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Supporting Information

A graphene/Co_9S_8 nanocomposite paper as a binder-free and free-standing anode for Lithium-ion batteries

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Table S1. Electrochemical properties of cobalt sulfide prepared by various methods from literature.

electrode	Current collectors	Voltage rang[V]/ Current rate	Initial C_{dis}/C_{cha} [mAh g^{-1}]	Discharge capacity[mA h g^{-1}]/ cycles	Co_9S_8 content
Hierarchical Hollow Co_9S_8 Microspheres[1]	copper foil	0.02-3.0/50 mA g^{-1}	910/-	57.37/20th	—
Mesocrystal Co_9S_8 hollow spheres[2]	copper foil	0.01-3.0/100 mA g^{-1}	1103.9/838.1	254.9/100th	—
Hollow nanospheres of mesoporousCo_9S_8[3]	copper foil	0.01-3.0/100 mA g^{-1}	1267/1002	1414/100th	—
MWCNT@a-C@Co_9S_8[4]	copper foil	0.01-3.0/(0.1 A g^{-1}–1 A g^{-1})[a]	1397.45/988	662/120th	~81.2%
C@Co_9S_8 dandelion[5]	copper foil	0.01-3.0/1000 mA g^{-1}	848/619	520/50th	—
This work RGO/Co_9S_8	Free-standing	0.01-3.0/1C (1C=545.4 mA g^{-1})	1415/922	~573/500th	66.7%

[a]The cycling performance of the MWCNT@a-C@Co_9S_8 nanocomposite was tested over 0.01–3.0 V at a current density of 0.1 A g^{-1} for the first five cycles then a current density of 1 A g^{-1} for the left.

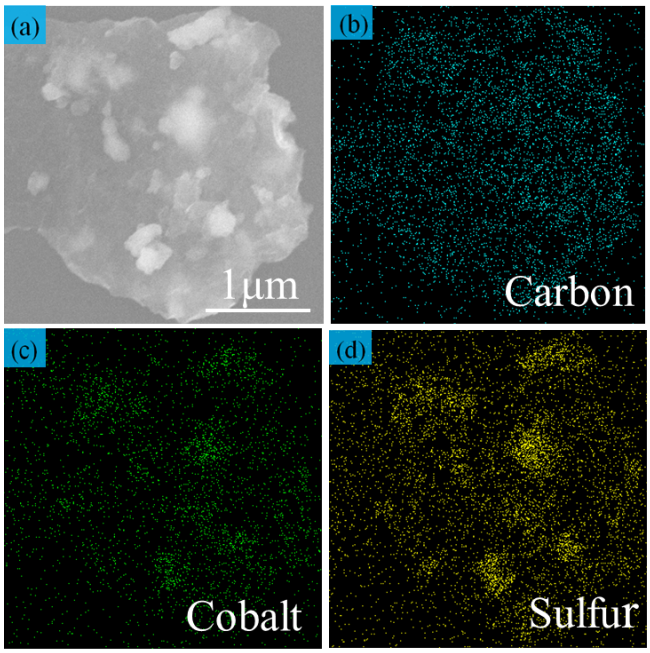

Fig. S1 EDX elemental mapping of RGO/Co_9S_8 paper (a) SEM image; (b) carbon map; (c) cobalt map; and (d) sulfur map.

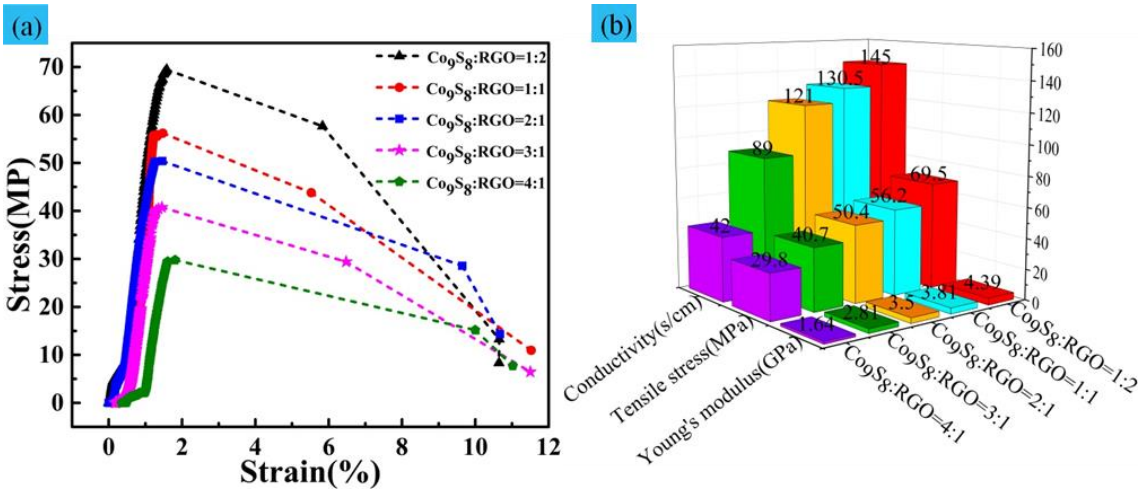

Fig. S2 (a) typical stress-strain curves of the RGO/Co_9S_8 paper with different mass ratios before discharge-charge tests. (b) Electric conductivity, Tensile stress and Young's modulus of the RGO/Co_9S_8 paper with different mass ratios.

