OSA Incubator on the Fundamental Limits of Optical Energy Conversion

12-14 November
OSA Headquarters ● 2010 Massachusetts Ave. NW ● Washington, DC, USA

HOSTED BY:
Svetlana V. Boriskina, Massachusetts Institute of Technology; Vivian Ferry, University of Minnesota; Alexander V. Kildishev, Purdue University; Jurgen Michel, Massachusetts Institute of Technology; Jonathan Tong, Massachusetts Institute of Technology

AGENDA

Wednesday, 12 November 2014

Afternoon  Arrival/Hotel Check-in
Hotel Palomar, 2121 P St., NW
18:00  Welcome Dinner
Ezme, 2016 P St., NW

Thursday, 13 November 2014

8:00  Breakfast
OSA Headquarters, 2010 Massachusetts Ave., NW
8:30  Welcome
Alison Taylor, The Optical Society, USA
8:45  Overview of the Goals of the Incubator
Svetlana V. Boriskina, Massachusetts Institute of Technology, USA
9:00  The Opto-Electronic Physics Which Broke the Efficiency Record in Solar Cells
Eli Yablonovitch, University of California at Berkeley, USA (Keynote talk)
9:30  Session 1: Breaking the Limits (Chair: Jurgen Michel)
- Enhanced Photon Recycling in III-V Multi-junction Solar Cells
  Myles Steiner, National Renewable Energy Laboratory, USA
- Towards 3rd Generation Solar Cells Based on the Plasmonic Hot Electron Protection
  Krzysztof Kempa, Boston College, USA
- Nanoscale Optical Tomography with Cathodoluminescence Spectroscopy
  Ashwin Atre, Stanford University, USA
Session Discussion
Thursday, 13 November 2014, continued

10:30  Poster session & Coffee break

10:50  **Session 2: Think Small (Chair: Alexander V. Kildishev)**

2D Materials for Photon Conversion: Limits and Applications  
*Volker Sorger, George Washington University, USA*

Nanoscale Optics and the Shockley-Queisser Limit  
*Jeremy Munday, University of Maryland, USA*

Quantum Confined Semiconductor Nanocrystals for use in High Efficiency – Low Cost Solar Energy Conversion Strategies  
*Matthew Beard, National Renewable Energy Laboratory, USA*

Spectrum Splitting Metasurfaces and Narrow-band Plasmonic Absorbers  
*Koray Aydin, Northwestern University, USA*

Engineering Nano Optical Resonator for Light Absorption and Thermal Emission  
*Zongfu Yu, University of Wisconsin-Madison, USA*

Session Discussion

12:20  Poster Session & Lunch, provided

13:20  **Session 3: Designer Materials & Fabrication Techniques (Chair: Vivian Ferry)**

Enabling Nanophotonics, Data Storage and Energy Conversion with New Plasmonic Materials  
*Vladimir Shalaev, Purdue University, USA*

Nanomaterials for Solar Energy Conversion - Mixing Excitons and Surface Plasmons  
*Jao van de Lagemaat, National Renewable Energy Laboratory, USA*

High-Bandgap III-Phosphide Cells for High-Efficiency Solar Energy Conversion  
*Minjoo Larry Lee, Yale University, USA*

Light Trapping in Colloidal Quantum Dot Photovoltaics  
*Susanna Thon, Johns Hopkins University, USA*

Nanomembranes and Soft Fabrication Methods for High Performance, Low Cost Energy Technologies  
*Ralph G. Nuzzo, University of Illinois at Urbana-Champaign, USA*

Session Discussion
Thursday, 13 November 2014, continued

14:50  Poster Session & Coffee Break

15:10  Session 4: Alternative Materials & Concepts (Chair: Jonathan Tong)

Photothermal Effects, Hot Plasmonic Electrons and Plasmonic Photochemistry in Hybrid Nanostructures
   Alexander Govorov, Ohio University, USA

Breaking the Space Charge Limit in Organic Solar Cells by a Novel Plasmonic-Electrical Concept
   Wallace Choy, The University of Hong Kong, China

Balancing Spectral Light Harvesting in Solution-Processed Solar Cells with Plasmonic Nanoparticles
   Matthew Klug, Massachusetts Institute of Technology, USA

Diamond Based Solar Thermionic Energy Converters
   Martin Cryan, Bristol University, UK

Probing the Limits of Non-Isothermal Conversion: Material Challenges to Reaching High Efficiency in Hot-Carrier Energy Converters
   Svetlana V. Boriskina, Massachusetts Institute of Technology, USA

Session Discussion

16:40  Thermodynamics and Heat Transfer of Thermal Radiation
   Gang Chen, Massachusetts Institute of Technology, USA (Keynote talk)

17:10  Panel & Discussion
   Moderator: Svetlana V. Boriskina, Massachusetts Institute of Technology, USA
   Panelists: Howard Branz, Advanced Research Projects Agency – Energy, USA
             Lenny Tinker, Department of Energy, SunShot Initiative, USA
             Michael Haney, Advanced Research Projects Agency – Energy, USA

18:30  Dinner
   The Mad Hatter DC, 1319 Connecticut Ave., NW
Friday, 14 November 2014

8:00  Breakfast
     OSA Headquarters, 2010 Massachusetts Ave., NW

8:30  Nanophotonic Control of Thermal Radiation to Enable New Energy Applications
     Shanhui Fan, Stanford University, USA (Keynote talk)

9:00  Session 5: Heat is the New Light (Chair: Svetlana V. Boriskina)
     Nanophotonics for Energy Applications
     Marin Soljačić, Massachusetts Institute of Technology, USA

     High-Temperature Selective Emitter for Thermophotovoltaic Energy Conversion
     David Woolf, Physical Sciences, Inc., USA

     Selective Absorbers and Emitters for Thermophotovoltaics
     Peter Bermel, Purdue University, USA

     Harvesting Renewable Energy from Earth’s Mid-Infrared Emissions
     Steven Byrnes, Harvard University, USA

     Thermally Enhanced Photoluminescence for Efficient Photovoltaics
     Carmel Rotschild, Technion Israel Institute of Technology, Israel

     Session Discussion

11:30  Group Discussion
       Moderators: Host Team

13:00  Lunch, provided

14:00  Adjourn

Poster Submissions
- Improving Hyperdoped Black Silicon Using Nanosecond Pulsed Laser Melting, Benjamin Franta, Harvard University, USA
- Design Considerations of Practical Solar-Hydrogen Generators, Miguel A. Modestino, EPFL, Switzerland
- Enhancing Solar Driven Water Splitting with Hematite Photoanodes by Separation of Light Confinement and Absorption Sites Within the Cell, Avi Niv, Ben-Gurion University of the Negev, Israel
- Photonic Engineering of Low Dimensional Structures for Renewable Energy Conversion and Heat Management, Jonathan Tong, Massachusetts Institute of Technology, USA
- Solar Powered Thermophotovoltaic Energy Conversion, David Bierman, Massachusetts Institute of Technology, USA
- Refractory Plasmonic Materials for Energy Harvesting, Urcan Guler, Purdue University, USA