

Supplementary information

Table S1 Detailed conditions of as-fabricated Samples and relevant specific capacitances for supercapacitors.

No.	Sample name	Duration Time (h)	NaOH (mol L-1)	Temperature (°C)	Morphology	specific capacitance (F/g) 1.0 A/g
1	MnO ₂ -C-0	30	0 (only pure water)	170	fiber	135.7
2	MnO ₂ -C-2	30	2	170	plate	92.8
3	MnO ₂ -C-4.5	30	4.5	170	Plate + belt + fiber	80.1
4	MnO ₂ -C-6.5	30	6.5	170	Plate + belt + fiber	126.0
5	MnO ₂ -C-8.5	30	8.5	170	belt + fiber	142.8
6	MnO ₂ -C-10.5	30	10.5	170	nanofiber	150.1
7	MnO ₂ -C-12.5	30	12.5	170	fiber	146.0
8	MnO ₂ -Tim-0	0	10.5	170	plate	70.1
9	MnO ₂ -Tim-1.5	1.5	10.5	170	plate	172.5
10	MnO ₂ -Tim -3	3	10.5	170	plate + belt	175.7
11	MnO ₂ -Tim -10	10	10.5	170	Plate + fiber	120
12	MnO ₂ -Tim -20	20	10.5	170	fiber + plate	127.6
13	MnO ₂ -Tim -40	40	10.5	170	fiber	129.7
14	MnO ₂ -Tep-100	30	10.5	100	plate	54.5
15	MnO ₂ -Tep -130	30	10.5	130	plate +	125.5
16	MnO ₂ -Tep -150	30	10.5	150	fiber	134.8
17	MnO ₂ -Tep -190	30	10.5	190	fiber + belt	86.1

Fig. S1. EDS mapping of MnO₂-C-10.5.

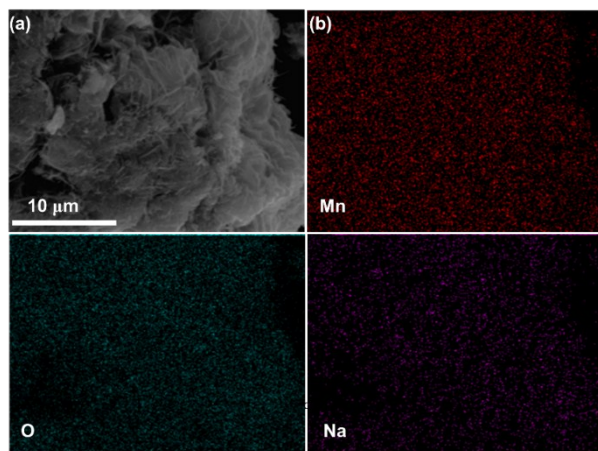


Fig. S2. Detailed SEM images of concentration-dependent MnO₂ products obtained at 170 °C for 30 h: (a) MnO₂- C-2, (b) MnO₂- C-4.5, (c) MnO₂- C-6.5, (d) MnO₂- C-8.5, (e) MnO₂-C- 10.5, (f) MnO₂- C-12.5.

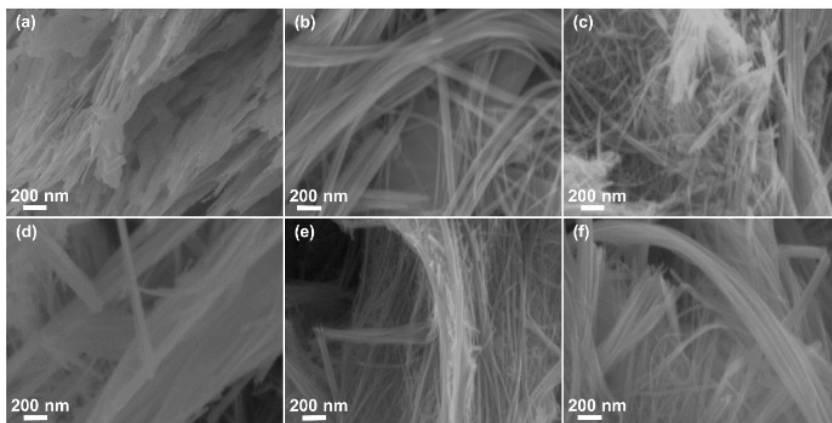


Fig. S3. High resolution SEM of time-dependent MnO_2 samples in 10.5 mol L^{-1} NaOH aqueous solution at $170 \text{ }^\circ\text{C}$: (a) $\text{MnO}_2\text{-Tim-0}$, (b) $\text{MnO}_2\text{-Tim-1.5}$, (c) $\text{MnO}_2\text{-Tim-3}$, (d) $\text{MnO}_2\text{-Tim-10}$, (e) $\text{MnO}_2\text{-Tim-20}$, (f) $\text{MnO}_2\text{-Tim-40}$.

