

COLLOID CHEMISTRY – BASED NANOPHOTONICS

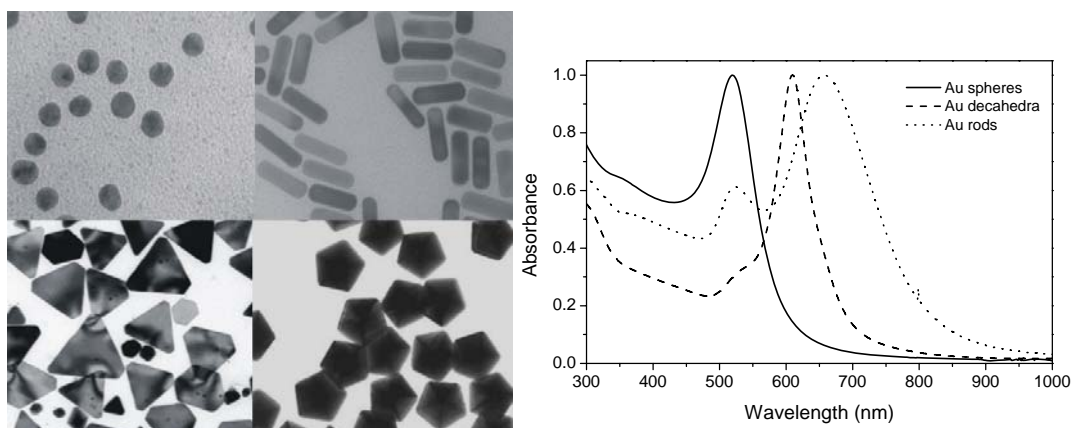
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In this talk, a survey will be given of wet-chemistry based techniques recently developed to synthesize noble metal nanoparticles with controlled size and shape. The shapes will include spheres, core-shells, rods, flat prisms and other polyhedra, which can be prepared in a wide (nano)size range. The resulting optical properties, which are mainly influenced by the surface plasmon resonance of conduction electrons, will be discussed for the various shapes and sizes, using several theoretical models, increasing in complexity when the particles deviate from the spherical shape.

Examples of the various shapes are shown in Figure 1, and characteristic extinction spectra are shown in Figure 2 for gold spheres, decahedra and rods of selected sizes, showing that the localized surface plasmon can be tuned to basically any position within the visible spectrum.



Among the various selected shapes, anisometric nanoparticles have been found particularly appealing, since they display various resonance conditions as a function of orientation, resulting in an anisotropic response toward incoming light, which allows for further manipulation of the optical effects, through alignment.

All these shapes are strongly sensitive toward the refractive index of the environment, which makes them suitable candidates for biosensing applications.

References:

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