



## Lecturers and Award Winners



### ...For the Rest of Us

*James M. Fenton will lecture on "Polymer Electrolyte Fuel Cells ... for the Rest of Us," on Sunday, October 29, 1830-1930h, in Universal 12-16, Conference Center, Sunrise.*

**JAMES M. FENTON** is currently the Director of the University of Central Florida's Florida Solar Energy Center and a professor of mechanical, materials, and aerospace engineering (since January 2005). He formerly served as a professor of chemical engineering at the University of Connecticut. After receiving a BS degree in chemical engineering from UCLA and MS and PhD degrees in chemical engineering from the University of Illinois, he joined the faculty at the University of Connecticut in 1984 where he then supervised approximately 35 graduate students who published over 120 papers. The Florida Solar Energy Center is the largest and most active state-supported renewable energy and energy efficiency research, development, and training institute in the United States. FSEC's research activities include solar water and pool heating, photovoltaics (solar electric) and distributed generation systems, energy-efficient buildings, alternative transportation systems and fuels, hydrogen, fuel cells, and energy education. The FSEC fuel cell team leads the DOE's twelve competitively awarded projects for development of high temperature, low relative humidity polymer membranes to be used in automobile engine polymer electrolyte fuel cells.

### 2006 Acheson Award



**VITTORIO DE NORA**, born in Altamura, Italy, has been throughout his life actively involved in research in the field of electrochemistry and is internationally known for his many contribu-

tions. After receiving his first doctorate in electrical engineering in 1934 from the Royal Politecnico of Milan, Dr. de Nora continued research in physical chemistry at Kings College University in London and in electrochemistry at the Technische Hochschule in Dresden. In 1937, he received a PhD in chemical and metallurgical engineering from Lehigh University.

In 1938, he was awarded the Weston Fellowship of The Electrochemical Society and upon his return to Italy that same year, Dr. de Nora was asked to join the faculty of his alma mater, the Politecnico of Milan where he lectured in physical chemistry and later in electrochemistry.

Professor de Nora has carried out and directed research not only at universities but also in laboratories of industrial companies with which he has been engaged in the design, engineering and construction or electrochemical plants throughout the world.

Some of his major contributions to industry have been in the manufacture of chlorine and in the development of dimensionally stable electrodes which have revolutionized the electrochemical and electrometallurgical industries.

In 1976, Lehigh University honored Professor de Nora by conferring upon him the honorary degree of Doctor of Science and a few years later, Case Western Reserve University honored

him also with the degree of Doctor of Science.

Professor de Nora is a Volta Fellow, a Case Centennial Scholar, a Fellow and Honorary Member of The Electrochemical Society, a member of Tau Beta Phi, the International Society of Electrochemistry, Deutsche Gesellschaft für Chemisches Apparatuswesen, the Royal Society of Chemistry, L'Associazione Elettrotecnica Italiana, and other scientific societies.

More recently, Professor de Nora has been dedicating the majority of his activity to the research and development of modified carbon and non-carbon, non-consumable electrodes for the production of aluminum, which would permit utilization of more efficient cells and eliminate pollution. Professor de Nora holds a great number of patents and is the author of many scientific publications. He has inspired new ideas to his research fellows and has been the instigator of great technical achievements.

### Charles W. Tobias Young Investigator Award



**HOCK MIN NG** was born in Muar, Malaysia in 1973. He received his BS, MS, and PhD in electrical engineering from Boston University. He is currently a member of technical staff at Bell Laboratories, Lucent

Technologies. His research interests are in the field of III-Nitrides (GaN, AlGaN, InGaN) semiconductor materials and devices, with a focus on growth by molecular beam epitaxy (MBE). His research has involved developing GaN-

based light emitting diodes and photodetectors, non-polar GaN, selective chemical etching of GaN as well as studies of GaN electrical transport, optical and structural properties. His current interests are in the area of nanostructures and sensors. He is the author and co-author of over 70 papers in technical journals and conference proceedings, three book chapters, and has three issued and four pending U.S. patents.

Dr. Ng has been active in ECS and has organized several symposia in the Electronics and Photonics Division. Dr. Ng was also the co-recipient of the 2003 Snell Premium from the Institute of Electrical Engineers (IEE). In 2004, he was invited to participate in the National Academy of Engineering's U.S. Frontiers of Engineering Symposium, which recognizes outstanding young engineers under the age of 45.

### 2006 Battery Division Technology Award



**KI-YOUNG LEE** received his BS in metallurgical engineering in 1981 from Seoul National University, Korea, and his MS in materials science and engineering in 1983 from

Korea Advanced Institute of Science and Technology, Korea. In 1994 Dr. Lee received his PhD in mechanical engineering from the University of Newcastle, Australia.

From 1983-1989, Dr. Lee worked as a production engineer at Daewoo Industries in Korea. He was a visiting professor at the Institut für

Festkoerperforschung in Jülich, Germany in 1992 and began his postdoctoral studies at the University of Vermont in 1993. He completed his post-doctoral studies at the Korea Advanced Institute of Science and Technology 1995. He was a Principal Research Scientist at the Battery Research Institute in Korea from 1996-2003 and was promoted to a vice-president in January 2004. He retired from this position in March 2006 and is presently an advisor of LG Chemical.

Dr. Lee has published 41 papers and presented 24 papers in the field of batteries and hydrogen absorption. He also has 29 registered patents and 13 published. He received the LG Research Award in 1999, and the Chang Young Sil Award in 1999. Dr. Lee has been a member of ECS since 2000 and a candidate member of National Academy of Engineering in Korea. In 1999 he was included in the Marquis Who's Who in the World 16th edition, IBC; 2000 Eminent Scientists of Today, 1st edition in 2003, IBC; 2000 Outstanding Scientists of the 21st Century 2004; and Marquis Who's Who in Science and Engineering 2006-07.

