USC Viterbi School of Engineering

MORK FAMILY DEPARTMENT OF CHEMICAL ENGINEERING AND MATERIALS SCIENCE

Lyman Handy Colloquia

Presents

"Semiconductor and Metal Nanocrystals as Plasmonic Antennas"

by

Professor Andrea Tao

University of California, San Diego
San Diego, California

Abstract

A critical need in nanotechnology is the development of new tools and methods to organize, connect, and integrate solid-state nanocomponents. I will present our recent work on the synthesis and self-assembly of nanocrystals for plasmonics, where light is propagated, manipulated, and confined by solid-state components that are smaller than the wavelength of light itself. We show the organization of polymer-grafted metal nanocrystals into nanojunction arrays that possess intense "hot spots" due to electromagnetic field localization. Nanocrystals organize into self-propagating chains resembling linear polymers, generating plasmonic homojunctions. Mixtures of nanocrystals organize into cross-propagating, branched structures that resemble copolymers to generate plasmonic heterojunctions. These hierarchical structures possess unique electromagnetic properties that rival top-down structures and demonstrate the potential of self-assembly for fabricating designer plasmonic materials. We also show that doped semiconductor nanocrystals can serve as a new class of plasmonic building blocks, where shape and carrier density can be actively tuned to engineer plasmon resonances. These examples demonstrate that nanocrystals possess unique electromagnetic properties that rival top-down structures, and the potential of self-assembly for fabricating designer plasmonic materials.

Thursday, October 10, 2013
12:45 pm, ZHS Room 159

The scientific community is cordially invited.