

# PRISM

PRINCETON INSTITUTE FOR THE SCIENCE  
AND TECHNOLOGY OF MATERIALS

UNIVERSITY–INDUSTRY  
Research Symposium

March 17-18, 2008



# PARTICIPATING CENTERS

## **PRISM PRINCETON INSTITUTE FOR THE SCIENCE AND TECHNOLOGY OF MATERIALS**

The Princeton Institute for the Science and Technology of Materials (PRISM) is a multidisciplinary research center at Princeton University in the general field of materials science through photonics, with a special emphasis on the interface between the hard material and soft material communities. Its mission includes graduate and undergraduate education and research, which will have a long-term impact on society. Key elements of PRISM are the integration of the sciences and engineering, with work spanning from fundamental theory through applications, and the integration of our work with efforts outside Princeton, especially with industry.

PRISM was formed in November 2003, based on foundations of two smaller interdisciplinary centers at Princeton, the former Princeton Materials Institute and the former Center for Photonics and Optoelectronic Materials. Research at PRISM is supported by a wide range of government agencies, industries, and foundations.

At PRISM, we offer a formal education program for Princeton undergraduates in which they are integrated into the research program, and a multidisciplinary program for graduate students in cooperation with the academic departments. The compact size of Princeton University ensures a close interaction between scientists and engineers across academic boundaries. Those outside of Princeton, especially industry, bring important long-term challenges to us and provide a path by which our discoveries and advances can be translated into practice to have a large impact on society.

## **CNSA CENTER FOR NETWORKS SCIENCE AND APPLICATIONS**

The PRISM Center for Networks Science and Applications (CNSA) conducts collaborative Industry/Government/University research leading to the transfer of advanced communications technology to the government and private sectors. The Center serves to identify technology and systems requirements of next-generation communications networks.

Working closely with industry and Federal laboratories, it develops and alpha-tests technologies and systems with great commercial promise, and transitions commercial results into military and homeland security applications.

The Center welcomes participation by companies of all sizes and stages of development, which benefit from access to expertise related to hardware, software, simulations and fundamental theory, as well as a networking testbed for collaboration projects.

## **PCCM PRINCETON CENTER FOR COMPLEX MATERIALS**

Launched in 1994, the Princeton Center for Complex Materials (PCCM) is an NSF-funded Materials Research Science and Engineering Center (MRSEC) at Princeton University dedicated to pushing the frontiers of complexity in materials science. PCCM brings together over thirty faculty from six departments in the natural sciences and engineering, and is centered in Bowen Hall at the eastern entrance to campus. PCCM currently has three Interdisciplinary Research Groups (IRGs) on the *Interplay of Magnetism and Transport in Correlated Electronic Materials*, *Guided Self-Assembly*, and *Adhesion, Deformation and Transport at Contacts in Small Structures*, and several seed projects.

In addition to conducting forefront materials research, the center sponsors an active educational outreach program involving elementary, middle and high schools, as well as a Research Experience for Undergraduates (REU) and a Research Experience for Teachers (RET) programs. Industrial collaboration is also an important aspect of PCCM research. More information on our outreach and collaborative programs may be found at [www.princeton.edu/~pccm](http://www.princeton.edu/~pccm).

## **MIRTHE MID-INFRA-RED TECHNOLOGIES FOR HEALTH AND THE ENVIRONMENT**

MIRTHE is a National Science Foundation Engineering Research Center headquartered at Princeton University, with partners City College New York, Johns Hopkins University, Rice University, Texas A&M University, and the University of Maryland Baltimore County. The center encompasses a world-class team of engineers, chemists, physicists, environmental and bio-engineers, and medical doctors. MIRTHE develops mid-infrared ( $\lambda \sim 3 - 30 \mu\text{m}$ ) optical trace gas sensing systems based on new technologies, such as quantum cascade lasers or quartz enhanced photo-acoustic spectroscopy, with the ability to detect minute amounts of chemicals found in the environment or atmosphere, emitted from spills, combustion, or natural sources, or exhaled in human breath.

Through its fundamental research and prototyping in materials, sources, detectors, sensing systems, and application testbeds, MIRTHE addresses a broad range of technologies and industry sectors—semiconductors, test and measurement, medical equipment manufacturers, chemical and petrochemical, and homeland security—as well as government labs and hospitals. MIRTHE provides an interdisciplinary and practice-oriented education for a competitive and diverse U.S. workforce and seeks to educate the public about chemical sensing applied to the environment, homeland security, and health.

