

Early-Bird Registration



218th ECS Meeting

Las Vegas

October 10-15, 2010

Nevada

Featured Speakers



The ECS Lecture

Monday, October 11

Current and Future Status of III-Nitride-based Solid State Lighting

by Shuji Nakamura

Shuji Nakamura will describe the Current Status of III-Nitride-based Light Emitting Diodes (LEDs) and laser diodes. Recently, nitride-based white LEDs have been used for many applications such as LCD TV backlighting, lighting for inside/outside applications and others. The efficiency of those white LEDs are around 150 lumen/W. For laser diodes, high efficient and high power blue laser diodes have been developed. For green laser diodes, the output power is still not so high at the wavelength of around 525 nm.

SHUJI NAKAMURA obtained BE, MS, and PhD degrees in electrical engineering from the University of Tokushima, Japan in 1977, 1979, and 1994, respectively. He joined Nichia Chemical Industries Ltd in 1979. In 1988, he spent a year at the University of Florida as a visiting research associate. In 1989 he started research on blue LEDs using group-III nitride materials. In 1993 and 1995 he developed the first group-III nitride-based blue/green LEDs. He also developed the first group-III nitride-based violet laser diodes (LDs) in 1995. He has received a number of awards, including: the Nishina Memorial Award (1996), MRS Medal Award (1997), IEEE Jack A. Morton Award, the British Rank Prize (1998), and the Benjamin Franklin Medal Award (2002). He was elected as the member of the U.S. National Academy of Engineering (NAE) in 2003. Also, he received the Millennium Technology Prize in 2006. Since 2000, he has been a professor in the Materials Department of University of California Santa Barbara. He holds more than 100 patents and has published more than 390 papers in this field.



2010 Edward Goodrich Acheson Award

Monday, October 11

Energy Storage

by John S. Newman

"Energy Storage" will include examples used to illustrate the essentials of modeling electrochemical systems for energy applications, with a focus on energy and power as well as life and failure. The modeling has a clear basis in chemical and physical principles, and covers length scales from molecules to the continuum in the context of both thermodynamics and transport, although the continuum scale is stressed. The examples to be discussed include discharge curves, the construction of optimized Ragone plots, modeling battery size and capacity use in a hybrid- or plug-in hybrid electric vehicle, molecular modeling of battery electrolytes, and the physics of Zn shape change and Li dendrite growth.

JOHN NEWMAN earned his BS in chemical engineering in 1960 from Northwestern University. While at Northwestern,

Newman was an engineering co-op student at Oak Ridge National Laboratory who worked on diffusion in ion exchangers and solvent extraction. Prof. Newman obtained his master's degree in 1962 at the University of California, Berkeley, on current distribution in porous electrodes, under the guidance of Professor Charles Tobias. In 1963, he obtained his doctorate, on steady laminar flow past a circular cylinder at high Reynolds numbers. While a PhD student, Newman contributed to the preparation of major portions of the English edition of Levich's book, *Physicochemical Hydrodynamics*, published in 1962. Shortly after receiving his doctorate, Newman joined the faculty at UC Berkeley. He became a full professor in 1970, and is still an active member today. 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 text in electrochemical engineering.

Dr. Newman is an ECS Fellow, who twice earned the Young Author's Prize: in 1966, for his work on current distribution on a rotating disk below the limiting current, and in 1969, for his work with his student William Parrish on modeling channel electrochemical flow cells. Other ECS awards include the David C. Grahame Award of the Physical and Analytical Electrochemistry Division in 1984, the Henry B. Linford Award for Distinguished Teaching in 1990, the Olin Palladium Medal in 1991, the Battery Division Research Award in 2004, and the Vittorio de Nora Award Medal in 2008. In 1999, Newman was elected to the National Academy of Engineering. In recognition of his outstanding contributions to ECS, Dr. Newman became an Honorary member in 2007.

Newman was 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, Newman spent a semester as the Onsager Professor at the Norwegian University of Science and Technology in Trondheim, Norway.



For the Rest of Us...

Sunday, October 10

Status and Outlook on the Photovoltaic Solar Industry Based on Solar Cell R&D

by Bolko von Roedern

BOLKO VON ROEDERN is a Senior Project Leader at the National Center for Photovoltaics at the National Renewable Energy Laboratory (NREL). Dr. von Roedern received his physics diploma (Dipl. Phys.) from Clausthal Technical University, Germany, in 1975. He received his PhD in physics (Dr. Rer.



nat.) from Stuttgart University, Germany), and did research at the Max Planck Institute for Solid State Research in Stuttgart (1979).

