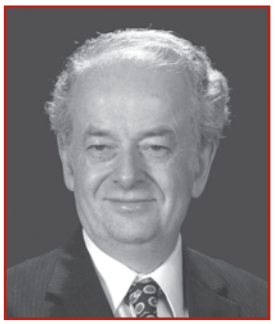
by Vijay K. Varadan

A new paradigm in healthcare, driven by cost and quality issues, is now emerging, which enables continuous point-of-care (POC) monitoring of patient's vital signs such as heart rate (ECG), respiration, body temperature, skin response (GSR), and motion activities (EMG). Real-time health monitoring could ensure the effectiveness of therapy by providing prevention, and early risk detection, which will significantly reduce healthcare costs by avoiding unnecessary hospitalizations. The key to POC monitoring is the development of cost-effective, light-weight and low-power consumable sensor devices that can be seamlessly embedded into a daily outfit. Latest advances in organic electronics have the ability to realize light and cost-effective smart fabrics with embedded electronics and sensors combined with wireless communications. In this presentation, we introduce several organic based sensor devices capable of measuring temperature, strain, pH and potassium ion concentrations, each of which will enable us to monitor the patient's respiration rate, skin/body temperature, and the onset of Acute Myocardial Ischemia. It is expected that these flexible organic sensors can easily fit on garment with wireless instrument, and this sensory suit will be ideal for the real-time monitoring of vital kinematics and signs at remote locations for activity and location monitoring. Selected movies illustrating the applications of both invasive and non-invasive wireless sensor systems to patients and surgical procedures will be shown at the talk.

Vijay K. Varadan is currently the Twenty-First Century Endowed Chair in Nano-and Bio-Technology and Medicine, and Distinguished Professor of Electrical Engineering and Distinguished Professor of Biomedical Engineering (College of Engineering) and Neurosurgery (College of Medicine) at University of Arkansas. He is also a Professor of Neurosurgery at the Pennsylvania State University College of Medicine. He also holds honorary doctorate degrees in Nano-, and Bio-Technologies and Medicine. He joined the University of Arkansas in January 2005 after serving on the faculty of Cornell University, Ohio State University, and Pennsylvania State University for the past 32 years.

Dr. Varadan is also the Director of the Center of Excellence for Nano-, Micro-, and Neuro-Electronics, Sensors and Systems, and the Director of the High Density Electronics Center. He has concentrated on the design and development of various electronic, acoustic, and structural composites, smart materials, structures, and devices including sensors, transducers, Microelectromechanical Systems (MEMS), synthesis and large scale fabrication of carbon nanotubes, NanoElectroMechanical Systems (NEMS), microwave, acoustic and ultrasonic wave absorbers and filters. He has developed neurostimulator, wireless microsensors and systems for sensing and control of Parkinson's disease, epilepsy, glucose in the blood and Alzheimer's disease. He is also developing both silicon and organic based wireless sensor systems with RFID for human gait analysis and sleep disorders and various neurological disorders.

Dr. Varadan is a founder and the Editor-in-Chief of the *Journal of Smart Materials and Structures*. He is the Editor-in-Chief of the *Journal of Nanomedical Science in Engineering and Medicine*. He is an Associate Editor of the *Journal of Microlithography, Microfabrication, and Microsystems*. He serves on the editorial board of the *International Journal of Computational Methods*. He has published more than 500 journal papers and 13 books. He has 13 patents pertinent to conducting polymers, smart structures, smart antennas, phase shifters, carbon nanotubes, and implantable devices for Parkinson's patients, MEMS accelerometers, and gyroscopes. He is a fellow of SPIE, ASME, the Institute of Physics, and the Acoustical Society of America. He has many visiting professorship appointments in leading schools overseas.



Monday, May 25
0800h
Plenary Session

The ECS Lecture

Quantum Cascade Lasers for the Mid- to Far-Infrared: Band-Structure Engineering, Beam Engineering and Applications

by Federico Capasso

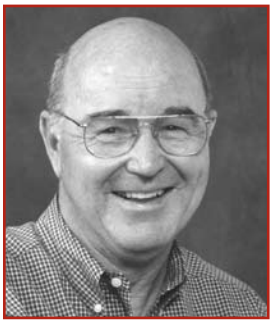
In his plenary talk Federico Capasso will trace the path from the invention to the exciting advances in the physics, applications, and commercialization of the quantum cascade lasers—a revolutionary light source which covers the mid- and far-ir spectrum and is broadly impacting sensing, spectroscopy, and sub-wavelength photonics.

The Quantum Cascade Laser (QCL) has emerged as the laser of choice for photonics and spectroscopy in the mid-infrared and in the far infrared, covering the range from 3 to 300 microns in wavelength, due to its unique wavelength agility and large "design space" that allows one to tailor its performance at will for a wide range of applications. These include single mode broadly tunable lasers for chemical sensing and trace gas analysis at parts per billion in volume; compact, chip-scale, broadband spectrometers with performance already comparable to state of the art Fourier-Transform-Infrared-Spectrometers; and high power continuous wave room temperature devices for military applications. Important commercial developments will be discussed. New functionalities have been demonstrated by integrating on the facets of QCLs sub-wavelength plasmonic

nanostructures that have led to highly collimated beams by achieving a dramatic reduction of the beam divergence for LIDAR applications, unprecedented control of the polarization and ultrahigh intensity nanoscale size spots in the near field for high resolution chemical imaging.

