Supporting Information

Ternary Organic Solar Cells Based on Two Compatible PDI-based Acceptors with Enhanced Power Conversion Efficiency

Kangkang Weng,[a] Chao Li,[a] Pengqing Bi,[e] Hwa Sook Ryu,[c] Yikun Guo,[d] Xiaotao Hao,[e] Dahui Zhao,[d] Weiwei Li*[b], Han Young Woo[c] and Yanming Sun*[a]

[a]School of Chemistry, Beihang University, Beijing 100191, P. R. China

[b]State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology, Beijing 100029, P. R. China

[c]Department of Chemistry, College of Science, Korea University, Seoul 136-713, Republic of Korea.

[d]College of Chemistry, Peking University, Beijing 100871, P. R. China

[e]School of Physics State Key Laboratory of Crystal Materials, Shandong University, Jinan 250100, P. R. China

E-mail: liweiwei@iccas.ac.cn, sunym@buaa.edu.cn

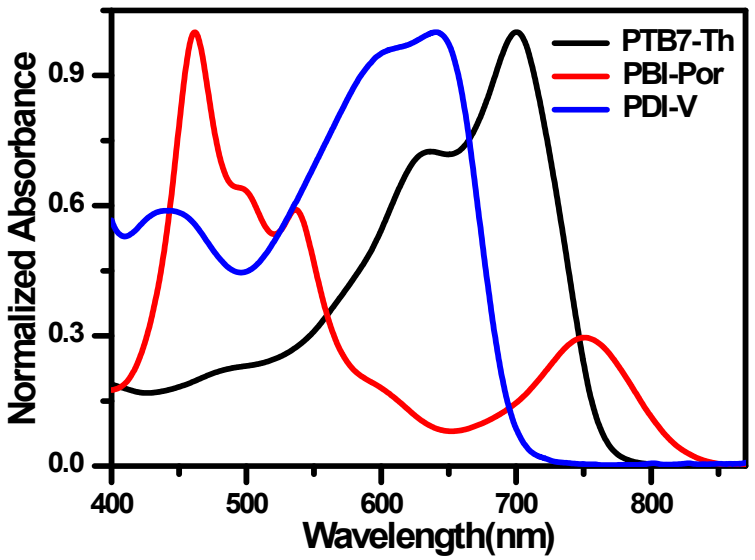

Fig. S1. The absorption of solution for PTB7-Th, PBI-Por and PDI-V.

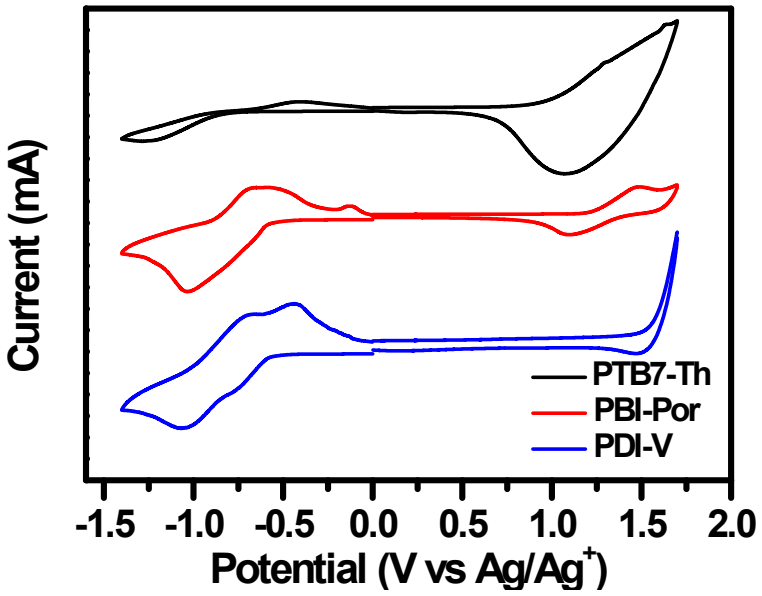

Fig. S2. Cyclic voltammogram curves of PTB7-Th, PBI-Por and PDI-V.

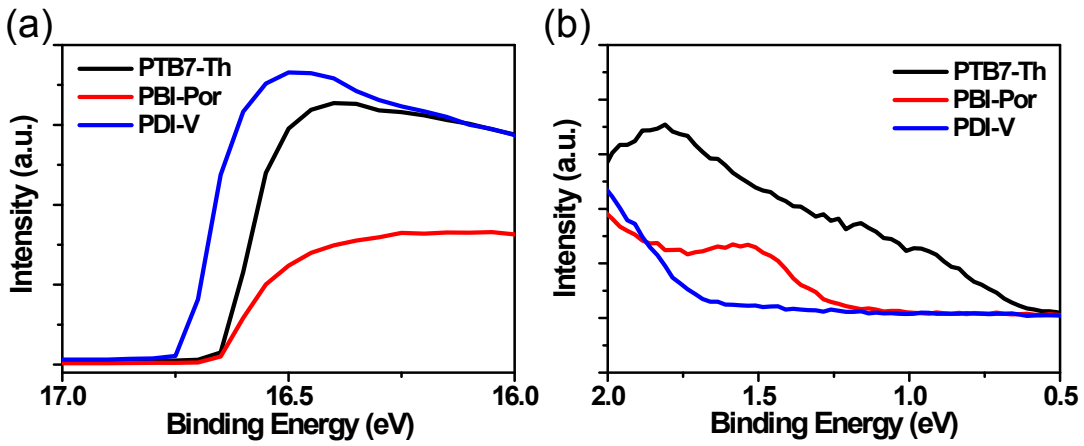

Fig. S3. UPS spectrum of PTB7-Th, PBI-Por and PDI-V. The IP of PTB7-Th, PBI-Por and PDI-V are calculated to be 5.33, 5.80 and 6.16 eV, respectively.

