Enhancing performance and stability of perovskite solar cells through interface engineering

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Abstract

Lead-based perovskites exhibit extraordinary optoelectronic properties which have made them most researched material today. Easy and cheap synthesis methodology adds more points to the tally of lead-based perovskites for industrial applications. However, the serious hitch that restricts them for commercial applications is poor environmental stability [2]. In perovskite solar cells, electron transport layer (ETL) and hole transport layer (HTL) are used adjacent to the perovskite layer for better charge collection. In this study, we have shown that both stability and performance of the solar cells can be enhanced by HTL layer engineering. The incorporation of new polymer-2D MoS_2 nanohybrid material as HTL results into drastic (41%) efficiency enhancement. The polymer-MoS_2 interface layer provides much better device stability [3]. Nonetheless, our results reveal that degradation induced traps are responsible for the reduction of photocurrent and hence the device performance.

References

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[2] A. Djurišić; F. Liu, H. Tam, M. Wong, C. Surya, W. Chen, Z. He. Prog. in Quantum Elect. 53, (2017),1.
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Figures

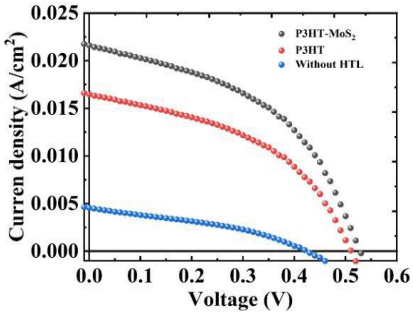

Figure 1: PCE of fabricated Solar cells with different HTL.

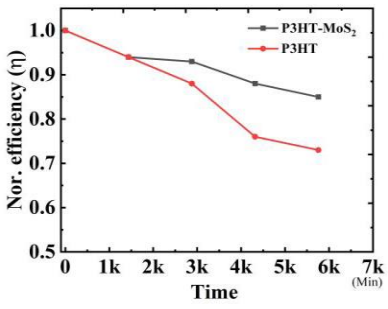

Figure 2: Stability of fabricated solar cells with different HTL.