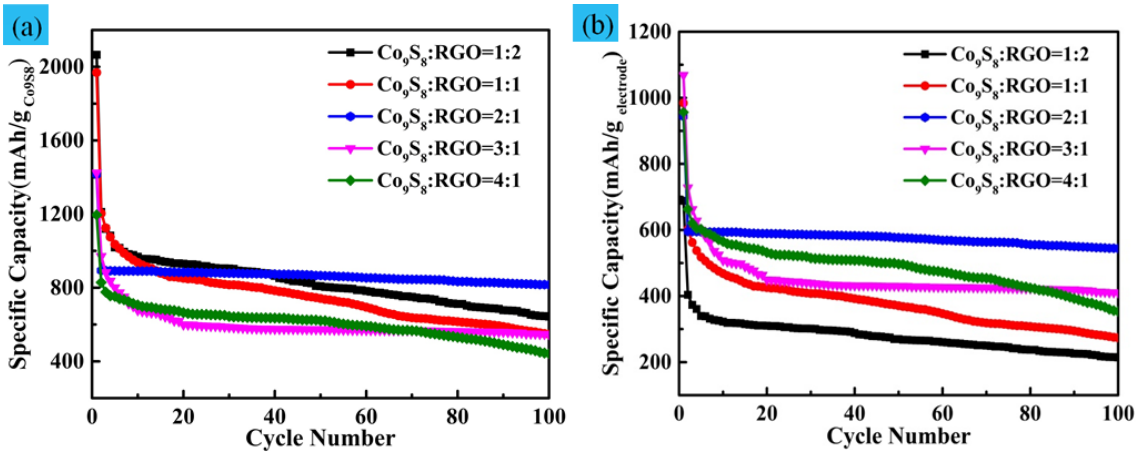

Fig. S3 Capacity based on (a) the Co_9S_8 weight and (b) the electrode weight as a function of cycle numbers of RGO/Co_9S_8 paper with different mass ratios.

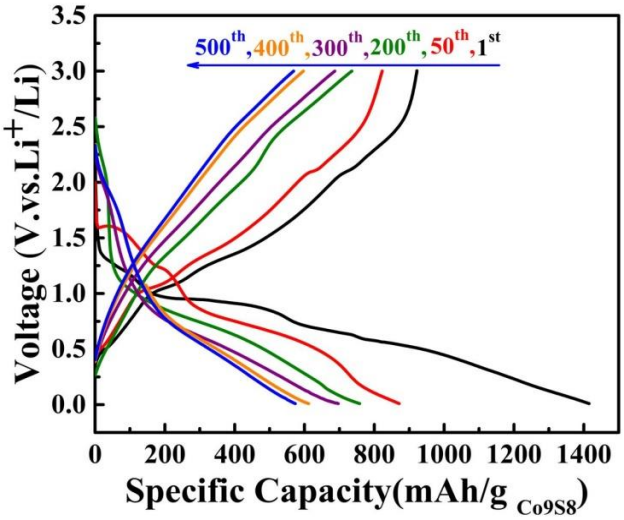

Fig. S4 Charge-discharge voltage profiles of RGO/Co_9S_8 paper.

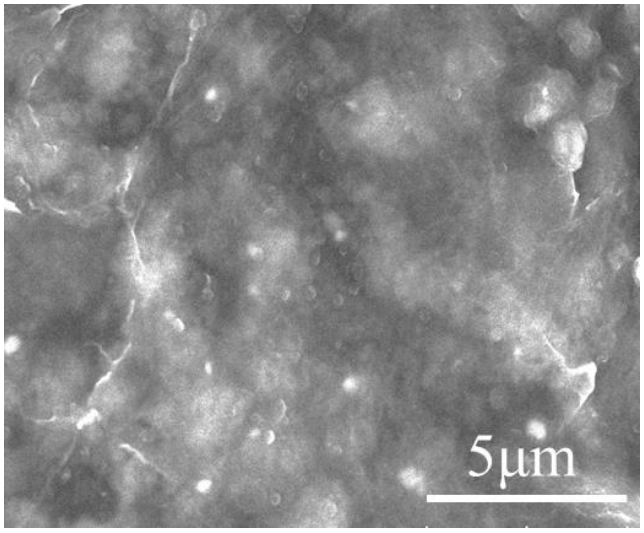

Fig. S5 (a) Characterization of RGO/Co_9S_8 nanocomposite paper after 500 charge-discharge cycles at a current rate of 1 C.

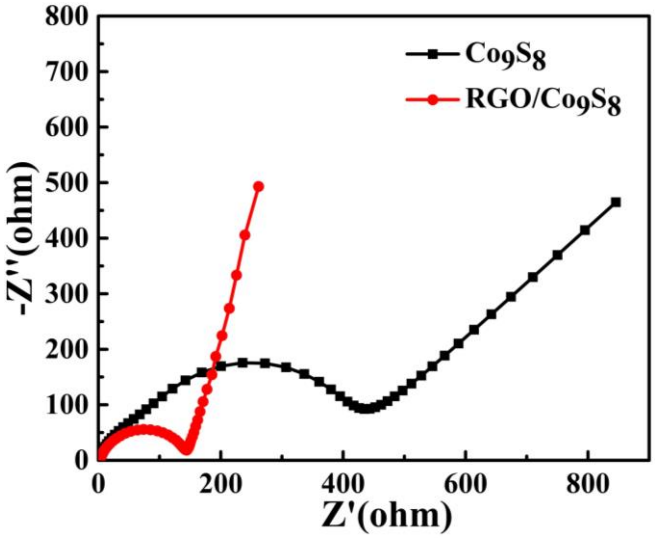

Fig. S6 Nyquist plots of RGO/Co_9S_8 nanocomposite and Co_9S_8 electrodes after 500 cycles.

References

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