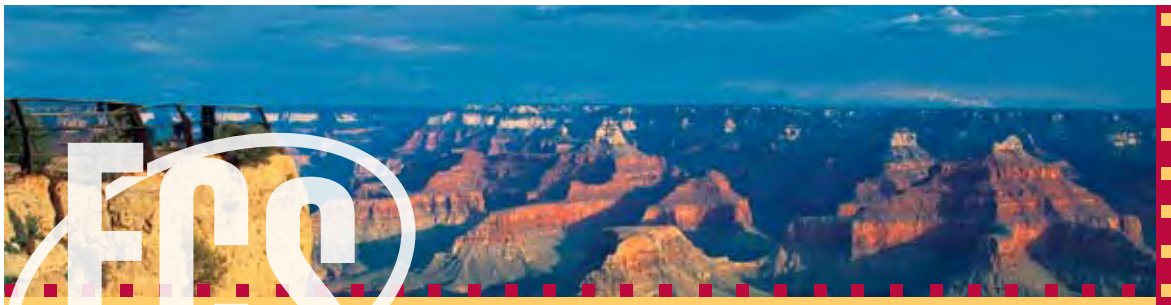
# 213th ECS Meeting

## PHOENIX, AZ

# Special Meeting Section

MAY 18-22, 2008 ❂ PHOENIX CONVENTION CENTER ❂ PHOENIX, AZ



# 213th ECS Meeting

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## MAY 18-22, 2008

***Welcome to Phoenix***— *where more than 325 days of annual sunshine mean you can count on exceptional weather as you experience the rich diversity of the Sonoran Desert area. We are pleased to venture into this city again for the 213th ECS Meeting. This major international conference will be held at the Phoenix Convention Center and the Hyatt Regency Phoenix Hotel and will include 39 topical symposia consisting of 1,250 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 18**
*For the Rest of Us…*
**1830h, Room 212 A/B/C, 200 Level, Phoenix Convention Center**

### Nanometric Objects and Chip-Scale Platforms for Disease Diagnosis

*by Marc D. Porter*

ECS meetings bring together researchers with wide-ranging interests. The Sunday evening "…For the Rest of Us" lecture series is designed to inform meeting attendees about areas outside of their immediate domain and to promote discussion and cross-Society interactions.

The drive for early disease detection, the growing threat of bioterrorism, and a vast range of challenges more generally in biotechnology have markedly amplified the demand for ultrasensitive, high-speed diagnostic tests. This presentation describes efforts to develop platforms and readout methodologies that potentially address demands in this arena through a coupling of nanometric labeling with surface enhanced Raman spectroscopic, magnetic, and scanning probe microscopic readout concepts. Strategies will be described for the fabrication and read-out of chip-scale platforms and nanometric sized labels that can be used with each novel readout modality. Examples will focus on the use of protein arrays as platforms targeted for the rapid, ultralow level detection of cancer markers and viral pathogens. Each example will also discuss challenges related to sensitivity and nonspecific adsorption and to fluid manipulation.

**MARC D. PORTER** is the USTAR Professor, Department of Chemistry and of Chemical Engineering, at the University of Utah. Dr. Porter received his doctorate from the Ohio State University in analytical chemistry in 1984. He then studied as a postdoctoral fellow at Bell Communications Research. Since 1986, he has been a member of the chemistry and of the chemical engineering faculty at Iowa State University where he was the Director of the Institute for Combinatorial Discovery and the Microanalytical Instrumentation Center. More recently, he served on the faculty of the Department of Chemistry and Biochemistry at Arizona State University, directing the Center for Combinatorial Sciences at the Biodesign Institute. His research team focuses on the role of interfaces in analytical chemistry, including nanometric strategies for high speed, ultrasensitive biodiagnosts, electrochemically modulated liquid chromatography, electrocatalysis, organic monolayer films, chemically modified surfaces, scanning probe microscopies, infrared and Raman spectroscopies, and acoustic wave sensors. He has published ~200 scientific manuscripts, given over 400 research presentations, holds more than ten patents with several more pending, and is a co-founder of four companies. His team's work has been supported by NSF, NIH, DAPRA, NASA, USDA, USDOE, and several companies, including IBM and Alcoa.

**MONDAY, MAY 19**
*Plenary Session*
**0800h, Regency A/B, First Floor, Hyatt**

*The ECS Lecture*

### Single-walled Carbon Nanotubes: Synthesis, Modification, and Characterizations

*by Sumio Iijima*

Unique properties of CNTs depend on their structures and morphologies, and well-controlled specimens are needed for precise and reliable experiments and industrial applications. Two important breakthroughs in the production of well-controlled single-wall carbon nanotube (SWCNT) growth were made in Prof. Ijima's group at AIST. One is a direct injection pyrolytic synthesis (DIPS) method, which can provide controlled tube diameters and extremely high purity tubes on an industrial scale production; applications include transparent and flexible conductive films, thin film transistors, and SWCNT threads and sheets. Another is the "Super-Growth" of SWCNTs, which grow vertically on various substrates including metal foils of "A4 size." Thus produced, substantially cheap SWCNTs are used for high power density capacitors. The importance of characterization of nanostructured materials will be demonstrated by showing the latest results of atomic structures of CNTs.