# UNIVERSITY–INDUSTRY **Research Symposium**

**Monday, March 17, 2008**

FRIEND CENTER AUDITORIUM, ROOM 101

**MORNING SESSION**

**MATERIALS FOR ENERGY**

**7:30 Check-in and Continental Breakfast**

**8:00 Directors' Welcome**

**JAMES C. STURM**, *Director*

*Princeton Institute for the Science and Technology of Materials (PRISM)*

**RICHARD A. REGISTER**, *Director*

*NSF Princeton Center for Complex Materials (PCCM)*

**8:30 Keynote Session**

**Keynote: Managing Climate Risks: The Role of Innovative Technologies**

**BRIAN P. FLANNERY**, *Science, Strategy and Programs Manager, Safety, Health & Environment Department, ExxonMobil Corporation*

**9:15 Keynote: Our Energy Future: Science and Technology Challenges for the 21st Century**

**THOMAS J. MEYER**, *Chemistry, University of North Carolina, Chapel Hill*

**10:00 Break (20 minutes)**

**Technical Session**

Chair: **STEFAN BERNHARD**, *Chemistry, Princeton University*

**10:20 Invited: Efficient Energy Conversion Devices Based on Nanostructured Organic Thin Films**

**STEPHEN R. FORREST**, *Electrical Engineering and Computer Science, and Physics, Vice President for Research, University of Michigan*

**10:50 Re-engineering Polymer Electrolyte Membrane Fuel Cells for Simplified Robust Operation**

**JAY B. BENZIGER**, *Chemical Engineering, Princeton University*

**11:10 Invited: Organic Solid State Lighting: The Materials Opportunity**

**PAUL E. BURROWS**, *Principal, Reata Research*

**11:40 Solution-processed Active Materials for Thin-film Electronics**

**LYNN LOO**, *Chemical Engineering, Princeton University*

**Noon Lunch and Poster Session**

# UNIVERSITY–INDUSTRY **Research Symposium**

## AFTERNOON SESSION

- 1:40 Dean's Remarks**  
**H. VINCENT POOR**, *Dean, School of Engineering and Applied Science, Princeton University*
- Keynote Session**
- 1:45 Keynote: Electrical Energy Generation and Storage: Fuel Cells, Lithium Ion Batteries and SuperCaps**  
**HÉCTOR D. ABRUÑA**, *Co-director of the Cornell Fuel Cell Institute, Cornell University*
- Technical Session**  
Chair: **LYNN LOO**, *Chemical Engineering, Princeton University*
- 2:30 Bioinspired Catalysts for Water Oxidation: Photoelectrolysis of Water for Renewable Hydrogen Fuel Production**  
**G. CHARLES DISMUKES**, *Chemistry, Princeton University*
- 2:50 New High-performance Materials for Flexible Displays**  
**SIGURD WAGNER**, *Electrical Engineering, Princeton University*
- 3:10 Invited: Molecular Thermoelectrics: Potential for Inexpensive Power from Heat**  
**RACHEL SEGALMAN**, *Chemical Engineering, University of California-Berkeley*
- 3:40 Break (20 minutes)**
- 4:00 Invited: Ionic Liquids for Carbon Capture**  
**JOAN BRENNECKE**, *Chemical Engineering, University of Notre Dame*
- 4:30 Chemical Carbon Mitigation: Using Light to Convert Carbon Dioxide to a Value Added Product**  
**ANDREW B. BOCARSLY**, *Chemistry, Princeton University*
- 4:50 Efficient Transition Metal Catalysts for the Photogeneration of Hydrogen**  
**STEFAN BERNHARD**, *Chemistry, Princeton University*
- 5:10 Directed Evolution and Adaptation of Bacteria**  
**ROBERT H. AUSTIN**, *Physics, Princeton University*
- 5:30 Reception, Convocation Room, Friend 113**
- 6:00 Roundtable:**  
*Drivers for Venture Investment in Energy and Environment*  
Moderator: **GREGORY H. OLSEN**, *GHO Ventures, Princeton, NJ*  
**Convocation Room, Friend 113**

