

Supporting Information

Enhanced stability and optoelectronic properties of MAPbI₃ films with cationic surface active agent for perovskite solar cells

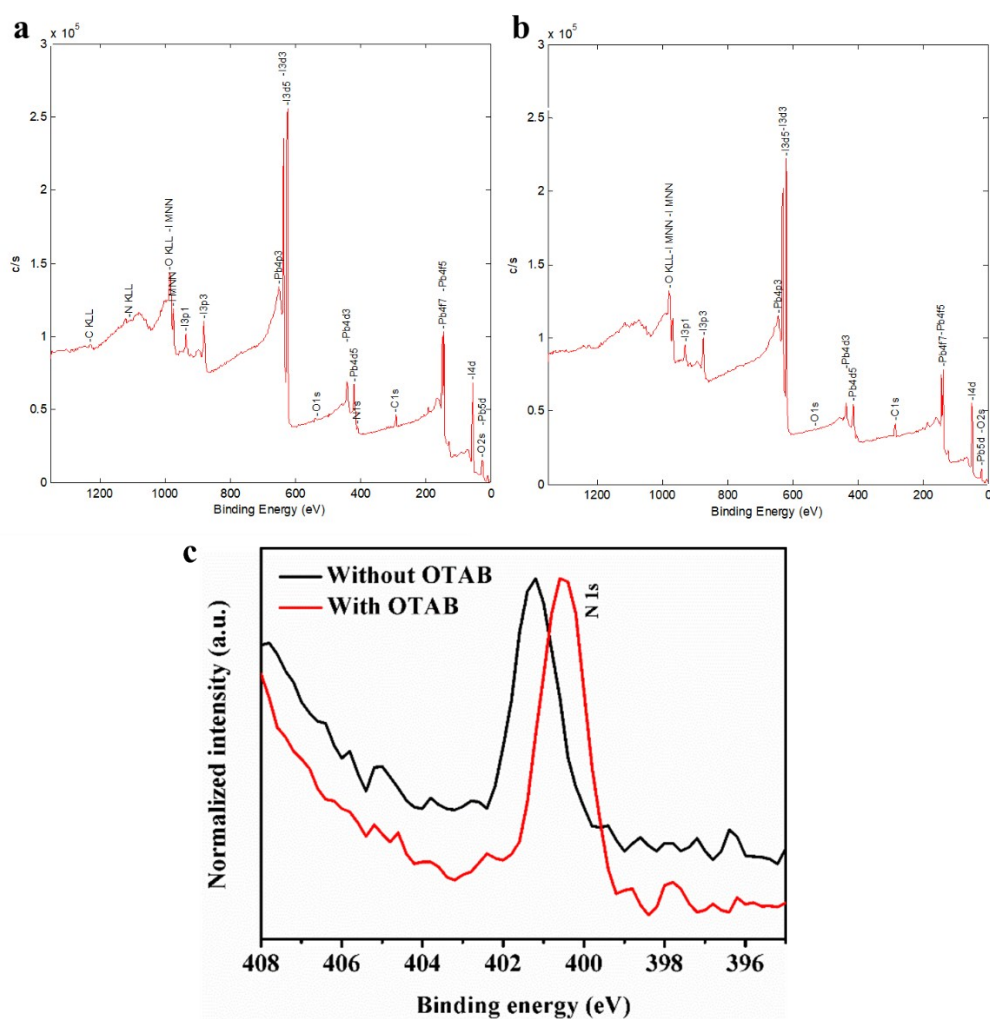


Figure S1. (a) Full XPS spectra of MAPbI₃ films without OTAB modified. (b) Full XPS spectra of MAPbI₃ films with OTAB modified. (c) N 1s XPS spectra of MAPbI₃ films with and without OTAB modified.

Table S1. The relative contents of elements on the surface of perovskite films measured by XPS.