**Sumio Iijima** is currently a professor at Meijo University, Nagoya; Director, Research Center for Advanced Carbon Materials, National Institute of Advanced Industrial Science and Technology, Tsukuba; and a Special Research Fellow of NEC, Nagoya, Japan. He graduated from the University of Electro-Communication in Tokyo in 1963, and received his PhD in physics from Tohoku University in 1969. He worked in Prof. J. M. Cowley's group at Arizona State University, first as a postdoctoral fellow from 1970 to 1976, and then as a senior research associate until 1982. He worked briefly at Cambridge University as a visiting scholar in 1979. At Arizona he devoted much time to developing high-resolution transmission electron microscopy (HRTEM), which is the basis of the current HRTEM method.

Prof. Ijima returned to Japan in 1982 to work in the Ultra-Fine Particles Project (JST, Japanese government research agency) and won the Nishina Memorial Award (1985). He joined the NEC Fundamental Research Laboratories in Tsukuba as a research fellow in 1987. In 1991, Prof. Iijima discovered carbon nanotubes and elucidated that carbon nanotubes are composed of concentric graphene tubes and have a helical atomic arrangement. In 1993, Iijima showed that single-wall nanotubes could be synthesized by a dc arc-discharge of carbon with co-existing metal catalysts. His discovery of carbon nanotubes opened up a new era of nanoscience and nanotechnology.

Prof. Iijima's latest awards include the Gregori Aminoff Prize in Crystallography (Royal Swedish Academy of Science, 2007), the Fujiwara Award (2007), and the Balzan Prize for Nanoscience (Italy-Switzerland, 2007). He is a fellow of APS and received the Doctor Honoris Causa from the University of Antwerp, EPF Lausanne, and Peking University. In 2007, he was elected as a foreign associate of the National Academy of Science. Professor Iijima is also the 2008 recipient of the ECS Fullerenes, Nanotubes, and Carbon Nanostructures Division Richard E. Smalley Research Award.

*Vittorio de Nora Award Lecture*

### From nW to TW

*by John Newman*

"From nW to TW" will cover the derivations of the Onsager reciprocal relations for multicomponent diffusion; the electrochemical reduction of carbon dioxide and water to carbon monoxide and hydrogen; and the production of liquid fuels from renewable energy.

**John Newman** earned his BS in chemical engineering in 1960 from Northwestern University. While at Northwestern University, he was also an engineering co-op student at Oak Ridge National Laboratory. Prof. Newman received his master's degree from the University of California, Berkeley in 1962, under the guidance of Prof. Charles Tobias. In 1963 he obtained his doctorate. While a PhD student, he contributed to the preparation of major portions of the English edition of Levich's book, *Physicochemical Hydrodynamics* (1962).

Shortly after receiving his doctorate, Newman joined the faculty at UC Berkeley and became a full professor in 1970. He won the Young Author's Prize in 1966, and again in 1969 for his work with his student William Parrish on modeling channel electrochemical flow cells. In 1985, he received the David C. Grahame Award of the ECS Physical and Analytical Electrochemistry Division. Dr. Newman's book, *Electrochemical Systems*, published in 1973, with a second printing in 1991, and a third in 2004 (with co-author Karen E. Thomas-Alyea), is used throughout the world as a monograph and graduate level text. He is an ECS Fellow, received the Henry B. Linford Award for Distinguished Teaching in 1990, and the Olin Palladium Medal in 1991. He was an associate editor for the *Journal of The Electrochemical Society* for 10 years starting in 1990.

In addition to his numerous publications, reviews, and lectures, Prof. Newman has made many contributions to electrochemical technology through his consulting work. He is also a Faculty Senior Scientist and Principal Investigator in the Environmental Energy Technologies Division at Lawrence Berkeley National Laboratory, where he is in charge of the Batteries for Advanced Transportation Technologies program. Lithium/polymer batteries and polymer-electrolyte fuel cells have been highlights of recent work. In 2002, he spent a semester as the Onsager Professor at the Norwegian University of Science and Technology in Trondheim, Norway, and, in 1999, was elected to the National Academy of Engineering.

***2008 Vittorio de Nora Award Reception***—*All meeting registrants are invited to attend the award reception honoring John Newman, recipient of the 2008 Vittorio de Nora Award at 1800-1845h, on Tuesday, May 20, in the Cowboy Artists Room on the Second Floor of the Hyatt.*

## Short Courses, Tutorials, and Workshops

**Four Short Courses** will be offered on Sunday, from 0900h to 1700h. The registration fee is $425 for ECS Members and $520 for nonmembers. Students are offered a 50% discount. The short course registration fee covers the course, text materials, continental breakfast, coffee break, and luncheon; it is not applicable to any other activities of the meeting. **Pre-registration is required**. All courses are subject to cancellation pending an appropriate number of advance registrants.

