

Supporting Information

High-performance ternary π -conjugated copolymers containing diarylethylene units: synthesis, properties, and study of substituent effects on molecular aggregation and charge transport characteristics

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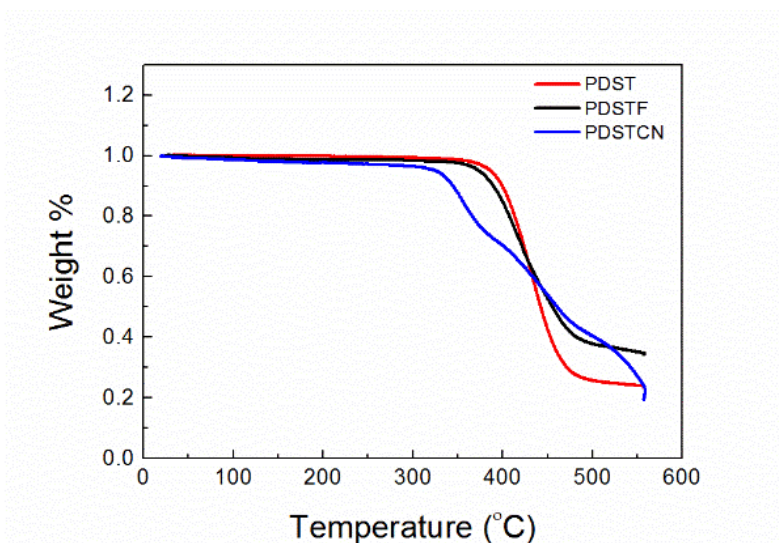
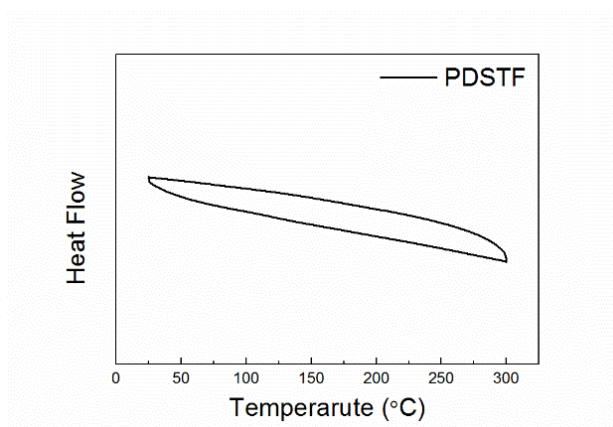
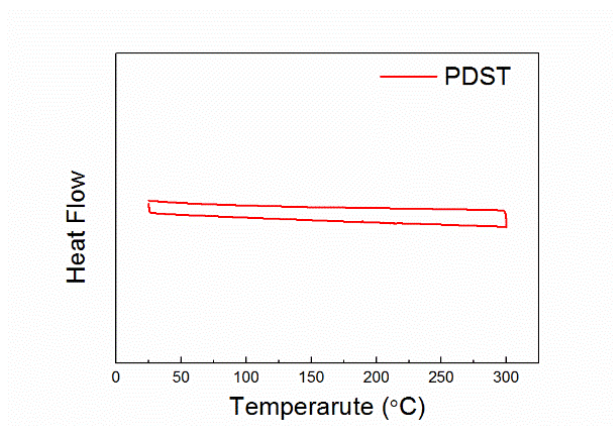


Fig. S1 Thermogravimetric analyses (TGA) of **PDST**, **PDSTF** and **PDSTCN**.



