

Supporting Information

Nanocrystal ZnS/Reduced Graphene Oxide Composite Anode with Enhanced Electrochemical Performances for Lithium-ion Batteries

Yan Feng^{*1, 2}, Yuliang Zhang¹, Yuzhen Wei¹, Xiangyun Song², Yanbo Fu², and Vincent S. Battaglia²

[1] Key Laboratory of Inorganic-Organic Hybrid Functional Materials Chemistry (Tianjin Normal University), Ministry of Education; Tianjin Key Laboratory of Structure and Performance for Functional Molecules; College of Chemistry, Tianjin Normal University, Tianjin 300387 (P. R. China)

E-mail: hxyfy@mail.tjnu.edu.cn

[2] Energy Storage and Distributed Resources Division, Energy Technologies Area, Lawrence Berkeley National Laboratory, Berkeley, California 94720 (United States)

1. Preparation of Graphene Oxide.
2. Figure S1. TGA of graphene oxide (GO) in oxygen at a rate of 10 °C min⁻¹.
3. Figure S2. SEM images of the ZnS/H1-RGO composite. (a) Magnification × 500; (b) Magnification × 1000; (c) Magnification × 5000; (d) Magnification × 10000.
4. Figure S3. XPS spectra of the pure ZnS (a) Survey; (b) Zn2p; (c) S2p.

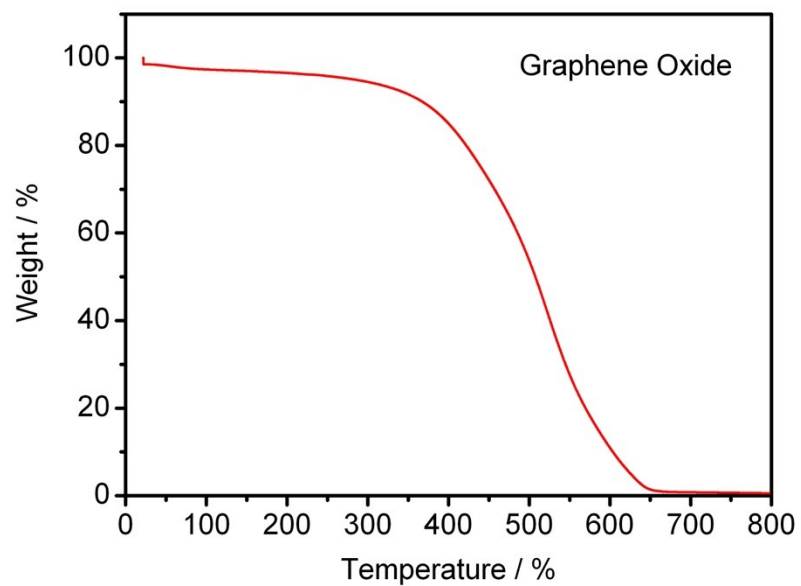
1. Preparation of Graphene Oxide.

The graphene oxide (GO) was synthesized from natural graphite powder according to the modified Hummers method.^{1,2} Graphite (0.2 g) and KMnO_4 (0.3 g) were added to concentrated H_2SO_4 (98 wt.%, 40 mL) while cooled in an ice bath and vigorously stirred such that the temperature remained around 35 °C. The stirring continued for 60 min. Then, additional KMnO_4 (6.0 g) was slowly added to the mixture while stirring for 60 additional minutes and the temperature kept at around 80 °C. A resulting brownish paste formed. After that, H_2O_2 (30 wt.%, 3.5 mL) and deionized water (72 mL) were added to solution to convert the residual KMnO_4 and MnO_2 into soluble MnSO_4 . The temperature of the solution was kept at 80 °C, and was stirred for 30 min. The resulting suspension was bright yellow in color. Finally, the above suspension was filtrated to collect the solid product and washed with aqueous HCl (3 wt.%, 30 mL) three times, and then washed repeatedly with deionized water until the pH of the supernatant was neutral. In the end, the material was dried under vacuum for 24 h to obtain a yellow-brown graphene oxide (GO).

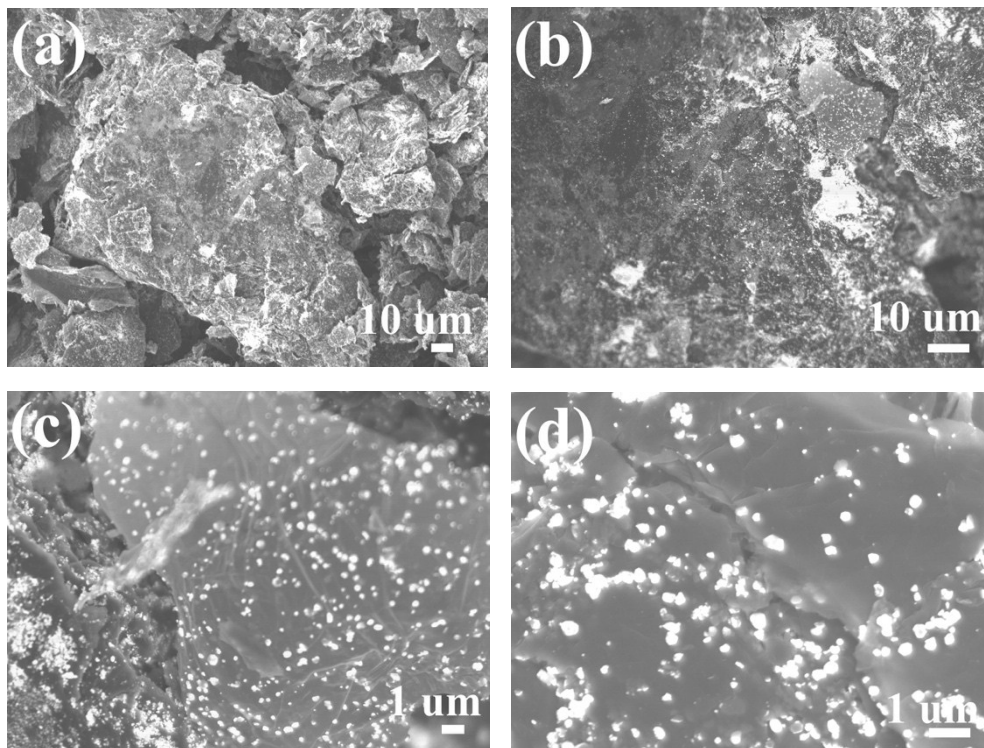
References

- (1) Hummers, W. S.; Offeman, R. E. *J. Am. Chem. Soc.* **1958**, *80*, 1339-1339.
- (2) Liao, K.-H.; Mittal, A.; Bose, S.; Leighton, C.; Mkhoyan, K. A.; Macosko, C. W. *ACS Nano* **2011**, *5*, 1253-1258.

2. **Figure S1.** TGA of graphene oxide (GO) in oxygen at a rate of 10 °C min⁻¹.



3. **Figure S2.** SEM images of the ZnS/H1-RGO composite. (a) Magnification $\times 500$; (b) Magnification $\times 1000$; (c) Magnification $\times 5000$; (d) Magnification $\times 10000$.



4. **Figure S3.** XPS spectra of the pure ZnS (a) Survey; (b) Zn2p; (c) S2p.

