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Effect of WS2 Monolayer as complementary ETL in a FAPbI3-based Heterostructure

In this work the incorporation of a monolayer of WS2 in a FAPbI3 perovskite based heterostructure is presented. FAPbI3/WS2/TiO2/ITO and FAPbI3/TiO2/ITO heterostructures were analyzed by UV-Vis spectroscopy, X-ray diffraction, scanning electron microscopy and Kelvin probe force microscopy (KPFM). The configuration with WS2 interlayer presents higher absorption in the visible region with a bandgap of ~1.44 eV. WS2 also enhances the deposition process of FAPbI3, resulting in the formation of pure photoactive α -phase. The smooth surface of WS2 favors a homogeneous morphology and an increase of the grain size to ~4.5 µm, the largest reported for similar structures. An energy band alignment between FAPbI3, WS2, and ITO is proposed based on the work function obtained by KPFM. These findings strongly suggest that the interfacial coupling of FAPbI3/WS2 could be a promising candidate in photovoltaic applications.

Keywords

FAPbI3, WS2, perovskite solar cells

Reference

no reference

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Author approval

I confirm

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