Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting information

Self-Assembled Three-Dimensional Hierarchical Graphene Hybrid Hydrogels with Ultrathin β-MnO_2 Nanobelts for High Performance Supercapacitors

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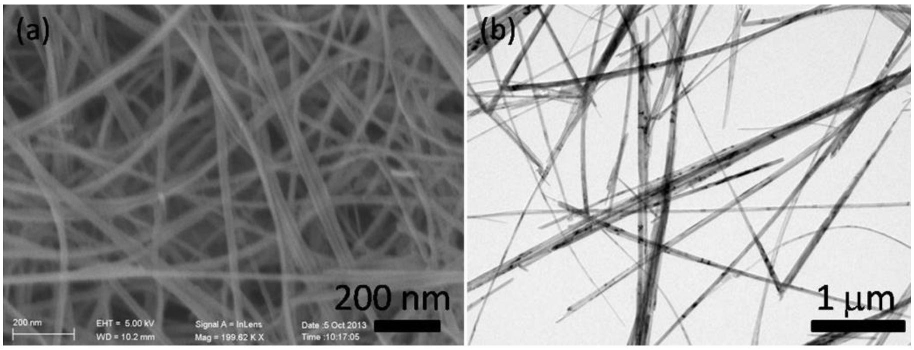

Figure S1. SEM image (a), TEM graph (b) of the as-obtained ultrathin β-MnO_2 nanobelts

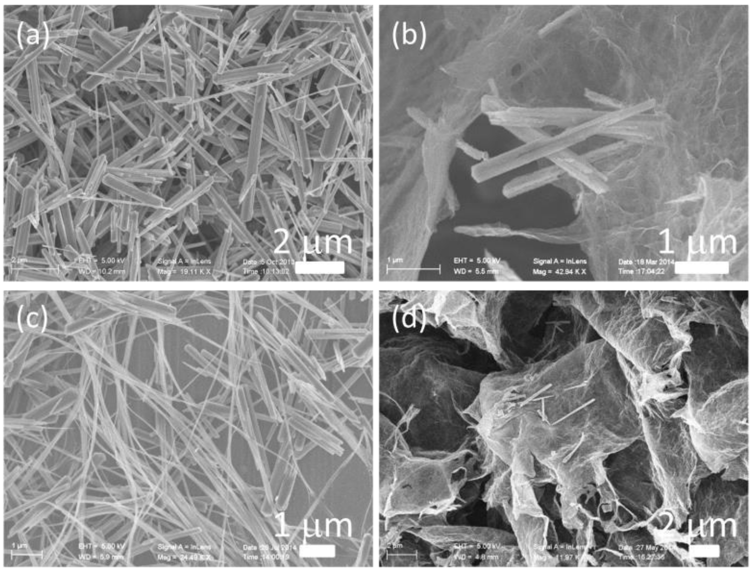

Figure S2. SEM images of the as-obtained MnO_2 nanorods (a), the 3D typical rGO/MnO_2 nanorod hybrid aerogel (b), nanorod-nanobelt heterostructure (c), and 3D typical rGO/MnO_2 heterostructure hybrid aerogel (d).

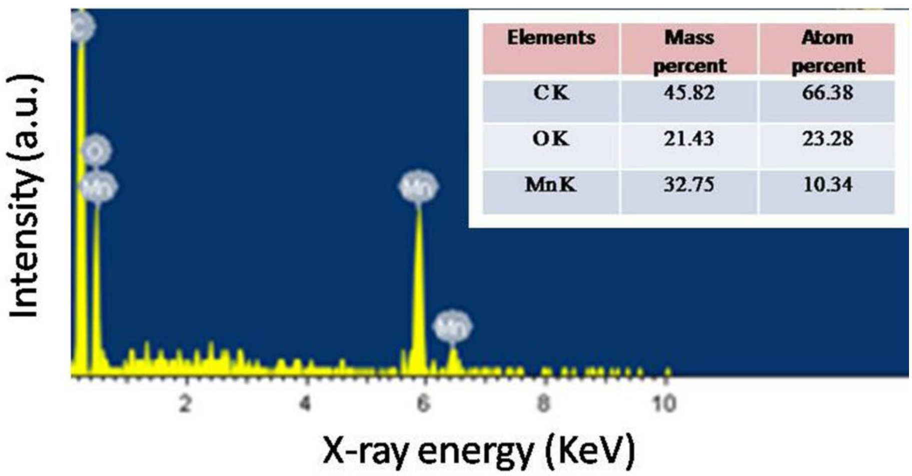

Figure S3. EDX spectrum of the typical 3D rGO/β-MnO_2 nanobelt hybrid sample, the inset is the table of the corresponding element content.

