

## Supporting Information

### **Synthesis of diketopyrrolopyrrole based conjugated polymers containing thieno[3,2-b]thiophene flanking groups for high performance thin film transistors.**

Shih-Hao Peng, Wei-Yi Tu, Ganesh Gollavelli, and Chain-Shu Hsu\*

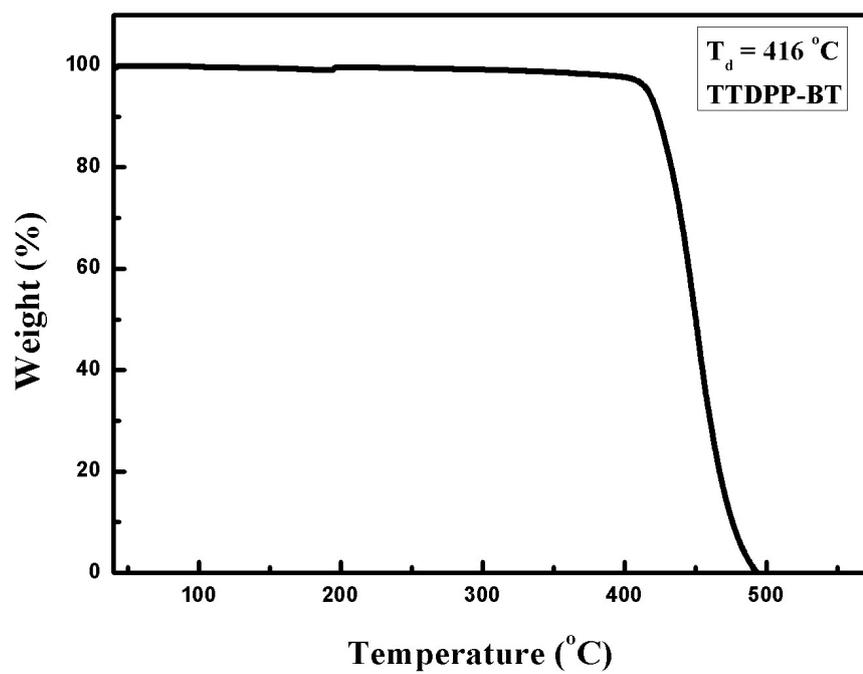
Department of Applied Chemistry, National Chiao Tung University, 1001 Ta Hsueh Road, Hsin-Chu, 30010 Taiwan

E-mail: [cshsu@mail.nctu.edu.tw](mailto:cshsu@mail.nctu.edu.tw)

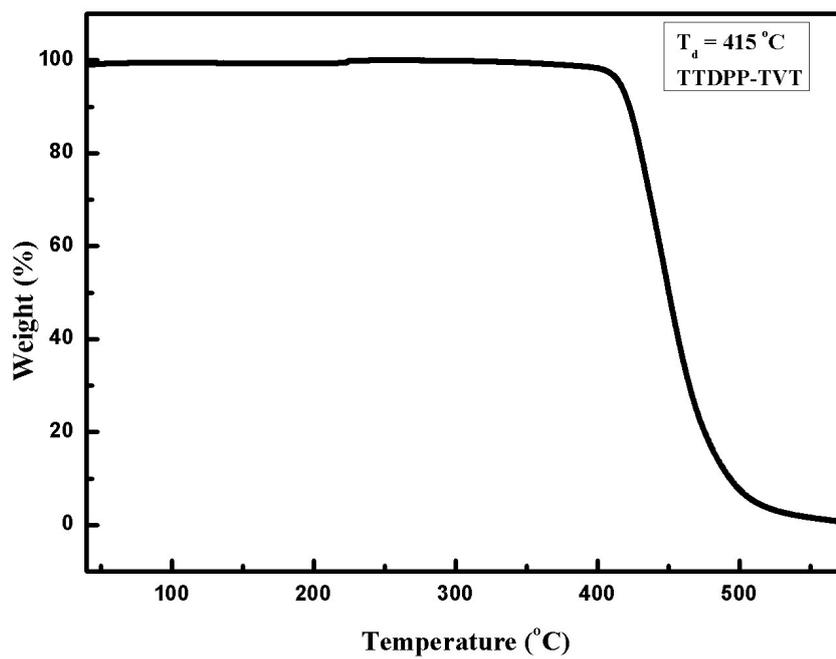
### **CONTENT**

1. Thermogravimetric analysis
2. Molecular weight and polydispersity index
3. OFET performance of TTDPP-BT, TTDPP-TVT, TTDPP-SVS
4. AFM images of polymers
5. NMR spectra of polymers