# UNIVERSITY–INDUSTRY **Research Symposium**

**Tuesday, March 18, 2008**

FRIEND CENTER AUDITORIUM, ROOM 101

**MORNING SESSION**

**PHOTONICS, SENSORS, NETWORKS**

**7:30 Check-in and Continental Breakfast**

**8:15 Directors' Welcome**

**CLAIRE F. GMACHL**, *Director, NSF-ERC on Mid-InfraRed Technologies for Health and the Environment (MIRTHE)*

**8:30 Keynote Session**

**Keynote: The DARPA Coherently Combined High-Power Intelligent Single Mode Emitters (COCHISE) Program: Progress in Scaling Diode Laser Power and Brightness**

**GEORGE W. TURNER**, *Group Leader, Electro-Optical Materials and Devices Group, MIT Lincoln Laboratory*

**Technical Session**

Chair: **CLAIRE F. GMACHL**, *Electrical Engineering, Princeton University*

**9:15 Quantum Cascade Laser Open-Path System for Trace Gas Analysis of the Urban Environment**

**ANNA P. MICHEL**, *MIRTHE and PRISM, Princeton University*

**9:35 Invited: Enhancing Security and Stability of Free-space Optical Communication Links Utilizing Mid-Infrared Quantum Cascade Lasers**

**RAINER MARTINI**, *Physics & Engineering Physics, Stevens Institute of Technology*

**9:55 Laser Spectroscopy from the Laboratory to the Stratosphere: New Instrumentation for Understanding Global Climate Change**

**MARK A. ZONDLO**, *Civil and Environmental Engineering, Princeton University*

**10:15 Break (25 minutes)**

**10:40 Search for Life in Extreme Environments**

**TULLIS ONSTOTT**, *Geosciences, Princeton University*

**11:10 Invited: II-VI Optoelectronics**

**MARIA C. TAMARGO**, *Chemistry, The City College of New York*

**11:30 Excited State Quantum Cascade Lasers and Lasing in K-Space**

**KALE J. FRANZ**, *Electrical Engineering, Princeton University and PRIMIS Technologies*

# UNIVERSITY–INDUSTRY **Research Symposium**

- 11:50** **Invited: Environmental Sensor Networks**  
**KATALIN SZLAVECZ**, *Earth and Planetary Science, The Johns Hopkins University*
- 12:10** **Lunch and Poster Session**
- AFTERNOON SESSION**
- 1:30** **Director's Welcome**  
**PAUL R. PRUCNAL**, *Director, Center for Networks Science and Applications (CNSA)*
- 1:45** **Keynote Session**  
**Keynote: Next Generation Network**  
**NICK SATOMI**, *Executive Vice-President, NEC America Laboratories*
- Technical Session**  
Chair: **PAUL R. PRUCNAL**, *Electrical Engineering, Princeton University*
- 2:30** **Sensor Networks, Coding Remote Sensing With Two Polarizations**  
**ROBERT CALDERBANK**, *Electrical Engineering, Princeton University*
- 2:50** **Break (30 minutes)**
- 3:10** **Network Security in OCDMA Network**  
**MABLE P. FOK**, *Electrical Engineering, Princeton University*
- 3:30** **Invited: Coverage Verification Without Location Information for Sensor Networks**  
**YIGAL BEJERANO**, *Technical Staff Member, Internet Management Research Department, Networking Research Lab, Bell Labs, Alcatel-Lucent*
- 4:00** **Multi-access Sensor Networks Based on Optical CDMA**  
**YANHUA DENG**, *Electrical Engineering, Princeton University*
- 4:20** **Nonlinear Recovery of Noise Hidden Signals at Low Levels Light**  
**JASON FLEISCHER**, *Electrical Engineering, Princeton University*
- 4:40** **Invited: Ultrafast Optical Information Processing for RF-Photonic and Sensing Applications**  
**ROB SAPERSTEIN**, *Research Staff Member, NEC America Laboratories*
- 5:10** **Adjourn**

# SPEAKERS

## JAMES C. STURM

*Director, Princeton Institute for the Science and Technology of Materials (PRISM)*

*Professor of Electrical Engineering, Princeton University*



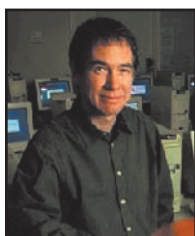
**J**ames C. Sturm joined the faculty of Princeton University in 1986, where he is currently a professor of Electrical Engineering and PRISM Director. He received the B.S.E. degree in electrical engineering and engineering physics from Princeton University, and the M.S.E.E and Ph.D. degrees from

