4th Workshop on Sustainable Energy Future:

Nanomaterials-Enabled Photovoltaics

Center for Nanophase Materials Sciences

Oak Ridge National Laboratory

September 22-23, 2011

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The purpose of this workshop is to review current state of research activities in nanomaterial-based photovoltaics from theory to fundamental properties of materials and devices and to facilitate discussions and collaboration between scientists and companies.

The quest to develop a suitable solar energy technology will require a highly collaborative science and engineering effort. Converting sunlight into usable energy (electricity), although broad in scope, involves some of the most fundamental questions in chemistry, physics, and material science. Still it clearly poses some very significant challenges to scientists and engineers attempting to translate discoveries made in research laboratories into functioning, robust devices that can be ultimately be produced in very large quantities. Meeting the challenges will require the synthesis of new materials, the rational design of materials and nanoscale architectures, the development of new methods for working with non-traditional materials, and ultimately the ability to assemble them cheaply into solar devices.

Nanomaterials ranging from quantum dots, nanoparticles, nanowires and nanotubes allow tunability of structure and functionality of thin film photovoltaics. Improvement of efficiency of photovoltaics was demonstrated with nanomaterial incorporated in transport and active layers. However the complexity of interactions between nanomaterials assemblies and other layers of photovoltaic cell need better understanding before full potential of nanomaterial based PVs can be realized along with dispersion and deposition.

Organizers:
Dr. Ilia Ivanov and Dr. Bobby Sumpter
Center for Nanophase Materials Sciences
Oak Ridge National Laboratory
ivanovin@ornl.gov; sumpterbg@ornl.gov

Prof. Bin Hu
Department of Materials Science and Engineering
University of Tennessee Knoxville
bhu@utk.edu

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Thursday, September 22, 2011
CNMS 2nd floor lobby (Bldg. 8610)

8:00 **Welcome to the Photovoltaics School**

8:30 Jay Jellison (ORNL), **"*Standard Diagnostic of Photovoltaics*"**

9:30 *Charly Schiller (Zahner)*, **"*Impedance Spectroscopy of Photovoltaics*"**

10:30 *Pavel Dorozhkin,(NT-MDT)* **"*Integrating AFM with optical probe. Towards Correlation of Chemical Structure, Morphology and Electro-Optical Properties on nano- and meso- scales*"**

11:30 **Transition to Poster Session (SNS, Bldg. 8600), Lunch**

Iran Thomas Auditorium
(SNS, Bldg. 8600)

1:00 David Carroll (Wake Forest U.), **"Quantum Dots and Organic Photovoltaics: a different point of view"**

2:00 *Bin Hu (UTK)*, **"*Characterization and Understanding of Photovoltaics Processes in Organic Photovoltaic Cells*"**
Internal

3:00 *Mike Barnes (U.Mass Amherst* **), "*Optical probes of exciton diffusion and dissociation in nanostructured semiconductors*"**

4:00 *Mark Dadmun (UTK)*, **"A New Model for the Morphology of P3HT/PCBM Organic Photovoltaics from Neutron Scattering"**

5:00 **Demonstration by NT-MDT and Zahner**

6:00 **Adjourn**

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Friday, September 23, 2011, Iran Thomas Auditorium (SNS)

8:30 Continental *Breakfast*

9:00 *Gang Li*, (UCLA) ***"Organic Photovoltaic Devices – from morphology to novel structure"***

10:00 *Bradley Habenicht(ORNL)*, ***"Overview of Theory, Modeling, and Simulations for Optoelectronics"***

11:00 *Rosario Gerhardt*, (GIT)***"Structure Property Relationships in Layer by Layer Assembled Nanoparticle Thin Films"***

12:00 **Lunch**

12:30 **Continued Poster Presentations**

1:00 *Jun Xu (ORNL),* ***"Nanocone Tip Film Solar Cells with Efficient Charge Transport"***

2:00 *Dmitry Voylov (Chernogolovka)*, ***"Nanoparticle Based Photovoltaics"***

3:00 **Break**

3:30 *Kai Xiao (ORNL)*, ***"Block Co-Polymer Controlled Morphology of P3HT/PCBM Photovoltaics"***

4:30 *Instrument Demonstration*
NT-MDT and Zahner (Continued)

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