Electronic Supplementary Material (ESI) for Polymer Chemistry.

Supporting information

Incorporation of Benzothiadiazole into the Backbone of 1,2,5,6-Napthalenediimide Based Copolymer, Enabling Much Improved Film Crystallinity and Charge Carrier Mobility

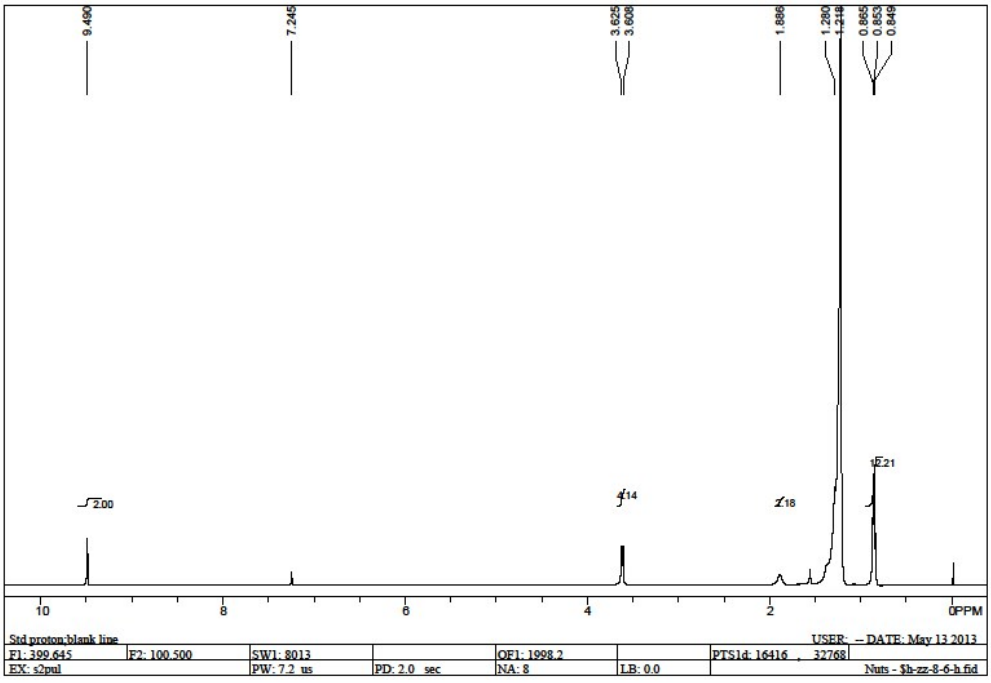
Zheng Zhao,[a] Zhongli Wang,[a] Congwu Ge,[a] Xu Zhang,[b] Xiaodi Yang,[b] and Xike Gao*[a]

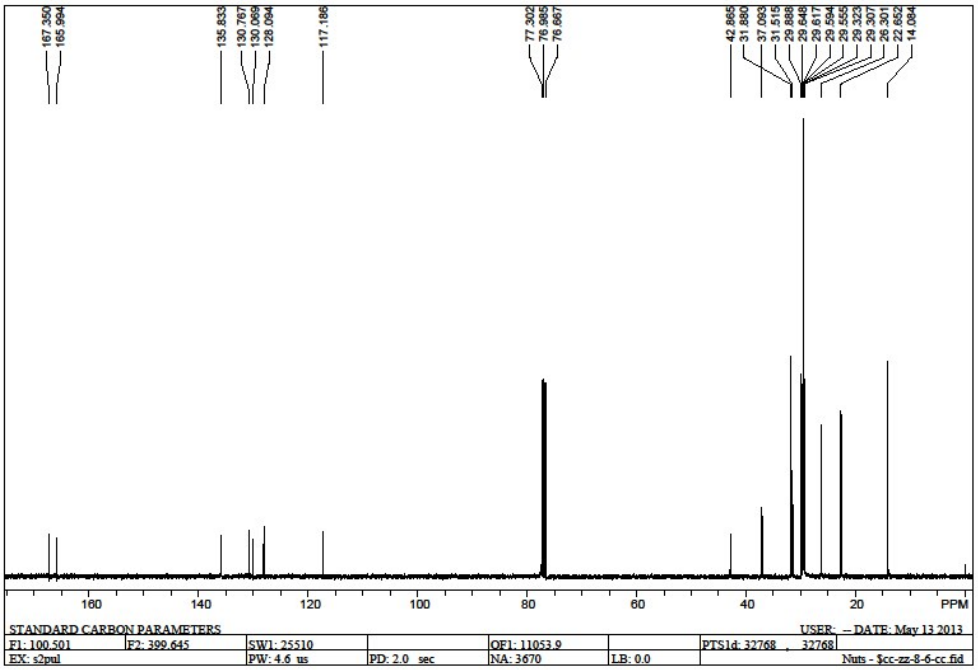
[a] *Key Laboratory of Synthetic and Self-Assembly Chemistry for Organic Functional Molecules , Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences (CAS), 345 Lingling Road, Shanghai 200032, China,*