Stanford University. Previous experience includes his work at Intel Corp. as microprocessor design engineer, as well as Siemens, Munich, Germany. In 1994-95, he was a von Humboldt Fellow at the Institut Fuer Halbleitertechnik at the University of Stuttgart, Germany. He has worked in the fields of silicon-based heterojunctions, three-dimensional integration, silicon-on-insulator, optical interconnects, TFT's, and organic light emitting diodes. Current research interests include silicon-germanium-carbon and related heterojunctions on silicon, SOI and 3-D integration, large-area electronics, flat panel displays, organic semiconductors, and the nanotechnology-biology interface. Prof. Sturm is a fellow of IEEE and a member of the American Physical Society, and the Materials Research Society. Formerly, he was a National Science Foundation Presidential Young Investigator. He has won ten awards for teaching excellence from both Princeton University and the Keck Foundation, and in 2004 received the President's Distinguished Teaching Award at Princeton.

## PAUL PRUCNAL

*Director, Center for Networks Science and Applications*

*Professor of Electrical Engineering, Princeton University*



**P**aul Prucnal received his A.B. from Bowdoin College, and the M.S., M.Phil. and Ph.D. from Columbia University. He joined Columbia's Electrical Engineering faculty in 1979, and was a member of the Columbia Radiation Laboratory, where he performed seminal work in the area of all-optical networks,

including optical code-division multiple access and self-routed photonic switching. In 1988, he joined Princeton University as Professor of Electrical Engineering, and founding Director of Princeton's Center for Photonics and Optoelectronic Materials. While at Princeton, he has also served as Visiting Professor at the University of Tokyo and the University of Parma, and as a consultant to government and private industry. He is widely known for his invention of the "Terahertz Optical Asymmetric Demultiplexer." Professor Prucnal has authored or co-authored some

250 journal articles/book chapters and holds 17 U.S. patents. He is editor of the book, *Optical Code Division Multiple Access: Fundamentals and Applications* (Taylor and Francis, 2006), and is an Area Editor of the *IEEE Transactions on Communications*. He served as the general chair of the OSA Topic Meeting on Photonics in Switching in 1999. Professor Prucnal is a Fellow of the Institute of Electrical and Electronics Engineers and the Optical Society of America, and is a member of Phi Beta Kappa, Eta Kappa and Sigma Xi. He received the Rudolf Kingslake Medal for his paper "Self-routing photonic switching with optically-processed control," and has been honored with Princeton's Engineering Council Award for Excellence in Teaching in 2005, the Graduate Mentoring Award in Engineering in 2006, and the Gold Medal from the Faculty of Mathematics, Physics and Informatics at the Comenius University in 2006.

## RICHARD A. REGISTER

*Director, Princeton Center for Complex Materials (PCCM)*

*Professor of Chemical Engineering, Princeton University*



**R**ichard A. Register is currently Professor of Chemical Engineering at Princeton University, and Director of the Princeton Center for Complex Materials, a broad-based Materials Research Science and Engineering Center funded by the National Science Foundation. He received a BS (1983, 1984) and MS (1985) degrees from MIT, and his Ph.D. from the University of Wisconsin (1989). His current

research interests revolve around micro- and nanostructured polymers, such as block copolymers, polymer blends, semicrystalline polymers, and ionomers. He has published over 130 peer-reviewed journal articles in the physics, synthesis, characterization, and applications of polymeric materials. A particular interest is in the design of self-assembling materials, where a desired mesoscale structure can be "built into" the molecule during synthesis to achieve robust control of material properties. He has been named a Fellow of the American Physical Society (2001), and received the Charles M.A. Stine Award from the AIChE's Materials Engineering and Sciences Division in 2002. He has also been named an NSF Young Investigator, a DuPont Young Professor, and the NEC Preceptor at Princeton. He chaired the APS's Division of Polymer Physics in 2004-2005, served as a Director of the AIChE's MESD (2004-2006), and was a Volume Organizer for the Materials Research Society's *MRS Bulletin* in 2007.

