

## Supplementary Materials:

# Systematic Design of Polypyrrole/Carbon Fiber Electrodes for Efficient Flexible Fiber-type Solid-state Supercapacitors

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**Table S1.** The  $C_L$  values for the PPy@CF electrodes prepared using 1 mA and 10 min for electropolymerization in different electrolytes.

Electrolyte	$C_L$ (mF/cm)
0.0 M PPy	0.44
0.5 M PPy	4.83
1.0 M PPy	6.69
0.5 M PPy + NaClO <sub>4</sub>	78.54
1.0 M PPy + NaClO <sub>4</sub>	93.75
1.5 M PPy + NaClO <sub>4</sub>	85.08

**Table 2.** The specific capacitances and charge-transfer resistances for the PPy@CF electrodes prepared using 10 min at different applied currents for electropolymerization in the electrolyte containing 0.5 M pyrrole and 0.3 M NaClO<sub>4</sub>.

Current (mA)	$C_L$ (mF/cm)	$C_M$ (F/g)	$R_s$ ( $\Omega$ )	$R_{ct}$ ( $\Omega$ )
10	126.8	211.4	3.32	1.68
20	211.9	238.1	2.20	0.15
30	229.0	200.9	3.00	0.35
40	244.9	178.8	2.13	0.16
50	180.9	110.3	3.40	0.60

**Table S3.** The specific capacitances calculated using the CV curve at 5 mV/s and charge-transfer resistances for the PPy@CF electrodes prepared using different times at 40 mA for electropolymerization in the electrolyte containing 0.5 M pyrrole and 0.3 M NaClO<sub>4</sub>. The loading mass of the active material on the substrate was also listed in this table.

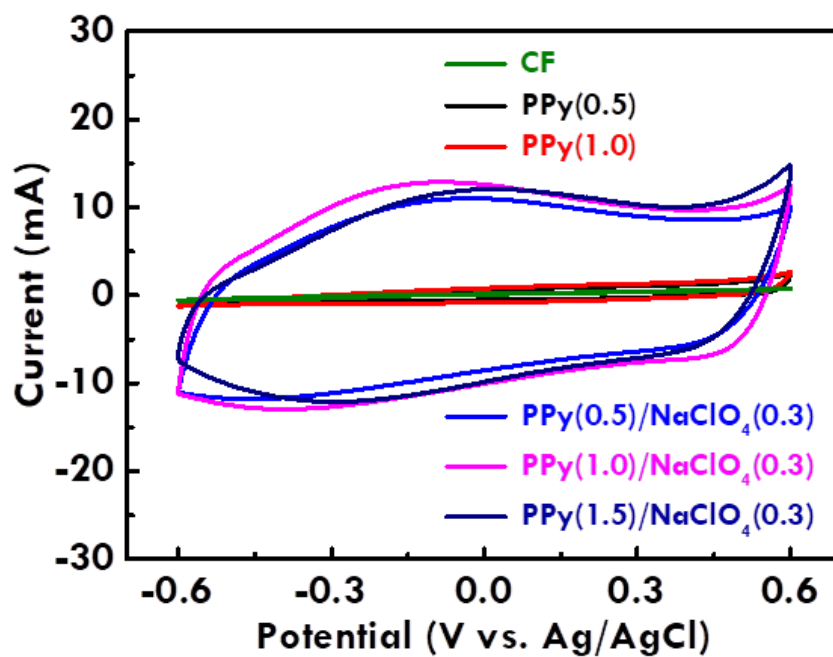
Time (min)	$C_L$ (mF/cm)	$C_M$ (F/g)	$R_s$ ( $\Omega$ )	$R_{ct}$ ( $\Omega$ )	Loading mass (mg)
10	394.3	277.7	3.13	0.883	14.2
20	921.5	308.2	2.37	0.345	29.9
30	1140.0	287.2	2.55	0.386	39.7

**Table S4.** The specific capacitances for the PPy@CF electrodes prepared using different times for electropolymerization measured using CV curves at different scan rates.

Time (min)	Scan rate (mV/s)	C <sub>L</sub> (mF/cm)	C <sub>F</sub> (F/g)
10	1	467.4	329.1
	2	452.7	318.8
	5	394.3	277.7
	10	370.9	261.2
	15	350.2	246.6
	20	327.5	230.6
20	1	970.9	324.7
	2	966.4	323.2
	5	921.5	308.2
	10	756.3	252.9
	15	579	193.6
	20	444	148.5
30	1	1352	340.6
	2	1270	319.8
	5	1140	287.2
	10	825.5	207.9
	15	577.3	145.4
	20	416.2	104.8

**Table S5.** The specific capacitances for the PPy@CF electrodes prepared using different times for electropolymerization prepared using the GC/D curves at different current densities.