(a)



(b)



(c)

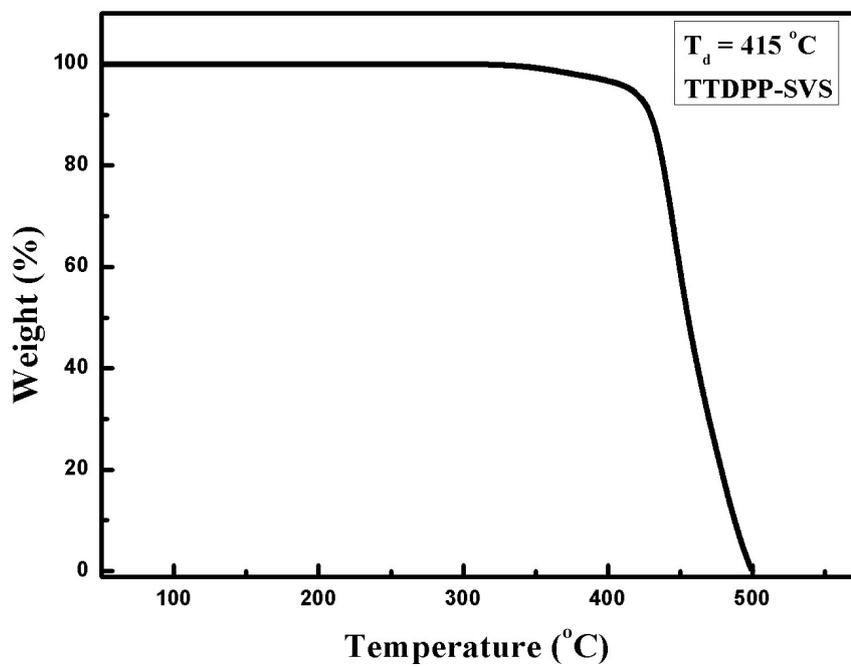


Fig. S1 TGA thermograms of (a) TTDPP-BT, (b) TTDPP-TVT, and (c) TTDPP-SVS

**Table S1.** The molecular weight and polydispersity index (PDI) of **TTDPP-BT**, **TTDPP-TVT** and **TTDPP-SVS**.

Polymer	Mn	Mw	PDI
<b>TTDPP-BT</b>	50072	83770	1.67
<b>TTDPP-TVT</b>	47493	91589	1.92
<b>TTDPP-SVS</b>	67730	103405	1.53

**Table S2.** Bottom-gate/top-contact OFET performance of **TTDPP-BT**.

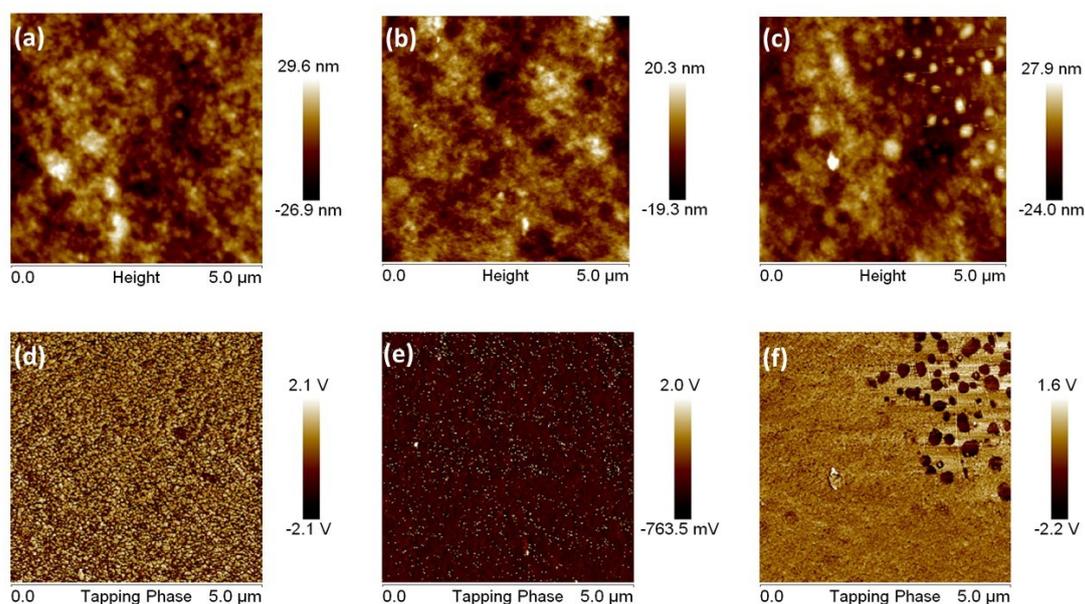
Device number	rpm	Annealing		$V_{th}$ (V)	$I_{on/off}$	Mobility ( $cm^2 V^{-1} s^{-1}$ )
		$T_{annealing}$ ( $^{\circ}C$ )	time (mins)			
(A)	800	200	10	-27.4	$3.82 \times 10^4$	$6.49 \times 10^{-2}$
(B)	800	200	30	-18.2	$3.91 \times 10^3$	$5.12 \times 10^{-2}$
(C)	800	200	60	-23.0	$3.33 \times 10^4$	$4.40 \times 10^{-2}$
(D)	800	250	10	-13.0	$1.53 \times 10^3$	$8.82 \times 10^{-2}$
(E)	800	250	30	-6.3	$7.09 \times 10^2$	$7.90 \times 10^{-2}$

