

Supplementary Information

Photo-degradation of high efficiency fullerene-free polymer solar cell

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Table S1. Photovoltaic performance parameters of the non-annealed and annealed PSCs under AM1.5G 100 mW cm⁻² illumination.

Device type	J _{sc} (mA/cm ²)	V _{oc} (V)	FF (%)	Avg. PCE (%)	R _s (Ω.cm ²)	R _{sh} (Ω.cm ²)
Non-annealed	18.3 ± 0.12	0.912 ± 0.00	68.8 ± 0.11	11.5 ± 0.06	4.7 ± 0.07	939 ± 104
80 °C	18.3 ± 0.16	0.911 ± 0.00	66.8 ± 0.75	11.1 ± 0.10	5.8 ± 0.25	789 ± 24.6
100 °C	18.0 ± 0.16	0.904 ± 0.00	62.2 ± 0.85	10.2 ± 0.07	6.9 ± 0.63	462.0 ± 35.5
120 °C	16.0 ± 0.28	0.862 ± 0.00	56.3 ± 0.28	7.7 ± 0.28	8.1 ± 0.34	293.6 ± 10.8
140 °C	16.8 ± 0.33	0.716 ± 0.01	49.8 ± 0.66	5.9 ± 0.04	10.5 ± 0.45	188.4 ± 6.3

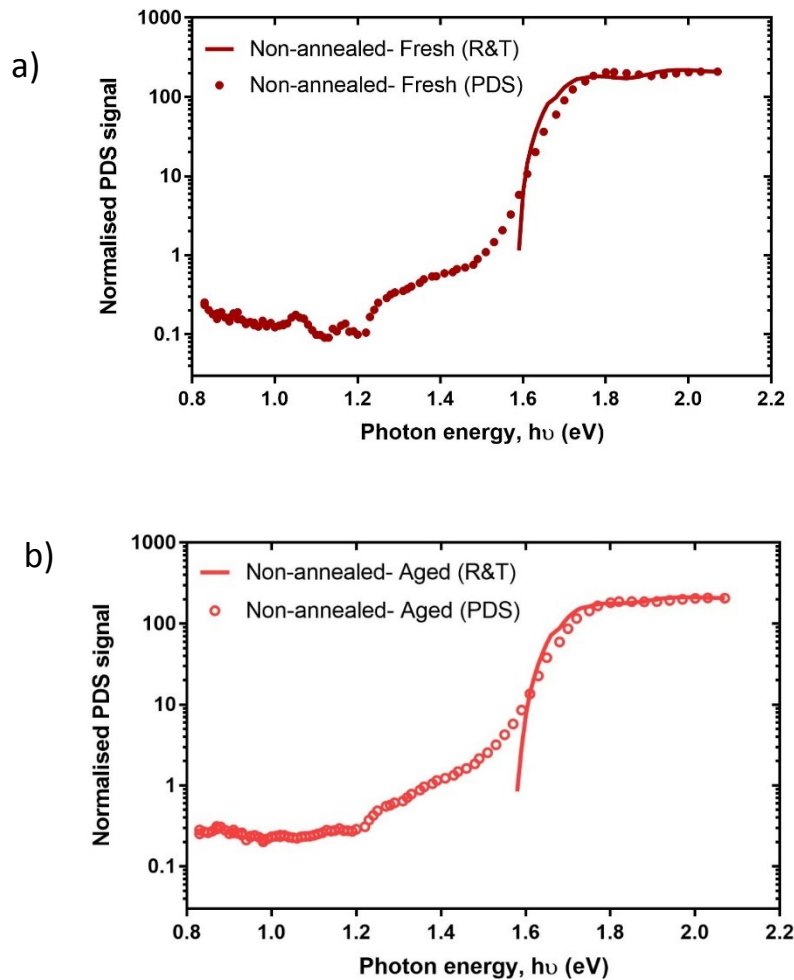


Fig. S1 A comparison of absorbance of non-annealed PBDB-T:ITIC blend film under both (a) fresh and (b) aged conditions using R&T and Photothermal deflection spectroscopy (PDS) techniques.