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### 2006 Battery Division Research Award



**TSUTOMU OHZUKU** has been a professor of chemistry at Osaka City University (OCU) since 1992. He received BSc in chemistry from Doshisha University, and his MSc and PhD

in chemistry in 1978 from Kyoto University. He did post-doctoral research with Prof. Earnest B. Yeager at Case Western Reserve University. From 1978 to 1987 he was a faculty member of Department of Synthetic Chemistry at Okayama University. Since 1987, he has been a faculty member of Department of Applied Chemistry at Osaka City University.

Prof. Ohzuku's major research interests include electrochemistry and structural chemistry of manganese (di)oxide for high-energy density lithium batteries and rechargeable lithium batteries of transition metal oxides, leading to the development of primary high-power manganese dioxide lithium batteries for automatic cameras (widely accepted) and rechargeable manganese dioxide lithium batteries (currently not available); lithium insertion materials for advanced lithium-ion batteries; solid-state electrochemistry of lithium insertion electrodes; and effective use of titanium, iron, manganese, and carbon for eco-technology, leading to the development of lithium-ion (shuttlecock)

batteries since 1990. His current studies relate to novel insertion materials of lithium nickel manganese oxides with or without cobalt for advanced lithium-ion batteries and lead-free accumulators consisting of lithium insertion materials with "green" elements. He is author or coauthor of approximately 130 papers. He was awarded the Sano Memorial Prize for the research on high-energy density lithium batteries from the Electrochemical Society of Japan in 1981 and the IBA Research Award for outstanding research on structural chemistry and electrochemistry of manganese dioxides from International Battery Materials Association in 1991.

Prof. Ohzuku has served as a chair of the committee for advanced lithium batteries organized in NEDO/MITI in 1998-2002 and a board of examiners for a national project on lithium batteries in 1993-2002. He is a member of ECS, the International Society of Electrochemistry, and the Electrochemical Society of Japan.

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### 2006 Corrosion Division H. H. Uhlig Award



**G. T. ("TIM") BURSTEIN** is a professor in the Department of Materials Science and Metallurgy of the University of Cambridge, United Kingdom. He was born and educated in New Zealand,

with a BSc, MSc and PhD from the University of Auckland. He has held academic posts in the University of Auckland where he lectured in chemistry, in Imperial College of Science and Technology (London), and in the University of Cambridge. Presently, as professor of materials chemistry and corrosion, he indulges his lifelong interest and pleasure in lecturing undergraduate and graduate students across a range of topics including corrosion and electrochemistry, and even management studies. His passion for teaching was recently rewarded with the award one of the prestigious Pilkington prizes of the University of Cambridge. Professor Burstein's research interests and passions are wide, covering many areas of electrochemistry and corrosion. These include localized corrosion, electrochemistry of mechanically bared fresh metal surfaces, passivation and passivity, electrocatalysis, fuel cells, electrochemical transformation of metal surfaces, and electrochemical development of surface structure and morphology on metals, including electrograining. His love of these fields has been inculcated

into many graduate students, past and present.

Professor Burstein is the author of over 180 papers and articles. He is editor-in-chief of *Corrosion Science* and co-editor of the third edition of *Corrosion* (with L. L. Shreir and R. A. Jarman). He received the T. P. Hoar Prize of the Institute of Corrosion and is this year the recipient of the U. R. Evans Award of the same Institute. He is a Fellow of The Electrochemical Society.

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### 2006 Electrodeposition Division Research Award



**THOMAS P. MOFFAT** began his research career as an undergraduate student working part time in the laboratory of Barry D. Lichter and William F. Flanagan at Vanderbilt University. He completed his BE and

MSc in materials science and engineering in 1982 and 1984 respectively. He then joined Ron Latanision's group in the H. H. Uhlig Laboratory at the Massachusetts Institute of Technology. In 1989 he received a ScD for his work exploring the chemical passivity of chromium-based metallic glasses. This was followed by a two-year stint as a post-doctoral associate in A. J. Bard's chemistry laboratory at the University of Texas, Austin studying the corrosion and passivity of metals using scanning tunneling microscopy. Dr. Moffat joined NIST in 1991 and has been involved in the application of electrochemical methods toward understanding thin film deposition and dissolution processes. His activities have ranged from the synthesis of strained-layer metallic superlattices to explorations of the coupling between underpotential deposition and 3-D alloy formation.

His most recent work has focused on the role of surfactants in mediating electrodeposition processes. In 2001 he received the Gold Medal of the U.S. Department of Commerce for work on superconformal film growth that explains the mechanism of bottom-up superfilling used in semiconductor metallization. He is an author or coauthor of over 100 technical papers. Dr. Moffat is an active member of The Electrochemical Society and has served as an Associate Editor of the *Journal of The Electrochemical Society* as well as *Electrochemical and Solid-State Letters*. He is also a member of the International Society of Electrochemistry, the Materials Research Society, and the American Association for the Advancement of Science; and he will serve as chair of the Gordon Research Conference on Electrodeposition in 2008.