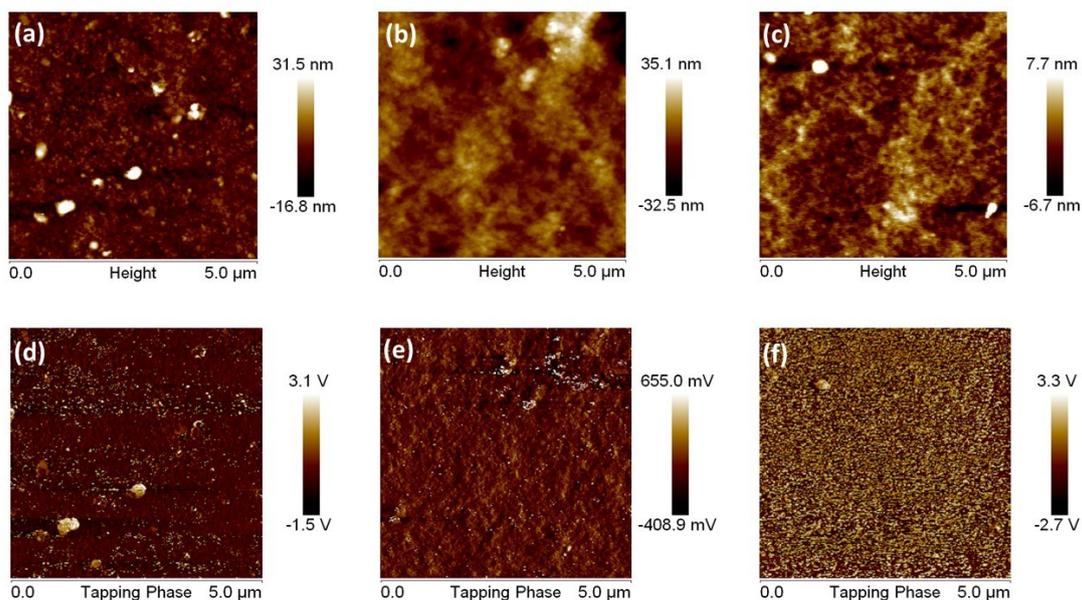
**Table S3.** Bottom-gate/top-contact OFET performance of **TTDPP-TVT**.

Device number	rpm	Annealing		$V_{th}$ (V)	$I_{on/off}$	Mobility ( $cm^2 V^{-1} s^{-1}$ )
		$T_{annealing}$ ( $^{\circ}C$ )	time (mins)			
(A)	800	200	10	-22.8	$3.76 \times 10^3$	$8.92 \times 10^{-3}$
(B)	800	200	30	-16.2	$6.24 \times 10^4$	$3.15 \times 10^{-2}$
(C)	800	200	60	-19.6	$4.98 \times 10^6$	$4.11 \times 10^{-2}$
(D)	800	250	10	-7.87	$1.92 \times 10^4$	$9.45 \times 10^{-2}$
(E)	800	250	30	-23.8	$1.23 \times 10^5$	$1.45 \times 10^{-2}$

