Electronic Supplementary Material (ESI) for Polymer Chemistry.

High Photovoltaic Performance of As-casting Device Based on New Quinoxaline-based Donor-Acceptor Copolymers

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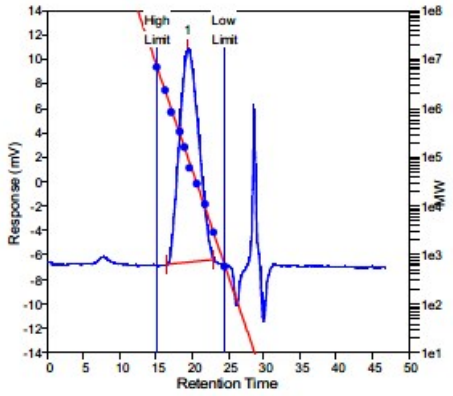
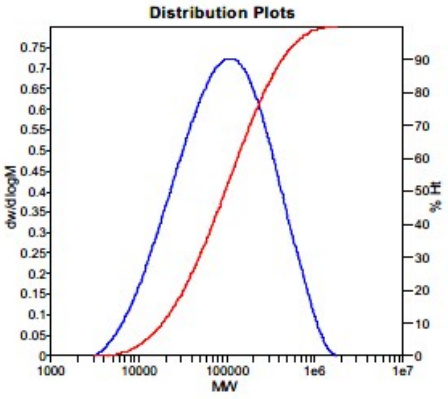
Content

（a）





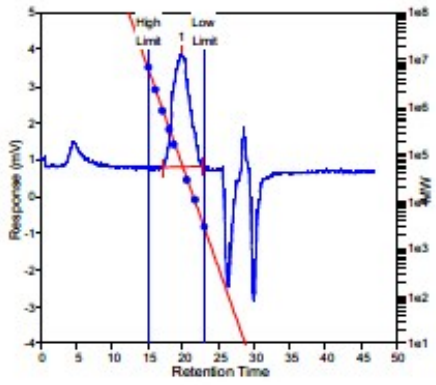
MW Averages

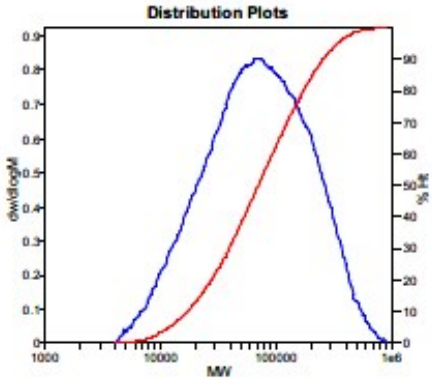
Peak No	Mp	Mn	Mw	Mz	Mz+1	Mv	PD
1	108129	45919	169254	410043	654387	140562	3.68593

Processed Peaks

Peak No	Name	Start RT (mins)	Max RT (mins)	End RT (mins)	Pk Height (mV)	% Height	Area (mV.secs)	% Area
1		16.58	19.38	22.93	17.4603	100	3343.07	100

(b)





MW Averages

Peak No	Mp	Mn	Mw	Mz	Mz+1	Mv	PD
1	70281	40304	108837	223197	341242	94161	2.7004

Processed Peaks

Peak No	Name	Start RT (mins)	Max RT (mins)	End RT (mins)	Pk Height (mV)	% Height	Area (mV.secs)	% Area
1		17.17	19.78	22.68	3.09041	100	518.688	100

Figure S1 GPC plot of polymers: (a) PBDT-DFQX-TTSEH (b) PBDT-DFQX-TTSC8

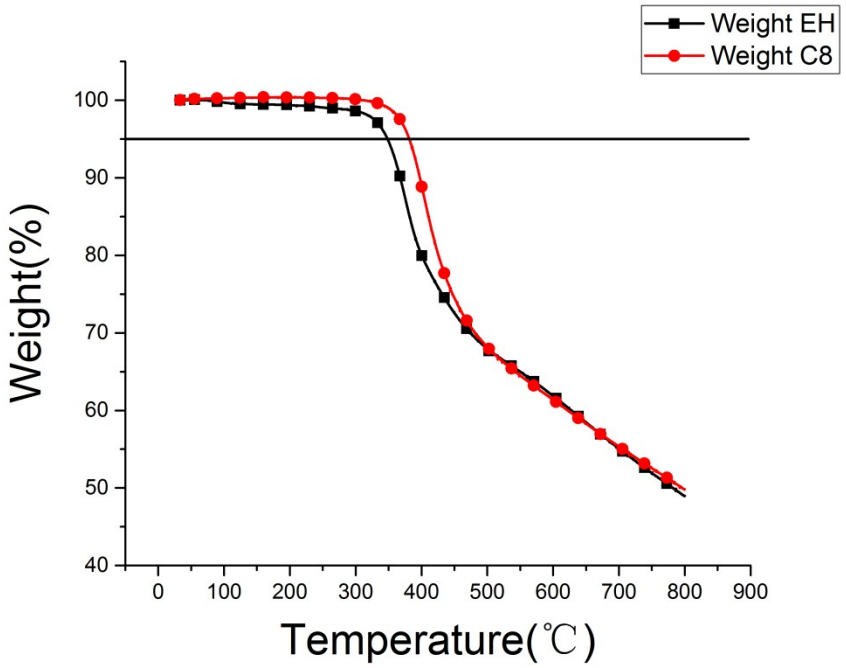


Figure S2 TGA plots of the polymers with a heating rate of 10 C min^{-1} under a N_2 atmosphere.

