

Supporting Information

Highly flexible, tailorable and all-solid-state supercapacitors from carbon nanotube-MnO_x composite films

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Figs. S1 and S7

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Caption for Video S1

1. Figures

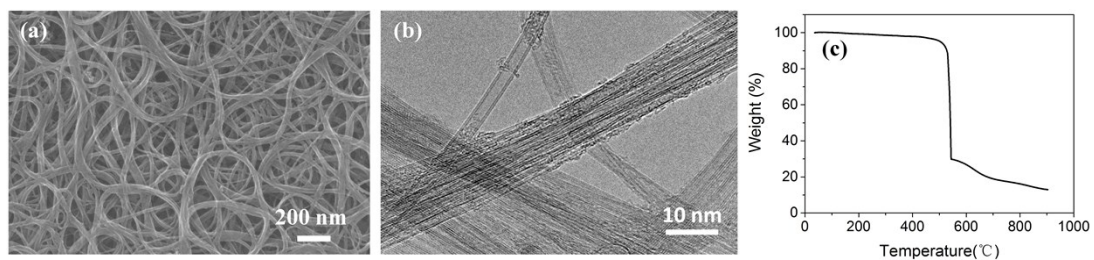


Fig. S1 Characterization of the purified TEM films. (a) SEM image, (b) Transmission electron microscope image, (c) Thermal gravimetric analysis (TGA) curve.

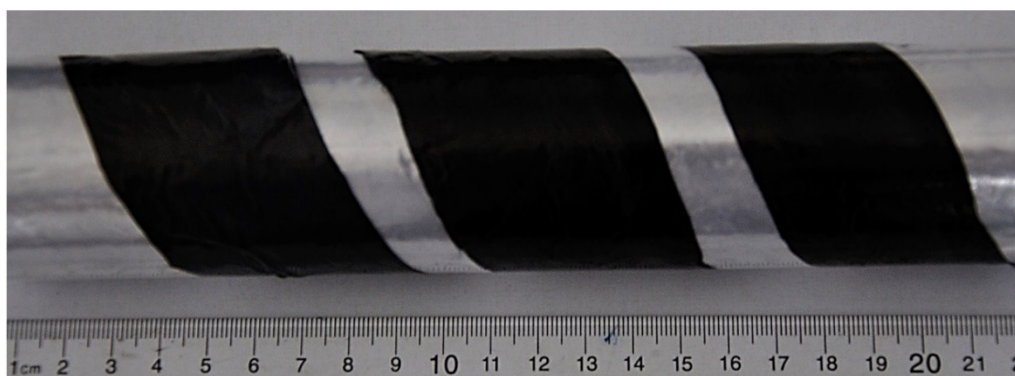


Fig. S2 Optical image of a purified CNT film winding on a cylinder.

