

# Center for Nanophase Materials Sciences 2011 User Meeting Poster Session

Monday, September 19, 2011

5:00 – 6:00 p.m.

## Accessing Advanced Electron Microscopes Via The Shared Research Equipment (SHaRE) User Facility and CNMS

Presenter: Kinga Unocic, SHaRE staff

## 2011 CNMS User Executive Committee Members

Presenters: UEC members

### User Research Posters

#### Quenched Optical Transmission in Ultrathin Plasmonic Gratings

G. D'Aguanno<sup>1,2</sup>, N. Mattiucci<sup>1,2</sup>, A. Alu<sup>3</sup> and M.J. Bloemer<sup>2</sup>

<sup>1</sup>AEgis Technologies, Nanogenesis Division, Huntsville, AL

<sup>2</sup>Charles M. Bowden Laboratory, Research and Engineering Development Command, Redstone Arsenal, AL

<sup>3</sup>Dept. of Electrical and Computer Engineering, University of Texas at Austin, TX

Presenter: Milan Buncick, AEgis Technologies

#### Plasmonic Brewster Angle: Broadband Extraordinary Transmission through Optical Gratings

C. Argyropoulos<sup>1</sup>, A. Alu<sup>1</sup>, G. D'Aguanno<sup>2,3</sup>, N. Mattiucci<sup>2,3</sup> and M.J. Bloemer<sup>3</sup>

<sup>1</sup>Dept. of Electrical and Computer Engineering, University of Texas at Austin, TX

<sup>2</sup>AEgis Technologies, Nanogenesis Division, Huntsville, AL

<sup>3</sup>Charles M. Bowden Laboratory, Research and Engineering Development Command, Redstone Arsenal, AL

Presenter: Milan Buncick, AEgis Technologies

#### Quantitative Analysis of Chain Packing in Polymer Melts using Large Scale Molecular Dynamics Simulations

Rajeev Kumar<sup>1</sup> and Bobby G. Sumpter<sup>2</sup>

<sup>1</sup>National Center for Computational Sciences, <sup>2</sup>Center for Nanophase Materials Sciences, ORNL

Presenter: Rajeev Kumar

#### Application of Scanning Probe Microscopy for Bio-mechanics

V. Reukov<sup>1</sup>, G.L. Thompson<sup>1</sup>, A. Vertegel<sup>1</sup>, M. Nikiforov<sup>2</sup>, S. Jesse<sup>2</sup> and S. Kalinin<sup>2</sup>

<sup>1</sup>Clemson University, <sup>2</sup>CNMS ORNL

Presenter: Vladimir Reukov

#### Role of Mn Dopant in Phase Transitions of Sr<sub>3</sub>(Ru<sub>1-x</sub>Mn<sub>x</sub>)<sub>2</sub>O<sub>7</sub> by Scanning Tunneling Microscopy/Spectroscopy

Guorong Li<sup>1</sup>, Biao Hu<sup>1</sup>, Jiandi Zhang<sup>1</sup>, Rongyin Jin<sup>1</sup>, Ward Plummer<sup>1</sup>, Qing Li<sup>2</sup> and Minghu Pan<sup>2</sup>

<sup>1</sup>Louisiana State University, <sup>2</sup>Center for Nanophase Materials Sciences

Presenter: Guorong Li

#### Nanoholes, Nanochannels and Nanowires

Lloyd Davis, William Hofmeister, Lino Costa, Jason King, Brian Canfield and Alexander Terekhov: U. Tennessee Space Institute

Presenter: Lloyd M Davis

### **Formation of Metastable TaON via In Situ X-ray Diffraction**

C. Bridges, Gabriel Veith, Ray Unocic, M.P. Paranthaman and Andrew Payzant: ORNL  
Presenter: Craig Bridges

### **Low Voltage, Low Power Organic Light Emitting Transistors for AMOLED Displays**

M. A. McCarthy<sup>1</sup>, B. Liu<sup>1</sup>, E. P. Donoghue<sup>1</sup>, I. Kravchenko<sup>2</sup>, D. Y. Kim<sup>3</sup>, J. R. Reynolds<sup>4</sup>, F. So<sup>3</sup> and A. G. Rinzler<sup>1</sup>

