Electronic Supplementary Information for

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Novel benzodithiophene unit with alkylthiobiphenyl side chain for constructing high-efficiency polymer solar cells

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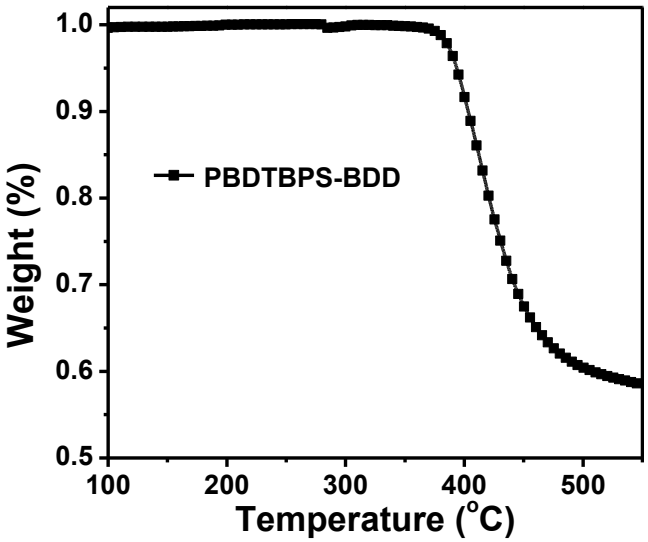

Fig. S1 TGA plots of PBDTBPS-BDD with a heating rate of 10 °C/min under an inert atmosphere.

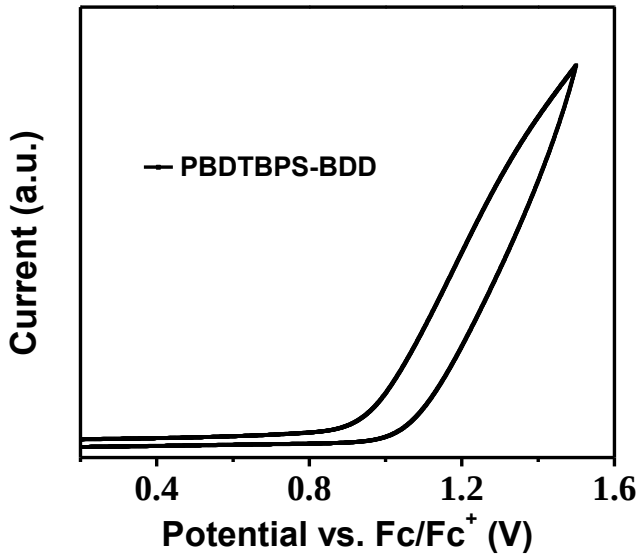

Fig. S2 Curves of PBDTBPS-BDD as casted film vs. Fc/Fc^+ in acetonitrile solution.

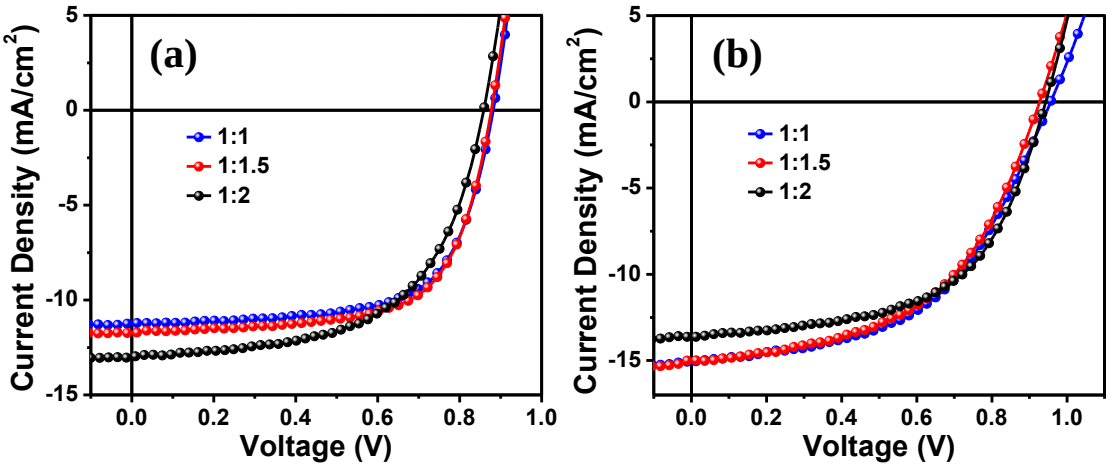

Fig. S3 (a) The J-V cures of $PC_{71}BM$-based devices with different polymer/ $PC_{71}BM$ ratios (b) The J-V cures of ITIC-based devices with different polymer/ ITIC ratios.