Federico Capasso is the Robert L. Wallace Professor of Applied Physics at Harvard University, which he joined in 2003 after a 27 year career at Bell Labs. He holds a Doctor of Physics degree from Rome University. His research includes band-structure engineering of novel devices/materials, nanophotonics, and quantum electrodynamics.

He has co-authored over 300 papers and holds over 65 U.S. patents. He is a member of the National Academy of Sciences, the National Academy of Engineering, and a Fellow of the American Academy of Arts and Sciences. His awards include the King Faisal International Prize for Science, the American Physical Society Arthur Schawlow Prize, the IEEE Edison Medal, the IEEE Streifer Award, the Wetherill Medal of the Franklin Institute, the OSA Wood prize, the Rank Prize in Optoelectronics, the Material Research Society Medal, the IEEE Sarnoff Award, the Welker Medal, the Duddell Medal and Prize of the Institute of Physics, and the Newcomb Cleveland Prize.



Following the ECS Lecture—

Gordon E. Moore Medal for Outstanding Achievement in Solid State Science and Technology Award Lecture

High Resolution Imaging Technology: A View of the Future

by C. Grant Willson

The drive to manufacture semiconductor devices with ever smaller features has inspired amazing improvements in imaging materials science and technology for over 3 decades. Billions of dollars have been spent in efforts to devise methods and materials that enable the printing of ever smaller transistors. The most advanced microelectronic devices in full scale production have minimum features in the range of 40-50 nm and fully functional transistors with 10 nm gates have been characterized. The lithographic process that has been used to generate these "nano-structures" is becoming extremely expensive and the cost of that process threatens the economics of the semiconductor manufacturing industry.

Imprint lithography, a much lower cost, high resolution patterning technology is emerging as a potential adjunct to photolithography. Imprint lithography loosely defines a set of techniques that include several forms of embossing, stamping, and molding that show great promise as low cost methods for producing nanostructures. These techniques take many different forms, each of which has its own special applicability. The technique we call Step and Flash Imprint Lithography (S-FIL) is designed to allow the fabrication of high resolution, high aspect ratio images that can be aligned with precision. The process accurately replicates arbitrary shapes as small as 20 nm and structures smaller than 5 nanometers in width have been faithfully reproduced. The state of high resolution imaging processes for production of devices with nanoscale features will be presented with emphasis on Step and Flash Imprint Lithography Process.

C. Grant Willson earned his BS and PhD degrees at UC, Berkeley. He came to The University of Texas in 1993 from his position as an IBM Fellow and Manager of the Polymer Science and Technology area at the IBM Almaden Research Center in San Jose, California. He joined IBM after serving on the faculties of California State University, Long Beach and the University of California, San Diego.

Dr. Willson's research can be characterized as the design and synthesis of functional organic materials with emphasis on materials for microelectronics. He is co-inventor of the chemically amplified photoresists used to manufacture all of today's advanced semiconductor devices and co-founder of Molecular Imprints, Inc.

Dr. Willson is a member of the ACS, APS, SPIE, SPE, ASEE, Sigma Xi, and the National Academy of Engineering. Dr. Willson is a Fellow of PMSE and SPIE. He is co-author of more than 450 journal publications and co-inventor on more than 40 issued patents.

His work has been honored by 5 awards from the ACS, the Alexander von Humboldt Award from the Federal Republic of Germany, the Aristotle Award from SRC, and the Malcolm E. Pruitt Award from the CRC. He received the National Academy of Sciences Award for Chemistry in Service to Society, the Japanese Photopolymer Science and Technology Award, the Dehon Little Award from the AIChE, and the Zernike Award from SPIE. He was the 2007 recipient of the SEMI North America Award and was recently awarded the National Medal for Technology and Innovation by the President of the United States.

***2009 Gordon E. Moore Award Reception*—**All meeting registrants are invited to attend the award reception honoring C. Grant Willson, recipient of the 2009 Gordon E. Moore Medal for Outstanding Achievement in Solid State Science and Technology on Tuesday, May 26 at 1800-1845h. Room to be announced.

Tuesday, May 26

Annual Society Luncheon and Business Meeting
At 1215h, the Annual Society Luncheon and Business Meeting will be held. The President, Secretary, and the Treasurer will give brief reports on the current state of the Society, and the Student Poster Award presentation will take place at this annual business luncheon. All members and meeting attendees are encouraged to participate in this meeting. Tickets are $27.00 in advance and $32.00 onsite.

Short Courses

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
Solid State Lighting
I. Ferguson, Instructor

Solid state lighting is an exciting new technology that has the potential to far exceed the energy efficiencies of conventional lighting. Approximately one quarter of the world's electricity use is for lighting, and substantial energy savings can be realized if affordable, efficient, solid state lighting one day becomes a reality. Solid state lighting is based on light-emitting diodes (LEDs) for illumination. White light can be produced by mixing the light from multiple single-color LEDs, or by using phosphor blends that absorb near-UV or blue light from an LED and convert it to white light. This short course will cover solid state lighting (SSL) technology with an emphasis on GaN LEDs and phosphors for use in LEDs.

