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Lead Acetate Impact on Lead Halide Perovskite (FAPbBr3) Polycrystalline Radiation Detector Performance

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In this study, we analyse the performance of polycrystalline pellets of FAPbBr3 as a semiconductor-based radiation detector, and study the impact of lead acetate (LA) on the FAPbBr3 X-ray detector performance. Using a hot-pressing method various FAPbBr3 pellets were fabricated with different concentrations of lead acetate to investigate the improvement in the pellet microstructure and X-ray sensitivity.
The bulk resistivity and of the pellets was studied by I-V measurements, with the addition of LA showing a significant reduction in dark current and increase in resistivity. The X-ray sensitivity measurements of the device were carried out using X-rays from an Amptek Mini X-ray source with an Au anode and an acceleration voltage of 40 kVp. The X-ray sensitivity of the FAPbBr3 pellet devices with and without LA were studied, and the devices containing LA showed a sensitivity of 27.5 ±0.9 μC/Gy cm2. We will discuss the role of the LA in improving the density and microstructure of the material, and its effect on charge transport and X-ray sensitivity.

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