Kyuwan received his B.S degree in Physics from Korea University (Seoul) as a Summa Cum Laude in 2003. He joined PhD program in Physics Department at University of Pittsburgh in 2004 and transferred to Purdue ABE in 2007. He is studying surface plasmon resonance on the metallic nanomaterials, and also investigating hyperspectral imaging system. He built optical tweezer and dark-field hyperspectral system to study nanoparticles plasmon resonance shift by interaction. He modified commercial Raman spectroscopy for hyperspectral imaging of surface enhanced Raman scattering (SERS). Main applications include detection and dynamical tracking of intracellular single molecules in living single cells using nanomaterials. Kyuwan was accepted to postdoctoral position at University of California, Berkeley.

Agricultural & Biological ENGINEERING

Thesis Defense

Speaker: Kyuwan Lee

Title: HYPERSPECTRAL MEASUREMENT OF SURFACE PLASMONIC RESONANCE ON NANOMATERIALS AND INTRACELLULAR SINGLE MOLECULE DETECTION

Major Professors: Dr. Joseph Irudayaraj

Date: April 19, 2011

Time: 10:00 am

Place: ABE 212

Abstract:

In this study, the hyperspectral imaging system (HSI) use designed and installed to detect various target molecules with multiplexing ability. Multiplexing ability of the HSI due to characteristic spectra of different materials and their structures is proposed to dynamically monitor the nanoscale processes and the change of environmental conditions, such as temperature and refractive index. Raman spectroscopy and Dark-field spectroscopy are mainly used for different purposes: Raman spectra can be used as a powerful tool especially for multiplexing detection and chemical identification with well-defined resolution, and Dark-field spectrum is good for motion tracking of dimer interaction in the range of distance from a few nanometers to 100 nm. Many different nanomaterials with spectral features in their response to the optical excitation have been employed as nanoprobes for HSI applications. This study particularly focuses on the gold nanoparticle and the control of its surface plasmon resonance by forming a regulated structure.