Supporting Information

Sheet-on-Sheet $ZnIn_2S_4$@RGO-Modified Separators with Abundant Sulfur Vacancies for High-performance Li-S Batteries

Liping Wu[1,a], Gang Liu[1,a], Hongyuan Xu[b], Zhenwei Hu[a], Tao Mei[a], Jingwen Qian[a] and Xianbao Wang[,a]*

[a] Hubei Collaborative Innovation Center for Advanced Organic Chemical Materials, Overseas, Expertise Introduction Center for Discipline Innovation (D18025), Key Laboratory for the Green Preparation and Application of Functional Materials, Hubei Key Laboratory of Polymer Materials, School of Materials Science and Engineering, Hubei University, Wuhan 430062, P.R. China

[b] Suzhou Academy, Xi'an Jiaotong University, Suzhou, Nano Science and Technology Institute, University of Science and Technology of China, Suzhou Institute for Advanced Research, University of Science and Technology of China, Suzhou, Jiangsu 215123, China

* Corresponding author. Fax: +86 27 8866 1729; Tel.: +86 27 8866 2132.

E-mail: wangxb68@aliyun.com (X.B. Wang)

Figure S1-11, Table S1

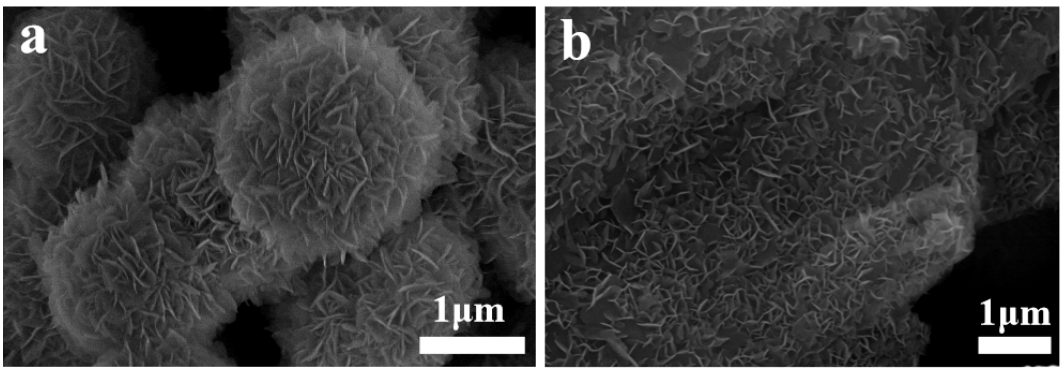

Fig. S1. (a) SEM image of ZIS. (b) SEM images of ZIS@RGO.

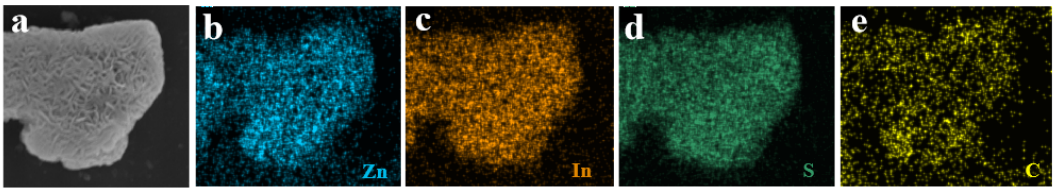

Fig. S2. (a) SEM image of Vs-ZIS@RGO. (b-e) Corresponding EDS mapping of Zn, In, S and C.

