May 14, 2015 Conference

Mackenzie Room
Jen-Hsun Huang Engineering Center
Stanford University
Welcome to the kick-off conference for Stanford Energy 3.0, the Stanford affiliates program focused on pioneering the future of energy. Stanford Energy 3.0 is the successor to the Energy and Environment Affiliates Program (EEAP). In the months ahead, we will be transitioning existing members from EEAP to Stanford Energy 3.0, as well as welcoming new members. Stanford Energy 3.0 is Stanford’s central link to industry related to energy technologies and sustainability. The program will connect industry people with Stanford University faculty and students engaged in cutting-edge energy research. Stanford Energy 3.0 will build a relationship customized to each member’s needs.

The annual spring conference is a signature event for Stanford Energy 3.0. We also have additional events planned over the course of the year, including conferences, focused group meetings, new faculty seminars, and customized meetings with faculty. This inaugural spring conference will present innovative state-of-the art technologies from both industry leaders and Stanford faculty and students across a broad spectrum of energy areas, including solar, batteries, renewable fuels, energy efficiency, smart grid and sensing technologies. In addition to the speakers, there will be a student poster session highlighting their latest research results.

The energy industry is adapting to tremendous changes in the last year as the oil market has evolved. These changes provide unique opportunities and challenges. Stanford Energy 3.0 offers a vehicle for industry to partner with Stanford to adapt to these changes by accelerating energy innovation. Each member gains access to people and research across the entire Stanford campus, and Stanford faculty and students benefit from valuable perspectives on real-world opportunities. We look forward to working with you to create the future.

Best Regards,

Jim KW Chen  
Managing Director  
Stanford Energy 3.0

Paul McIntyre  
Faculty Co-Director  
Stanford Energy 3.0

Fritz Prinz  
Faculty Co-Director  
Stanford Energy 3.0
2015 CONFERENCE AGENDA

Thursday, May 14, 2015

8:00 – 9:00 am  Registration and breakfast

9:00 – 9:25 am  Welcome and introduction of Stanford Energy 3.0 program

Paul McIntyre, Co-Director, Stanford Energy 3.0, Professor and Department Chair, Materials Science and Engineering

Keynote Industry Speaker

9:25 – 10:00 am  Homer Antoniadis, Global Technology Director, DuPont Photovoltaic Solutions, PV Technology Development and Innovation at DuPont

Energy Applications

Moderator: Paul McIntyre, Co-Director, Energy 3.0, Professor and Department Chair, Materials Science and Engineering

10:00 – 10:35 am  Tom Jaramillo, Associate Professor, Chemical Engineering, Producing Renewable Fuels and Chemicals from CO₂ and H₂O

10:35 – 10:50 am  Coffee break

Moderator: Arun Majumdar, Professor, Mechanical Engineering

10:50 – 11:25 am  Shanhui Fan, Professor, Electrical Engineering, Controlling Thermal Radiation for Energy Applications

11:25 am – 12:00 noon  Juan Rivas, Assistant Professor, Electrical Engineering, Emerging Applications in Power Electronics

12:00 – 1:30 pm  Lunch and poster viewing

1:30 – 1:35 pm  Welcome back

Fritz Prinz, Co-Director, Stanford Energy 3.0, Professor, Materials Science and Engineering and Mechanical Engineering

Keynote Industry Speaker

1:35 – 2:10 pm  Ray Wood, Managing Director, US Power and Renewables, Bank of America, Clean Energy Capital Formation-The Market’s Perspective

Energy Technologies

2:10 – 2:45 pm  William Chueh, Assistant Professor, Materials Science and Engineering, Paradigm-Shifting Materials Insights for Solar Fuels and Energy Storage

2:45 – 3:20 pm  Debbie Senesky, Assistant Professor, Aeronautics and Astronautics, Robust Sensing Technology for Energy Applications

3:20 – 3:35 pm  Coffee break

Solar Industry and the Electric Grid

Moderator: Sally Benson, Director, Precourt Institute for Energy, Professor, Energy Resources Engineering