# SPEAKERS

## CLAIRE F. GMACHL

*Director, NSF-ERC on Mid-InfraRed Technologies for Health and the Environment*

*Professor of Electrical Engineering, Princeton University*



Claire F. Gmachl received the Ph.D. degree (sub auspiciis praesidentis) in electrical engineering from the Technical University of Vienna, Austria, in 1995. In 1996, she joined Bell Laboratories, Lucent Technologies, Murray Hill, NJ, as Post-Doctoral Member of Technical Staff to work on Quantum Cascade laser devices

and microcavity lasers. In March 1998, she became a Member of Technical Staff in the Semiconductor Physics Research Department and a Distinguished Member of Staff in 2002. In September 2003, Gmachl joined Princeton University as an Associate Professor in the Department of Electrical Engineering and adjunct faculty to PRISM; since July 2007 she is a Full Professor at Princeton University. Gmachl is the Director of MIRTHE, the NSF Engineering Research Center on Mid-InfraRed Technologies for Health and the Environment. Prof. Gmachl has authored and co-authored more than 170 publications, has given more than 100 presentations at conferences and seminars, and holds 26 patents. She is an Associate Editor for *Optics Express* and a member of the IEEE/LEOS Board of Governors. Prof. Gmachl is a 2005 MacArthur Fellow. She has won various awards and is a member of several professional societies.

## H. VINCENT POOR

*Dean of the School of Engineering and Applied Science, Princeton University*



Vincent Poor (Ph.D., Princeton, 1977) is the Dean of Engineering and Applied Science at Princeton University, where he is also the Michael Henry Strater University Professor of Electrical Engineering. From 1977 until he joined the Princeton faculty in 1990, he was a faculty member at the University of Illinois

at Urbana-Champaign. He has also held visiting appointments at a number of universities, including recently, Imperial College, Stanford and Harvard. His research interests are primarily in the areas of stochastic analysis and statistical signal processing, with applications in wireless networks, finance and related fields. Among his publications in these fields is the recent book *MIMO Wireless Communication* (Cambridge, 2007).

Dr. Poor is a member of the U.S. National Academy of Engineering, and is a Fellow of the American Academy of Arts & Sciences. He is also a Fellow of the IEEE, the Institute of Mathematical Statistics,

the Optical Society of America, and other scientific and technical organizations. He has served as the President of the IEEE Information Theory Society and as a member of the IEEE Board of Directors, and is currently Editor-in-Chief of the *IEEE Transactions on Information Theory*. Recent recognition of his work includes a Guggenheim Fellowship and the IEEE Education Medal.

## GREGORY H. OLSEN

*President, GHO Ventures*



Gregory H. Olsen was the third private citizen to orbit the earth on the International Space Station (ISS). After training for five months (900 hours) at the Yuri Gagarin Cosmonaut Training Center in Moscow, he launched on a Russian Soyuz rocket TMA-7 on Oct. 1, 2005, with Cosmonaut Valeri Tokarev

and Astronaut Bill McArthur (Expedition 12). He then docked to the ISS on Oct. 3, and returned to earth on Soyuz TMA-6 on Oct. 11 with Cosmonaut Sergei Krikalev and Astronaut John Phillips (Expedition 11). He performed more than 150 orbits of the earth and logged almost 4 million miles of weightless travel during his 10 days in space.

Greg is now president of GHO Ventures in Princeton, where he manages his “angel” investments, South African winery, Montana ranch, and performs numerous speaking engagements to encourage children—especially minorities and females—to consider careers in science and engineering. He is active in the New Jersey Technology Counsel (NJTC), NJTC Venture Fund, Institute of Electrical and Electronics Engineers (IEEE) and the NJ Commission on Science and Technology.

Greg received a BS Physics (1966), a BSEE and MS Physics (1968) from Fairleigh Dickinson University, then was awarded a Ph.D. in Materials Science from the University of Virginia (1971). He performed post-doctoral studies at the University of Port Elizabeth (South Africa), taught elementary physics classes, and then worked as a research scientist at RCA Labs (Sarnoff Center) from 1972 to 1983. He developed vapor phase epitaxial crystal growth of optoelectronic devices, including laser diodes and photodetectors for fiber optic applications based on the material indium gallium arsenide (InGaAs). He was awarded 12 patents, wrote more than 100 technical papers, co-authored several book chapters, and has given numerous invited lectures to both technical and trade journal audiences. Greg is an IEEE LEOS Fellow and the first recipient of the prestigious IEEE Aron Kressel Award.