Short Course #3
Fullerenes and Carbon Nanotubes
D. Guldi, Instructor

This course is targeted at chemists, physicists, materials scientists, and engineers with an interest in nanostructured carbon materials—ranging from fullerenes and carbon nanotubes to carbon onions and carbon nanohorns. The aim of this short course is to introduce the student to the chemistry and physics of these novel carbon allotropes. An overview of recent advances in the synthesis, characterization, and physico-chemical properties of nanostructured carbon materials will be presented. To benefit most effectively from this course, registrants should have completed at least their first two years of a bachelor's program in chemistry, physics, or engineering; or have several years of practical experience.

Short Course #4
Electrochemical Nanotechnology
S. Lipka, Instructor

The aim of this short course is to introduce the student to selected aspects of nano-material synthesis, characterization, and device fabrication as it relates to electrochemical systems. An overview of recent advances in the synthesis, characterization, and properties of nanomaterials will be presented with particular emphasis on experimental methods and strategies to develop functional nanomaterials and devices applicable to the field of electrochemistry. The course reviews the "tools of the trade" available to the nanotechnologist for characterizing and manipulating materials at the atomic level. Strategies for preparing nanomaterials in the form of rods, wires, tubes, and particles and their application in electrochemical devices such as batteries, fuel cells, electrochemical capacitors, electrochemical actuators, and sensors are presented. Fabrication of nanomaterials and architectures using electrochemical directed self-assembly processes is reviewed.

Short Course #5
Basic Electrochemical Measurements
B. Eggers, Instructor

The course is targeted at scientists and engineers who are tasked with using electrochemical techniques in a variety of application areas: fuel cells, capacitors and batteries, corrosion, physical electrochemistry, electrodeposition, and sensors. The course will take a look at the basics of electrochemistry, the instruments and cells used in performing the experiments, the techniques available, and the interpretation of results. The techniques discussed will include those used in voltammetry, corrosion measurement, impedance spectroscopy, pulse plating, and more.

Professional Development Workshops
J. R. Susko, Instructor

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.

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 and 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 and Monday, 1300-1345h.

Resume Round Table—Designed to provide feedback on resumes by publicly critiquing participants' resumes and offering suggestions on ways to make them more effective. To take full advantage of the workshop, please bring a copy of your current professional resume, Monday, 1400-1700h.

Award Winners

NOTE: *For complete biographies of the award recipients, and the schedule of their presentations, please see the General Meeting Program on the ECS website: www.electrochem.org/meetings/biannual/215/215.htm.*

Electronics and Photonics Division Award

Eicke R. Weber is director of the Fraunhofer Institute for Solar Energy Systems (ISE) and Professor of Physics and Applied Sciences at the Albert-Ludwig University of Freiburg, Germany. The ISE institute has a total staff of about 830 and an annual budget of more than Euro 50M and is one of the world's leading research institutes in the field of renewable energy and energy efficiency. The focus of Dr. Weber's research is the analysis of lattice defects in Si and compound semiconductors; recently he studied specifically how good solar cells may be produced out of upgraded metallurgical ("dirty") silicon with high metal content.

Prof. Weber studied physics at the University of Cologne, Germany, where he received his doctorate in 1996 and his habilitation in 1983. From 1983-2006 he was on the faculty of the Department of Materials Science and Engineering of the University of California, Berkeley, since 1991 as a professor of materials science. In 1990 he was appointed a visiting professor at the Tohoku University in Sendai, Japan, and in 2000 at the Kyoto University in Kyoto, Japan. In 1994 he received an Alexander von Humboldt Senior Scientist award. From 2004-2006 he served as the chair of the Nanoscale Science and Engineering Graduate Group in Berkeley. He served as president of the Alexander von Humboldt Association of America (AvHAA) in 2001-2003 and in 2003 he was elected founding president of the German Scholars Organization (GSO). In 2006 he received the Award of Merit ("Bundesverdienstkreuz am Bande") from the President of Germany.

Energy Technology Division Research Award

Krishnan Rajeshwar's research contributions span a broad spectrum in environmental and energy areas ranging from the thermo- and electroanalytical chemistry of oil shales and oil sands, photocatalytic remediation of organic and inorganic pollutants in water and air, semiconductor thin film preparation and characterization, energy-efficient methods for oxide semiconductor preparation, photoelectrochemical energy conversion, and solar water splitting using inorganic semiconductors. He is the author of over 450 refereed publications in reputed journals and several book chapters and monographs or edited volumes. His recent research on photocatalysis and solar energy conversion has been featured in the popular media including CNN, *Radio Business News, UTA Today, Dallas Morning News, Arlington Morning News,*

Fort Worth Star Telegram, Chemistry and Industry, Chemical & Engineering News, and *Business Week*. Dr. Rajeshwar is an active member of the Energy Technology Division within the Society where he served as past chair and organizes many symposia for that Division, including one at this meeting. He is also currently serving as the Editor of the ECS *Interface* magazine and is on the Editorial Advisory Board of the *Journal of Applied Electrochemistry*. He is a Fellow of The Electrochemical Society. Dr. Rajeshwar was inducted into the Academy of Distinguished Scholars at UT Arlington as a charter member and now holds the title of Distinguished University Professor of Chemistry & Biochemistry and Associate Dean, College of Science. He is the founding director of the Center for Renewable Energy Science & Technology (CREST), which brings together some 25 faculty members on campus to do collaborative research on energy-related problems.