Table S1. The mass, volume and density of the 3D rGO/β-MnO_2 nanobelt hybrid aerogels

Samples	Mass (g)	Volume (cm^3)	Density (g/cm^3)
rGO	0.0084	1.092	0.007692
18.9% β-MnO_2 NBs/rGO	0.0107	1.240	0.008629
30.7% β-MnO_2 NBs/rGO	0.0186	1.286	0.01446
54.2% β-MnO_2 NBs/rGO	0.0242	1.442	0.02526
80.9% β-MnO_2 NBs/rGO	0.0345	1.366	0.01678

Table S2. The comparisons of the as-obtained specific capacitance with the reported values under different current densities or scan rates.

Number	Composite electrodes	Highest capacitance (F/g)	Current density or scan rate
1	MnO_2 nanosheets/graphene	236	0.25 A/g
2	MnO_2 nanosheets/graphene	380	0.1 mA/cm^2
3	MnO_2 nanopaticles/rGO	312	2 mV/s
4	urchin-like MnO_2/GNS	263	10 mA/cm^2
5	MnO_2 nanoflower/graphene	195	77 A/g
6	nanostructured MnO_2/GO	280	0.5 A/g
7	MnO_2 nanobelts/rGO	362	1 A/g

References

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Table S3. The detailed comparison of the specific capacitance (C), energy density (E) and power density (P) for the typical hybrid hydrogels with various nanostructures.

Samples	**C (F/g)**	**E (Wh/kg)**	**E (kW/kg)**
rGO	118	61	14.50
45.9% β-MnO_2 NRs/rGO	242	121	25.64
48.7% β-MnO_2 NRs-NBs /rGO	326	163	33.97
54.2% β-MnO_2 NBs/rGO	362	181	49.57

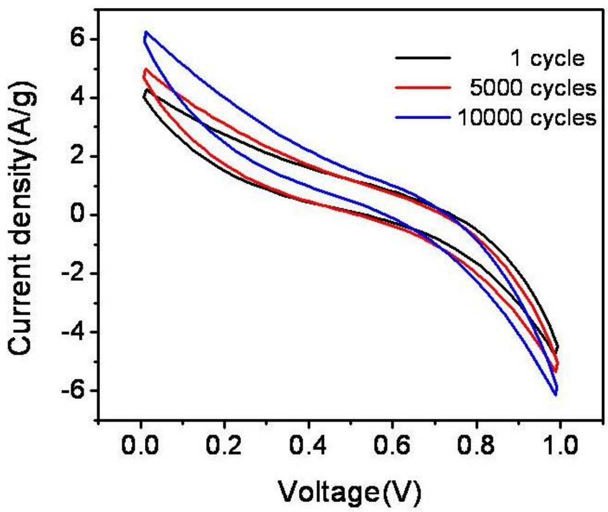

Figure S4. CV curves of the typical 3D hybrid hydrogels under the voltage scan rate of 500 mV/s in 6.0 M KOH electrolyte.

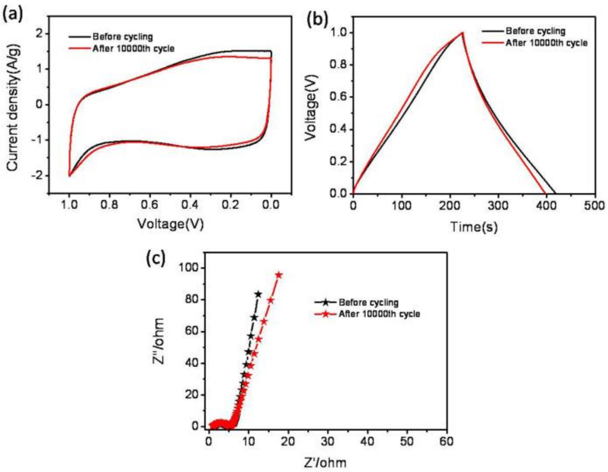

Figure S5. The comparison of the CV, GCD and EIS curves of the rGO/β-MnO_2 nanobelt hybrid hydrogel before and after using under the voltage scan rate of 5 mV/s in 6.0 M KOH electrolyte.

Table S4. The detailed ESR values of different electrodes

Samples	**R_{ct}[ohm]**
rGO	19.5
18.9% β-MnO_2 NBs/rGO	5.2
30.7% β-MnO_2 NBs/rGO	5.1
54.2% β-MnO_2 NBs/rGO	4.6
80.9% β-MnO_2 NBs/rGO	22.8