(a) (b)

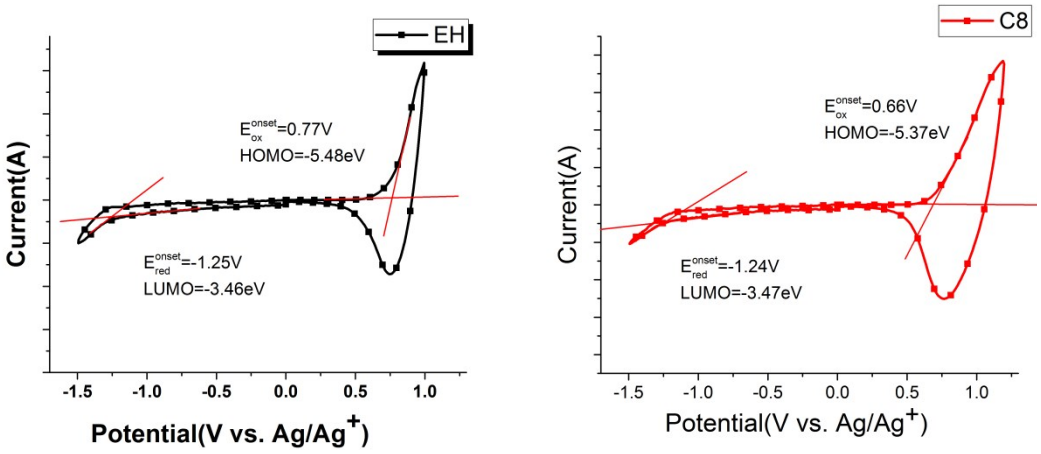


Figure S3 Thin film cyclic voltammograms of PBDTTS-EH-Qx and PBDTTS-C8-Qx in 0.1 M Bu_4NPF_6 acetonitrile solution at a scan rate of 100 $mV \cdot s^{-1}$

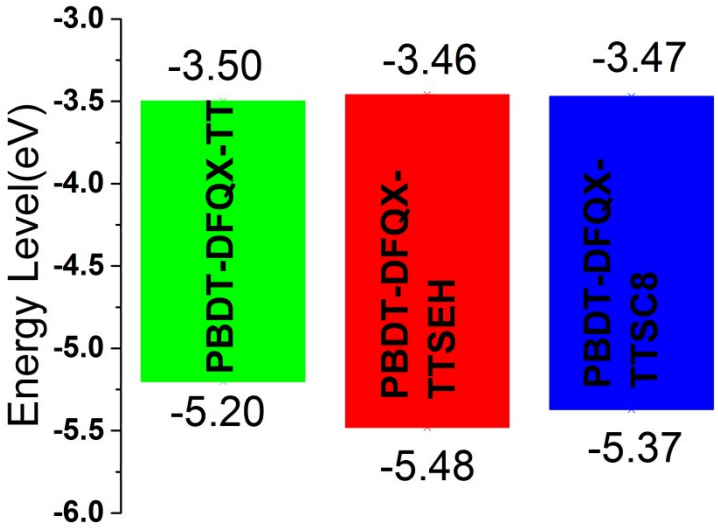


Figure S4 Energy level diagrams for PBDT-DFQX-TT, PBDT-DFQX-TTSEH and PBDT-DFQX-TTSC8

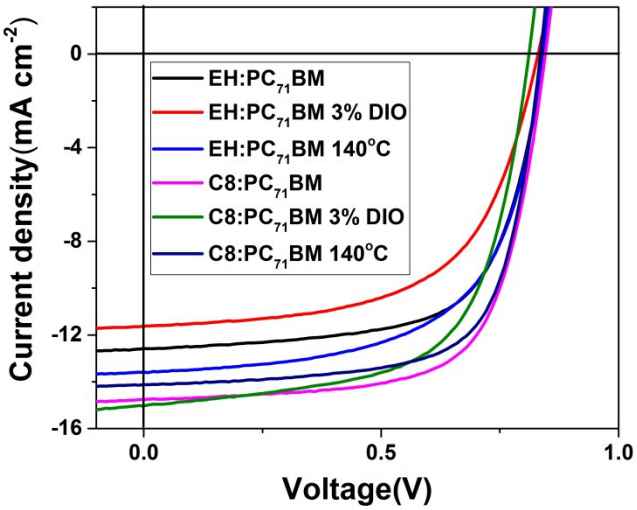


Figure S5 Current density–voltage characteristics of the PSCs based on polymer:$PC_{71}BM$ blends with different treatment under illumination of AM1.5, 100 mW cm^{-2}

