

Abstract

We present L-cysteine capped $\text{CdO}_x\text{Te}_{1-x}$ and $\text{CdTe}_x\text{Se}_{1-x}$ nanoparticles (NPs) prepared in one pot. The as-prepared $\text{CdO}_x\text{Te}_{1-x}$ NPs were found to have a hexagonal crystal structure of CdTe with a cubic phase of CdO. There was, however, change in phase to cubic type when 2 mM of Se was introduced into the CdTe at 60 min of reaction time. The average crystallite sizes obtained from X-ray diffraction analysis for $\text{CdO}_x\text{Te}_{1-x}$ and $\text{CdTe}_x\text{Se}_{1-x}$ NPs were in the range of 10–36 nm. The diffraction peaks shifted to higher diffraction angle with longer growth time. Scanning electron microscope images display change in shape and size as reaction progress. Photoluminescence (PL) emission was observed to shift from 510–566 nm and 620–653 nm for $\text{CdO}_x\text{Te}_{1-x}$ and $\text{CdTe}_x\text{Se}_{1-x}$ NPs respectively followed by variation in the peak intensities. The emission spectra displayed a good symmetry and a narrow full width at half maximum ranging from 41 to 100 nm in both cases. The absorbance analysis of the as-prepared NPs displayed well-resolved absorption bands. The optical band gaps of the as-prepared NPs were found to decrease with increase in reaction time. Reaction parameters such as pH, reaction time, reaction temperature and the molar concentration could have major effects on the optical properties of the as-prepared nanoparticles hence their need to control them.