Time (min)	Current density (A/g)	C <sub>L</sub> (mF/cm)	C <sub>F</sub> (F/g)
10	0.5	1352.3	340.6
	1	1269.5	319.8
	1.5	1140.3	287.2
	2	825.5	207.9
	3	577.3	145.4
20	0.5	207.4	146.1
	1	169.4	119.3
	1.5	161.3	113.6
	2	150.1	105.7
	3	149.1	105.0
30	0.5	575.6	192.5
	1	425.0	142.1
	1.5	394.0	131.8
	2	358.8	120.0
	3	294.7	98.6



**Figure S1.** The CV curves for the PPy@CF electrodes prepared using 1 mA and 10 min for electropolymerization in different electrolytes.

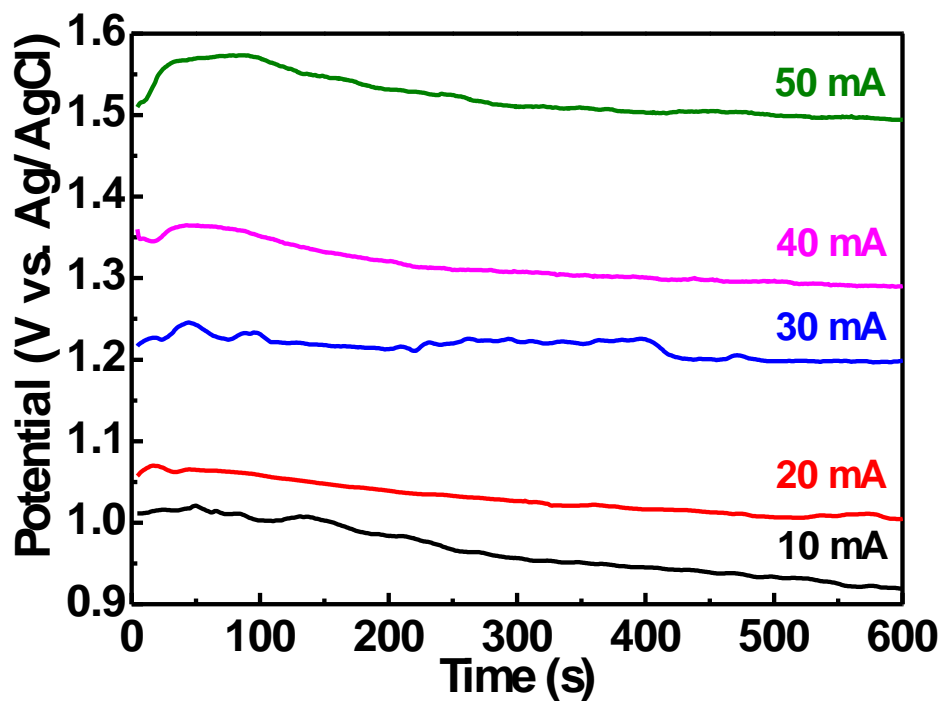
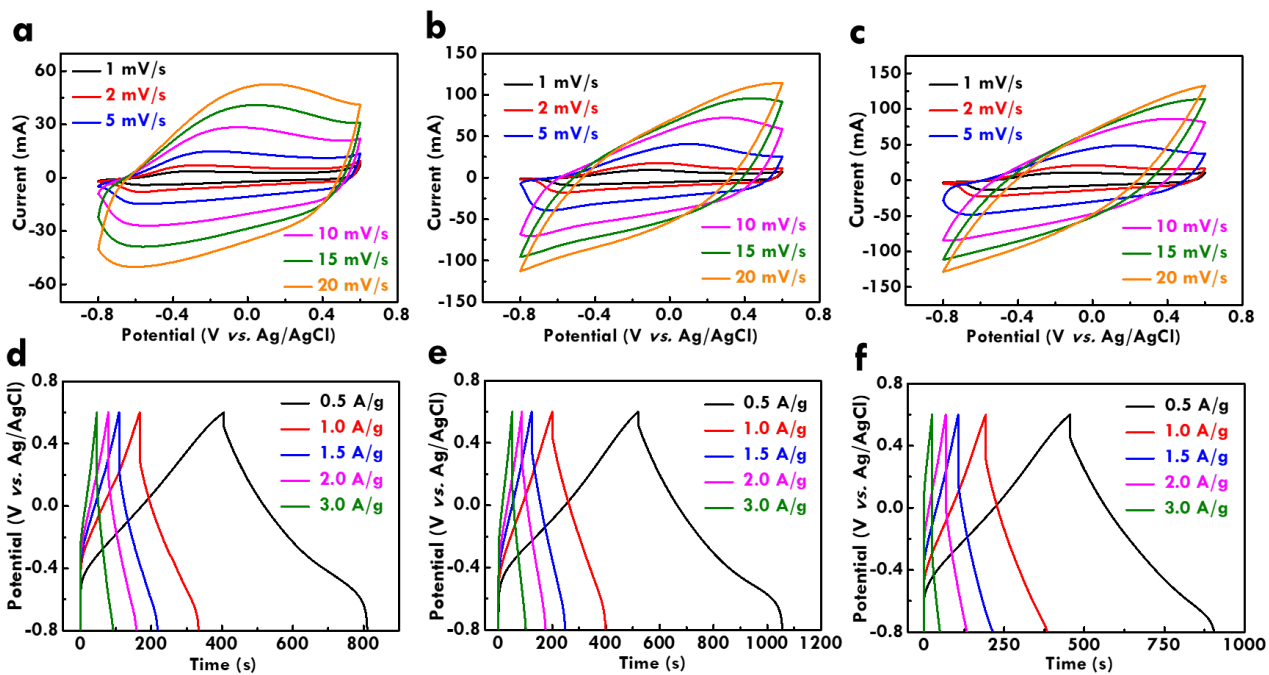


