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Te trilayer thin films

Smita Survase, Madhavi Thakurdesai, I. Sulania, D. Kanjilal



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**Swift Heavy Ion irradiation induced nanocrystallisation in Te/Cd/Te trilayer thin films**Smita Survase<sup>1</sup>, Madhavi Thakurdesai<sup>1</sup>, I. Sulania<sup>2</sup>, D.Kanjilal<sup>2</sup><sup>1</sup> Thin Film Research Laboratory, Department of Physics, Birla College (Affiliated to University Of Mumbai), Kalyan 421 304, India<sup>2</sup> Inter University Accelerator Center, New Delhi- 110-067, India.**Abstract:**

In this paper, we report Swift Heavy Ion (SHI) irradiation induced nanocrystallisation in Te/Cd/Te trilayer thin films. In the present investigation, thermally evaporated Te/Cd/Te trilayer thin films were irradiated by 100 MeV <sup>107</sup>Ag ion beam at varying fluence. The structural characterization of Te/Cd/Te trilayer thin films was carried out using X-ray Diffraction (XRD) technique. XRD studies revealed that SHI irradiation results in Te/Cd/Te layer mixing leading to formation of CdTe nanocrystalline phase. Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM) were employed for surface studies. SEM studies indicate ion beam induced surface modifications. Further, AFM pictures indicate nano grain formation in the irradiated films. The elemental analysis of trilayer films before and after irradiation was carried out using Energy Dispersive X-ray Spectroscopy (EDX). EDX analysis indicates that percentage ratio of Cd and Te remains unaffected after SHI irradiation. Optical characterization was done using UV-Vis spectroscopy. Band gap values determined on the basis of UV-Vis spectroscopy of all the irradiated films were found to be more than the reported bulk value of 1.5 eV. The increase in bandgap value is attributed to the combined effect of ion induced strain and quantum confinement effect. SHI irradiation induced formation of nanocrystallisation in Te/Cd/Te trilayer films is explained mainly in the framework of Ion Beam Mixing (IBM).

**Keywords:** Nanocrystalline CdTe, SHI, XRD, SEM, AFM, UV-VIS Spectroscopy.

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