Supporting Information

Balancing the trade-off between the mechanical and electrical properties of conjugated polymer blend films for organic field-effect transistors

Hang Ren,[a,b] Yanhong Tong,[b] Mingzhao Ouyang,[a] Jiake Wang,[a] Lei Zhang,[a] Yuegang Fu,[*a] and Qingxin Tang[*b]

[a]Key Laboratory of Optoelectronic Measurement and Optical Information Transmission Technology, Ministry of Education, Changchun University of Science and Technology, Changchun 130022, China.

[b]Centre for Advanced Optoelectronic Functional Materials Research and Key Laboratory of UV-Emitting Materials and Technology, Ministry of Education, Northeast Normal University, Changchun 130024, China.

* Corresponding author email: tangqx@nenu.edu.cn, fuyg@cust.edu.cn

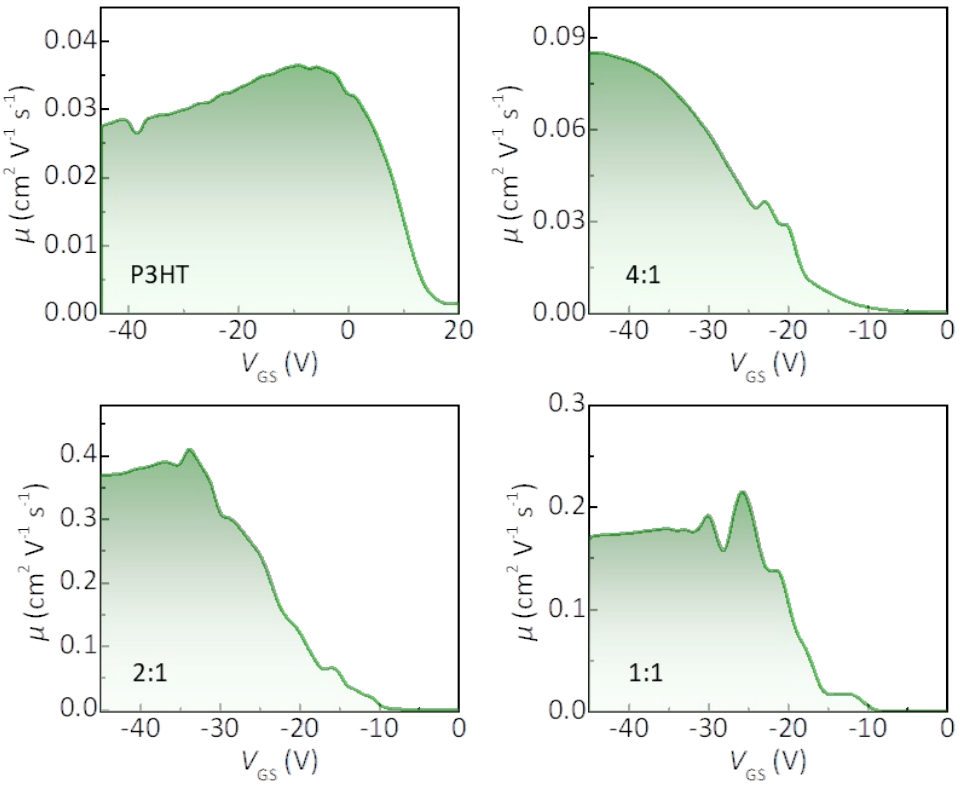

Fig. S1. Saturation mobility as a function of gate voltage for the OFETs with P3HT and P3HT:DPPT-TT blend films.