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## Award Winners (continued)

### HTM Division Outstanding Achievement Award



**ANIL VIRKAR** is a professor and Chair of Materials Science & Engineering at the University of Utah, and is a co-founder and vice-president of Materials and Systems Research, Inc. (MSRI). He

received his BTech in metallurgical engineering from Indian Institute of Technology in 1967, his MS in engineering mechanics from Louisiana State University in 1969, and his PhD from Northwestern University in Materials Science in 1973. He is Fellow of the American Ceramic Society, a member of ECS, and a member of the American Society for Metals. He has received awards on research from the American Ceramic Society and the University of Utah. He also received best teacher of the year award in college of engineering at Utah. He is listed in the [www.ISIHighlyCited.com](http://www.ISIHighlyCited.com) database in the materials science category as one of the most highly cited researchers. He is an author or co-author of over 180 refereed research articles, and an inventor or co-inventor on more than 35 patents. His research interests are in fabrication and characterization of high temperature materials and their applications in high thermal conductivity substrates for electronic packaging, sodium-sulfur batteries, sensors, and solid oxide fuel cells (SOFC). Many of his articles and patents are on sodium-sulfur batteries and SOFC technology. He was invited to offer a two-day, intensive course on SOFC by the U.S. Department of Energy, National Energy Technology Laboratory (NETL). He has also co-taught a one day course on SOFC at the ECS meeting in Québec City, Canada, in May 2005. He has also conducted research on fracture mechanics of ceramics with emphasis on non-transforming zirconia-based ceramics. He has conducted research on the synthesis of nanosize powders and currently heads a State of Utah Center of Excellence on nanosize powders.

### LDM Division Outstanding Achievement Award



**HANS ULRICH GÜDEL** is a professor of chemistry at the University of Bern, Switzerland. He received his PhD in inorganic and physical chemistry from the University of Bern in 1969. After spending two

years as a post-doc at the University of Copenhagen and two years at the Australian National University in Canberra he returned to Bern. In 1978 he became a professor of chemistry. Sabbatical stays brought him to Stanford (1983/84), the Hughes Research Labs in Malibu (1992/93) and back to Copenhagen in 2002.

Prof. Güdel's contributions to science have been in two distinctly different areas: molecular nanomagnets and light emitting materials and processes. Together with his colleague Albert Furrer he pioneered the use of inelastic neutron scattering for the study of exchange and anisotropy interactions in molecular nanomagnets. In recent years this research has mainly centered on so-called Single Molecule Magnets and other quantum spin systems. Photon upconversion materials and processes are in the focus of Prof. Güdel's other line of research. Chemical and structural variation to tune the light emission properties is the guiding principle of his research. Thus the scope of upconversion research has been significantly expanded beyond the traditional trivalent lanthanide systems. Upconversion has been found and characterized in transition metal ion doped materials, mixed lanthanide/transition metal systems as well as in divalent lanthanide systems. Together with his colleagues Karl Krämer, Pieter Dorenbos, and Carel van Eijk, Prof. Güdel has developed the new materials  $\text{LaCl}_3: \text{Ce}^{3+}$  and  $\text{LaBr}_3: \text{Ce}^{3+}$  with outstanding scintillator properties and an application potential in many different areas.

### Physical and Analytical Electrochemistry Division



**JOHN S. WILKES** is a professor of chemistry at the U.S. Air Force Academy in Colorado Springs, CO. He is also the Director of the Chemistry Research Center there, which he founded in 1995. Previously he was at

the Frank J. Seiler Research Laboratory, also at the Air Force Academy. From 1978 to 1995 Dr. Wilkes held positions as a research chemist, technical director, and eventually laboratory director at the Seiler Research Lab. His research there concentrated mainly in the synthesis, properties, and applications of room temperature molten salts, an area now called ionic liquids. Previous to his long tenure at the Air Force Academy, Dr. Wilkes served on active duty in the U.S. Air Force, and on the faculty of the University of Colorado at Denver. He was born in the Panama Canal Zone (a U.S. territory at the time, 1947), but he calls himself a native of Buffalo, NY. His father was a career Army officer, resulting in numerous relocations to Louisiana, Texas, Japan, Illinois, and France during his childhood and youth. He has a BA in chemistry from the University at Buffalo, and a PhD in chemistry from Northwestern University. His current research interests include ionic liquids, hydrogen storage materials, and power sources for unmanned aerial vehicles.

### Sensor Division Outstanding Achievement



**WILLIAM R. HEINEMAN** received a BS degree in chemistry from Texas Tech University in 1964 and a PhD in 1968 in analytical chemistry from the University of North Carolina at Chapel

Hill, where he worked under the direction of Royce Murray. He was a research chemist at Hercules Research Center for two years before becoming a post-doctoral research associate with Ted Kuwana in 1970 at Case Western Reserve University and then at The Ohio State University. He joined the faculty at the University of Cincinnati in 1972 where he is now Distinguished Research Professor.

Professor Heineman's research interests include spectroelectrochemistry, chemical sensors and biosensors, electrochemical immunoassay, and



microfluidic systems for chemical analysis. He has published over 370 research papers and patents. He is coauthor of the laboratory manual *Chemical Experiments for Instrumental Methods*, the instrumental analysis textbook, *Chemical Instrumentation: A Systematic Approach*; and coeditor of the textbook *Laboratory Techniques in Electroanalytical Chemistry*.

Professor Heineman has received the following awards: Sigma Xi Research Recognition Award, Cincinnati Chemist of the Year, Distinguished Scientist Award from the Technical Societies Council of the Engineers and Scientists of Cincinnati, Japan Society for the Promotion of Science Fellowship, Japanese Government Research Award for Foreign Scientists, George Rieveschl, Jr. Award for Distinguished Scientific Research, Humboldt Prize from West Germany, McMicken Dean's Award for Distinguished Scholarship, Hans H. Jaffe Chemistry Award, Charles N. Reilley Award in Electroanalytical Chemistry from the Society for Electroanalytical Chemistry, Chemical Sensors Award from the International Meeting on Chemical Sensors, Award for Excellence in Teaching from the Division of Analytical Chemistry of the American Chemical Society, Torbern Bergman Medal 1999 from the Analytical Section of the Swedish Chemical Society, and the EAS Award for Outstanding Achievement in the Fields of Analytical Chemistry from the Eastern Analytical Symposium in 2003. He is an elected Fellow of the American Association for the Advancement of Science.

