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Effect of Environment on the Preparation of CdSe Quantum Dots Capped with Mercaptoacetic Acid

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Abstract

We report a preparation of CdSe quantum dots in the presence of capping molecules under ambient air and argon atmospheres. The growth of the quantum dots with applying an equimolar ratio of precursor of Cd²⁺ and Se⁻² in the presence of a high percentage of the mercaptoacetic acid as capping molecules is studied. Quantum dots are characterized via EDX, transmission electron microscopy, X-ray diffraction, thermogravimetric analysis (TGA), UV-Vis optical absorption, Raman and infrared spectroscopy. Combination of EDX and Raman spectroscopy showed a graded diffusion of sulfur on the surface of CdSe quantum dots for the sample prepared under argon atmosphere, while the sample prepared under ambient air atmosphere the sulfur isn't diffused into the CdSe core. In addition, the sample prepared under air revealed a formation of oxides on the surface of the quantum dots. On the other hand, we have studied the nature of capping and how the surface of the quantum dots core is terminated for the prepared samples. In addition, we have studied the acoustic and optical phonons of the quantum dots cores.

Keywords

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