3:35 – 4:10 pm  Stefan Reichelstein, Professor, Graduate School of Business, Prospects for the Solar PV Industry

4:10 – 4:45 pm  Ram Rajagopal, Assistant Professor, Civil and Environmental Engineering, Smart Grid Technologies and Demand Side Management

4:45 – 5:00 pm  Wrap up, Sally Benson, Director, Precourt Institute for Energy, Professor, Energy Resources Engineering
Homer Antoniadis  
*Global Technology Director, DuPont Photovoltaic Solutions*

Homer Antoniadis is responsible for DuPont Photovoltaic (PV) Solutions global technology and for accelerating the introduction of next-generation DuPont materials and offerings into the solar energy market. He joined DuPont in 2011 with the acquisition of Innovalight, Inc., where he was chief technology officer and vice president of engineering. Prior to Innovalight, his 20-year career included positions with Osram Opto Semiconductors, Hewlett-Packard Labs and Xerox. Widely recognized in the PV industry, he regularly serves as a lecturer and conference chair at leading industry events. Antoniadis has more than 60 publications in crystalline and amorphous silicon photovoltaics, OLEDs, and polymer materials and has 25 issued U.S. patents. He earned a B.S. in physics from Ioannina University in Greece and his Ph.D. and M.S. in physics from Syracuse University.

Sally Benson  
*Director, Global Climate and Energy Project, Director, Precourt Institute for Energy, Professor, Energy Resources Engineering*

A groundwater hydrologist and reservoir engineer, Benson has conducted research on a range of issues related to energy and the environment, including techniques to reduce greenhouse gas emissions by capturing CO₂ from power plants and pumping it underground for permanent sequestration. Benson’s research interests also include technologies and energy systems for a low-carbon future, groundwater quality and remediation, and geotechnical instrumentation for subsurface characterization and monitoring. Benson was also a coordinating lead author on the 2005 Intergovernmental Panel on Climate Change (IPCC) Special Report on Carbon Dioxide Capture and Storage. Benson earned a bachelor’s degree in geology from Barnard College at Columbia University, and a master’s and Ph.D. in materials science and mineral engineering from UC-Berkeley.

Jim Chen  
*Managing Director, Stanford Energy 3.0*

Jim Chen is responsible for developing and managing Stanford Energy 3.0 engagements for corporations and other organizations that have an interest in Stanford’s research, faculty, and graduate students in energy and energy-related areas. He has a broad background in energy and technology, specializing in technology and product development. He has held technical positions at Lawrence Berkeley Labs, GTE Labs, and AT&T Bell Labs, and technology executive positions at both start-ups and Fortune 500 companies, including FormFactor and Eaton. He received his PhD degree from MIT and his MS degree from the University of California, Berkeley both in materials science and engineering, and his BS degree from the University of California, Berkeley in electrical engineering.

William Chueh  
*Assistant Professor, Materials Science and Engineering*

William Chueh received his B.S. in Applied Physics and M.S. and Ph.D. (2010) in Material Science from Caltech. Prior to joining Stanford in 2012, he was a Distinguished Truman Fellow at Sandia National Laboratories. Chueh has received numerous honors, including the Caltech Demetriades-Tsafak-Kokkalis Prize in Energy (2012), the Josephine de Karmen Fellowship (2009), and the American Ceramics Society Diamond Award (2008). The Chueh group explores efficient electrochemical routes for converting solar energy to chemical fuels and subsequently to electricity. The group also develops next-generation electrochemical energy storage materials. The group takes a rational approach towards materials discovery and optimization. Technology Review has recently named Chueh to its annual TR35 list honoring the year’s top young innovators. He is recognized for developing a technology of using heat that is otherwise wasted to boost the efficiency of solar fuel production.

