Electronic Supplementary Information for

Scalable Synthesis of SnS_2/S-Doped Graphene Composites for Superior Li/Na-Ion Batteries

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Figure S1. Penglun Zheng *et al.*

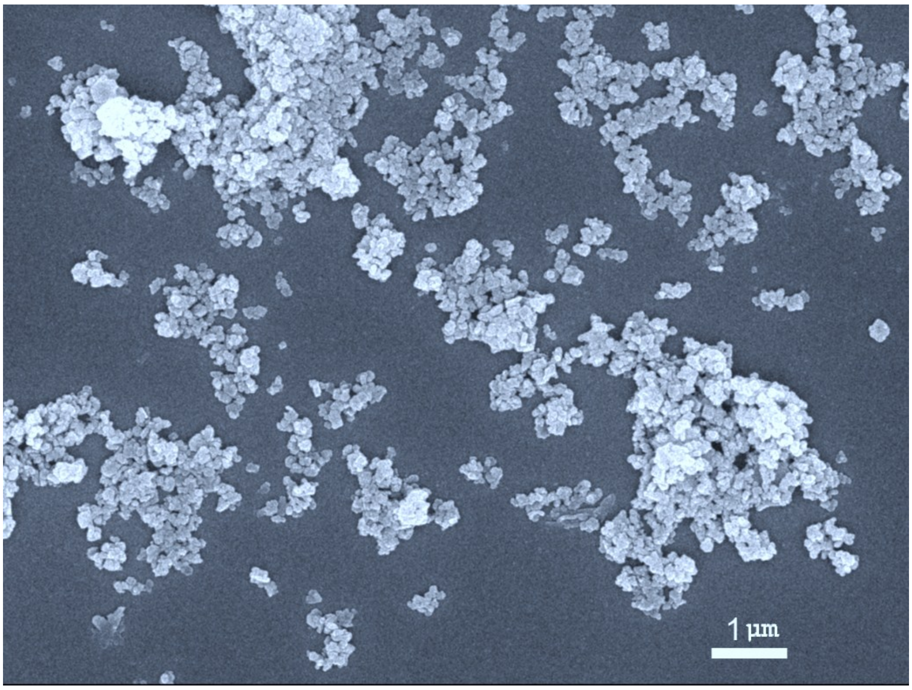

Figure S1. SEM image of commercial SnS_2 powders.

Figure S2. Penglun Zheng *et al.*

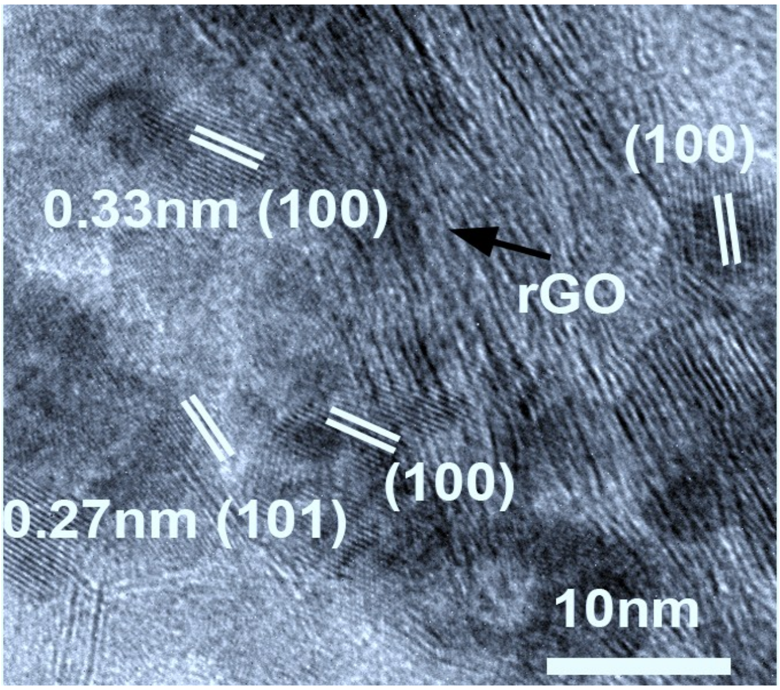

Figure S2. HRTEM image of SnS_2/S-rGO nanocomposites, showing the layered feature of rGO.