Greg founded EPITAXX, a fiber-optic detector manufacturer in 1984 together with Vladimir Ban. It was sold in 1990 for \$12 million. He then founded Sensors Unlimited, a near-infrared camera manufacturer in 1992 with Marshall Cohen. Sensors was sold to Finisar Corp. for \$600 million in 2000, repurchased by the management team in 2002 for \$6 million, then sold again to Goodrich Corp. in 2005 for \$60 million.

# SPEAKERS — KEYNOTES

## BRIAN P. FLANNERY

*Science, Strategy and Programs Manager, Safety, Health & Environment Department, ExxonMobil Corporation*

### **Managing Climate Risks: The Role of Innovative Technologies**



**B**rian P. Flannery is Science, Strategy and Programs Manager in the Safety, Health and Environment Department, Exxon Mobil Corporation. Before joining Exxon, Dr. Flannery received degrees from Princeton (AB) and University of California Santa Cruz (Ph.D.) in astrophysics. He pursued postdoctoral

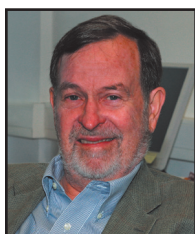
research in astrophysics at The Institute for Advanced Study, and later as a professor at Harvard University. After joining Exxon in 1980, he spent eighteen years at Corporate Research in research, supervisory, and management roles involving theoretical science, mathematical modeling, and the environment. Flannery is co-author of the widely used reference *Numerical Recipes: the Art of Scientific Computing*.

Since joining ExxonMobil, he has conducted and sponsored research and organized international workshops and symposia dealing with scientific, technical, economic, and policy related aspects of global climate change. Dr. Flannery has served on numerous editorial boards and scientific and governmental advisory panels, and has been involved on behalf of business and industry in national and international forums that address global climate change. He is a lead author in Working Group III of the Intergovernmental Panel on Climate Change, Vice Chair of the Environment and Energy Commission of the International Chamber of Commerce, and Co-chair of the International Energy Committee of the United States Council for International Business. Dr. Flannery played a leadership role in the creation of the Global Climate and Energy Project at Stanford University and is a member of the Advisory Committee to the School of Engineering at Stanford.

## THOMAS J. MEYER

*Professor of Chemistry, University of North Carolina, Chapel Hill*

### **Our Energy Future: Science and Technology Challenges for the 21st Century**



**T**homas J. Meyer rejoined the faculty of the University of North Carolina at Chapel Hill as Arey Professor of Chemistry on July 1, 2005. In 2000 he was named Associate Director for Strategic Research at the Los Alamos National Laboratory in New Mexico. From 1994 to 1999, he was Vice Chancellor for Graduate Studies and Research and Kenan Professor of Chemistry at UNC.

At Los Alamos, Meyer was responsible for the oversight and management of a large part of the R&D portfolio, including research

in support of the Laboratory's nuclear weapons, threat reduction, and energy and environment missions.

At LANL, he oversaw industrial interactions and economic development, intellectual property, educational programs, the Energy and Environment Council, and LANL program offices in Science, Energy and Environment, and Nuclear Technology and Applications. At UNC, he oversaw a graduate and professional student program of over 8,000 students and a research portfolio of more than \$300 million. He led planning efforts that resulted in campus-wide initiatives in genomics and bioinformatics, Arts Carolina, enhanced graduate student support from the State of North Carolina, and through a bond issue, for the science complex and other campus construction projects.

Meyer was a NATO postdoctoral fellow at University College, London in 1967, joined the faculty at UNC in 1968, was promoted to Associate Professor in 1972, Full Professor in 1975, Smith Professor in 1982 and Kenan Professor in 1987. He was the Head of Chemistry from 1985 to 1990, Chair of the Curriculum in Applied Sciences from 1994 to 1997, and Vice Chancellor/Vice Provost for Graduate Studies and Research from 1994 to 1999. He served on the North Carolina Board of Science and Technology, the Executive Committees of the North Carolina Biotechnology Center, the Research Triangle Institute, and the Triangle University Center for Advanced Study Inc., and on the Board of Associated Universities Inc. He has served on the Boards of the Mind Institute, the International Informatics Society, the National Center for Genome Research, the Coronado Ventures Forum, the Science and Technology External Advisory Board of Sandia National Laboratory and the Commission on Higher Education for the State of New Mexico.

