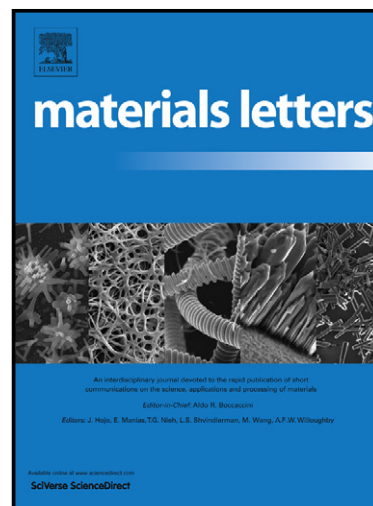


L-cysteine assisted formation of mesh like Ag_2S and Ag_3AuS_2 nanocrystals through hydrogen bonds

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L-Cysteine assisted formation of mesh like Ag₂S and Ag₃AuS₂ nanocrystals through hydrogen bondsChidambaram Siva¹, Chandrasekaran Nivedhini Iswarya¹, Pari Baraneedharan¹, Muthusamy Sivakumar^{1,2*}¹Division of Nanoscience and Technology, ²Department of Chemistry,

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Abstract

Biomolecules assisted formation of inorganic nanostructures facilitates the electrostatic stabilization and thus impact in the material properties. We have studied the Ag⁰ nuclei mediated synthesis of Ag₂S nanocrystals, where L-Cysteine is utilized as sulfur source. Also, we have obtained the novel Ag₃AuS₂ nanocrystals by adopting the gold ions in the L-Cysteine assisted Ag₂S formation. From the XRD patterns, the crystal sizes of Ag₂S and Ag₃AuS₂ nanocrystals are calculated as 6.5 nm and 13 nm respectively. FT-IR results revealed that, Ag₂S and Ag₃AuS₂ nanocrystals were interconnected themselves with L-Cysteine molecules through hydrogen bonding. Interestingly, the mesh like interconnected morphology has been observed in HR-TEM images in both Ag₂S and Ag₃AuS₂ nanocrystals. The HRTEM images shows the average particle size of 5.2 nm for Ag₂S and 9.1 nm for Ag₃AuS₂ nanocrystals.

Keywords: Biomaterials, L-Cysteine, Ag₂S, Ag₃AuS₂, Hydrogen bonds, Nanocrystalline materials**1. INTRODUCTION**

The ability of the organosulphur compounds (including those with sulfhydryl and disulfide moieties) to attach strongly to certain metallic surfaces, creates the modified interfaces with unique properties. These biomolecule conjugated metallic surfaces may find significant applications in several areas such as chemical sensing, catalysis and electrochemical reactions [1-4]. One of the water soluble amino acid available in natural sources, L-Cysteine is highly reactive, due to the presence of sulfur in the form of sulfhydryl. The hydrogen in a sulfhydryl group of L-Cysteine can be easily replaced by cations or metal surfaces to form a covalent bond. The functional groups of L-Cysteine are useful in resulting enzymatic reactions, metal conjugation, capping the particle to prevent the agglomeration, which influences in the applications such as

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