Electronic Supplementary Information

Superior Electrochemical Performanc of Ultrasmall SnS_2 Nanocrystals Decorated on Flexible RGO in Lithium-ion Batteries

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Experimental details:

Preparation of pristine SnS_2

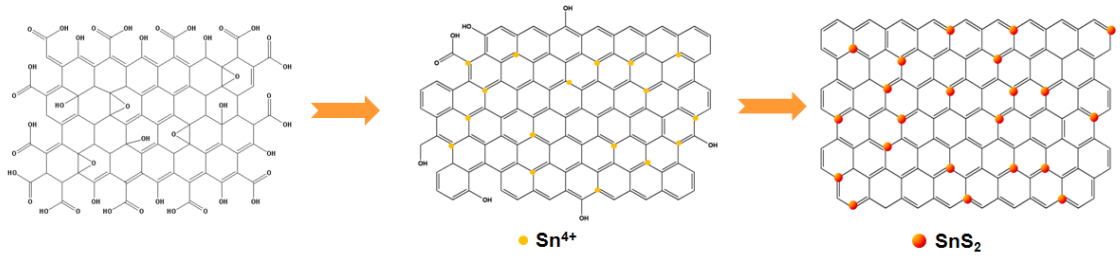
2 mmol $SnCl_4 \cdot 5H_2O$, 4 mmol thioacetamide (TAA) was added into the 50 mL deionized water and was vigorous stirred with refluence at 95 °C for 8 h. The mixture cooled to room temperature. The product was collected by centrifugation, washed several times using ethanol and dried in a vacuum oven at room temperature.

Preparation of SnS_2@C composites

2 mmol $SnCl_4 \cdot 5H_2O$, 4 mmol thioacetamide (TAA) was added into the 50 mL deionized water and was vigorous stirred with refluence for 8 h at 95 °C. Then 1 g glucose was added into the mixture solution and was vigorously stirred for 0.5 h. The mixture solution was sealed in a 60 mL Teflon-lined stainless-steel autoclave, and heated at 180 °C for 2 h to carbonize. After cooling to room temperature naturally, the product was collected by centrifugation, washed several times using ethanol, and then dried in a vacuum oven at room temperature.

Preparation of multiwalled carbon nanotubes coated by SnS_2 (MWCNT@SnS_2)

50 mg of multiwalled carbon nanotubes (MWCNTs) was suspended in 50 mL ultrapure water and sonicated for 2 h. Then 2 mmol $SnCl_4 \cdot 5H_2O$ and 4 mmol thioacetamide (TAA) was added into the solution and was vigorous stirred with refluence for 8 h at 95℃. After cooling to room temperature naturally, the product was collected by centrifugation, washed several times using ethanol, and then dried in a vacuum oven at room temperature.



Scheme 1 A synthetic of SnS_2 nanocrystals arrays on RGO nanosheets.

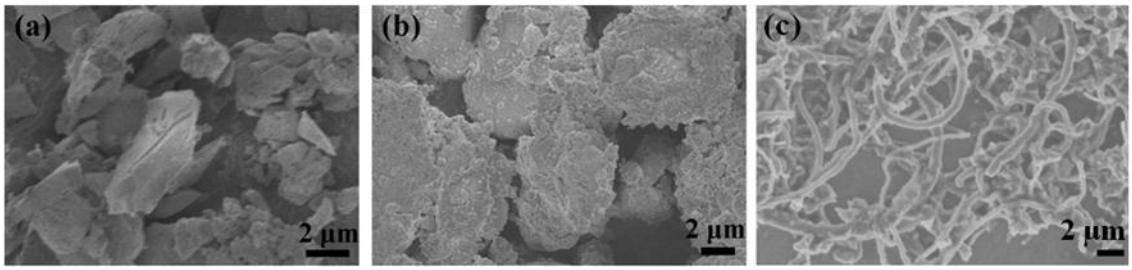


Fig. S1 SEM images of (a) pristine SnS_2, (b) SnS_2@C, (c) MWCNT@SnS_2.

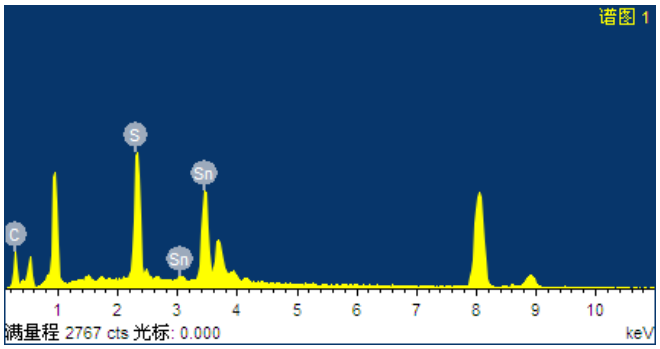


Fig. S2 Energy-dispersive X-ray spectrum of the ultrasmall SnS_2 nanocrytals@RGO.

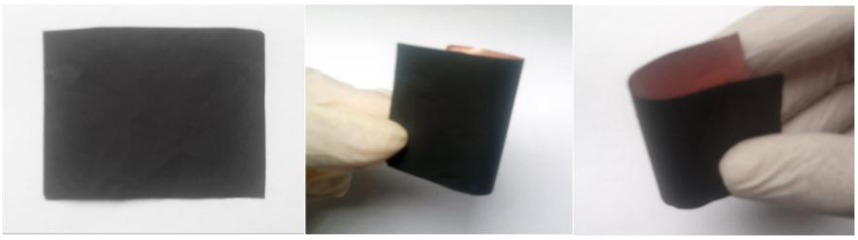


Fig. S3 Photographs of SnS_2 nanocrytals@RGO substrate electrode.

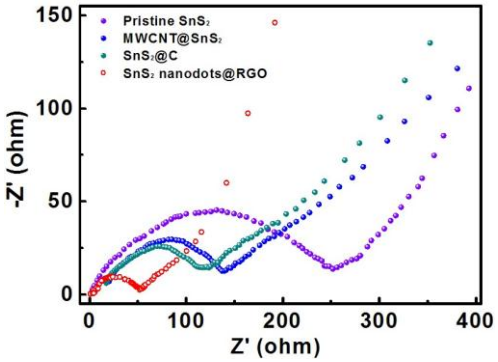


Fig. S4 Electrochemical impedance spectra of the SnS_2 nanocrystals @RGO, pristine SnS_2, SnS_2@C and MWCNT@SnS_2 electrodes.