<sup>1</sup>Department of Physics, University of Florida, Gainesville, FL

<sup>2</sup>Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

<sup>3</sup>Department of Materials Science and Engineering, <sup>4</sup>Department of Chemistry, University of Florida, Gainesville, FL

Presenter: Ivan Kravchenko

### **Lower Critical Solution Temperature Properties of Water-Soluble Polythiophene Derivatives**

Xiang Yu<sup>1</sup>, Ilia Ivanov<sup>2</sup>, Yingzhong Ma<sup>1</sup>, Kai Xiao<sup>2</sup>, Rafael Verduzco<sup>3</sup>, Hugh M. O'Neill<sup>1</sup> and Kunlun Hong<sup>2</sup>

<sup>1</sup>Chemical Science Division and <sup>2</sup>Center for Nanophase Materials Science, Oak Ridge National Laboratory

<sup>3</sup>Department of Chemical and Biomolecular Engineering, Rice University, Houston, TX

Presenter: Kunlun Hong

### **Novel Titanium Oxide Nanostructures and Architectures for Energy Harvesting and Energy Storage Applications**

M. Parans Paranthaman, Xiaofeng Qiu, Zhonghe Bi, Sukeun Yoon, Craig Bridges, Hansan Liu, Gilbert Brown, Xiao-Guang Sun, Sheng Dai, I. Ivanov, Harry M. Meyer, Raymond Unocic, Miaofang Chi, Lisa DeBeer-Schmitt, Larry Anovitz, William Heller and Ken Littrell: ORNL

Presenter: M. Parans Paranthaman

### **Rational Design and Theoretical Investigation of Spin-functionalized Helicenes**

Jingsong Huang<sup>1,2</sup>, Alejandro Lopez-Bezanilla<sup>1</sup>, Brad Slepetz<sup>3</sup>, Bobby G. Sumpter<sup>1,2</sup>, and Miklos Kertesz<sup>3</sup>

<sup>1</sup>CSMD and <sup>2</sup>CNMS, Oak Ridge National Laboratory, <sup>3</sup>Department of Chemistry, Georgetown University,

Presenter: Jingsong Huang

### **Disparity in Defect Tolerance and Band Dispersion Dictated by Crystal Packing Motifs of Pentacene Derivatives**

Jingsong Huang<sup>1,2</sup>, Ying Shu<sup>3</sup>, Jihua Chen<sup>2</sup>, John E. Anthony<sup>3</sup>, Paul R. C. Kent<sup>1,2</sup> and Bobby G.

Sumpter<sup>1,2</sup>

<sup>1</sup>CCSD and <sup>2</sup>CNMS, Oak Ridge National Laboratory, <sup>3</sup>Department of Chemistry, University of Kentucky, Lexington

Presenter: Jingsong Huang

### **Dynamics and Applications of Laser-induced Phase-transition of VO<sub>2</sub> Films**

Judson Ryckman<sup>1</sup>, Petr Markov<sup>1</sup>, Sharon M. Weiss<sup>1</sup>, V. Diez Blanco<sup>2</sup> and Richard F. Haglund Jr.<sup>2</sup>

<sup>1</sup>Department of Electrical Engineering & Computer Science, and <sup>2</sup>Department of Physics and Astronomy, Vanderbilt University, Nashville

Presenter: Victor Diez Blanco

### **Probing Li-Ni Cation Disorder in Li<sub>1-x</sub>Ni<sub>1+x-y</sub>Al<sub>y</sub>O<sub>2</sub> Cathode Materials by Neutron Diffraction**

Lu Cai<sup>1</sup>, Zengcai Liu<sup>2</sup>, Ke An<sup>1</sup>, Chengdu Liang<sup>2</sup> and Xun-Li Wang<sup>1</sup>

<sup>1</sup>Spallation Neutron Source, and <sup>2</sup>Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