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

### Short Course #1

Advanced Impedance Spectroscopy

*Mark E. Orazem, Instructor*

This course is intended for chemists, physicists, materials scientists, and engineers with an interest in applying electrochemical impedance techniques to study a broad variety of electrochemical processes. 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

Electrical Characterization and Characteristics of MOS Devices with Ultrathin High-k Gate Dielectrics

*Samares Kar, Instructor*

This course is designed to accommodate a diverse group of attendees: chemists, physicists, material scientists, electrical engineers, and chemical engineers; hence will begin with the fundamentals, but, 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 electrical characterization techniques for MOS devices with high-k gate dielectrics and an understanding of the important issues of gate dielectric

leakage, mobility degradation, gate dielectric degradation, instability, and device reliability.

## Short Course #3

### Electrochemical Biosensors Based on Nanomaterials

*Arben Merkoci, Instructor*

The aim of this course is to show some aspects of the implementation of nanoscience and nanotechnology, in bioanalysis in general, and in biosensors in particular. It will explain several strategies related to the integration of nanomaterials into biosensor systems. This represents one of the hottest topics today in nanotechnology and nanoscience, due to the capacity of nanomaterials to provide special optical or electrical properties, improve stability, and minimize surface fouling of the sensing systems. After participating in this course, researchers interested in biosensors will learn about the advantages of nanomaterials compared to other conventional materials but also will get inside the response mechanisms related to such improvements.

## Short Course #4

### MEMS Reliability and Packaging

*Slobodan Petrovic, Instructor*

From accelerometers to biomedical devices, from pressure sensors to optical displays, and from tunable lasers to DNA sensors, MEMS (microelectromechanical systems) technology is becoming integral part of modern life. One of the biggest challenges hampering further progress of MEMS devices is the development of effective packaging solutions. This is a survey course, and while some prior knowledge by the participants of MEMS in general is helpful, the packaging discussion will present a fairly detailed explanation of the principles of operation, fabrication methods, and materials used in building MEMS structures. The intended outcome of the course is to provide a comprehensive overview of the MEMS packaging and reliability principles; with a particular emphasis on sensors and actuators used in industrial, medical, and automotive applications. The seminar will be divided in three major sections: packaging design considerations, packaging types, and reliability and failure analysis.

## 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 Room 208A on the 200 level of the Phoenix Convention Center.

**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.

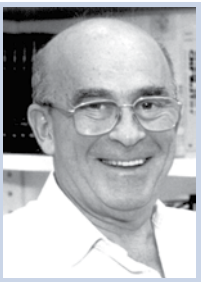
*Sunday, 1600-1645h and Monday, 1300-1345h*

**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/213/213.htm.*



### *ECS Henry B. Linford Award for Distinguished Teaching*

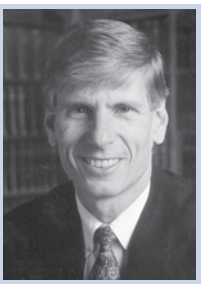
**Eliezer Gileadi** obtained his MSc in chemistry and physics from the Hebrew University in Jerusalem in 1956. He obtained his PhD in electrochemistry under the supervision of Brian Conway in Ottawa Canada (1963-66) and worked with John O'M. Bockris as a senior research associate at the University of Pennsylvania in Philadelphia (1993-96). In 1966 he joined the School of Chemistry of Tel-Aviv University (TAU), where he has been ever since.

At TAU, Prof. Gileadi divides his time between teaching, research and academic administration. He has authored two graduate textbooks in electrochemistry, edited two books, and published more than 170 scientific papers and chapters in books. He was the Chair of the School of Chemistry (1973-76) and Dean of the Faculty of Exact Sciences (1980-1984).

Professor Gileadi is the recipient of the ECS Olin-Palladium Award (2003); the Herzberg Award and Fellowship of NRC, Canada (2004); and a Fellow of the Royal Society of Canada (2004). He has been teaching a workshop on "Electrochemical Measurements" at CWRU in Cleveland (1991-2004). He was also a regular summer visitor in the departments of materials science at the University of Virginia and the Johns Hopkins University, where he participated in guiding the work of many graduate students.

The fields of interest of Prof. Gileadi are wide, from fundamental issues in physical electrochemistry, such as adsorption and charge transfer, to applied subjects, such as electroplating of magnetic alloys and clotting of blood *in vivo*. He has visited many universities in the U.S., Canada, Europe, Japan, and Australia; and has acted as a consultant to some of the major companies and research institutes in the U.S. and Israel, including Naval Research labs, Israel Aviation Industry, Hooker Chemicals, Celanese Research Corp., Lockheed Space and Missile Corp., and Brookhaven National Labs.

The most important service of Prof. Gileadi to the public was the establishment of a special project for employment of new-immigrant scientists from the former Soviet Union. This program, funded by the Israeli government, now employs about 500 scientists and engineers in the universities and research institutes in Israel.



