Supporting Information

Ultra-high performance and flexible polypyrrole coated CNT paper electrode for all-solid-state supercapacitors

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Keyword: polypyrrole; carbon nanotube; interfacial polymerization; flexible; supercapacitor.

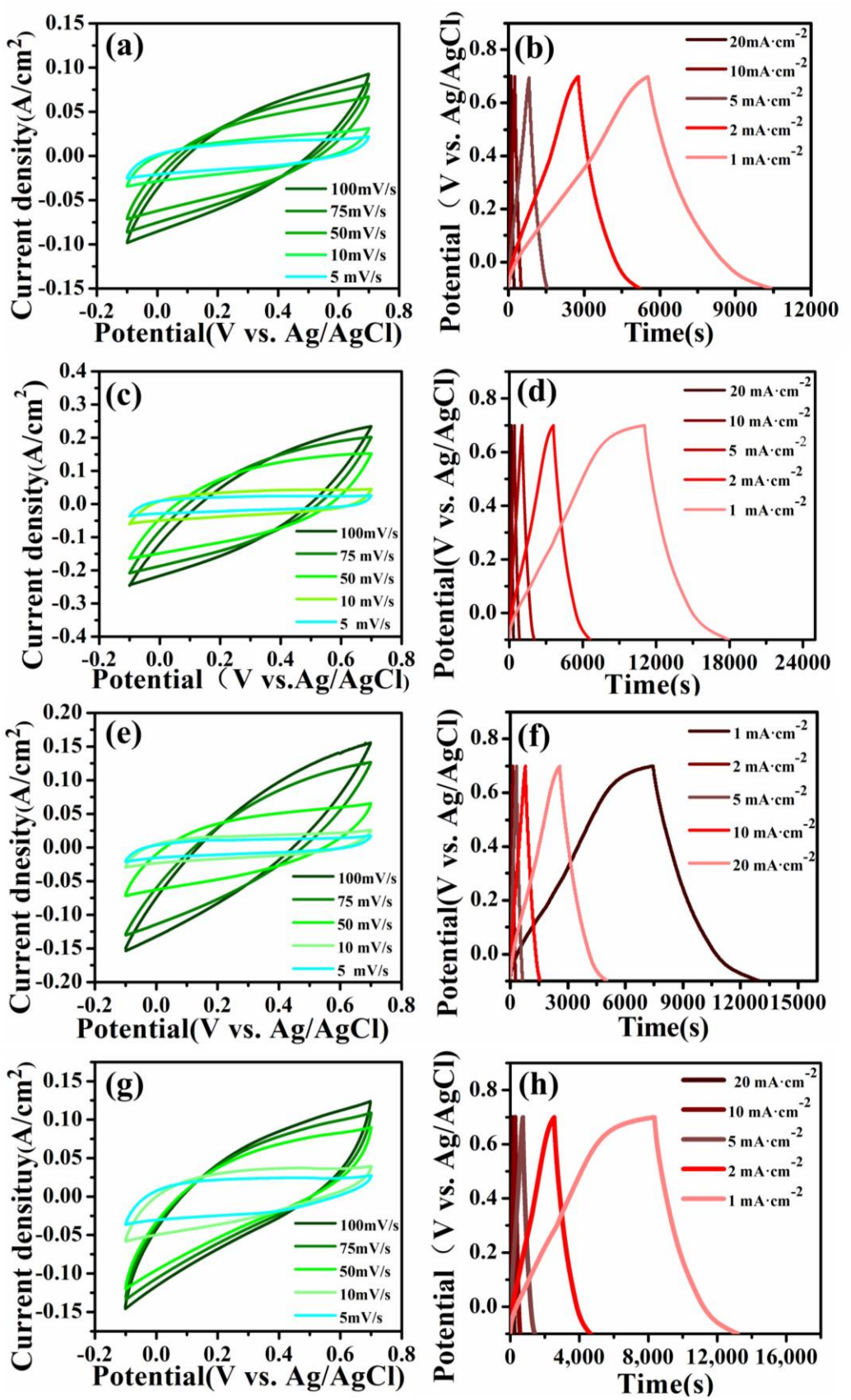

Figure S1. (a-h) CV curves and GCD curves of the 210-, 260-, 310-, and 360-PPy/CNTP electrodes.