Presenter: Lu Cai

### **Synthesis of LiNiO<sub>2</sub> Cathode Materials with Homogeneous Al Doping at the Atomic Level**

Zengcai Liu<sup>1</sup>, Honghe Zhen<sup>3</sup>, Yoongu Kim<sup>2</sup> and Chengdu Liang<sup>1</sup>

<sup>1</sup>Center for Nanophase Materials Sciences and <sup>2</sup>Materials Science & Technology Division, Oak Ridge National Laboratory, <sup>3</sup>School of Energy, Soochow University, Suzhou, PR China

Presenter: Zengcai Liu

## **Preferably Orienting Organic Semiconductor Molecules on Graphene for High-efficiency Photovoltaics**

Wan Deng, Kai Xiao, Ivan Vlassioug, Kendal Clark, An-Ping Li, Gong Gu and David Geohegen: ORNL  
Presenter: Wan Deng

## **Boron Nitride Nanoribbons Become Metallic**

Alejandro Lopez-Bezanilla, Jingsong Huang, Humberto Terrones and Bobby Sumpter: ORNL  
Presenter: Alejandro Lopez-Bezanilla

## **Rational Engineering of Semiconductor Nanowires and Superstructures**

Michael A. Filler, Naechul Shin, Ildar Musin and Saujan S. Sivaram: Georgia Tech  
Presenter: Michael A. Filler

## **Mapping Mesoscopic Dynamic Heterogeneity in Na<sub>0.5</sub>Bi<sub>0.5</sub>TiO<sub>3</sub>-BaTiO<sub>3</sub> Crystals using Band Excitation & Switching Spectroscopy Piezoresponse Force Microscopy**

Jianjun Yao<sup>1</sup>, Yunseok Kim<sup>2</sup>, Amit Kumar<sup>2</sup>, Stephen Jesse<sup>2</sup>, Qinhui Zhang<sup>3</sup>, Haosu Luo<sup>3</sup>, Jiefang Li<sup>1</sup>, Wenwei Ge<sup>1</sup>, Sergei Kalinin<sup>2</sup> and D. Viehland<sup>1</sup>

<sup>1</sup>Department of Materials Science and Engineering, Virginia Tech, Blacksburg, Virginia

<sup>2</sup>Center for Nanophase Materials Sciences and Materials Science and Technology Division, ORNL

<sup>3</sup>Shanghai Institute of Ceramics, Chinese Academy of Sciences, Jiading, Shanghai

Presenter: Jianjun Yao

## **Kinetic Studies of Methane Hydrate Dissociation using Low Temp X-ray Diffraction**

S. Michelle Everett<sup>1</sup>, Claudia J. Rawn<sup>1</sup>, Derek L. Mull<sup>3</sup>, E. Andrew Payzant<sup>2</sup> and Tommy J. Phelps<sup>2</sup>

<sup>1</sup>University of Tennessee, <sup>2</sup>Oak Ridge National Laboratory, <sup>3</sup>University of Toledo

Presenter: S. Michelle Everett

## **Image and Compositional Characterization of Electrodeposited Nanowire/tube Catalysts for Alcohol Synthesis**

Mayank Gupta<sup>1</sup>, Viviane Schwartz<sup>2</sup>, Steven Overbury<sup>2</sup>, Karren More<sup>2</sup> and James J. Spivey<sup>1</sup>

<sup>1</sup>Cain Department of Chemical Engineering, Louisiana State University

<sup>2</sup>Oak Ridge National Laboratory

Presenter: Mayank Gupta

## **Mechanisms of Retention and New Separation Modes in Ordered Nanoscale Fluidic Arrays: Surface Enhanced Raman Spectroscopy in Microfluidic Pillar Arrayed Separation Chips**

Teresa B. Kirchner<sup>1</sup>, Lisa C. Taylor<sup>1</sup>, Nickolay V. Lavrik<sup>2</sup> and Michael J. Sepaniak<sup>1</sup>

<sup>1</sup>University of Tennessee, Chemistry <sup>2</sup>CNMS, ORNL

Presenter: Teresa B. Kirchner

## **High Temperature Studies of Mayenite**

Claudia Rawn<sup>1,2</sup> and Sabina Ude<sup>2</sup>

<sup>1</sup>ORNL, <sup>2</sup>MSE Dept. at University of Tennessee

Presenter: Sabina Ude

## **Comparative Study of the Morphological Changes of Pd-based Films in the Presence of O<sub>2</sub> and H<sub>2</sub> Using High Resolution Scanning Electron Microscopy**