Sample	C (%)	N (%)	Pb (%)	I (%)	O (%)
MAPbI ₃ without OTAB	35.44	10.14	15.81	36.27	2.34
MAPbI ₃ with OTAB	45.38	10.98	11.35	30.59	1.69

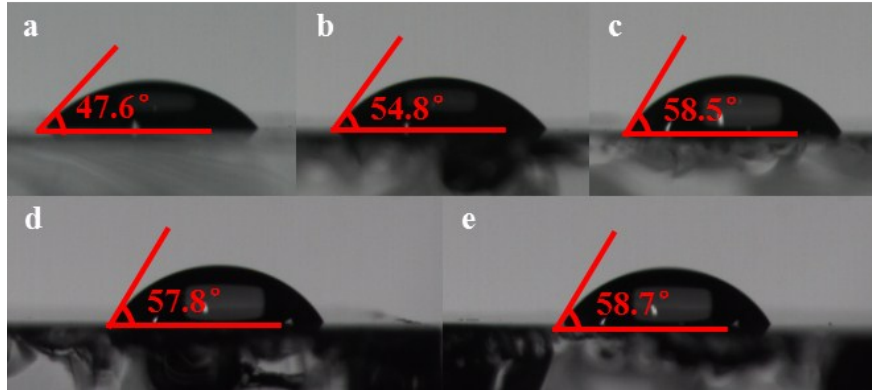


Figure S2. The static contact angles between MAPbI₃ films with adding (a) 0 mg/mL, (b) 0.1 mg/mL, (c) 0.5 mg/mL, (d) 1 mg/mL, (e) 3 mg/mL OTAB additive and deionized water.

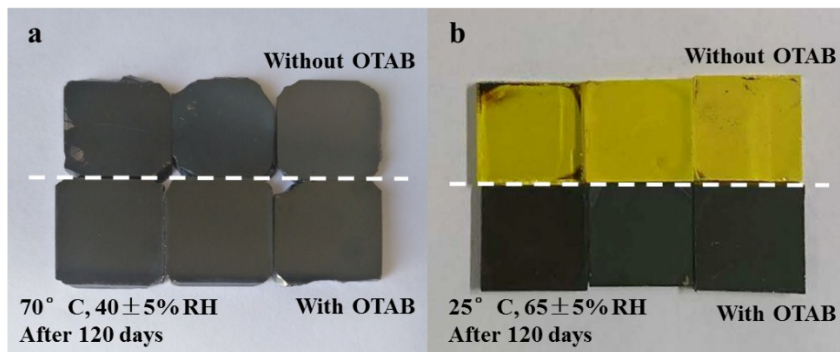


Figure S3. Photographs of MAPbI₃ films aging for 120 days under (a) 70°C, 40±5% relative humidity and (b) 25°C, 65±5% relative humidity.

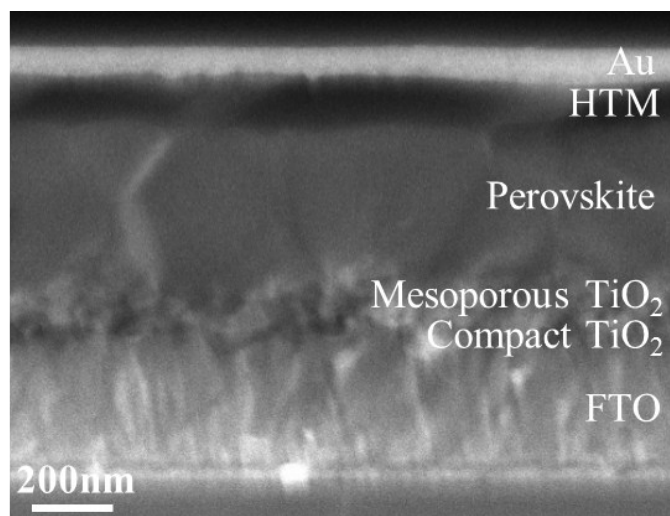


Figure S4. The cross sectional SEM image of perovskite solar cell with 0.5 mg mL⁻¹ OTAB modified.