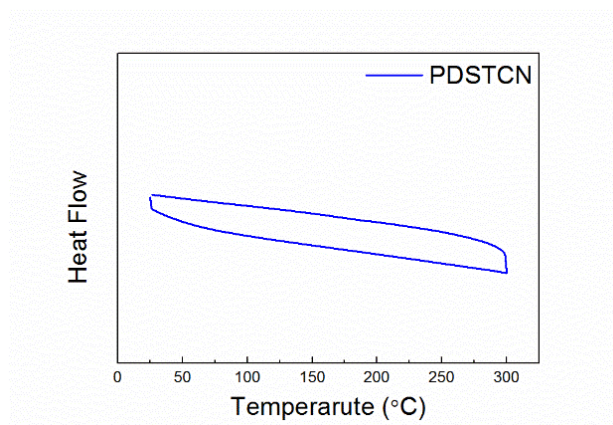
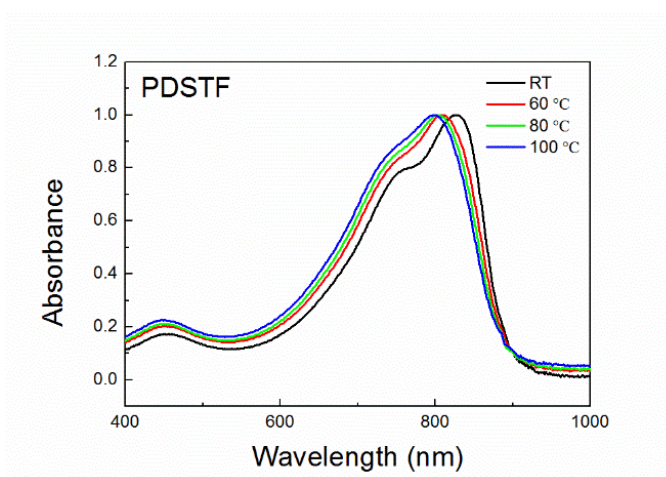
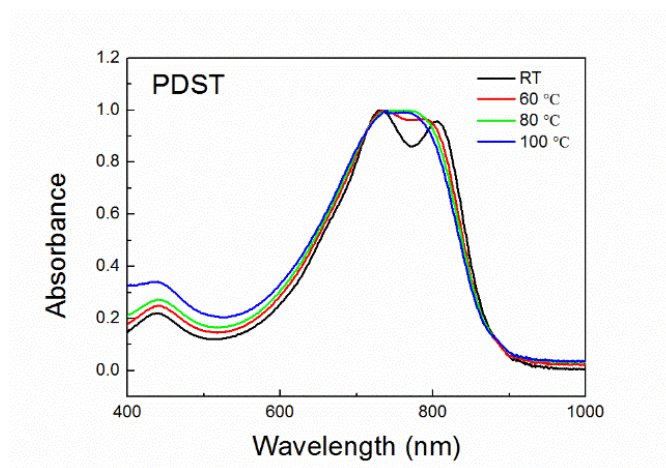


Fig. S2 Differential scanning calorimetry (DSC) characterization of **PDST**, **PDSTF** and **PDSTCN**.



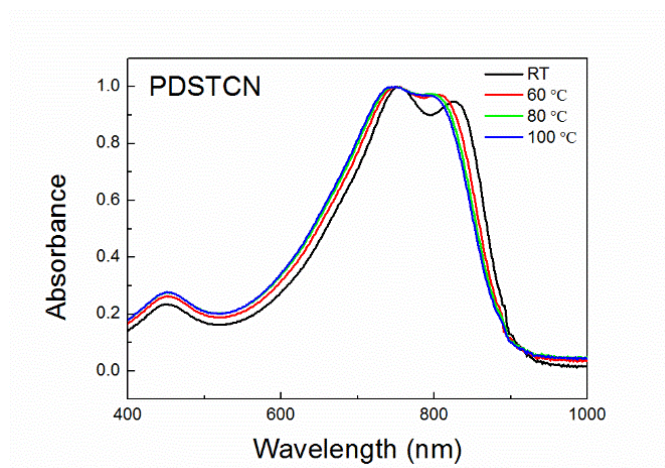


Fig. S3 Temperature-dependent UV-vis-NIR absorption profiles of **PDST**, **PDSTF** and **PDSTCN** in *o*-dichlorobenzene.

