

UNH Materials Science Seminar

13:10-14:00, Wednesday, Dec. 1, 2010

DeMeritt 240

University of New Hampshire

Functionalized Carbon Nanotubes as Chemical and Biological Sensors

Dr. Michelle Chen

Physics and Engineering Department, Point Loma Nazarene University

Nanoscaled chemical and biological sensing capability of functionalized single-walled carbon nanotube field effect transistors (SWNT-FETs) will be presented. SWNT-FETs non-covalently functionalized with DNA/RNA showed current change when exposed to gaseous chemical analytes whereas the bare SWNT-FETs did not. Our study showed that the SWNT-FET's chemical sensing response differed in sign and magnitude depending on both the type of gaseous analyte and the sequence of DNA/RNA used. DNA/RNA functionalized SWNT-FET gas sensors possess rapid recovery and self-regenerating ability, making the realization of sensitive nanoscaled electronic olfaction and disease diagnosis possible. We will also present proof-of-concept experiments that SWNT-FETs functionalized with protein receptors can be a highly sensitive and responsive biosensor for ligand-receptor-protein specific virus detection. SWNT-FETs covalently functionalized with human coxsackievirus and adenovirus receptor (CAR) showed current decrease when exposed to adenovirus protein, Ad12 Knob (Knob). These results suggest that CAR-functionalized SWNT-FETs can ably serve as biosensors for detection of environmental adenoviruses.

Dr. Michelle Chen is currently an assistant professor in Physics and Engineering Department at Point Loma Nazarene University, San Diego. Prior to Point Loma she was an assistant professor in Physics department at Simmons College from 2008-2010. She received BA and MS in physics from The University of Chicago and Ph.D. in Materials Science and Engineering from University of Pennsylvania in 2008. Her research interests include synthesis and characterization of carbon nanotubes and graphene, and their interface with biological systems.

Host: Prof. Jian-Ming Tang, x3515