Energy Technology Division Research Award

Jai Prakash is interim chair and professor of chemical engineering at the Illinois Institute of Technology's (IIT) Department of Chemical and Biological Engineering, as well as the director of Center for Electrochemical Science and Engineering, both located in Chicago, Illinois. He received his PhD in physical chemistry from Delhi University, India, in 1985. After completion of his degree, he joined Professor Ernest Yeager's research group at Case Western Reserve University, Cleveland, Ohio, and earned his second PhD in electrochemistry in 1990. He then joined Argonne National Laboratory as a post-doctoral fellow and became a full staff member in 1993. From 1996 to 1998, he worked at Energizer Power Systems as a technology manger before joining IIT as an associate professor. He is also the past chair and vice-chair of the ECS Energy Technology Division. Prakash's research interests are in the area of energy and sustainability, with an emphasis on electrochemical energy conversion and storage. His research group applies the key tenets of fundamental electrochemistry and materials science to achieve advances in battery, fuel cell, photovoltaic, and hydrogen storage technologies. Prakash's work has resulted in eight patents, two book chapters, and more than 122 journal publications and proceedings papers in these areas.

Fullerenes, Nanotubes, and Carbon Nanostructures Division Richard E. Smalley Research Award

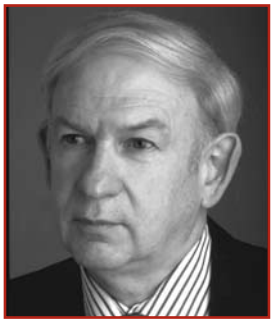
Phaedon Avouris received his BSc degree at the Aristotle University in Greece and his PhD degree in physical chemistry at Michigan State University in 1974. He did postdoctoral work at UCLA and was a Research Fellow at AT&T Bell Laboratories before joining the staff of IBM's Research Division at the Watson Research Center in 1978. In 1984 he became manager of Chemical Physics and in 2004 he was elected IBM Fellow. He is currently manager of Nanoscience and Nanotechnology. He has also been an adjunct professor at Columbia University and the University of Illinois.

Over the years, his research has involved a wide variety of subjects in such areas as laser spectroscopy, surface physics and chemistry, scanning tunneling microscopy, atom manipulation and nanoelectronics. His current research is focused on experimental and theoretical studies of the electrical, optical, and optoelectronic properties of carbon nanotubes and graphene. The work includes the design, fabrication, and study of nanoelectronic and optoelectronic devices and circuits.

Dr. Avouris has published over 350 scientific papers. He 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, 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, and the Richard Feynman Nanotechnology Prize. He has also received many IBM Corporation "Outstanding Technical Achievement" awards, and Michigan State University's Distinguished Alumnus Award. He serves in the Editorial Boards of a number of journals and book series.

Industrial Electrochemistry and Electrochemical Engineering Division New Electrochemical Technology (NET) Award

FuelCell Energy (FCE), CT, USA will receive the award for its high-efficiency, ultra-clean, and high reliability Carbonate Direct FuelCell® (DFC®) power plant commercialized for on-site electric and combined heat and power generation applications. DFC power plants electrochemically produce electricity directly from readily available hydrocarbon fuels. The basic R&D started in 1976 culminating in a 250 kW commercial product delivered to Kirin Brewery in Japan in 2003. Currently (as of January 2009) the DFC products have achieved over 20 MW installed capacity. The DFC generator electricity conversion efficiency approaches 50% in smaller size simple cycle units, and 60% in large combined cycle generators, which is unmatched by alternate technologies in its size range. The key contributors to the technology are as follows.



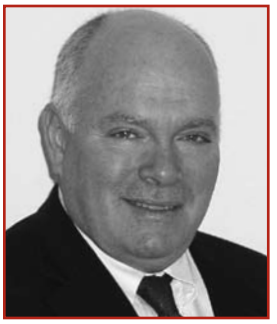
Bernard S. Baker (deceased) was the research, development and commercialization pioneer. Dr. Baker started working on carbonate fuel cells in Amsterdam, Holland as a Fullbright Scholar with Prof. G. H. J. Broers. Dr. Baker continued his research on carbonate fuel cells at the Institute of Gas Technology, Chicago, where he directed research in the area of energy conversion and fuel cells, and simultaneously pursued his doctoral degree at the Illinois Institute of Technology in Chicago, IL. Shortly after receiving his doctorate in chemical engineering from IIT in 1969, Dr. Baker co-founded and served as president, chief executive officer, and chairman of Energy Research Corporation, now called FuelCell Energy, Inc., where Dr. Baker worked on his unique version of the carbonate fuel cell – the DFC®. Dr. Baker created his first DFC, which was no bigger than a silver dollar and generated only a few milliwatts. By the time Dr. Baker retired in 1997, the company he founded became a leading fuel cell company manufacturing large-scale fuel cells for industry. Dr. Baker received the Grove Medal in 1999 for his contributions to the advancement of fuel cells. He was issued 20 U.S. patents relating to fuel cells and other electrochemical systems. He authored more than 100 publications, including technical papers, books and symposia proceedings on the subject of fuel cells.