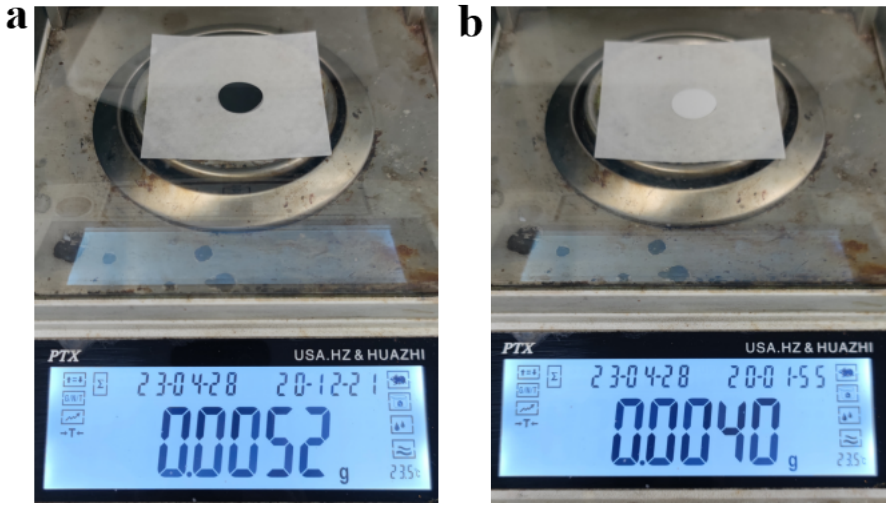

Fig. S3. (a) and (b) Photographs of the weight for Vs-ZIS@RGO//PP and PP.

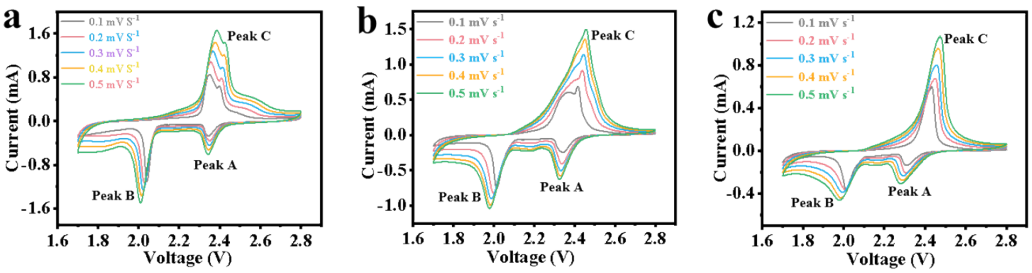

Fig. S4. CV curves of the (a) Vs-ZIS@RGO//PP, (b) ZIS@RGO//PP and (c) GO//PP at a scan rate from 0.1 to 0.5 mV s^{-1}.

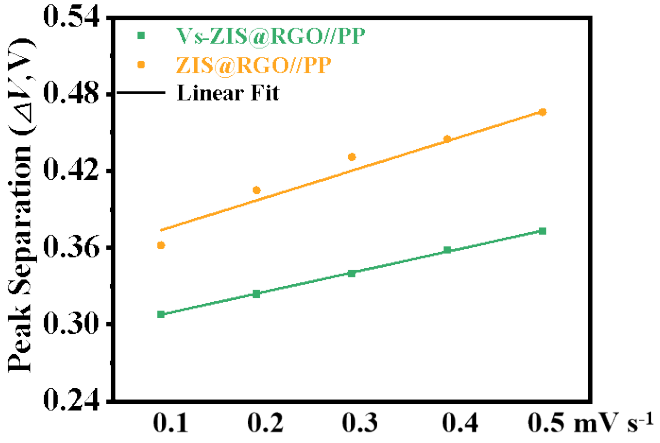

Fig. S5. Voltage polarization of Vs-ZIS@RGO//PP and ZIS@RGO at a scan rate from 0.1 to 0.5 mV s^{-1}.