### *Dielectric Science & Technology Division Thomas Callinan Award*

**Paul Kohl** is the Hercules Inc./Thomas L. Gossage Chair and Regents' Professor in the School of Chemical & Biomolecular Engineering at the Georgia Institute of Technology. He is also the Director of the SRC's Interconnect Focus Center at Georgia Tech.

Dr. Kohl received a PhD in chemistry from The University of Texas at Austin in 1978 and was employed at AT&T Bell Laboratories until 1989. At Bell Labs, he was involved in chemical processing and characterization of semiconductor devices and their packaging. The topics

included photoelectrochemical methods for making integrated optical components on photonic devices, the high-speed deposition of metals, and development of materials for advanced semiconductor packages.

In 1989, Dr. Kohl joined the faculty of the Georgia Institute of Technology. He participates in a number of research activities. The introduction of low dielectric constant materials is vital to future electronic devices and systems. New, low-k, low-stress polymers have been developed and characterized along with rapid-curing methods. The materials and methods for fabricating air-gaps into microelectronic devices have been developed. The strategic placement of air-cavities can provide superior electrical isolation and mechanical compliance. He is also involved in the integration of power sources, such as micro fuel cells, into electronic devices.

Paul Kohl has received the ECS Carl Wagner Memorial Award and is an ECS Fellow. He has also served as Editor of the *Journal of The Electrochemical Society*, *Electrochemical and Solid-State Letters* (founding Editor), and *Interface* (Founding Editor).

### *Electronics and Photonics Division Award*

**Fan Ren** is Charles A. Stokes Professor in Chemical Engineering at the University of Florida. He received a BS degree in applied chemistry in 1975 from Fung Cha University, an MS degree in chemical engineering in 1978 from National Cheng Kung University, an MS degree in polymer science and engineering and a PhD degree in inorganic chemistry in 1991 from Brooklyn Polytechnic, Brooklyn, NY.

Prior to joining the University of Florida, he worked for AT&T Bell Laboratories in Murray Hill, NJ for 13 years. At Bell Labs, he worked on III-V compound semiconductor material-based electronic devices and digital circuits. He and his colleagues pioneered and made major contributions on enhancement-mode inversion-channel GaAs as well as InGaAs based n- and p-MOSFETs and AlGaAs/GaAs heterojunction bipolar transistors with carbon doped based layers. He joined the University of Florida in 1998. At UF, his research has been focused on GaN-based high breakdown voltage Schottky diodes, AlGaN/GaN high electron mobility transistor passivation, and wide energy bandgap-based semiconductor sensors for chemical and bio-chemical applications.

Prof. Ren has published over 650 journal articles, co-edited 3 books, and contributed 11 book chapters. He has also been granted 19 U.S. and 11 European patents. He is a Fellow of ECS and AVS. He has been an ECS member since 1994 and actively involved in Society affairs. He regularly organizes symposium for ECS and has edited 14 ECS proceedings volumes.

### *Energy Technology Division Research Award*

**Tom Fuller** joined Georgia Institute of Technology in 2004 as the director of the GT Center for Innovative Fuel Cell and Battery Technologies. He holds a joint appointment as a professor in the School of Chemical and Biomolecular Engineering and as a Principal Engineer at Georgia Tech Research Institute (GTRI). Dr Fuller also was elected a Fellow at GTRI.

Prior to attending graduate school, Dr. Fuller spent five years in the U.S. Navy in the submarine force. As a postdoc at Lawrence Berkeley National Laboratory, he developed advanced lithium batteries. He then moved to United Technologies Corporation. As a senior engineer he was principal investigator for DARPA and DOE programs in direct methanol fuel cells. In subsequent assignments Dr. Fuller was manager and most recently was director of engineering. He was responsible for technology development, design, assembly, and test of cell stacks for UTC Fuel Cells.

His research group at Georgia Tech is focused on durability challenges for electrochemical systems. Fundamental understanding of the physical phenomena serves as a guide to the development of new materials and systems solutions to mitigate degradation in batteries and fuel cells. This research is a blend of experiments and mathematical modeling.

Dr. Fuller holds a bachelor of science from the University of Utah and a PhD from the University of California, Berkeley, both in chemical engineering. He is a past Chair of the ECS Energy Technology Division. Presently, he chairs the Fuel Cell coordinating group, and serves on the Honors and Awards Committee.

### *Fullerenes, Nanotubes, and Carbon Nanostructures Division Smalley Award*

**Sumio Iijima** is currently a professor at Meijo University, Nagoya; Director, Research Center for Advanced Carbon Materials, National Institute of Advanced Industrial Science and Technology, Tsukuba; and a Special Research Fellow of NEC, Nagoya, Japan. He graduated from the University of Electro-Communication in Tokyo in 1963, and received his PhD in physics from Tohoku University in 1969. He worked in Prof. J. M. Cowley's group at Arizona State University, first as a postdoctoral fellow from 1970 to 1976, and then as a senior research associate until 1982. He worked briefly at Cambridge University as a visiting scholar in 1979. At Arizona he devoted much time to developing high-resolution transmission electron microscopy (HRTEM), which is the basis of the current HRTEM method.