Industrial Electrochemistry and Electrochemical Engineering Division New Electrochemical Technology (NET) Award
(continued)

Hansraj C. Maru was the research and development leader in developing and commercially introducing Direct FuelCell power plants. Dr. Maru oversaw the development of these power plants from the initial miliwatt units to the present megawatt size. Maru was an integral part of the development of the DFC technology holding a number of technical and management positions in his 29 years of service with the company. Over the years, he served as vice president of research and development, executive vice president, and chief technology officer. Maru retired in 2006 as CTO. Maru holds 13 patents, and he authored more than 160 publications. He edited four symposium volumes and contributed chapters to two books. Maru's work was recognized with the 2004 F. T. Bacon Medal Award and the 2003 Mass High Tech All Star Award for his contributions to fuel cell technology.

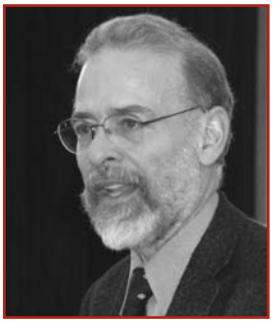
Mohammad Farooque is a key DFC technology developer. Farooque is the Senior Vice President and Distinguished Fellow, Direct Fuel Cell Technology at FCE. Dr. Farooque has carried out increasing responsibilities for technology development. He has been leading the development of all aspects of the direct fuel cell technology since early 1990s. Under his technical leadership, the direct carbonate technology as well as the power plant design, was developed under a Department of Energy and a private-sector funded co-operative program. Dr. Farooque is considered a world's leading expert in the carbonate fuel cell technology. He has authored over 130 publications in electrochemical systems and fuel cells including chapters in three fuel cell handbooks and has been awarded 24 U.S. patents.

Chao-Yi Yuh is a key developer of the DFC core technology. He is the Director, Carbonate Cell/Stack Development and Discipline Chief, Carbonate Fuel Cell Material Sciences at FuelCell Energy. Prior to joining the company, he conducted experimental and theoretical investigations of fuel cell porous electrodes at the Institute of Gas Technology, Chicago. Chao-Yi joined FuelCell Energy in 1985 as an electrochemical engineer, assuming increasing responsibilities and performing a lead role on materials development, design, testing, and validation of fuel cell core components. He has made major contributions to the development of numerous advanced components currently used in the company's commercial DFC products. He is a leading expert on fuel cell electrochemistry, corrosion, materials science, stack design, and fabrication. He was awarded in 2000 a prestigious Tibbetts award by the U.S. Government's Small Business Administration (SBA) for successfully developing and commercializing fuel cell materials developed under a DOE SBIR program. He was granted 11 patents in fuel cell area and has authored more than 60 publications, including chapters in several books.



Joel Doyon is a key developer of the core DFC components. Starting his career in 1979 as a research chemist, Mr. Doyon was involved in the development of the first high temperature fuel cell core components that are currently used in FuelCell Energy's commercial DFC products. Since then, Mr. Doyon has held various positions of increasing responsibility within the company beginning as Manager of Components Manufacturing to Vice President of Government Programs. Mr. Doyon played a key role in the engineering design, plant layout, and successful commissioning of the first state-of-the-art pilot manufacturing facility for the direct fuel cells. Mr. Doyon oversaw the development of the fuel cell module and the submegawatt power plant that is now the basis for the company's commercial products. Mr. Doyon was awarded 7 patents and has authored many papers. Mr. Doyon retired from FuelCell Energy in 2008.

Pinakin Patel is a key DFC cell and stack developer. Mr. Patel has been actively engaged in the development of fuel cells for over three decades. Mr. Patel is a key member of the FuelCell Energy team that developed the direct carbonate fuel cell and stack technology. His technical innovations and leadership played an important role in the development of the DFC full-size stack design. As the leader of the design team, he participated in collaborative research and development efforts with many reputed international companies such as Sanyo and Mitsubishi in Japan, and Haldor Topsoe and Elkraft Power Co. in Denmark. He led the design team for the first 2 MW fuel cell module for demonstration at Santa Clara, California. Mr. Patel is currently the Director of Special Systems and Research at FCE. Mr. Patel holds 15 U.S. patents and has authored over 100 publications and seminar presentations in the US, Canada, Japan, Europe, and India.



Physical and Analytical Electrochemistry Division David C. Grahame Award

Héctor D. Abruña, Emile M. Chamot Professor of Chemistry, completed his graduate studies with Royce W. Murray and Thomas J. Meyer at the University of North Carolina at Chapel Hill in 1980 and was a postdoctoral research associate with Allen J. Bard (1980-81) at the University of Texas at Austin. After a brief stay at the University of Puerto Rico, he went to Cornell in 1983.

The signal accomplishment of Dr. Abruña's research has been to take a multidisciplinary approach to the study of electrochemical phenomena by combining elements of various branches of chemistry, physics, and biochemistry. He has incorporated concepts of coordination chemistry and biochemistry into the area of chemically modified

electrodes and their analytical application in sensors, for transition metal ions and organic functionalities, biosensors and in electrocatalytic applications. He pioneered the use of x-ray based techniques to the *in-situ* study of electrochemical interfaces.

Most recently, his work has focused on novel materials (based on ordered intermetallic phases) as electrocatalysts for fuel cell applications, the use of organosulfur materials as high performance cathodes for lithium ion batteries, and on the synthesis and development of nanometric building blocks for application in molecular electronics.

Prof. Abruña is the co-author of over 300 publications, has given over 420 invited lectures world-wide, and is most proud of the 32 students that, to date, have obtained a PhD with him.