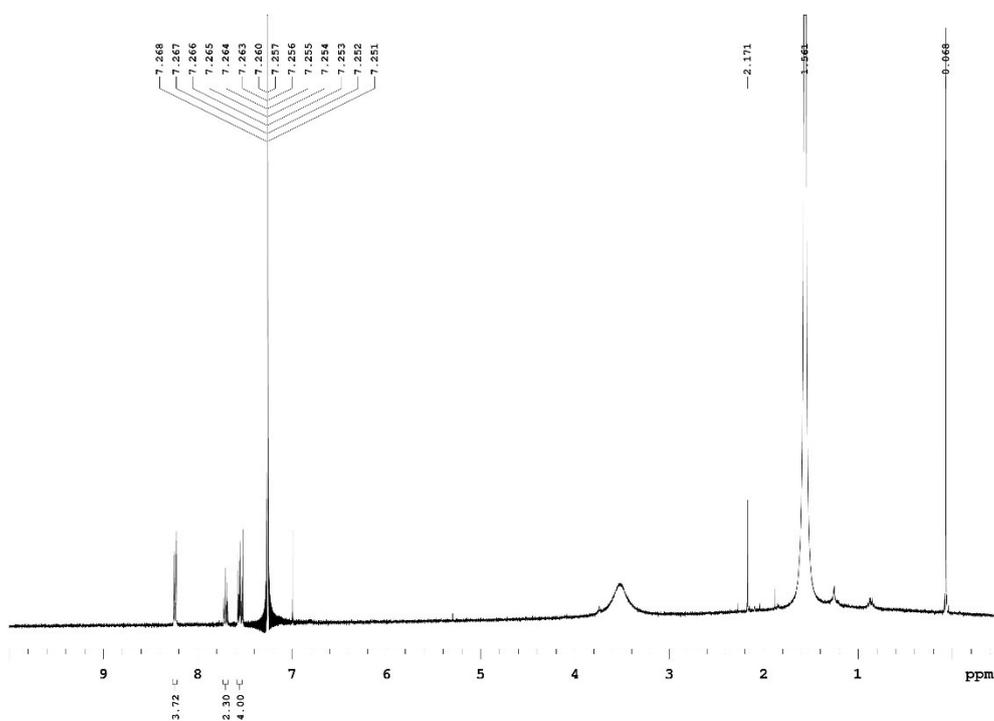
**Table S4.** Bottom-gate/top-contact OFET performance of **TTDPP-SVS**.

Device number	Rpm	T <sub>annealing</sub> (°C)	Annealing time (mins)	V <sub>th</sub> (V)	I <sub>on/off</sub>	Mobility (cm <sup>2</sup> V <sup>-1</sup> s <sup>-1</sup> )
(A)	800	200	10	-26.1	1.91 × 10 <sup>3</sup>	1.18 × 10 <sup>-2</sup>
(B)	800	200	30	-28.0	8.57 × 10 <sup>6</sup>	2.45 × 10 <sup>-2</sup>
(C)	800	200	60	-0.1	1.10 × 10 <sup>1</sup>	0.112
(D)	800	250	10	-3.3	2.13 × 10 <sup>4</sup>	0.158
(E)	800	250	30	-3.6	6.54 × 10 <sup>4</sup>	0.196

**Fig. S2** Representative as-cast AFM height images of (a) **TTDPP-BT** (b) **TTDPP-TVT** and (c) **TTDPP-SVS**, and corresponding AFM phase images of (d) **TTDPP-BT** (e) **TTDPP-TVT** and (f) **TTDPP-SVS**



**Fig. S3** Representative as annealed AFM height images of (a) **TTDPP-BT** (b) **TTDPP-TVT** and (c) **TTDPP-SVS**, and corresponding AFM phase images of (d) **TTDPP-BT** (e) **TTDPP-TVT** and (f) **TTDPP-SVS**