Figure S2. Chronopotentiometric curves for the electrodes prepared using 10, 20, 30, 40 and 50 mA.



**Figure S3.** The CV curves at different scan rates for PPy@CF prepared using (a) 10, (b) 20, and (c) 30 min; GC/D curves at different current densities for PPy@CF prepared using (d) 10, (e) 20, and (f) 30 min and the applied current of 40 mA in the electrolyte containing 0.5 M pyrrole and 0.3 M NaClO<sub>4</sub>.

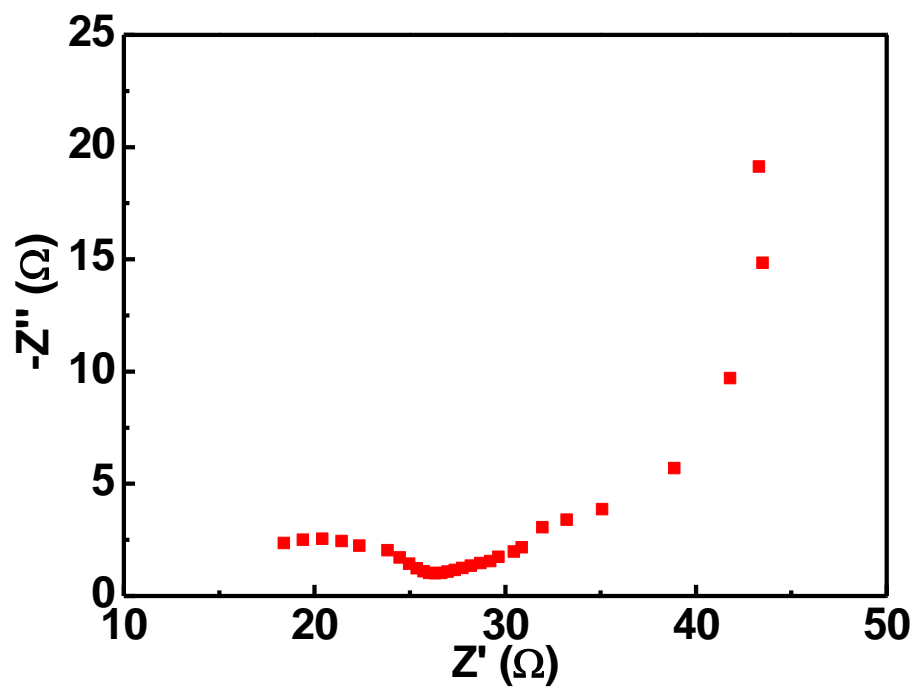


Figure S4. The Nyquist plot for the FSC with  $H_3PO_4/PVA$  electrolyte.