Electronic Supplementary Information For

Influence of Aromatic Heterocycle of Conjugated Side Chains on Photovoltaic Performance of Benzodithiophene-Based Wide-Bandgap Polymers

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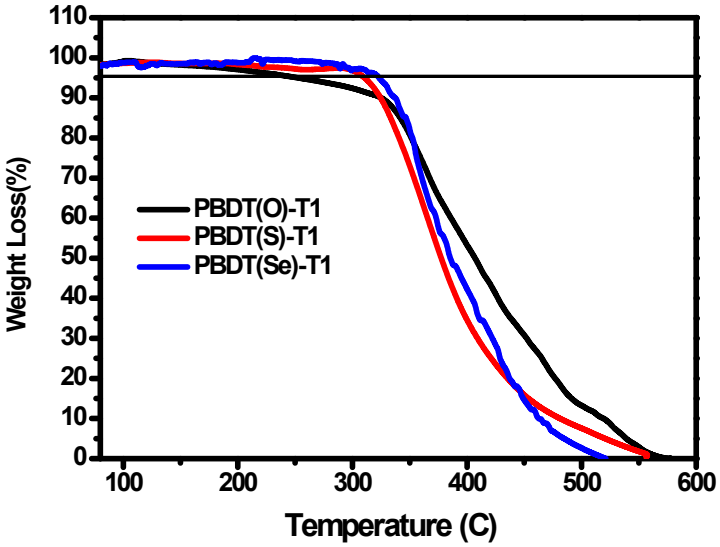

Figure S1. TGA thermograms of the three polymers with a heating rate of 10°C min^{-1} under nitrogen atmosphere.

