Supporting Information

A New Benzo[1,2-b:4,5-b']difuran-Based Copolymer for Efficient Polymer Solar Cells

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Fabrication of OFET devices

Thin-film OFETs were fabricated with top-contact configuration. Thermally oxidized (100) silicon wafers (n^{++} doped) with a SiO_2 thickness of 300 nm were sequentially cleaned with detergent, deionized water, acetone and ethanol in ultrasonic bath. Then hydrophilic treatment of these silicon wafers was performed according to the standard procedure. Briefly, the substrates were soaked in a mixture of deionized water, 25% ammonium hydroxide and 30 % H_2O_2 (5:1:1 by volumetric ratio) for 20 min at 80 °C, then rinsed with deionized water and dried with nitrogen flow. Octadecyltrimethoxysilane (OTMOS) was self-assembled on the surface of hydrophilic-treated substrates according to the reported method.[1] Thin polymer films were prepared by spin coating of PBDFDTNO in chlorobenzene onto the OTMOS modified SiO_2/Si substrates at a speed of 3000 rpm (revolutions per minute) for 40 s at room temperature. After annealing at 180 °C under N_2 for half an hour, gold film (50 nm) was deposited on the organic layer to form the drain and source electrodes, for a typical device, the drain-source channel length (L) and width (W) are 80 μm and 8800 μm, respectively. OFET measurements were performed at room temperature using a Keithley 4200 SCS semiconductor parameter analyzer under ambient conditions.

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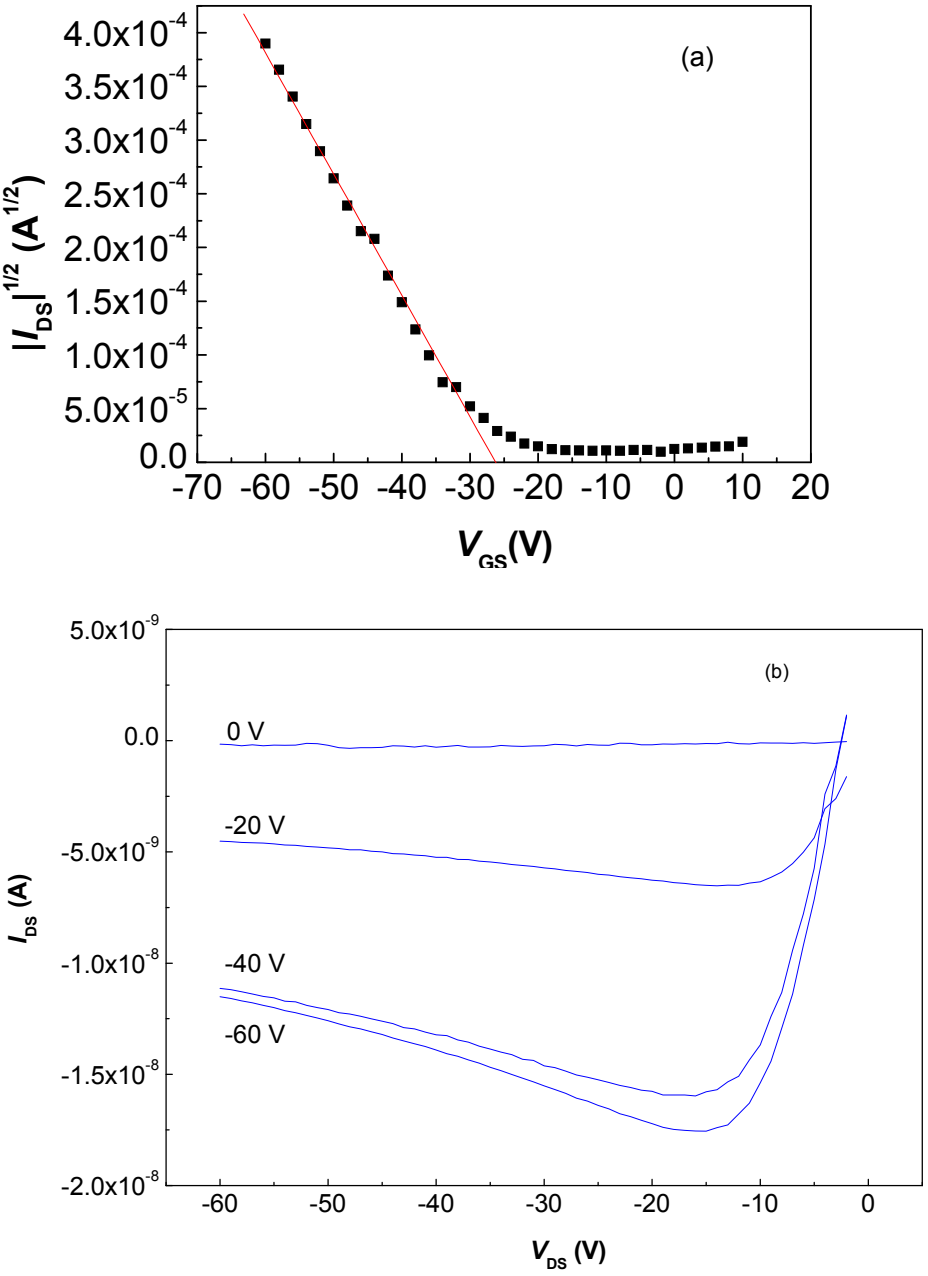

