Effect of solution concentration on photovoltaic performance of non-halides perovskite solar cells

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Abstract

In this research, we investigate the effect of precursor concentration on the photovoltaic and the materials properties of perovskite solar cells derived from the dehydrated lead acetate as source material. The inverted p-i-n planar heterojunction architecture was adopted in this work. One of the advantages of lead acetate as source material for perovskite solar cells is that it accelerates the crystal growth of perovskite due to the facile removal of the byproduct *N*-methylammonium acetate (CH_3NH_3Ac). As a result, smooth films with fewer pinholes were achieved at a low temperature below 100 ^oC, which results in better device performance. We vary the precursor concentration between 0.7 M to 1.1 M and the optimal solution concentration was obtained to be 0.9 M which gives the best power conversion efficiency (PCE) of 12.2% at an annealing temperature of 90 ^oC. Our investigations reveal that the effect of the precursor concentration depends largely on the rate of evaporation of the byproduct from the perovskite films.