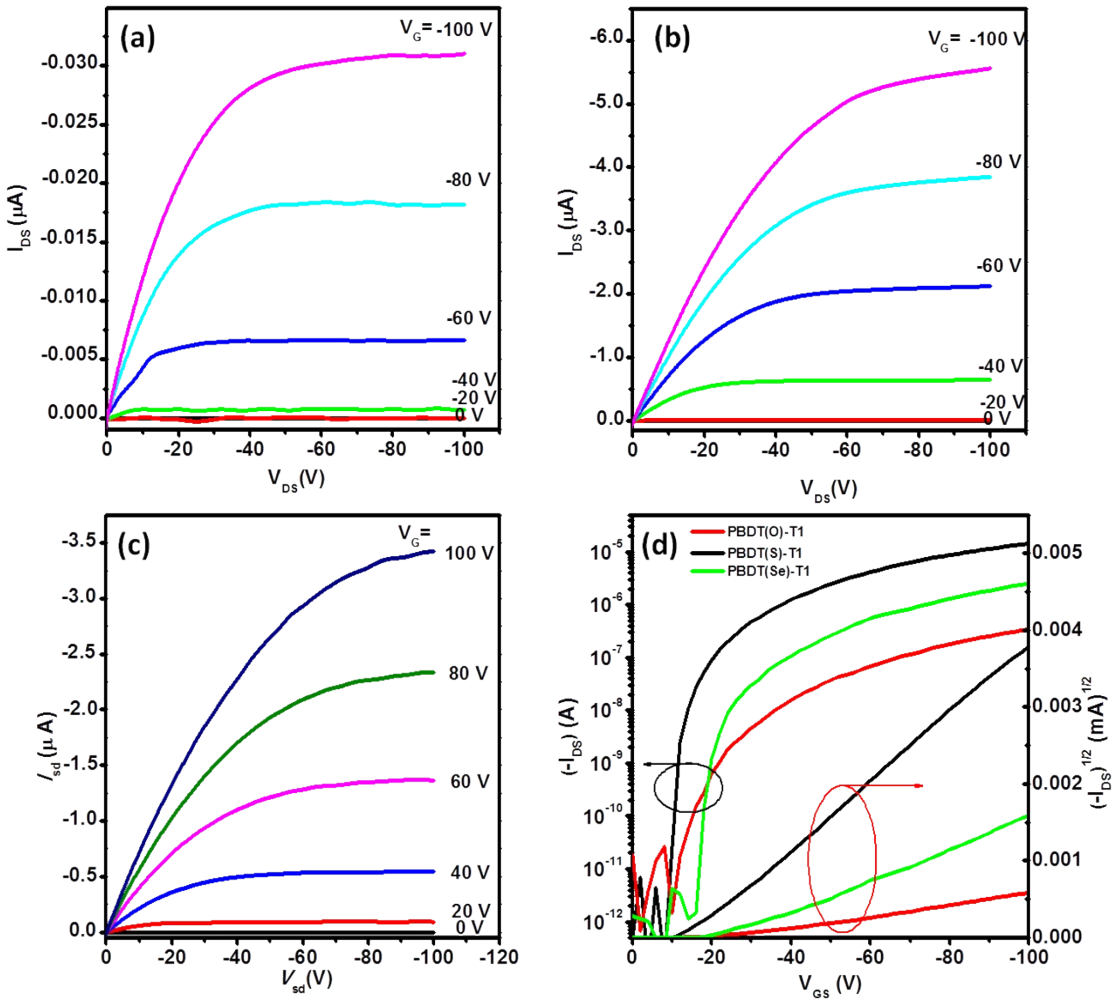

Figure S2. Current−voltage characteristics of OFET devices fabricated with PBDT(X)-T1: (a-c) Output curves of OFET devices based on PBDT(O)-T1, PBDT(S)-T1 and PBDT(Se)-T1; (d) Transfer curves of OFET devices.

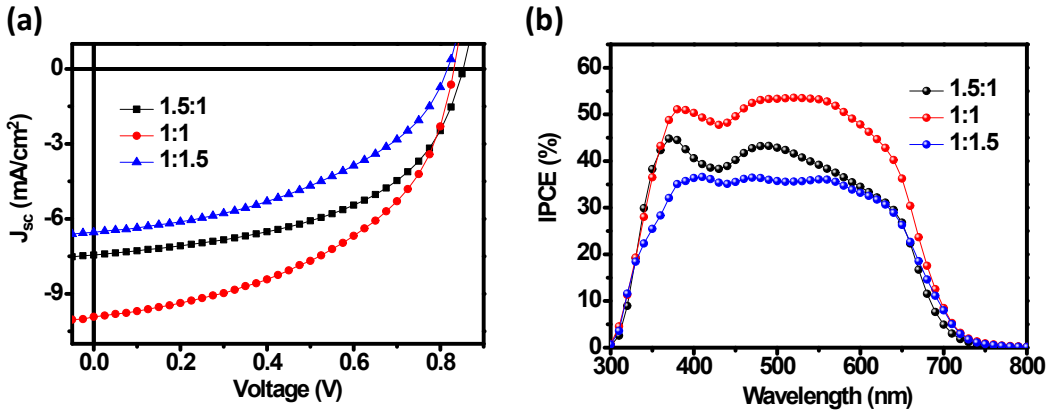

Figure S3. (a) Current density-voltage characteristics and (b) IPCE spectra of PBDT(O)-T1/$PC_{70}BM$ solar cells with different weight ratios.

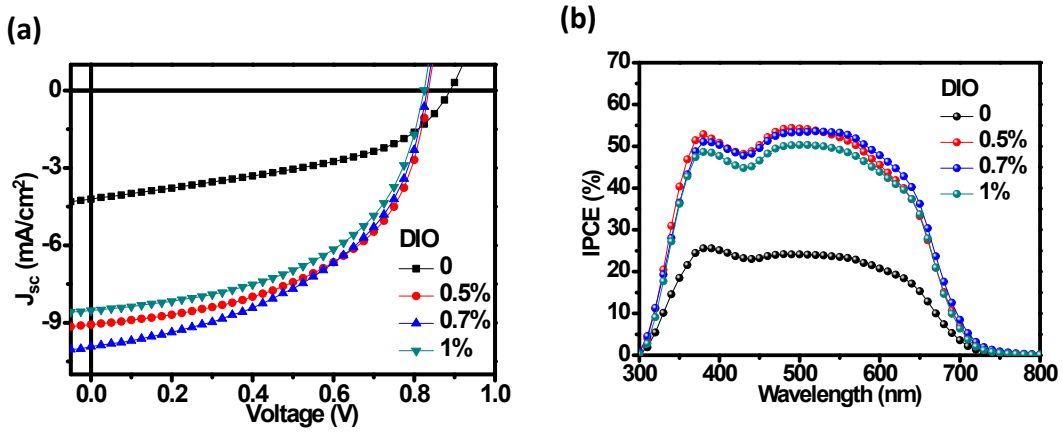

Figure S4. (a) Current density-voltage characteristics and (b) IPCE spectra of PBDT(O)-T1:$PC_{70}BM$ solar cells with different DIO concentration at the blend weight ratio of 1:1.

