Supporting Information

Improved photon-to-electron response of ternary blend organic solar cells with low band gap polymer sensitizer and interfacial modification

Shuhua Zhang,[a] Lijian Zuo,[a,*] Jiehuan Chen,[a] Zhongqiang Zhang,[a] Jiangquan Mai,[b] Tsz-Ki Lau,[b] Xinhui Lu,[b] Minmin Shi[a] and Hongzheng Chen[a,*]

[a] *State Key Laboratory of Silicon Materials, MOE Key Laboratory of Macromolecular Synthesis and Functionalization, Department of Polymer Science & Engineering, Zhejiang University, Hangzhou 310027, P. R. China*

E-mail: hzchen@zju.edu.cn , zjuzlj@gmail.com

[b] *Department of Physics, Chinese University of Hong Kong, New Territories, Hong Kong, P. R. China*

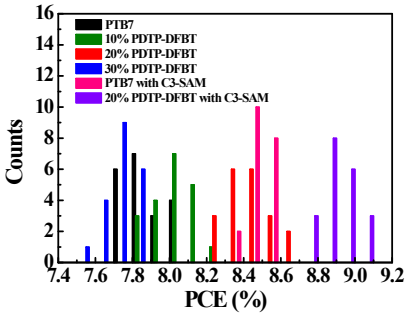

Fig. S1 PCE histograms of the binary and ternary inverted PSCs with and without C3-SAM.

The PCE distribution of the binary and ternary PSCs was match up with the trend of the performance summarized in Table 1. Compared with that of the PSCs without C3-SAM modification, the device performance of the binary and ternary PSCs with C3-SAM modification showed a narrow distribution of PCE. This indicated that the C3-SAM could also improve the reproducibility of organic solar cells[31].

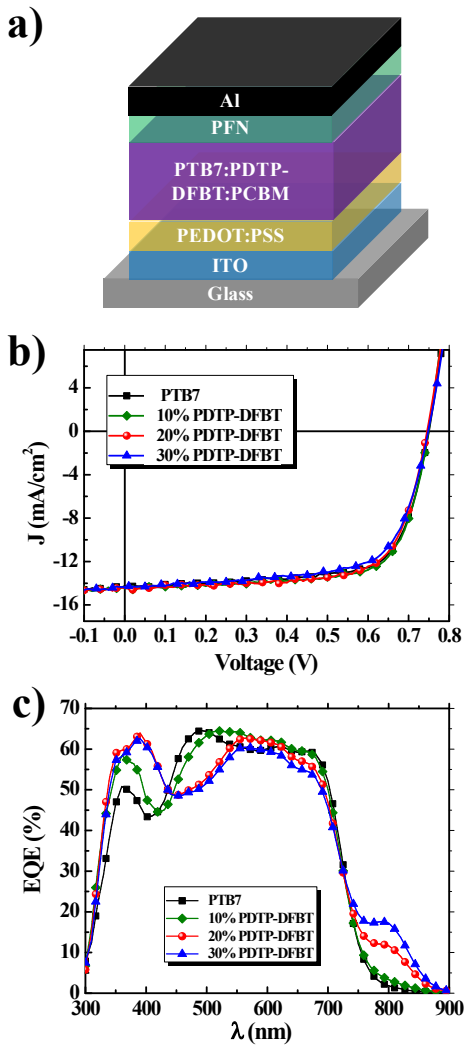

Fig. S2 a) Schematic device structure of the conventional single junction ternary solar cells; b) J-V characteristics and c) EQE spectra of PTB7:PDTP-DFBT:$PC_{71}BM$ with different weight fractions of PDTP-DFBT under AM 1.5G illumination at 100 mW cm^{-2}.

Table S1 Summarized solar cell parameters of the ternary PTB7:PDTP-DFBT:$PC_{71}BM$ blends with different weight ratios of PTB7:PDTP-DFBT conventional devices

PTB7:PDTP-DFBT:$PC_{71}BM$	J_{sc} (mA cm^2)	V_{oc} (V)	FF (%)	PCE (%)	
				Best	Average
1:0:1.5	14.25	0.75	71.18	7.61	7.42±0.12
0.9:0.1:1.5	14.49	0.75	70.96	7.72	7.55±0.14
0.8:0.2:1.5	14.44	0.75	69.55	7.53	7.28±0.14
0.7:0.3:1.5	14.35	0.75	67.47	7.26	7.01±0.10

Conventional device fabrication

The cleaned ITO glass substrates were spin-coated with PEDOT:PSS AL-P 4083 at 3000 rpm for 40 s, followed by heating at 140°C in air for 15min. The PEDOT:PSS coated substrates were then transferred into a N_2 glovebox for further processing. In the following, 25 mg/ml PTB7:PDTP-DFBT:$PC_{71}BM$ (10 mg/ml for polymer and 15 mg/ml for $PC_{71}BM$) solution in chlorobenzene solvent with 3% solvent additives (DIO) was

spin-cast on the PEDOT:PSS at 1400 rpm to form 110 nm thickness active layer. 0.4mg/ml PFN methanol solution was spin-cast on the active layer at 3000 rpm for 40s to form a cathode modification layer. Finally, a 10 nm Al was evaporated on the PFN in vacuum to complete the conventional devices.