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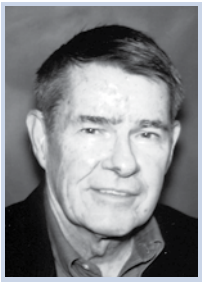

### *Organic and Biological Electrochemistry Division Manuel Baizer Award*

**Albert Fry** earned a BS from the University of Michigan in 1958 and a PhD in organic chemistry from the University of Wisconsin in 1963. After a postdoctoral year at Caltech with George S. Hammond, he joined the faculty of Wesleyan University, in Middletown, Connecticut, where he is now the Elisha B. Nye Professor of Chemistry. Fry became fascinated by organic electrochemistry shortly after joining the Wesleyan faculty. Early research was on the mechanism of electrochemical reduction of alkyl halides, including geminal halides, α, α′-dibromoketones, 1,3-dihalides, benzyl and benzal dihalides, and dihalocyclopropanes. The discovery that reduction of dibromoketones could be induced by mercury metal under ultrasonic irradiation (the first reported organic chemical reaction effected by ultrasound) led to a series of papers comparing electrochemical reduction with the reaction with ultrasonically dispersed mercury. More recently, the Fry group has been studying the electrocatalytic oxidation of monosilanes and disilanes, alkenes, and arylalkanes, and developing new high oxidation potential electrocatalysts to carry out such oxidations. Another area of research over the last six years has been the application of quantum chemical methods to problems in organic electrochemistry, including ion-pairing and solvation effects upon the electrochemical behavior of polycyclic aromatic hydrocarbons, the electrochemical oxidation and reduction of cyclo-octatetraene, and substituent effects on the electrochemical reduction and oxidation of aromatic substrates. The research has been described in 140 research papers and three books. Prof. Fry is Vice-Chair of the ECS Organic & Biological Electrochemistry Division and a (very) amateur musician.

# Technical Exhibit

*The Technical Session coffee break is scheduled for 0930h in Hall 2, Lower Level of the Phoenix Convention Center 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 19 ..... 1800-2000h
*includes the Monday Evening Poster Session*

Tuesday, May 20..... 0900-1400h
and re-opening..... 1800-2100h
*includes the Tuesday evening Poster Session*

Wednesday, May 21 ..... 0900-1400h

## Exhibitors as of Press-Time

### ECS
Booth 200
ecs@electrochem.org
www.electrochem.org

### Agilent Technologies AFM
Booth 206
Joan Horwitz
joan_horwitz@agilent.com
www.agilent.com

### Bio-Logic USA
Booths 201 & 300
Sharon Partin
sharon.partin@bio-logic.us
www.bio-logic.us

### Brinkmann Instruments
Booths 105 & 107
Michelle Kraemer
info@brinkmann.com
www.brinkmann.com

### EMD Chemicals, Inc.
Booth 100
Kathy Lodge
kathy.lodge@emdchemicals.com
www.emdchemicals.com

### Entrepix Inc.
Booth 101
Bob Tucker
btucker@entrepix.com
www.entrepix.com

### Gamry Instruments
Booths 305 & 307
Pete Peterson
ppeterson@gamry.com
www.gamry.com

### Levitronix LLC
Booth 103
Paul Weingartner
pweingartner@levitronix.com
www.levitronix.com

### MACCOR, Inc.
Booth 204
Mike Sandoval
m.sandoval@maccor.com
www.maccor.com

### Materials Today
(Literature Display)
Gemma Thomson
G.Thomson@elsevier.com
www.materialstoday.com

### Net Flow Research
Booth 205
Lali Breen
lalibreen@netflowresearch.com
www.netflowresearch.com

### PEC North America
Booth 306
Peter Ulrix
peter.ulrix@peccorp.com
www.peccorp.com/batteries

### Pine Research Instrumentation
Booth 202
Jenny Garry
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www.pineinst.com/echem

### Princeton Applied Research/ Solartron Analytical
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### Scribner Associates, Inc.
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### SOPRA Inc.
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### Webcom Communications
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# Symposium Topics and Organizers

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

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 —**Online** editions of *ECS Transactions* issues will be available ONLY via the ECS Digital Library. Online editions of the Phoenix "at" meeting issues will be available for purchase beginning April 27. 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, H. Martin, V. Subramanian, and X. Zhang

A2 — IDEAS: Intriguing Disclosures on Electrochemical Advances Symposium (Tu) — J. Leddy and D. Hess

A3 — Nanotechnology General Session (M-Tu) — E. Traversa, J. Li, and W. Van Schalkwijk

A4 — Tutorials in Nanotechnology: Focus on Energy and Technology (M-Tu) — C. Bock and G. Sandi

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

B1 — Batteries General Session (Tu-Th) — N. Dudney, K. Abraham, and K. Zaghib

B2 — Alkaline Electrochemical Power Sources (Tu-W) — C. Wang, R. Mantz, and J. Xu

B3 — Biological Fuel Cells 3 (M-Th) — S. Calabrese Barton, P. Atanassov, K. Kano, S. Minteer, and I. Taniguchi