Dr. von Roedern moved to Colorado in 1983 when he was hired by NREL (then SERI), after working on a SERI subcontract as a post-doctoral fellow at Harvard University. He developed amorphous-silicon-based (a-Si) solar cells within SERI's in-house amorphous silicon group as a senior scientist. In 1985, he joined a start-up company, Glasstech Solar, Inc. (GSI) in Wheat Ridge, CO, managing all aspects of the technology developments as well as day-to-day operation. GSI developed a turnkey a-Si photovoltaic module manufacturing line. GSI was formed by the same investors that founded the precursor to First Solar, Solar Cells Incorporated (SCI).

In 1990, he returned to SERI as a Project Manager in the Amorphous Silicon Research Project. This project was merged into the Thin Film Partnership Project, and since 1992, he has been part of a three-person team responsible

for supporting, through subcontracts, amorphous and crystalline Si, cadmium telluride, and copper indium diselenide thin-film photovoltaic R&D and technology. Together with his colleagues, he was among the finalists of the 1999 World Technology Award for Energy, the Thin Film Partnership, and in collaboration with NREL subcontractors has also won several awards and recognitions (RD100, etc.).

From 1992 to 2006, he was involved in national R&D teams supporting the work of the Thin Film Partnership, and from 1996 to 2006, he managed the a-Si national team. Since 2007, he has been the technical monitor for some major Technology Pathway Partnership programs financed through DOE (Golden Office), as well as managing some NREL PV incubator subcontracts. Scientifically, he pursues an evaluation of how material quality will affect solar cell performance, and he is intimately familiar with many techniques used to evaluate semiconductor properties of bulk and thin film semiconductor materials and devices. Since 2008, he has also become involved as the photovoltaic liaison for the Solar Advisory Model (SAM).

Hotel Reservation Information



The 218th ECS Meeting will be held at the Riviera Hotel (2901 Las Vegas Blvd., South, Las Vegas, NV 89109). Guest room reservations for the headquarters hotel can be made online from the ECS website at special discounted meeting rates. See the ECS

website for more details and to make your reservation.

The deadline for reservations is September 10, 2010. Reservations attempted after September 10 will be accepted on a space and rate availability basis.

Companion Registrant Program

Guests of Technical Registrants are invited to register for the 218th Meeting as a "Companion Registrant." The companion registration fee of \$25 (Early-Bird) or \$30 (after September 10) includes admission to non-ticketed social events, an exclusive lounge with beverage service, Monday through Thursday, 0800-1000h, and a special "Welcome to Las Vegas" orientation presented by the Las Vegas Convention and Visitors Bureau on Monday, October 11 at 0900h in the Companion Registrants Lounge. On Wednesday, October 13, at 0900h, there will be a group discussion of the book "Las Vegas Noir," a book of short stories edited by J. Keene and T. Pierce. For questions please contact Donna Smyrl at donnasmyrl@comcast.net.

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

Short Courses and Workshops

Five Short Courses will be offered in conjunction with The 218th ECS Meeting. These courses will be held on Sunday, October 10, 2010, from 0900h to 1700h. The registration fee is \$425 for ECS members and \$520 for nonmembers. **Students are offered a 50% discount.** The registration fee for the course covers the course, text materials, continental breakfast, luncheon, and refreshment breaks; it is not applicable to any other activities of the meeting. **The deadline for registration for a course is September 10, 2010.** Interested parties may register using the Advance Registration Form in this brochure. Written requests for refunds will be honored only if received at Society headquarters before September 17, 2010. **Pre-registration is required.** All courses are subject to cancellation pending an appropriate number of advance registrants. **Before making any flight or hotel reservations, please check to make sure the course is running.**

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

SHORT COURSE #1

Polymer Electrolyte Fuel Cells

Hubert Gasteiger and Thomas Schmidt, Instructors

This short-course develops the fundamental thermodynamics and electrocatalytic processes critical to polymer electrolyte fuel cells (PEFCs). In the first part, we will discuss the relevant half-cell reactions, their thermodynamic driving forces, and their mathematical foundations in electrocatalysis theory (e.g., Butler-Volmer equations). Subsequently, this theoretical framework will be applied to catalyst characterization and the evaluation of kinetic parameters like activation energies, exchange current densities, reaction orders, etc. In the second part of the course, we will illuminate the different functional requirements of actual PEFC components and present basic *in situ* diagnostics (Pt surface area, shorting, H₂ crossover, electronic resistance, etc.). This will be used to



develop an in-depth understanding of the various voltage loss terms that constitute a polarization curve. Finally, we will apply this learning to describe the principles of fuel cell catalyst activity measurements, the impact of uncontrolled-operation events (*e.g.*, cell reversal), and the various effects of long-term materials degradation. To benefit most effectively from this course, registrants should have completed at least their first two years of a bachelor's program in physics, chemistry, or engineering; or have several years of experience with PEFCs.