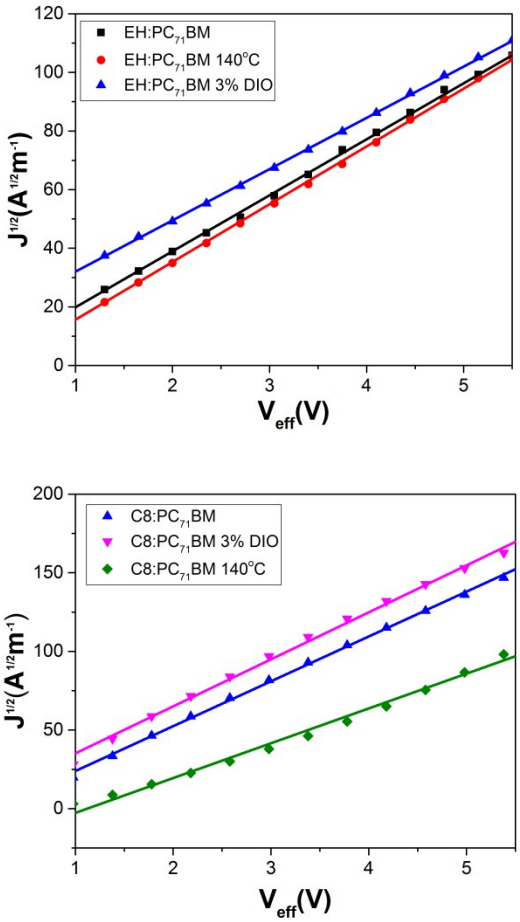


Figure S6 $J^{1/2}$~V_{eff} characteristics for the devices based on the blend films. Solid lines were the fitting lines of the data.

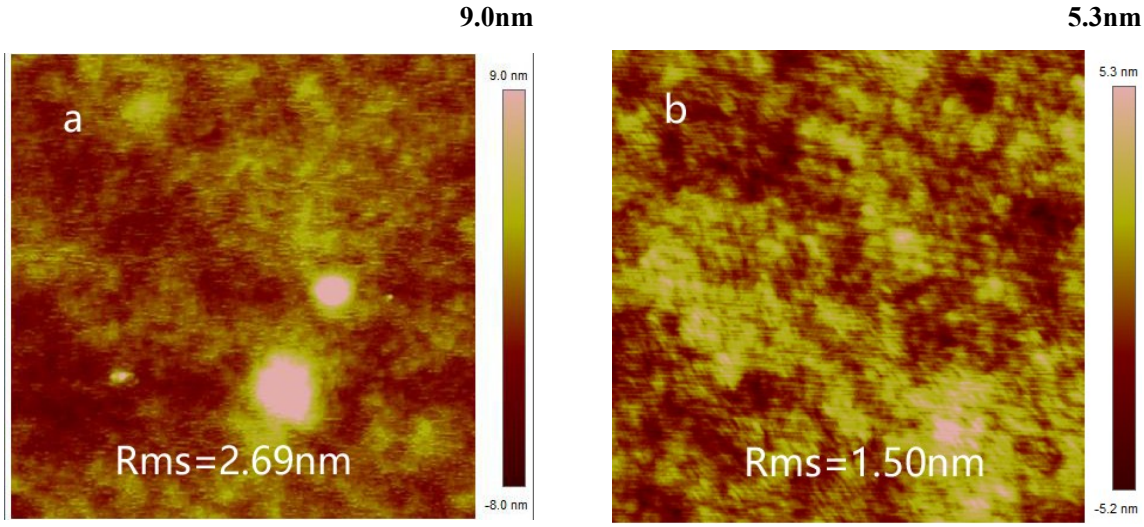


Figure S7 AFM topography ($2.5 \times 2.5\ \mu m^2$) of blend films treat both with DIO and thermal annealing. (a) for PBDT-DFQX-TTSEH (b) for PBDT-DFQX-TTSC8

Table S1 Photovoltaic performances of the PSCs based on polymer/$PC_{71}BM$

under the illumination of AM1.5G, 100 mW·cm^{-2}.

Polymer	Ratio [a]	Treatment	V_{oc} (V)	J_{sc} ($mA \cdot cm^{-2}$)	FF(%)	PCE[b](%)
EH	1:1.2	3%DIO,TA	0.83	12.05	59.11	5.94(5.47 ± 0.36)
C8	1:1.2	3%DIO,TA	0.81	14.04	61.54	6.9(6.80 ± 0.17)

[a] Polymer/$PC_{71}BM$ weight ratio. [b] Optimized data. Average data were in the parentheses and obtained from 10 devices.

