Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.
This journal is © The Royal Society of Chemistry 2020

Supporting Information

Synchronously Improved Stretchability and Mobility via Tuning Molecular Weight for Intrinsically Stretchable Transistor

Hang Ren, [a] *Junmo Zhang,* [a] *Yanhong Tong,*[*a] *Jidong Zhang,*[*b] *Xiaoli Zhao,* [a] *Nan Cui,* [a] *Yuanzheng Li,* [a] *Xiaolin Ye,* [a] *Qingxin Tang* [*a] *and Yichun Liu* [a]

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

E-mail: tangqx@nenu.edu.cn

[b] Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, P. R. China.

E-mail: jdzhang@ciac.ac.cn

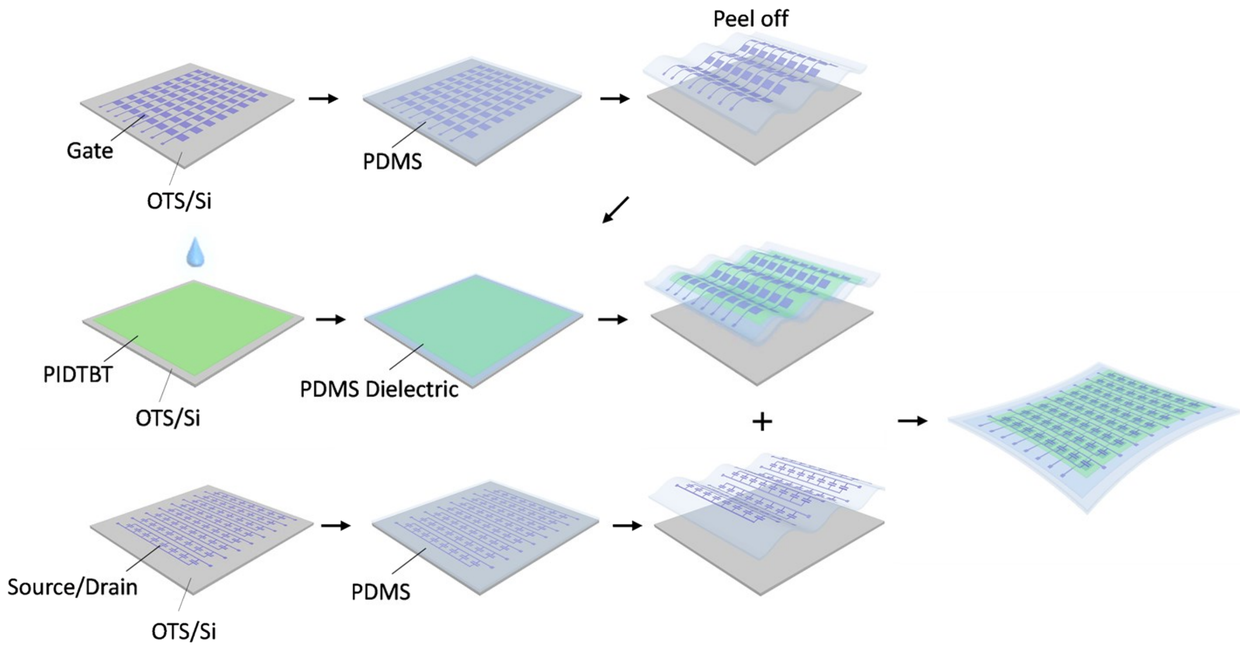

Fig. S1. Schematic illustration of the fabrication process for fully intrinsically stretchable transistor array.

