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Low temperature processed PEDOT:PSS/VO_x bilayer for hysteresis-free and stable perovskite solar cells

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Abstract: Planar perovskite solar cells (PSCs) have attracted tremendous attention because of their excellent photovoltaic efficiencies and low temperature fabrication. However, most of the PSCs showed low open circuit voltage due to imperfect band alignment between poly(3,4-ethylenedioxythiophene): poly (styrene sulfonate) (PEDOT:PSS) and perovskite, which lead to limited performance. In this letter, low temperature solution processed VO_x film is used as a hole transport layer (HTL) to modified PEDOT:PSS for inverted PSCs, which could modify the Fermi energy of pristine PEDOT:PSS HTL, resulting in an improved band alignment and increasing open circuit voltage. The optimized device shows nearly free hysteresis with maximum power conversion efficiency (PCE) up to 14.22%, which shows better stability than the performance of the device based on PEDOT:PSS.

Keywords: Solar energy materials, Optical materials and properties, Multilayer structure,

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