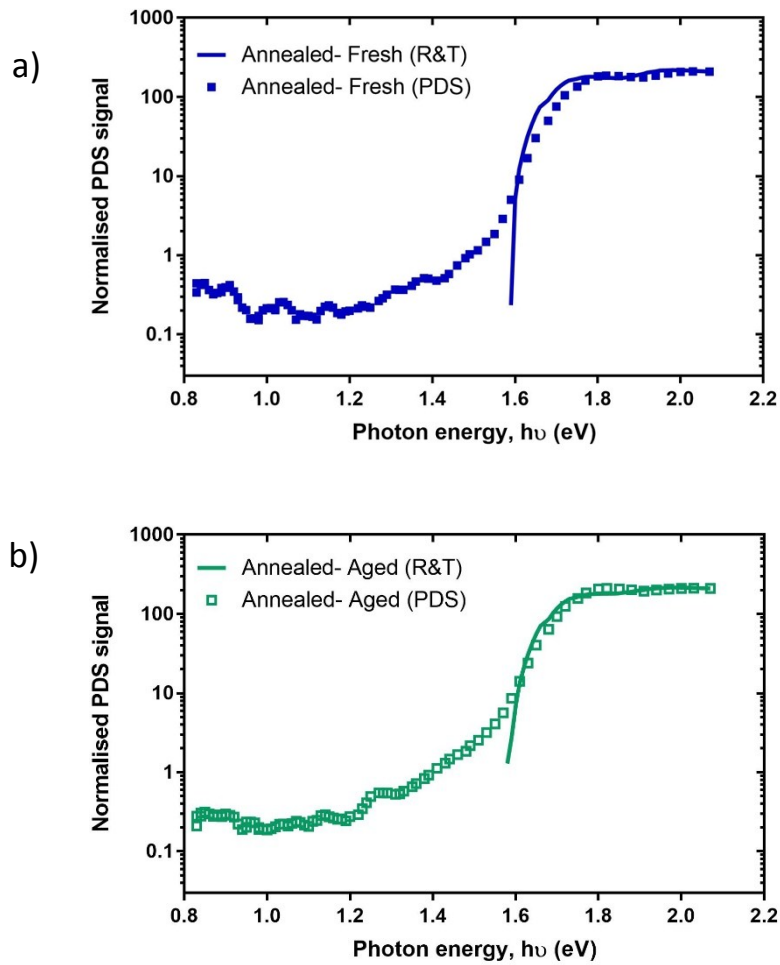


Fig. S2 A comparison of absorbance of annealed PBDB-T:ITIC blend film under both (a) fresh and (b) aged conditions using R&T and Photothermal deflection spectroscopy (PDS) techniques.

