

Particle-in-Binder(PIB)법을 이용한 다결정 HgI₂ 필름 제작 및 특성 연구

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Fabrication and Characterization of Polycrystalline Mercuric Iodide Films using Particle-in-Binder Methods

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Abstract : Polycrystalline mercuric iodide (HgI₂) films are being developed as a new detector technology for digital x-ray imaging. The HgI₂ is generally vacuum deposited by physical vapor deposition (PVD) process. But the PVD thick deposition has been caused any instability in the biasing due to any defects or cracks. In this work we present a new particle-in-binder (PIB) methodologies used for the HgI₂ thick films. These growth techniques can be easily extended to produce much larger film areas. This paper, for the first time, presents results and comparison of polycrystalline HgI₂ films derived by various PIB methods.

We investigated the structural and morphological properties of the films using X-ray diffraction (XRD) and scanning electron microscopy (SEM) analysis. The films were characterized with respect to their electrical properties and in response to x-ray photons. Physical and electrical results were also compared between conventional polycrystalline PVD and our detectors. Leakage current as low as 350 pA/cm² at the bias voltage of ~ 200 V has been observed. And high sensitivity and good linearity in the response to x-rays was obtained in the film derived by *PIB sedimentation method*. Our future efforts will concentrate on optimization of film growth techniques for uniform large area deposition on image readout arrays.

Key Words : Mercuric Iodide, X-ray Detector, Particle-In-Binder, Sensitivity