[b] *Laboratory of Advanced Materials, Fudan University, Shanghai 200433, China,*

E-mail: gaoxk@mail.sioc.ac.cn

The ^{1}H NMR, ^{13}C NMR and MS spectra of iso-NDI2DT-2Br are listed as follows:





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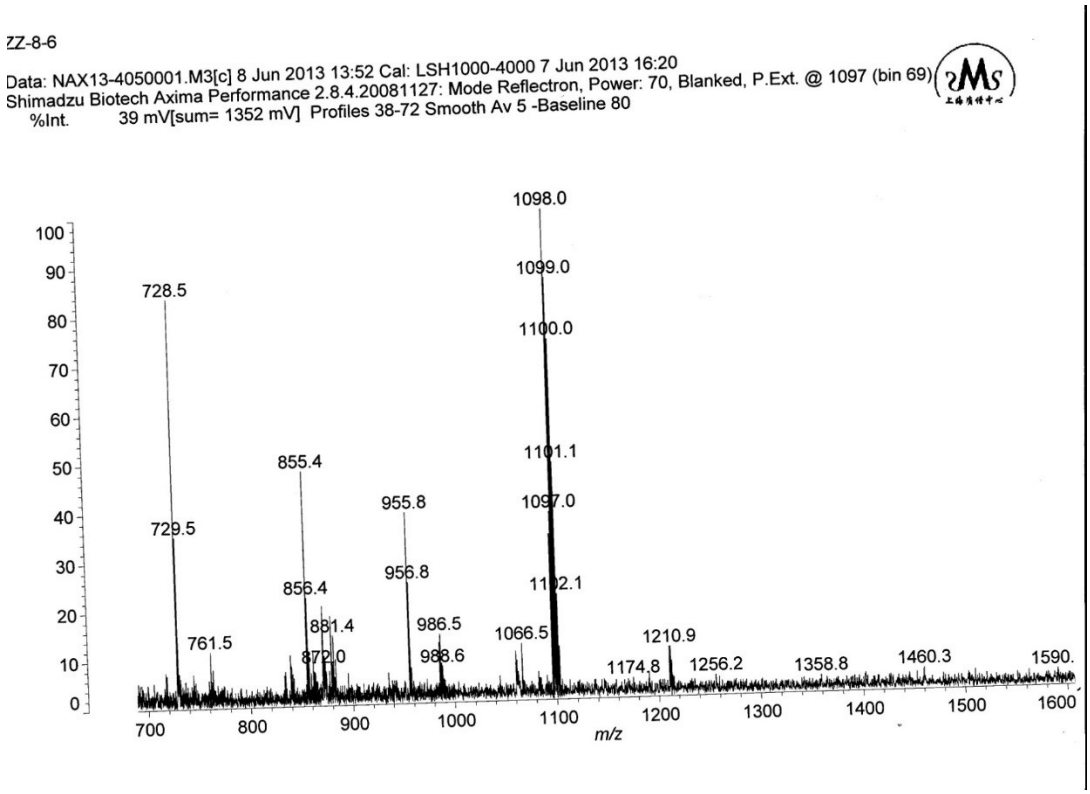

