Electronic Supplementary Information

Flexible all solid-state supercapacitors based on chemical vapor deposition derived graphene fibers

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Calculation of Specific Capacitances

The areal capacitance (mF/cm^2) of individual GF electrodes was calculated by using the following equation:

$$C = \frac{2 \times I \times t}{S \times V} \tag{1}$$

where S (cm) is surface area of the fiber electrode (cylindrical surface area: $S=2\pi rL$, r is radius of the fiber and L is the length of fiber); I (mA) is the discharging current; t (s) is the discharging time; V (V) is the potential voltage window.

The energy density (mWh/cm^2) and power density (mW/cm^2) of SC were calculated using the following equations:

$$E = \frac{C \times V^2}{2 \times 3600} \tag{2}$$

$$P = \frac{V \times I}{S} \tag{3}$$

References:

1 X. H. Lu, G. M. Wang, T. Zhai, M. H. Yu, S. L. Xie, Y. C. Ling, C. L. Liang, Y. X. Tong, Y. Li, *Nano Lett.*, 2012, 12, 5376-5381.

2 Y. N. Meng, Y. Zhao, C. G. Hu, H. H. Cheng, Y. Hu, Z. P. Zhang, G. Q. Shi, L. T. Qu, *Adv.*

Mater., 2013, 25, 2326-2331.

Supplementary Figures

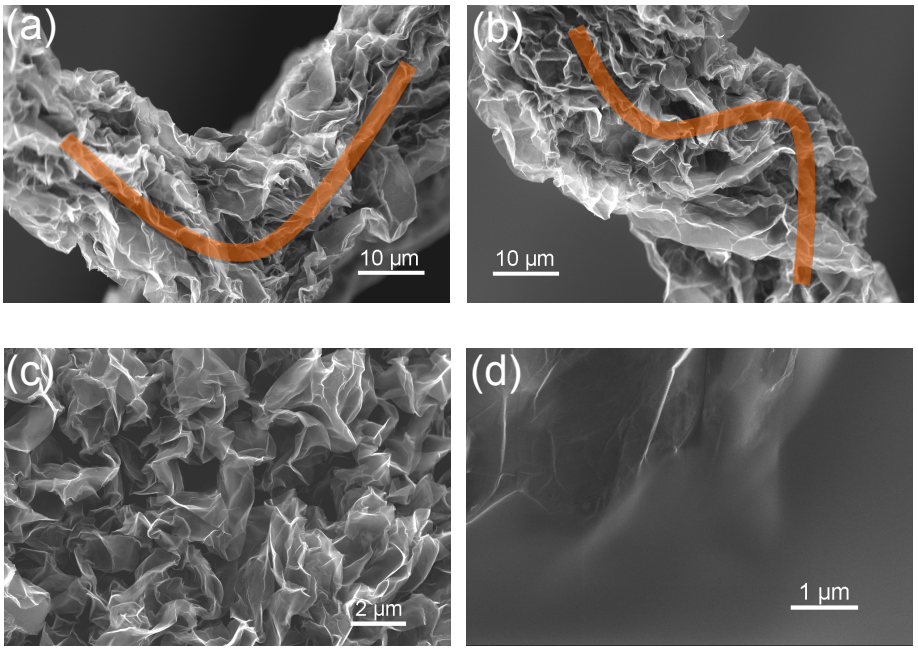

Figure S1. (a-c) SEM images of GFs. (d) SEM image of the gel coated GF.

