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Ternary ZnS:Te nanoparticles capped with 3-mercaptopropionic acid prepared in aqueous media

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Abstract

The research is aimed at introducing the low temperature and extremely simple method of preparing ZnS:Te, within aqueous media. In order to accomplish this research objective, the research is intended to perform analysis of the prepared nanoparticles by using different techniques. Some of the major techniques include X-ray diffraction, optical transmission, photoluminescence (PL), and infrared and Raman spectroscopies. In this research, ZnS(1-x)Te(x), with x = 0.0, 0.05 and 0.2 nanoparticles, was synthesized, for the first time, in aqueous medium by colloidal method. The synthesized nanoparticles were characterized by using XRD, EDX, and UV-Vis optical transmission, PL, thermogravimetric, and FTIR and Raman spectroscopies. XRD analysis confirmed that the prepared nanoparticles had zinc blende structure and that the size of nanoparticles ranged from 1.8 to 2.5 nm. Optical transmission revealed energy gap of 4.05-3.36 eV and high transmission in the infrared region of the prepared nanoparticles, doped with Te. PL and PL excitation showed formation of isoelectronic trapping states in forbidden gap for the doped nanoparticles.

Keywords

KeyWords Plus: LUMINESCENCE; RAMAN

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