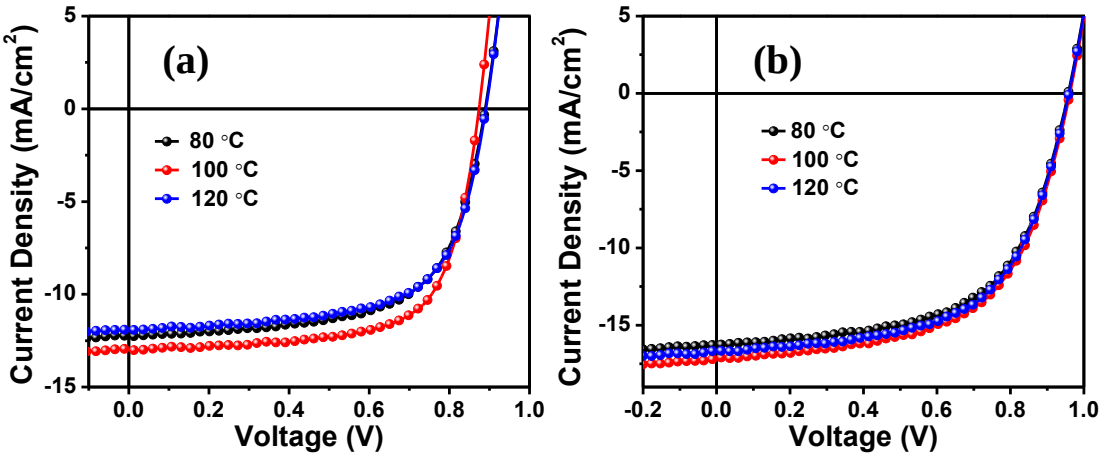

Fig. S4 (a) The J-V cures of $PC_{71}BM$-based devices with different annealing temperature (b) The J-V cures of ITIC-based devices with different annealing temperature.

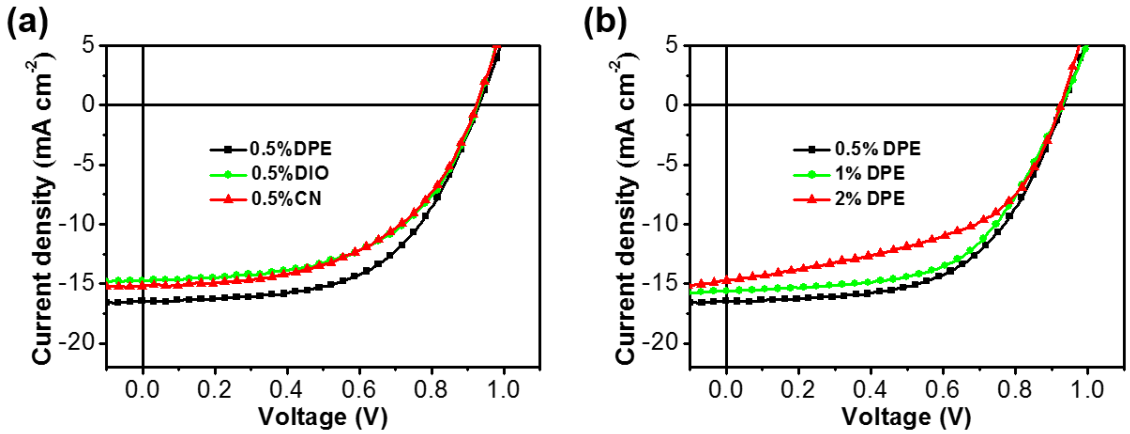

Fig. S5 (a) The J-V cures of ITIC-based devices with different additive.

Table S1. The device parameters of the PBDTBPS–BDD: ITIC (1:1) based devices with different additive.

	Annealing temperature (°C)	additive (v/v)	V_{OC} (V)	J_{SC} (mA cm^{-2})	FF (%)	PCE (%)
PBDTBPS-BDD:ITIC	100	0.5%DPE	0.93	16.49	56.83	8.72
	100	0.5%DIO	0.92	14.72	54.61	7.44
	100	0.5% CN	0.92	15.17	52.64	7.37
	100	1%DPE	0.92	15. 43	54.92	7.80
	100	2%DPE	0.92	14.72	50.64	6.86

Table S2. The charge carrier mobilities of the optimal blend films.

Device	μ_e (cm^2/Vs)	*thickness (nm)*	μ_h (cm^2/Vs)	*thickness (nm)*	μ_h/μ_e
PBDTBPS–BDD:$PC_{71}BM$	5.93×10^{-4}	120	5.25×10^{-4}	115	0.89
PBDTBPS–BDD:ITIC	1.02×10^{-4}	100	1.45×10^{-4}	105	1.42