

Supporting Information

Biaxially Extended Conjugated Polymers with Thieno[3,2-*b*]thiophene Building Block for High Performance Field-Effect Transistor Applications

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Table S1. Calculated torsional angles of the studied polymers using DFT method

Polymer	θ_α	θ_β	θ_γ
PTTT2T	34°	51°	-
P2TTT2T	20°	55°	0.3°
PTTTT2T	35°	46°	-
PTVTTT2T	15°	58°	1°

Table S2. Relevant crystallographic parameters for the studied polymer thin films

Polymer	$Q_z(100)$ (Å ⁻¹)	d -spacing (Å)
PTTT2T	0.328	19.1
P2TTT2T	0.272	23.4
PTTTT2T	0.273	23.3
PTVTTT2T	0.221	28.4

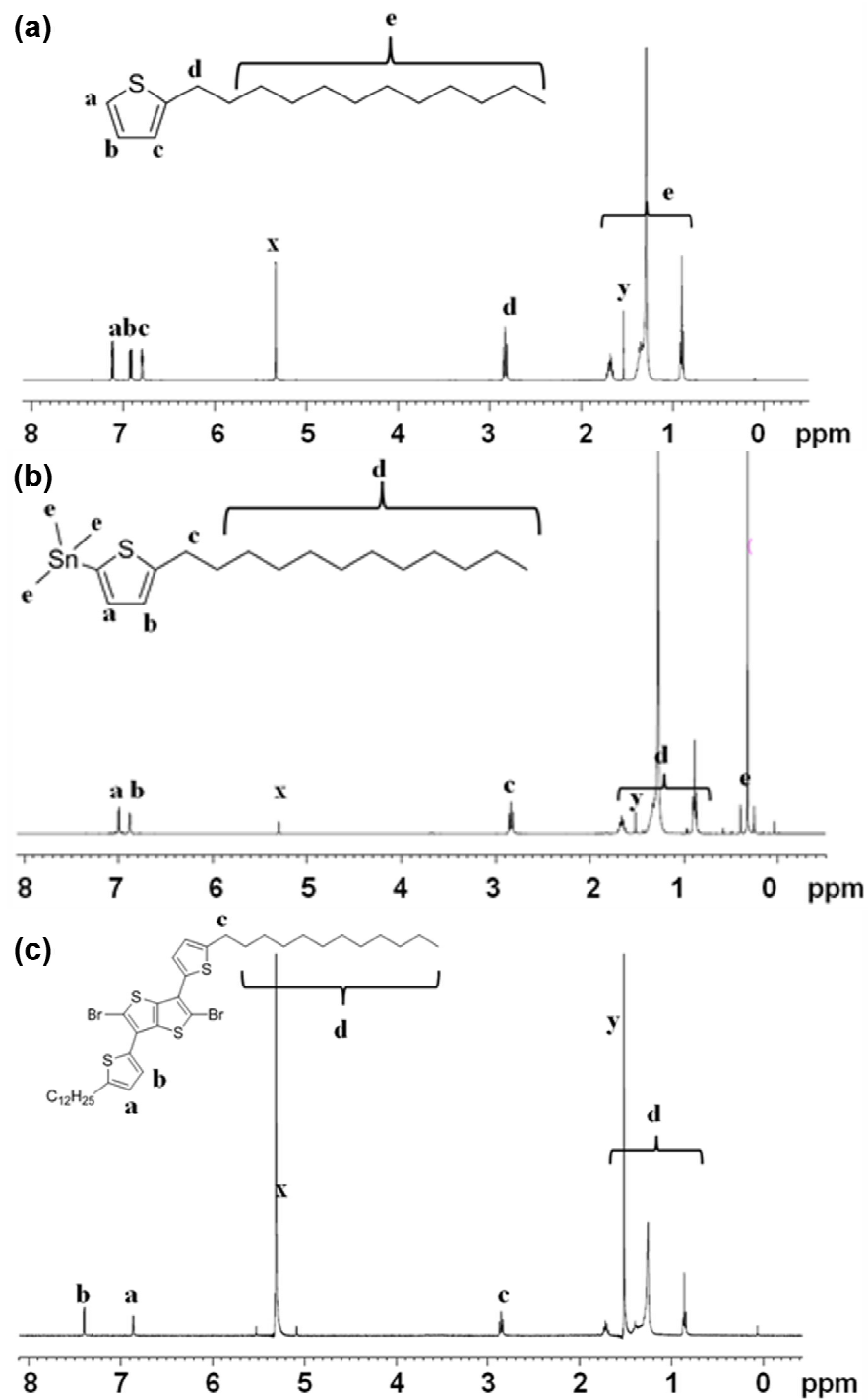


Figure S1. ^1H -NMR spectra of (a) 2-dodecylthiophene, (b) (5-dodecylthiophen-2-yl) trimethylstannane, and (c) 2,5-dibromo-3,6-bis(5-dodecylthiophen-2-yl)thieno-[3,2-*b*]thiophene (TT2T-Br₂) in CD₂Cl₂ (x: CD₂Cl₂, y: H₂O).

