ANTIMONY SELENIDE SOLAR CELLS

Tested for doping

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Antimony selenide (Sb_2Se_3) is an emerging material for photovoltaic applications that has recently enabled solar cells with a 9.2% power conversion efficiency. Device and material design is based on the assumption that Sb_2Se_3 is a p-type semiconductor where the majority of charge carriers are holes. Sb_2Se_3 is therefore often interfaced with n-type materials to obtain efficient charge separation and maximize device efficiency. Recent works, however, challenge this assumption, suggesting that Sb_2Se_3 can have either an n-type or an intrinsic character. Now, Jonathan Major and colleagues across the UK, United States and France verify the intrinsic nature of Sb_2Se_3 and report on its use as a photovoltaic absorber with n-type character.

The researchers investigate the type of majority carriers, that is, electrons or holes, in Sb_2Se_3 by means of a range of complementary techniques. They find that the high-quality Sb_2Se_3 behaves as an intrinsic material with no detectable dominant carrier type. However, impurities in the precursor materials can lead to either n- or p-type Sb_2Se_3 , thus offering an explanation for the opposite results reported in literature. Furthermore, Major and colleagues demonstrate solar cells based on n-type Sb_2Se_3 with efficiency over 7%, equalling p-type counterparts. The researchers suggest that future investigations should exploit the opportunity to dope Sb_2Se_3 at will to understand which carrier type and device design maximize solar cell performance.

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