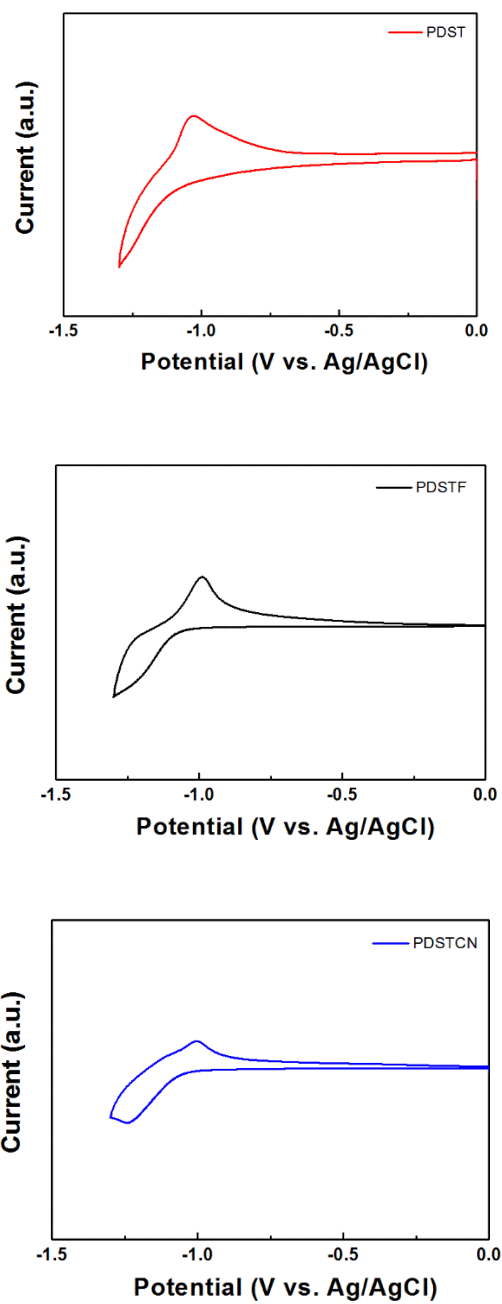


Fig. S4 The enlarged reduction peaks of cyclic voltammetry characterization of **PDST**, **PDSTF** and **PDSTCN**.

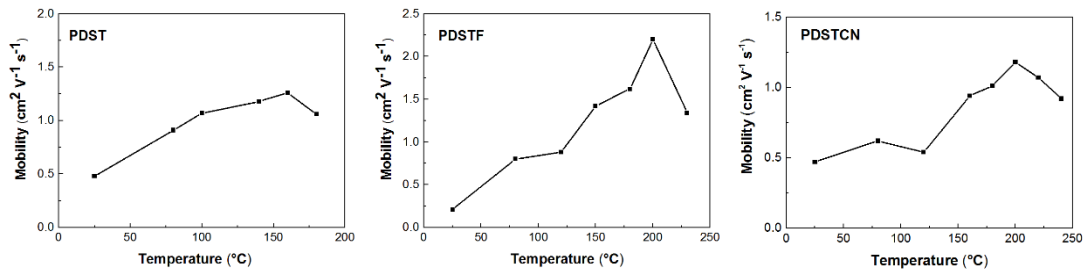


Fig. S5 The annealing temperature-dependent mobilities of **PDST**, **PDSTF**, and **PDSTCN**-based OFET devices with a 40 μm channel length.

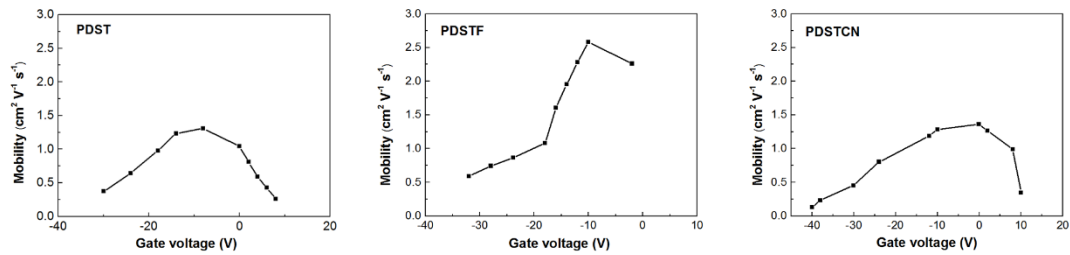


Fig. S6 The gate voltage dependent mobilities of **PDST**, **PDSTF**, and **PDSTCN**-based OFET devices with a 40 μm channel length.