Shanhui Fan  
*Professor, Electrical Engineering*

Professor Fan’s group performs research on the theory and simulation of photonic solid state materials and devices for telecom and information technology applications. Particular areas of interest include photonic bandgap materials, nanoscale photonic devices and metamaterials. The Fan group is exploring the use of dynamic photonic structures for the storage of light for data buffering applications and modeling magneto-optic materials for storage applications. Dr. Fan’s group has collaborated with the Solgaard group on tunable filters based upon photonic bandgap crystals. In collaboration with the Kahn group, they are exploring the use of adaptive optics to achieve high data rate transmission in multi-mode fibers. Dr. Fan’s group is also exploring the use of dynamic photonic structures for stopping, storage, and time reversal of light for packet buffering in all optical switches. Fan received his Ph.D. in Physics from the Massachusetts Institute of Technology.
SPEAKERS AND MODERATORS, CONTINUED

Tom Jaramilloy
Associate Professor, Chemical Engineering

Originally from San Juan, Puerto Rico, Jaramillo came to Stanford University to pursue his B.S. in Chemical Engineering. Jaramillo then continued his education at the University of California at Santa Barbara, earning his M.S. and Ph.D. in Chemical Engineering. Jaramillo then conducted post-doctoral research at the Technical University of Denmark in the Department of Physics, as a Hans Christian Ørsted Post-doctoral Fellow. Jaramillo returned to Stanford in fall 2007 to start his independent research career, where he has won a number of awards for his research efforts, including the National Science Foundation (NSF) CAREER Award (2011), Mohr-Davidow Ventures MDV Innovator Award (2009), the Hellman Faculty Scholar Award (2009), and the NSF BRIGE Award. He is Deputy Director for the SUNCAT Center for Interface Science and Catalysis.

Arun Majumdar
Professor, Mechanical Engineering

Arun Majumdar is the Jay Precourt Professor at Stanford University, where he serves on the faculty of the Department of Mechanical Engineering and is a Senior Fellow of the Precourt Institute for Energy. Prior to joining Stanford, he was the Vice President for Energy at Google, where he created several energy technology initiatives and advised the company on its broader energy strategy. He continues to be a consultant to Google on energy. In October 2009, Dr. Majumdar was nominated by President Obama and confirmed by the Senate to become the Founding Director of the Advanced Research Projects Agency - Energy (ARPA-E), where he served till June 2012. He received his bachelor’s degree in Mechanical Engineering at the Indian Institute of Technology, Bombay in 1985 and his Ph.D. from the University of California, Berkeley in 1989.

Paul McIntyre
Professor, and Department Chair, Materials Science and Engineering

Paul McIntyre is a senior fellow at the Precourt Institute for Energy and faculty co-director of Stanford Energy 3.0. McIntyre leads a research team of graduate students, postdoctoral researchers, visiting scientists and consulting professors who perform basic research on nanostructured inorganic materials for applications in electronics and energy technologies. His work focuses on metal oxide/semiconductor interfaces, ultrathin metal oxide films, atomic layer deposition and semiconductor nanowires. His research team synthesizes materials, characterizes their structures and compositions with a variety of advanced microscopies and spectroscopies, studies the passivation of their interfaces, and measures functional properties of devices. Their research is supported by several U.S. government agencies and major semiconductor manufacturers. McIntyre holds eight U.S. patents and has received two IBM Faculty Awards, a Charles Lee Powell Foundation Faculty Scholarship and an SRC Inventor Recognition award. He received a Sc.D. from MIT.

Fritz Prinz
Finmeccanica Professor in the School of Engineering at Stanford University, Professor of Materials Science and Engineering, Professor of Mechanical Engineering

Professor Prinz is a senior fellow at the Precourt Institute for Energy and faculty co-director of Stanford Energy 3.0. Prinz obtained his Ph.D. in Physics at the University of Vienna, Austria. Prof. Prinz’s current work focuses on scaling effects and quantum confinement phenomena for energy conversion. He leads a research team of approximately twenty-five graduate students, visiting scientists and consulting professors who study mass transport phenomena across thin membranes such as oxide films and lipid bi-layers. In their research, the Prinz group employs Scanning Probe Microscopy, Impedance Spectroscopy, and Quantum Modeling. In his laboratory, prototype fuel cells, solar cells, and batteries serve to test new concepts and novel material structures.

