

Electronic supplementary information

Roll-coating fabrication of flexible organic solar cells: comparison of fullerene and fullerene-free systems

Kuan Liu,^{ab} Thue Trofod Larsen-Olsen,^b Yuze Lin,^a Michail Beliatis,^b Eva Bundgaard,^b Mikkel Jørgensen,^b Frederik C. Krebs*^b and Xiaowei Zhan*^a

^a Department of Materials Science and Engineering, College of Engineering, Key Laboratory of Polymer Chemistry and Physics of Ministry of Education, Peking University, Beijing 100871, China. E-mail: xwzhan@pku.edu.cn

^b Department of Energy Conversion and Storage, Technical University of Denmark, Frederiksborgvej 399, Roskilde DK-4000, Denmark. E-mail: frkr@dtu.dk

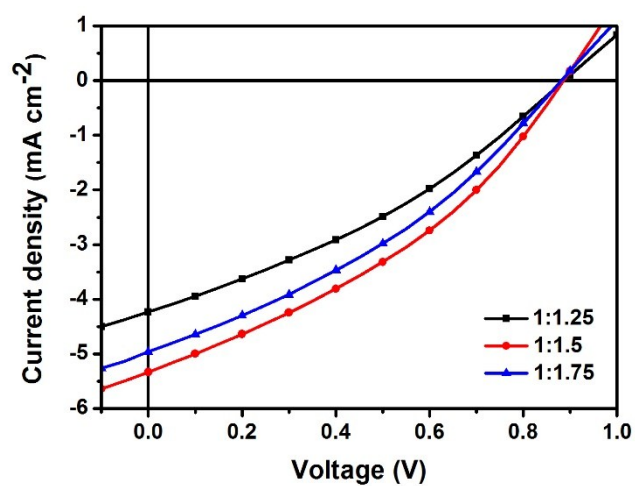


Fig. S1 J - V curves of the non-fullerene OSCs based on ITO-free substrate with different PTB7-TH:IEIC weight ratios (1:1.25, 1:1.5 and 1:1.75) processed with CB solvent.