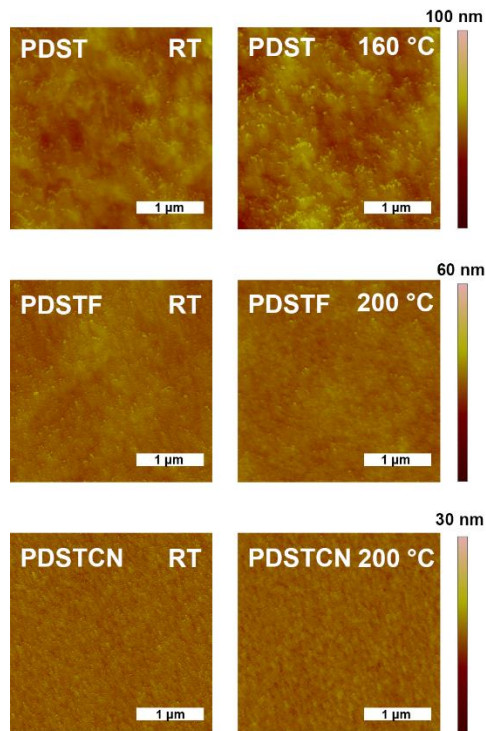


Fig. S7 AMF topography images (3 × 3 μm^2) at RT and the corresponding optimal temperatures of **PDST**, **PDSTF** and **PDSTCN** thin film.

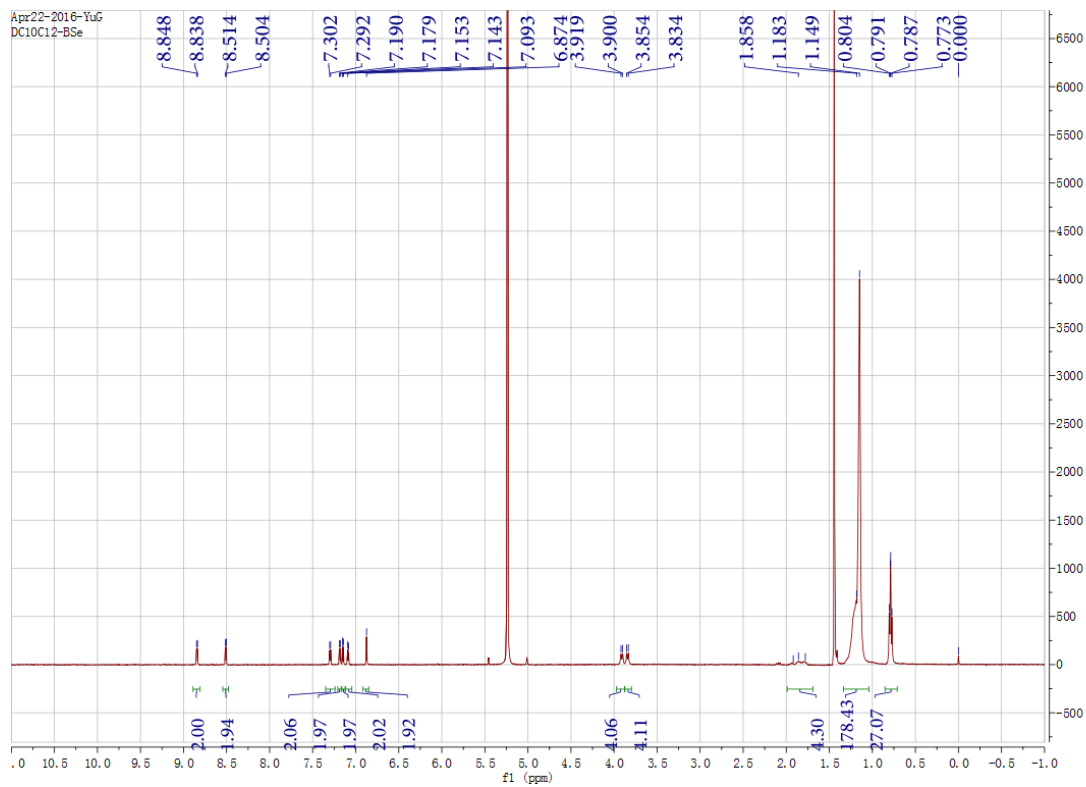


Fig. S8 ^1H NMR spectrum of compound 3.