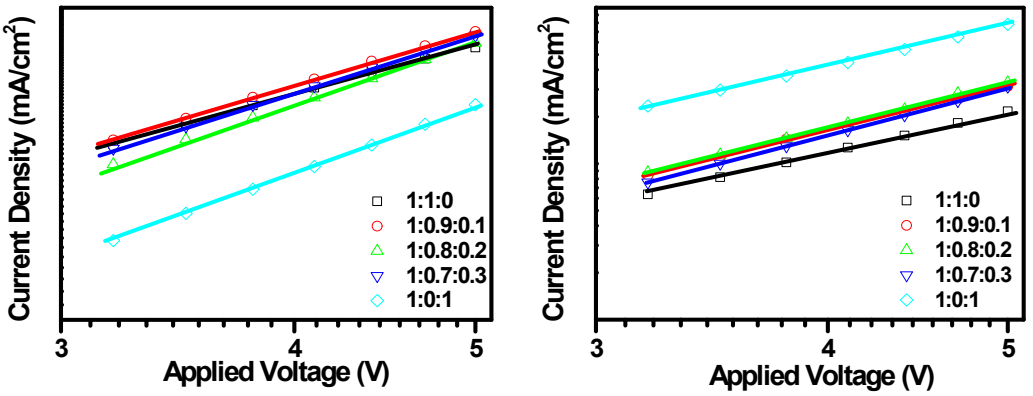

Fig. S4. a) Hole-only and b) electron-only mobilities of all ternary blend films with different PDI-V contents.

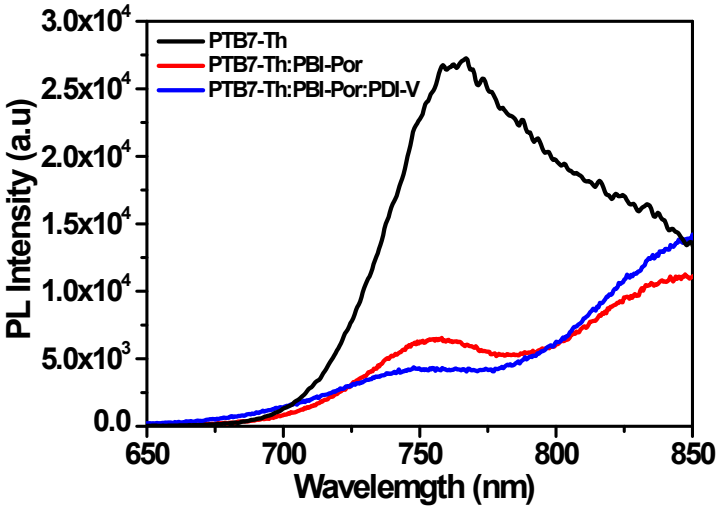

Fig. S5. PL spectra of PTB7-Th, PTB7-Th:PBI-Por, and PTB7-Th:PBI-Por:PDI-V films.

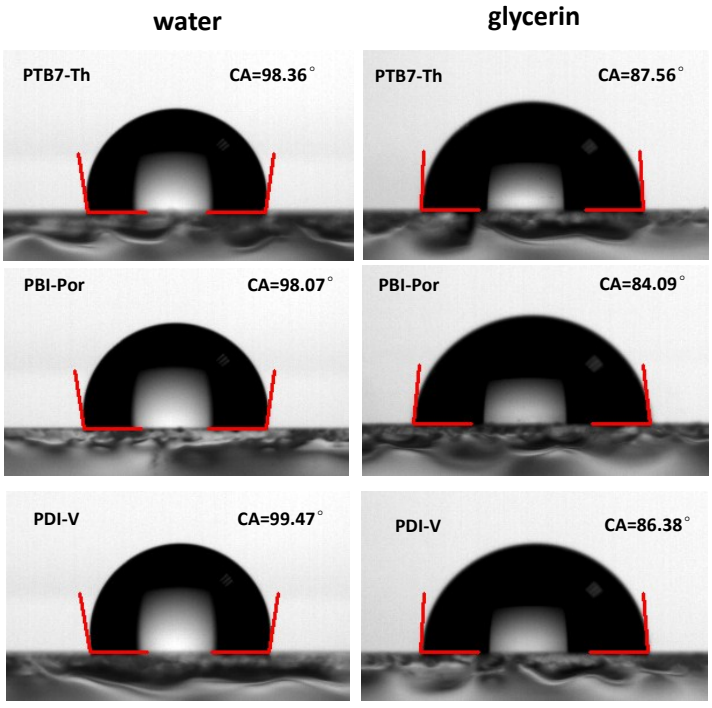

Fig. S6. Contact angle of water and glycerol of PTB7-Th, PBI-Por, and PDI-V.

Table S1. Series resistance (R_S) and shunt resistance (R_{SH}) parameters of ternary devices with different PDI-V contents.

PDI-V	R_{SH} (Ω cm^2)	R_S (Ω cm^2)
0%	315.6	6.7
10%	349.6	3.9
20%	709.2	2.9
30%	606.1	4.9
50%	440.7	4.9
90%	534.5	5.7
100%	801.9	4.9

Table S2. Summary of GIWAXS packing parameters.

PDI-V	Out-of-plain (OOP)		In-plain (IP)	
	q (100) (Å^{-1})	q (010) (Å^{-1})	q (100) (Å^{-1})	q (010) (Å^{-1})
0%	0.29	1.59	0.27	1.43
10%	0.30	1.60	0.28	1.42
20%	0.31	1.60	0.27	1.41
30%	0.32	1.61	0.28	1.41
100%	0.33	1.62	0.28	1.40