Fiber-Based All-Solid-State Asymmetric Supercapacitor Based on Co_3O_4@MnO_2 Core/Shell Nanowire Array

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Supplementary experimental section

The synthesis of MnO_2 on Ni wire

High purity Ni wire was immersed in 6 M HCl solution in an ultrasound bath for 20 min to remove the NiO layer on the surface, and then cleaned with deionized water. The Ni wire was immersed into 0.1 M aqueous glucose solution for 24 h, followed by carbonization at 400 °C in N_2 gas for 100 min. After carbonization, the sample was put into a 25 mL Teflon-lined stainless steel autoclave containing a 0.03 M $KMnO_4$ solution, which was subsequently maintained at 160 °C for 5 h. Finally, the Ni wire covered with MnO_2 nanosheets was rinsed with deionized water, and dried at 60 °C for one night. Then, the MnO_2 nanosheets were scraped off the Ni wire.

Supplementary Figures

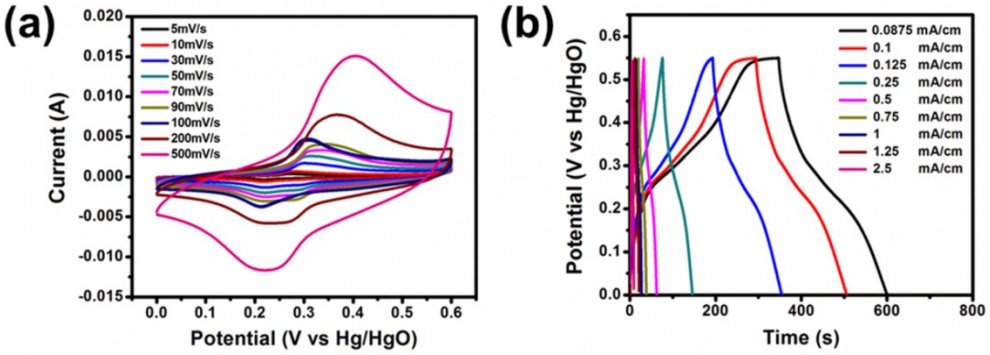

Fig. S1. (a) CV curves of the Ni wire/Co_3O_4@MnO_2 nanowire array electrode tested in a three electrode configuration at various scan rates in 6 M KOH aqueous electrolyte. (b) GCD curves of the Ni wire/Co_3O_4@MnO_2 nanowire array electrode at different current density.

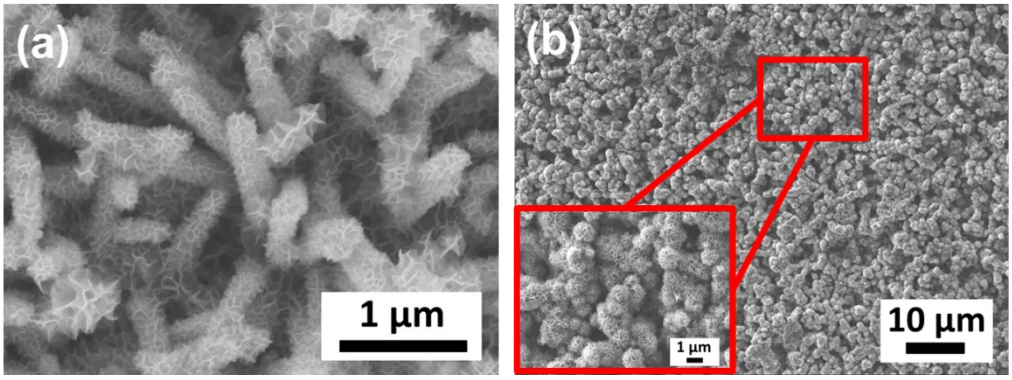

Fig. S2. (a, b) SEM images of the Co_3O_4@MnO_2/Ni wire electrode before and after 1000 galvanostatic charge-discharge cycling.

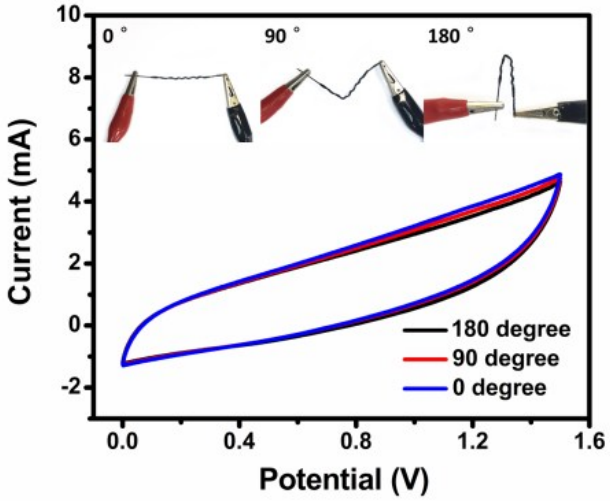

Fig. S3. CV curves of the fiber-based supercapacitor device under different bending angles.

Table S1. Comparison of the present and previously reported solid state fiber-based supercapacitors.

Samples	Current density (mA/cm^2)	Specific capacitance (mF/cm^2)	Power density ($\mu W/cm^2$)	Energy density ($\mu Wh/cm^2$)	Ref.
Co_3O_4@MnO_2/Ni	0.10	13.90	750	4.34	This work
CNF/MW	0.10	12.50	64	1.74	S1
CNT/RGO composite fiber	0.05	27.36	250	3.80	S2
MnO_2/carbon fiber	0.26	10.45	117.56	3.26	S3
CF/MnO_2 // CF/MoO_3	0.50	4.86	530	2.70	S4
CNT/MnO_2 polymer fiber	0.42	40.90	66.90	2.60	S5
PEDOT@D-TiO_2/Ti	1.27	2.65	230.43	0.44	S6

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