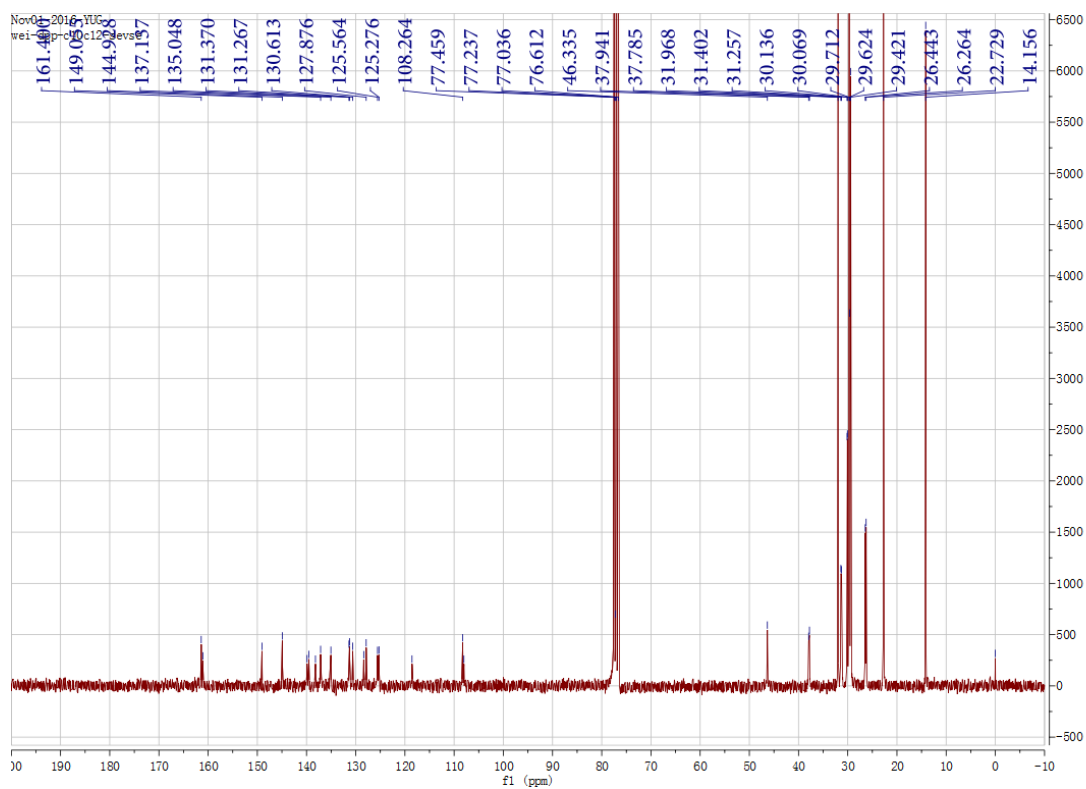


Fig. S9 ^{13}C NMR spectrum of compound 3.