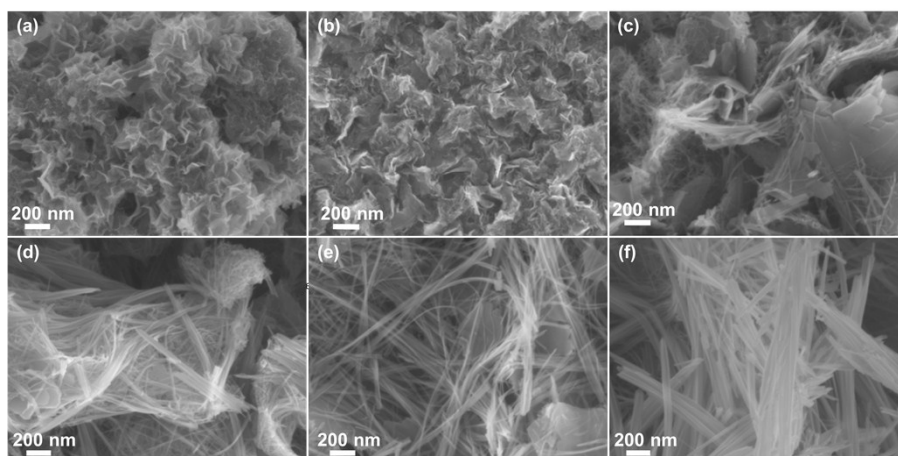


Fig. S4. The detailed SEM images of temperature-dependent MnO₂ materials prepared at 170 °C in 10.5 mol L⁻¹ NaOH solution. (a) MnO₂-Tep-100, (b) MnO₂-Tep-130, (c) MnO₂-Tep-150, (d) MnO₂-Tep-190.

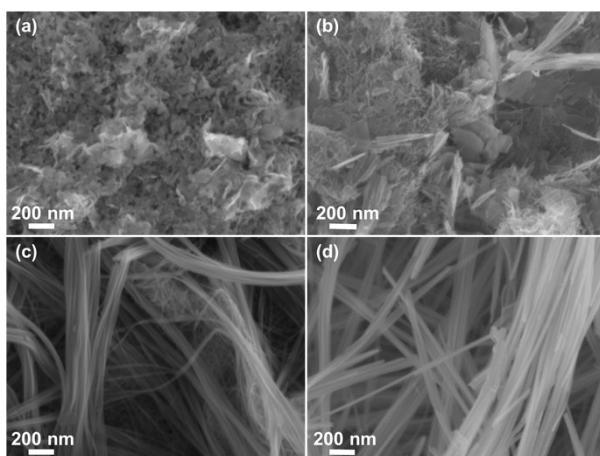


Fig. S5. the HRTEM and TEM images of MnO₂-Tim-20 (a, c) and MnO₂-C-10.5 (b, d).

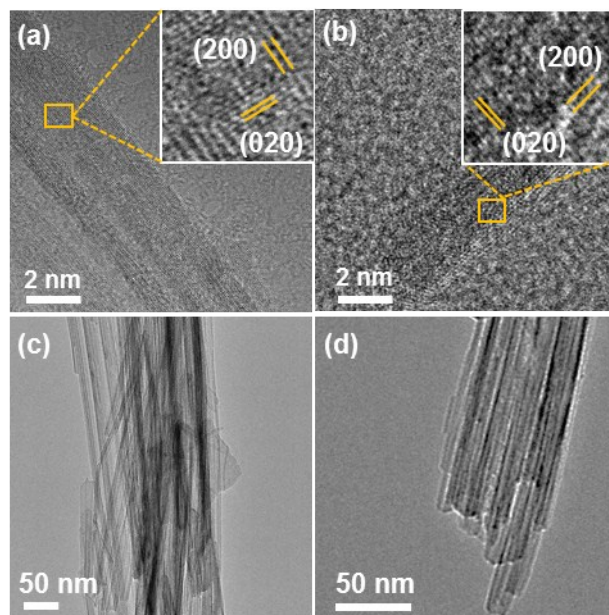


Fig. S6. Electrochemical impedance spectrum of MnO₂-C-10.5 and MnO₂-Tep-190 at open circuit potential in the frequency range from 0.01Hz to 100 kHz.

