Supporting Information

Intrinsically mechanical properties of polymeric semiconductor

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Table S1. The Young's modulus and hardness of six polymers.

Sample	Constant Displacement Rate[a]						Constant Load Rate[b]	
	h_{max} = 60 nm		h_{max} = 120 nm		h_{max} = 180 nm			
	E_r (GPa)	H (GPa)	E_r (GPa)	H (GPa)	E_r (GPa)	H (GPa)	E_r (GPa)	H (GPa)
PFO	20.57 ± 1.25	1.36 ± 0.13	25.06 ± 0.20	1.79 ± 0.03	23.32 ± 0.21	1.68 ± 0.03	22.48 ± 0.34	1.48 ± 0.07
F8BT	22.34 ± 1.46	1.82 ± 0.06	23.79 ± 0.38	1.87 ± 0.10	24.92 ± 0.28	1.92 ± 0.01	22.65 ± 0.53	1.70 ± 0.03
PVK	3.01 ± 0.17	0.20 ± 0.02	2.44 ± 0.05	0.17 ± 0.01	13.48 ± 0.72	0.46 ± 0.01	2.82 ± 0.32	0.07 ± 0.01
P3HT	16.51 ± 2.54	0.71 ± 0.27	18.13 ± 1.86	0.78 ± 0.17	18.65 ± 0.42	0.82 ± 0.03	15.01 ± 1.38	0.57 ± 0.15
PTB7-Th	3.06 ± 0.18	0.11 ± 0.01	3.45 ± 0.11	0.07 ± 0.01	6.84 ± 0.22	0.09 ± 0.01	3.93 ± 0.27	0.14 ± 0.01
MEH-PPV	12.96 ± 1.48	0.38 ± 0.04	13.91 ± 0.54	0.50 ± 0.02	20.90 ± 0.97	0.58 ± 0.06	15.59 ± 0.78	0.43 ± 0.01

[a]The loading time is 5 s. [b]The loading time is 5 s and P_{max} is set according to the result at constant displacement rate. The load rate operated on PFO, F8BT, PVK, P3HT, PTB7-Th and MEH-PPV was 24 μN/s, 32 μN/s, 2.4 μN/s, 12 μN/s, 4 μN/s and 14 μN/s respectively.

Table S2. The mechanical parameters of six polymers obtained from three-parameter models.

Samples	P_0 (μN)	P_1 (μN)	τ (s)	D_0 (nm)	D_1' (nm)	τ' (s)	P_1:P_0	D_1':D_0
PFO	51.29 ± 2.00	90.15 ± 2.11	3.56 ± 0.20	4.30 ± 0.04	27.50 ± 0.02	1.20 ± 0.03	1.76:1	6.40:1
F8BT	26.84 ± 0.57	140.05 ± 0.65	2.13 ± 0.09	3.88 ± 0.99	40.90 ± 0.02	1.51 ± 0.07	5.22:1	10.54:1
PVK	4.64 ± 0.03	18.12 ± 0.04	0.93 ± 0.02	2.79 ± 0.15	10.06 ± 0.02	1.79 ± 0.18	3.91:1	3.61:1
P3HT	17.17 ± 0.06	33.02 ± 0.08	0.99 ± 0.01	5.41 ± 0.04	11.80 ± 0.02	1.17 ± 0.02	1.92:1	2.18:1
PTB7-Th	5.77 ± 0.03	11.89 ± 0.03	0.87 ± 0.01	15.05 ± 0.11	14.14 ± 0.02	1.68 ± 0.02	2.06:1	0.94:1
MEH-PPV	41.63 ± 0.11	39.73 ± 0.18	1.00 ± 0.11	13.62 ± 0.10	10.83 ± 0.02	1.67 ± 0.02	0.95:1	0.80:1