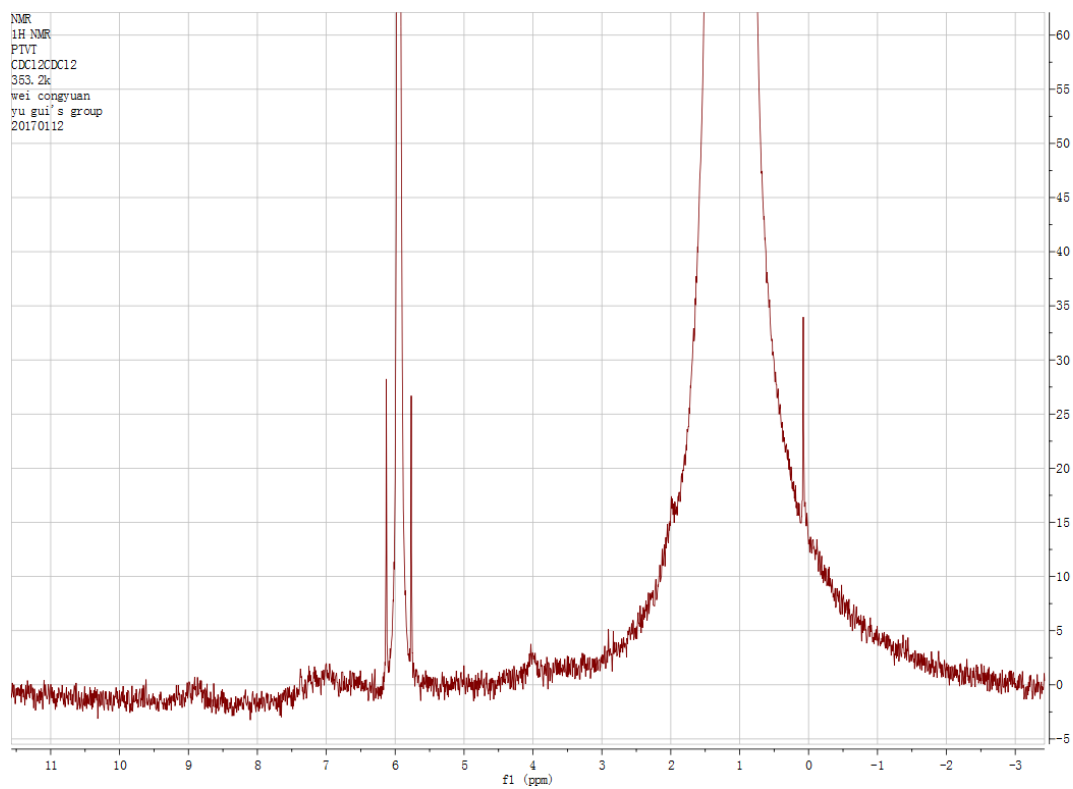


Fig. S10 ¹H NMR spectrum of the polymer PDST.

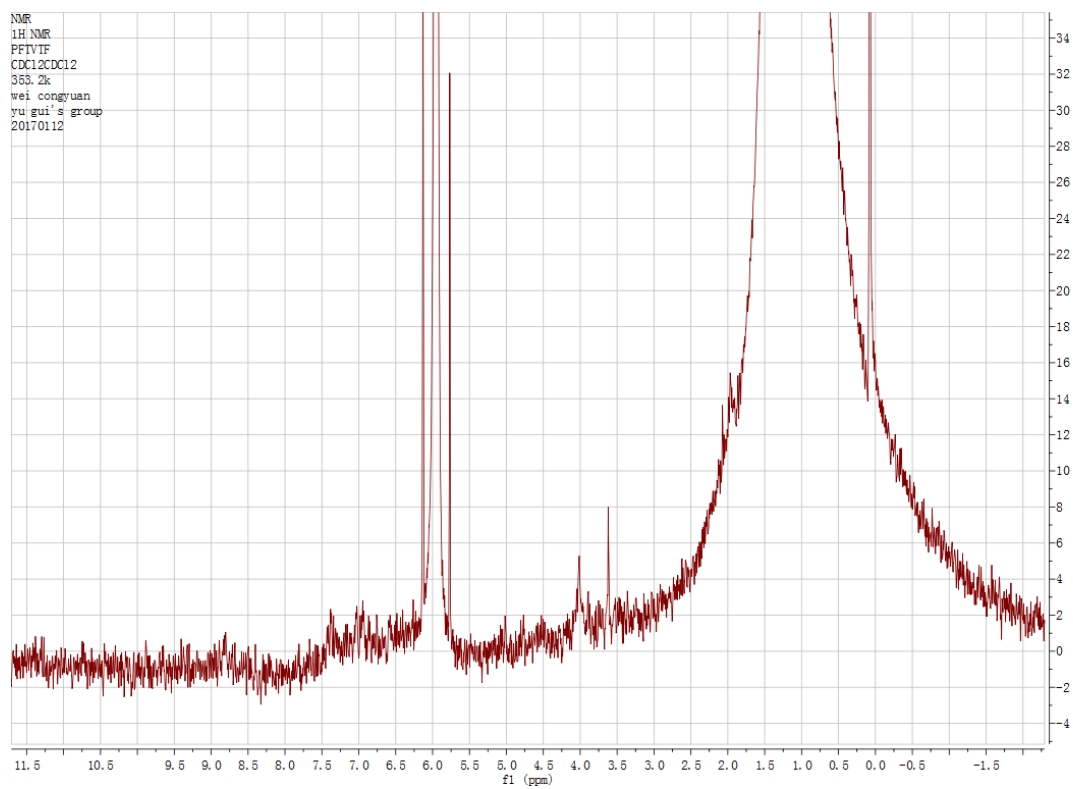


Fig. S11 ¹H NMR spectrum of the polymer PDSTF.