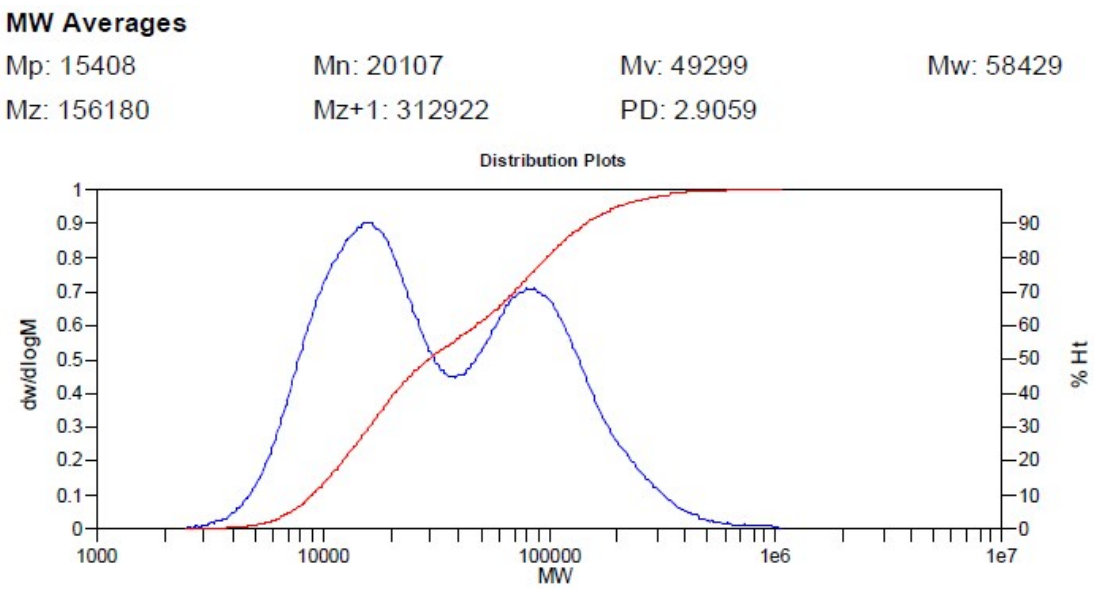

Figure S1. GPC plot of P(iso-NDI2DT-TBT) with trichlorobenzene as eluent at 150 °C

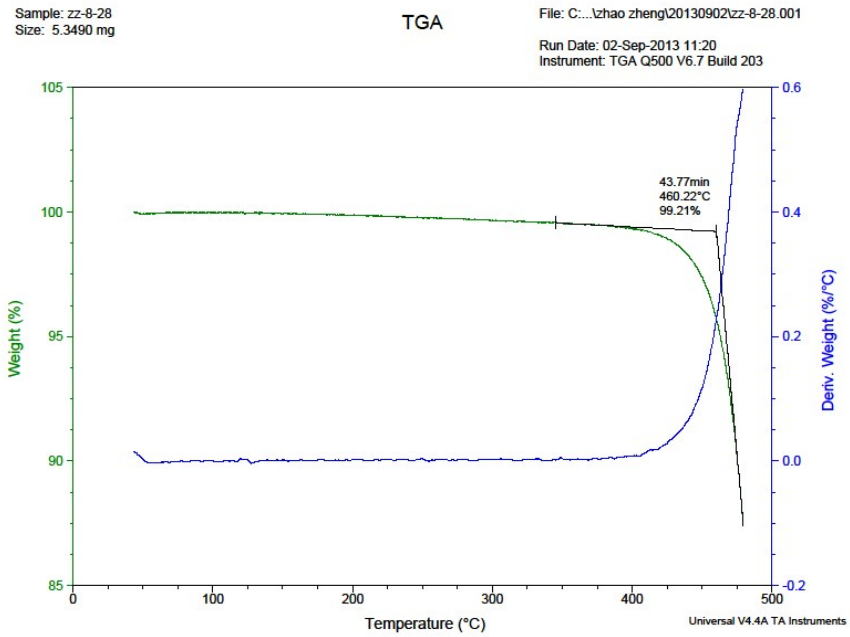

Figure S2. TGA curves of P(iso-NDI2DT-TBT) with a heating rate of 10 °C/min under nitrogen atmosphere.

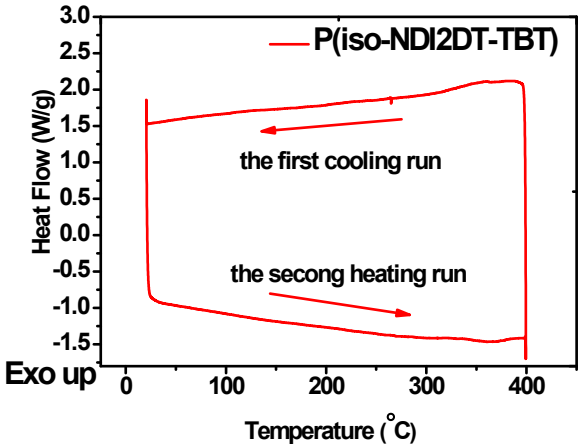

Figure S3. DSC plots of P(iso-NDI2DT-TBT)

