Physical Chemistry Seminar

Tuesday, November 9, 2010 | **11:00 a.m.** | **Room 1315 Chemistry Building**

Collective Plasmon Modes in Nanoparticle Assemblies

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In order to incorporate plasmonic nanoparticles into functional devices it is necessary to understand how surface plasmons couple as particles are arranged into ordered structures. Bottom-up assembly of chemically prepared nanoparticles facilities strong plasmon coupling due to short interparticle distances, but also gives to rise to defects in particle size, shape, and ordering. Single particle spectroscopy of plasmonic nanoparticle assemblies, especially when correlated with structural characterization using scanning electron microscopy, allows one to gain a detailed understanding about collective plasmon modes. We have used polarization sensitive dark-field scattering spectroscopy covering a broad spectral range from the visible up to 2000 nm and polarization dependent photothermal imaging to separately investigate radiative and nonradiative coupling in one-dimensional assemblies of plasmonic nanoparticles. For both scattering and absorption, we observed collective plasmon modes that are highly polarized along the main axis of the one-dimensional nanoparticle chain and red-shifted from the plasmon resonance of the individual constituents. These collective plasmon modes are compared to plasmon antenna modes of continuous nanorods with varying length and width. Furthermore, we have developed a fluorescence based method to visualize plasmon propagation in one-dimensional nanostructures.

Refreshments will be available prior to the seminar at 10:45 a.m. outside room 1315

Graduate Students and Post Docs may meet with the speaker at 1:00 p.m. in Room 8335