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Dielectric Sensitivity of Plasmon Resonances in Single Gold Nanorods COLLEEN NEHL, Department of Physics & Astronomy, Rice University, HONGWEI LIAO, Department of Chemistry, Rice University, JASON HAFNER, Department of Physics & Astronomy, Rice University — The surface plasmon resonances of noble metal nanoparticles are highly sensitive to their local dielectric environment. The binding of analytes to acceptor molecules attached to a nanoparticle surface has been shown to alter this environment, thus enabling biological and chemical detection through spectroscopic measurements. When the plasmon resonances of individual nanoparticles are observed, the sensitivity reaches 100's to 1000's of molecules, and may approach single molecule detection for large analytes. Gold nanorods may serve as exceptionally versatile plasmon resonance sensors due to their high aspect ratios, tunable plasmon resonance energies, rational synthesis, and well-developed surface chemistry. We have measured the plasmon resonance energy dependence of single gold nanorods as a function of dielectric environment and nanorod aspect ratio. These results, as well as progress towards biological functionalization of gold nanorods will be discussed.

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