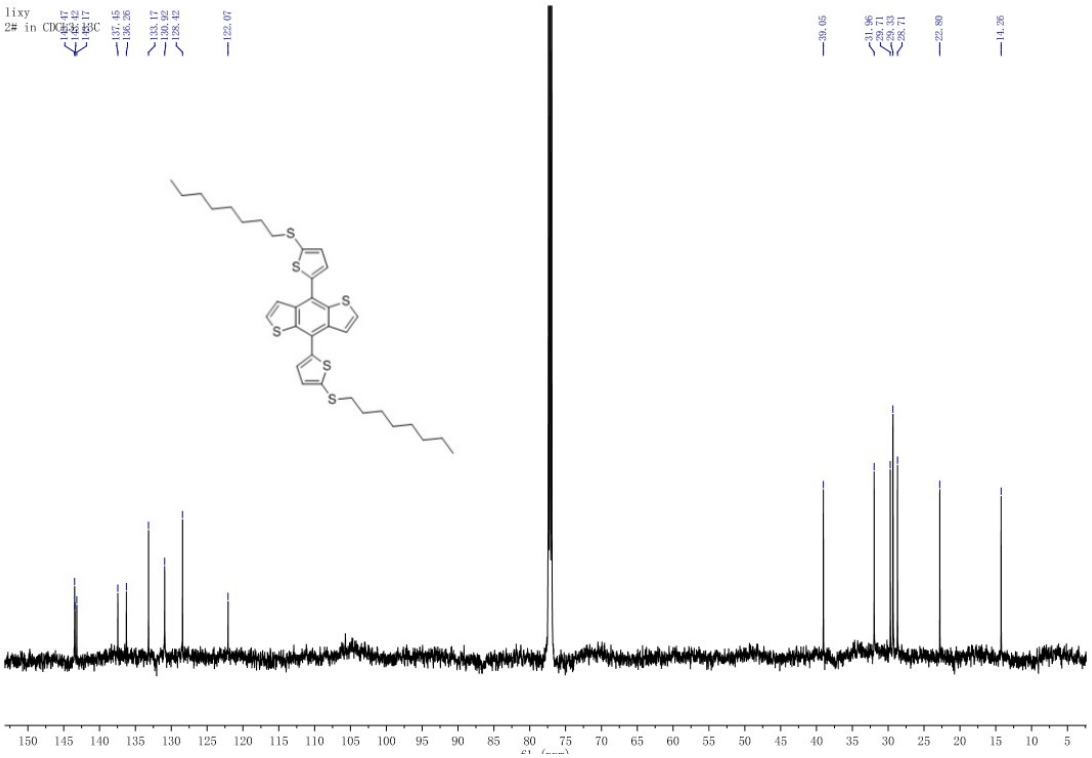


Figure S8 13C-NMR of BDT-TSC8

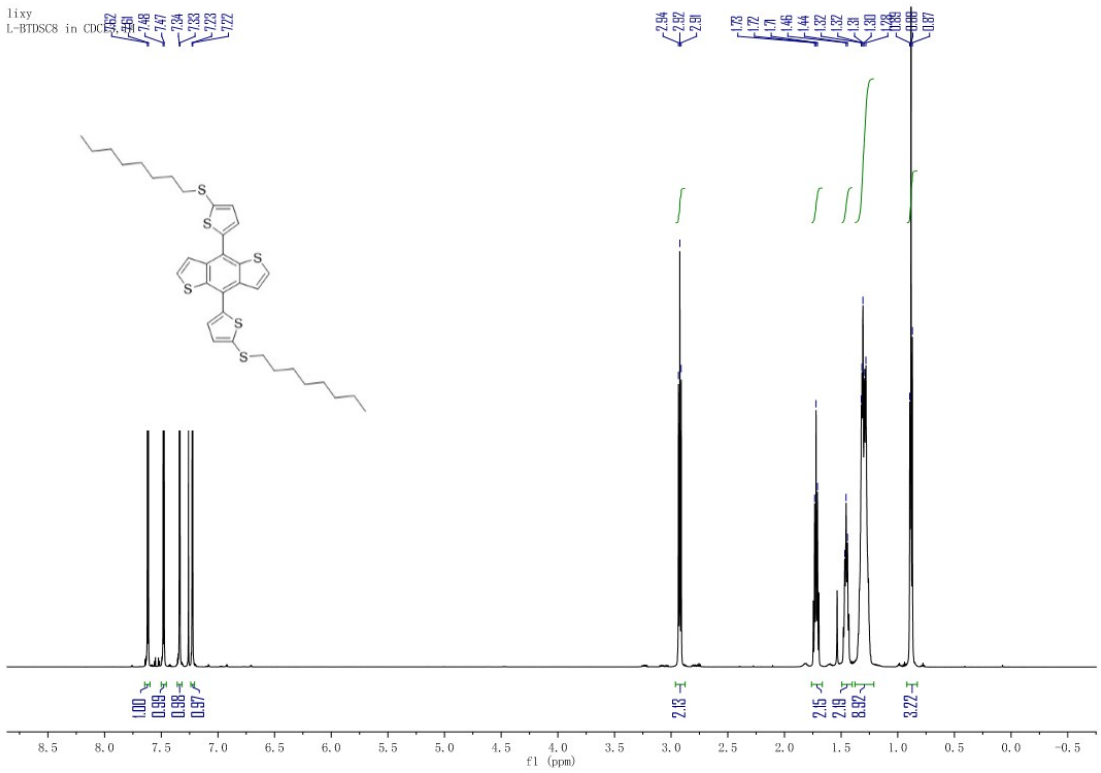


Figure S9 1H-NMR of BDT-TSC8

