

Optical properties of silica-gold core-shell particles

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Silica-gold core-shell particles consist of a silica core covered by a thin gold shell. It is well known that controlling the morphology of these particles causes a change in the optical properties. Due to their unique optical properties, these particles can be used in many biomedical applications.

In this work, we used Stöber process to synthesize silica particles. The surface of silica particles were functionalized using 3-aminopropyltriethoxysilane (APTES). The surface-modified silica particles were then coated by gold as follows. First, small gold nanoparticles synthesized by the HAuCl_4 reduction method were adsorbed onto the APTES-functionalized silica particle surface. Then, HAuCl_4 was reduced to grow the gold shell on the silica particles.

Various experimental techniques such as transmission electron microscopy (TEM), UV-visible spectroscopy, quasi-elastic light scattering (QELS), and the angularly-resolved scattering intensity characterization were used to characterize the properties of particles. As the Mie scattering theory suggests, scattering characteristics in terms of scattering angle is highly dependent on the size of scatterers.