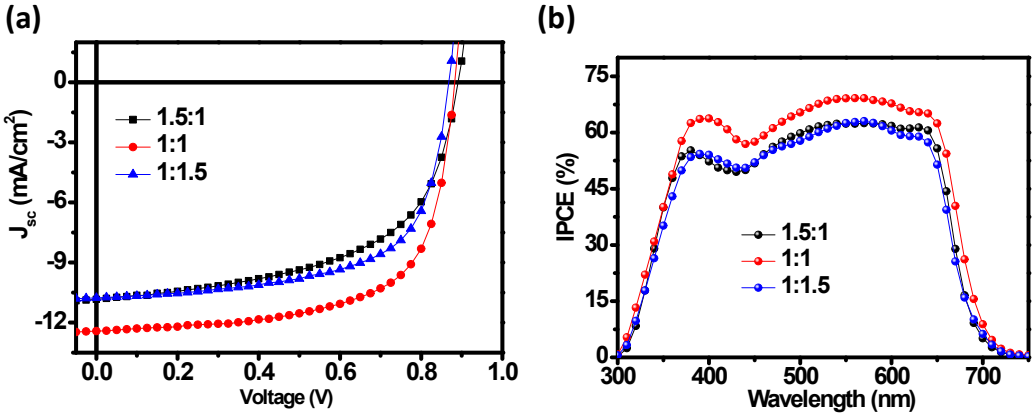

Figure S5. (a) Current density-voltage characteristics and (b) IPCE spectra of PBDT(S)-T1/$PC_{70}BM$ solar cells with different weight ratios.

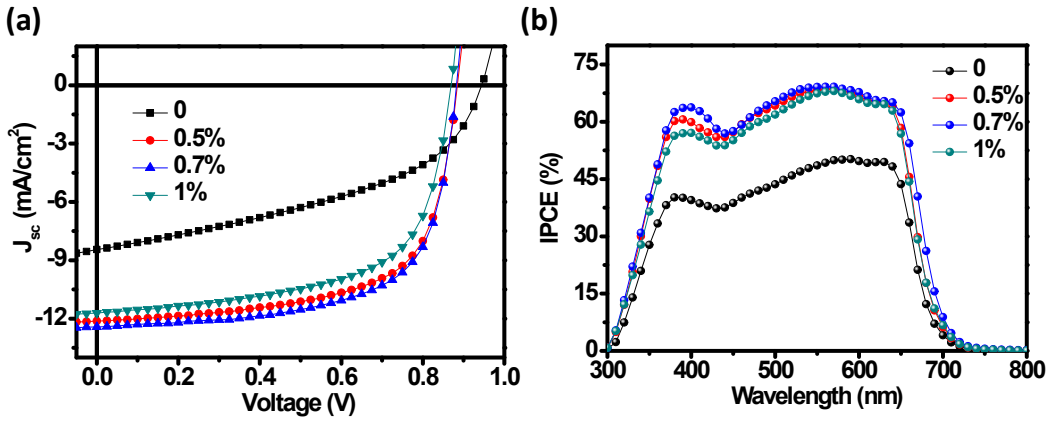

Figure S6. (a) Current density-voltage characteristics and (b) IPCE spectra of PBDT(S)-T1:$PC_{70}BM$ solar cells with different DIO concentration at the blend weight ratio of 1:1.

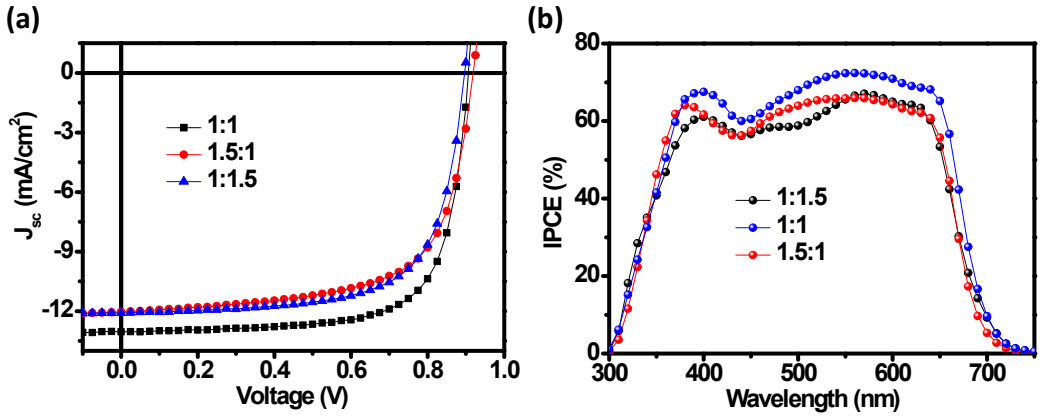

Figure S7. (a) Current density-voltage characteristics and (b) IPCE spectra of PBDT(Se)-T1/$PC_{70}BM$ solar cells with different weight ratios.