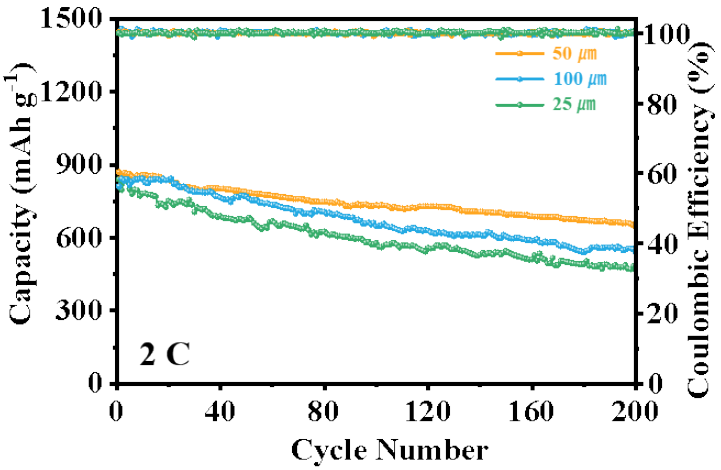

Fig. S6. Cycling performance of Vs-ZIS@RGO layer with different coating thickness at 2 C.

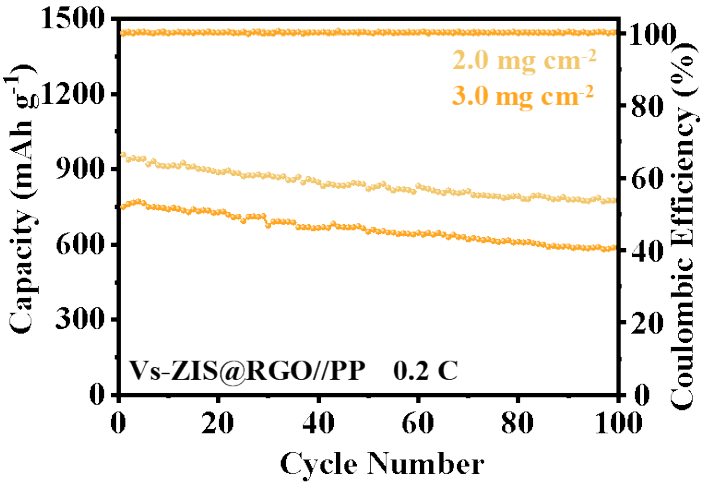

Fig. S7. Cyclic performance of Vs-ZIS@RGO//PP at 0.2 C with a high sulfur loading of 2.0 and 3.0 mg cm^{-2}.

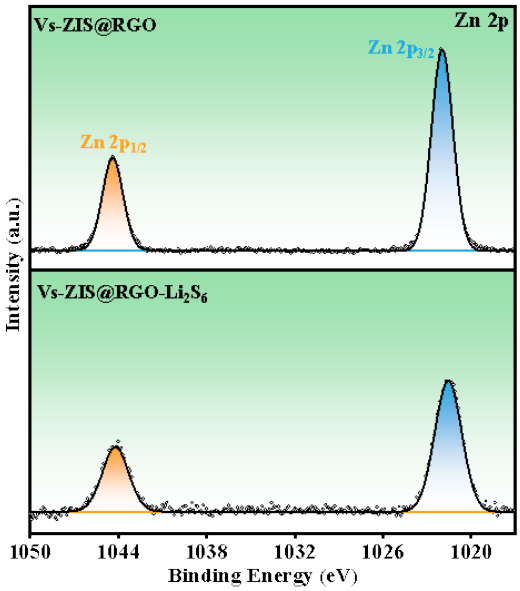

Fig. S8. Zn 2p spectra of Vs-ZIS@RGO//PP before and after the permeation experiments.

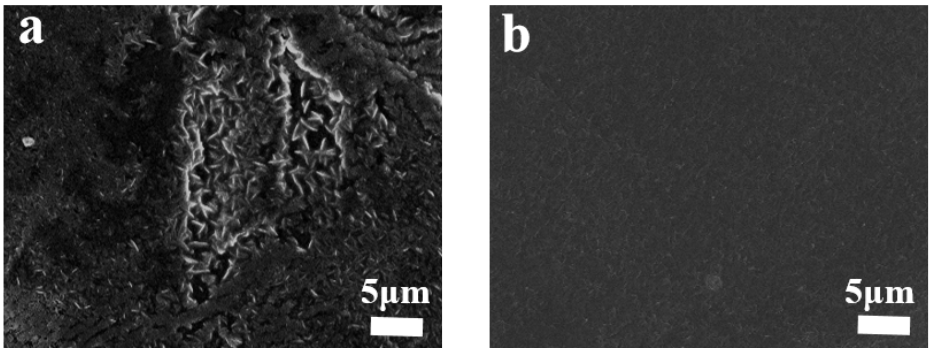

Fig. S9. SEM images of Li anode in contact with (a) PP and (b) Vs-ZIS@RGO//PP after 200 cycles.