Prof. Abruña has been the recipient of numerous awards including (most recently) the ACS Award in Electrochemistry and the C. N. Reilley Award in Electrochemistry for 2007. He was elected member of the American Academy of Arts and Sciences in 2007 and Fellow of the International Society of Electrochemistry in 2008.

Technical Exhibit

The Technical Session coffee break is scheduled for 0930h in the exhibit hall 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, May 25 ..... 1800-2030h
(includes the Monday Evening Poster Session)

Tuesday, May 26..... 0900-1400h
re-opening 1800-2030h
(includes the Tuesday evening Poster Session)

Wednesday, May 27 ..... 0900-1400h

Exhibitors as of Press-Time

ECS

Booth 100
ecs@electrochem.org
www.electrochem.org

Bio-Logic USA

Booths 215 & 314
Bill Eggers
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CSIR, Materials Science & Manufacturing, Energy & Processes

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Dierker & Associates, P.C. - Intellectual Property Law

Booth 205
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Fuel Cell Technologies

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Pine Research Instrumentation

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Princeton Applied Research / Solartron Analytical

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www.solartronanalytical.com

Radiometer Analytical, A Hach Company Brand

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SES Research

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Springer

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Event Highlights

NOTE: *For a list of Committee Meetings, please visit the San Francisco meeting page: www.electrochem.org/meetings/biannual/215/215.htm.*

Sunday, May 24

0900h.....Short Courses

1500h.....Writing an Effective Cover Letter and Resume Workshop

1600h.....Job Interviewing Tips Workshop

1830h.....For the Rest of Us — "Development of Organic Sensors and Electronics in Medicine and for Point-of-Care Patient Health Monitoring in Real Time," Vijay K. Varadan

1930h.....Sunday Evening Get-Together

2000h.....Electronics and Photonics Division Award Reception and General Meeting

Monday, May 25

0800h.....The ECS Lecture: "Quantum Cascade Lasers for the Mid- to Far-Infrared: Band-Structure Engineering, Beam Engineering and Applications," Federico Capasso; and the 2009 Gordon E. Moore Award Lecture: "High Resolution Imaging Technology: A View of the Future," C. Grant Willson

0930h.....Coffee Break

1200h.....Writing an Effective Cover Letter and Resume Workshop

1215h.....Industrial Electrolysis and Electrochemical Engineering Division Luncheon & Business Meeting; tickets are $27 in advance, $32 onsite, non-refundable

1215h.....Physical and Analytical Electrochemistry Division Luncheon & Business Meeting; tickets are $27 in advance, $32 onsite, non-refundable

1300h.....Job Interviewing Tips Workshop

1400h.....Resume Roundtable Workshop

1800h.....Monday Evening Mixer, Student Poster Session, and Technical Exhibit Opening

Tuesday, May 26

0900h.....Technical Exhibit

0930h.....Coffee Break, Exhibit Hall

1215h.....Annual Society Luncheon and Business Meeting with Student Poster Award Presentation; tickets are $27 in advance, $32 onsite, non-refundable

1800h.....Gordon E. Moore Award Reception honoring C. Grant Willson

1800h.....Technical Exhibit and General Poster Session

Wednesday, May 27

0900h.....Technical Exhibit

0930h.....Coffee Break, Exhibit Hall

1215h.....Dielectric Science and Technology Division Luncheon & Business Meeting; tickets are $27 in advance, $32 onsite, non-refundable

1215h.....Energy Technology Division Luncheon & Business Meeting; tickets are $27 in advance, $32 onsite, non-refundable

1215h.....Fullerenes, Nanotubes and Carbon Nanostructures Division Luncheon & Business Meeting; tickets are $27 in advance, $32 onsite, non-refundable

1215h.....Organic and Biological Electrochemistry Division Luncheon & Business Meeting; tickets are $27 in advance, $32 onsite, non-refundable

Thursday, May 28

0930h.....Coffee Break

Hotel & Travel Information

Hotel Reservation Information—The Hilton San Francisco, located at 333 O'Farrell Street, San Francisco, CA 94102, USA, is the headquarters hotel for the meeting. We encourage you to stay at the Hilton, where your stay will be most enjoyable and convenient. Guest room reservations for the Hilton can be made online from the ECS website. The discounted meeting rates are as follows:

Single, from $169 **Double, from $189**

A block of rooms have been reserved for May 21-31, 2009. The special room rate will be available until April 24. Reservations attempted after April 24 will be accepted on a space and rate availability basis. A deposit equal to your first night's stay is required to guarantee your reservation. Cancellation must be received at least 72 hours before expected arrival for a full refund of your deposit.

Special Offer at the Meeting Headquarters Hilton San Francisco Hotel—Pre-pay for your full stay and receive $129 special nonrefundable room rate, which includes all of the following:

- complimentary in-room high speed internet access
- 20% discount on all Spa services
- 10% discount on all food and beverage in the Urban Tavern Restaurant
- double HHonors points

Ground Transportation—SuperShuttle ground transportation service is available from San Francisco International Airport to the Hilton San Francisco at a special discounted rate for meeting attendees. Simply make your reservation from the ECS Website using ECS discount code: YP9EF.

