

High-transmittance Nanopatterning Mesoporous TiO₂ Thin Film for Organo-Lead Halide Perovskite Solar Cells

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Organo-lead halide Perovskite solar cells have recently attracted as their high energy conversion efficiency, low-cost production, simple process such as solution techniques at low temperatures, and flexibility. The increasing light harvesting is the best way to improve the energy conversion efficiency of solar cells. However, it is difficult to adapt the light harvesting materials in perovskite solar cells because the device architectures consist of thin film layers. Here we used nanoimprint lithography technique to highly uniform and well-designed nanopatterning mesoporous TiO₂ thin film in perovskite solar cells. Compared to the plain layer of mesoporous TiO₂, the nanoimprinted device yielded short-circuit current density of 25.26mA/cm², a 6.7% enhancement. Consequently, the energy conversion efficiency were increased from 14.65% to 15.91%, a 8.6% enhancement, due to the increasing light harvesting to perovskite structure by nanopatterning mesoporous TiO₂ thin film as high-transmittance layer.