

**STEVENS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING**

**Thursday, February 8, 2007
Carnegie Room 315, NOON**

****** Note special day & time ******

Micromachined sensors and components for bio/chemical applications

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Mechanical, Materials & Aerospace Engineering
Electrical and Computer Engineering
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Broadly defined as MEMS (micro-electro-mechanical systems) or MST (microsystems technology), this research area is interdisciplinary and application-oriented. This seminar will cover various aspects of the MEMS/BioMEMS research activities at NanoFab and BioMEMS Lab at the University of Central Florida with a focus on micromachined sensors and actuators, in particular, a SPR (surface plasmon resonance) microsensor for monitoring biomolecular activities; nanoparticle-integrated hydrogen sensors and hydrogen peroxide sensors, and a magnetic microactuator for optical applications.

First, the micro SPR sensor which consists of a polymer waveguide and a MSM (metal-semiconductor-metal) photodetector on a GaAs substrate will be introduced. The planar integration enables the direct opto-electric signal conversion without resorting to a separate bulk optical component and facilitates further integration of a light source. The functionality and potential of a waveguide-based SPR sensor with an integrated MSM photodetector will be discussed. Secondly, a novel micromachined hydrogen (H₂) sensor operating at room temperature will be discussed. The sensor has been successfully designed and fabricated based on interdigitated conductometric microelectrodes integrating indium oxide (In₂O₃)-doped tin oxide (SnO₂) semiconductor nanocrystalline particles with platinum (Pt) nanoclusters. Very high H₂ sensitivity with fast response and recovery has been observed for the present sensor at room temperature and low H₂ gas concentration. The last part will cover a regenerative free radical sensor, a micromachined bi-directional actuator and other research activities at the UCF BioMEMS lab.

Professor Hyoung Jin "Joe" Cho is an Assistant Professor at the University of Central Florida with joint appointments in the Departments of Mechanical, Materials & Aerospace Engineering and Electrical and Computer Engineering. Dr. Cho earned his doctoral degree in electrical engineering (specialty: MEMS and BioMEMS) from the University of Cincinnati in 2002. He received his B.S. and M.S. degrees in Materials Science and Engineering from Seoul National University, Korea in 1989 and 1991, respectively. He was with KETI (Korea Electronics Technology Institute) from 1993 to 1997 as a research engineer. He is a NSF CAREER awardee of 2004 (Project Title: A Micro Surface Plasmon Resonance Sensor Source).

For more information, please contact Prof. Frank Fisher at Frank.Fisher@stevens.edu or 201-216-8913