

High Sensitivity Polycrystalline CsPbBr₃ Wafer X-ray Detectors

Thursday, 20 July 2023 14:50 (20 minutes)

Here we have fabricated and characterised CsPbBr₃ wafers for direct X-ray detection. Gram-scale CsPbBr₃ powder was synthesized by milling of CsBr and PbBr₂ precursors in a planetary ball mill. 0.4 g of CsPbBr₃ powder was pressed into a pellet of 10 mm diameter by a hot-pressing method at 70° C. We have characterized the morphology and structural properties of the polycrystalline CsPbBr₃ wafer by scanning electron microscopy (SEM) and X-ray diffraction (XRD), respectively. The optimised pellets show highly compact and uniform morphology, which results in superior carrier transport and higher X-ray sensitivity. 80 nm of Au electrodes were deposited on both sides of the pellet by vacuum thermal evaporation. We have studied the X-ray response of the Au/ CsPbBr₃ pellet/Au X-ray detector under different X-ray irradiation dose rates and applied bias voltages. The device exhibits an X-ray sensitivity of 151 $\mu\text{C Gy}^{-1}\text{cm}^{-2}$ under an applied bias of 20 V.

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Session Classification: Session 3

Track Classification: default track