



## **Use of Silicon, Glass, Gold and ITO Interfaces: For Near-Field Opto-Electro-Mechanical Biosensors**

**Wednesday October 10, 2007  
Burchard 118, Time 11am**

**Professor Kenneth D. Kihm**  
Magnavox Chair Professor  
Mechanical, Aerospace and Biomedical Engineering (MABE)  
University of Tennessee, Knoxville, Tennessee, U. S. A

Development of four different biosensors, separately using silicon, glass, gold and ITO interfaces, will be discussed in studying micro/nano-scale biofluidic phenomena occurring within a few hundred nanometer range from the interfaces. Example ongoing applications of each of the opto-electro-mechanical biosensors will also be presented:

**Silicon** – Atomic Force Microscopy (AFM) cantilever probe obtains nanotopography of hydrogels to determine the effect of polymeric ion concentrations on cell proliferations.

**Glass** - Total Internal Reflection Fluorescence Microscopy (TIRFM) allows three-dimensional tracking of nano-particles such as intracellular protein trafficking responding as markers for anti-tumorigenesis for human colorectal cancer cells.

**Gold** - Surface Plasmon Resonance (SPR) Reflectance Microscopy permits label-free and dynamic mappings of full-field scalar properties, including micromixing, temperature, salinity, and chemical reaction processes.

**ITO** - The use of Interference Reflection Contrast Microscopy (IRCM) in conjunction with optically transparent Indium-Tin-Oxide (ITO) electrodes permits integrative analyses of proliferation and cytotoxicity of live endothelial/cancer cells.

---

**Dr. Kenneth Kihm** received his Ph.D. in the area of micro-particle tracking using laser Doppler-scattering techniques in Mechanical Engineering from Stanford University in 1986. He then worked as Research Associate on advanced laser diagnostics at Carnegie-Mellon University for two years. He worked on micro/nano-scale optical imaging techniques as Assistant, Associate and Full Professor at Texas A&M University from 1988 to 2004. Since 2004, he has been working on opto-electro-mechanical biosensors for integrated analyses of live cells as Magnavox Chair Professor in MABE at the University of Tennessee. Dr. Kihm, Fellow of ASME, is currently serving as Associate Editor for Experiments in Fluids. He has published 90 refereed journal articles and 85 conference proceeding articles to date.