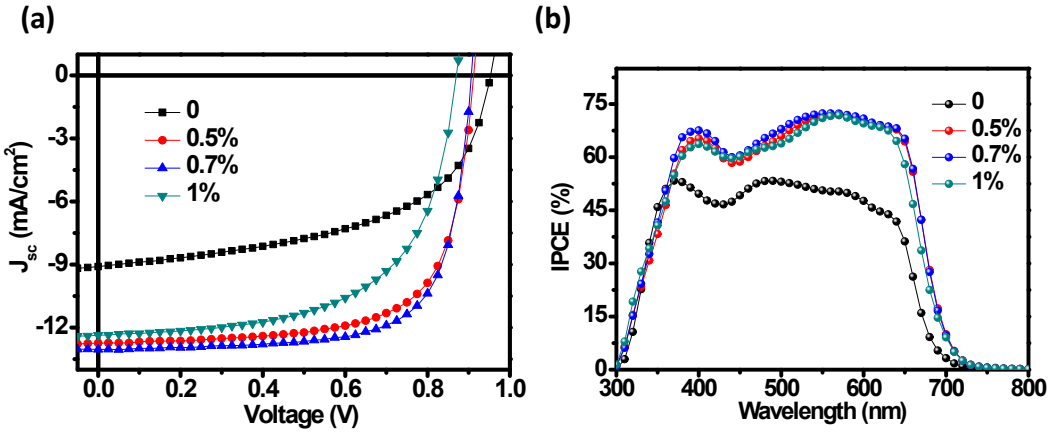

Figure S8. (a) Current density-voltage characteristics and (b) IPCE spectra of PBDT(Se)-T1:$PC_{70}BM$ solar cells with different DIO concentration at the blend weight ratio of 1:1.

Table S1. Photovoltaic performance of solar cells based on different weight ratios of PBDT(X)-T1: $PC_{70}BM$ in a conventional structure under the illumination of AM1.5G, 100 mW/cm^2 .

Active layer	Weight ratios (w/w)	V_{oc} (V)	J_{sc} (mA/cm^2)	FF	PCE (%)
PBDT(O)-T1:$PC_{70}BM$	1:1.5	0.82	6.54	0.44	2.36
	1:1	0.83	9.92	0.49	4.01
	1.5:1	0.85	7.45	0.52	3.28
PBDT(S)-T1:$PC_{70}BM$	1:1.5	0.87	10.76	0.64	6.01
	1:1	0.88	12.43	0.68	7.48
	1.5:1	0.89	10.84	0.57	5.48
PBDT(Se)-T1:$PC_{70}BM$	1:1.5	0.9	12.09	0.68	7.43
	1:1	0.91	13.04	0.72	8.52
	1.5:1	0.92	11.53	0.68	7.23

Table S2. Photovoltaic performance of solar cells based on PBDT(X)-T1: $PC_{70}BM$ (1:1, w/w) with different DIO additive contents in a conventional structure under the illumination of AM1.5G, 100 mW/cm^2.

Active layer	DIO (V/V, %)	Voc (V)	Jsc (mA/cm^2)	FF	PCE (%)
PBDT(O)-T1:$PC_{70}BM$	0	0.89	4.21	0.45	1.67
	0.5	0.83	9.07	0.53	4.00
	0.7	0.83	9.92	0.49	4.01
	1.0	0.82	8.52	0.53	3.7
PBDT(S)-T1:$PC_{70}BM$	0	0.94	8.45	0.44	3.52
	0.5	0.88	12.13	0.65	7.01
	0.7	0.88	12.43	0.68	7.48
	1.0	0.87	11.72	0.62	6.37
PBDT(Se)-T1:$PC_{70}BM$	0	0.95	9.10	0.54	4.68
	0.5	0.91	12.74	0.70	8.10
	0.7	0.91	13.04	0.72	8.52
	1.0	0.87	12.36	0.61	6.55