Meyer is a member of the National Academy of Sciences and the American Academy of Arts and Sciences. He has won many awards for his research in chemistry and was awarded the Order of the Long Leaf Pine for service to the State of North Carolina. Meyer received his bachelor's degree and doctorate in chemistry from Ohio University and Stanford University, respectively. He has published over 560 papers, holds three patents and is one of the most highly cited chemists in the world.

## NICK SATOMI

*Executive Vice-President, NEC America Laboratories*

### **Next Generation Network**



**N**ick Satomi graduated from WASEDA University, Japan in 1975. He entered NEC Corporation in 1975. Satomi transferred to NEC America, Fairfax, Va., to work from 1982 to 1987. He transferred to NEC Laboratories America, Princeton, as Executive VP in 2005. Satomi was assigned as VP with NEC Corporation of America, NYC, since 2007.

# SPEAKERS — KEYNOTES

## GEORGE W. TURNER

*Group Leader, Electro-Optical Materials and Devices Group, MIT Lincoln Laboratory*

### **The DARPA Coherently Combined High-Power Intelligent Single Mode Emitters (COCHISE) Program: Progress in Scaling Diode Laser Power and Brightness**



**G**eorge Turner is the Group Leader of Group 83, the Electro-Optical Materials and Devices Group at MIT Lincoln Laboratory. In this position, he is responsible for a vertically integrated group of ~50 people engaged in a number of research and development efforts involving semiconductor epitaxial materials,

device design, fabrication and packaging and the resultant demonstration of many different classes of advanced electro-optical devices. The Group's activities include the development of high-power diode laser arrays, VCSEL arrays, mid-infrared lasers, quantum cascade lasers and avalanche photodiodes. Dr. Turner received the Ph.D. in Electrical Engineering from the Johns Hopkins University in 1979. He joined Lincoln Laboratory directly after completing his Ph.D.. Dr. Turner has authored or co-authored several book chapters, over 125 technical publications and holds four U.S. patents.

