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Mobility–Lifetime Measurements of Amorphous Hydrogenated Boron Carbide Using the Steady-State Photoconductivity Method JUSTIN HURLEY, MAHBUBE SIDDIKI, CHRISTOPHER KECK, BRADLEY NORDELL, THUONG NGUYEN, ANTHONY CARUSO, MICHELLE CARUSO, Univ of Missouri - Kansas City — As a p-type semiconductor with a high band gap (>2.5 eV) and high electrical resistivity (>10ˆ12 Ω•cm), ortho-carborane-based amorphous hydrogenated boron carbide (a-BxC:Hy), grown by plasma-enhanced chemical vapor deposition, is one of a handful of materials suitable for direct-conversion solid-state neutron detection. Traditionally, there has been minimal investigation into the boron carbide class of solids outside of its mechanical uses, and the basic knowledge of electrical transport properties needed to optimize a-BxC:Hy for detector applications is lacking. In particular, the mobility–lifetime product ($\mu\tau$), a measure of the ability to extract and transport charges within a material, is an important figure of merit for detector devices. Herein we will describe our implementation of the steady-state photoconductivity method, which provides a straightforward determination of $\mu\tau$ in a-BxC:Hy films. Values of $\mu\tau$ as a function of wavelengths spanning the UV-Vis range have been determined for a range of a-BxC:Hy samples. We will describe how thin-film growth conditions can be adjusted to optimize $\mu\tau$.

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