B4 — Characterization of Porous Materials (M-Tu) — B. Lakshmanan, G. Brisard, and A. Lasia

B5 — Fundamentals of Energy Storage and Conversion (M-Th) — D. Scherson, S. Al-Hallaj, P. Chang, J. Harb, J. Ruzyllo, and M. Tao

B6 — Ionic and Mixed Conducting Ceramics 6 (M-Th) — M. Mogensen, T. Armstrong, T. Gur, and H. Yokokawa

B8 — Proton Transfer and Transport in Fuel Cells (M-W) — T. Zawodzinski and S. Calabrese Barton

## C—Biomedical Applications and Organic Electrochemistry

C1 — Electrochemistry in Biological Analysis (Tu-W) — J. Burgess, G. Brisard, R. Contolini, H. De Long, and I. Taniguchi

C3 — Manuel M. Baizer Award Symposium on Organic Electrochemistry (M-Tu) — F. Maran, K. Moeller, H. Tanaka, and M. S. Workentin

C4 — Organic and Biological Electrochemistry Symposium in Honor of Yoshihiro Matsumura (Tu-Th) — I. Nishiguchi, D. Peters, and J. Yoshida

## D—Corrosion, Passivation, and Anodic Films

D1 — Corrosion General Session (Tu-Th) — A. Davenport

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

E1 — Advanced Gate Stack, Source/Drain, and Channel Engineering for Si-Based CMOS 4: New Materials, Processes, and Equipment (M-W) — P. Timans, E. Gusev, H. Iwai, D. Kwong, M. Ozturk, and F. Roozeboom e HC

E2 — Chemical Mechanical Polishing 9 (Tu) — G. Banerjee, V. Desai, Y. Obeng, and K. Sundaram e

E3 — Dielectrics for Nanosystems 3: Materials Science, Processing, Reliability, and Manufacturing (M-W) — D. Misra, T. Chikyow, H. Iwai, and J. Vanhellemont HC e

E4 — Plasma Processing 17 (M-Th) — G. Mathad, M. Engelhardt, and D. Hess

E5 — State-of-the-Art Program on Compound Semiconductors (SOTAPOCS 48) (M-Tu) — M. Overberg, B. Gila, P. S. Nam, and H. Ouyang HC e (joint ECST issue with E7)

E6 — Thermal and Plasma CVD of Nanostructures (Tu) — M. K. Sunkara, L. Delzeit and R. Mani

E7 — ZnO, InZnO, and InGaO Related Materials and Devices for Electronic and Photonic Applications (M-Tu) — F. Ren, L. Chen, Y. Heo, J. Kim, J. La Roche, P. Shen, and K. Shiojima HC e (joint ECST issue with E5)

## F—Electrochemical/Chemical Deposition and Etching

F1 — Electrodeposition for Energy Applications (M-W) — J. L. Stickney, S. R. Brankovic, L. Deligianni, M. D. Lay, K. Rajeshwar, G. Zangari, and S. Zou

## G—Electrochemical Synthesis and Engineering

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

G2 — Multiscale Simulations of Electrochemistry Systems — Computational Aspects (Tu) — V. Subramanian and V. Ramani

G3 — Tutorials in Electrochemical Technology: Impedance Spectroscopy (Tu-W) — M. E. Orazem and B. Tribollet

## H—Fullerenes, Nanotubes, and Carbon Nanostructures

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

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

H3 — Carbon Nanotubes and Nanostructures: Fundamental Properties and Processes (M-Tu) — R. Weisman and S. Subramoney

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

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

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

H7 — Carbon Nanotubes and Nanostructures: Medicine and Biology (Tu, Th) — T. Da Ros and L. Wilson

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

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

## I—Physical and Analytical Electrochemistry

I1 — Physical and Analytical Electrochemistry General Session (M-Tu) — P. Trulove and H. De Long

I2 — Exploiting Magnets and Magnetic Fields in Electrochemical Systems and Devices (Tu) — I. Fritsch, Z. Aguilar, and S. Minteer

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

J1 — Sensors, Actuators, and Microsystems General Session (W-Th) — G. Hunter, S. Bhansali, V. Bhethanabotla, M. Carter, R. Cernosek, J. Grate, A. Hillman, D. Malocha, and R. Mukundan

J3 — Electrochemical Nano/Biosensors (M-Tu) — A. L. Simonian, Z. Aguilar, M. Bayachou, H. De Long, and P. Hesketh

# Event Highlights

**NOTE:** *For a list of Committee Meetings, please visit the Phoenix meeting page: www.electrochem.org/meetings/biannual/213/213.htm.*

## Sunday, May 18

0900h.....Short Courses begin

1830h.....For the Rest of Us — "Nanometric Objects and Chip-Scale Platforms for Disease Diagnosis," Marc D. Porter, Room 212 A/B/C, 200 Level, Phoenix Convention Center

1900h.....Electronics and Photonics Division Award Reception and General Meeting, Cowboy Artists Room, Second Floor, Hyatt