## Fellows of The Electrochemical Society

The 2006 Class of Fellows of The Electrochemical Society will be introduced during the Plenary and Honor and Awards session on Monday, October 30, starting at 0830h, in the Universal Ballroom, 2<sup>nd</sup> Floor, Expo Center. Pictured below, along with their citations, are the 2006 ECS Fellows.



**ALBERT G. BACA**  
For development of advanced manufacturable compound semiconductor devices.

Albert G. Baca is a Distinguished Member of the Technical Staff at Sandia National Laboratories. From 1985-1990 he worked at AT&T Bell Laboratories in GaAs-based microelectronics. Since 1990 he has been at Sandia National Laboratories where he has

been responsible for the development of a number of compound semiconductor device technologies. Dr. Baca has led research efforts in the realization of compound semiconductor devices such as GaAs/AlGaAs heterostructure field effect transistors for high speed fiber optic communications, high voltage GaAs heterojunction bipolar transistors (HBTs), co-integration of sensors and GaAs electronics, low-power InP HBTs, novel InGaAsN HBTs, high power GaN/AlGaIn high electron mobility transistors, and high voltage, high current photoconductive semiconductor switches. This research has led both to research "firsts" as well as production worthy technology. He has co-authored more than 150 publications, and holds eight US patents. He has also co-authored the book, *Fabrication of GaAs Devices* (with Carol I. H. Ashby) and co-edited six other books as well as several book chapters. Since 1998 he has served on the honorary editorial board for *Solid-State Electronics*.

Dr. Baca received a BS degree in chemistry and mathematics from the University of New Mexico in 1979 and a PhD in chemistry from the University of California at Berkeley in 1985. He is a senior member of the IEEE. He has been actively involved in ECS affairs since 1996 and is currently vice-chair of the Electronics and Photonics Division. Among other ECS activities, he has co-organized 10 symposia for ECS meetings, chaired the Solid-State Subcommittee for selection of the Young Authors Award from 2002-2005, and also served as secretary of the Electronics and Photonics Division from 2003-2004. In 2003, he chaired the Subcommittee on Processing for the InP and Related Materials Conference. He also served on the IEEE GaAs IC Symposium Technical Program Committee from 1997-1999.



**SUPRIYO BANDYOPADHYAY**  
For pioneering contributions to electrochemical synthesis of nanostructures and nanodevices.

Supriyo Bandyopadhyay was born in Kolkata, India. He received his bachelor's degree in electronics and electrical communications engineering from the Indian Institute of Technology, Kharagpur, India in 1980; his master's degree in electrical engineering from Southern Illinois University, Carbondale, IL in 1982; and his PhD in electrical engineering from Purdue University, West Lafayette, IN in 1985. He was a faculty member at Purdue, University of Notre Dame, University of Nebraska-

Lincoln and is currently a professor of electrical and computer engineering and professor of physics at Virginia Commonwealth University, Richmond, VA. He directs the Quantum Device Laboratory, which is world renowned for its many achievements in nanoscience and nanotechnology. Bandyopadhyay's work in electrochemical self assembly of regimented arrays of nanostructures was highlighted as one of four significant achievements in nanoscience in the U.S. Army Nanoscience Poster in 1997. Other achievements in this laboratory include demonstration of a novel electronic bistability in electrochemically self assembled quantum dots with potential applications in high density non-volatile memory, electrochemically synthesized nanowire infrared photodetectors with record noise equivalent power, and numerous magnetic and spintronic devices fabricated using electrochemistry. This laboratory was also used as a benchmark to gauge nanotechnology pipeline challenges in a pilot study conducted by the ASME. Bandyopadhyay has over 300 research publications. He serves on the editorial board of three international journals, chairs two technical committees of the Institute of Electrical and Electronics Engineers (IEEE), and is an IEEE Electron Device Society Distinguished Lecturer. He is a Fellow of the IEEE, Fellow of the American Physical Society, and Fellow of the Institute of Physics (UK).



**THOMAS FAHIDY**  
For pioneering work introducing a variety of mathematical and statistical techniques for the treatment of electrochemical engineering problems.

Born in Budapest, Hungary, Dr. Fahidy began studying chemical engineering at the Veszprem Institute of Chemical Technology and obtained his BSc (Hon.) and MSc at Queen's University (Kingston, Ontario), and finally his PhD at the University of Illinois (Urbana Champaign) in 1965.

Joining the Department of Chemical Engineering at the University of Waterloo, Dr. Fahidy initiated a two-prong research applying process dynamics-control techniques to electrochemical systems, and in magneto-electrolysis. Full professor from 1971 until 2002, he was named Distinguished Professor Emeritus in 2004, and is currently an adjunct professor. He has authored over 250 refereed articles, a graduate-level textbook on electrochemical reactor

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## Award Winners (continued)

analysis, ten chapters in research monographs, and a chapter in an electronic encyclopedia on electrochemistry.

Dr. Fahidy also served in administrative capacities, e.g., as Associate Dean for Graduate Studies and Research in the Faculty of Engineering, and on the University of Waterloo Senate. He was also a member of the Executive Committee of the ECS Canadian Section (1991/92), and a two-term Associate Editor of the *Canadian Journal of Chemical Engineering*. He was on various grant-selection committees, a nuclear waste disposal review team, and an engineering program accreditation team. Examiner of numerous scientific/engineering manuscripts and research proposals, he was also an invited scholar at institutions in the United Kingdom, France, and Switzerland. He is a member of the Advisory Board of the *Journal of Applied Electrochemistry*, and a professional engineer registered in Ontario.

