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The Study of Defects in Cadmium Zinc Telluride Crystals[1]
CHARLES PAYTON, STEPHEN BABALOLA, TRENT MONTGOMERY, Alabama A&M Univ, CLAUDIO MUNTELE, Mentor — Cadmium Zinc Telluride (CZT) has desirable properties making it a good candidate for radiation detection. Despite the positive properties of CZT its theoretical performance is sub-optimal because of material defects. The scope of this work focuses on understanding the agglomeration of Tellurium atoms in the lattice, dislocations, and grain and twin boundaries on the surface. Nakagawa and Saucedo solutions were used to etch the surface of CdZnTe crystals to reveal etch pits. Infrared (IR) imaging and Scanning Electron Microscopy (SEM) were used to study the defects within the crystals. After etching the surface of the CZT crystal, Etch Pit Density (EPD) estimation of the population of Tellurium inclusions on the surfaces of the crystals were performed. Infrared imaging revealed Tellurium inclusions as distinct features around dislocations and boundaries. SEM was used to study the features of observed defects. This work shows defects that are responsible for sub-optimal performance of CZT as a radiation detector. Ongoing research is aimed at correlating the observed and characterized defects with detector performance.

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