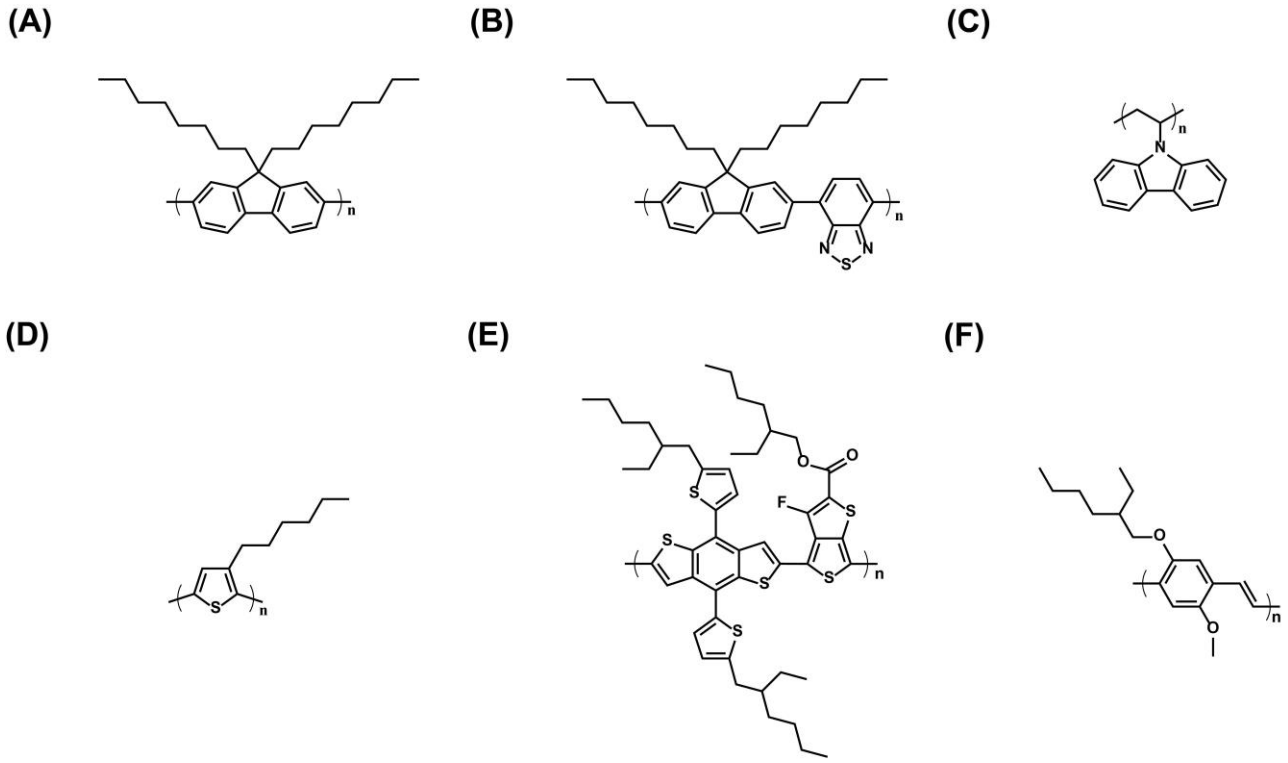

Figure S1. The chemical structure of **(A)** PFO, **(B)** F8BT, **(C)** PVK, **(D)** P3HT, **(E)** PTB7-Th and **(F)** MEH-PPV.

