

E-beam evaporated NiO thin film as efficient hole transporting layer for inverted perovskite solar cells

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Among the metal oxides, nickel oxide (NiO) displays high conduction band and excellent hole transporting properties because of its good stability and high hole mobility. In our work, highly uniform and stable NiO thin film was deposited on FTO substrates by e-beam evaporation method. For thin film deposition, nickel (Ni) of different thicknesses was deposited through e-beam evaporator and thereafter, FTO/nickel thin films were subjected to annealing at a high temperature of 500 °C for the oxidation of Ni to NiO. The FTO/NiO(130 nm)/CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub>/PC<sub>61</sub>BM/Ag configuration based PSC exhibited a high power conversion efficiency (PCE) of ~8.87 % with a J<sub>SC</sub> of ~18.20 mA/cm<sup>2</sup>, V<sub>OC</sub> of ~1.04 V and FF of ~0.47. The superior performances of PSC were accredited to the high hole mobility, homogeneous deposition of NiO and fast hole injection from the valence band of CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> into the suitable HOMO of NiO HTM thin film.