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The absorption and radiation transitions of Mn²⁺ ions in the polyvinyl pyrrolidone capped ZnS:Mn nanoparticles

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Polyvinyl pyrrolidone (PVP) is a conductive polymer having strong polarized carbonyl ($-C=O$) group, in which oxygen atom is able to coordinated bond with Zn^{2+} and Mn^{2+} ions on the surface of ZnS:Mn nanoparticles. Under the effect of ultraviolet radiation, electrons of PVP chains can be absorption, radiation transitions HOMO LUMO and then energy transfer to ZnS:Mn nanoparticles. This paper present the preparation process of PVP capped ZnS:Mn nanoparticles, in which ZnS:Mn nanoparticles were synthesized by co-precipitation method, after that they were dispersed in PVP matrix. Microstructure, morphology and average crystalline size of PVP capped ZnS:Mn (ZnS:Mn/PVP) nanoparticles were determined by X-ray diffraction pattern (XRD) transmission electron spectroscopy (TEM), thermal gravimetric analysis (TGA) and differential gravimetric analysis thermographs (DTG). Fourier transfer infrared absorption spectra (FT-IR). The results show that the capping of ZnS:Mn nanoparticles by PVP almost do not change crystalline structure with average particle size about of 3.6 – 4 nm. The optical properties of PVP capped ZnS:Mn nanoparticles were investigated by UV-Vis absorption spectra, photoluminescence (PL) and photoluminescence excitation (PLE) spectra. The capping of ZnS:Mn nanoparticles by PVP mass almost not change the peak position of bands characterized to absorption and radiation transitions of Mn²⁺ ions in PLE and PL spectra. But their intensities were changed according to PVP mass and the PL intensity increase stronger with appropriate PVA mass. From achieved experimental results, the absorption and radiation transitions of Mn²⁺ ions in PVP capped ZnS:Mn nanoparticles were studied and explained

Biography

Tran Minh Thi has got his academic degree as an Doctor from the Institution, Faculty of Physics, Hanoi National University of Education, Hanoi city, Vietnam.

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