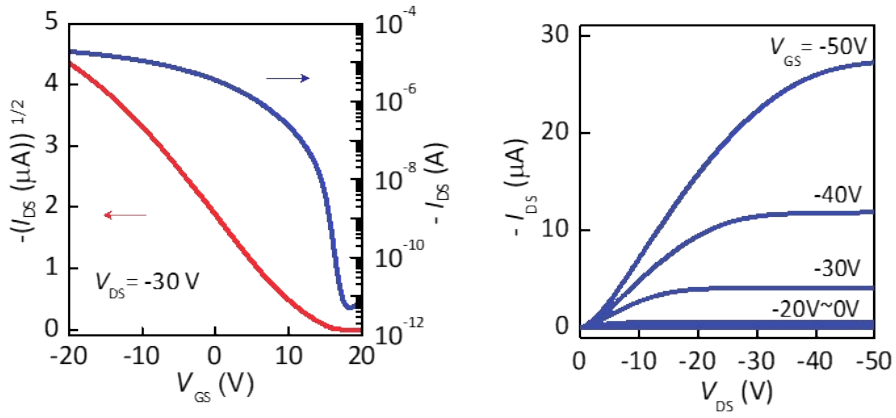

Fig. S2. Representative transfer and output characteristics of BGTC OFETs for the neat DPPT-TT film (L=50 μm, W=1000 μm).

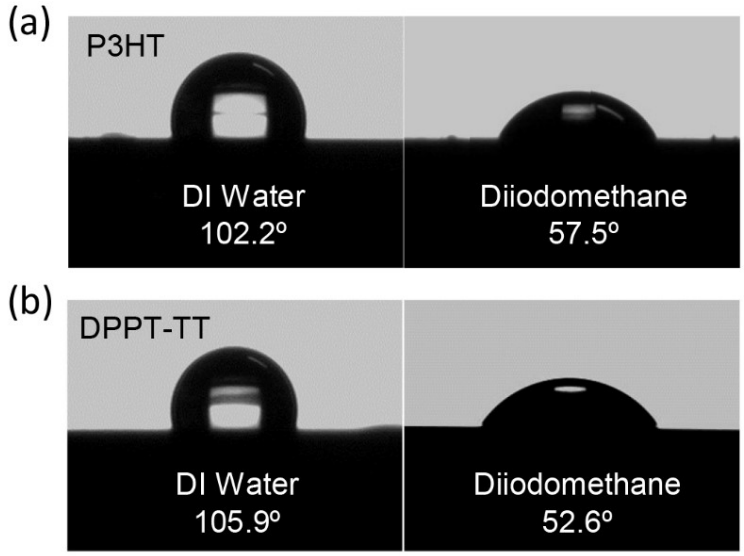

Fig. S3. Contact angles of DI water and diiodomethane on (a) P3HT and (b) DPPT-TT.

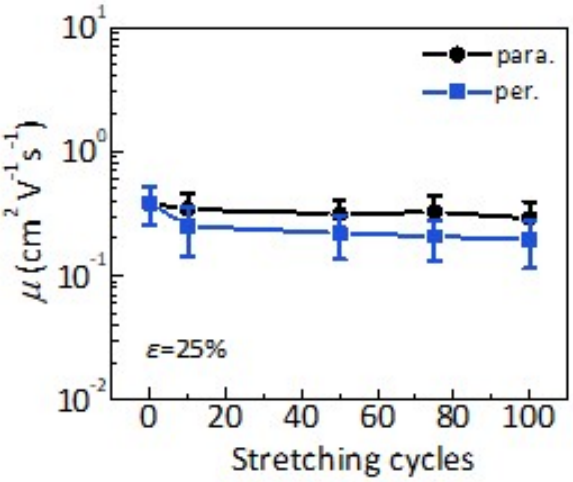

Fig. S4. Field-effect mobility versus number of stretching cycles at a strain of 25% perpendicular and parallel to the channel length direction.