SHORT COURSE #2 **Scientific Writing for Scientists and Engineers**

D. Noel Buckley, Instructor

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

SHORT COURSE #3 **Fundamentals and Applications of Electrochemistry**

James J. Noël, Instructor

This course is suited to people with a physical sciences background who have not been trained as electrochemists, but who want to add electrochemical methods to their repertoire of research approaches. There are many fields in which researchers originally approach their work from another discipline but then discover that it would be advantageous to understand and use some electrochemical methods to complement the other work that they are doing. The course will cover the following areas. (1.) Introduction and Overview of Electrode Processes. (2.) Chemical vs. Electrochemical Thermodynamics (cell potentials, Nernst equation, electrode-solution interface, double-layer structure, and adsorption; applications in analytical electrochemistry and sensors). (3.) Chemical Stoichiometry vs. Faraday's Law (coulometry, bulk electrolysis). (4.) Chemical vs. Electrochemical Kinetics (electrode reactions, rates, mechanisms and rate constants, mass transport, Butler-Volmer, Tafel, and Levich equations). (5.) Kinetic Methodology (potential step and sweep methods, polarography, controlled-current techniques, controlled mass transport approaches, rotating electrodes, microelectrodes, electrochemical impedance spectroscopy). (6.) Electrochemical Instrumentation (voltmeters, potentiostats, cells). (7.) Scanning Probe Techniques (scanning electrochemical microscopy, AFM, etc.). (8.) Coupled Characterization Methods (modified electrodes, spectroelectrochemistry, in-situ neutron scattering, surface analysis, etc.).

SHORT COURSE #4 **Grid Scale Energy Storage**

Jeremy Meyers, Instructor

This course is intended for chemists, physicists, materials scientists, and engineers to better understand the specific requirements for energy storage on the electric grid. The course will introduce students to the concepts associated with the "smart grid" and the demands that intermittent renewable power sources place on the grid from the perspective of distribution. We will then examine some of the key technologies under consideration for energy storage and the technical targets and challenges that must be addressed. Students will be brought up to date with the current state of the art, and review data from demonstration systems, experimental data from prototype designs, and some modeling and analysis. The following areas will be covered in this short course: (1.) introduction to the electric grid and renewable power sources; (2.) current role of energy storage on the grid; (3.) location and deployment of energy storage on the "smart grid"; (4.) existing technologies for energy storage on the grid; (5.) adaptation of secondary batteries for grid-based storage applications; (6.) redox flow batteries; (7.) high-temperature batteries for energy storage; (8.) novel battery concepts; (9.) materials and engineering challenges for grid storage; and (10.) diagnostics and characterization techniques.

SHORT COURSE #5 **Electrodeposition Fundamentals and Applications**

Sudipta Roy, Instructor

Electrodeposition is a simple but powerful film deposition technique that is increasingly being used in the fabrication of materials systems and devices, also in many instances by those who have limited formal preparation in the subject. This course will offer the opportunity to students and researchers alike to either be introduced to or to refresh the fundamentals of the subject. The approach will be rigorous but geared toward applications. Attendees will have the opportunity to learn practical aspects of this technology; in particular, lectures on the electrodeposition of magnetic materials, their alloys, and compositionally modulated materials. Four lectures in the morning and four in the afternoon are planned. Each will last about 45 minutes. The lectures are planned so as to develop fundamental concepts in the morning session, which then form the basis of lectures related to practical applications in the afternoon. Answers to queries of attendees will be discussed during the sessions, breaks, and lunch period.

