NU-MRSEC

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Hosted by ***George C. Schatz***

Thursday *January 20, 2011*

3:00PM Cook Hall 2058

Designing the Plasmonic Response of Noble Metal Nanoparticles

A great amount of progress has been made toward the synthesis of monodispersed nanoparticles with a wide variety of interesting physical and chemical properties, which can be tailored by manipulating their size, morphology, composition, and environment. One of the most fascinating aspects of nanoparticles is the optical property, which is mainly characterized by the surface plasmon resonances (SPR), whose position, width, and intensity can be managed by using different combinations of these parameters. This versatility has opened a large amount of potential applications in, for example, detection and imaging, surface enhanced Raman scattering (SERS) and fluorescence, as biomedical markers and therapy, in storage and transport, among others. In this sense, theoretical and simulation studies play a major role in the explanation and prediction of novel nanostructures with specific properties. In this presentation, I will discuss some of our recent research on these topics. On the first part, we use the spectral representation formalism to understand the role of morphology, composition, and environment in the response of noble metal nanoparticles. Finally, some general aspects of the role of SPRs in dispersive forces between nanoparticles will be discussed.