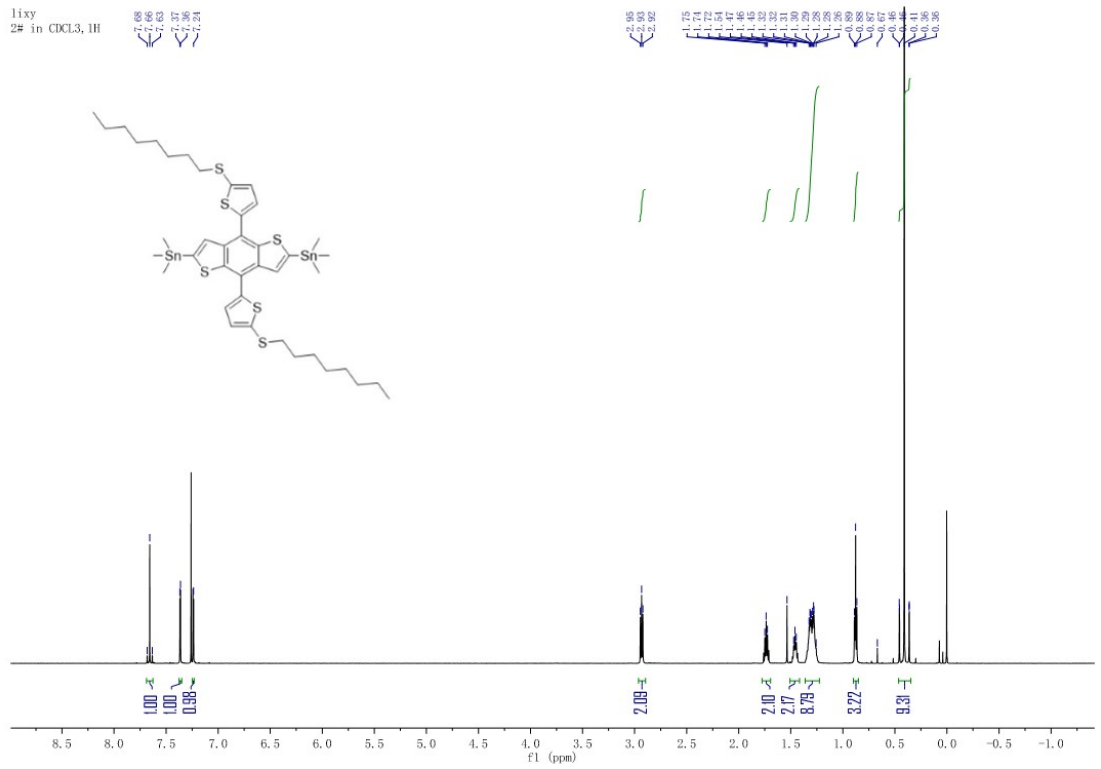


Figure S10 1H-NMR of BDT-TSC8-2Sn

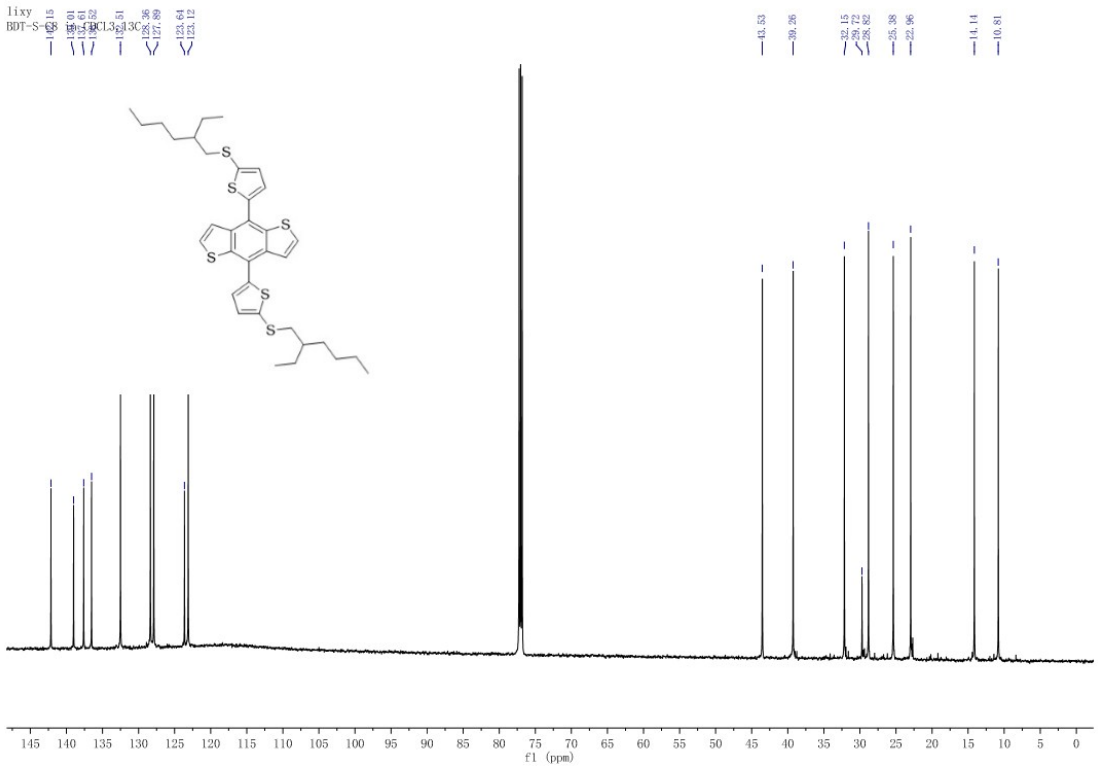