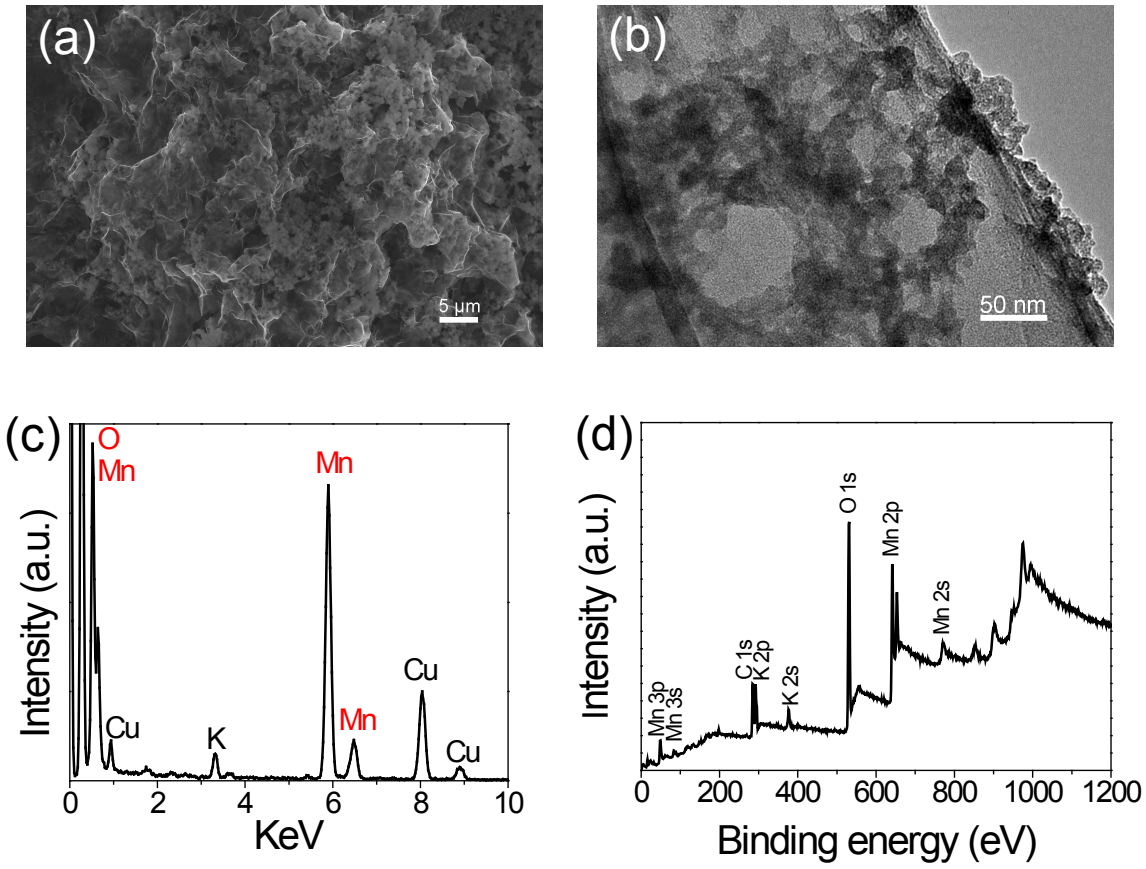

Figure S2. (a) Low-magnification SEM image of GF/MnO_2. (b) Low-magnification TEM image of MnO_2. (c) EDS and (d) XPS of MnO_2.

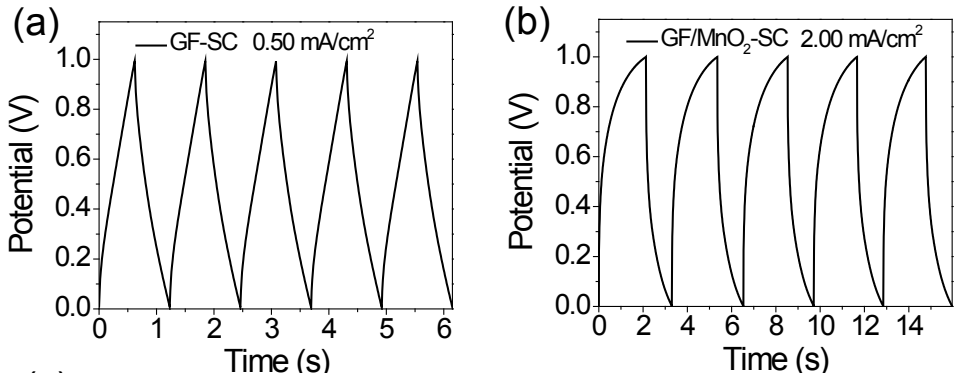

Figure S3. Cyclic CD curves of (a) GF-SC at current density of 0.5 mA/cm^2 and (b) GF/MnO_2-SC at current density of 2.0 mA/cm^2.

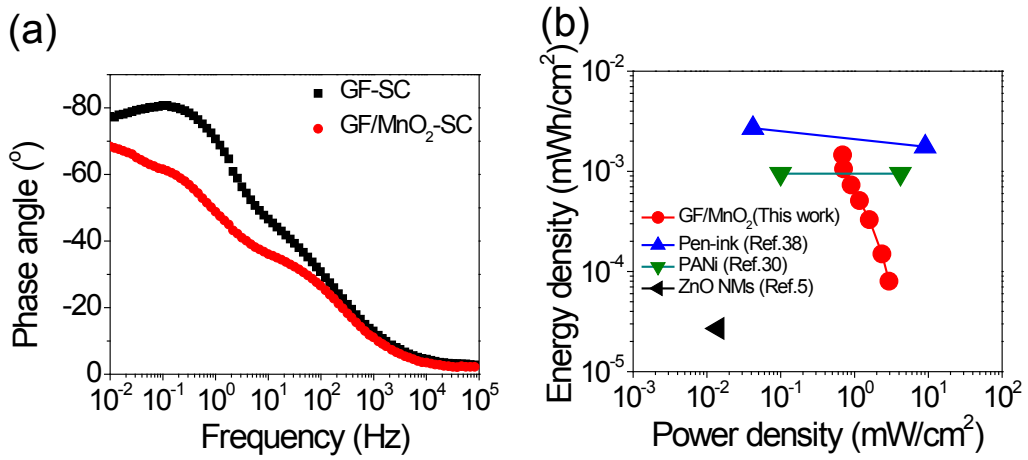

Figure S4. (a) The dependency of the phase angle on the frequency for SC. (b) Comparison between the energy density of our SC and other fiber-based SCs.