Dr. Fahidy is a Fellow of the American Institute of Chemical Engineers, Fellow of the Chemical Institute of Canada, and a member of the general assembly of the Hungarian Academy of Sciences. He has been regularly featured in "Who is Who in Canada" since 1999.



**GERALD FRANKEL**  
*In recognition of contributions to the advancement of science and technology, for leadership in electrochemical and solid state science and technology, and for active leadership in the affairs of The Electrochemical Society.*

Gerald S. Frankel is a professor of materials science and engineering at the Ohio State University and Director of the Fontana Corrosion Center. He earned the ScB degree in materials science engineering from Brown University in 1978, and the ScD degree in materials science and engineering from the Massachusetts Institute of Technology in 1985. Prior to joining OSU in 1995, he was a postdoctoral researcher at the Swiss Federal Technical Institute in Zurich, Switzerland, and then a Research Staff Member at the IBM Watson Research Center in Yorktown Heights, NY. He has more than 180 publications, and his primary research interests are in the passivation and localized corrosion of metals and alloys, corrosion inhibition, and protective coatings. He is past chair of the ECS Corrosion Division, past chair of the Research Committee of NACE, and a member of the editorial board of the

journal *Corrosion*. Frankel is a fellow of NACE International. He has received the Alexander von Humboldt Foundation Research Award for Senior U.S. Scientists, the H. H. Uhlig Educators Award from NACE, and the Harrison Faculty Award and Lumley Research Award from the OSU College of Engineering. In 2005 he was on sabbatical at the Max Planck Institute für Eisenforschung (Institute for Iron Research) in Dusseldorf Germany.



**CHENNUPATI JAGADISH**  
*For seminal and sustained contributions to semiconductor optoelectronics and nanotechnology.*

Chennupati Jagadish received his BSc degree

from Nagarjuna University, Guntur, India in 1977, an MSc (Tech) degree from Andhra University, Waltair, India in 1980, and his MPhil(1982) and PhD (1986) degrees from the University of Delhi. He was a Lecturer in physics and electronics at S. V. College, University of Delhi, during 1985-88 and worked at Queen's University, Kingston, Canada, during 1988-90 as a research associate. He moved to Australia in 1990 where he is currently a Federation Fellow, a professor and head of Semiconductor Optoelectronics and Nanotechnology Group in the Department of Electronic Materials Engineering, Research School of Physical Sciences and Engineering, the Australian National University. His research interests include compound semiconductor optoelectronics and nanotechnology.

Professor Jagadish is a winner of 2000 Institute of Electrical and Electronics Engineers, Inc (IEEE) Millennium Medal and served as a Distinguished Lecturer of both IEEE Lasers and Electro-Optics Society (LEOS) and IEEE Electron Devices Society (EDS). He has published more than 480 research papers (310 journal papers), co-authored a book, co-edited a book and co-edited seven conference proceedings. Professor Jagadish served as Vice-President (Publications) of the IEEE Nanotechnology Council (NTC) during 2004-2005 and is currently the chair of the NTC Awards Committee and also chair of the Nano-Optoelectronics and Nano-Photonics Technical Committee. He served as an elected member of EDS AdCom (1999-2004), and chair of Optoelectronic Devices technical committee of EDS (1998-2003). He served as chair of the Australian Chapter of EDS and LEOS (1993-2005). He is currently Vice-President (Membership and Regional Activities-Asia Pacific) of the LEOS. He is a Fellow of the IEEE,

American Physical Society, Optical Society of America, Australian Institute of Physics, the Institute of Physics (UK), the Institute of Nanotechnology (UK), SPIE- International Society for Optical Engineering, the Australian Academy of Technological Sciences and Engineering and the Australian Academy of Science. He serves on editorial boards of eight journals and as an Associate Editor of the *IEEE/OSA Journal of Lightwave Technology*. He is currently a member of the IEEE Fellows Committee.



**NOBUYOSHI KOSHIDA**  
*For his pioneering research in the science and technology of quantum-sized silicon.*

Nobuyoshi Koshida was born in Hokkaido, Japan, in 1943. He received

his BS (1966), MS (1968), and PhD (1973) degrees from Tohoku University, Sendai, Japan, all in the field of electronic engineering. After working as a graduate researcher in Tohoku University and a researcher in the Central Laboratories of Nissan Motor Co. Ltd., he moved to Tokyo University of Agriculture and Technology as an associate professor in 1981. He has been working there as a professor of electronic device engineering since 1988, and as a professor of strategic research initiative for future nanoscience and technology in the Graduate School of Engineering since 2002. Related professional careers are a visiting scientist in the Department of Electrical Engineering and Computer Science, Massachusetts Institute of Technology, USA, in 1992-1993; in Cavendish Laboratory, Cambridge University, UK, in 1993; and an invited visiting professor at J.-Fourier University Grenoble, France, in 1996. His research activity concerns photonic and electronic materials and their device applications. From 1973 to 1978, he studied the fundamentals of photo-electronic devices for detecting ultra-low intensity optical incidences and images. During 1979-1981, he engaged in research and development of displays and materials for automobiles. Since 1981, he has been studying nanofabrication process, optical characterizations, and device physics of quantum-sized nanosilicon. Current research interests include the implementation of optoelectronic, electronic, and acoustic nanodevices toward silicon-based functional integration. He has presented over 280 publications, including journal papers, conference papers, book chapters, and review articles. He has served as the ECS Japan Section chair (2002-2004) and as

a Council Committee Member of the Japan Society of Applied Physics since 2000. He is also a member of Materials Research Society and American Physical Society.