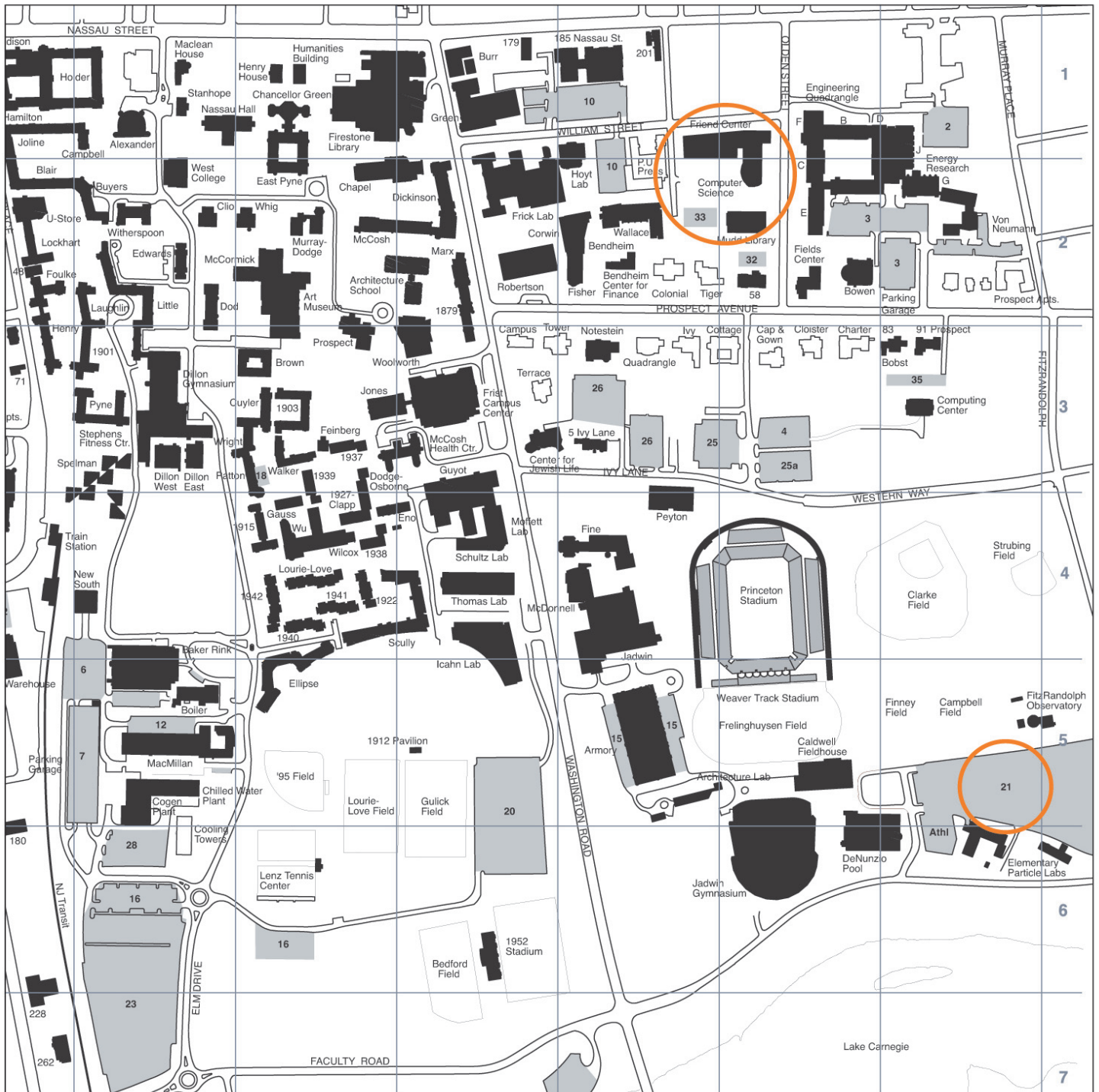
## HÉCTOR ABRUÑA

*Co-director of the Cornell Fuel Cell Institute, Cornell University*

### **Electrical Energy Generation and Storage: Fuel Cells, Lithium Ion Batteries and Supercaps**



**H**éctor Abruña, Emile M. Chamot Professor and Chair of Chemistry and Chemical Biology, completed his graduate studies with Royce W. Murray and Thomas J. Meyer at the University of North Carolina at Chapel Hill in 1980, and was a postdoctoral research associate with Allen J. Bard at the University of Texas at Austin. After a brief stay at the University of Puerto Rico, he arrived at Cornell in 1983. Professor Abruña is an AAAS Fellow and recipient of a Presidential Young Investigator Award, an Alfred P. Sloan Foundation Research Fellowship, a John S. Guggenheim Fellowship, the Tajima Prize of the International Society of Electrochemistry, a J.W. Fulbright Senior Research Fellowship and an Iberdrola Fellowship.



**MEETING LOCATION**

All sessions will be held in the Friend Center for Engineering Education on Olden and William streets (see map, top right). Keynote and technical sessions will be held in the Friend Center Large Auditorium, Room 101.

**LUNCH & POSTER SESSION**

Lunch on both days will be held in the Friend Convocation Room 113. The poster session will be held in the Friend Center Atrium on Monday and Tuesday afternoons.

**RECEPTION & VENTURE ROUNDTABLE**

The March 17 evening reception and the venture roundtable will be held in the Friend Center Convocation Room 113.

**CONFERENCE PARKING**

Event parking (see map, bottom right) is located in lot #21 off Faculty Drive at Fitzrandolph Road. Shuttle service to the Friend Center runs approximately every 15 minutes. Door-to-door transit time is approximately 10 minutes, so please plan accordingly. For early arrivals, long-term meter (quarters only) parking may be available on Princeton streets: on William Street, and on Olden Street (between William Street and Prospect Avenue), as well as Prospect Avenue. Please be sure to use the long-term (10-hour) meters as overtime and illegal parking is strictly enforced by the municipality.



# PRISM

PRINCETON INSTITUTE FOR THE SCIENCE  
AND TECHNOLOGY OF MATERIALS

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**JOSEPH X. MONTEMARANO**

PRISM Director for Industrial Enterprise

MIRTHE Managing Director/Industrial Liaison

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**FOR ADDITIONAL INFORMATION,  
PLEASE VISIT US ONLINE:**

PRISM: [www.prism.princeton.edu](http://www.prism.princeton.edu)

PCCM: [www.princeton.edu/~pccm](http://www.princeton.edu/~pccm)

MIRTHE: [www.mirthecenter.org](http://www.mirthecenter.org)