1930h.....Sunday Evening Get-Together, Regency Ballroom, First Floor, Hyatt

## Monday, May 19

0800h.....Plenary Session, Regency A/B, First Floor, Hyatt — The ECS Lecture: "Single-walled Carbon Nanotubes: Synthesis, Modification, and Characterizations," Sumio Iijima; **and** the 2008 Vittorio de Nora Award Lecture: "From nW to TW," John Newman

1000h.....Coffee Break, Atrium Lobby, Second Floor, Hyatt

1215h.....Industrial Electrochemistry and Electrochemical Engineering Division Luncheon & Business Meeting, Curtis B, Second Floor, Hyatt; tickets are $25 in advance, $30 onsite, non-refundable

1215h.....Physical and Analytical Electrochemistry Division Luncheon & Business Meeting, Ellis East, Second Floor, Hyatt; tickets are $25 in advance, $30 onsite, non-refundable

1800h.....Monday Evening Mixer, Student Poster Session, and Technical Exhibit Opening, Hall 2, Lower Level, Phoenix Convention Center

## Tuesday, May 20

0900h.....Technical Exhibit, Hall 2, Lower Level, Phoenix Convention Center

0930h.....Coffee Break, Hall 2, Lower Level, Phoenix Convention Center

1215h.....Annual Society Luncheon and Business Meeting with Student Poster Award Presentation, Phoenix East/West, Second Floor, Hyatt; tickets are $25 in advance, $30 onsite, non-refundable.

1800h.....Vittorio de Nora Award Reception, Cowboy Artists Room, Second Floor, Hyatt

1800h.....Technical Exhibit and General Poster Session, Hall 2, Lower Level, Phoenix Convention Center

## Wednesday, May 21

0900h.....Technical Exhibit, Hall 2, Lower Level, Phoenix Convention Center

0930h.....Coffee Break, Hall 2, Lower Level, Phoenix Convention Center

1215h.....Dielectric Science and Technology Division Luncheon & Business Meeting, Borein B, Second Floor, Hyatt; tickets are $25 in advance, $30 onsite, non-refundable

1215h.....Energy Technology Division Luncheon & Business Meeting, Ellis East, Second Floor, Hyatt; tickets are $25 in advance, $30 onsite, non-refundable

1215h.....Fullerenes, Nanotubes and Carbon Nanostructures Division Luncheon & Business Meeting, Ellis West, Second Floor, Hyatt; tickets are $25 in advance, $30 onsite, non-refundable

1215h.....Organic and Biological Electrochemistry Division Luncheon & Business Meeting, Curtis B, Second Floor, Hyatt; tickets are $25 in advance, $30 onsite, non-refundable

1800h.....Organic and Biological Electrochemistry Division Manuel M. Baizer Award Reception, in honor of Albert Fry, Ellis East, Second Floor, Hyatt; tickets are $10 in advance, $12 onsite, non-refundable

## Thursday, May 22

0930h.....Coffee Break, Atrium Lobby, 100 Level, Phoenix Convention Center

# Hotel & Travel Information

***Hotel Reservation Information***—The Hyatt Regency Phoenix, located at 122 North Second Street, Phoenix, AZ 85004, USA, is the headquarters hotel for the meeting. We encourage you to stay at the Hyatt, where your stay will be most enjoyable and convenient. Guest room reservations for the Hyatt can be made online from the ECS website. The discounted meeting rates are as follows.

**Single/Double.....$165.00**

A block of rooms have been reserved for May 18-23, 2008. The special room rate will be available until April 18th. Reservations attempted after April 18 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.

***Ground Transportation***—SuperShuttle ground transportation service is available from Phoenix Sky Harbor, and Phoenix-Mesa Gateway airports to the Hyatt Regency Phoenix. Simply make your reservation from the ECS Website using our special discount code: P886J.

***Companion Registrants*** (formerly "Nontechnical Registrants")—Guests of Technical Registrants are invited to register for the 213th Meeting as a "Companion Registrant." The companion registration fee of $25 (Advance) or $30 (Onsite) includes admission to ECS social events, an exclusive lounge with beverage service, Monday through Thursday, 0800-1000h, and a special "Welcome to Phoenix" orientation presented by the Greater Phoenix Convention and Visitors Bureau on Monday, May 19th at 0900h in the Companion Registrants Lounge in Suite 327, Third Floor, Hyatt. Please note that online registration is not available for Companion Registrants. For your convenience, you may register using the attached Advance Registration Form.

# Technical Program

***Symposium Organizer*** and Technical Session Co-Chair Orientation—We encourage all Symposium Organizers and Technical Session Co-Chairs to attend this important informational session in the Board Room, Second Floor, Hyatt 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. 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.

***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.

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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 Thursday, in Room 206, 200 Level, Phoenix Convention Center. This room is 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 on each level of the Convention Center 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 area will be located in the Atrium Lobby, Second Floor, Hyatt. Registration will open on Sunday and the technical sessions will be conducted Monday through Thursday.

***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 18, 2008**. Refunds are subject to a 10% processing fee and will only be honored if written requests are received by April 25, 2008. All participants of the 213th 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, check or money order payable to ECS.