Fig. S1 Transfer characteristics (a) and output characteristics (b) of PBDFNTDO thin film deposited on OTMOS modified SiO_2.

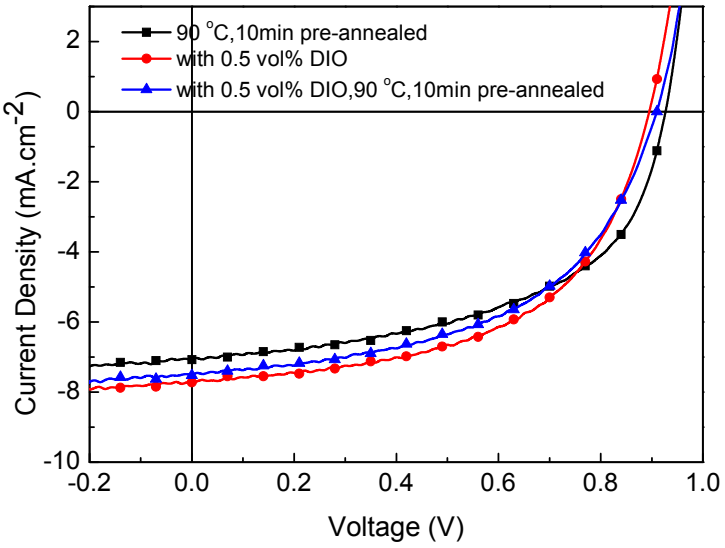

Fig.S2 *J-V* curves of the polymer solar cells based on PBDFNTDO:$PC_{71}BM$ with a weight ratio of 1:1.5 in ODCB with different modifications.

Table S1 The photovoltaic results from modifications of devices

Active layer	V_{oc} (V)	J_{sc} ($mAcm^{-2}$)	FF (%)	PCE (%)
PBDFNTDO:$PC_{71}BM$=1:1.5 90 °C，10 min[a]	0.93	7.08	53.4	3.52
PBDFNTDO:$PC_{71}BM$=1:1.5 +DIO(0.5%, *v*/*v*)[b]	0.89	7.72	55.1	3.78
PBDFNTDO:$PC_{71}BM$=1:1.5 +DIO(0.5%, *v*/*v*), 90 °C，10 min[c]	0.91	7.53	52.0	3.56

a: annealed at 90 °C for 10 min. b: 0.5% volume DIO . c. 0.5% volume additive, then annealed at 90 °C for 10 min.

References

(1) Ito, Y.; Virkar, A. A.; Mannsfeld, S.; Oh, J. H.; Toney, M.; Locklin, J.; Bao, Z. *J. Am. Chem. Soc.* **2009**, *131*, 9396.