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

Supporting information

rGO/SnS_2/TiO_2 Heterostructured Composite with Dual-Confinement for Enhanced Lithium-Ion Storage

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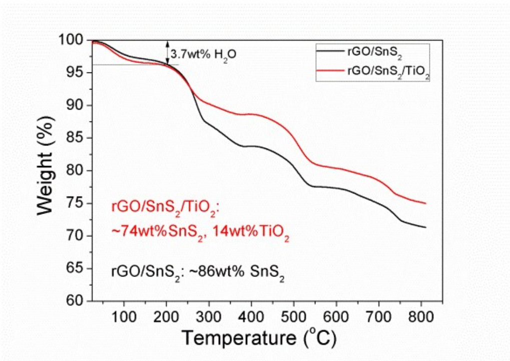

Figure S1. TGA curves of rGO/SnS_2 and rGO/SnS_2/TiO_2 tested in air with a temperature ramping rate of 5 ^{o}C/min.

The calculation of the SnS_2 in rGO/SnS_2 was referring the following two chemical reaction equations:

$$SnS_2+3O_2 \rightarrow SnO_2+2SO_2\uparrow, \quad rGO+O_2 \rightarrow CO_2\uparrow.$$

Ideally, rGO/SnS_2 composite will be completely converted into SnO_2 after TGA analysis in air over 800 ^{o}C. Therefore, in 1 gram of rGO/SnS_2 sample, one can assume the mass of SnS_2 is x gram and rGO is (1-x) gram. The molar weights of SnS_2 and SnO_2 are 182.7 and 150.7, respectively. Therefore, the remaining weight of SnO_2 after TGA test can be calculated as (x/182.7)×150.7 gram, and the corresponding weight loss is [1-(x/182.7)×150.7] gram. Similarly, SnO_2/TiO_2 composite can be obtained after TGA measurement of rGO/SnS_2/TiO_2 composite sample in air, and the mass content of TiO_2 in the rGO/SnS_2/TiO_2 can be calculated given that the rGO and SnS_2 ratio has already been determined. From **Figure S1**, the mass content of SnS_2 in rGO/SnS_2 composite can be calculated to be ~86wt% while the mass contents of SnS_2 and TiO_2 in rGO/SnS_2@TiO_2 composite are ~74 wt% and ~14 wt%, respectively.

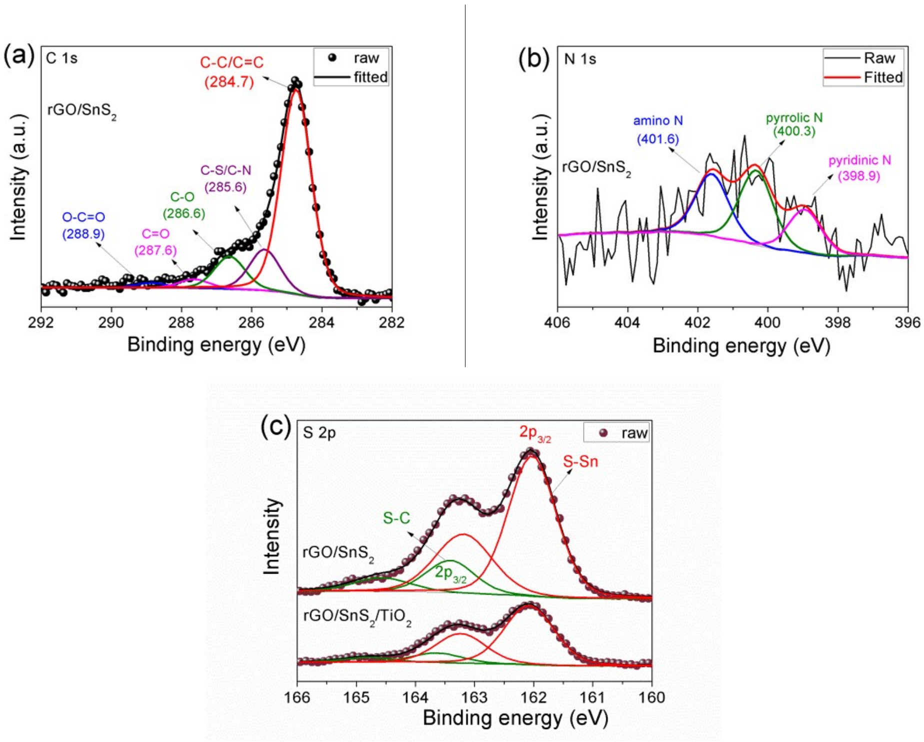

Figure S2. High resolution XPS spectra of (a) C1s, (b) N1s in rGO/SnS_2 sample, and (c) S2p in rGO/SnS_2 and rGO/SnS_2/TiO_2.

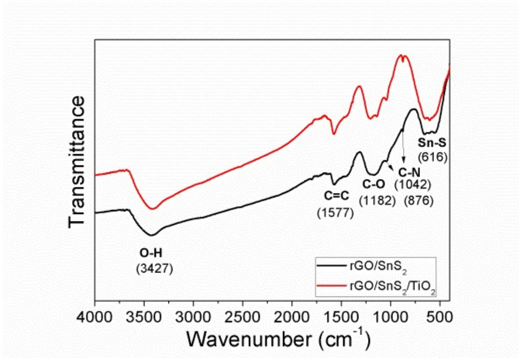

Figure S3. FTIR spectra of (a) rGO/SnS_2 and (b) rGO/SnS_2/TiO_2 samples.

