Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Interfacial engineering of CuSCN-based perovskite solar cells *via* PMMA interlayer toward enhanced efficiency and stability

Pan Xu, Jian Liu, Jiahao Huang, Fan Yu, Cheng-Hui Li, You-Xuan Zheng*

[*] Mr. P. Xu, Dr. J. Liu, Mr. J. Huang, Ms. F. Yu, Dr. C.-H. Li, Dr. Y.-X. Zheng

State Key Laboratory of Coordination Chemistry, School of Chemistry and Chemical Engineering, Nanjing University, Nanjing 210093, PR China

E-mail: liu.jian@nju.edu.cn

[*] Dr. J. Liu

College of Chemical Engineering, Nanjing Forestry University, Nanjing 210037, P. R. China

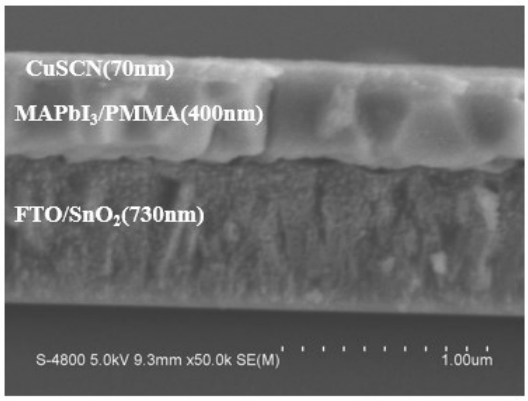


Figure S1. The cross-sectional SEM image of PSCs with the configuration of $FTO/SnO_2/MAPbI_3/CuSCN$.

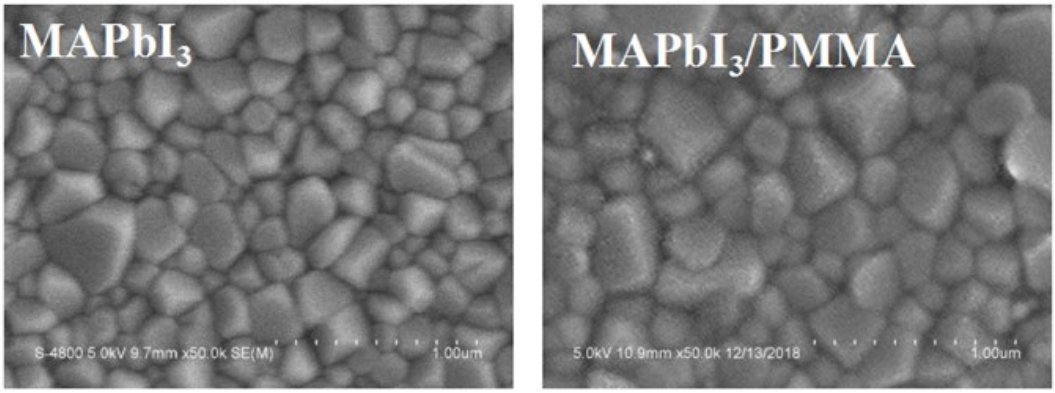


Figure S2. SEM images of perovskite thin films.

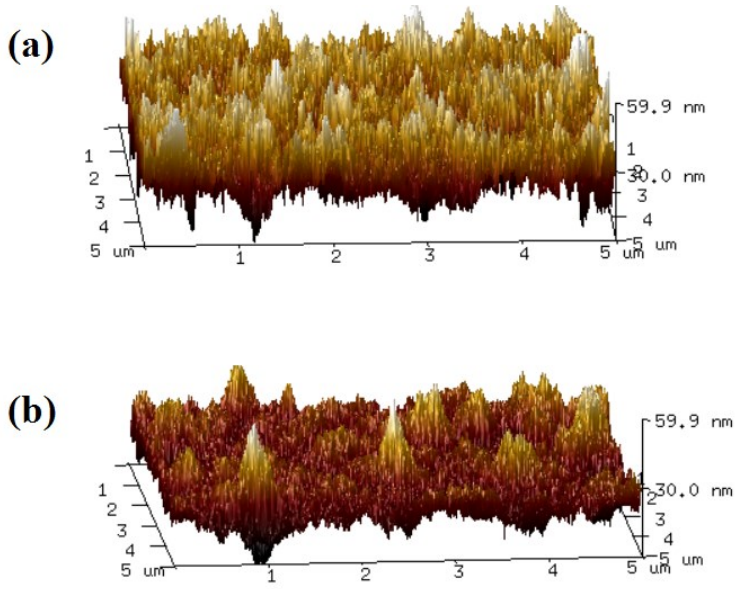


Figure S3. AFM topographical image of perovskite thin films. a) without PMMA; b) with PMMA.