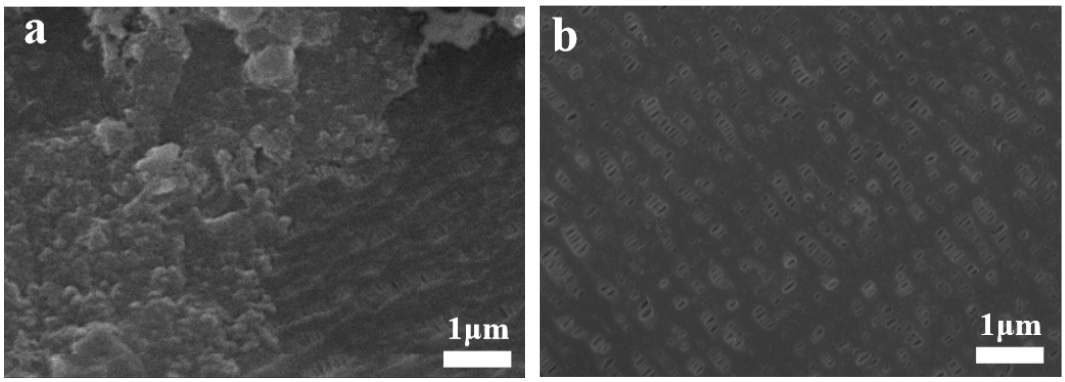

Fig. S10. SEM images of (c) PP and (d) Vs-ZIS@RGO//PP at the anode side after 200 cycles.

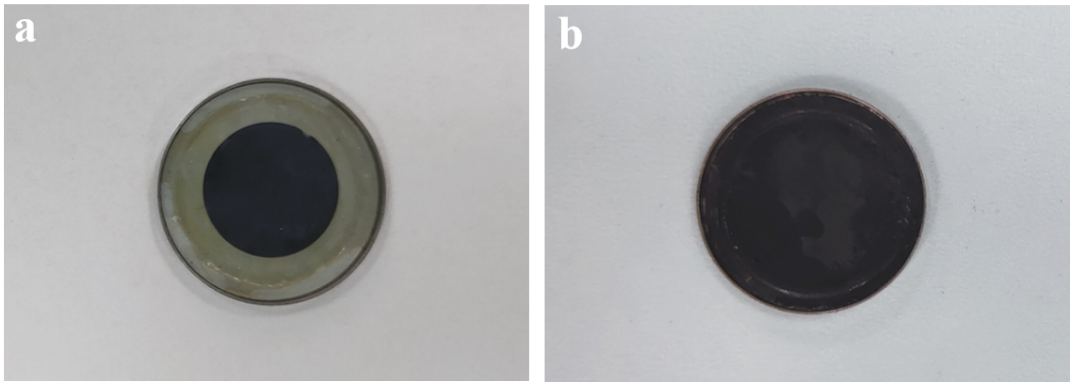

Fig. S11. Photographs of (a) PP and (b) Vs-ZIS@RGO//PP facing the anode side after 200 cycles.

State of adsorption	The vacuum	On the surface of ZIS	On the surface of Vs-ZIS
Bond length of Li_2S_6 (Å)	Li-S:2.041 2.010 S-S: 1.939 1.887 1.901 1.939 1.905	Li-S:2.074 2.080 S-S: 2.039 2.097 2.013 2.062 2.055	Li-S:2.216 2.195 S-S: 2.099 2.109 2.121 2.102 2.125

Table S1. Comparison of bond lengths of Li_2S_6 before and after adsorption