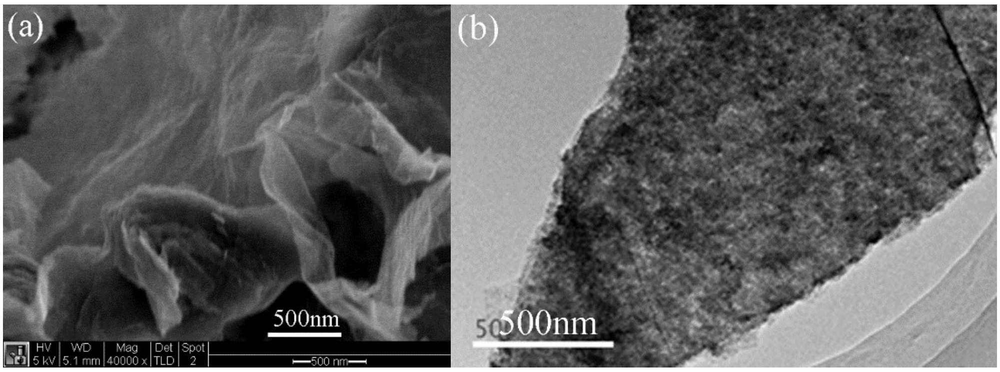

Figure S4. (a) SEM and (b) TEM images of rGO/SnS_2 composite sample.

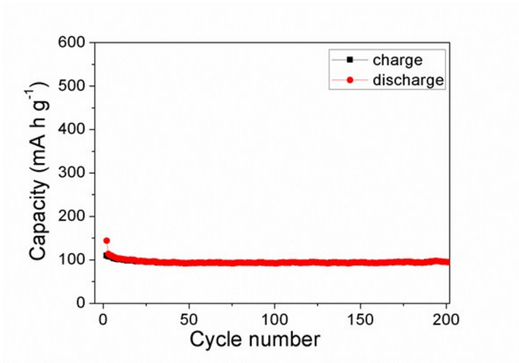

Figure S5. Electrochemical cycling property of pure rGO nanosheets electrode in Li-half cells within a voltage region of 3~0.05 V (vs. Li^{+}/Li) at a current density of 1 A g^{-1}.

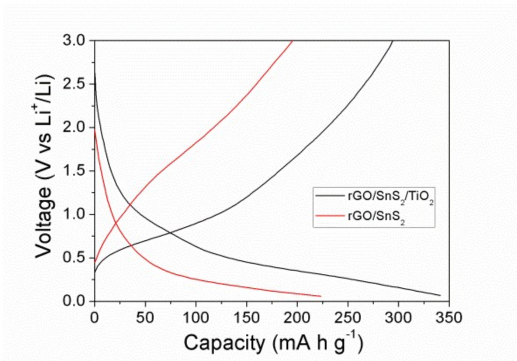

Figure S6. The 200th galvanostatic charge/discharge profiles of the rGO/SnS_2/TiO_2 and rGO/SnS_2 electrodes at 0.5 A g^{-1}.

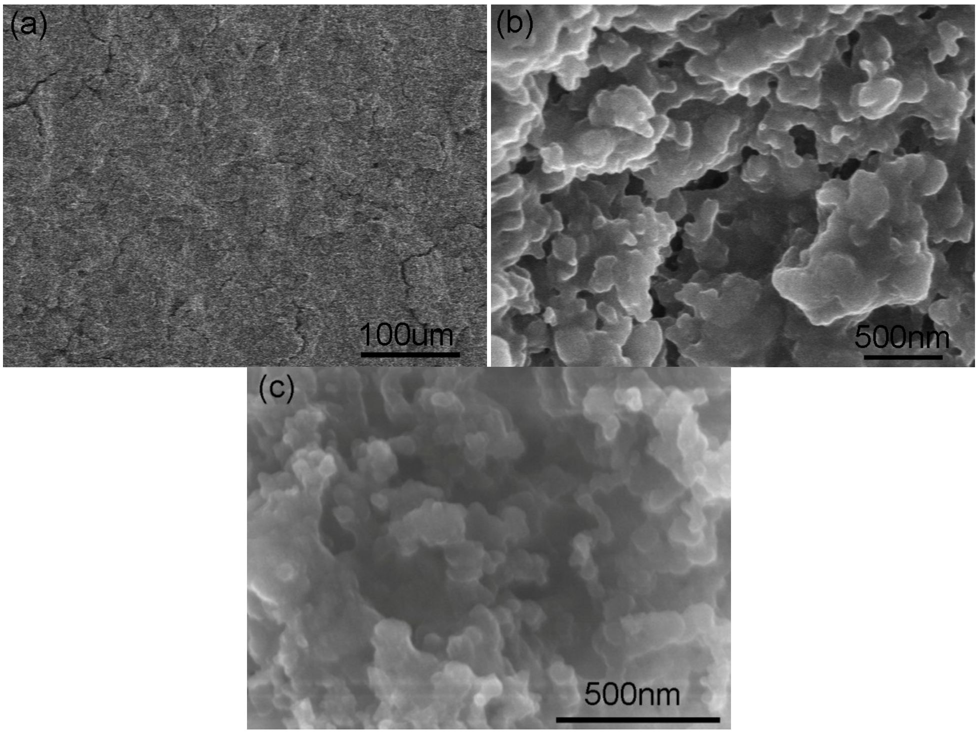

Figure S7. Ex situ SEM iamges of (a, b) $rGO/SnS_2/TiO_2$ electrode and (c) rGO/SnS_2 electrode after cycling for 200 cycles.