Supplementary Material

Air-processed $MAPbI_3$ perovskite solar cells achieve 20.87% efficiency and excellent bending resistance enabled via polymer dual-passivation strategy

Pengyun Zhang[a], Jie Xiong[a], Wei-Hsiang Chen[b], Pingfan Du[a], Lixin Song[a*]*

[a] College of Textile Science and Engineering, Zhejiang Sci–Tech University, Hangzhou, 310018, China

[b] School of Science, Huzhou University, Huzhou, 313000, Zhejiang, China

*** Corresponding Authors: jxiong@zstu.edu.cn (J Xiong); lxsong12@zstu.edu.cn (LX Song).**

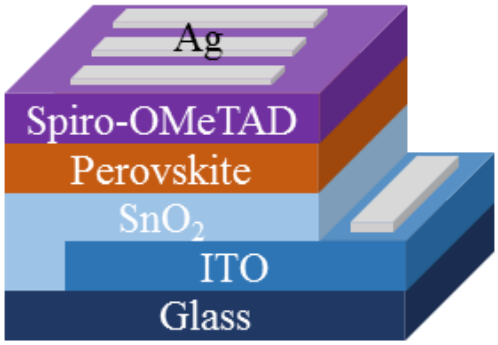

Fig. S1. The complete structure of perovskite ($MAPbI_3$) solar cell.

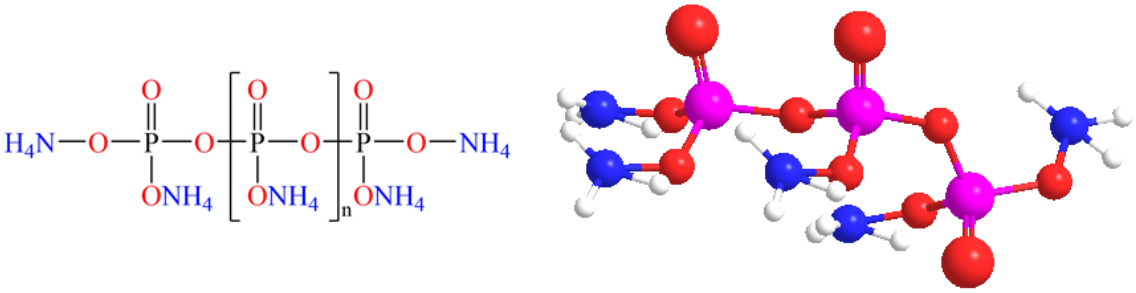

Fig. S2. The chemical formula of APP and corresponding simplified 3D structure.

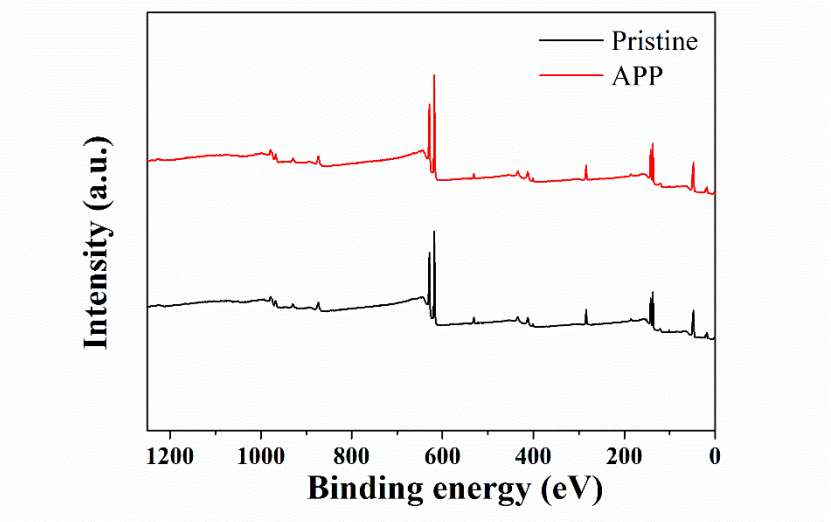

Fig. S3. The XPS survey spectra of the perovskite films (without/with APP).

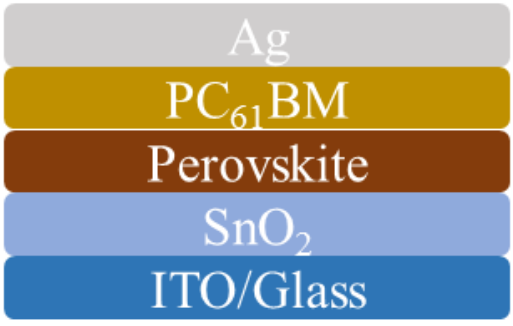

Fig. S4. The structure of electron-only device.

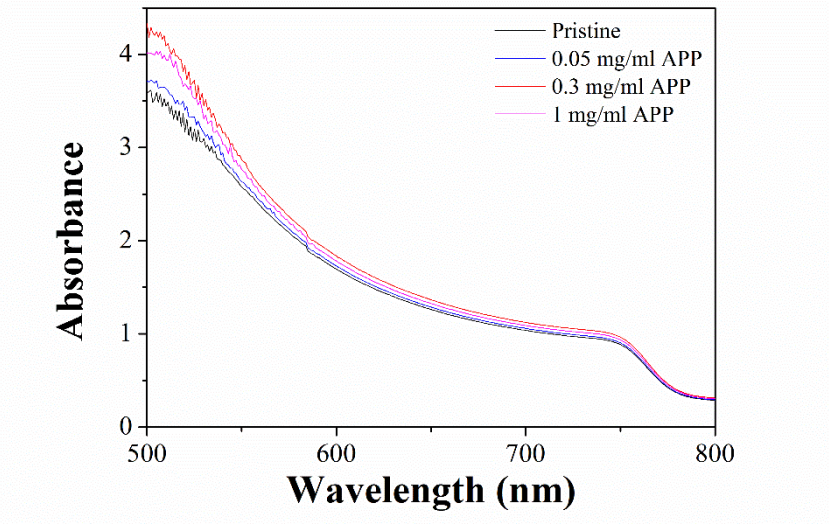

Fig. S5. The UV-vis spectra of perovskite film doping with different concentration of APP.