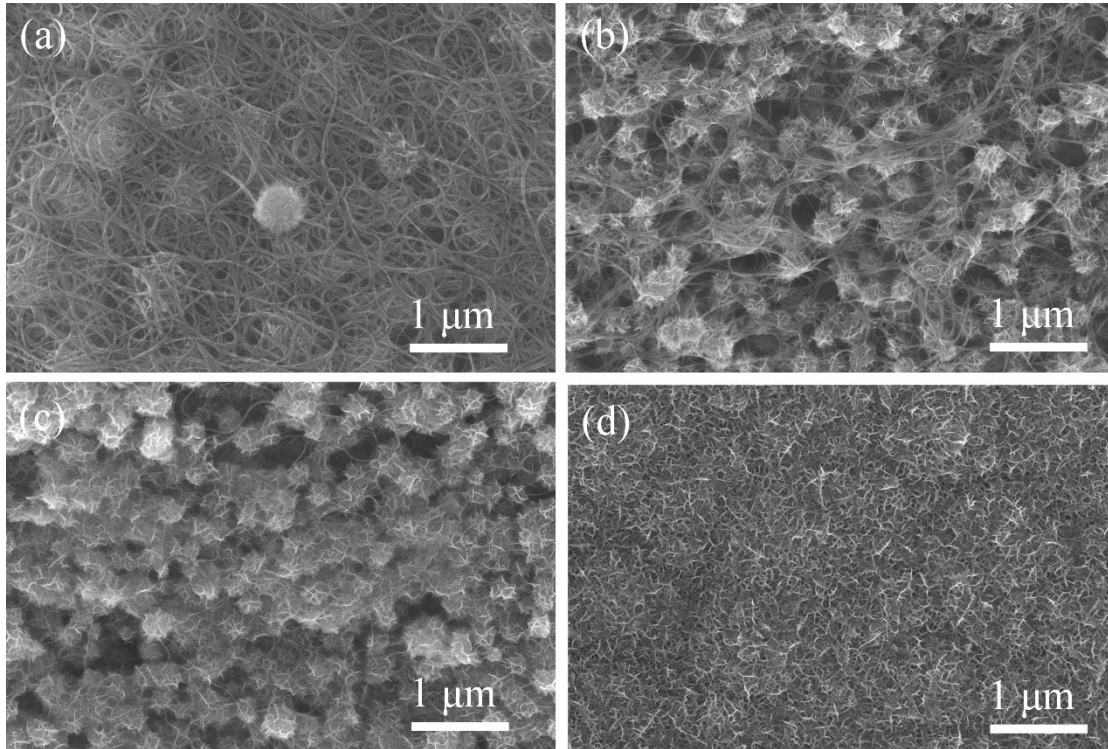


Fig. S3 SEM images of the CNT-MnO_x films prepared from different deposition times. (a)100 s, (b)300 s, (c) 600 s, (d)1200 s.

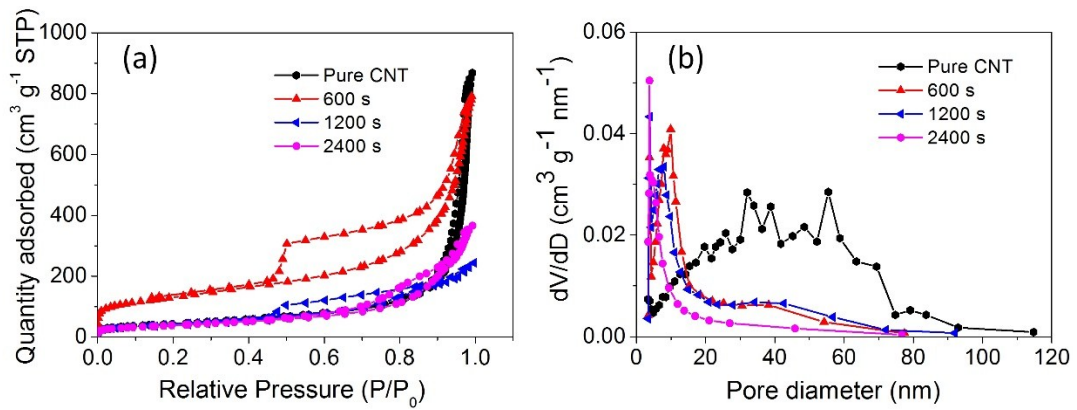


Fig. S4 Specific surface area (a) and pore size distribution (b) of the pure CNT film and the CNT-MnO_x composite films prepared at 600, 1200, and 2400 s. The corresponding specific surface area are 159, 157, 155, and 141 m²/g; and the pore size distribute mainly at 55.4, 9.9, 3.9, and 3.8 nm, respectively.

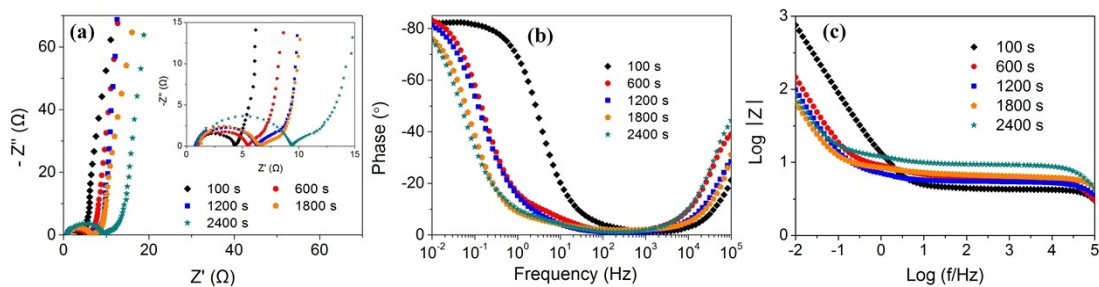


Fig. S5 EIS of the CNT-MnO_x composite electrodes prepared at different deposition times. (a) Nyquist plots, (b) and (c) are Bode plots.

