Optical and Magnetic properties of Manganese doped gold clusters

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Abstract

Clusters and cluster assembled nanomaterials are of strong research interest with a prospect of controlling the electronic and optical properties by their atomic arrangements. Gold clusters and their super structures with different atomicity have been pursued since decade due to the its wide applications in optics. Further, tunning the properties by doping in atomic cluster is a challenging area of research. This work demonstrates the doping of Mn and ligand mediated assembling of eight atoms gold clusters (Au_8) into a local periodic nanostructure. The local structure has been analyzed using transmission electron microscopy, x-ray diffraction and small angle x-ray scattering measurements. It revealed a local periodicity as 1.47 nm in the assembled hexagonal+1 Au_8 clusters. The observation of two opposite nature of the excitonic states in the circular dichroism spectra corroborates to the coupling of excitons in a fixed chirality. The magnetic properties of the sample have been analyzed extensively using theory and experimets. A strong ferromagnetic ordering has been observed from Mn doped Au_8 due to spin-orbit interaction.

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