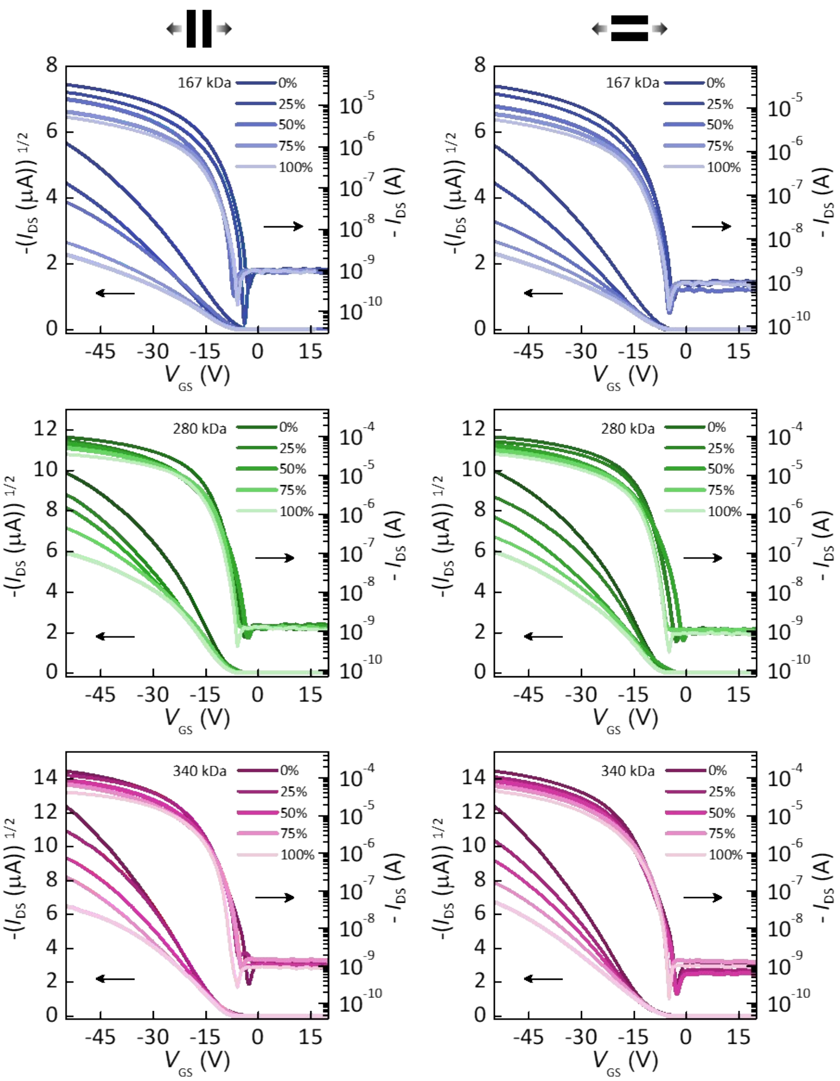

Fig. S2. Typical transfer curves of the different molecular weight PIDTBT FETs with SiO_2 dielectric layer under various strain parallel and perpendicular to channel length direction.

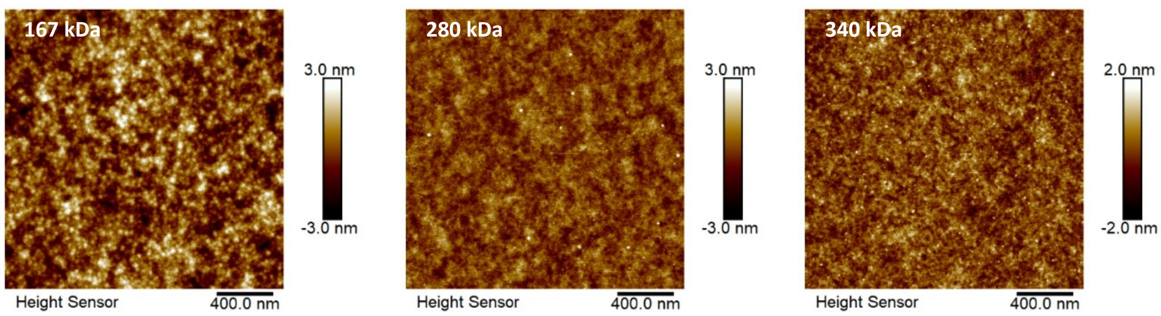

Fig. S3. 2×2 μm AFM height images of the unstretched PIDTBT polymer films with different M_w at small height range, showing the fibril-like texture of the film surfaces.

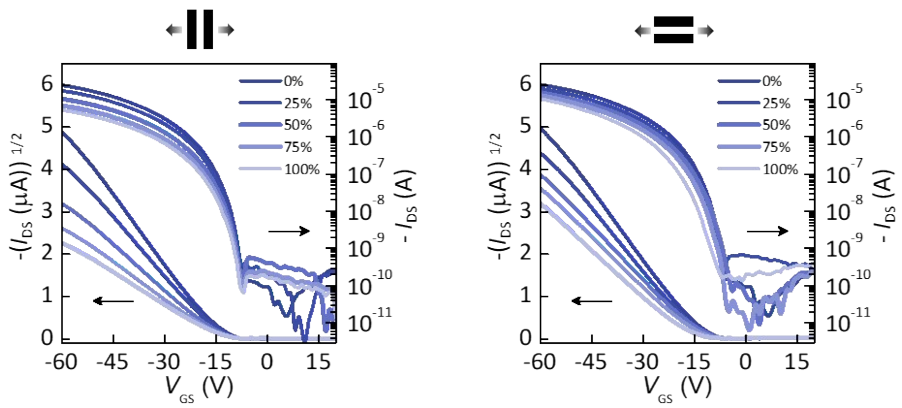

Fig. S4. Transfer curves of the intrinsically stretchable PIDTBT FETs under different strains parallel and perpendicular to the channel length direction, respectively.