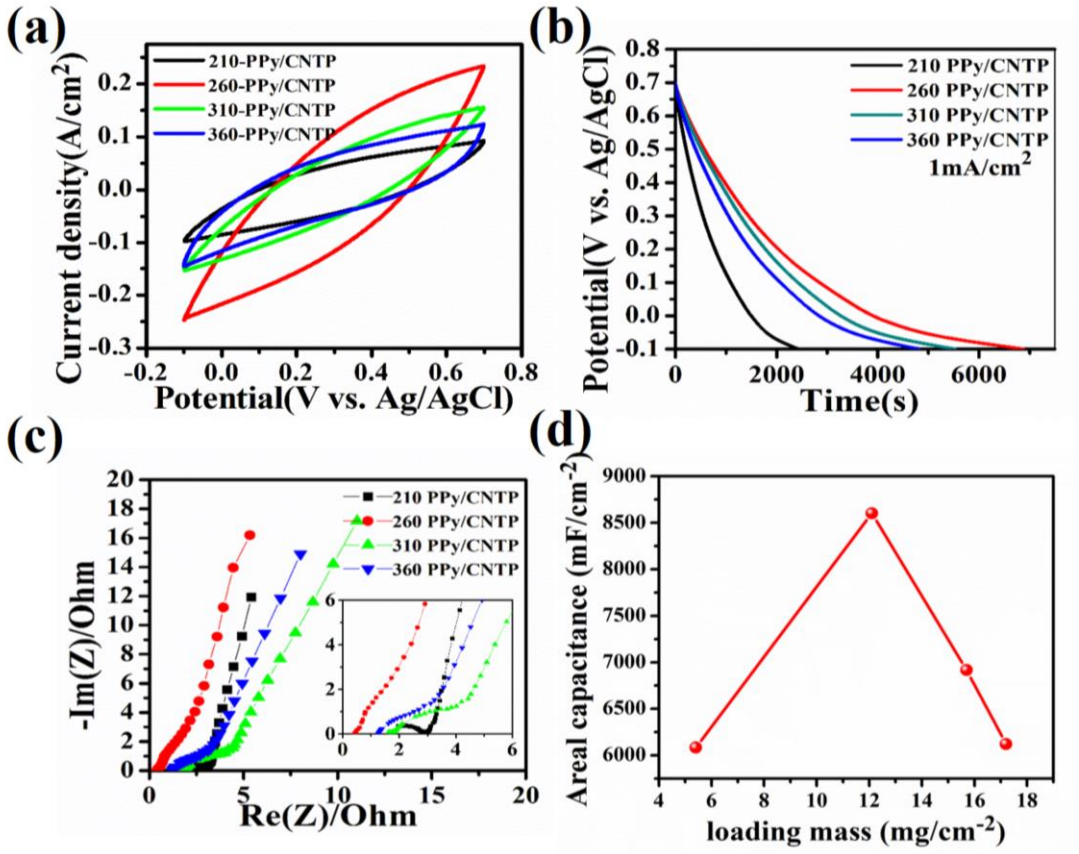

Figure S2. CV curves (a) at 5 mV s^{-1} and GCD curves (b) at 1mA cm^{-2} of the 210-, 260-, 310-, and 360-PPy/CNTP electrodes. (c) Nyquist plots for the different electrodes measured at frequency ranging from 100 kHz to 0.01 Hz. (d) Areal capacitance as a function of loading mass.

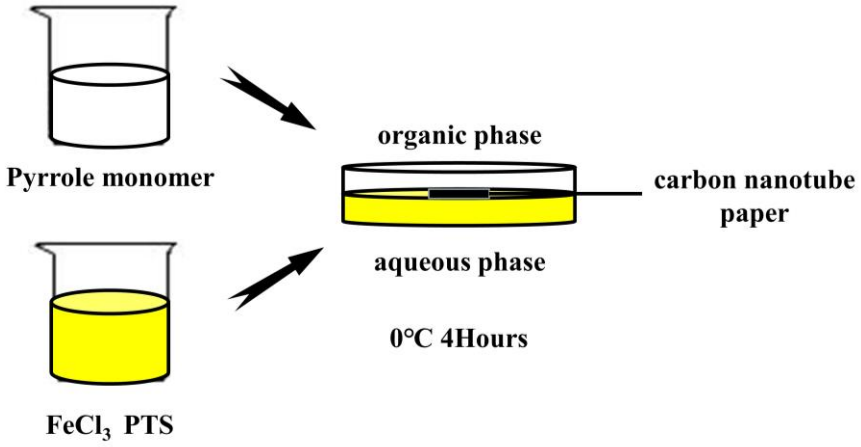

Figure S3. Schematic diagram of the preparation of the PPy/CNTP electrode.

