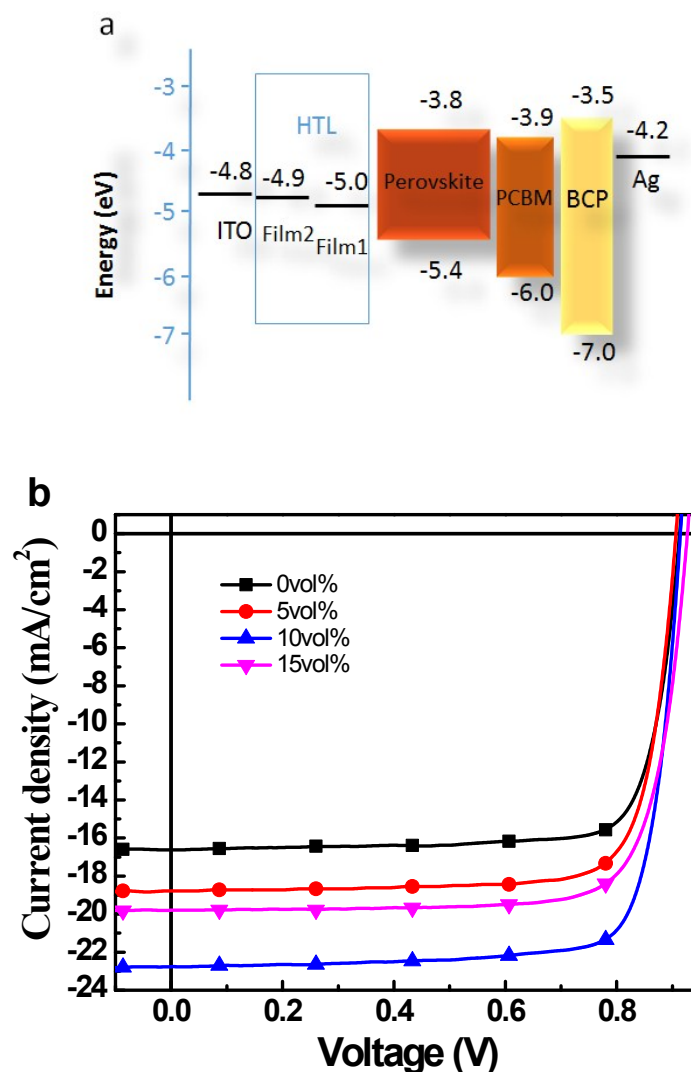


Supporting Information

Perovskite Solar Cells with DMSO-treated PEDOT:PSS Hole Transport Layer Exhibit Higher Photovoltaic Performance and Enhanced Durability

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Fig. S1. a) The energy band diagram of perovskite solar cell; b). The reverse sweep (scan rate: 22mV/s) J–V characteristics of $\text{CH}_3\text{NH}_3\text{PbI}_3$ devices with different DMSO doping ratios under 100 mW/cm^2 (AM 1.5G),

Table S1. The key parameters of $\text{CH}_3\text{NH}_3\text{PbI}_3$ solar cells under 1 Sun (AM 1.5G)

DMSO doping in PEDOT:PSS	FF[%]	Voc[V]	Jsc[mA/cm^2]	PCE[%]	Rs[Ωcm^2]
0 vol%	80	0.92	16.62	12.15	2.1
5 vol%	80	0.91	18.8	13.50	1.9
10 vol%	80	0.92	22.76	16.72	1.6
15 vol%	79	0.93	19.80	14.35	2.9