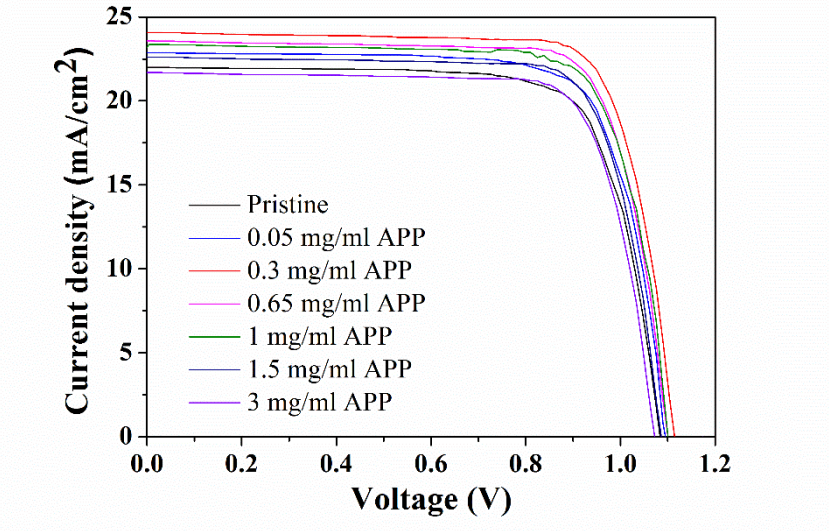

Fig. S6. The J-V curves of PSCs based on different concentration of APP.

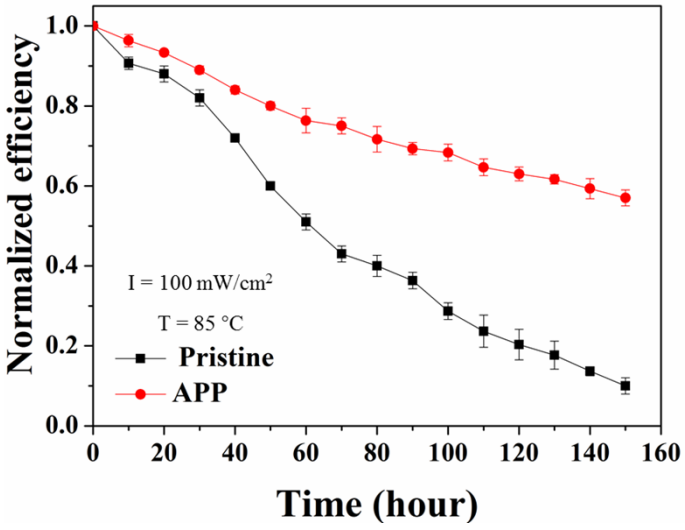

Fig. S7. Normalized PCE which investigated under continuous illumination (100 mW/cm)

and elevated temperature (85 °C) at the same time.

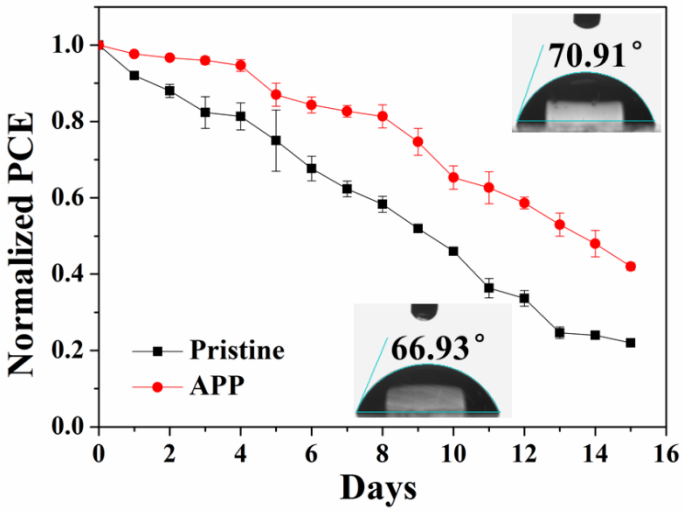

Fig. S8. The normalized PCE which investigated under 85 relative humidity for 15 days. The illustrations show the water-contact-angles images.

Table S1. Detailed photovoltaic parameters of PSCs doping with different concentrations of APP.

Samples	J_{sc} (mA/cm^2)	V_{oc} (V)	FF (%)	PCE (%)
Pristine	21.99	1.08	75.71	17.98
0.05 mg/ml APP	22.86	1.09	76.21	18.99
0.3 mg/ml APP	24.07	1.12	77.42	20.87
0.65 mg/ml APP	23.57	1.10	77.64	20.13
1 mg/ml APP	23.36	1.10	77.17	19.83
1.5 mg/ml APP	22.61	1.09	77.22	19.03
3 mg/ml APP	21.69	1.07	77.25	17.93