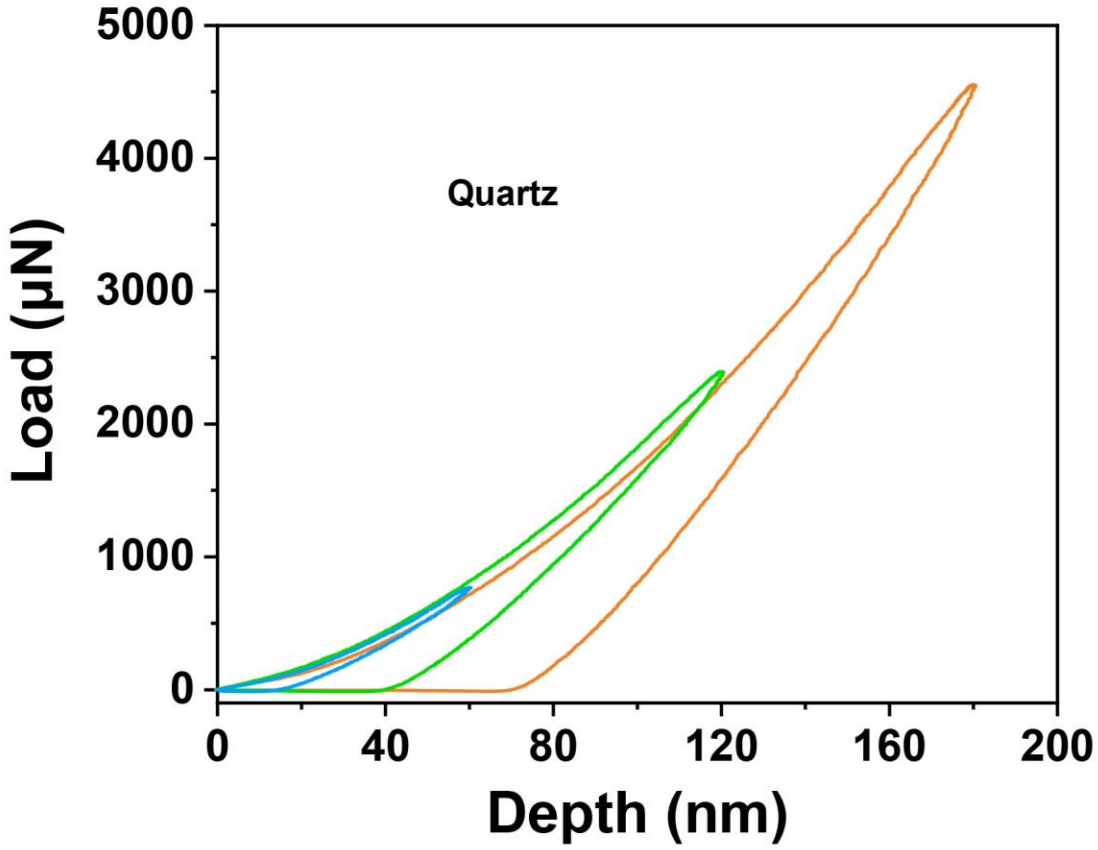

Figure S2. The nano-indentation test curves of quartz substrate at constant displacement rate mode. ($\boldsymbol{E_r}$= 76.07 ± 5.00 GPa and $\boldsymbol{H}$= 11.18 ± 0.84 GPa.) The blue, green and orange curve represents $\mathbf{h_{max}}$= 60 nm, 120 nm and 180 nm, respectively.