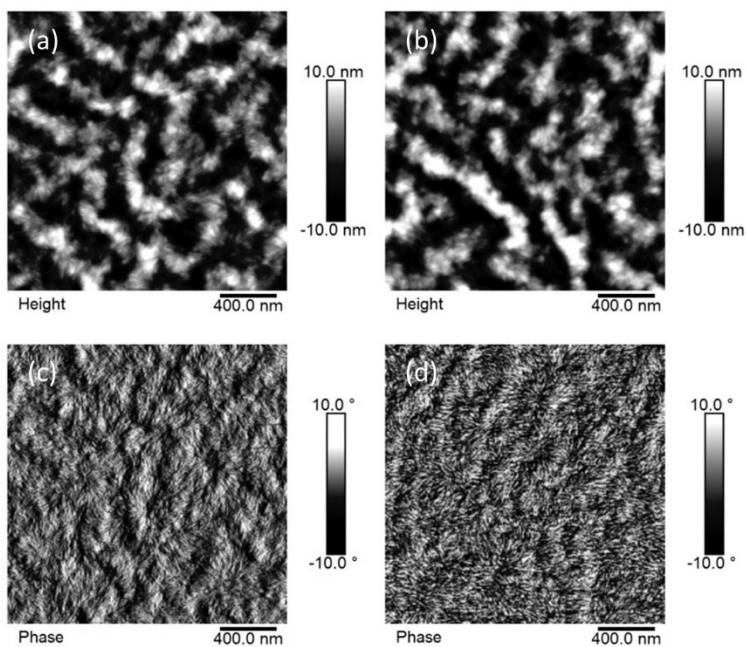


Fig. S3 The AFM height and phase images ($2\ \mu\text{m}\times 2\ \mu\text{m}$) of PBDB-T:ITIC blend films deposited on top of ITO/ZnO surface; (a, c) non-annealed film; (b, d) annealed at $80\ ^\circ\text{C}$.

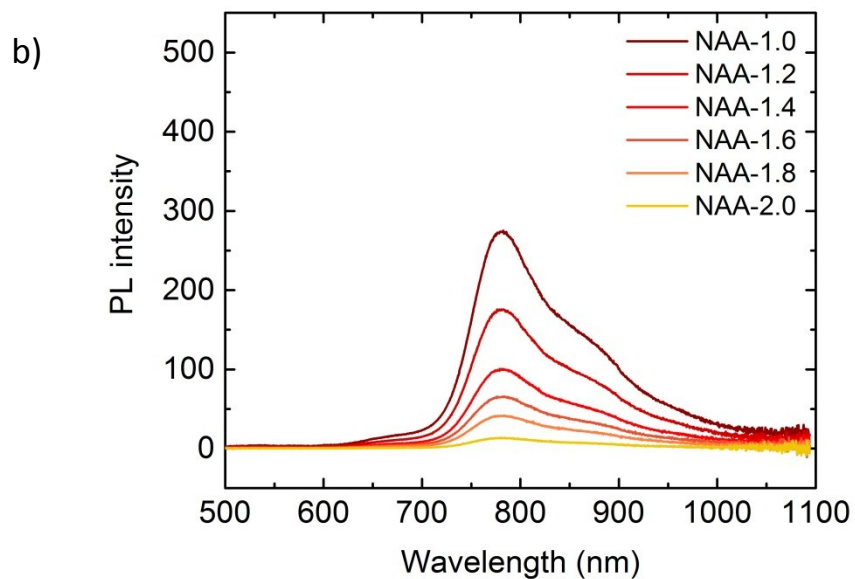
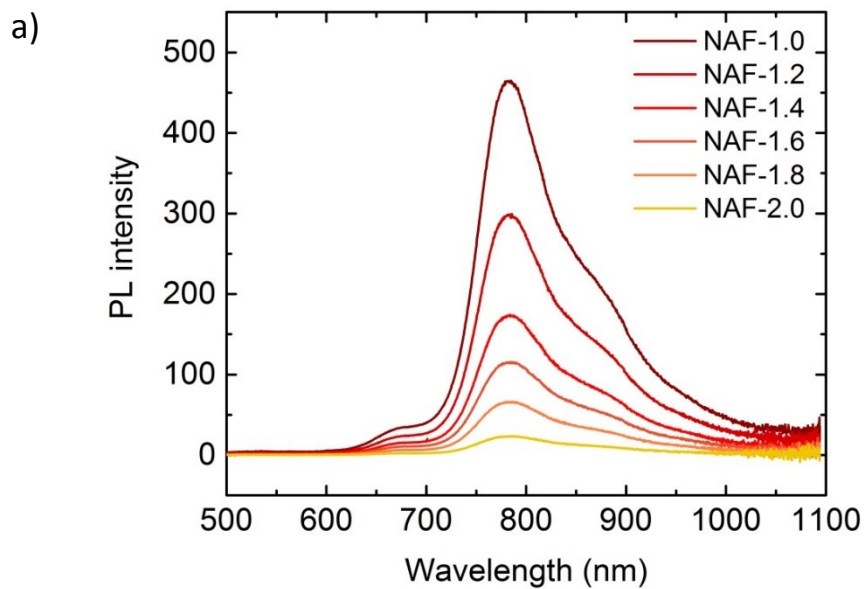


Fig. S4 PL emission spectra of non-annealed (a) fresh and (b) aged PBDB-T:ITIC blend films at different intensities, 1 and 2 denote the highest and lowest intensity, respectively.