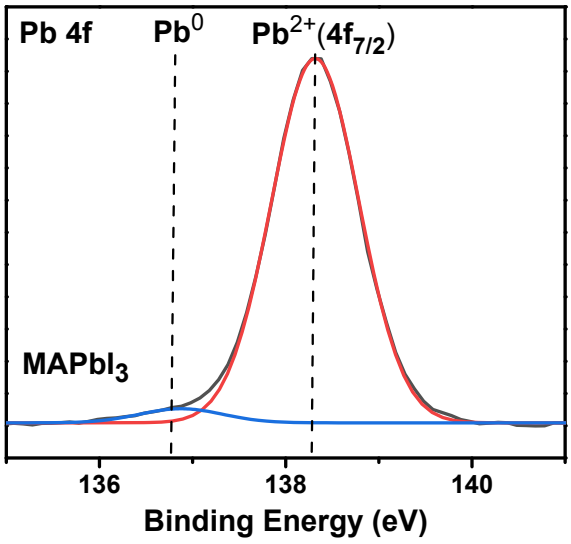


Figure S4. The XPS spectra of Pb 4f core level of $MAPbI_3$ thin film.

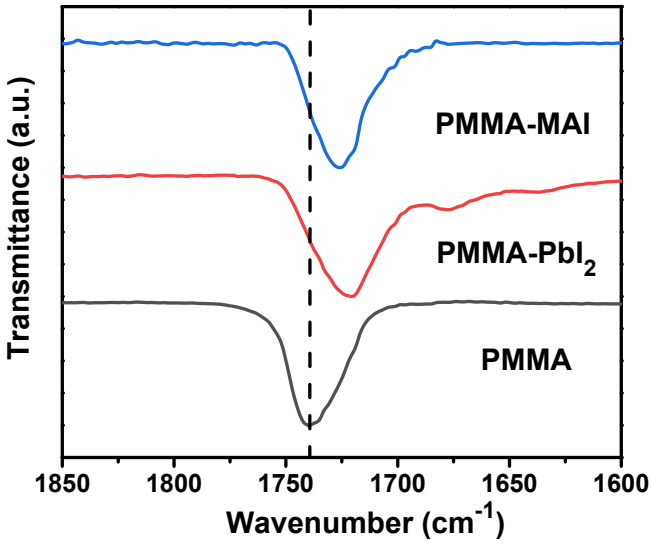


Figure S5. FTIR spectra of PMMA and PbI_2/PMMA thin films.

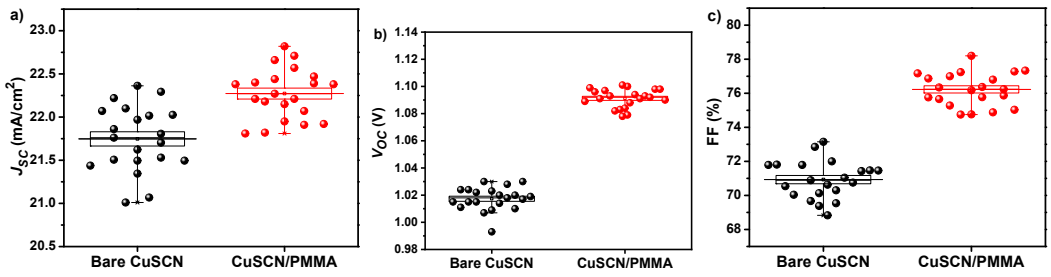
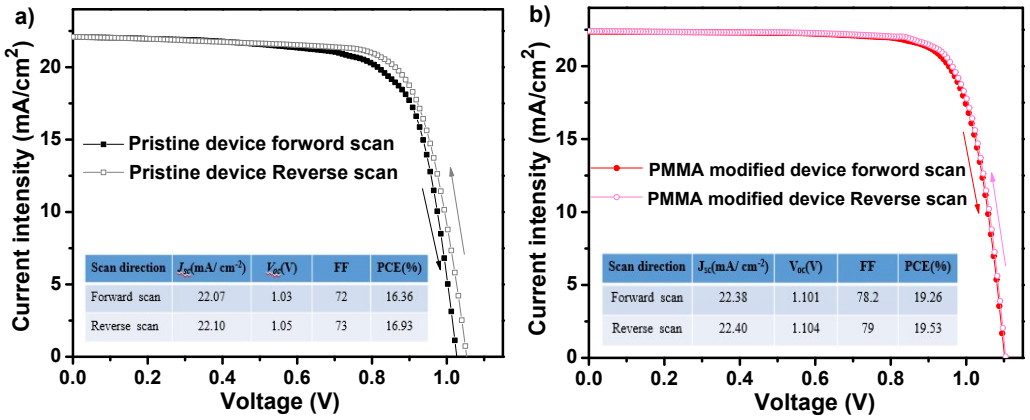


