Thursday, February 28, 2013

Photonics Center

Boston, MA

Meeting Schedule

5:30 PM - Meeting Registration & Facility Tour (7th Floor-Atrium)

6:00 PM - Dinner

6:50 PM - Welcoming Remarks (9th Floor-Room 901): Fettah Kosar, Ph.D., *NESM President*

7:10 PM - **"Electron Microscopy goes 3D: the technique and future development of electron tomography"**, Daniela Nicastro, Ph.D., *Brandeis University, Waltham, MA*

7:50 PM - **"Enhanced Ion and Molecule Transport in Nanoscale Confined Liquids"**, Chuanhua Duan, Ph.D., *Boston University, Boston, MA*

8:30 PM - Closing Remarks: Fettah Kosar, Ph.D., *NESM President*

Meeting Sponsors

NESM would like to extend our thanks and appreciation to Anlee Krupp and the Photonics Center for hosting today's meeting.

Parking for this event was paid for by a generous donation from **FEI**.

NESM February Meeting 2013
Abstracts & Bios

7:10 PM - "Electron Microscopy goes 3D: the technique and future development of electron tomography"

Daniela Nicastro, Ph.D., *Brandeis University, Waltham, MA*

Abstract: In electron tomography (ET), a set of projection images from different viewing angles is recorded using a transmission electron microscope. These images can then be used to reconstruct the three-dimensional structure of the specimen. ET is a rapidly developing technique that is playing an increasingly important role in both the materials and life sciences. This presentation will give an introduction into electron tomography combined with different specimen preparation methods, discuss strengths and limitations, and describe a few exemplary applications to biological specimen. Especially cryo-ET in combination with subtomogram averaging and structural classification is providing new views of the 3D structure of cellular organelles and molecular machines at unprecedented resolution.

Bio: Daniela Nicastro received her Ph.D. in Biology from the Ludwig-Maximilians University in Munich, Germany in 2000. Following three years in the lab of Prof. Baumeister at the Max-Planck Institute for Biochemistry in Munich (1998-2001), she took a post-doctoral position at the University of Colorado, Boulder. Since 2006, she is Assistant Professor of Biology and director of the "Correlative Light and Electron Microcopy" (CLEM) facility at Brandeis University. She has 18 years experience in electron microscopy of cellular structures and is a leading expert in cellular cryo-electron tomography. The research interest of the Nicastro lab is focused on studying the three-dimensional structure and function of cytoskeletal assemblies, molecular motors, organelles and cells using a combination of cutting-edge methods that focus on the structure-function relationships of macromolecular complexesin situ, i.e. in their native environment. Other areas of interest include the development of cryo-EM and image processing techniques.

7:50 PM – "Enhanced Ion and Molecule Transport in Nanoscale Confined Liquids"

Chuanhua Duan, Ph.D., *Boston University, Boston, MA*

Abstract: Nanofluidics refers to the study and application of ion/molecule transport in nanoscale-confined liquids. Although researchers mainly focused on its biological applications over the last ten years, this field is now expanding to address the challenges of energy demand and environmental problems. One of the unique aspects of nanofluidics is that its relevant length scale is comparable with the ranges of various intermolecular forces in liquids, including hydration force (0.1-2 nm in range), van der Waals force (0.1-50 nm in range) and/or electrostatic force (1-100 nm in range). The interplay between these forces could significantly affect ion/molecular transport in nanoscale confined structures. In this talk, I will first introduce surface-charge-governed ion transport due to electrostatic force in 1-D confined nanochannels. Several new applications of this surface-charge-governed transport, including power generation, flow control and enzyme sensing will be demonstrated. I will then present some recent discoveries on enhanced ion transport in 2 nm nanochannels due to electrostatic and hydration forces, and fast evaporation due to cavitation under negative pressure. Potential applications of such enhanced transport in energy storage and conversion will also be discussed.

Bio: Chuanhua Duan received his B.S. and M.S. degrees in Engineering Thermophysics from Tsinghua University in 2002 and 2004. He obtained his Ph.D. in Mechanical Engineering from the University of California, Berkeley in 2009. After staying in Berkeley for two more years as a postdoctoral research fellow at the Lawrence Berkeley National Laboratory, Dr. Duan joined the department of Mechanical Engineering at Boston University as an Assistant Professor in January 2012. His current research interests include energy conversion and storage, micro/nanofluidics and phase change heat transfer.