

Properties of Optically Active Gold Nanoparticles with Cyanobiphenyl Liquid Crystal Ligand

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Abstract

The size-dependence properties of gold nanoparticles (Au NP) make this material an excellent candidate for the development of new electronic and optical device. In particular, the absorbance band of Au NP in the visible spectrum results from the Plasmon Resonance which is influenced by the NP size, organic shell, and matrix such as liquid crystal (LC). Our objective is to tune the Au NP optical properties and spacing using LC capping agent and matrix. A novel one phase ligand exchange reaction was used to synthesize 5 nm diameters Au NP having mono- and mix mono-layers made of thioalkoxycyanobiphenyl (SH n OCB – $n = 8, 12, 16$) and/or alkyl thiol (C m SH – $m = 6, 10$) with SH n OCB:C m SH ligand ratio between 2:1 and 1:6. The purity and properties of the NP were assessed using Thermogravimetric Analysis and Differential Scanning Calorimetry (DSC).