Figure S11 13C-NMR of BDT-TSEH

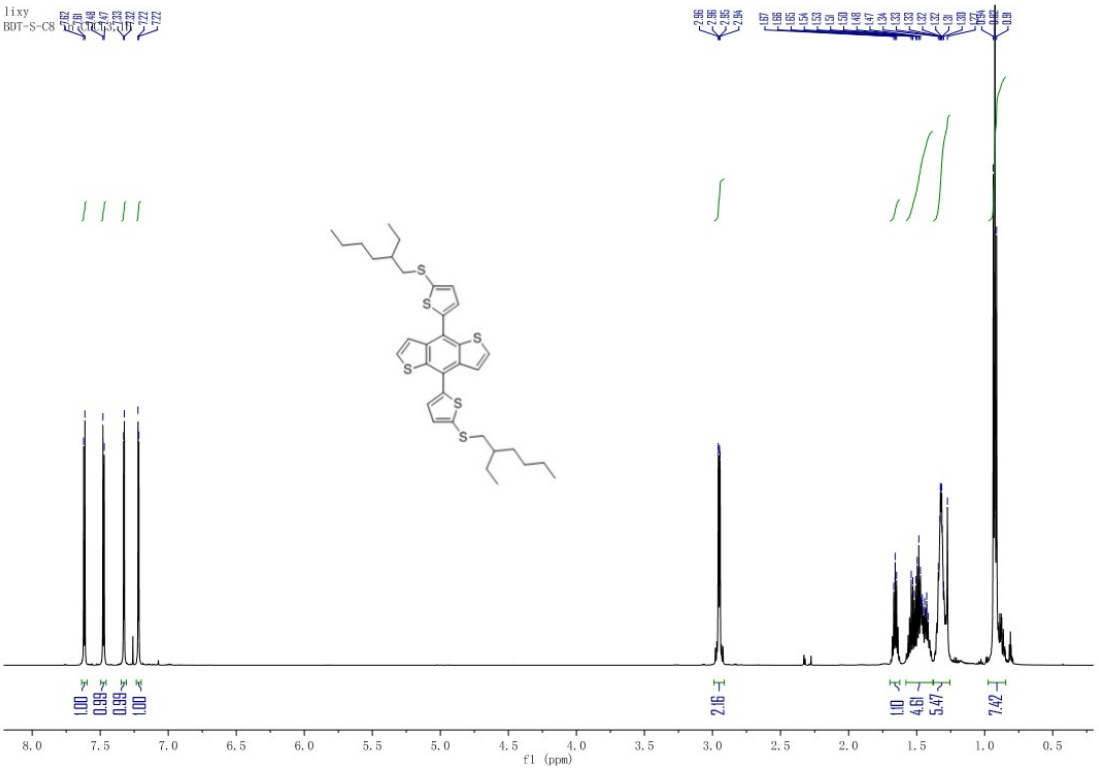


Figure S12 1H-NMR of BDT-TSEH

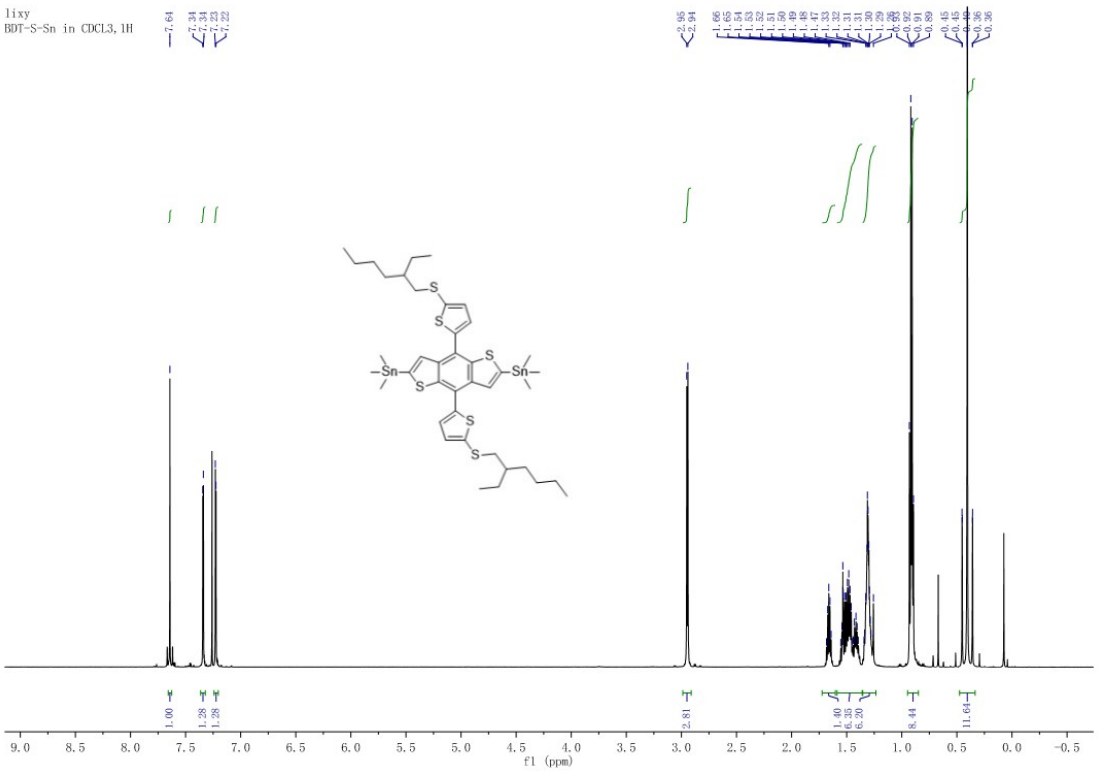