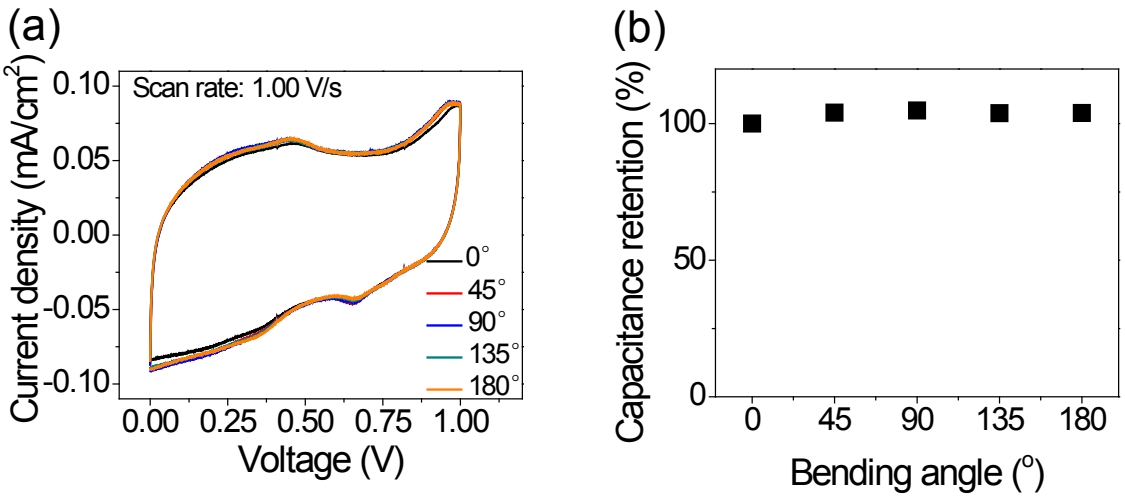

Figure S5. Characterization of flexible GF/SC. (a) Cyclic CV curves of GF-SC at different bending angles. (b) The retention ratio of the areal capacitance at different bending angels.

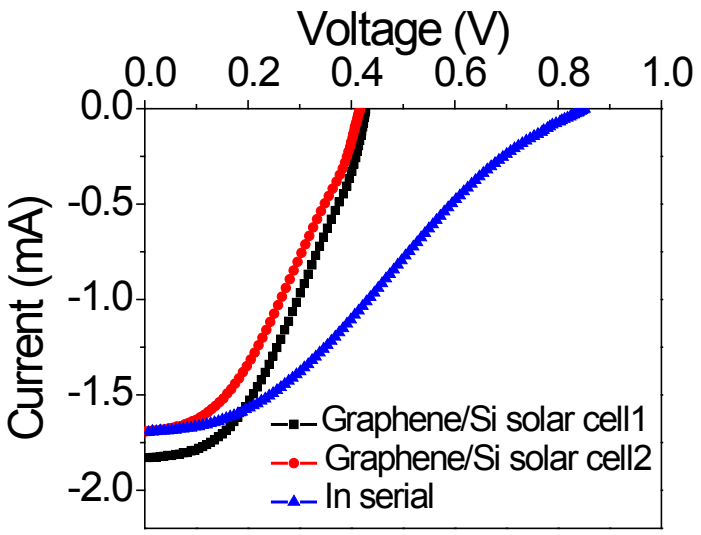

Figure S6. Light *J–V* curves of two grahene/Si solar cells connected in series.

Table S1. Areal capacitances of GF-SC and GF/MnO_2-SC evaluated from the CV curves at 0.01-1.0 V/s scan rates.

Scan rate (V/s)	Areal capacitance (mF/cm^2)	
	GF-SC	GF/MnO_2-SC
0.01	2.13	42.02
0.02	2.00	30.62
0.05	1.88	21.01
0.10	1.78	14.80
0.20	1.66	9.47
0.50	1.44	4.18
1.00	1.19	2.23

Table S2. Energy and power densities of GF-SC and GF/MnO_2-SC.

Scan rate (V/s)	GF-SC		GF/MnO_2-SC	
	Energy density (mWh/cm^2)	Power density (mW/cm^2)	Energy density (mWh/cm^2)	Power density (mW/cm^2)
0.01	7.38×10^{-5}	0.010	1.46×10^{-3}	0.69
0.02	6.94×10^{-5}	0.012	1.06×10^{-3}	0.71
0.05	6.51×10^{-5}	0.028	0.73×10^{-3}	0.90
0.10	6.18×10^{-5}	0.049	0.51×10^{-3}	1.17
0.20	5.77×10^{-5}	0.086	0.33×10^{-3}	1.59
0.50	5.00×10^{-5}	0.216	0.15×10^{-3}	2.35
1.00	4.14×10^{-5}	0.404	0.08×10^{-3}	2.94