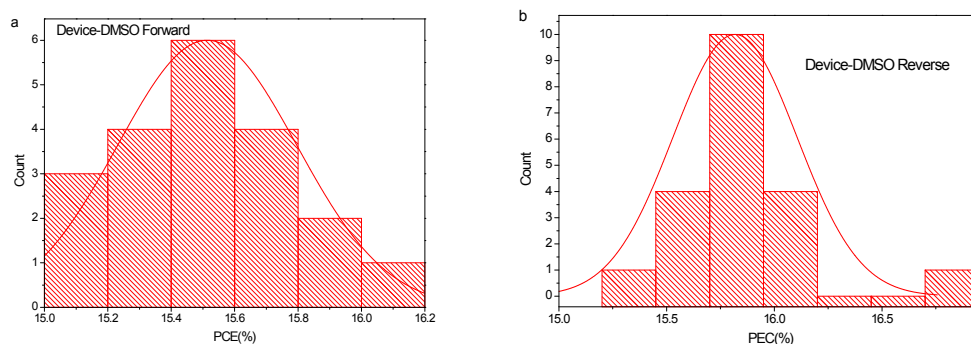


Fig. S2. Statistics on Device-DMSO PCE of 20 individual solar cells, a) forward scan and b) reverse scan.

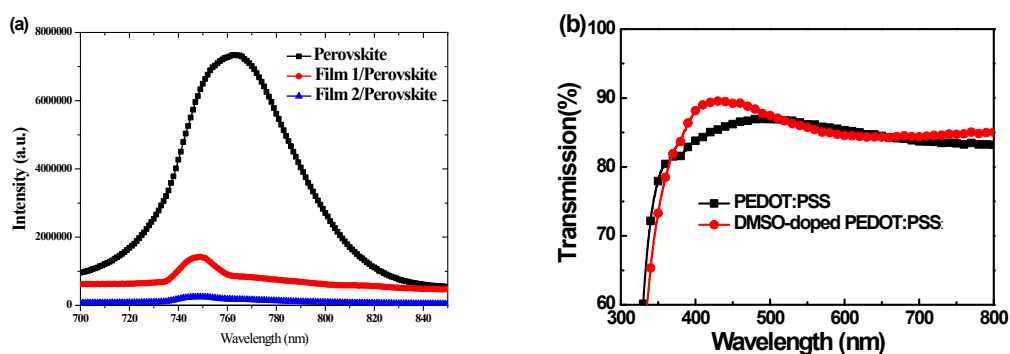


Fig. S3. (a) Steady-state PL spectra with 505nm laser a power of 1.31uW as excitation source from the air side and (b) Transmission spectra of untreated and treated PEDOT:PSS films with DMSO.

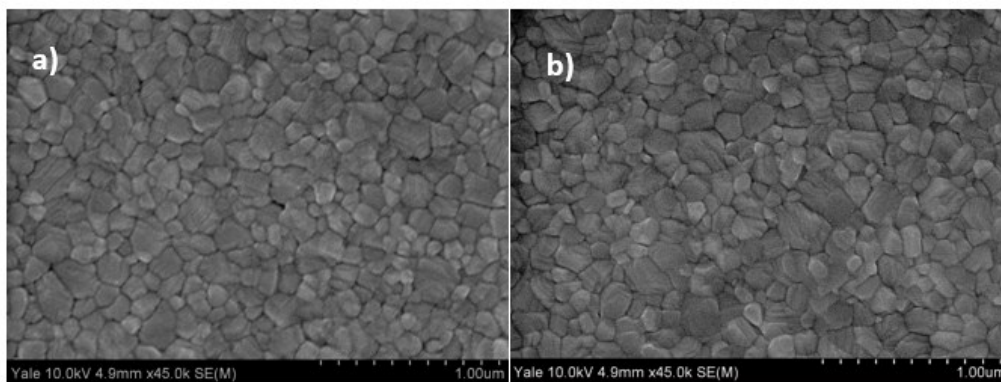


Fig. S4. Scanning electron microscopy (SEM) images of $\text{CH}_3\text{NH}_3\text{PbI}_3$ on different substrate (a) pristine PEDOT:PSS coated ITO/glass and (b) DMSO-doped PEDOT:PSS coated ITO/glass. Scale bar is $1.00\mu\text{m}$.

Table S2. The values of FWHM at the peak of (110), and (220).