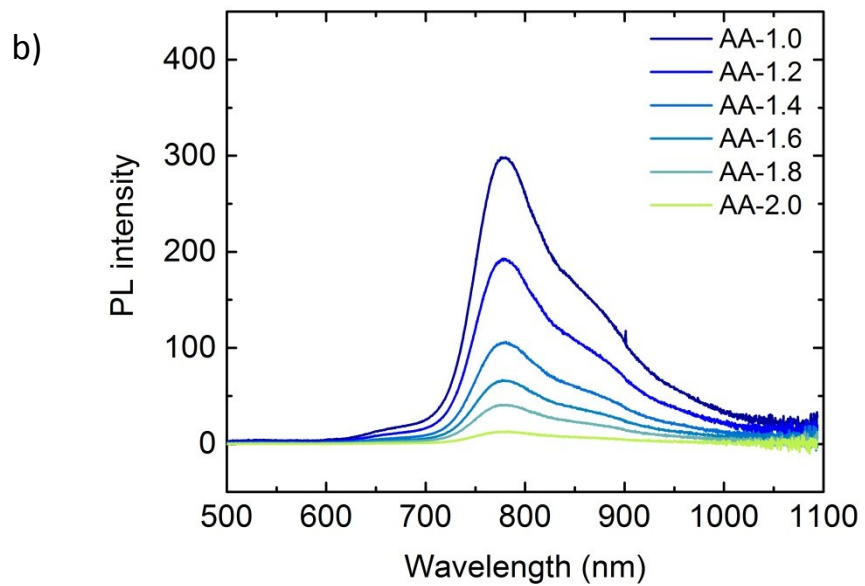
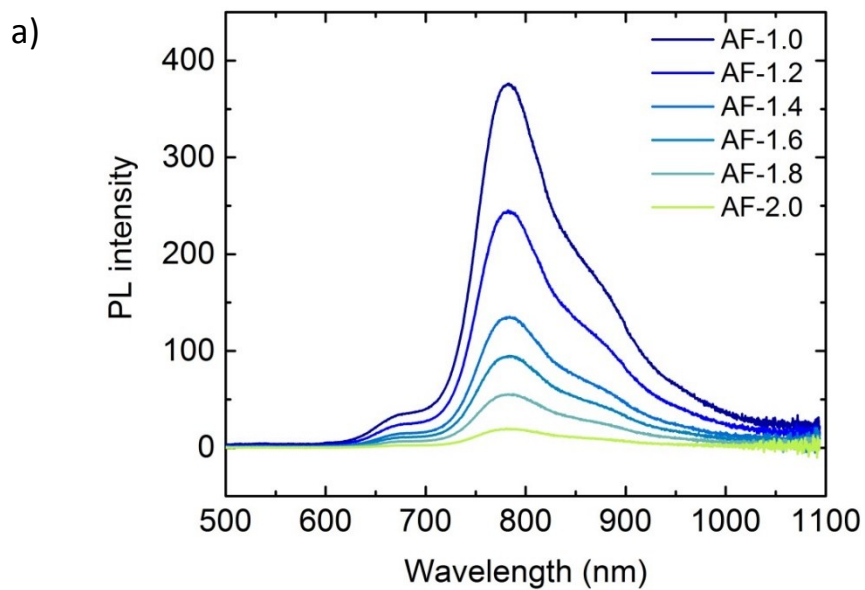


Fig. S5 PL emission spectra of annealed (a) fresh and (b) aged PBDB-T:ITIC blend films at different intensities, 1 and 2 denote the highest and lowest intensity, respectively.