Taking the Place of Perylene Diimide: Perylene Tetracarboxylic Tetraester as Building Block for Polymeric Acceptor to Achieve Higher Open Circuit Voltage in All-Polymer Bulk Heterojunction Solar Cells

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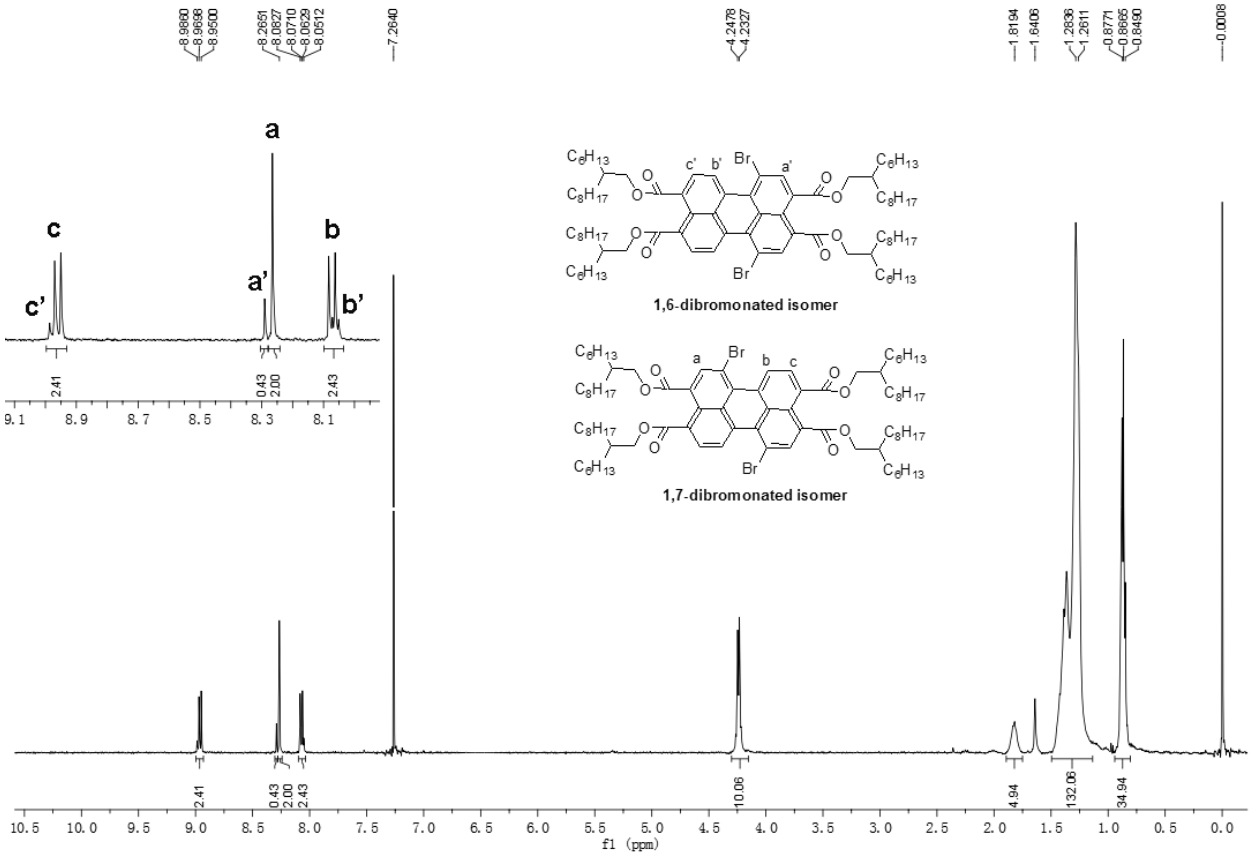

Figure S1 a.[1] H NMR spectrum of 1, 7-dibromo-perylene-3,4,9,10-tetracarboxylic tetra(2-hexyldecanyl)ester (compound **2**) containing around 0.22 equiv. of 1, 7-dibromo-perylene-3,4,9,10-tetracarboxylic tetra(2-hexyldecanyl)ester as indicated in the inset.

