Abstract Submitted
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Solvent-treated PEDOT:PSS hole transport layer to improve the performance and stability of perovskite solar cells[1] KHAN MAMUN REZA, QIQUAN QIAO, Department of Electrical Engineering, Center for Advanced Photovoltaics, South Dakota State University, Brookings 57007, SD, USA — Poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) is one of the most actively used hole transport materials in perovskite solar cells (PSCs). However, charge transport ability in PEDOT:PSS is inefficient due to low conductivity with the presence of weak ionic conductor PSS. In addition, optoelectronics properties of perovskite absorber is also regulated by the underlying PPEDOT:PSS layer. In this work, a facile solvent-treated method (using ethylene glycol and methanol) is applied to achieve a non-wetting conductive hole transport layer by removing the predominant PSS from the surface of PEDOT:PSS. Non-wetting conducting surface of PEDOT:PSS helps to grow larger perovskite crystalline domains, which in combination with higher conductive hole transport layer result in improved charge carrier lifetime, transport time and transfer impedance in the solvent-treated PEDOT:PSS-based PSCs. This facile solvent treatment improves the stability and the efficiency of the $MAPbI_3$ PSCs to 18.46%, which is more than 39% improvement compared to that of devices with untreated PEDOT:PSS.

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