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Synthesis and Optical Properties of Star-shaped Gold Nanoparticles[1] COLLEEN NEHL, Physics and Astronomy Department, Rice University, HONGWEI LIAO, Chemistry Department, Rice University, JASON HAFNER, Physics and Astronomy, Chemistry Departments, Rice University — Here we describe the synthesis, structure, and optical properties of ca. 100 nm star-shaped gold nanoparticles. Seed mediated, surfactant directed synthesis yields nanoparticle solutions sufficiently monodisperse that extinction spectra reveal plasmon bands representative of their structure. Single particle spectroscopy measurements demonstrate that these nanoparticles exhibit multispectral, multidirectional polarized scattering. Through correlated structural characterization by electron microscopy, each scattering component can be assigned to the different points on the star-shaped structure. The plasmon resonances were also found to be extremely sensitive to the local dielectric encironment, yielding sensitivities as high as 1.41 eV photon energy shift per refractive index unit. These properties suggest that the star-shaped gold nanoparticles may be highly valuable for certain biosensing and microscopic imaging paradigms.

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