

## Conference Abstract

**Effect of Nickel doping in P3HT hole transporting material on the performance of perovskite solar cells**

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**Abstract**

Perovskite solar cell (PSC) has intensively been focused on improving their efficiencies and stability for commercialisation. Various hole transporting materials (HTMs) have been reported in enhancing the performance of the PSCs. Poly-3-hexylthiophene (P3HT) is one the well-studied Hole Transporting Materials (HTM) in PSC, however, the poor carrier mobility of P3HT is the major challenge which results with the limited performance in the PSCs. In order to overcome these problems, transition metal doped Poly-3-hexylthiophene (P3HT) HTM was employed in this work to fabricate organic-inorganic hybrid PSC in air. A comparison study on several  $\text{TiO}_2/\text{CH}_3\text{NH}_3\text{PbI}_x\text{Cl}_{3-x}/\text{P3HT}/\text{Au}$  PSCs with undoped and transition metal doped P3HT devices was carried out. An efficiency over 10.5 % was achieved with Ni doped P3HT HTM, whereas the pristine P3HT was exhibited only 8.3 % under illuminations of  $100 \text{ mW/cm}^2$  (1 sun) with Air Mass (AM) 1.5 filter. The power conversion efficiency was found to be at maximum with 0.3 wt % Ni doped P3HT devices. The enhancement is mainly attributed to the improvement in short circuit current density ( $J_{\text{SC}}$ ). Incorporation of Ni in P3HT is expected to improve the hole mobility, and, thus, resulting higher  $J_{\text{SC}}$  and power conversion efficiency of PSCs.

**Keywords:** Perovskite solar cells, P3HT, Ni doped P3HT