Figure S3. Penglun Zheng *et al.*

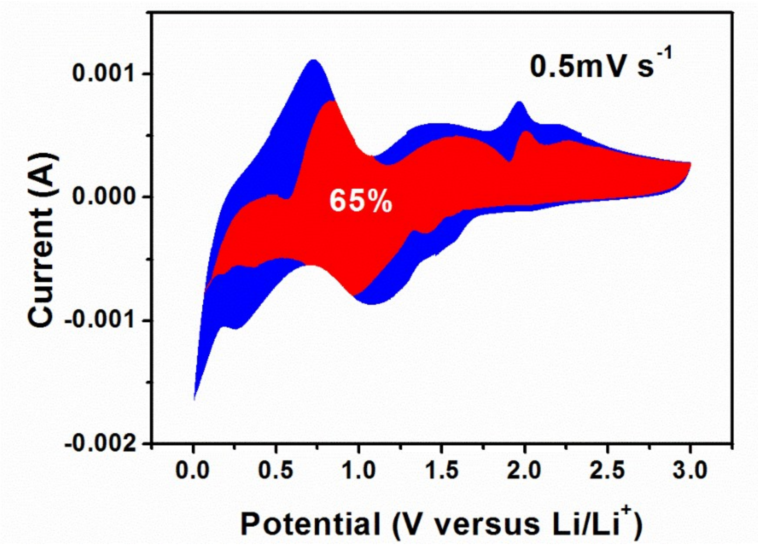

Figure S3. Capacitive (red) and diffusion-controlled (blue) contribution to charge storage of SnS_2/S-rGO composite electrode at 0.5 mV s^{-1}.

We have analyzed CV curves and calculated the capacitive contribution at 0.5 mV s^{-1}. The ratios of Li-ion capacitive contribution can be quantitatively quantified by separating the current response i at a fixed potential V into capacitive effects (proportional to the scan rate v) and diffusion-controlled reactions ($k_2v^{1/2}$), according to Dunn:

$$i(V) = k_1\vartheta + k_2\vartheta^{1/2}$$

By determining both k_1 and k_2 constants, we can distinguish the fraction of the current from surface capacitance and Li-ion diffusion. Fig. S3 shows the typical voltage profile for the capacitive current (red region) in comparison with the total current. A dominating capacitive contribution (65 %) is obtained for the SnS_2/S-rGO composite electrode.

Figure S4. Penglun Zheng *et al.*

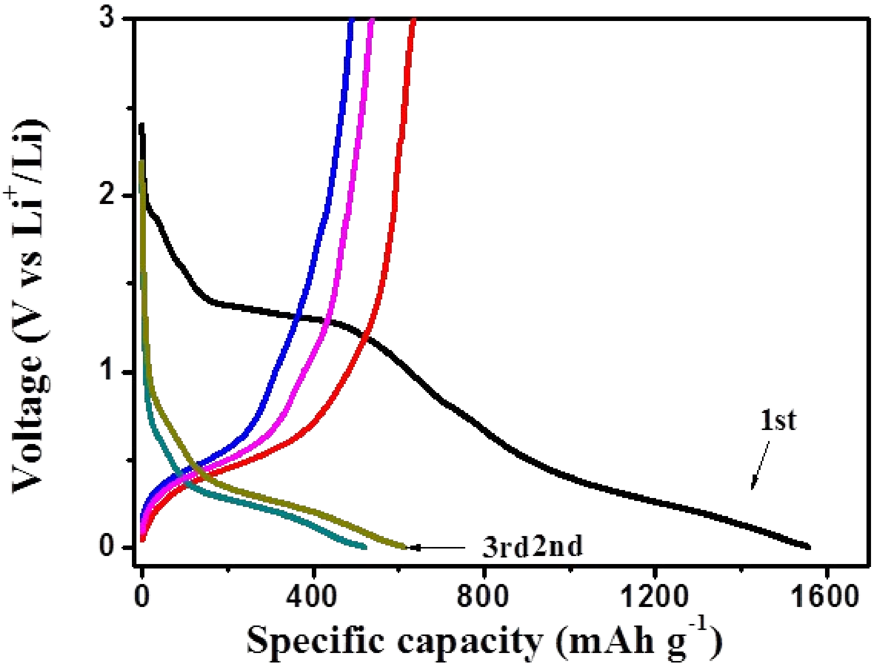

Figure S4. The initial three discharge/charge profiles of the pure SnS_2 at a current density of 0.1 A g^{-1}.

