

Characterization of CdS nanoparticles synthesized using microwave-assisted polyol method

ABSTRACT

Synthesis of cadmium sulfide (CdS) nanoparticles has been performed through the simple and rapid microwave-assisted polyol method, using cadmium chloride and thioacetamide as the cadmium and sulfur sources respectively. Attempts were made to control the size and crystallinity of the CdS nanoparticles by controlling microwave irradiation time and the initial molar ratio of the cadmium and sulfur sources. The structure of nanoparticles characterized by X-ray diffraction (XRD) was hexagonal. No peaks corresponding to impurities were detected, indicating the high purity of the product. The size of the prepared samples was calculated by Debye-Scherrer formula according to XRD spectra. The morphology of particles was observed in the transmission electron microscopy (TEM) images was spherical. The average size of nanoparticles was also estimated from these images. The optical absorption of CdS nanoparticles studied by UV-Visible spectroscopy showed a blue shift from bulk CdS due to quantum confinement. The size of nanoparticles was calculated by Brus formula according to UV-Visible spectrum and compared to XRD and TEM results.

Keyword: CdS nanoparticles; Irradiation time; Microwave; Molar ratio