Abstract Submitted
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Structure-specific spectroscopy of plasmon-supporting nanoparticles KENNETH KNAPPENBERGER, Florida State University — Recent advances in the development of sensitive ultrashort laser-based spectroscopic probes to investigate dynamics of high surface-to-volume metal and alloy nanostructures will be discussed. Electronic relaxation and interparticle electromagnetic coupling processes in hollow gold nanospheres (HGNs) and HGN aggregates were studied using femtosecond pump-surface plasmon probe and second harmonic generation spectroscopies, including single-particle measurements. In the case of HGNs, an unexpected, but systematic, blue shift of the spectral position of the surface plasmon resonance was observed upon nanoparticle aggregation. Femtosecond time-resolved measurements, high-resolution TEM, and Finite-Difference Time-Domain calculations demonstrate that this blue shift results from interparticle cavity coupling, an effect not possible for solid nanospheres. The efficiency of this coupling was tailored by controlling HGN aspect ratio over a vast range of sizes (20 nm to 80 nm outer diameters). This effect may be applied to developing more efficient optical and electronic devices, including photovoltaics.

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