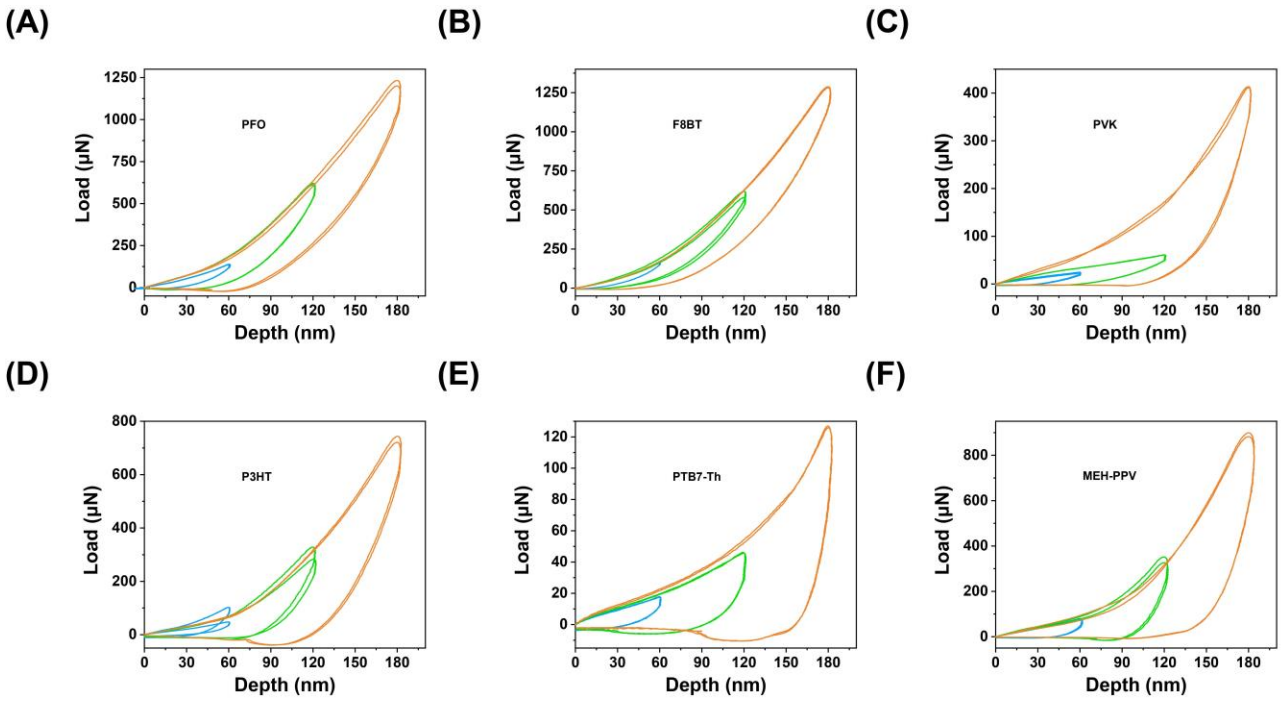

Figure S3. The nano-indentation test curves of **(A)** PFO, **(B)** F8BT, **(C)** PVK, **(D)** P3HT, **(E)** PTB7-Th and **(F)** MEH-PPV at constant displacement rate mode. The blue, green and orange curves represent $\mathbf{h_{max}}$= 60 nm, 120 nm and 180 nm, respectively.

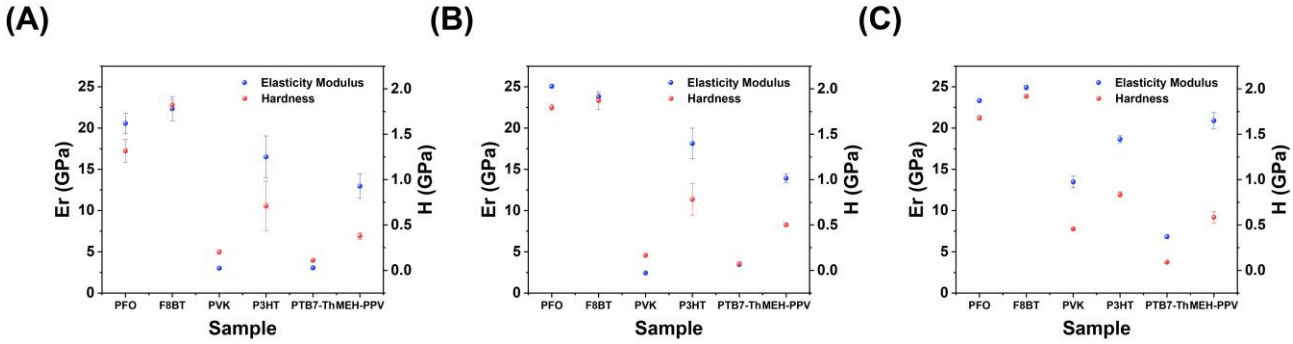

Figure S4. The $\boldsymbol{E_r}$ and $\boldsymbol{H}$ of six polymers at $\mathbf{h_{max}}$= **(A)** 60 nm, **(B)** 120 nm and **(C)** 180 nm.