

Influence of Ag⁺ and Mn²⁺ ions on structural, optical and photoluminescence features of ZnS quantum dots

Autores

P.Sakthivel, K.Kavi Rasu, G.K.D.Prasanna Venkatesan, Amelec Vilorio.

Abstract

The current study deals with the structural, morphological, elemental, optical and photoluminescence behaviors of Ag⁺, Mn²⁺ dual doped ZnS quantum dots (QDs). The X-ray diffraction (XRD) and Transmission Electron Microscope (TEM) studies confirmed the cubic structure and size of the crystallites (~2 nm). The Scanning Electron Microscope (SEM) photographs portrayed the surface and morphological structure of prepared samples. Energy dispersive X-ray (EDX) and Fourier Transform Infrared Spectra (FTIR) ensured the presence of Zn, Ag, Mn and, S in the samples as per the anticipated stoichiometry ratio. The UV–visible spectra showed a red shift in optical absorption and band gap gets narrowed due to the incorporation of Ag⁺ ions. The size effect has overcome the quantum confinement effect in this case. Through photoluminescence (PL) studies, a weak UV emission and strong red wavelength emissions were received and discussed on the basis of sulfur vacancies. This red emission was dealt in terms of d-electrons transition between host and dopant ions.

Palabras clave

Ag⁺ Mn²⁺, ZnS, Quantum dots, Optoelectronic.