Flexibility perovskite solar cells with high photovoltaic performance using solution processed tin oxide nanoparticle

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Hybrid organic/inorganic perovskite solar cells (PSCs) have been attracted enormous attention due to their high photovoltaic power conversion efficiency (PCE) (> 20.0%) [1-3]. The low temperature solution processed flexible PSCs are recognized as promising candidates for next generation photovoltaics in wearable electronics, and bendable display. The obtained efficiency of metal oxide electron transport materials (ETM) based normal architecture flexible PSCs (~16.0 %) has not been compared with rigid substrates' due to the fabrication difficulties of electron transport layer by low temperature process [4].

In this study, we employed SnO_2 nano-particle as the ETM for flexible PSCs (SnO_2-fPSCs) on $Cs_{0.05}(MA_{0.17}FA_{0.83})_{0.95}Pb(I_{0.83}Br_{0.17})_3$ perovskite. Figure 1(a) shows current density-voltage (*J-V*) curve of flexible PSC. The *J-V* curve shows PCE of 17.05% on SnO_2-fPSCs without hysteresis, and the inset presents the high stabilized power output (SPO) PCE of 16.9% on 1000 s light consecutive soaking. These are highest record of PCE on normal architecture fPSCs, up to date. Moreover, the normalized PCE as a function of bending cycles with bending radii of 9 mm is depicted in Figure 1(b). The SnO_2-fPSCs exhibits the superior bending stability of 78.0% in normalized PCE even after hard bending test with 2000 times. The outstanding performance of SnO_2 nano-particle film as an excellent ETM for the fPSCs will be discussed.

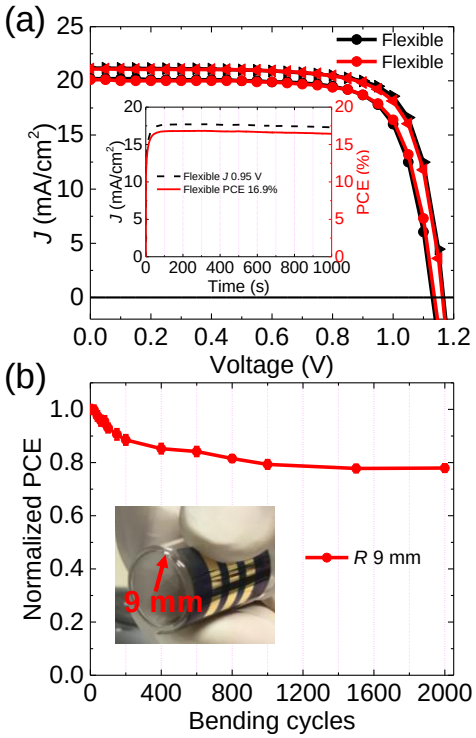

Figure 1 (a) *J-V* and SPO curves of PSCs. (b) bending stability testing curve of fPSCs.

References

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