Ram Rajagopal
Assistant Professor, Civil and Environmental Engineering

Professor Rajagopal leads a laboratory for creating sustainable engineering systems, with renewable energy systems as one of the main focus areas. He received his Ph.D. in electrical engineering and computer sciences and master’s degree in statistics from the University of California, Berkeley. He has specialized in creating and deploying large sensing systems, and using the generated data together with novel statistical algorithms and stochastic control to achieve sustainable transportation, energy, and infrastructure networks.
SPEAKERS AND MODERATORS, CONTINUED

Stefan Reichelstein  
*Professor, Graduate School of Business*

Stefan Reichelstein received his Ph.D. from the Kellogg School of Management at Northwestern University in 1984. Prior to that, he completed his undergraduate studies in economics at the University of Bonn in Germany. Over the past 30 years, Reichelstein has served on the faculties of the Haas School of Business at UC Berkeley, the University of Vienna in Austria, and the Stanford Graduate School of Business. His teaching has spanned financial and managerial accounting courses offered to undergraduate, MBA, and doctoral students. In recent years, he has introduced new courses on Sustainability and Clean Energy at the Stanford Business School. Reichelstein’s research has been supported by the National Science Foundation and a range of private foundations.

Juan Rivas-Davila  
*Assistant Professor, Electrical Engineering*

Juan Rivas came to Stanford as an assistant professor in January 2014. He previously was an assistant professor in Electrical Engineering at the University of Michigan. Before becoming a faculty member in 2011, he worked for the General Electric Global Research Center developing power electronics for medical imaging and aviation systems. He received the B.Sc. degree in electrical engineering from the Monterrey Institute of Technology (Mexico) in 1998. He obtained his masters (2003) and doctoral degree (2006) at the Massachusetts Institute of Technology. His research interests are in power electronics, RF power amplifiers, resonant converters, soft switching topologies and design of power converters for operation in harsh environments.

Debbie Senesky  
*Assistant Professor, Aeronautics and Astronautics*

Debbie G. Senesky received the Ph.D. degree in mechanical engineering from the University of California, Berkeley, in 2007. From 2007 to 2008, she was a Design Engineer for GE Sensing (formerly known as NovaSensor) developing sensors for healthcare and automotive applications. From 2008 to 2012, she was a postdoctoral researcher at the Berkeley Sensor and Actuator Center developing silicon carbide (SiC) sensing technology for extreme harsh environments. Her laboratory (EXtreme Environment Microsystems Laboratory, XLab) is researching the synthesis of temperature tolerant, chemically resistant, and radiation-hardened wide bandgap semiconductor thin films and nanostructures. These new material sets serve as a platform for the realization of sensor, actuator, and electronic components that can operate and collect data under the most hostile conditions. More specifically, smart and adaptable structures for extreme environments are enabled through the technology developed in her laboratory.

Ray Wood  
*Managing Director, US Power and Renewables, Bank of America*

Ray Wood serves as Managing Director and Co-Head of The Global Alternative Energy Group at Credit Suisse Group AG and U.S. Power Group. Mr. Wood is working with several clients on anticipated and pending initial public offerings globally across the following sectors: wind manufacturing and development, smart grid and transportation. In addition, Mr. Wood has led several structured Wind financings for NextEra, formally known as FPL (Florida Power & Light Company). Over Mr. Wood’s 20-year career, he has assisted clients on noteworthy strategic transactions and financing. He has transaction expertise across the spectrum of mergers and acquisitions, initial public offerings, leveraged finance, structured finance, commodities and privatizations. He received an M.B.A. from the Massachusetts Institute of Technology’s Sloan School of Management and a B.A. from Dartmouth College.
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