**JEAN LESSARD**

*For his pioneering research in electro-organic synthesis, electrocatalytic hydrogenation reactions, green chemistry, and the chemistry of imidyl radicals; and for his mentoring of*

*many young Canadian chemists.*

Jean Lessard studied chemistry at l'Université Laval, Québec, and received his PhD in organic chemistry in 1964. After two years as postdoctoral fellow at Imperial College, London, UK, with Professor Sir Derek Barton, he joined the National Research Council of Canada as assistant research officer. In 1969, he moved to the Département de Chimie de l'Université de Sherbrooke and was promoted full professor in 1976. He has been vice-chair and chair of the Département de Chimie. In 1972, together with Professor Frank Kimmeler, he established the first FCAR Electrochemistry Research Team in Québec. He was Head of the team from 1972 to 1993. From 1986 to 1996, he was the leader of the Équipe Action Structurante "Électrocatalyse," which grouped together the researchers of three universities in Québec and led, in 1996, to the creation of four new professorships, two at l'Université de Sherbrooke, one at l'École Polytechnique de Montréal, and one at l'Université du Québec à Montréal. From the Équipe Action Structurante, he established the Centre de Recherche en Électrochimie et Électrocatalyse in 1989 and was the director from 1989 to 2000. This center teamed up to fourteen professors in electrochemistry in Québec, thirty-two graduate students and ten postdoctoral fellows in addition to research assistants and technicians. The successful research in electrochemistry and electrocatalysis carried out by the Équipe Action Structurante was recognized by the granting of the Research Chair MRN/Electrocatalyse-Hydrogène to Jean Lessard in 1989 by the Ministry of Natural Resources of Québec which supported the chair from 1989 to 2000. Through his leadership, the electrochemistry team at Sherbrooke was involved in fruitful scientific collaborations with researchers in Canada and France and was successful in getting funds from the Interprovincial Collaboration Program and the Coopération France-Québec Program. In

2002, he received the Electrochemical Award (Gold Medal) of the ECS Canadian Section. One of his main scientific contributions in electrochemistry is in the field of electrocatalytic hydrogenation of organic compounds. He developed highly selective hydrogenations using Raney metals as electrodes. He received the 2004 Murray Raney Award of the Organic Reactions Catalysis Society for these contributions. He is a Fellow of the Chemical Institute of Canada since 1986.

Jean Lessard has been a member of ECS since 1984 and has been actively involved in the Society. He was member-at-large, secretary-treasurer, vice-chair, and chair of the Organic and Biological Electrochemistry Division (1991-2003), member of the Technical Affairs Committee (2001-2005), and has organized many symposia. He has also participated in the activities of other societies and organizations. For five years, he was member of the Advisory Board of *Electrochimica Acta* and is currently vice-chair of the Macromolecular Electrochemistry Division of the International Society of Electrochemistry. He has been actively involved in the Canadian Society of Chemistry, was member of the Scientific Program Subcommittee of the Pacific Basin Chemical Congresses from 1987 to 1996, and chair of this committee for the PACIFICHEM '95 Congress.



**BARRY MACDOUGALL**

*For outstanding contributions to the understanding of metal corrosion, passivity, and environmental protection; and for distinguished service to the Society.*

Barry MacDougall is a Principal Research Officer at the National Research Council (NRC) of Canada, where he has worked for the past 32 years. He received his Honors BSc from St. Francis Xavier University in Nova Scotia and his PhD in electrochemistry from the University of Ottawa under the supervision of Brian Conway. He joined the NRC as a postdoctoral fellow with Morris Cohen in the "Corrosion Group" of the Division of Chemistry, and became a full NRC staff member in 1974. In 1990, Dr. MacDougall's research focus switched to semiconductor and microstructural electrochemistry, and in 1992 he set up a research group in the field of electrocatalysis.

Dr. MacDougall has 110 scientific papers, four active patents and four book chapters. He is also an adjunct professor in the Department of Chemistry at the University of Ottawa. Dr. MacDougall

has been a member of ECS for more than 30 years, and was the chair of the Ontario-Québec (now the Canadian) Section in 1979-1980. He received both the Lash Miller (1979) and Jacobsen (1990) Awards of the Canadian Section. He served on the Corrosion Division of ECS from 1984 to 1996, and was chair from 1994 to 1996. He has co-organized symposia on Anodic Oxide Films in 1981, 1985, 1992, and 2000, continuing the long-established ECS series begun in the fifties. He has co-organized several other symposia, including one to honor Prof. Norio Sato at the 1999 meeting in Hawaii. Dr. MacDougall became a member of the ECS Honors and Awards Committee in 1996, and served for the next four years as chair of the Fellows Selection Subcommittee. In 2000, he became chair of the Honors and Awards Committee. Over the years, he has served on the Society's Long Range Planning Committee, the Society Nominating Committee; and he was significantly involved with the 2002 ECS Centennial Meeting, in Philadelphia. From 1984 to 1992, Dr. MacDougall was a Divisional Editor of the *Journal of The Electrochemical Society*. He received a Young Authors Award of ECS in 1976, and the Society's Carl Wagner Award in 1995. He is a Fellow of the National Association of Corrosion Engineers (NACE) and the Chemical Institute of Canada (CIC).



