Symposium on Micro- and Nano-Technologies

Three Keynote Lectures will be given within the Symposium on Micro and Nanotechnologies on Friday 8 February 2008 by Jason H. Hafner Ph.D., Rice University; Ravi Bellamkonda Ph.D., Georgia Institute of Technology, Atlanta, GA, and John T. McDevitt, The University of Texas at Austin.

Biomedical Applications of Plasmon Resonant Nanoparticles

Keynote Address: Jason H. Hafner, Ph.D., Department of Physics & Astronomy, Department of Chemistry, Rice University

Intensive research effort over the past two decades has produced nanoparticles of controlled size and structure that are composed of a variety of materials, including semiconductors, metals, oxides, fullerenes, and organics. These nanomaterials often exhibit novel, tunable physical properties not found in their molecular or bulk precursors. When coupled to surface ligands for a controlled interface with their environment, the nanoparticle properties enable new biomedical technologies for the detection and treatment of disease. For example, noble metal nanoparticles exhibit strong visible and near infrared extinction due to an effect called localized surface plasmon resonance (LSPR). This effect allows the nanoparticles to act as molecular contrast agents in a spectral region where tissue is relatively transparent. The localized heating due to resonant absorption enables new thermal ablation therapies and drug delivery mechanisms. The sensitivity of these resonances to their environment leads to simple affinity sensors for the detection of low level molecular analytes. Coupled with their general lack of toxicity, these applications suggest that noble metal nanoparticles are a highly promising class of nanomaterials for biomedical applications.

Dr. Jason Hafner received his Ph.D. from Rice University in 1998 and was a postdoctoral researcher at Harvard University from 1998-2001. He is currently an Assistant Professor at Rice University in the Department of Physics & Astronomy. His research group studies plasmon resonances in gold nanoparticles and their biological and biomedical applications. His research interests also include electrostatic analysis of lipid membranes by atomic force microscopy.

Personalized Cancer Therapy Enabled by Nano-scale Contrast Agents

Keynote Speaker: Ravi Bellamkonda Ph.D., Georgia Institute of Technology, Atlanta, GA

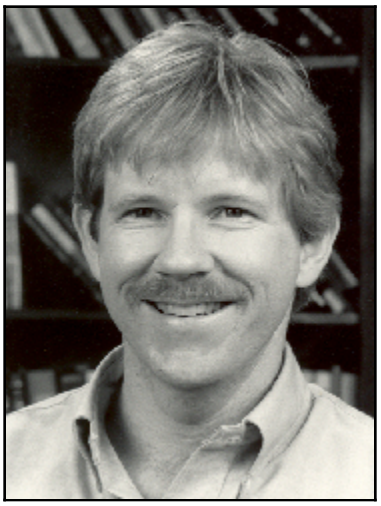
Ravi Bellamkonda, Ph.D., is the Georgia Cancer Coalition Distinguished Scholar, Professor of Biomedical Engineering, Neurological Biomaterials and Therapeutics, in the Department of Biomedical Engineering at Georgia Institute of Technology and Emory University.

Integrated Nano-Bio-Chip Sensor Systems: From Bio-terrorism to Humanitarian Applications

Keynote Speaker: John McDevitt, Ph.D., The University of Texas at Austin

Homeland defense, in vitro diagnostics industries and humanitarian sectors share the goal of developing new test systems that can influence in a positive manner important global health issues. All these areas have limited resources and all face significant technical challenges that serve as impediments to improvement of the infrastructure for global health and security. Indeed, the marriage of micro-fabrication and in vitro diagnostic devices serves as a combination that may play a key role in developing the next generation diagnostic devices that can be affordable and accessible for all humanity. Accordingly, new nano-materials and nano-device concepts are combined in this program so as to develop a suite of customized nano-bio-chip that can operate at the point-of-need with reduced

cost. While these lab-on-a-chip systems exhibit impressive analytical and diagnostic capabilities as compared with gold standards (such as pH meters for acidity, ELISA for protein analysis, FDA approved automated instruments for cardiac risk factors and planar DNA chips for nucleotide detection), their compact design and low cost also allows for their use in numerous important applications areas. This talk will explore the synergies between the homeland defense, human medicine and humanitarian efforts in areas where these nano-bio-chip sensor systems show promise.



Dr. John McDevitt is currently Full Professor of Chemistry at The University of Texas at Austin. During the past decade, the McDevitt lab has pioneered microchip sensors for homeland defense, cardiac risk and HIV immune function. In 2004, the team was awarded a Gates grant for rapid development of biochips for use in Africa. In 2006, McDevitt was selected to serve as the principal investigator of a four-year, $6.1M program supported by NIH(NIDCR). The McDevitt group's lab-on-a-chip work was recently selected as part of Science Coalition's Best Scientific Advances for Year. He has published more than 150 peer-reviewed manuscripts, secured more than 95 patents/patent applications and founded the company LabNow.