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Investigation of Length Effect on Power Conversion Efficiency of Perovskite Solar Cells Composed of ZnO Nanowires

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Abstract : The power conversion efficiency (PCE) of the perovskite solar cells has been achieved by inserting vertically-aligned ZnO nanowires (NWs) between the cathode and the active layer and shows better solar cells performance. Perovskite solar cells have drawn significant attention due to the superb efficiency and low-cost fabrication process. In this experiment, ZnO nanowires are used as the electron transport layer (ETL) due to its low temperature process. The main idea of this thesis is utilizing the 3D structures of the hydrothermally-grown ZnO nanowires to increase the junction area to improve the photovoltaic performance of the perovskite solar cells. The infiltration and the surface coverage of the perovskite precursor solution changed as tuning the length of the ZnO nanowires. It is revealed that the devices with ZnO nanowires of 150 nm demonstrated the best PCE of 8.46 % under the AM 1.5G illumination (100 mW/cm2).

Keywords : hydrothermally-grown ZnO nanowires, perovskite solar cells, low temperature process, pinholes
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