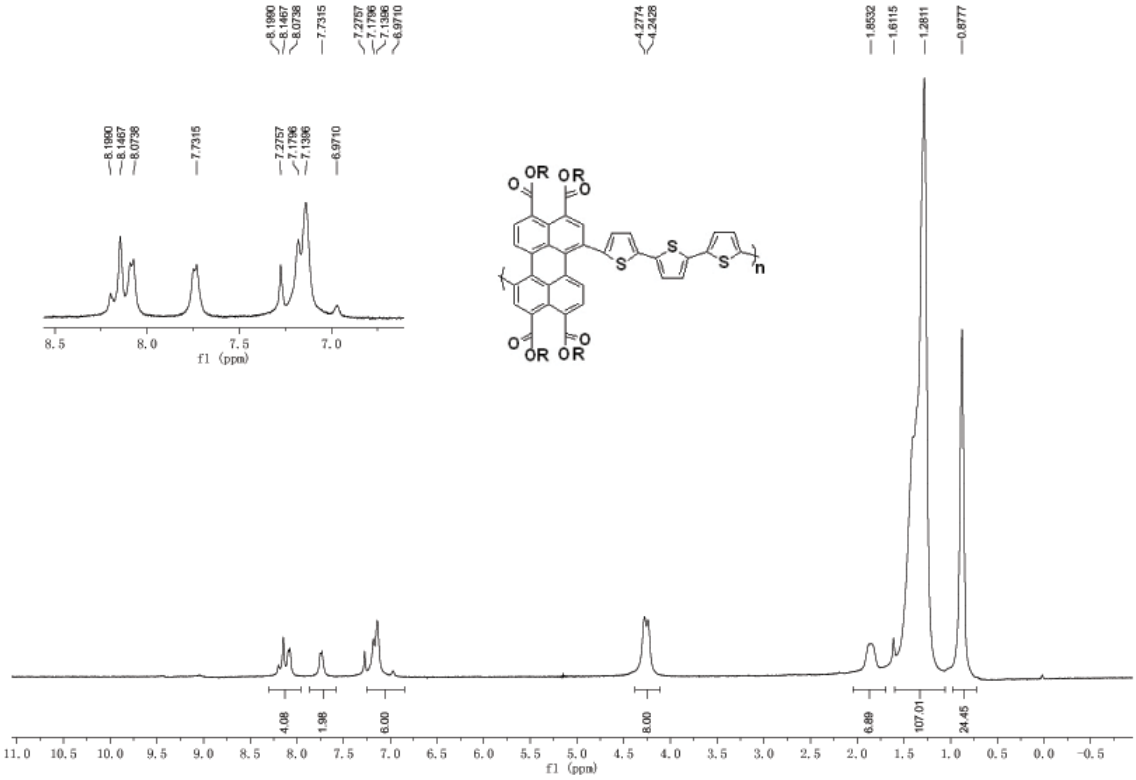

Figure S1 b.[1] H NMR spectrum of copolymer PPTTE-TerT.

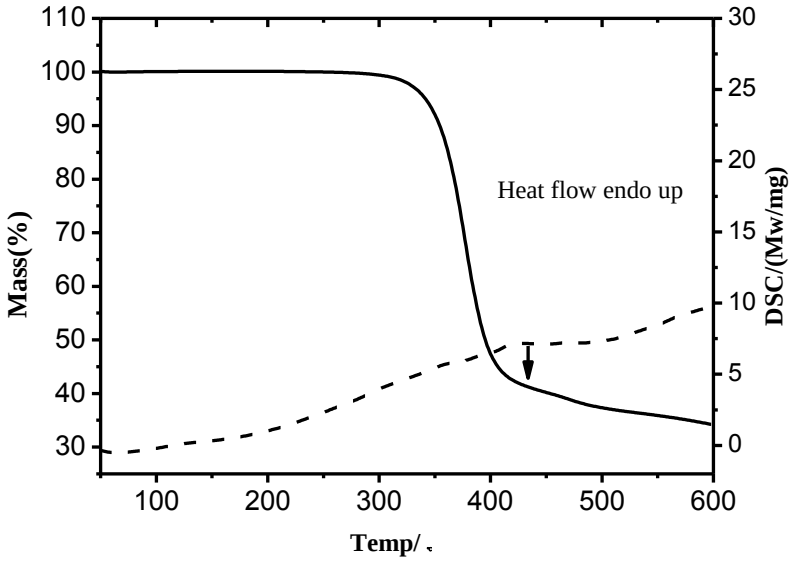

Figure S2.TGA-DSC curves of PPTTE-TerT at a heating rate of 10 ºC min^{-1} under nitrogen flow.