**HISHAM MASSOUD**

*For contributions to the understanding of silicon oxidation kinetics and the growth and electrical characterization of ultrathin gate dielectrics for MOS field-effect transistors.*

Hisham Z. Massoud received his BSc and MSc degrees in electrical engineering from Cairo University, Cairo, Egypt, in 1973 and 1975; and MS and a PhD degrees in electrical engineering from Stanford University, Stanford, CA, in 1976 and 1983. His doctoral dissertation research topic was the thermal oxidation of silicon in the ultrathin-oxide regime and the electrical characteristics of ultrathin dielectrics. The results of this work are widely used in the process modeling of ultrathin silicon-dioxide layers. In 1983, he joined Duke University, Durham, NC, where he is currently a professor of electrical and computer engineering, and founding director of the Semiconductor Research Laboratory. His research interests are in the thermal and rapid-thermal oxidation

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## Award Winners (continued)

of silicon, silicon/silicon-dioxide studies, point-defect and diffusion phenomena in silicon, electron and hole trapping in silicon-dioxide layers, and the role of the anomalous positive charge and chemical partial-charge transfer dipoles at the silicon-dioxide/silicon interface in linking the electrical properties of interfaces with their processing history. Since 1994, he has focused his research on the physics, modeling, and simulation of carrier tunneling in ultrathin gate dielectrics and the effects of gate tunneling currents on the operation and characterization of ultrathin-oxide MOSFETs, and on the performance of near-limit CMOS integrated circuits.

Dr. Massoud is a thirty-year member of ECS, a Fellow of the Institute of Electrical and Electronics Engineers, and a member of the American Physical Society, the American Vacuum Society, the Materials Research Society, the American Association for the Advancement of Science, Eta Kappa Nu, Tau Beta Pi, and Sigma Xi. He has served the ECS on numerous Electronics and Photonics Division and Society committees, is a member-at-large of the Executive Committee of the Electronics and Photonics Division, and has served as chair of the Executive Committee of the Electronics and Photonics Division (1997-1999).



**DURGA MISRA**

*For pioneering research on understanding and minimizing of plasma-process induced damage mechanisms in metal-oxide-semiconductor devices and silicon-germanium devices*

*and materials. For fundamental studies in reliability of gate oxide in MOS devices through incorporation of deuterium at the silicon-silicon dioxide interface by implantation.*

Durga Misra is a professor in the Electrical and Computer Engineering Department at New Jersey Institute of Technology. He is currently the Director of Materials and Device Characterization Laboratory. He earned a doctorate in electrical engineering from University of Waterloo, Canada in 1988, a master's in solid-state materials from the Indian Institute of Technology, New Delhi 1983; and a master's and bachelor's in physics from Utkal University in Orissa, India in 1981 and 1978 respectively. He joined the NJIT faculty in 1988.

His research is primarily focused on semiconductor devices and integrated circuits for nano-electronics. His current work is in the area of advanced CMOS gate stacks with high-k gate dielectrics

and device reliability. He uses hafnium-based gate dielectrics on germanium as an alternate substrate in addition to his reliability work on silicon/hafnium-silicate gate stacks. In this research for future nanoscale devices below 45 nm domain, Prof. Misra collaborates with a team of international researchers constituting from International SEMATECH; IMEC, Belgium; and IBM Research. In a recent work he has also studied the reliability of gate oxides in MOS devices through incorporation of deuterium at the silicon-silicon dioxide interface by implantation.

Prof. Misra's earlier research includes the development of materials and processes designed to enhance the performance and reliability of semiconductor devices where he focused on plasma processing induced damage. As a part of SEMATECH Center of Excellence in Plasma Processing in late 1980s his work outlined the impact of reactive ion etching on silicon substrate and the behavior of these defects in silicon due to subsequent thermal budget. During 1997 he worked as a visiting professor on plasma charging damage to CMOS devices at the VLSI Research Department of Bell Laboratories of Lucent Technologies. He also worked on design and processing of photo detectors in CCD technology and in CMOS imager technology.

His record includes more than 170 publications in scientific journals, proceeding volumes, conference presentations and scientific reports. He has edited and co-edited 15 proceeding volumes including three *ECS Transactions* volumes. Prof. Misra has published extensively in the *Journal of The Electrochemical Society* and *Electrochemical and Solid-State Letters*. He has presented many invited talks in international conferences. He has also given numerous invited seminars at universities, research laboratories and industries worldwide. He received several research awards from the National Science Foundation, NASA, and various industries. He has graduated many PhD and MS students. He received Excellence in Teaching Award from NJIT. Currently he serves as the vice-chair of the ECS Dielectric Science and Technology Division. He is an Associate Editor of *IEEE Circuits and Devices magazine*. He has organized numerous international conferences in the area of solid-state science and technology. He is, currently, a Distinguished Lecturer of IEEE Electron Device Society.



**MARK ORAZEM**

*For his contributions to the understanding of impedance spectroscopy and to cathodic protection for buried pipelines and for his distinguished service to the educational and research dissemination*

*missions of The Electrochemical Society.*

Mark Orazem obtained his BS and MS degrees from Kansas State University and his doctorate in 1983 from the University of California, Berkeley. In 1988 he joined the faculty of the University of Florida where, since 1992, he holds the position of Professor of Chemical Engineering. He is the director and organizer of the UF/BP Engineering Development Program for the Caspian Sea Region. Orazem is the recipient of two teaching awards and two research professorships from the University of Florida. He was recognized as an outstanding educator in 2004 by BP Azerbaijan. He was recognized as the 2005 College of Engineering Distinguished International Educator, and he received the 2006 Excellence in Teaching Award from the local student chapter of the AIChE.

Orazem has over 100 refereed publications, and he has delivered five plenary lectures at international meetings. Orazem's interests in electrochemical engineering include development of mathematical models for corrosion processes and cathodic protection of complex structures. His work on electrochemical impedance spectroscopy has encompassed corrosion, biomedical processes, and electronic materials. Orazem's group at the University of Florida was the first to develop finite-element and boundary-element models for cathodic protection of coated pipelines with coating defects that expose bare steel. The measurement model approach, developed in collaboration with Professor Luis Garcia-Rubio (University of South Florida), provides a powerful method for statistical analysis of impedance data.