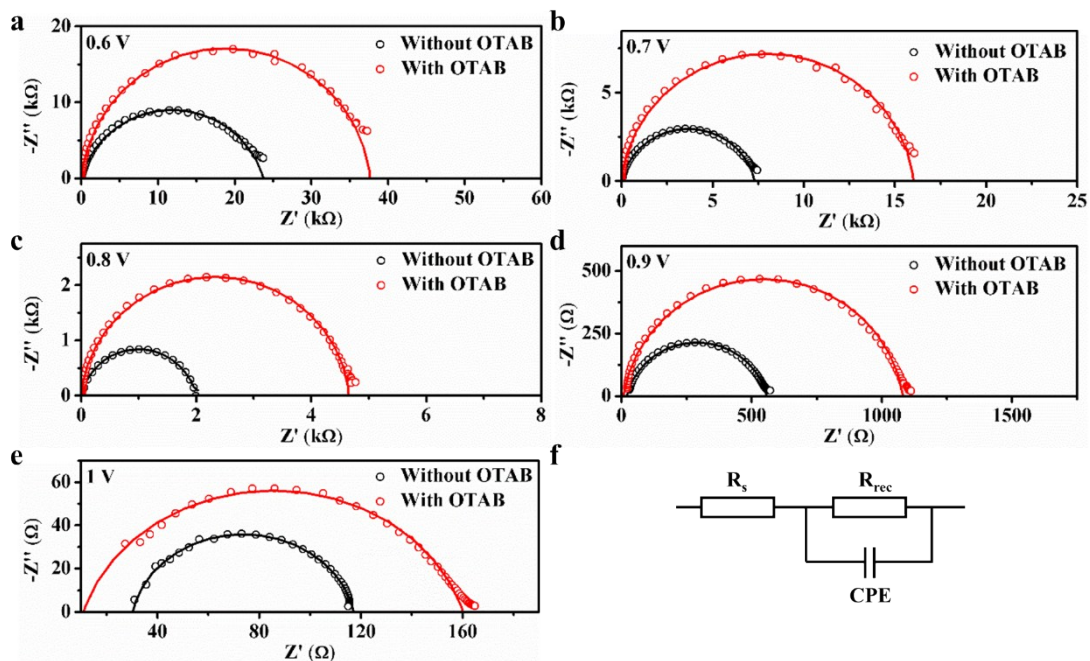


Figure S5. Nyquist plots of the PSCs measured in the dark with different bias voltage. (a) 0.6V; (b) 0.7V; (c) 0.8V; (d) 0.9V; (e) 1V. (f) Simplified equivalent circuit.

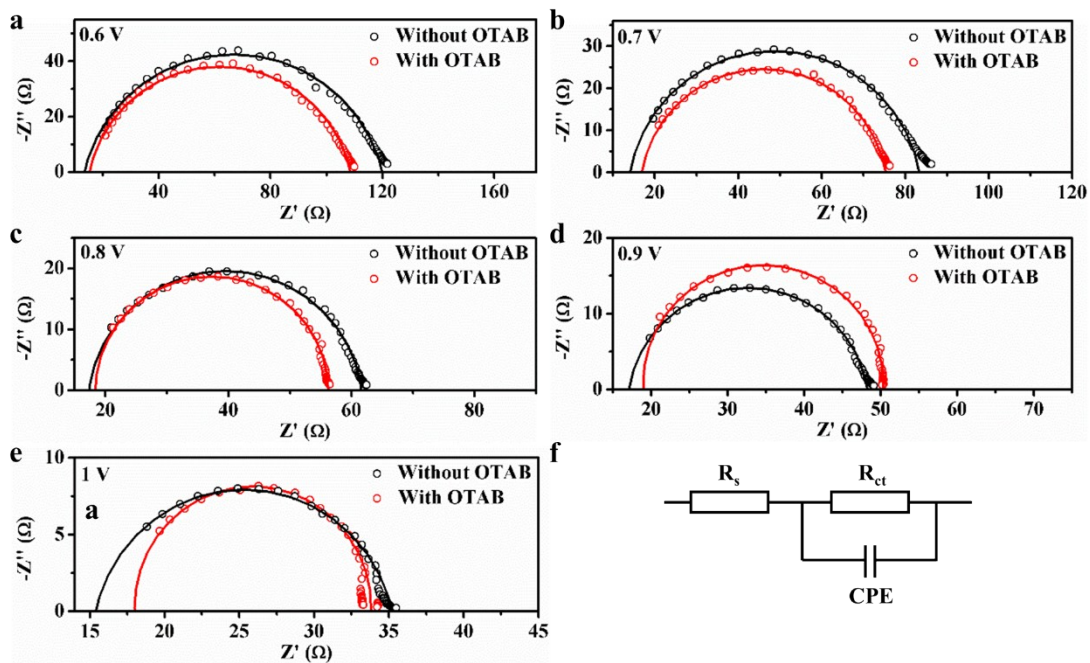


Figure S6. Nyquist plots of the PSCs measured under 1 sun light illumination with different bias voltage. (a) 0.6V; (b) 0.7V; (c) 0.8V; (d) 0.9V; (e) 1V. (f) Simplified equivalent circuit.

