

Nanocomposites and nanomaterials

Obtaining and properties of gold nanocrystals of different morphology

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There is a great deal of current interest in the synthesis of monodisperse metal nanoparticles ensembles such as gold, silver and platinum for potential applications in catalysis, nanoelectronics, nanomedicine, biotechnology, surface-enhanced Raman spectroscopy (SERS), non-linear optics. The properties of gold nanoparticles strongly depend on their structure, shape and size.

Here we report a simple and relatively fast colloidal synthesis of isolated gold nanocrystals of different morphology in aqueous solutions and study their properties.

Stable colloidal solutions of gold nanocrystals (Au NCs) of different morphology (spherical nanoparticles, "nanostars" and "nanoflowers") with size range about 12-70 nm were obtained.

The diffraction rings in electron diffraction pattern can be indexed to the face centered cubic unit cell structure of Au NCs.

The study of the absorption spectra of Au NCs colloidal solutions showed that a change of the Au NCs morphology from spherical to nanostars leads to a shift of the plasmon peak position to longwave region and broadening of the plasmon peak. The nanostars' plasmon peaks are tunable from 650 to 700 nm.

Nanostars can be synthesized in a controlled fashion and exploited as potential candidates for NIR excitation and absorption in the 'diagnostic window' for biomedical applications [1].

1. Yuan H., Khoury C. G., Hwang H., Wilson C. M., Grant G. A., Vo-Dinh T. Gold nanostars: surfactant-free synthesis, 3D modelling, and two-photon photoluminescence imaging // *Nanotechnology*.-2012.-**23**.-075102 (9pp).