Companion Registrants—Personal guests of Technical Registrants are invited to register for the 215th 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 San Francisco" orientation presented by the San Francisco Convention and Visitors Bureau on Monday, May 25th 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 on Sunday, May 24 from 1500-1700h. The Co-Chair Orientation, which includes a demonstration of the technical session audio-visual equipment, 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. Presenting authors should verify laptop/projector compatibility in the speaker ready room 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. Visit the ECS website for other details about author presentations.

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Symposium Topics and Organizers

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

HC **Hard-cover** 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 order form in this section or when registering online.

e **Electronic** (PDF) editions of *ECS Transactions* issues will be available ONLY via the ECS Digital Library. Online editions of the San Francisco "at" meeting issues will be available for purchase beginning May 15, 2009. Please visit the ECS website for all issue pricing and ordering information for the online editions.

A — General & Tutorials

A1 — General Student Poster Session (M) — *V. Desai, G. Botte, P. Kulesza, V. Subramanian and X. Zhang*

A2 — Nanotechnology General Session (M-Tu) — *E. Traversa and C. Bock*

B — Batteries, Fuel Cells, and Energy Conversion

B1 — Battery / Energy Technology Joint General Session (M-F) — *N. J. Dudney, S. R. Narayanan and C. R. Walk*

B2 — Battery Modeling at Cell Level (W) — *V. Srinivasan, A. M. Sastry and K. Zaghib*

B3 — Characterization of Porous Materials 2 (Tu-W) — *B. Lakshmanan, G. Brisard and A. Lasia*

B4 — Fuel Cells for Portable Power (M-Th) — *S. R. Narayanan, D. Chu and E. Plichta*

B5 — Hydrogen Production, Transport, and Storage 3 (M-Tu) — *M. C. Williams, M. Heben, S. N. Lvov, M. Manivannan, P. H. Maupin, S. R. Narayanan, E. D. Wachsman and J. W. Weidner*

B6 — Measurement and Diagnostics for Energy Systems (Tu) — *S. R. Narayanan, S. Mukerjee, R. Mukundan and P. Strasser*

B7 — Nanostructured Materials for Energy Storage and Conversion (M-Th) — *K. Zaghib, K. M. Abraham and C. Julien*

B8 — Photoelectrochemical Energy Conversion (M-Tu) — *K. Rajeshwar, J. Hupp and B. Parkinson*

B9 — Advanced Materials and Concepts for Energy Harvesting (M-W) — *X. Zhou, M. Manivannan and J. C. Nino*

C — Biomedical Applications and Organic Electrochemistry

C2 — Dielectrics and Engineered Interfaces in Biological and Biomedical Applications (Tu-W) — *M. Madou, S. Daunert, A. Hoff, I. Hsing, C. Kranz, D. Landheer, L. A. Nagahara, M. Nishizawa, A. Offenhaeusser, K. Sode and T. Thundat*

C3 — Mechanistic and Synthetic Aspects of Organic Electrochemistry (M-Tu) — *D. Peters and G. T. Cheek*

D — Corrosion, Passivation, and Anodic Films

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

E — Dielectric and Semiconductor Materials, Devices, and Processing

E1 — Advanced Gate Stack, Source/Drain, and Channel Engineering for Si-Based CMOS 5: New Materials, Processes, and Equipment (Tu-W) — *V. Narayanan, E. P. Gusev, H. Iwai, D. L. Kwong, F. Roozeboom and P. J. Timans* HC e

E2 — Chemical Mechanical Polishing 10 (M) — *G. Banerjee, V. Desai, Y. Obeng and K. Sundaram* e

E3 — Nanocrystal Embedded Dielectrics for Electronic and Photonic Devices (Tu-W) — *P. Mascher, P. Joshi, Y. Kuo, M. E. Overberg and P. Srinivasan* e

E4 — Novel Plasma Techniques for Low Temperature Processing of Thin Films for Flexible Electronics (Tu, Th) — *P. Joshi, P. Srinivasan and R. Todi* e

E5 — Silicon Nitride, Silicon Dioxide, and Alternate Emerging Dielectrics 10 (M-Th) — *R. Ekwal Sah, J. M. Deen, A. Toriumi, J. Yota and J. Zhang* HC e

E6 — Solid-State Lighting (M-Tu) — *M. Shur, I. Ferguson and A. Zukauskas*

E7 — State-of-the-Art Program on Compound Semiconductors 50 (SOTAPOCS 50) (M-Tu) — *A. G. Baca, J. Brown, D. N. Buckley and P. Nam* HC e

E8 — Processes at the Semiconductor Solution Interface 3 (W-Th) — *C. O'Dwyer and A. Etcheberry* HC e

E9 — SOI Device Technology 14 (Tu-F) — *Y. Omura, S. Cristoloveanu, F. Gamiz and B. Nguyen* HC e

F — Electrochemical/Chemical Deposition and Etching

F1 — Electrochemical Processing in ULSI and MEMS 4 (M-W) — *T. P. Moffat, H. Deligianni, J. Dukovic and J. L. Stickney*

G — Electrochemical Synthesis and Engineering

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

G2 — Leadership and Entrepreneurship in Electrochemical Engineering: A Tutorial Symposium (M) — *G. Pillay, R. Savinell and J. W. Van Zee*

G3 — Separators and Membranes for Batteries, Capacitors, Fuel Cells, and Other Electrochemical Systems (Tu) — *P. Arora and V. Ramani*

