NANOHOUR

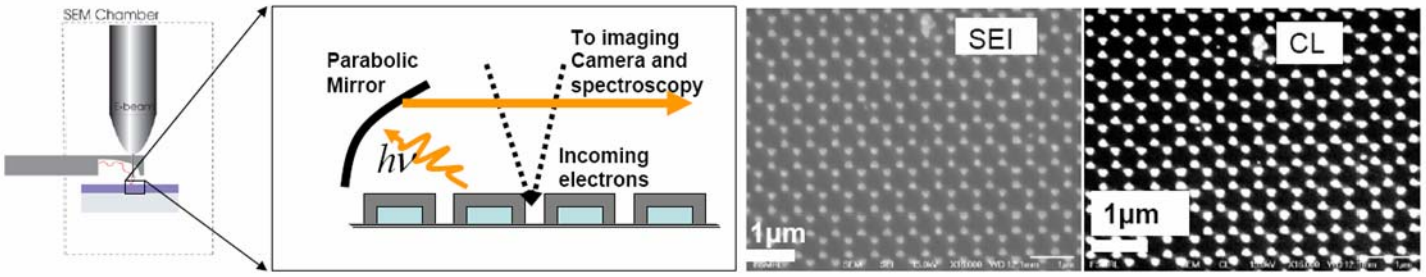
Wednesday, April 2, 2008
3:00 PM
Beckman Institute - Room 3269

Imaging of Plasmonic Modes of Nanostructures Using High-Resolution Cathodoluminescence Spectroscopy

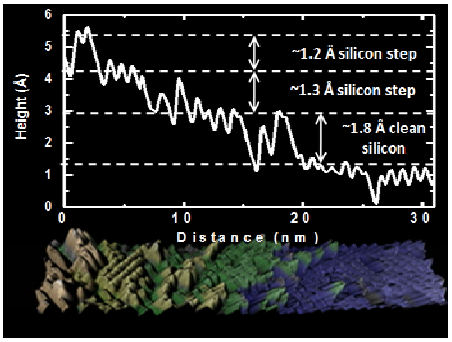
Pratik Chaturvedi

Graduate student in Mechanical Engineering with Professor Nicholas Fang

A multitude of optical phenomena at the nanoscale are caused by resonant surface plasmons in metal systems. Extraordinary transmission enhancement, amplification of evanescent waves, enhanced Raman scattering are some of the phenomena that offer great opportunities to realize many potential applications such as optical imaging with sub-diffraction resolution, nanolithography, detection of chemical and biological species with single molecule sensitivity and others. These applications however require a precise control of the resonant modes of metal nanostructures. Cathodoluminescence (CL) imaging and spectroscopy offers an opportunity to investigate these resonant plasmon modes with unprecedented resolution. In this study, we employ CL spectroscopy to study the plasmonic modes of nanostructures fabricated on silver and gold films. Direct excitation and emission of decoupled surface plasmon modes is observed with panchromatic and monochromatic imaging techniques. With monochromatic imaging, we are able to distinguish the emission regions of different plasmon modes. Localized plasmon modes are shown to have dramatic spatial variation over single nanoantenna of various geometries. This study presents a significant step in the development of plasmon driven optics at the nanoscale.



Low Temperature Selective Silicon Epitaxy at the Nanometer Scale



Matthew Sztelle

Graduate student in Electrical Engineering with Professor Joseph Lyding

We demonstrate the feasibility of using the hydrogen-passivated silicon surface as a lithographic mask for low temperature (≤325˚C), nanometer-scale templated silicon epitaxy. The scanning tunneling microscope (STM) is used to define the chemically reactive template and to remove diffusion inhibiting hydrogen after silicon and silicon-hydride species have been deposited using disilane (Si_2H_6) gas or silicon from the STM tip. We show that 2 monolayers of epitaxial growth are possible and we discuss the reasonable temperature limits for pattern fidelity.

Coffee and cookies will be served.
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