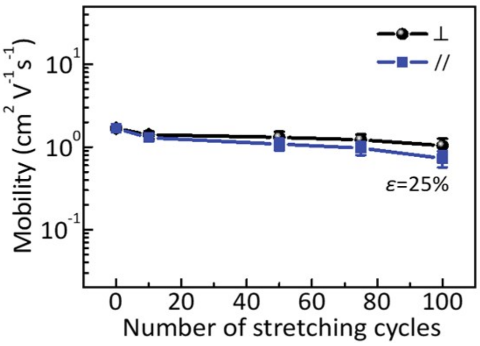

Fig. S5. Field-effect mobility versus number of stretching cycles at a strain of 25% perpendicular and parallel to the channel length direction.

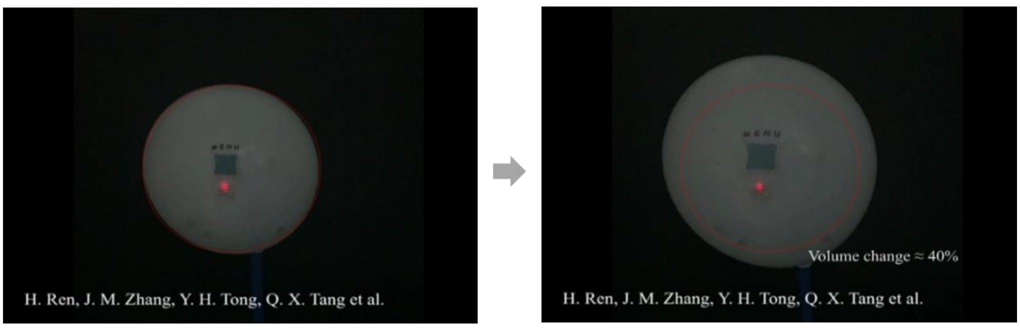

Fig. S6. Photographs of the fully stretchable transistor adhered on an inflating balloon with different volumes to drive an LED.

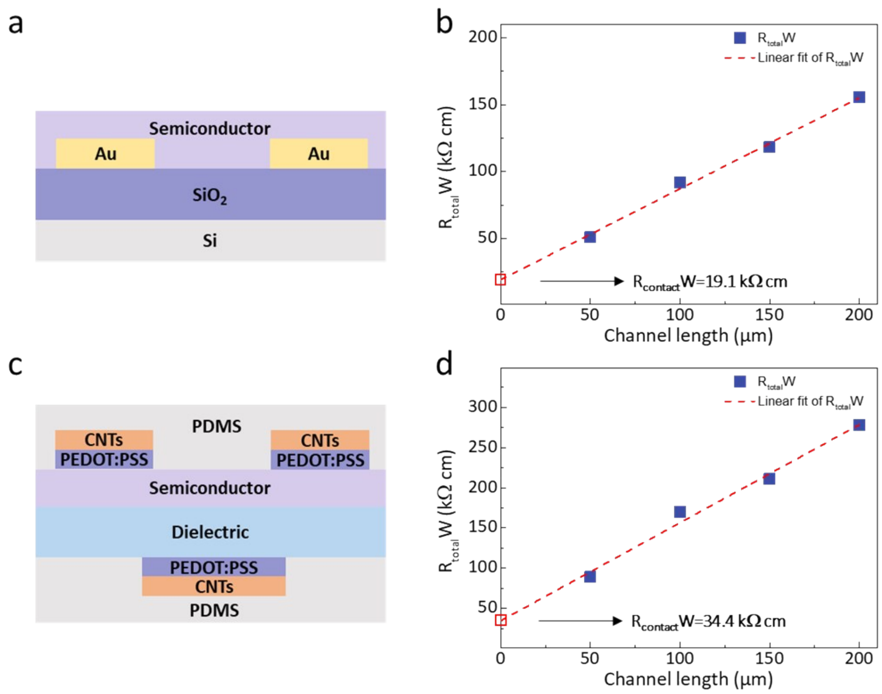

Fig. S7. The normalized contact resistance and the linear fitting results of (a,b) the SiO_2-based transistor and (c,d) the intrinsically stretchable transistor.

Table S1. Parameters of different molecular weight PIDTBT.

Polymer	M_n (kDa)	M_w (kDa)	Đ	Mobility ($cm^2V^{-1}s^{-1}$)	Crack-onset strain (%)
1	57	167	2.9	0.56±0.09	26±4
2	100	280	2.8	1.47±0.18	54±6
3	112	340	3.0	1.95±0.22	97±5

Table S2. Change of the channel dimension and dielectric capacitance under different strain perpendicular and parallel to channel length direction.

Strain direction	Strain (%)	Length (μm)	Width (μm)	Capacitance (nF cm^{-2})
	0	100	1000	1.59
	25	124.5	911.8	1.72
	50	151.8	852.9	1.83
	75	176.5	838.2	1.95
	100	200.2	813.5	2.05

	0	100	1000	1.59
	25	97.1	1253.1	1.72
	50	91.4	1507.3	1.83
	75	88.6	1752.9	1.95
	100	82.7	2004.5	2.05