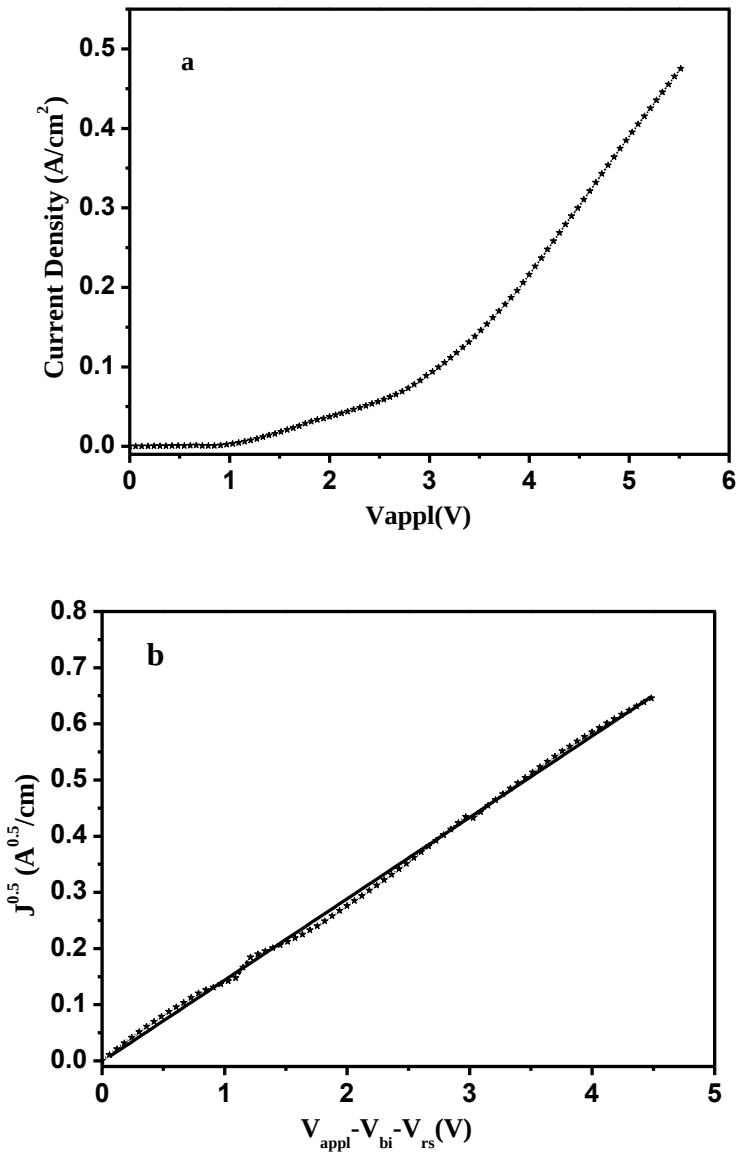

Figure S3. (a) J vs V_{appl} and (b) $J^{0.5}$ vs $V = V_{appl} - V_{bi} - V_{rs}$ plots for pristine film with electron-only device structure of ITO/PEDOT: PSS (45 nm)/ PPTTE-TerT (125nm)/Ca (20nm)/Al (80 nm) for hole-only devices.

Table S1. Photovoltaic properties of BHJ films of P3HT: PPTTE-TerT blends with different film thickness from solutions at various D: A ratio.

Weight ratio D: A	Thickness (nm)	V_{oc} (V)	J_{sc} (mA·cm^{-2})	FF	PCE (%)
1:0.3	100	0.85	1.97	0.30	0.49
	84	0.83	1.95	0.33	0.53
	73	0.58	0.77	0.32	0.14
1:0.7	202	0.81	0.99	0.20	0.16
	149	0.83	2.74	0.34	0.76
	128	0.71	2.31	0.33	0.54
1:1	200	0.86	1.12	0.35	0.33
	165	0.85	1.67	0.31	0.45
	108	0.74	1.48	0.36	0.39

Table S2. Diffraction Angles and related d-spacing in pristine and blend films from XRD spectra

	2θ(deg)	d[100]-spacing (Å)
P3HT	5.40	16.36
PPTTE-TerT	--	--
P3HT: PPTTE-TerT =1:0.3(weight ratio)	5.48	16.12
P3HT: PPTTE-TerT =1:0.7(weight ratio)	5.39	16.38
P3HT: PPTTE-TerT =1:1(weight ratio)	5.38	16.40

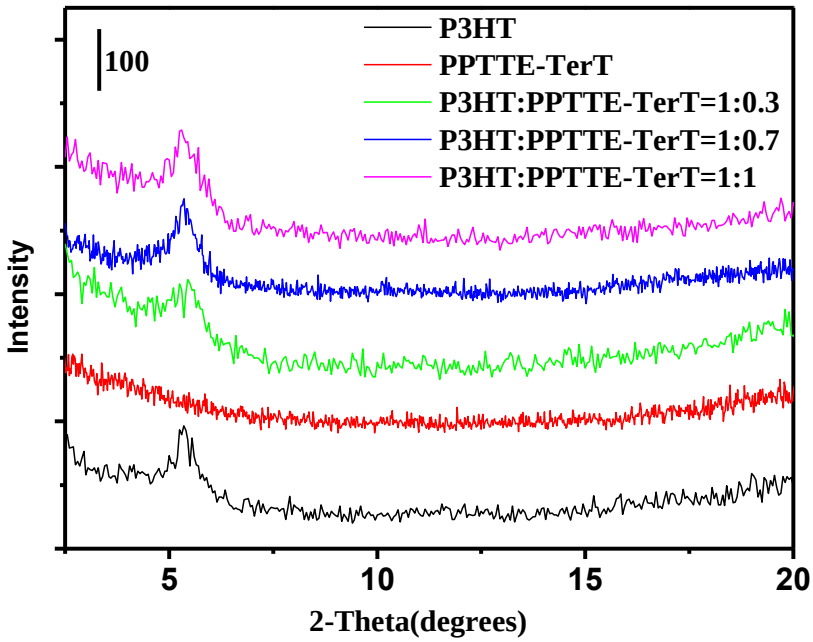

Figure S4. Out of plane GIXRD profiles of pristine and blend films of PPTTE-TerT and P3HT on the quartz glass substrate.