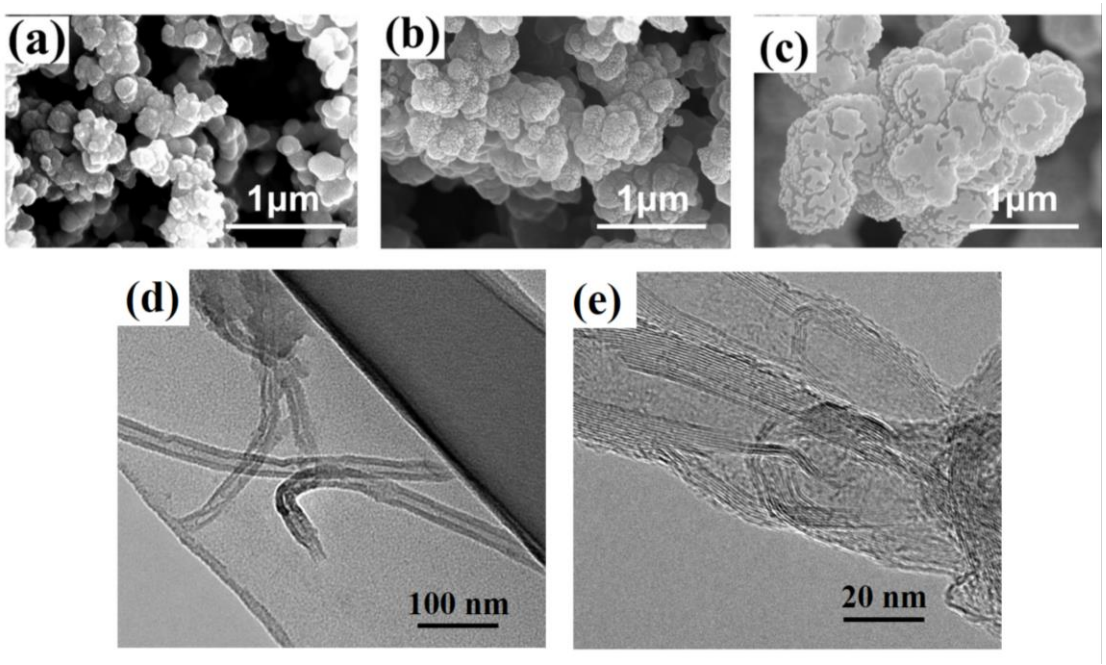

Figure S4.SEM image of the 210-(a), 310-(b), and (c) 360-PPy/CNTP electrodes. TEM (d) and HRTEM (e) images of the CNTs without coated with PPy

Table S1. The electrical conductivity of the samples.

Sample	Electrical conductivity (S/cm)	Thickness (μm)
CNTP	28.35±0.10	103
210-PPy/CNTP	51.00±0.06	184
260-PPy/CNTP	55.86±0.07	200
310-PPy/CNTP	41.09±0.04	215
360-PPy/CNTP	38.23±0.11	247

Table S2. Comparison of the electrochemical performances for conducting polymer based and carbon-based material supercapacitors in acidic solution.

Flexible materials	Capacitance ($mF\ cm^{-2}$)	Cycling capability (cycles)	Ref.
PPy/carbon cloth	136.99	85% after 10,000	[1]
PEDOT-graphene film	448	95% after 10000	[2]
PPy/print paper	420	75.6% after 10,000	[3]
PPy/RGO/BC electrode	2100	64.6% after 5,000	[4]
PPy-CNT film	~280	95% after 10000	[5]
Functionalized CNT film	150	90% after 10000 cycles	[6]
β-$Ni(OH)_2$-graphene film	3.3	100% after 2000	[7]
$V_2O_5 \cdot H_2O$-graphene film	11.7	95% after 2000	[8]
$VOPO_4$-graphene film	8.36	96% after 2000	[9]
Mo_2N-graphene paper	142	85.7% after 4000	[10]
MnO_2-graphene paper	897	78% after 3600	[11]
260-PPy/CNTP	8604.5	107% after 12,000	This Work

Table S3. Mass of the 260-PPy/CNTP electrode before and after ultrasonic treatment.

Sample	Ultrasonic time (min)	M (mg)
260-PPy/CNTP	0	22.6
	5	22.6
	15	22.6
	30	22.6

Figure S5. digital photos of the 260-PPy/CNTP electrode before and after 30 min ultrasonic treatment.

References

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