Professional Development Workshops

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



Meeting Events-at-a-Glance

Sunday, October 10

- 0900h Short Courses
- 1500h Writing an Effective Cover Letter and Resume Workshop
- 1600h Job Interviewing Tips Workshop
- 1830h For the Rest of Us — "Status and Outlook on the Photovoltaic Solar Industry Based on Solar Cell R&D," by Bolko von Roedern
- 1900h Electronics and Photonics Division Award Reception and General Meeting
- 1930h Sunday Evening Get-Together

Monday, October 11

- 0930h Coffee Break
- 1200h Writing an Effective Cover Letter and Resume Workshop
- 1215h Battery Division Luncheon & Business Meeting; non-refundable ticketed event
- 1215h High Temperature Materials Division Luncheon & Business Meeting; non-refundable ticketed event
- 1300h Job Interviewing Tips Workshop
- 1400h Resume Roundtable Workshop
- 1440h 2010 Edward Goodrich Acheson Award Lecture, "Energy Storage," by John S. Newman
- 1700h The ECS Lecture: "Current and Future Status of Nitride-based Solid State Lighting," by Shuji Nakamura
- 1800h Monday Evening Mixer, Student Poster Session, and Technical Exhibit Opening

Tuesday, October 12

- 0900h Technical Exhibit
- 0930h Coffee Break
- 1215h Corrosion Division Luncheon & Business Meeting; non-refundable ticketed event
- 1215h Sensor Division Luncheon & Business Meeting; non-refundable ticketed event
- 1800h Technical Exhibit and General Poster Session

Wednesday, October 13

- 0900h Technical Exhibit
- 0930h Coffee Break
- 1215h Electrodeposition Division Luncheon & Business Meeting; non-refundable ticketed event
- 1215h Luminescence & Display Materials Division Luncheon & Business Meeting; non-refundable ticketed event
- 1800h General Poster Session

Thursday, October 14

- 0930h Coffee Break

Friday, October 15

- 0930h Coffee Break

Early-Bird Registration Instructions

Complete ALL sections of the Early-Bird Registration Form located on the adjacent page or on the ECS website. Make check or money order payable to ECS. Payments must be made in U.S. funds drawn on a U.S. bank; MasterCard, Visa, American Express, or Discover are also accepted. **Completed registration forms along with payment must be received by September 10, 2010 to qualify for the Early-Bird rates.** All refunds are subject to a 10% processing fee. Written requests for refunds will be honored only if received at the ECS headquarters office by September 17, 2010.

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

A—REGISTRATION FEES

All technical registrations include a copy of the *Meeting Abstracts* on USB flashdrive only. Attendees who wish to have paper copies of abstracts should download and print them in advance of the meeting, from the ECS website, free of charge. Please note that paper copies of meeting abstracts will NOT be available. Additional copies of the *Meeting Abstracts* on USB flashdrive may be purchased by registrants; the cost is \$74 for members and \$92.50 for nonmembers.

All prices are in U.S. dollars.

	Early-Bird (through Sept. 10)	Sep. 11 through Oct. 15
ECS Member.....	\$405	\$505
Nonmember.....	\$615	\$715
ECS Student Member.....	\$150	\$250
Student Nonmember.....	\$190	\$290
One Day ECS Member.....	\$275	\$375
One Day Nonmember.....	\$365	\$465
ECS Emeritus or Honorary Member.....	\$0	\$0
Companion Registrant.....	\$25	\$30

B—SUNDAY SHORT COURSES

Deadline for Short Course registration is September 10, 2010. **Pre-registration is required.** All courses are subject to cancellation pending an appropriate number of advance registrants. The registration fee is \$425 for ECS Members and \$520 for nonmembers. Students are offered a 50% discount. Includes admittance to Sunday Short Courses ONLY; not applicable to any other meeting activities. **Before making any flight or hotel reservations, please check to make sure the course is running.**

C—LUNCHEONS & SPECIAL EVENTS

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

	Early-Bird (through Sept. 10)	Sep. 11 through Oct. 15
Monday (October 11)		
Battery Div. Luncheon & Business Meeting.....	\$27	\$32
High Temperature Materials Div. Luncheon & Business Meeting.....	\$27	\$32

Tuesday (October 12)

Corrosion Div. Luncheon & Business Meeting.....	\$27	\$32
Sensor Div. Luncheon & Business Meeting.....	\$27	\$32
Corrosion Div. Award Reception.....	\$14	\$16
D3 Symposium Banquet in Honor of D. Shoesmith....	\$55	\$65

Wednesday (October 13)

Electrodeposition Div. Luncheon & Business Meeting.....	\$27	\$32
Luminescence & Display Materials Div. Luncheon & Business Meeting.....	\$27	\$32
Battery Div. Award Reception.....	\$14	\$16
Max Bredig Award Banquet and Address.....	\$30	\$40