James F. Patton<sup>1</sup>, Nickolay V. Lavrik<sup>2</sup>, David C. Joy<sup>2</sup>, and Michael J. Sepaniak<sup>1</sup>

<sup>1</sup>University of Tennessee, Chemistry <sup>2</sup>CNMS, ORNL

Presenter: James F. Patton

## **Characterization of Mn and Li Promoted Titania-supported Rh Catalysts for CO Hydrogenation**

Viviane Schwartz<sup>1</sup>, Adefemi Egbebi<sup>2</sup>, Andrew Campos<sup>2</sup>, James J. Spivey<sup>2</sup>, and Steve Overbury<sup>1</sup>

<sup>1</sup>Oak Ridge National Laboratory, <sup>2</sup>Louisiana State University

Presenter: Viviane Schwartz

### **Fabrication and catalytic studies of arrays of shape-selective nanoposts**

Katie Heroux and Simona Hunyadi Murph: Savannah River National Laboratory  
Presenter: Simona Hunyadi Murph

## **CNMS Capabilities and Research**

### **Tailoring End-group Composition in Toly-functionalized Poly(3-hexylthiophenes)**

Presenter: Deanna Pickel, Macromolecular Nanomaterials, CNMS

### **Nanomaterials Theory Institute: Recent Highlights and Capabilities**

Presenter: Bobby Sumpter, Nanomaterials Theory Institute, CNMS

### **Synthesis and Characterization of Nanostructured Catalysts**

Presenter: Viviane Schwartz, Chemical Functionality, CNMS

### **Soft-Materials Microscopy at CNMS**

Jihua Chen<sup>1</sup>, Dale K. Hensley<sup>1</sup>, Qianping He<sup>2</sup>, Kunlun Hong<sup>1</sup>, Kai Xiao<sup>1</sup>, S. Michael Kilbey II<sup>1,2</sup>, David C. Joy<sup>1,2</sup> and Adam J. Rondinone<sup>1</sup>

<sup>1</sup>Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, <sup>2</sup>University of Tennessee-Knoxville  
Presenter: Jihua Chen

### **Atomic Layer Deposition of Dielectric and Multifunctional Nanomaterials**

Presenter: Nickolay Lavrik, Nanofabrication Research Laboratory, CNMS

### **Characterization of Nanoscale Mechanical and Optical Structures by Optical Interferometric Profilometry**

Presenter: Nickolay Lavrik, Nanofabrication Research Laboratory, CNMS

### **Control of Mass Transport and Chemical Reaction Kinetics in Ultrasmall Volumes**

Pat Collier, Seung-Yong Jung, Dave Karig, Scott Retterer and Mike Simpson  
Presenter: Pat Collier, Nanofabrication Research Laboratory, CNMS

### **Control of the Octahedral Tilts in Lanthanum Cobaltite and the Impact On Magnetic Properties**

Presenter: Mike Biegalski, Functional Hybrid Nanostructures, CNMS

### **Ultrahigh Vacuum STM in Extreme Environments**

Minghu Pan, John Wendelken, and Peter Makysmovich  
Presenter: Minghu Pan, Imaging Functionality, CNMS

### **Voltage Spectroscopy Atomic Force Microscopy at CNMS: Imaging Ferroelectric and Ionic Functionality on the Nanoscale**

Stephen Jesse, Nina Balke, and Sergei Kalinin  
Presenter: Stephen Jesse, Imaging Functionality, CNMS

### **Ion Beam Microscopy – Aberration Free Imaging and Microanalysis**

Presenter: David Joy, Imaging Functionality, CNMS

### **Correlation between electron transport and local structures at the nanoscale**

An-Ping Li, Shengyong Qin, Kendal Clark, X.-G. Zhang, Arthur P. Baddorf, and John Wendelken  
Presenter: An-Ping Li, Imaging Functionality, CNMS