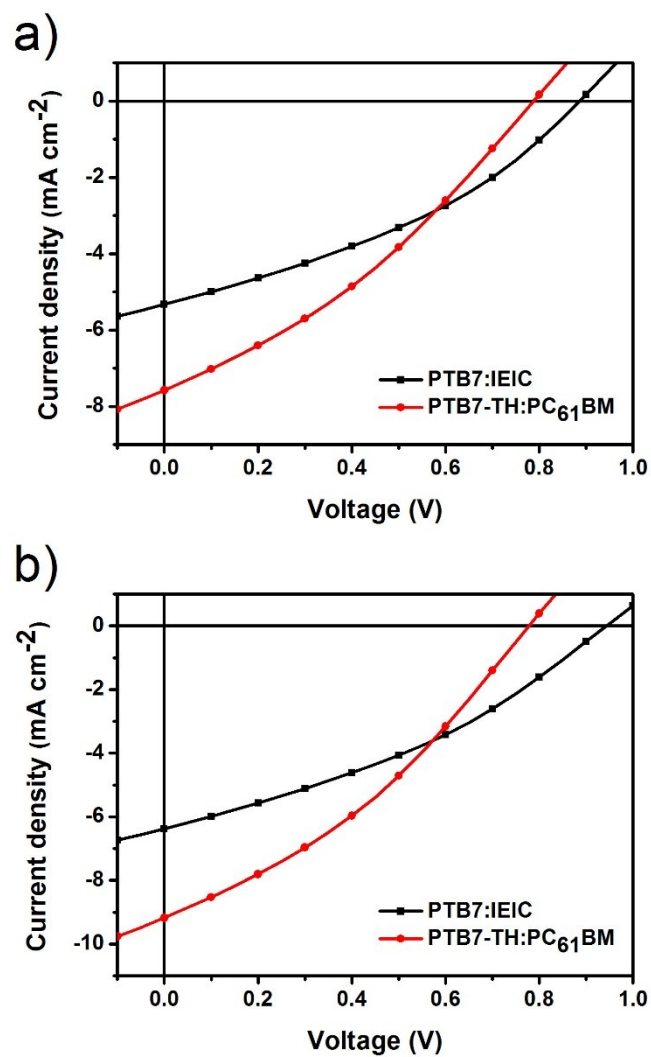


Fig. S2 J - V curves of the non-fullerene and fullerene OSCs based on (a) ITO-free substrate, (b) flexible ITO substrate (1:1.5, w/w, DCB solvent).

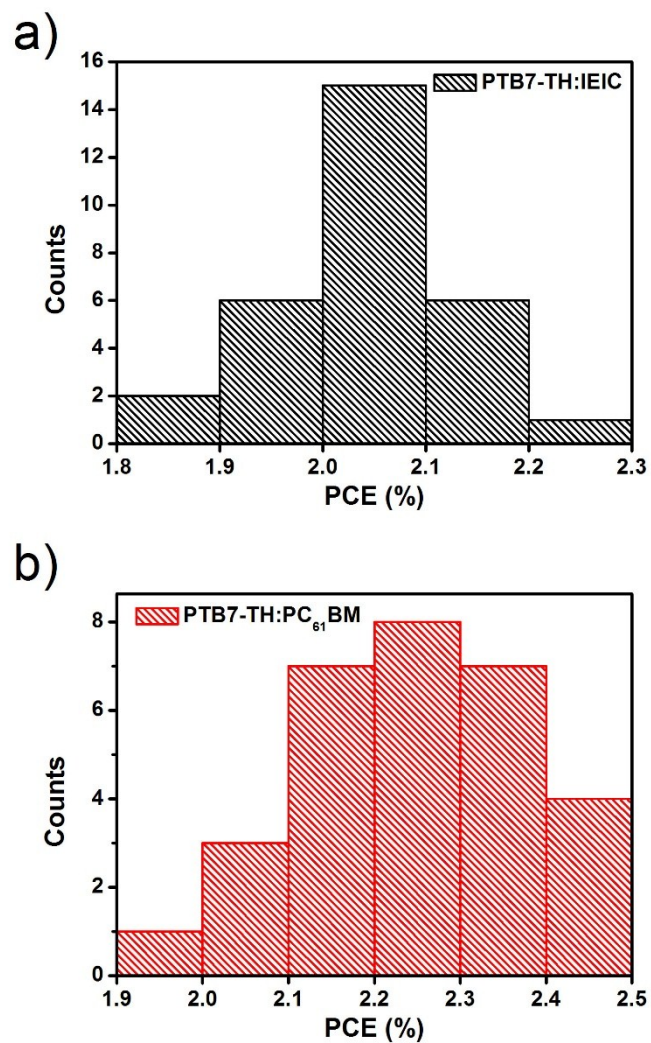


Fig. S3 The normal distribution of the PCEs of 30 flexible ITO-based OSCs based on blended films of (a) PTB7-TH:IEIC, (b) PTB7-TH:PC₆₁BM (1:1.5, w/w, DCB solvent).