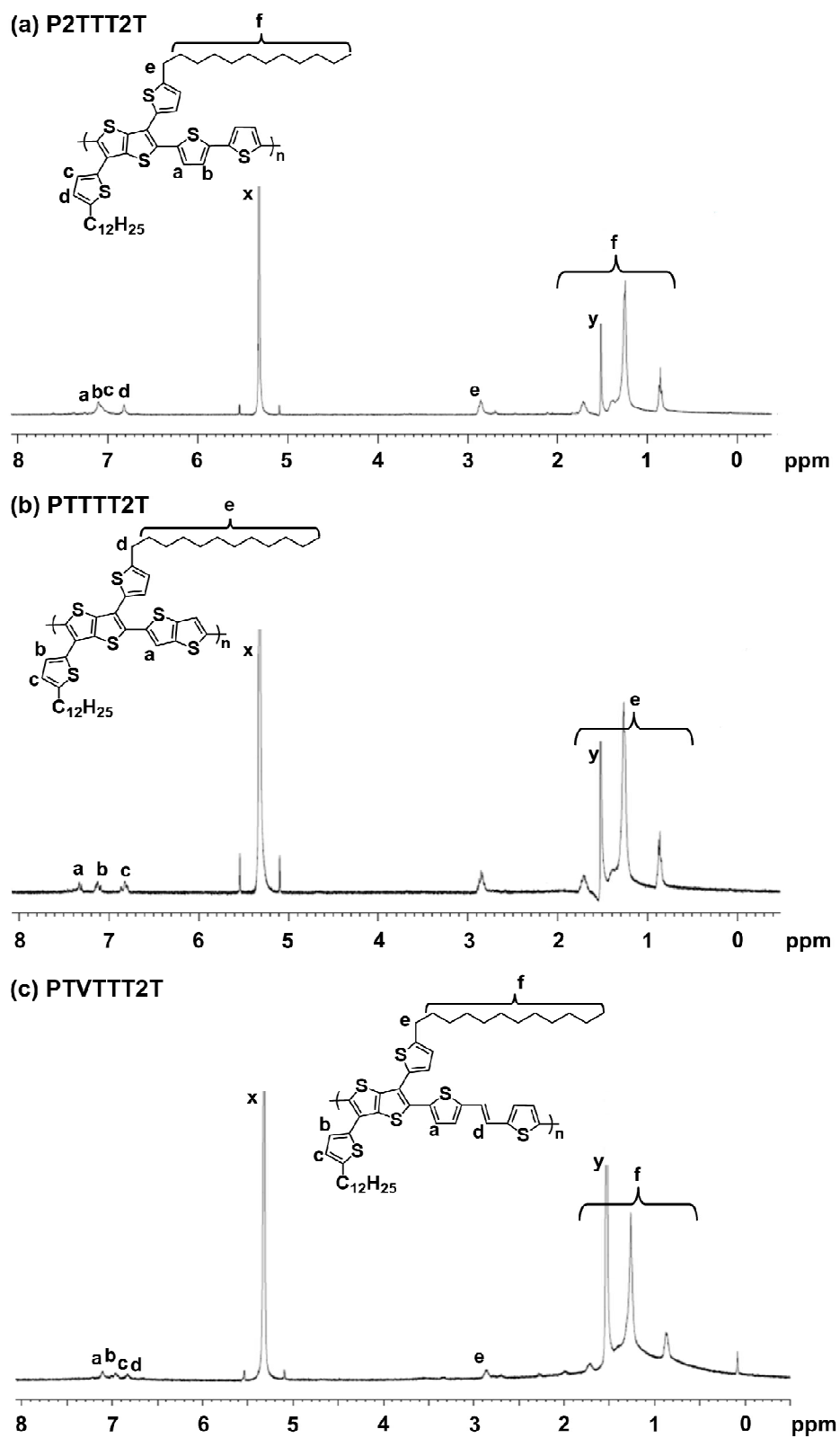


Figure S2. ^1H -NMR Spectra of (a) P2TTT2T, (b) PTTT2T, and (c) PTVTTT2T in CD_2Cl_2 (x: CD_2Cl_2 , y: H_2O).

