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Influence of drying temperature on morphology of $MAPbI_3$ thin films and the performance of solar cells

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Abstract

Photoelectric conversion efficiency of organic-inorganic perovskite solar cells has been rapidly raised and attracted great attention in recent years. The quality of perovskite films is vital for the performance of devices. We used the anti-solvent method to prepare $CH_3NH_3PbI_3$ thin films by spin coating and dried them at various temperature to transform adduct MAI •PbI_2 •DMSO into $CH_3NH_3PbI_3$. We researched in detail on the relationship between surface morphology of MAPbI3 thin films fabricated by the anti-solvent method and various drying temperature. We found that surface roughness and grain size of $CH_3NH_3PbI_3$ films together increased with increasing drying temperature. The larger grain size could efficiently reduce crystal boundaries which is advantageous for the suppression of photo-induced charge carrier recombination resulting in increase of FF. However, increase of surface roughness resulted in larger contact area at interface which might produce more tarp states and