

(Supplementary Information)

Electropolymerized poly(3,4-ethylenedioxythiophene) (PEDOT)/screen-printed reduced graphene oxide-chitosan (rGO-CS) bilayer electrodes for flexible supercapacitors

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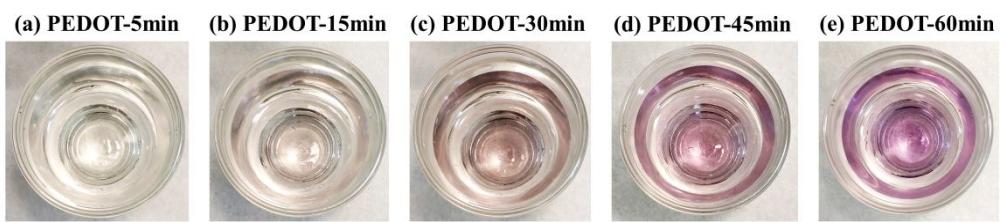


Figure S1. Final color of the EDOT solution after various electropolymerization

times.

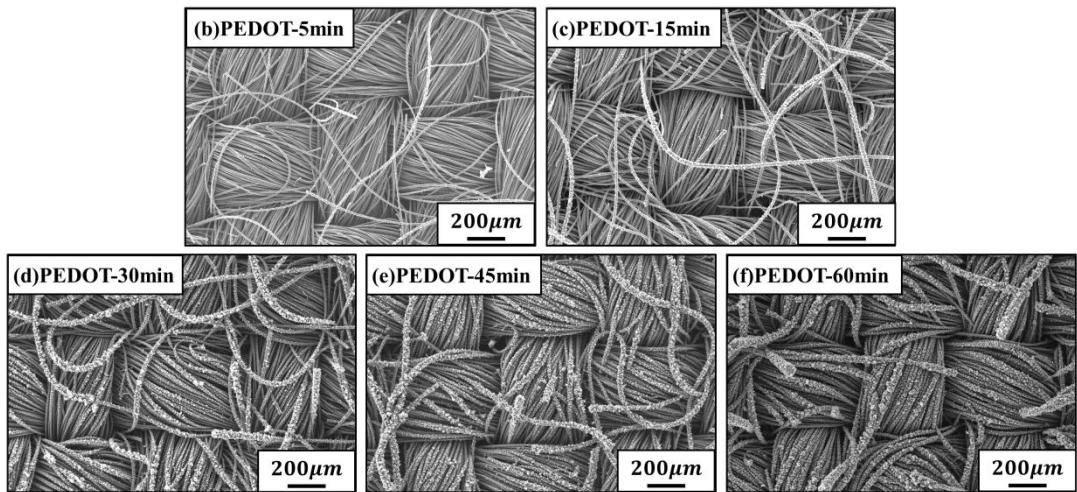


Figure S2. Low-magnification SEM images of CC/PEDOT.

Electropolymerization time: (a) 5 min, (b) 15 min, (c) 30 min, (d) 45 min,
and (e) 60 min.

