Enhancement Strategies for Stability and Efficiency of Perovskite Solar Cells

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Abstract

Perovskite solar cells (PSCs) have attracted considerable attention in the photovoltaic (PV) field due to the rapid enhancement in their power conversion efficiency (PCE). PSCs have several advantages, such as, high absorption coefficient, tuneable bandgap, and low-cost materials and fabrication procedures.[1] However, long-term stability is still the main problem in avoiding PSCs reaching commercialization stage. The I^- and MA^+ ions can migrate causing irreversible PV device degradation. In this work, we use of propionic acid (CH_3CH_2COOH, PA), with distinct PA/$MAPbI_3$ ratios, to dope methylammonium lead iodide ($MAPbI_3$) perovskite thin films for avoiding ions migration. [2] Once the optimal ratio is chosen, a thin but compact Bismuth (Bi) interlayer was evaporated between electron transport layer and top electrode for protecting it from iodine corrosion.[3] Figure 1. a) and d) demostrate that PSC fabricated with the 0.5 wt% doped $MAPbI_3$ perovskite film and Bi interlayer results in better PCE and are more stable over time than the oher manufaqctured devices. Figure 1 b) and c) exhibit how to influence the amount of PA in the optoelectronic and structural properties of $MAPbI_3$ perovskite thin film.

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References

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Figures

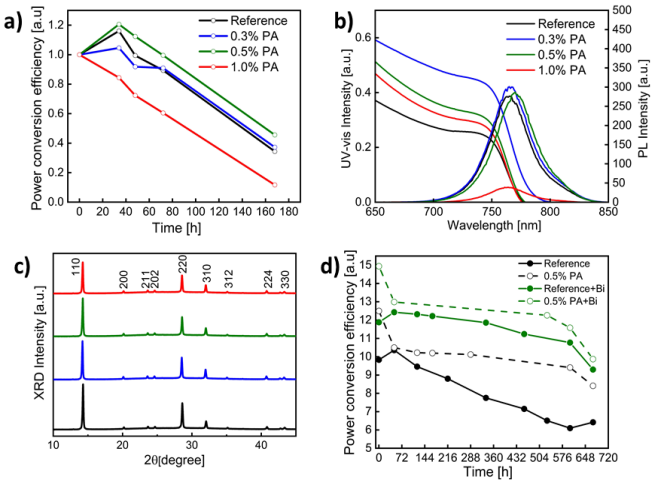

Figure 1: PCE evolution plots *vs*. time of **a)** perovskite films with different PA/$MAPbI_3$ ratios and **d)** with the Bi interlayer addition. **b)** XRD diffractogram and **c)** UV-vis absorption and photoluminescence emission spectra images of the perovskite films with different PA/$MAPbI_3$ ratios.