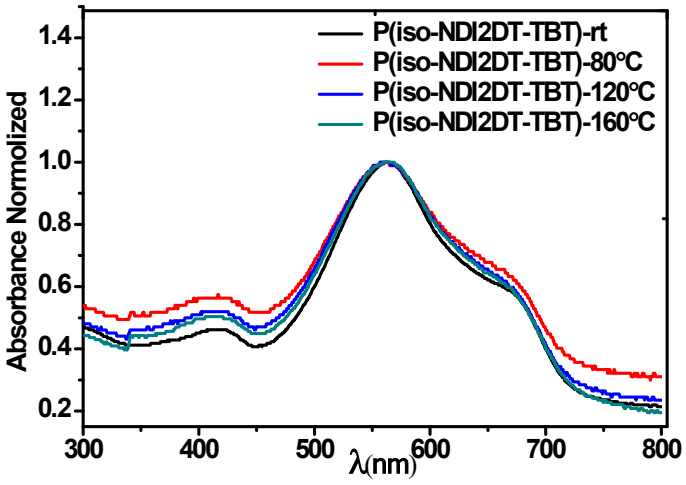

Figure S4. Absorption spectra of thin films of P(iso-NDI2DT-TBT) annealed at different temperature.

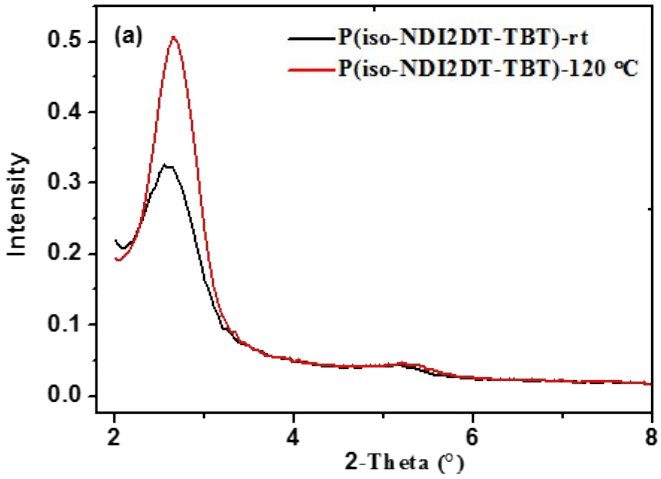

Figure S5. GIXD patterns of the as-spun and annealed thin films of P(iso-NDI2DT-TBT).

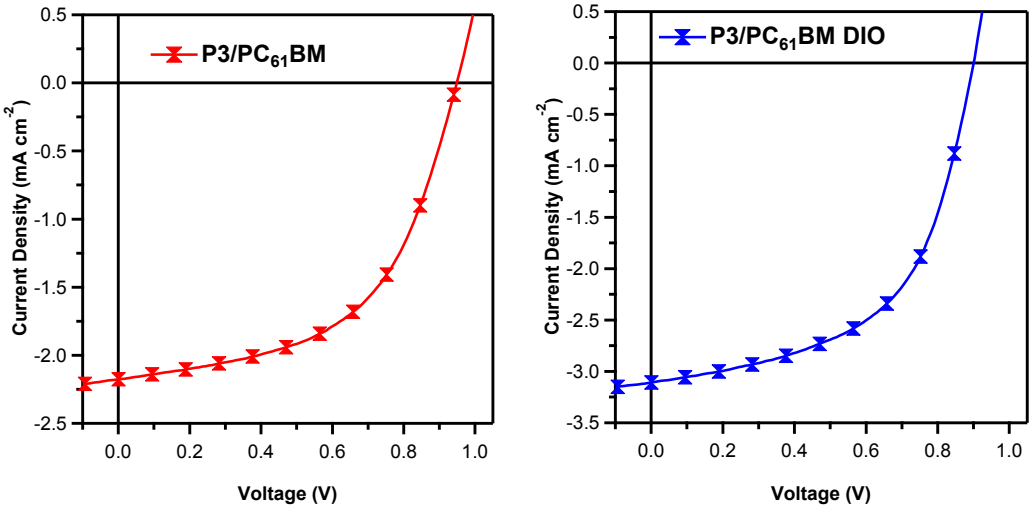

Figure S6. *J- V* curves of the P(iso-NDI2DT-TBT)/PC61BM device under an illumination of AM1.5G, 100 mW cm $^{-2}$.

