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The influence of morphology on charge transport/recombination dynamics in planar perovskite solar cells

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ABSTRACT

The photovoltaic performance of planar perovskite solar cell is significantly influenced by the morphology of perovskite film. In this work, five kinds of devices with different perovskite film morphologies were prepared by varying the concentration of CH₃NH₃Cl in precursor solutions. We found that best morphology of perovskite film results the excellent photovoltaic performance with an average efficiency of 15.52% and a champion efficiency of 16.38%. Transient photovoltage and photocurrent measurements are performed to elucidate the mechanism of photoelectrical conversion processes, which shows that the charge recombination is effectively suppressed and the charge transport is obviously promoted by optimized morphology.

Keywords

Chloride; Morphology; Planar perovskite solar cells; Charge transport/recombination

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