G5 — Tutorials in Electrochemistry Technology - Current Distribution (M-Tu) — *M. E. Orazem and J. M. Fenton*

H — Fullerenes, Nanotubes, and Carbon Nanostructures

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

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

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

H4 — Carbon Nanotubes and Nanostructures: Applications and Devices (M-Tu) — *S. Rotkin and Y. Gogotsi*

H5 — Endofullerenes and Carbon Nanocapusules (Tu, Th) — *H. Shinohara, T. Akasaka and A. L. Balch*

H6 — Energetics and Structure and Solid-State Physics (Tu-Th) — *Z. Slanina, O. V. Boltalina and P. Reinke*

H7 — Carbon Nanotubes and Nanostructures: Medicine and Biology (Tu-W) — *T. Da Ros, A. Hirsch and L. Wilson*

H8 — Porphyrins and Supramolecular Assemblies (M-Tu) — *N. Solladie and K. M. Kadish*

H9 — Metallic and Semiconducting Nanoparticles for Energy Conversion (M-Tu) — *P. V. Kamat and H. Imahori*

H10 — First International Symposium on Graphene and Emerging Materials for Post-CMOS Applications (M-Th) — *Y. Obeng, F. D'Souza, S. De-Gendt, H. Grebel, H. Iwai, P. V. Kamat, Z. Karim, D. Misra, J. Ruzyllo and P. Srinivasan* HC e

I — Physical and Analytical Electrochemistry

I1 — Physical and Analytical Electrochemistry General Session (Tu-W) — *P. Trulove*

I2 — Electrochemical Detection of Pathogens (W-Th) — *C. Kranz and I. Fritsch*

I3 — Electrochemistry in Medicine and Biomedical Applications (Tu-W) — *C. Bock, J. Burgess, B. Eggers, C. Holmes, J. Rusling and M. Urquidi-Macdonald*

I4 — Impedance in Electrochemistry - From Analytical Applications to Mechanistic Speculation 2 (Tu-W) — *P. Vanysek, D. C. Hansen and M. E. Orazem*

I6 — Novel Electrode Materials (Tu, Th) — S. Minteer and B. Lakshmanan

I7 — Role of Electrochemistry in Addressing Climate Change (Tu-W) — *I. Fritsch, S. R. Narayanan and K. Zaghib*

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

J1 — Sensors, Actuators, and Microsystems General Session (W-Th) — *G. Hunter, Z. P. Aguilar, S. Bhansali, M. Carter and R. Mukundan*

J2 — 35 Years of Chemical Sensors - Honorary Symposium for Professor Jiri Janata (M-W) — *J. Li, R. Brown, C. J. Bruckner-Lea, D. Hatchet, M. Josowicz and P. Vanysek* HC e

J3 — Sensor Applications: Food Safety, Agricultural and Environmental Sensors (Th) — *A. Simonian, Z. P. Aguilar, S. Bhansali, W. Buttner, G. Hunter and I. Taniguchi*

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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. Visit the ECS website for other details on Poster Session requirements. 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. 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 in the exhibit hall at 1400h; judging of the posters will begin at 1700h.

Speaker-Ready Room—A Speaker-Ready Room will be available Sunday through Friday 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 on each level of the hotel for your assistance.

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

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

Registration & General Meeting Information

Meeting Registration—The meeting registration will open on Saturday and the technical sessions will be conducted Monday through Friday.

Advance Registration—Advance registration is encouraged. Register online at www.electrochem.org; or print out the Advance Registration form, and send to: The Electrochemical Society, 65 South Main Street, Pennington, NJ 08534, USA, Fax: 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 April 24, 2009.** Refunds are subject to a 10% processing fee and will only be honored if written requests are received by May 1, 2009. All participants of the 215th ECS Meeting 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, or check or money order payable to ECS.

Key Locations

Meeting Registration	East Lounge, Ballroom Level, Buildings 1/2/3
Information/Message Center	East Lounge, Ballroom Level, Buildings 1/2/3
ECS Book Store and Membership Desk	East Lounge, Ballroom Level, Buildings 1/2/3
ECS Headquarters Office	California Room, Ballroom Level, Buildings 1/2/3
Speaker Ready Room	Yosemite Coatroom, Ballroom Level, Buildings 1/2/3
Development Office	Green Room, Ballroom Level, Building 2
Employment Interview Room	To Be Announced

Registration and ECS Book Store Hours

Sunday, May 24	1600-1900h
Monday, May 25	0700-1830h
Tuesday, May 26	0700-1730h
Wednesday, May 27	0800-1600h
Thursday, May 28	0800-1600h
Friday, May 29	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.

	Advance	Onsite
Member	$405	$505
Nonmember	$615	$715
Student Member	$150	$250
Student Nonmember	$190	$290
One Day Member	$275	$375
One Day Nonmember	$365	$465
ECS Emeritus & 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 CD-ROM 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 and generally governed by the symposium organizers. Individuals may inquire directly to the symposium organizers of the symposium in which they are presenting their paper to see if funding is available. Individuals requiring an official letter of invitation should write to the ECS headquarters office; such letters will not imply any financial responsibility of ECS.

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". An Employment Interview Room will be provided at the Hilton from 0800-1700h Monday through Friday for representatives from those companies or institutions that would like to interview applicants during the meeting.

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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