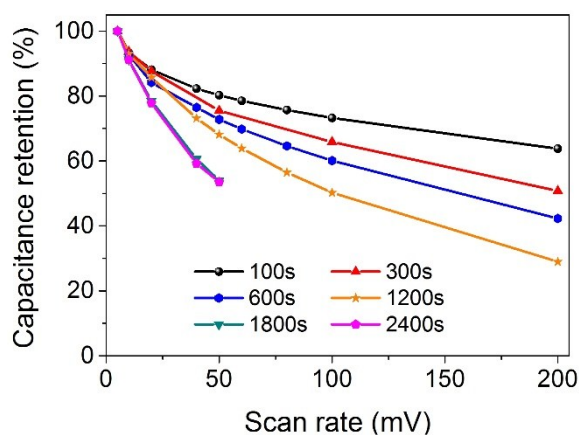


Fig. S6 Capacitance retention rate of the flexible CNT-MnO_x composite film electrodes prepared at different deposition times.

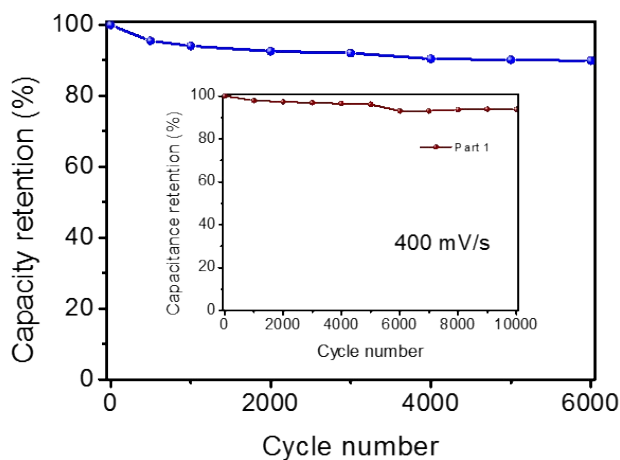


Figure S7. Cyclic stability of a CNT-MnO_x supercapacitor. Inset is the cyclic test result of a small piece of supercapacitor cut from the original one.

2. Tables

Table S1. The specific capacitance of the CNT-MnO_x composite films depending on the loading of MnO_x at a scan rate of 5 mV/s.

Deposition time (s)	MnO _x loading (wt.%)	Specific capacitance (F/g)	Areal capacitance (F/cm ²)
100	62.5	119.2	19.1
300	80.5	160.3	55.2
600	86.4	165.4	134.0
800	88.1	166.3	156.5
1000	89.4	168.0	157.9
1200	90.5	175.9	184.7
1800	93.9	172.5	282.9
2400	94.9	170.5	366.6

Table S2. Time constant, charge transfer resistance and high frequency resistance

Deposition time (s)	Time constant τ_0 (s)	CTR (Ω)	HFR (Ω) (f = 97.7 HZ)
100	0.050	3.3	4.4
600	0.895	4.5	6.3
1200	1.084	5.4	5.5
1800	1.928	5.4	6.8
2400	2.830	8.5	9.5

τ_0 - Time constant, CTR - Charge transfer resistance, HFR - High frequency resistance

Table S3. Capacitive performance of three supercapacitors using in powering a stopwatch and LED light at 5 mA/cm².

Supercapacitor	Specific capacitance (F/g)	Energy density (Wh/kg)	Power density (kW/kg)
1#	55.8	4.3	0.523
2#	99.3	7.9	0.657
3#	62.6	4.9	0.669

3. Video

Video S1: A video of a purified CNT macro-film under twisting and recovering.