Measuring Optical Properties of a Single Nanoparticle

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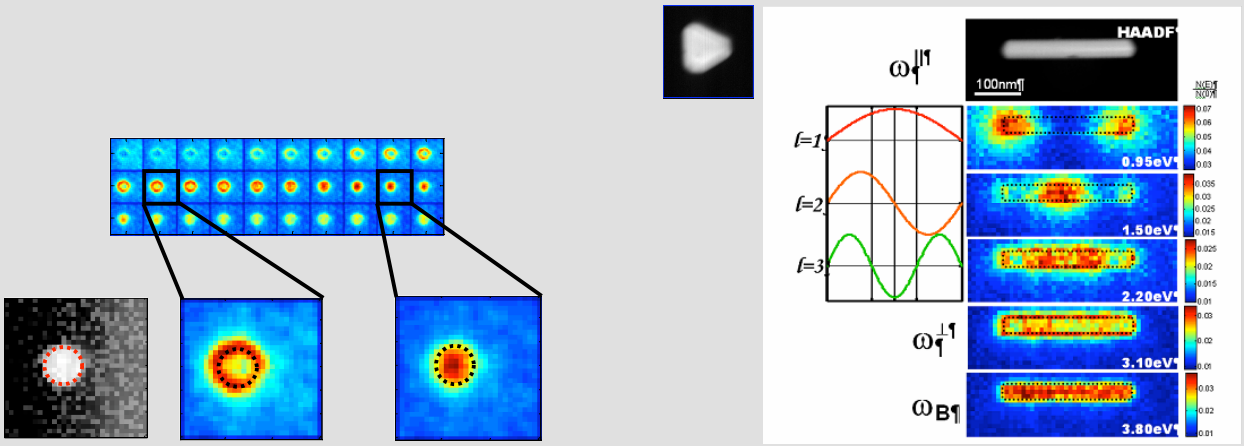

Figure. *Energy filtered images revealing the signatures of shape dependant plasmonic excitation modes for different silver particles. Spherical particle (left) triangular prism (center) and silver nanorod . (right) .*

Plasmons, i.e. collective oscillations of conduction electrons, determine the optical properties of metalic nanostructures. The plasmon resonance in nanoparticles is determined not only by the nature of metal or alloy the particle is made of, but also by the particles size and shape. Due their small size, the correlation of the shape and optical properties of individual nanocrystals is not straight forward. By combining the power of high resolution scanning transmission electron microscopy(STEM) and the electron energy loss spectroscopy (EELS) we are able measure the optical response of a single nanoparticle. Moreover, ploting the intensity of the energy loss signal as function of beam location reveals the plasmon mode wavefunctions associated with the diffrent oscilation modes. Recent publication describe ways to synthesize not only coplex shapes nanoparticles, but also their essamblies into superlatices aiming to utilize them as functional components in optoelectronic devices or as signal enhancing probes in optical spectroscopies.