### *Registration Hours*

| | |
|---|---|
| Sunday, May 18 | 0800-1830h |
| Monday, May 19 | 0730-1730h |
| Tuesday, May 20 | 0730-1600h |
| Wednesday, May 21 | 0730-1500h |
| Thursday, May 22 | 0730-1300h |

***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, or American Express 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 |

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". Room 203 on the 200 Level of the Phoenix Convention Center will be available as an Employment Interview Room from 0800-1700h Monday through Thursday 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.

### *Key Locations*

| | |
|---|---|
| Meeting Registration | Atrium Lobby, Second Floor, Hyatt |
| Information/Message Center | Atrium Lobby, Second Floor, Hyatt |
| Book Display and Membership Desk | Atrium Lobby, 100 Level, Phoenix Convention Center |
| ECS Headquarters Office | Curtis A, Second Floor, Hyatt |
| ECS Satellite Headquarters Office | Room 205, 200 Level, Phoenix Convention Center |
| Speaker Ready Room | Room 206, 200 Level, Phoenix Convention Center |
| Development Office | Room 204, 200 Level, Phoenix Convention Center |
| Employment Interview Room | Room 203, 200 Level, Phoenix Convention Center |

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E-mail: ecs@electrochem.org
Web: www.electrochem.org

# IDEAS: Intriguing Disclosures on Electrochemical Advances Symposium

***Sponsored by the ECS New Technology Subcommittee***

**Tuesday, May 20, 2008, 1400h — Room 106A, 100 Level, Phoenix Convention Center**

The ECS New Technology Subcommittee (NTS) is charged with bringing new ideas and developments into ECS in a timely manner. IDEAS is a bit of an inversion of this process in that IDEAS brings new and electrochemically-relevant advances to NTS and the ECS. Chaired by Johna Leddy and Dennis Hess, IDEAS in Phoenix is the inaugural meeting of this by-invitation-only symposium. Four speakers working in diverse and exciting new areas will present their most resent work.



## Solution-Processable Organic Materials for Low-Cost Electronics and Flexible Wiring

**Lynn Loo** will discuss patterning and processing tools for making organic electronic devices. Large-area displays based on organic materials promise low-cost fabrication, lightweight construction, mechanical flexibility, and durability. To truly realize the low-cost aspects of organic electronics, conventional high-vacuum deposition technologies—costly both in terms of instrumentation as well as operation—will have to be replaced by solution processing methodologies like inkjet printing or spin casting. This talk will focus on the processing-structure-function relationships of solution-processable organic compounds and polymers as active components in electronic devices. Yueh-Lin (Lynn) Loo is an associate professor in the Chemical Engineering Department at Princeton University.



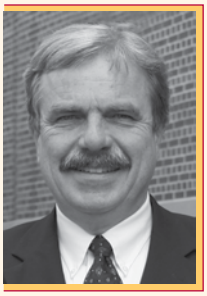
## New Perspectives on Wettability

**Tom McCarthy** will present his work in the area of superhydrophobicity. Several topics of research will be discussed including, two dimensional fluidics based on differential lyophobicity; condensation on ultrahydrophobic surfaces; explanations of the "lotus effect;" practical preparations of large area (acres) of artificial lotus leaves; a perfectly hydrophobic surface (distinguishing between contact angles of 178° and 180°); and why Wenzel and Cassie were wrong. Ultrahydrophobicity is a topical research subject and from our experience, it is widely misunderstood. We hope that this talk has an impact on this field of research. Dr. McCarthy is a professor in the Polymer Science and Engineering Department at the University of Massachusetts.



## Organelle-based Biofuel Cells for Self-Powered Explosive Sensors

**Shelley Minteer** will describe her work on biofuel cells, including biofuel cells built around mitochondria wired to electrodes wherein the mitochondria convert available fuels to carbon dioxide. Dr. Minteer is an associate professor of chemistry and biomedical engineering at Saint Louis University. Her research focus has been on enzyme immobilization membranes for biosensors and biofuel cells, along with multi-enzyme bioelectrocatalysis. At Saint Louis University, her research program has focused on the development of enzyme immobilization membranes for increased stability of biosensor and biofuel cell electrodes, along with incorporating direct and mediated bioelectrocatalysis into anodes and cathodes.





## Measuring Dopamine with Fast-Scan Cyclic Voltammetry in Behaving Rats

**R. Mark Wightman** will describe his most recent work on the monitoring of neurotransmitters in rat brains. Neurotransmitters are chemicals that are secreted by neurons and relay messages to target cells. The goal of *in vivo* electrochemistry is to provide a real-time view of neurotransmitters in the extracellular space of the brain. This requires a high degree of chemical selectivity and stability. In this presentation, the realization of this goal for the measurement of dopamine release in the rat brain during a behavioral task will be demonstrated. Dr. Wightman is the W. R. Kenan, Jr. Professor of Chemistry at the University of North Carolina at Chapel Hill, a position he has held since 1989. He is also a faculty member in the Neurobiology Curriculum and the Neuroscience Center.