Figure S13 1H-NMR of BDT-TSEH-2Sn

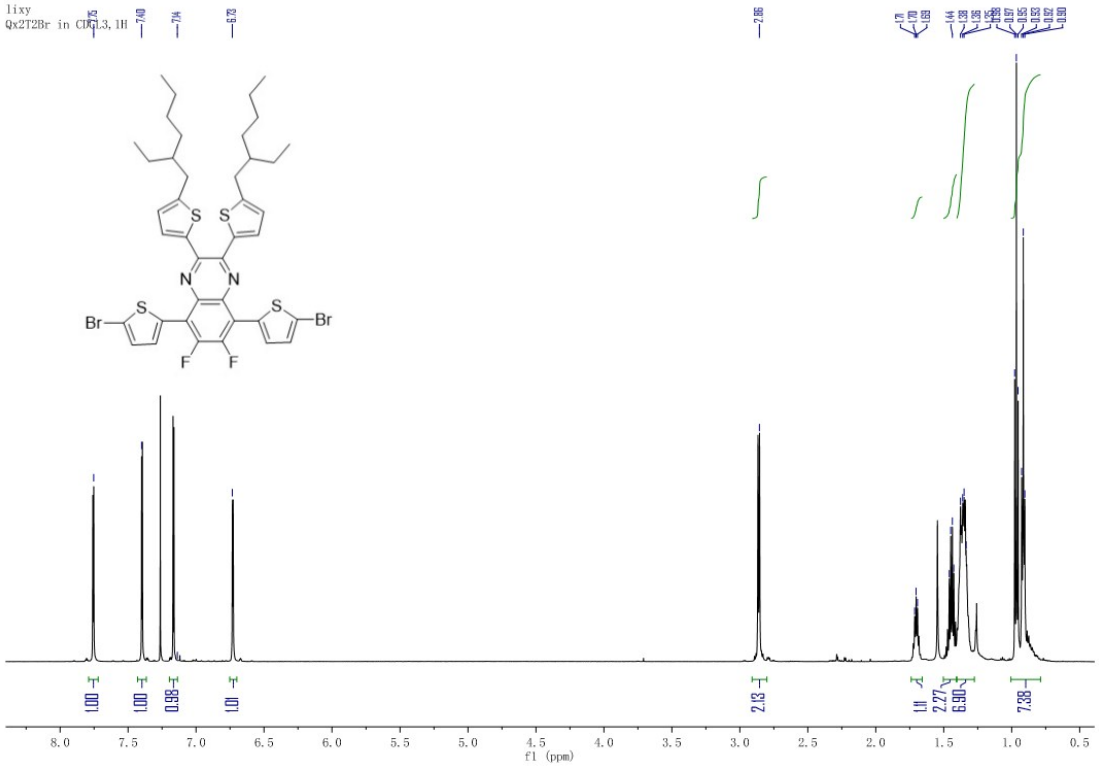


Figure S14 1H-NMR of DFQx-TEH-2T-2Br

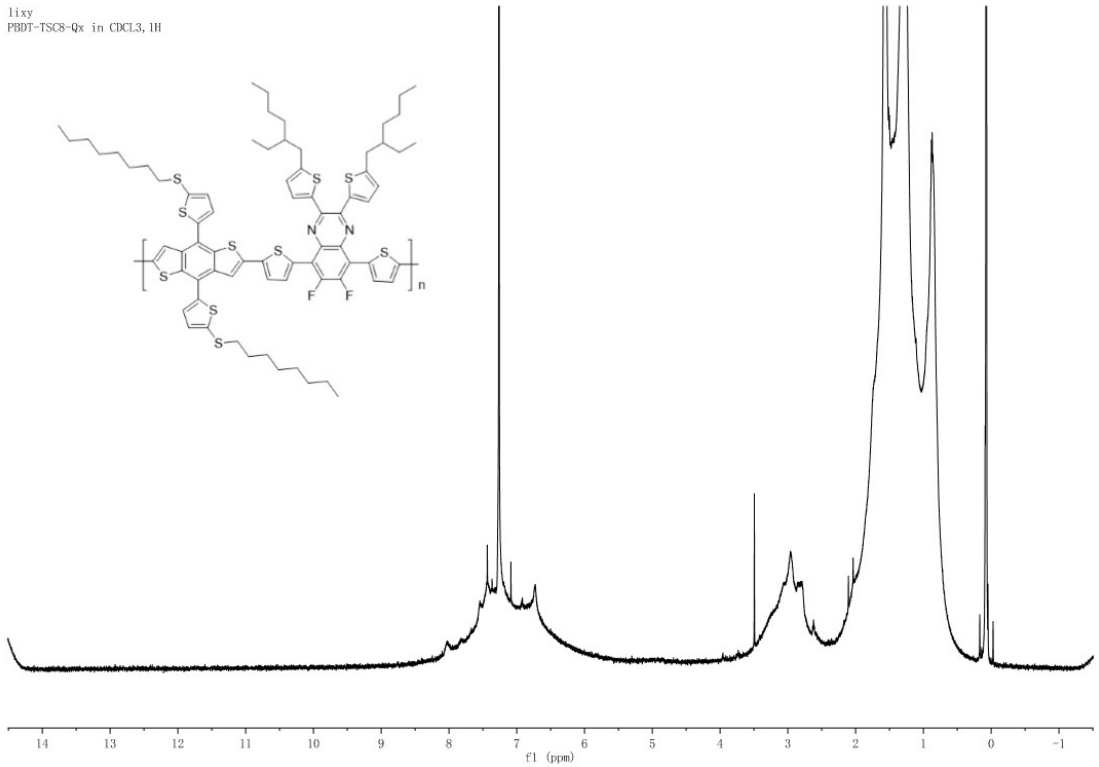