Table S1. Photovoltaic properities of the PSCs based on P(iso-NDI2DT-TBT) /PC61BM under the illumination of AM1.5G, 100 mW cm^{-2}.

Blending Ratio (w/w)(D/A)	Annealing Temperature (^{o}C)	V_{OC} (V)	J_{SC} (mA cm^{-2})	FF (%)	PCE (%)
1:3	120	0.93	1.56	60.0	0.87
1:2		0.92	1.48	57.9	0.79
1:1		0.95	2.18	53.8	1.11
2:1		0.94	1.37	46.2	0.59
3:1		0.90	1.42	40.4	0.52
1:1[a]		0.90	3.11	55.3	1.54

[a] with 1% DIO added

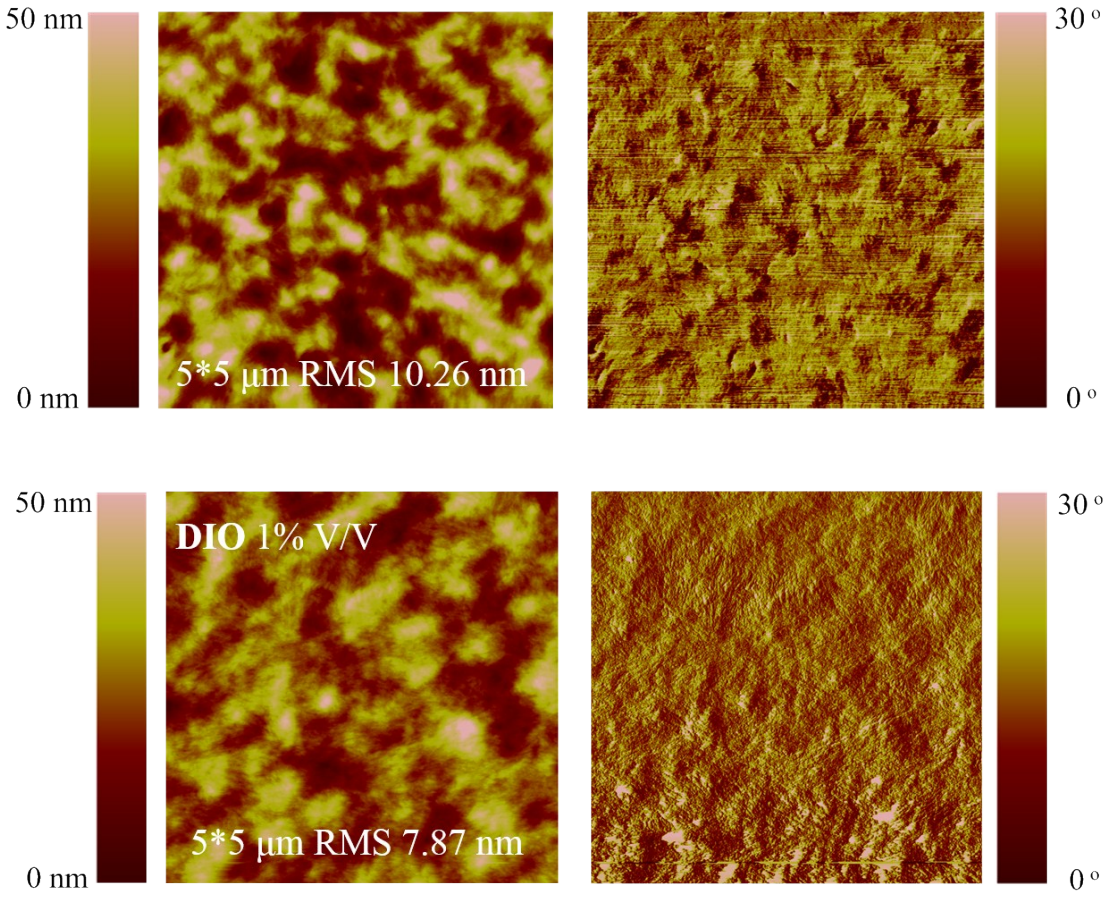

Figure S7. AFM topography (left) and phase (right) images (5 × 5µm^2) of the active layers from P(iso-NDI2DT-TBT)/ PC61BM with weight ratio of 1 :1.