

Annealing Effect of Thallium Bromide Thin Film

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Thallium Bromide (TlBr) is a compound semiconductor with a wide band gap(2.68 eV). TlBr can be formed into thin films by vacuum evaporation, and large areas can be produced without a tiling process. TlBr is potentially suitable for FPD applications.

TlBr thin films deposited by vacuum evaporation was evaluated. In direct conversion semiconductor detectors, the quality of the semiconductor crystals is important. Polycrystals are less efficient at collecting the charge generated by photons due to grain boundaries, so larger grain sizes are preferred. Ideally, single crystals are best. Therefore, we conducted experiments to improve the crystal orientation by post-processing. Crystal orientation was evaluated by X-ray diffraction. The results showed that post-deposition heat treatment improved the crystal orientation. The results also showed that the crystalline orientation deteriorated when the cooling rate after heating was too fast. It was suggested that the recrystallization process during the transition from the liquid phase to the solid phase is affected by the cooling rate. It was found that the cooling rate must be controlled for post-deposition heat treatment to improve the crystal orientation. The results of this study will accelerate the application of thin film TlBr to detectors.

Topics

Session A. Physics of condensed matter and spectroscopy

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