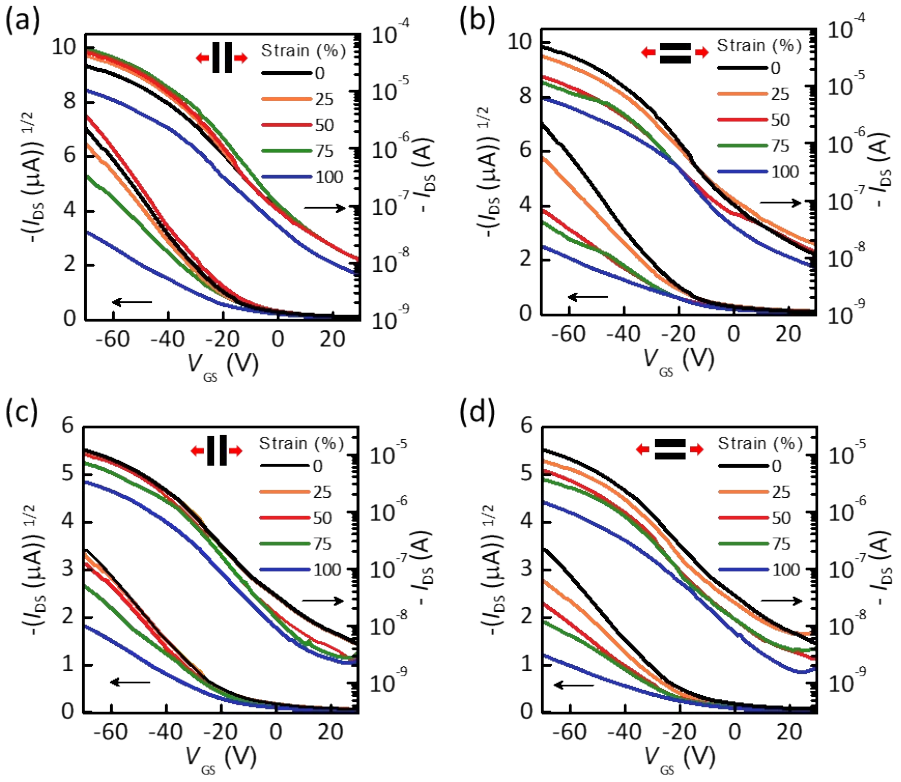

Fig. S5. Representative transfer (drain voltage: -30 V) characteristics of BGTC OFETs with (a,b) 50 μm and (c,d) 200 μm channel length under different tensile strains in parallel or perpendicular to the stretching direction.

Table S1. Electrical performance of the OFETs with a semiconductor layer of P3HT and P3HT:DPPT-TT blend films. 10 devices were measured for each type of OFET.

Semiconductor	Crack-onset strain (%)	μ ($cm^2 V^{-1} s^{-1}$)	V_T (V)	I_{on}/I_{off}
P3HT	105±4	0.03±0.01	14.75	~10^2
4:1	104±6	0.06±0.04	-15.82	~10^3
2:1	100±5	0.33±0.16	-15.79	~10^2
1:1	50±3	0.21±0.11	-15.29	~10^4
1:2	38±4	0.25±0.14	-14.75	~10^4
DPPT-TT	12±2	0.54±0.22	13.11	~10^6

Table S2. Electrical performance of the OFETs with stretchable P3HT thin films.

Semiconductor	μ_1 (cm²/Vs)	ε	μ_2 (cm²/Vs)	Ref.
P3HT	3.4×10^{-2}	100%	6.8×10^{-3}	*Adv. Mater.* 2014, 26, 4253.
P3HT	4.2×10^{-3}	100%	6.0×10^{-4}	*Polymer* 2018, 155, 146–151.
P3HT:SIS	$\sim1.0\times10^{-2}$	100%	$\sim1.0\times10^{-3}$	*Adv. Electron. Mater.* 2021, 2100591.
P3HT:fluorine rubber	1.1×10^{-2}	100%	2.3×10^{-3}	*Polymer* 2018, 155, 146–151.
P3HT:PDMS	7.85×10^{-3}	100%	3.74×10^{-4}	*Adv. Electron. Mater.* 2016, 2, 1500250.
P3HT:PDMS	0.18	100%	\	*Chem. Mater.* 2016, 28, 1196−1204.
P3HT:PDMS	0.17	100%	0.15	*Chem. Mater.* 2017, 29, 7645−7652.
P3HT:PCDTPT	~0.8	75%	~1.2	*ACS Appl. Mater. Interfaces* 2016, 8, 14037−14045.
P3HT:DPPT-TT	0.33	100%	0.08	Our work