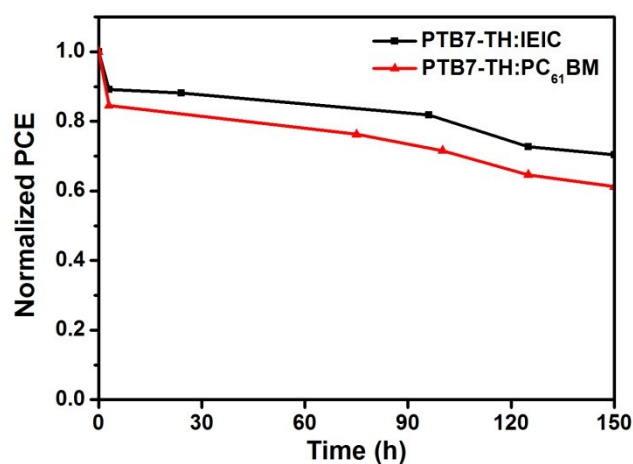


Fig. S4 The dark storage stability curves of the unencapsulated OSCs with flexible ITO substrate based on blended films of PTB7-TH:IEIC and PTB7-TH:PC₆₁BM (both processed by DCB solvent and 1:1.5 D/A weight ratio) in the ambient atmosphere ($20 \pm 5^\circ\text{C}$, $40 \pm 10\%$ relative humidity), measured under the illumination of an AM 1.5G solar simulator, 100 mW cm^{-2} .

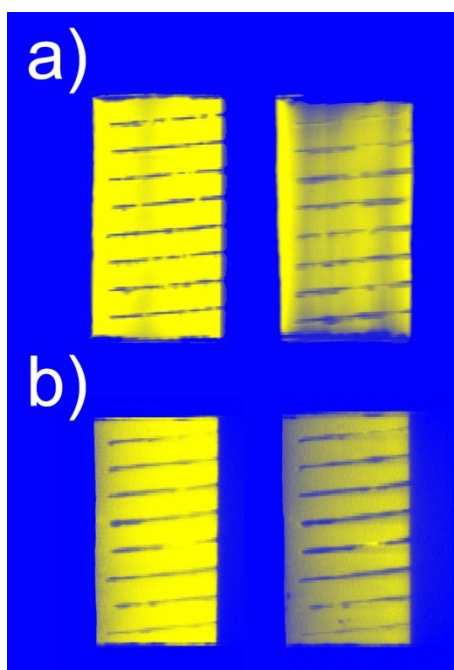


Fig. S5 The LBIC images of the ITO-based OSCs based on (a) the blended films of PTB7-TH:IEIC and (b) PTB7-TH:PC₆₁BM before (left) and after (right) 180 h dark storage.

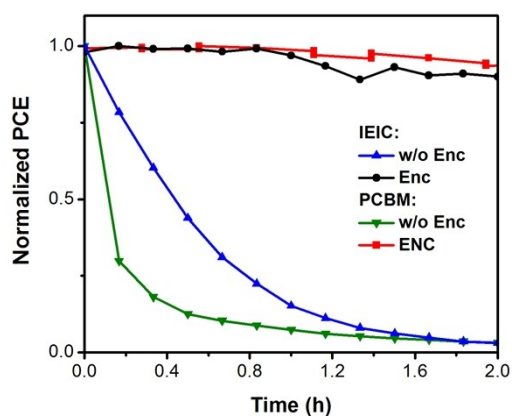


Fig. S6 Continuous illumination stability test of unencapsulated and encapsulated IEIC and PCBM-based devices in ambient atmosphere.

Table S1 Average and best photovoltaic performance of the OSCs based on the blended film of PTB7-TH:IEIC under different conditions

substrate	processing solvent	D/A weight ratio	V_{oc} (V)	J_{sc} (mA cm ⁻²)	FF (%)	PCE (%)	
						average	best
ITO-free	CB	1:1.25	0.886	4.23	33.16	1.28	1.36
ITO-free	CB	1:1.5	0.886	5.33	35.44	1.53	1.67
ITO-free	CB	1:1.75	0.881	4.96	34.12	1.37	1.49
ITO-free	DCB	1:1.25	0.893	4.65	34.62	1.31	1.44
ITO-free	DCB	1:1.5	0.903	5.39	36.71	1.60	1.79
ITO-free	DCB	1:1.75	0.900	4.93	34.50	1.36	1.51
ITO	DCB	1:1.25	0.928	5.93	33.04	1.68	1.82
ITO	DCB	1:1.5	0.938	6.86	35.17	2.05	2.26
ITO	DCB	1:1.75	0.943	6.38	34.33	1.91	2.07