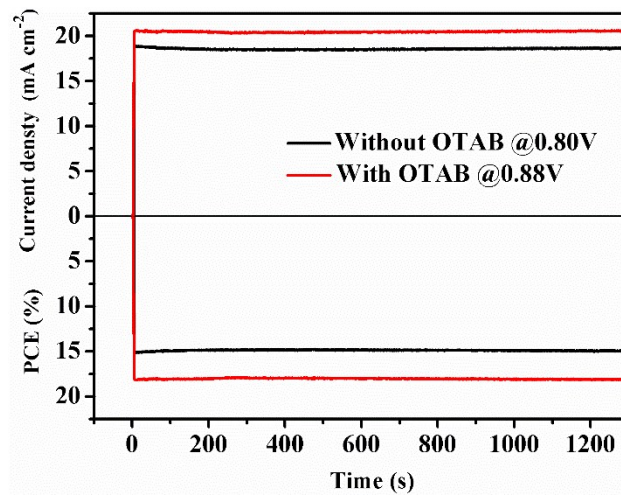


Figure S7. Stabilized current density and PCE at the maximum power point.

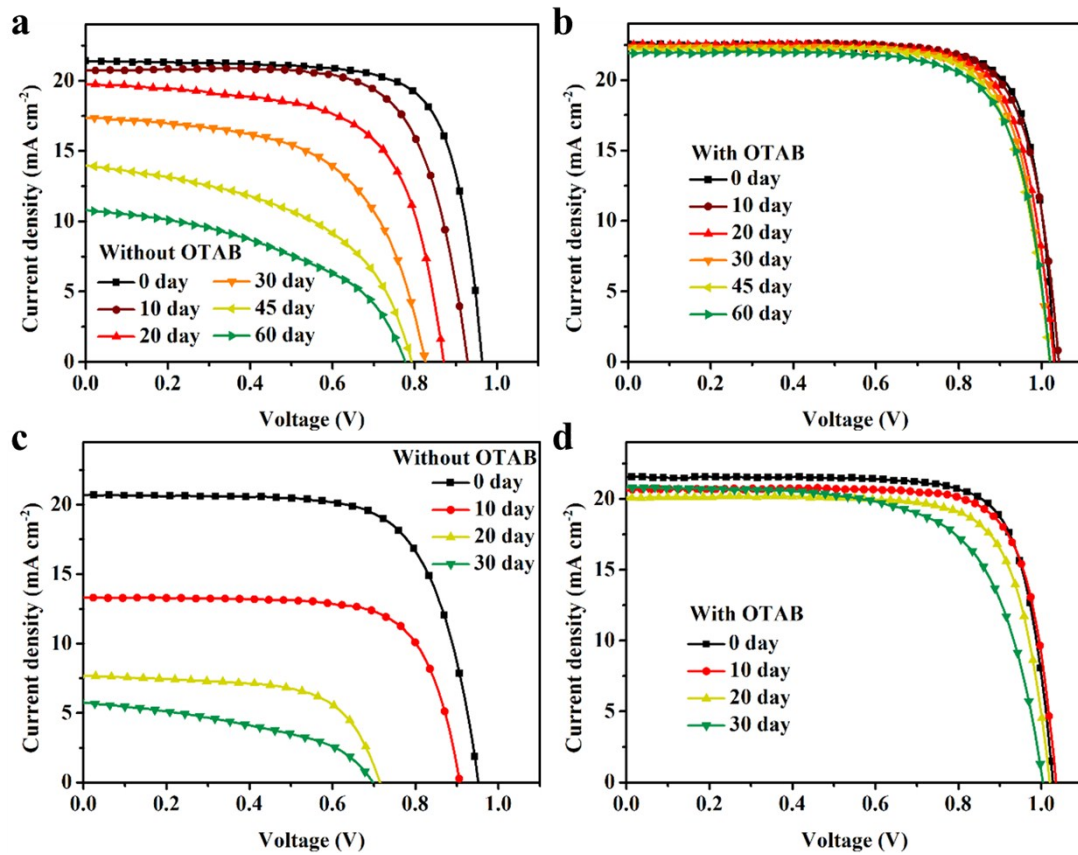


Figure S8. The evolution of J-V curves of PSCs without and with OTAB modified under (a, b) 70°C, 40±5% relative humidity for 60 days and (c, d) 25°C, 75±5% relative humidity for 30 days.