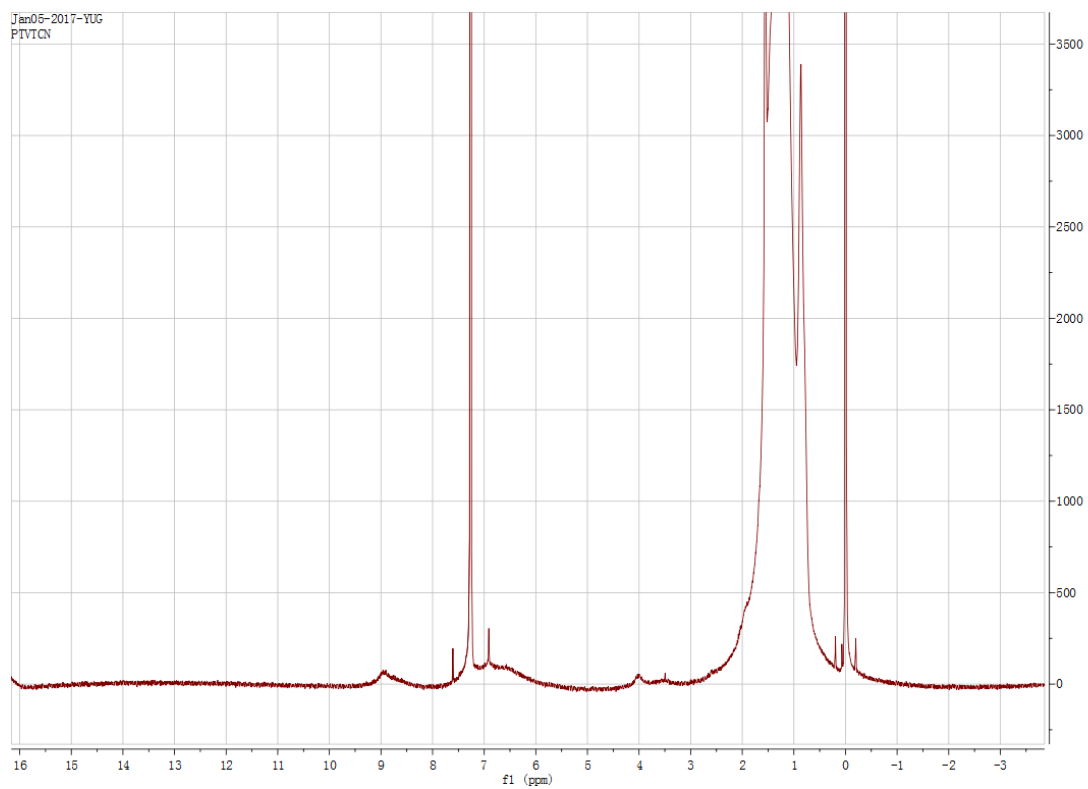


Fig. S12 ^1H NMR spectrum of the polymer PDSTCN.

Table S1 Theoretical calculation results of PDST, PDSTF and PDSTCN

Polymer	E_{HOMO} (eV)	E_{LUMO} (eV)	E_{gap} (eV)
PDST	-4.61	-3.07	1.54
PDSTF	-4.66	-3.14	1.53
PDSTCN	-4.71	-3.22	1.50

Table S2 The XRD data of PDST, PDSTF and PDSTCN thin film

Polymer	Temp (°C)	Out-of-plane		In-plane		FWHM	Coherence
		d-d	π - π	d-d	π - π	(100)	length (Å)
		spacing (Å)	spacing (Å)	spacing (Å)	spacing (Å)	(nm ⁻¹)	(Å)
PDST	RT	20.70			3.86	0.639	87.51
	40	20.84			3.79	0.635	88.06
	80	20.98	NA	NA	3.80	0.605	92.43
	120	20.98			3.81	0.523	106.92
	160	20.98			3.80	0.469	119.23
PDSTF	RT	21.56			3.63	0.549	101.86
	50	21.56			3.62	0.550	101.67
	100	21.56	NA	NA	3.61	0.463	120.78
	150	21.60			3.62	0.399	140.15
	200	21.41			3.66	0.308	181.56
PDSTCN	RT	20.02	3.37	NA	3.39	0.384	145.63
	80	20.66	3.40	NA	3.42	0.322	173.67
	120	21.11	3.43	NA	3.45	0.258	216.75
	160	21.34	3.48	NA	3.48	0.230	243.13
	200	21.34	NA	NA	3.61	0.183	305.58