Electronic Supplementary Information

# Fast synthesis of SnO<sub>2</sub>/graphene composites by reducing graphene

## oxide with stannous ions

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## I Experimental Section

Graphite powders were purchased from Alfa Aesar China (Tianjin) Co. Ltd., with an average particle diameter of 47  $\mu$ m. All other chemicals were of analytical grade and used as received without any purification process. The water was Millipore Milli-Q grade with a resistivity larger than 18 M $\Omega$  cm<sup>-1</sup>.

Graphene oxide (GO) was prepared from graphite powders according to a modified Hummers' method.<sup>1,2</sup> Exfoliation was carried out by sonicating GO dispersion (2 mg/mL) under ambient condition for 2 h. we prepared a mixture of GO, tin dichloride and urea with the concentration of 0.4 mg/mL, 0.025 and 0.05 M. respectively. Next, the mixture was refluxed under ambient for 5 min with a microwave heater. Finally, after washed with deionized water and ethanol for 5 times and dried in oven at 363 K for 12 h, composites containing SnO<sub>2</sub> and graphene sheets (Sn-GSs I) were collected. To obtain pure graphene sheets (GSs), Sn-GSs I were processed by HCl (0.1 M) to remove SnO<sub>2</sub>. After washed repeatedly with deionized water and isolated by centrifugation, graphene sheets (GSs) were dried at 353 K for 12 h. As a comparison, in a control experiment, the mixture without of tin dichloride was refluxed for 5 min with a microwave heater. And the final product was marked as GOX. To investigate the electrochemical properties of the composites as anode materials for lithium ion batteries, Sn-GSs I were treated in Ar at 773 K for 2 h and the products were marked as Sn-GSs II.

The composites were characterized by a powder X-ray diffraction (XRD) on SIEMENS D5000 X-ray diffractometer with Cu K<sub> $\alpha$ </sub> irradiation ( $\lambda$ =0.15406 nm). The

microstructure and morphology of composites were analyzed by a Hitachi S4800 scanning electron microscope (SEM), and a JEOL-2010 transmission electron microscope (TEM) at a 200 kV accelerating voltage. Fourier transform infrared (FT-IR) spectra were obtained on a WQF-410 Fourier transform infrared spectrophotometer (Beijing Secondary Optical Instruments, China). Thermogravimetric analysis (TGA) data were achieved on a Netzsch STA449C. Raman spectra were obtained using a confocal microprobe Raman system (LabRam-010, 632 nm as excitation source). UV-vis absorption spectra were recorded using a TU-1900 UV-vis double-beam spectrophotometer.

Electrochemical properties of products were measured using CR2016-type coin cells.<sup>3</sup> In a process of fabricating the lithium ion batteries, electrodes were prepared by compressing a mixture of active materials (Sn-GSs II) (80 wt %), carbon black (10 wt %) and polyvinylidene fluoride (PVDF, 10 wt %) on pure copper foils. The mass of active materials on each anode is ca. 0.8 mg. A Celgard 2400 microporous polypropylene membrane was used as a separator. The electrolyte consists of a solution of 1 M LiPF<sub>6</sub> in ethylene carbonate/dimethyl carbonate/diethyl carbonate (1:1:1, in wt %). Pure lithium foils were used as counter electrodes. These cells were assembled in an argon-filled glovebox with water and oxygen contents less than 1 ppm. The discharge and charge measurements were carried on an Arbin BT2000 system with the cut off potentials being 0.005 V for discharge and 2 V for charge.

## II TG of Sn-GSs II



Figure S1. TG and DSC curves of Sn-GSs II in air with a heating rate of 10 K/min.

## III FESEM images of Sn-GSs II on copper foils



Figure S2. FESEM images of Sn-GSs II on copper foils before cycles (a, b), after 50 cycles (c, d) and after 100 cycles (e, f).

#### References

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