

GROWTH, STRUCTURAL, OPTICAL, ELECTRICAL AND Γ - SPECTRAL ANALYSIS OF $\text{Cd}_{0.95}\text{Mn}_{0.05}\text{Te}$ SINGLE CRYSTAL FOR APPLICATIONS IN ROOM TEMPERATURE RADIATION DETECTORS

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This report discusses the growth of $\text{Cd}_{0.95}\text{Mn}_{0.05}\text{Te}$ single crystal by modified vertical Bridgman technique and its gamma spectral performance. This material has several applications in medical diagnostics, astronomy, particle physics, detection of radionuclides, and national security [1]. Laue diffraction confirms the single crystalline nature and zinc blende crystal structure of the grown crystal. The F4-3m space group with a lattice constant of 6.4497\AA was found using powder X-ray diffraction analysis. The two optical phonon modes (LO and TO modes) observed from Raman spectroscopy confirm the presence of CdTe and MnTe sublattices in the ternary system. A higher transmittance of over 60% is observed in the FTIR and NIR transmittance measurements. The band gap of 1.57 eV was estimated by PL spectroscopy [2]. Tellurium inclusions and their size were determined by infrared microscopy. The resistivity in the order of $3 \times 10^9 \Omega\cdot\text{cm}$ was determined by I-V measurement. The energy resolution at 59.5 keV of ^{241}Am gamma source is $\sim 11\%$ with FWHM of [3].

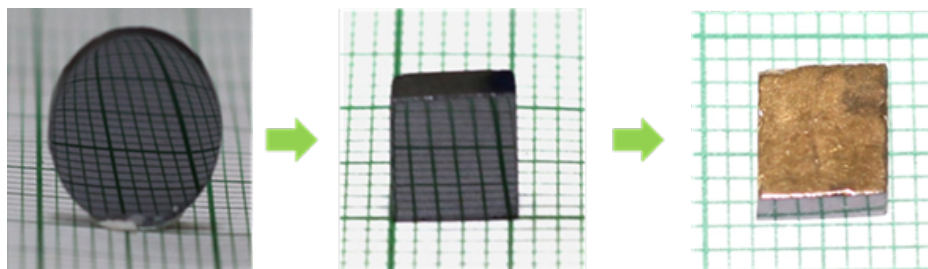


Fig.1. Detector fabrication process of the polished $\text{Cd}_{0.95}\text{Mn}_{0.05}\text{Te}$ single crystal

References

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2. K. Kim *et al.*, www.bnl.gov.
3. P. Vijayakumar *et al.*, Mater Sci Semicond Process, vol. 169, 2024, 107897.