	FWHM ($\text{\AA}^{-1}$)	
	(110)	(220)
Film1/Perovskite	0.071	0.142
Film2/Perovskite	0.064	0.100

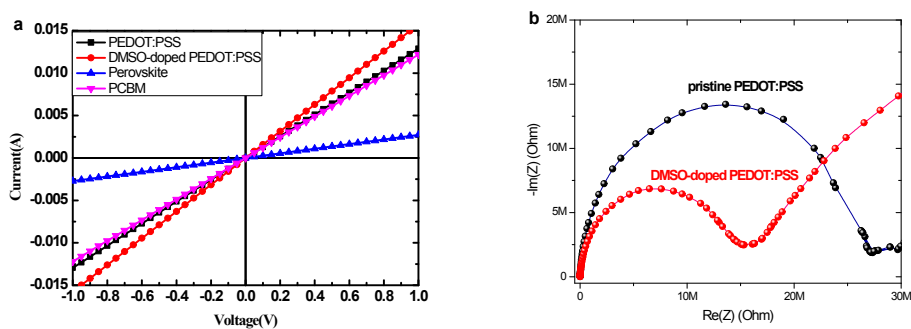


Fig.S5. a) I-V characteristics of ITO/HTL or PCBM or $\text{CH}_3\text{NH}_3\text{PbI}_3/\text{Au}$; b) Nyquist impedance plots of ITO/PEDOT:PSS or DMSO-doped PEDOT:PSS/Ag, scanned from 1M Hz to 0.5 Hz.

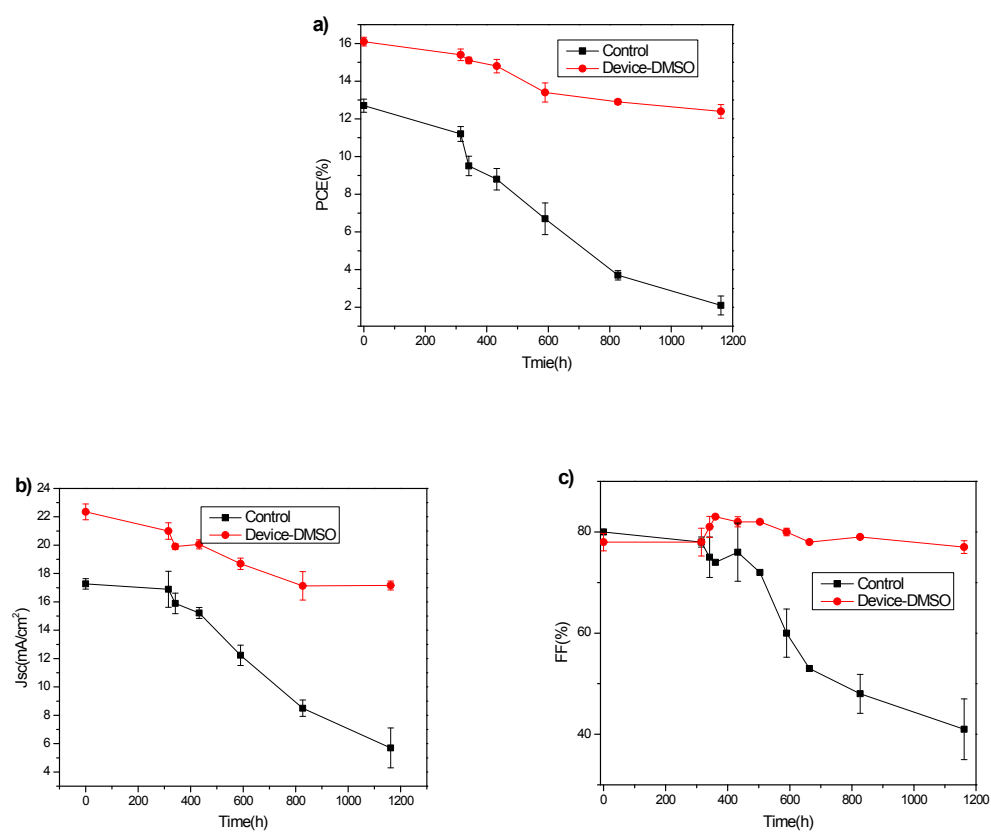


Fig.S6 Variation of a) PCE, b)J_{sc} and c) FF with time of unsealed heterojunction solar cells based on corresponding perovskite films and stored in N₂ glove box