SYMPOSIUM TOPICS

A — General Topics

A1 — General Student Poster Session

A2 — Nanotechnology General Session

A3 — Tutorials in Nanotechnology: Focus on Luminescence and Display Materials

B — Batteries, Fuel Cells, and Energy Conversion

B1 — Batteries and Energy Technology Joint General Session

B2 — Battery Safety and Abuse Tolerance

B3 — Electrochemistry of Novel Materials for Energy Storage and Conversion

B4 — Electrode-Electrolyte Interfaces in Li-Ion Batteries

B5 — Materials Design and Electrode Architecture for Batteries

B6 — Non-Aqueous Electrolytes for Lithium Batteries

B7 — Polymer Electrolyte Fuel Cells 10 **HC e**

B8 — Rechargeable Lithium and Lithium Ion Batteries

B9 — Solid State Ionic Devices 8 - NEMCA

D — Corrosion, Passivation, and Anodic Films

D1 — Corrosion General Session

D2 — Corrosion and Biofuels

D3 — Corrosion Issues in Nuclear Waste Storage: A Symposium in Honor of the 65th Birthday of David Shoesmith

D4 — Corrosion Modelling

D5 — High Resolution Characterization of Corrosion Processes 2

D6 — Pits and Pores 4: New Materials and Applications - In Memory of Ulrich Gösele

E — Dielectric and Semiconductor Materials, Devices, and Processing

E1 — Solid State Topics General Session

E2 — Atomic Layer Deposition Applications 6 **HC e**

E3 — Chemical Mechanical Polishing 11 **e**

E5 — High Dielectric Constant and Other Dielectric Materials for Nanoelectronics and Photonics **HC e**

E6 — High Purity Silicon 11 **e**

E7 — Low-Dimensional Nanoscale Electronic and Photonic Devices 4 **e**

E8 — Photovoltaics for the 21st Century 6

E9 — Processing, Materials, and Integration of Damascene and 3D Interconnects **e**

E11 — Semiconductor Wafer Bonding 11: Science, Technology, and Applications in Honor of Ulrich Gösele **HC e**

E12 — State-of-the-Art Program on Compound Semiconductors 52 (SOTAPOCS 52) **e**

E13 — Thin Film Transistors 10 (TFT 10) **HC e**

E14 — SiGe, Ge, and Related Compounds: Materials, Processing, and Devices 4 to E22 **HC e**

F — Electrochemical / Chemical Deposition and Etching

F1 — Electroless Deposition Principles, Activation, and Applications

F2 — Electronics and 3-D Packaging 4

F3 — Magnetic Materials, Processes, and Devices 11

F4 — Molecular Structure of the Solid-Liquid Interface and Its Relationship to Electrodeposition 7

I — Physical and Analytical Electrochemistry

I1 — Physical and Analytical Electrochemistry General Session

I2 — Electrochemistry in Nanospaces

I3 — International Symposium on Molten Salts and Ionic Liquids 17 **HC e**

I4 — Oscillations and Pattern Formation in Electrochemistry

I5 — Professor V. S. Bagotsky: 65 Years in Theoretical Electrochemistry, Electrocatalysis, and Applied Electrochemistry

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

J1 — Chemical Sensors 9: Chemical and Biological Sensors and Analytical Systems **HC e**

J2 — Luminescence and Energy Efficiency

J3 — Microfabricated and Nanofabricated Systems for MEMS/NEMS 9 **HC e**

J4 — Physics and Chemistry of Luminescence and Display Materials

ECS Transactions — Symposia with issues available “at” the meeting are labeled with the following icons:

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

e **Electronic (PDF)** editions of *ECS Transactions* issues will be available ONLY via the ECS Digital Library. Electronic editions of the Las Vegas “at” meeting issues will be available for purchase beginning October 1, 2010. Please visit the ECS website for all issue pricing and ordering information for the electronic editions.

ECS Transactions — Forthcoming Issues

In addition to those symposia that have committed to publishing an issue of *ECS Transactions*, all other symposium topics potentially will have articles in electronic format and/or will be published in a hard-cover issue about 12 weeks after the Las Vegas meeting. If you would like to receive information on any of these issues when they become available, please e-mail ecst@electrochem.org. Please include your name, e-mail address, and all issues in which you are interested.

Purchase a hardcover copy of ECS Transactions Volume 33, Issues 1, 2, 3, 4, 5, 6, 7, or 8 with your Las Vegas meeting registration and receive 10% off that issue's list price! For ECS Members the 10% discount will be on top of your regular Member discount for these issues. Any discounted books purchased must be picked up at the Las Vegas meeting. The discount does not apply to electronic editions of these issues. This discount is not valid on any other issues of ECST, Monographs, or Proceedings Volumes purchased at the meeting.

