

Electro-Optical Modulation using Gold Nanocrystals

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In this talk, I will discuss the emergence of nanocrystals for applications in optical switching, sensing and signal modulation. These potential applications arise from the unusual nature of surface plasmon resonances (SPRs). Surface plasmon resonance frequencies or wavelengths depend on the electron density of the gas, particle size and shape, and also the medium refractive index.

We will show that we can modulate the particle response by altering the electron density, through hydrostatic loading and by modifying the refractive index of the medium. We also demonstrate how refractive index modulation leads to a method for direct modulation of light, that could be used in high speed signal processing. Finally, we also show detection of 100 electrons using single gold rods as sensors [1-4].

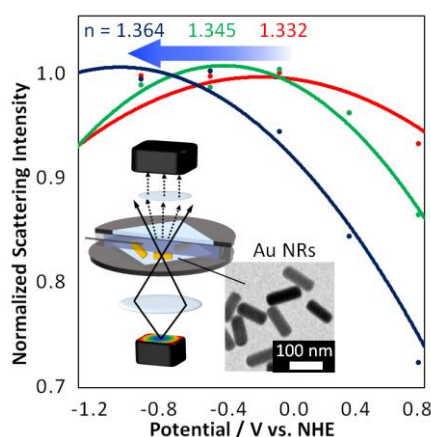


Figure 1. The basis of scanning LSPR detection. The scattering from a particle is both potential and refractive index dependent.

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[4] C. Martin-Sanchez, J. A. Barreda-Argüeso, S. Seibt, P. Mulvaney, F. Rodríguez, "Effects of Hydrostatic Pressure on the Surface Plasmon Resonance of Gold Nanocrystals", *ACS Nano*, 13, (2018), 498-504.

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