**Fig. S4**  $^1\text{H}$  NMR spectrum of polymer **TTDPP-BT**

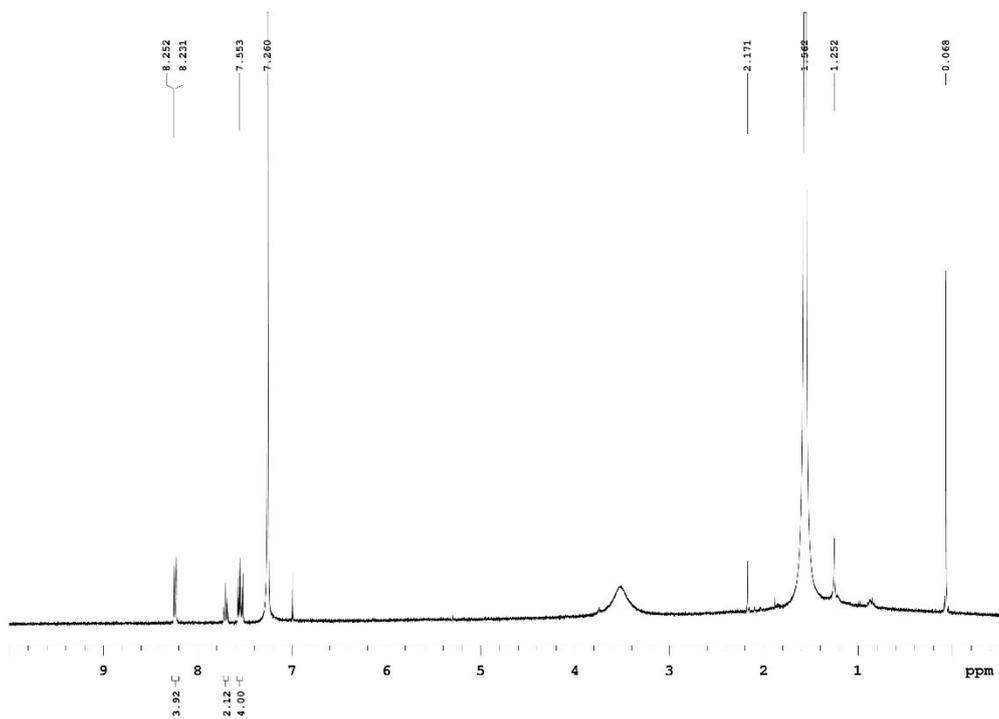


Fig. S5  $^1\text{H}$  NMR spectrum of polymer TTDPP-TVT

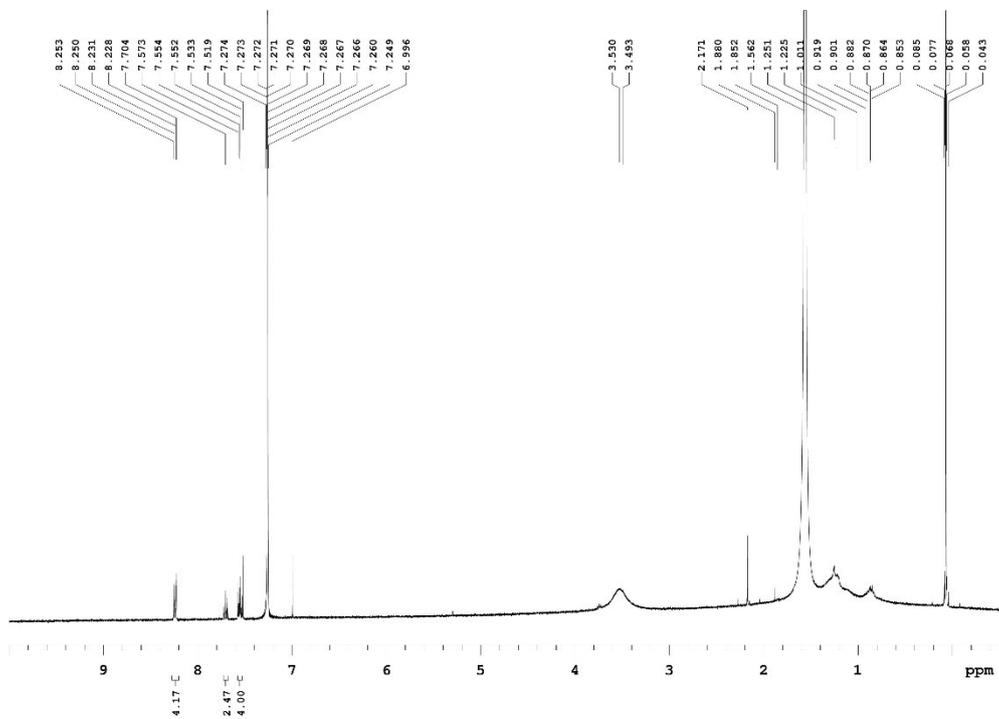


Fig. S6  $^1\text{H}$  NMR spectrum of polymer TTDPP-SVS