

Bismuth Tri-iodide Polycrystalline Films For X-ray Direct And Digital Imagers

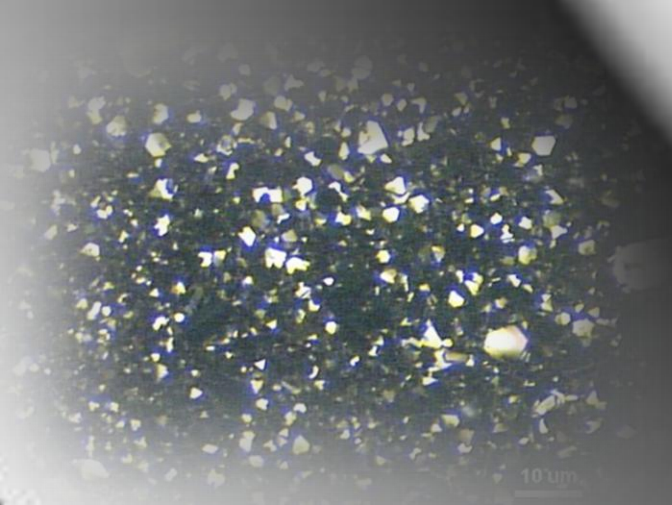
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INTRODUCTION

- ✿ Bismuth tri-iodide is a promising photoconductor that is being studied for direct and digital X-ray imaging
- ✿ Reports about detectors made with polycrystalline and oriented layers of this material indicate they have appropriate properties for X-ray detection
- ✿ We report here the growth and characterization of polycrystalline bismuth tri-iodide thick films intended for imaging applications, with good response and low dark current
- ✿ We compare the properties of our polycrystalline films with previous reported ones in light of growth feasibility and final task appropriateness and performance



RESULTS

- ✿ Bismuth tri-iodide was synthesized from $\text{Bi}_2\text{O}_3\text{CO}_2\cdot\text{H}_2\text{O}$ and KI, was then purified by zone refining (100 passes) followed by three sublimations
- ✿ With such starting material, films 1"x1" in size were grown onto gold coated glass substrates by the physical vapor deposition (PVD) method
- ✿ Detectors were assembled depositing gold as front contact, attaching Pd wire and then performing acrylic encapsulation
- ✿ The dark current density and the electron collection were studied as a function of the electric field applied to the detector
- ✿ The dark current measured (10 pA/mm² for an electric field of 0.7 V/μm) is very low and comparable with the one of the best previous reported detectors of Bismuth tri-iodide and other compound semiconductor films
- ✿ The response of the films to an X-ray beam (from a radiographer) gave good linearity with the electric field and good sensitivity (0.11 nC/R.cm²)

CONCLUSIONS

- ✿ Detectors with better electrical and response to radiation properties than previously reported ones for polycrystalline bismuth tri-iodide films have been assembled. They are suitable for X-ray direct and digital imaging
- ✿ Time requirements and yield are better than for the previously reported oriented films, which makes our procedure an interesting and cheaper alternative for producing photodetectors of this material