



## Structural, Morphological and Optical Studies of As-Prepared and Annealed Cadmium Doped $\text{Te}_{90-x}\text{Se}_{10}\text{Cd}_x$ Chalcogenides

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### Abstract

The present study is undertaken in order to investigate the influence of addition of cadmium (Cd) with decreasing at.wt. % of Tellurium (Te) at constant at wt% of Selenium (Se) on the optical properties of the  $\text{Te}_{90-x}\text{Se}_{10}\text{Cd}_x$  ( $x = 0, 10, 20$ ). Optical Studies of the metal doped chalcogenide prepared by melt quenching method from 99.999% pure elements has been reported. XRD pattern reveals that as-prepared and thermally annealed chalcogenide alloys show polycrystalline nature and a combination of hexagonal and cubic phase. Average crystal size observed by Scherrer's formula for as-prepared and thermally annealed sample S1, S2, S3 of  $\text{Te}_{90-x}\text{Se}_{10}\text{Cd}_x$  ( $x=0, 10, 20$ ) are 22.83, 33.86, 29.58 nm and 21.51, 49.27, 46.34 nm respectively. FESEM images of the sample S1, S2, and S3 are uniform which shows the presence of some micro-crystallites of the synthesised material. Spectral dependence of the absorption spectra recorded in the range of 200 – 1000 nm for as-prepared and thermally annealed samples in normal wavelength scanning mode is shown by UV-Visible spectroscopy. Crystal size and optical band gap ( $E_g$ ) of the as-prepared and thermally annealed sample increases while dislocation density, absorption coefficient of each sample decrease with increasing Cd% in the sample. The luminescence intensity of as-prepared sample S3 (20% of Cd) is much more than its annealed sample at 330 nm excitation wavelength.

**Keywords:**  $\text{Te}_{90-x}\text{Se}_{10}\text{Cd}_x$  ( $x = 0, 10, 20$ ), XRD, FESEM, UV/VIS/NIR, PL.

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