Figure S15 1H-NMR of PBDT-DFQx-TTSC8

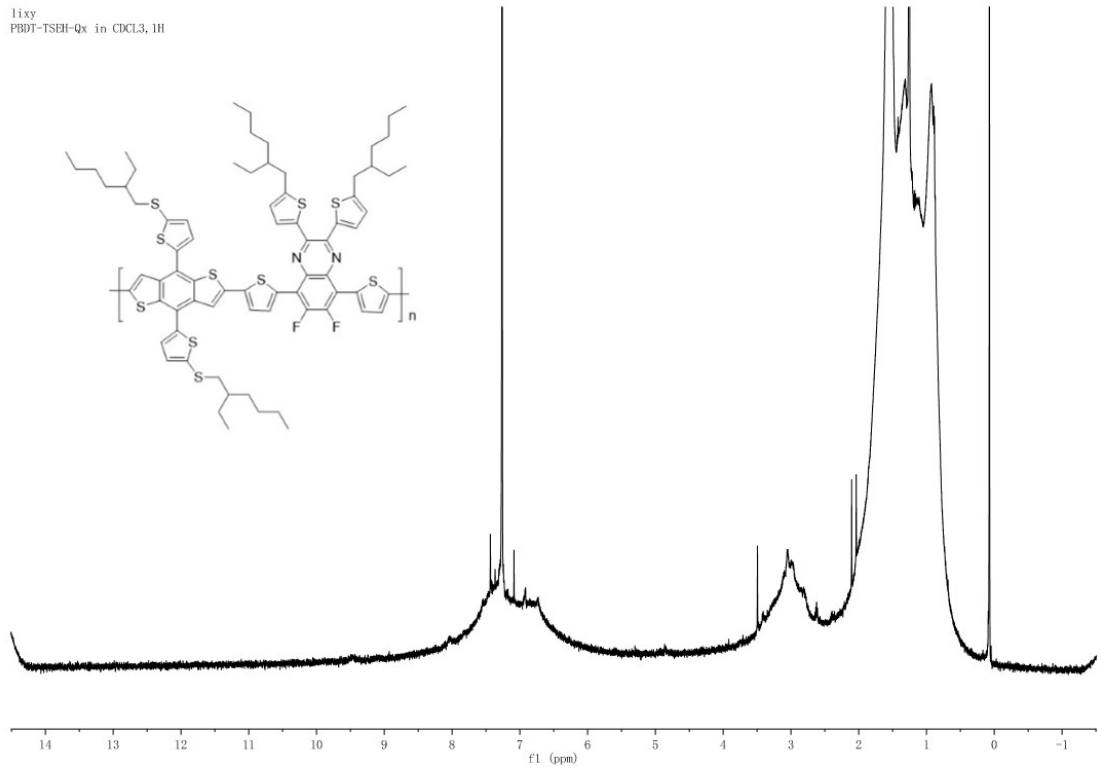


Figure S16 1H-NMR of PBDT-DFQx-TTSEH