Figure S5. Penglun Zheng *et al.*

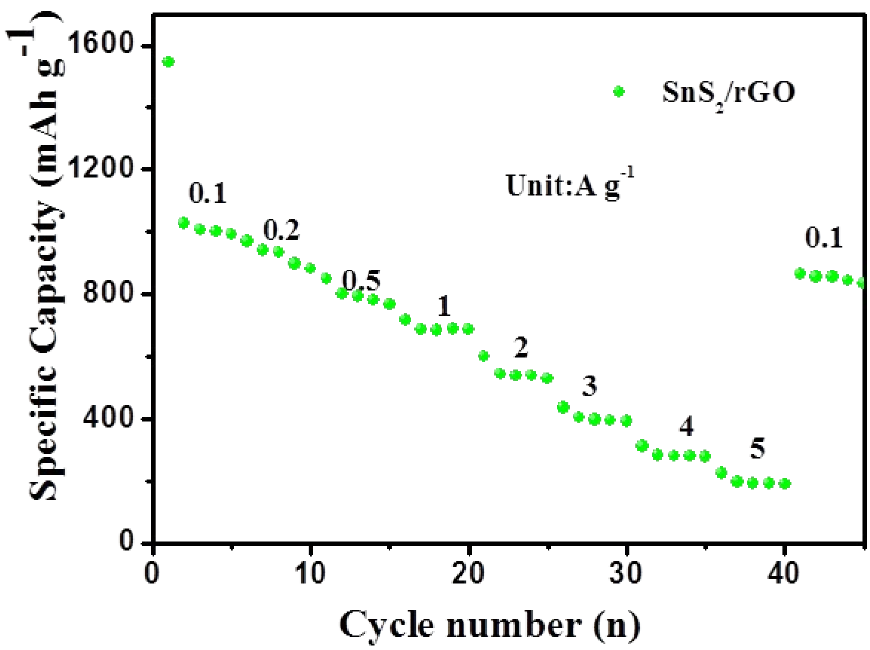

Figure S5. LIBs rate performance of SnS_2/rGO electrodes at different current densities from 0.1 to 5.0 A g^{-1}.

Figure S6. Penglun Zheng *et al.*

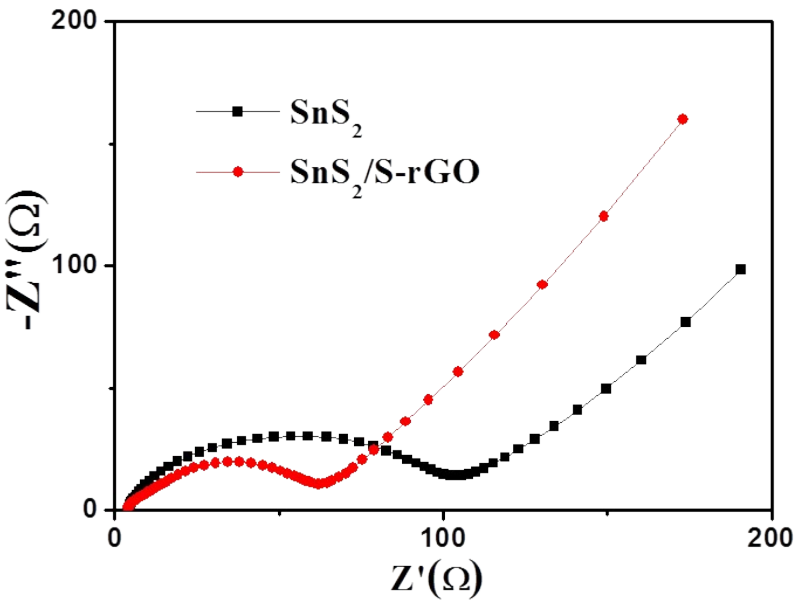

Figure S6. Nyquist plots of the SnS_2/S-rGO and SnS_2 electrodes in the frequency range from 100 kHz to 10 mHz.

Figure S7. Penglun Zheng *et al.*

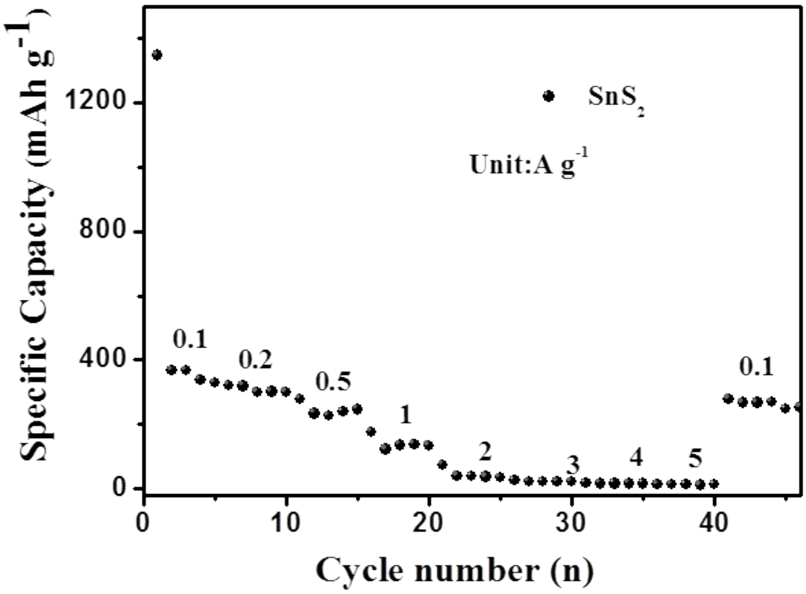

Figure S7. SIBs rate performance of SnS_2 electrodes at different current densities from 0.1 to 5.0 A g^{-1}.