

Supporting Information

Tunable Metallic-Like Transport in Polypyrrole

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Table S1. The specific IR peak strength of the different PPy samples.

Samples	Peak strength			
	C–H out-plane bending (784 cm ⁻¹)	C–H in-plane bending (1000 cm ⁻¹)	C–N stretching (1147 cm ⁻¹)	Py ring in-plane bending vibrations (1544 cm ⁻¹)
#1	1.29	0.55	2.02	2.16
#2	1.28	0.55	0.93	2.02
#3	1.10	0.47	0.92	2.3
#4	0.97	0.39	1.68	2.50
#5	0.77	0.34	1.42	1.67
#6	0.39	0.25	1.16	0.77
#7	-	1.29	2.07	0.52
#8	-	2.06	2.81	0.51
#9	-	1.81	2.58	0.40
#10	1.24	0.59	0.73	3.39
#11	1.13	0.47	0.59	2.95
#12	1.11	0.44	0.29	1.47

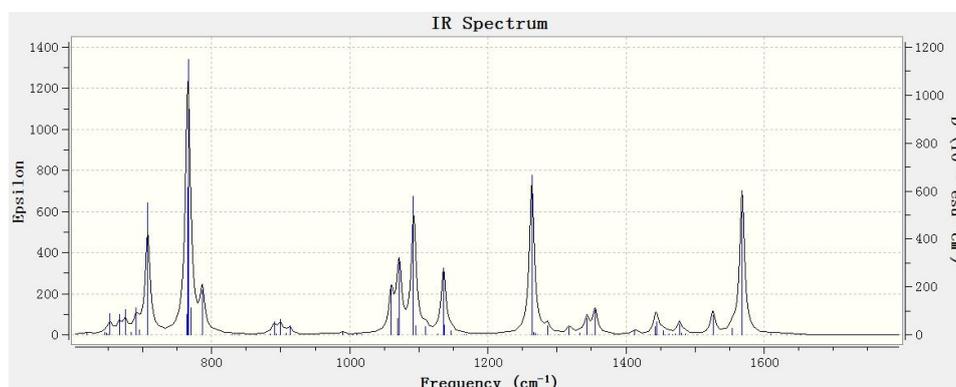


Figure S1. The theoretical FTIR spectrum of optimized oligo-Py molecule containing 6 units calculated by B3LYP/6-31+G(d) method with gaussian09 software.

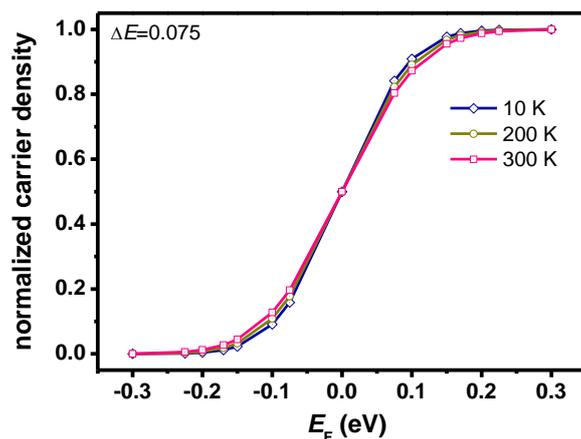


Figure S2. The relation between the carrier densities and E_F at different temperature with $\Delta E = 0.075$ eV.

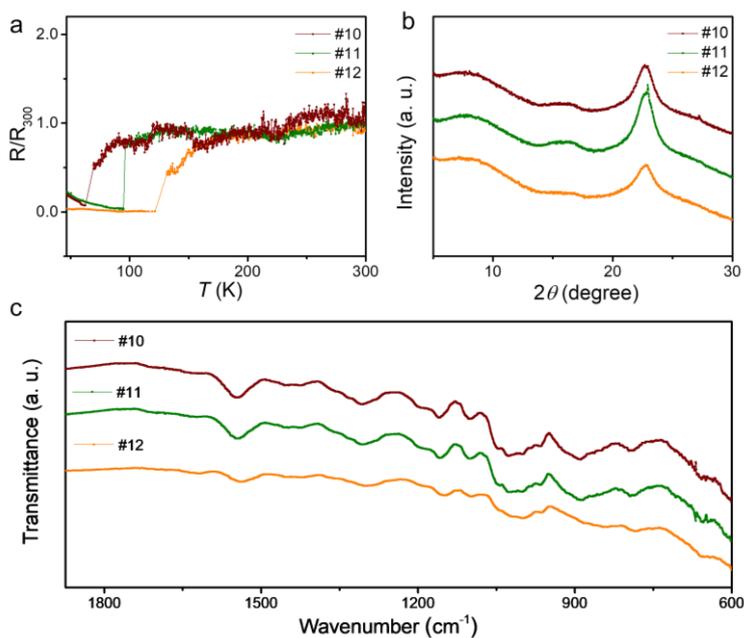


Figure S3. The performance of the PPy samples with superconducting-like property. The samples (#10-12) were fabricated using paper as substrates, FeCl_3 as oxidant (1 M). (a) The relationship between resistance and temperature from 50 to 300 K. (b,c) The XRD patterns and the FTIR spectra of the three PPy samples.