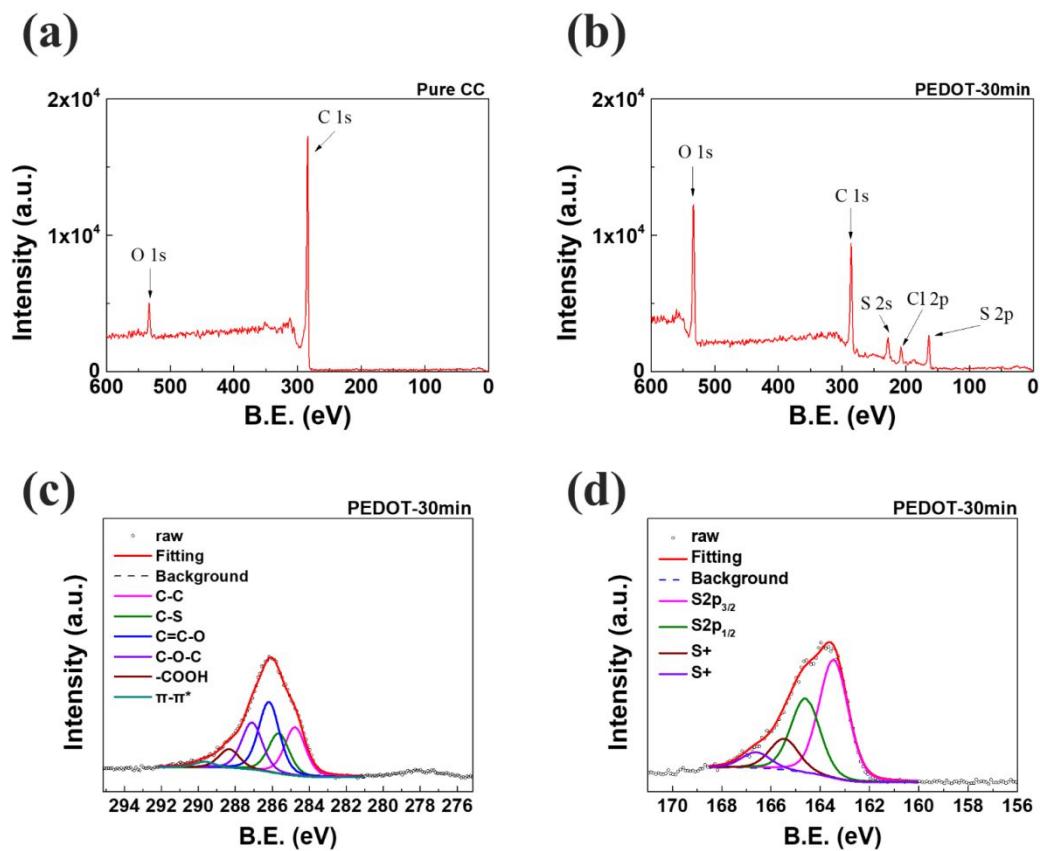


Figure S3. (a) XPS survey spectra of carbon cloth (CC), (b) XPS survey spectra of CC/PEDOT-30min, (c) C1s spectra of CC/PEDOT-30 min, (d) S2p spectra of CC/PEDOT-30 min.

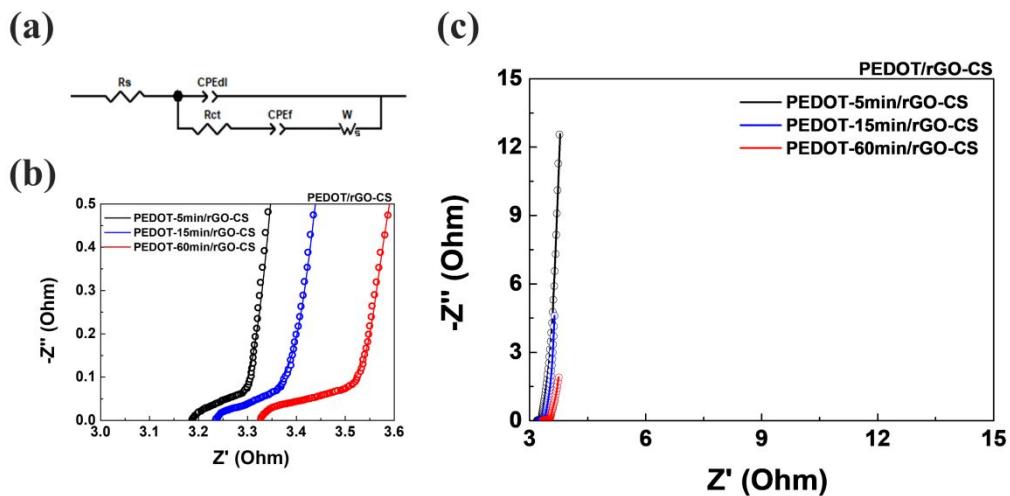


Figure S4. (a) The equivalent circuit model, (b) Nyquist plot of PEDOT/rGO-CS SCs (high frequency), (c) Nyquist plot of PEDOT/rGO-CS SCs.

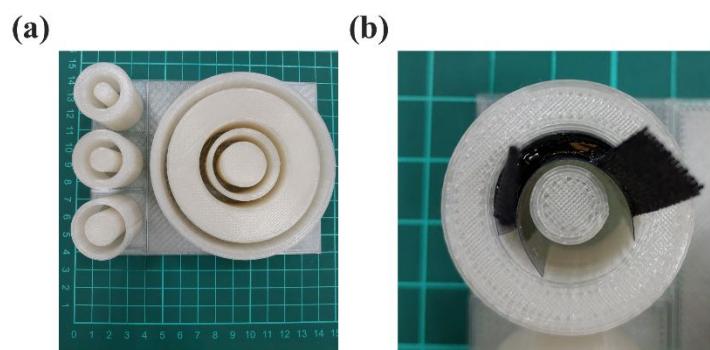


Figure S5. (a) Schematic diagram of the bending tool, (b) Schematic diagram of the bending tool with maximum curvature (1.5 cm^{-1})

Table S1. Areal capacitance (mF/cm^2) (Figure 6) at various potential scanning rate.

