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Charge transport properties in perovskites X-ray detectors working at 0V external bias

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Metal halide perovskite (MHP) is a promising candidate material for the next-generation X-ray detector, particularly due to the excellent charge transport properties.

However, a mobility-lifetime product of electrons and holes as well as detector stability are compromised by high ionic conductivity under an external electrical field.

To resolve this issue, we explore charge transport properties of the methylammonium lead iodide ($\text{CH}_3\text{NH}_3\text{PbI}_3$) single crystals, and we show while operating photovoltaic mode (under 0V bias) devices exhibit simultaneously near to unity charge collection efficiency and high x-ray attenuation efficiency for a few hundred μm thick crystals.

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