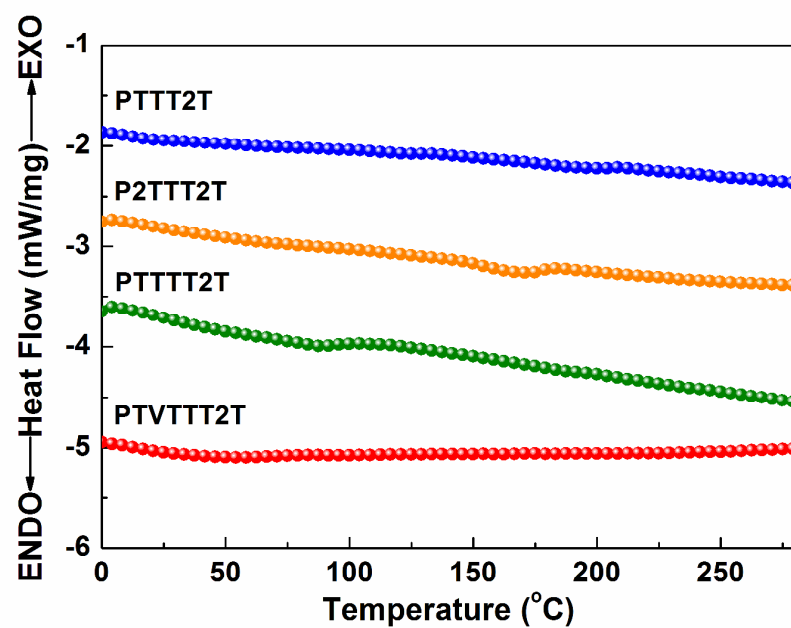


Figure S3. DSC traces of the studied polymers with a scanning rate of 10 °C min⁻¹ under nitrogen atmosphere.

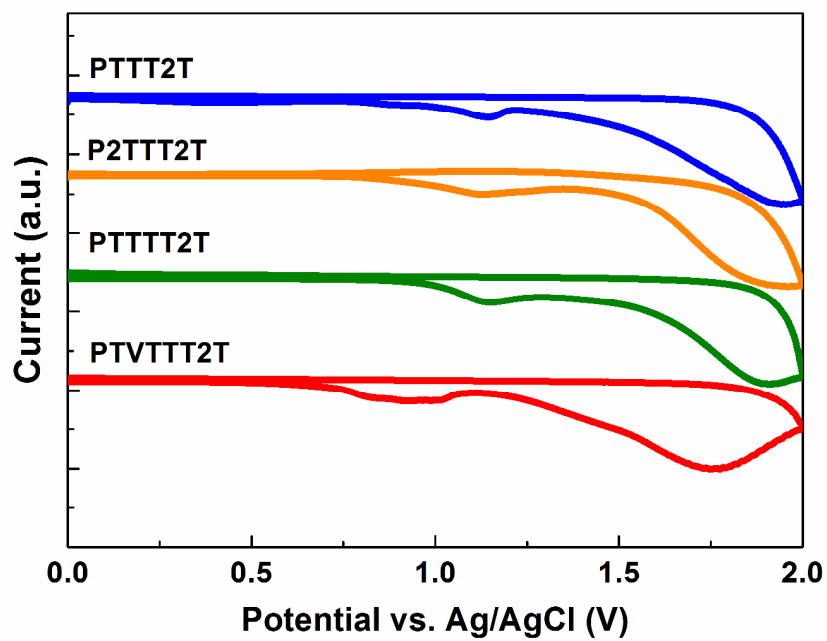


Figure S4. Cyclic voltammetry curves of the studied polymers.

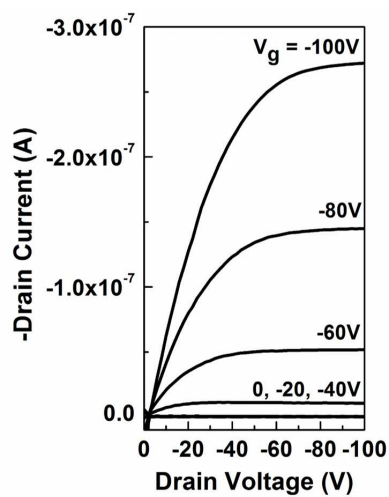


Figure S5. Output characteristics of the PTTTT2T.