# Identification of Low-Level Sulfur Contaminants by Amplitude and Phase-Sensitive Detection of Single Particle Surface Plasmon Scattering

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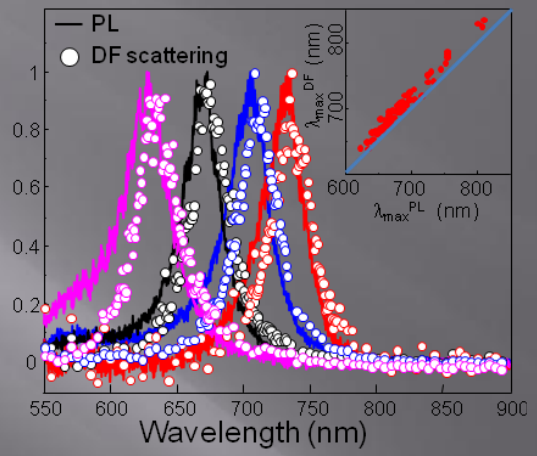
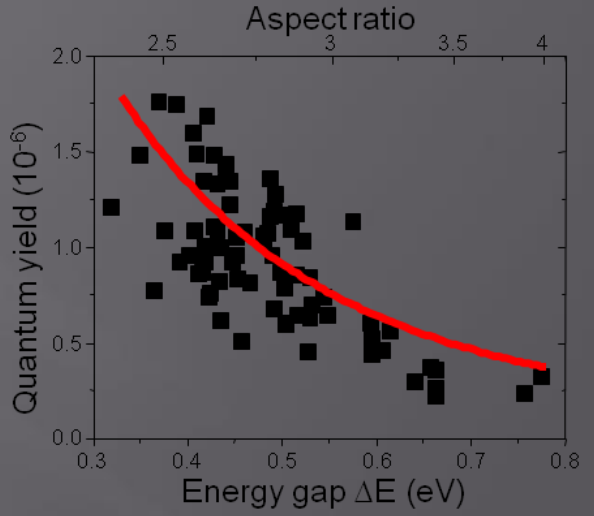
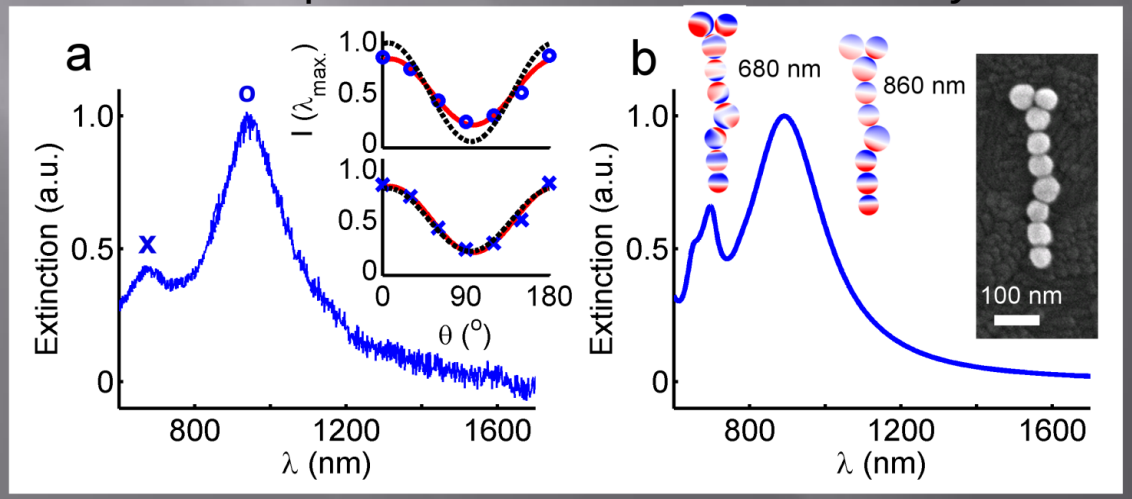
***One-photon luminescence of gold nanorods:*** We investigated the luminescence quantum yield of single gold nanorods as a function of aspect ratio when exciting the transverse plasmon resonance. We find that the quantum yield decreases approximately exponentially with increasing aspect ratio. This decrease is interpreted as a change in coupling efficiency between excited electronic states and the longitudinal surface plasmon.




Experiment

Theory




***Sub- and super-radiant plasmon modes resulting from strong near-field coupling:*** We assembled linear chains of 50 nm gold nanoparticles and investigated their collective plasmonic properties using electron microscopy, single-particle extinction spectroscopy, and electrodynamics simulations. We were able to identity super- and sub-radiant plasmon modes based on the calculated charge distribution. Comparison to calculations of perfectly ordered chains revealed that as the number of constituent nanoparticles increases the effect of disorder becomes less important.