Orazem serves since 2001 as Associate Editor for the *Journal of The Electrochemical Society*. He has served on the Publication, Education, and Finance committees of the Society. He is a vice-president of the International Society of Electrochemistry and served previously as their U.S. Regional Representative. He has delivered numerous short courses on Impedance Spectroscopy for the Electrochemical Society (ECS) and is co-authoring, with Bernard Tribollet, of the CNRS in Paris, a textbook on impedance spectroscopy.

**ANIL VIRKAR**

*For outstanding and seminal contributions to thermodynamics, kinetics, and transport of high temperature solid state ionic and electronic conductors in fuel cells and batteries.*

Anil Virkar is a professor and Chair of Materials Science & Engineering at the University of Utah, and is a co-founder and vice-president of Materials and Systems Research, Inc. (MSRI). He received his B.Tech in metallurgical engineering from Indian Institute of Technology in 1967, his MS in engineering mechanics from Louisiana State University in 1969, and his PhD from Northwestern University in Materials Science in 1973. He is Fellow of the American Ceramic Society, a member of ECS, and a member of the American Society for Metals. He has received awards on research from the American Ceramic Society and the University of Utah. He also received best teacher of the year award in college of engineering at Utah. He is listed in the [www.ISIHighlyCited.com](http://www.ISIHighlyCited.com) database in the materials science category as one of the most highly cited researchers. He is an author or co-author of over 180 refereed research articles, and an inventor or co-inventor on more than 35 patents. His research interests are in fabrication and characterization of high temperature materials and their applications in high thermal conductivity substrates for electronic packaging, sodium-sulfur batteries, sensors, and solid oxide fuel cells (SOFC). Many of his articles and patents are on sodium-sulfur batteries and SOFC technology. He was invited to offer a two-day, intensive course on SOFC by the U.S. Department of Energy, National Energy Technology Laboratory (NETL). He has also co-taught a one day course on SOFC at the ECS meeting in Québec City, Canada, in May 2005. He has also conducted research on fracture mechanics of ceramics with emphasis on non-transforming zirconia-based ceramics. He has conducted research on the synthesis of nanosize powders and currently heads a State of Utah Center of Excellence on nanosize powders.

**ANDRZEJ WIECKOWSKI**

*In recognition for his pioneering work in the field of electrochemical NMR and for contributions to the field of electrochemical surface science.*

Andrzej Wieckowski, North American Editor for *Electrochimica Acta*, is a professor of chemistry at the University of Illinois at Urbana-Champaign, Illinois, U.S. (he was made a full professor in 1996). He received his MSc, PhD, and DSc in 1981 from the University of Warsaw, Poland, where he was a junior faculty until 1983. Professor Wieckowski came to the University of Illinois in 1985 after two years of holding a visiting scientist position at the University of California at Santa Barbara. His main research focus is on electrode surface structure in relation to electrocatalysis combined with molecular-level studies of adsorption, surface redox reactions, and fuel cells. Wieckowski pioneered the development (and use) of the method now known as Electrochemical NMR (EC-NMR), which combines metal/surface NMR and electrochemistry for studies of electrochemical interfaces. His group contribution is through new catalyst syntheses, the use of electroanalytical and spectroscopic methods: EC-NMR, XPS, STM, SFG, synchrotron GIF-XAS for single crystal and nanoparticle studies, and through broadly published correlations of electronic-level data and reactivity for fuel cells.

Professor Wieckowski has received several national and international chemistry awards, and frequent lecture awards. He is editing electrochemistry books and is on editorial boards of several chemistry journals. The progress in his research has been reported in about 260 publications and chapters. Wieckowski has held chairs or equivalent positions in scientific organizations such as ECS, ISE, and ACS.

**HARUMI YOKOKAWA**

*For sustained and internationally recognized contributions to the thermodynamic understanding and development of high temperature materials, especially for solid oxide fuel cells.*

Harumi Yokokawa was born in Saitama, Japan and received his master's and doctoral degrees in engineering from the University of Tokyo, Tokyo, Japan. His thesis work was a calorimetric investigation on uranium compounds. In 1977, he joined the National Chemical Laboratory for Industry (later, National Institute for Materials and Chemical Research and currently known as AIST). From 1978-1980, he was a research associate at the James Frank Institute of University of Chicago and worked with Prof. O. J. Kleppa on the thermodynamic properties of alloys and metal/salt mixtures. From 1980, he has been engaged in R&D work in energy-related field. He is currently a principal research scientist and fuel cell group leader in the energy technology research institute, National Institute of Advanced Industrial Science and Technology (AIST).

He has written about 300 papers, has given 51 international and 24 domestic invited presentations and has established thermodynamic databases. In NCL/ NIMC/AIST, Yokokawa has worked with late Dr. M. Dokiya and other members on energy-related research and development, particularly for aluminum blast furnace and solid oxide fuel cells. His main interest has been in applications of thermodynamics to high temperature processes. With Dr. S. Yamauchi, he made efforts in constructing the thermodynamic database and developing related software to facilitate the thermodynamic analysis on practical materials problems.

Yokokawa's work on the thermodynamic database and its utilization in the energy-related fields has been awarded from the Japan Information Center for Science and Technology (1989) and also from the Minister of the Agency for Science and Technology (2001). In 2002, Yokokawa was awarded outstanding achievement award from the ECS High Temperature Materials Division in recognition of his contribution to the practical application of thermochemistry to high temperature materials research and technology, especially in the area of solid oxide fuel cells. In 2004, Yokokawa and his group were awarded Christian Friedrich Schönbein Silver Medal from the European Solid Oxide Fuel Cell Forum.