



# GCEP Research Symposium

## *New Research Directions in a Rapidly Evolving Global Energy Landscape*



September 30 - October 2, 2009  
*Frances C. Arrillaga Alumni Center*  
 STANFORD UNIVERSITY

### Wednesday, September 30

8:00 – 8:30	<b>CONTINENTAL BREAKFAST</b>	
<b>8:30 – 9:40</b>	<b>Introduction and Keynotes</b>	
8:30	GCEP Welcome	Sally Benson, <i>Stanford</i>
8:40	Keynote Address – Report from the America's Energy Future panel at the National Academy of Sciences	Mark Wrighton, <i>Washington University in St Louis</i>
<b>9:40–11:55</b>	<b>Perspectives on the Need for Innovative and Transformative Energy Research in the Current Global Environment</b>	<b>Chair: Sally Benson</b>
9:40	Accelerating Energy Innovations - What is Important and What is Not	John Deutch, <i>MIT</i>
10:15– 10:45	<b>BREAK</b>	
10:45	Technological Innovation: The Cornerstone of Value	Jeff Keller, <i>GE</i>
11:20	Basic Research Needs in Solar Energy Utilization	Nate Lewis, <i>Caltech</i>
11:55 – 1:00	<b>LUNCH</b>	
<b>1:00 – 5:30</b>	<b>Highlights and Future Directions for Innovative Energy Research</b>	<b>Chair: Lynn Orr</b>
1:00	Advanced Batteries	Yi Cui, <i>Stanford</i>
1:40	Biofuels from Bacteria	Chaitan Khosla, <i>Stanford</i>
2:20	Advanced Combustion	Chris Edwards, <i>Stanford</i>
3:05 – 3:35	<b>BREAK</b>	
3:35	Electricity Infrastructure	Kevin Tomsovic, <i>U Tennessee</i>
4:15	Results from America's Energy Future Panel on Liquid Transportation Fuels from Coal and Biomass	Michael P. Ramage, <i>ExxonMobil Research and Engineering Company (retired)</i> , Jim Sweeney, <i>Stanford</i>
5:30	<b>ADJOURN</b>	
<b>5:30 – 6:45</b>	<b>Reception</b>	



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**Thursday, October 1**

8:00 – 8:30 **CONTINENTAL BREAKFAST**

<b>8:30 – 9:00</b>	<b>Renewable Energy Analysis</b>	<b>Chair: Sally Benson</b>
8:30	Insights and Opportunities: Technologies, Policies and Markets for Clean Energy Solutions	Doug Arent, <i>NREL</i>
<b>9:00 – 12:00</b>	<b>Biofuels and Bioenergy Conversion</b>	<b>Chair: Chris Field</b>
9:00	Biomass Energy: the Climate-Protective Domain	David Lobell, <i>Stanford</i>
9:30	Assembly of a Lignin Modification Toolbox	Clint Chapple, <i>Purdue University</i>
10:30	Biofuels and Bioenergy Conversion Poster Session	
12:00 – 1:30	<b>LUNCH</b>	
<b>1:30 – 5:00</b>	<b>Carbon Capture and Storage</b>	<b>Chair: Sally Benson</b>
1:30	A Strategy for Exploiting Unconventional Gas Resources Incorporating CO <sub>2</sub> Sequestration	Mark Zoback, <i>Stanford</i>
2:00	Controlled Freeze Zone™ Technology: An Integrated Solution for Processing Sour Natural Gas	Chuck Mart, <i>ExxonMobil</i>
2:30	Geological Sequestration of CO <sub>2</sub> - An Exploratory Study of the Mechanisms and Kinetics of CO <sub>2</sub> Reaction with Mg-Silicates	Gordon Brown, <i>Stanford</i>
3:00	Collaborative Research on Carbon Sequestration in Saline Aquifers in China	Kristian Jessen, <i>University of Southern California</i>
3:30	Carbon Capture and Storage Poster Session	
5:00	<b>ADJOURN</b>	



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### Friday, October 2

8:00 – 8:30 **CONTINENTAL BREAKFAST**

**8:30 – 9:00 Global Exergy Analysis Chair: Sally Benson**

8:30 Exergy and Carbon Flow in Natural and Human Systems Richard Sassoon, *Stanford*

**9:00 – 12:00 Solar Energy Chair: Nate Lewis**

9:00 Plasmonic Photovoltaics Mark Brongersma, *Stanford*

9:30 Photo-electric Enhancement of Thermionic Emission Nick Melosh, *Stanford*

10:00 Ultra-High Efficiency Thermo-Photovoltaic Cells Using Metallic Photonic Crystals as Intermediate Absorber and Emitter Shanhui Fan, *Stanford*

10:30 Solar Energy Poster Session

12:00 – 1:15 **LUNCH**

**1:15 – 5:00 Advanced Energy Transformations and Storage Chair: Chris Chidsey**

1:15 Metal Oxide Nanotubes and Photo-Excitation Effects: New Approaches for Low Temperature Solid Oxide Fuel Cells to Enable Low GWG-Emission Transportation Paul McIntyre, *Stanford*

1:45 Nano-structured MoS<sub>2</sub> and WS<sub>2</sub> for the Solar Production of Hydrogen Tom Jaramillo, *Stanford*

2:15 High Capacity Molecular Hydrogen Storage in Novel Crystalline Solids Wendy Mao, *Stanford*

2:45 The Electron Economy: Oxidation Catalysis for Energy Management Bob Waymouth, *Stanford*

3:15 Advanced Energy Transformations and Storage Poster Session

5:00 **ADJOURN**