Figure S6. Statistics on performance variations of pristine devices and PMMA modified devices (20 cells for each). a) J_{sc}; b) V_{oc}; c) FF.



Scan direction	J_{sc}(mA/ cm^{-2})	V_{oc}(V)	FF	PCE(%)
Forward scan	22.07	1.03	72	16.36
Reverse scan	22.10	1.05	73	16.93

Scan direction	J_{sc}(mA/ cm^{-2})	V_{oc}(V)	FF	PCE(%)
Forward scan	22.38	1.101	78.2	19.26
Reverse scan	22.40	1.104	79	19.53

Figure S7. Hysteresis of the pristine device and PMMA modified device. (Inset, photovoltaic parameters extracted from the *J-V* curves of the champion devices measured at reverse and forward scans.)

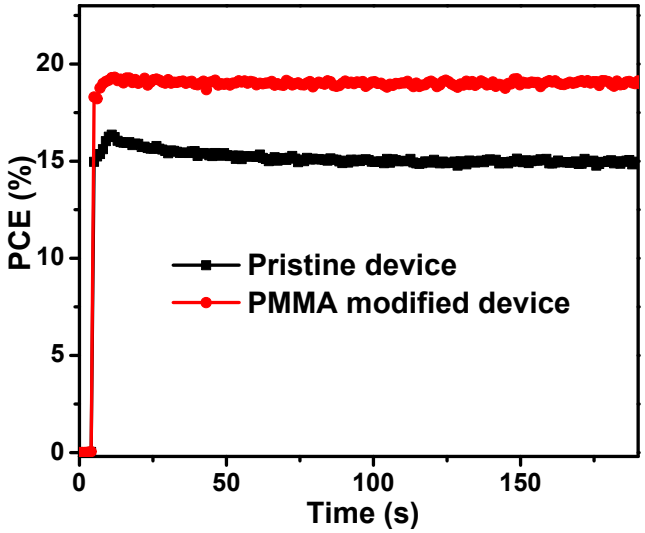


Figure S8. Steady photocurrent of pristine device and PMMA modified device.

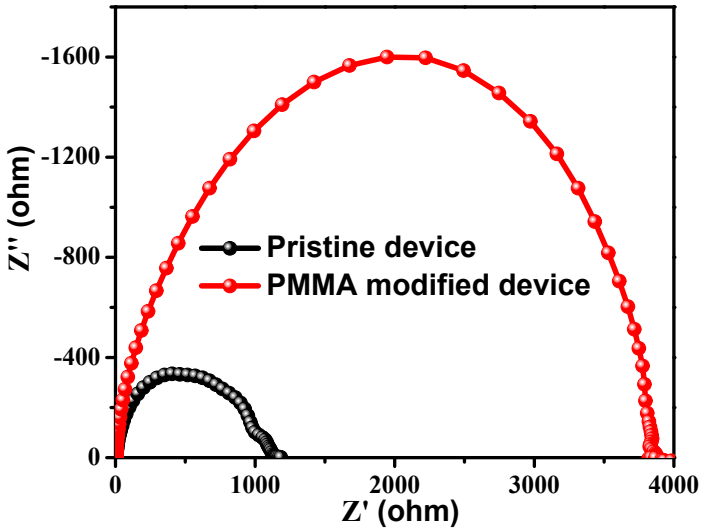


Figure S9. Nyquist plots of pristine device and PMMA modified device, measured under dark conditions at a bias of 0.8 V.

Table S1 Photovoltaic parameters of PSCs with or without the PMMA layer

device	J_{SC} (mA/cm^2)	V_{OC} (V)	FF (%)	PCE (%)
Pristine device	21.74 ± 0.37	1.017 ± 0.008	0.709 ± 0.01	15.69 ± 0.43
PMMA modified device	22.27 ± 0.29	1.091 ± 0.006	0.760 ± 0.01	18.53 ± 0.43