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Highly efficient MA-free perovskite solar cells based on multifunctional interface modification

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Bulk and interface defects are the culprits of power conversion efficiency (PCE) loss of the perovskite solar cell (PSC)[1,2]. Meanwhile, notorious hysteresis is also an obstacle on the road of PSC's commercialization process. Consequently, it is urgently needed to develop a multifunctional modification strategy to address the above issues. Herein, we report a multifunctional buffer molecule (oteracil potassium, OP) for suppressing hysteresis and passivating defect in stable and efficient methylammonium-free PSC[3]. Experimental and theoretical results prove that multi-functional OP has strong chemical interaction with SnO_2 and the perovskite layer. It can not only reduce the oxygen vacancy defects in SnO_2 film, but also passivate the under coordinated Pb^{2+} in perovskite. At the same time, it can significantly inhibit hysteresis. Due to these beneficial effects, the PCE of the OP modified device is over 22%, and the unencapsulated modified device exhibits more excellent humidity stability. This work provides guidance for the development of multifunctional modified molecules for high PCE, stable, and non-hysteresis PSC.

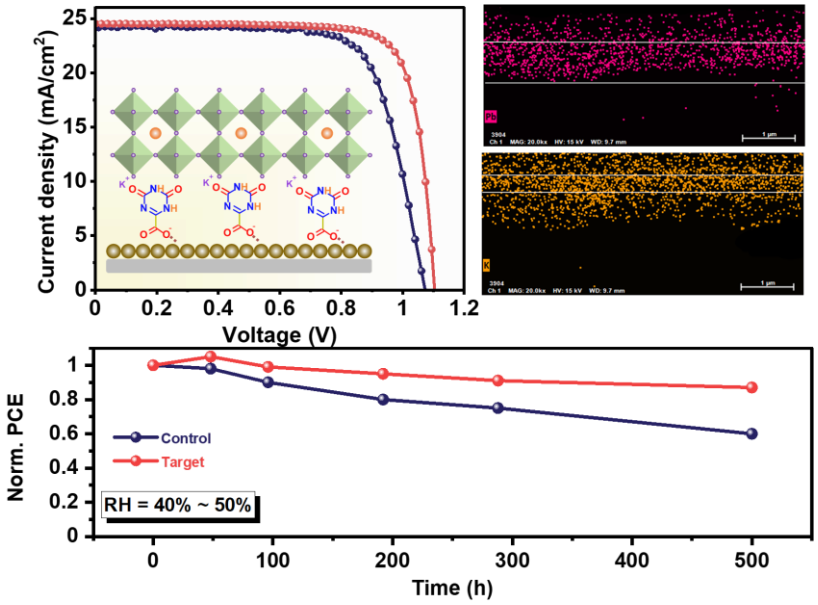

Figure 1. J-V curves of the devices without and with OP modification; cross-section EDS mapping of the devices modification. Long-term stability test with the condition of 40~50 RH%.

Key words: methylammonium-free perovskite solar cell; interface engineer; low hysteresis; multifunctional modifier; oteracil potassium

References:

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