Potential scan rate (mV/s)	rGO-CS (mF/cm^2)	PEDOT-5 min/rGO-CS (mF/cm^2)	PEDOT-15 min/rGO-CS (mF/cm^2)	PEDOT-30 min/rGO-CS (mF/cm^2)	PEDOT-45 min/rGO-CS (mF/cm^2)	PEDOT-60 min/rGO-CS (mF/cm^2)
30	21.73	132.74	309.88	489.50	589.99	598.79
25	21.82	133.50	309.30	486.06	587.96	632.98
20	21.69	137.96	322.86	517.03	637.14	692.42
15	22.73	144.18	338.58	550.61	689.69	750.62
10	22.00	154.59	359.88	591.03	749.67	822.41
5	25.00	180.52	401.25	656.79	837.09	922.37
2	25.39	228.60	489.43	774.32	976.05	1073.67

Table S2. Capacitance contribution of PEDOT/rGO-CS as analyzed by the Trasatti method.

	C _{total} (mF/cm ²)	C _{in} (mF/cm ²)	C _{out} (mF/cm ²)	Capacitive Contribution (%)	
				PC	EDLC
rGO-CS	26.77	6.47	20.3	24.2	75.8
PEDOT-5 min/ rGO-CS	270.27	173.52	96.75	64.2	35.8
PEDOT-15 min/ rGO-CS	561.8	315.64	246.16	61.1	38.9
PEDOT-30 min/ rGO-CS	934.58	537.8	396.78	57.5	42.5
PEDOT-45 min/ rGO-CS	1258.58	782.8	475.78	62.2	37.8
PEDOT-60 min/ rGO-CS	1498.76	1004.64	494.12	67.0	33.0

Table S3. Areal capacitance (mF/cm^2) calculated based on GCD measurement

results.

Constant current (mA)	CC/rGO-CS (mF/cm^2)	PEDOT-5min /rGO-CS (mF/cm^2)	PEDOT-15min /rGO-CS (mF/cm^2)	PEDOT-30min /rGO-CS (mF/cm^2)	PEDOT-45min /rGO-CS (mF/cm^2)	PEDOT-60min /rGO-CS (mF/cm^2)
0.5	10.61	69.75	183.93	326.17	427.56	500.84
0.7	10.44	68.84	181.70	322.70	422.88	493.79
1	10.31	68.03	178.99	318.76	416.90	485.23
3	10.17	65.09	168.51	302.81	396.73	459.10
5	10.37	62.81	160.32	290.25	380.71	440.22
7	N/A	61.15	152.40	278.58	366.21	423.45
10	N/A	58.61	141.04	260.76	346.07	399.33

Table S4. Power density (mW/cm^2) and energy density ($\mu\text{Wh}/\text{cm}^2$) calculated based on GCD measurement results.

	Energy density ($\mu\text{Wh}/\text{cm}^2$)					
	PEDOT-	PEDOT-	PEDOT-	PEDOT-	PEDOT-	
	5min/	15min/	30min/	45min/	60min/	
	rGO-CS	rGO-CS	rGO-CS	rGO-CS	rGO-CS	
Power density (mW/cm^2) / Constant Current (mA)	0.1/0.5	6.2	16.35	28.99	38	44.52
	0.14/0.7	6.12	16.15	28.68	37.59	43.89
	0.2/1.0	6.05	15.91	28.33	37.06	43.13
	0.6/3.0	5.79	14.98	26.92	35.26	40.81
	1.0/5.0	5.58	14.25	25.8	33.84	39.13
	1.4/7.0	5.44	13.55	24.76	32.55	37.64
	2.0/10	5.21	12.54	23.18	30.76	35.5

Table S5. Areal capacitance (mF/cm^2) at different cycle numbers.

Cycle numbers	Areal capacitance (mF/cm^2)	Normalized capacitance (%)	Coulombic efficiency (%)
1	81.51	97.40	94.08
1000	83.15	99.35	97.50
2000	83.17	99.38	97.37
3000	83.38	99.63	97.22
4000	83.46	99.73	97.22
5000	83.69	100.00	97.12
6000	83.63	99.93	97.06
7000	83.63	99.93	97.03
8000	83.47	99.74	97.01
9000	83.43	99.69	97.01
10000	83.13	99.34	97.29