Controllable Synthesis of Monodisperse Ultrathin SnO_2 Nanorods on Nitrogen-doped Graphene and Its Ultrahigh Lithium Storage Properties

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Additional Images

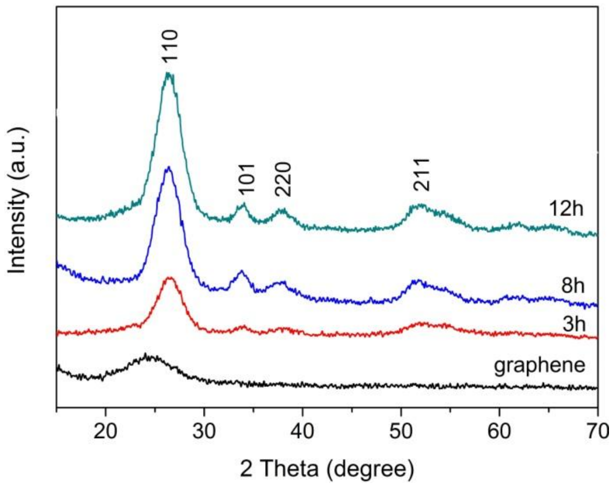

Figure S1. XRD curves of the as synthesized GS and SnO_2/GS-N composites obtained at different times. The composites have a better crystallinity when prolong the hydrothermal reaction times as it shown in the XRD curves, where the sample obtained with long hydrothermal reaction treatment have a relative stronger reflection peaks.

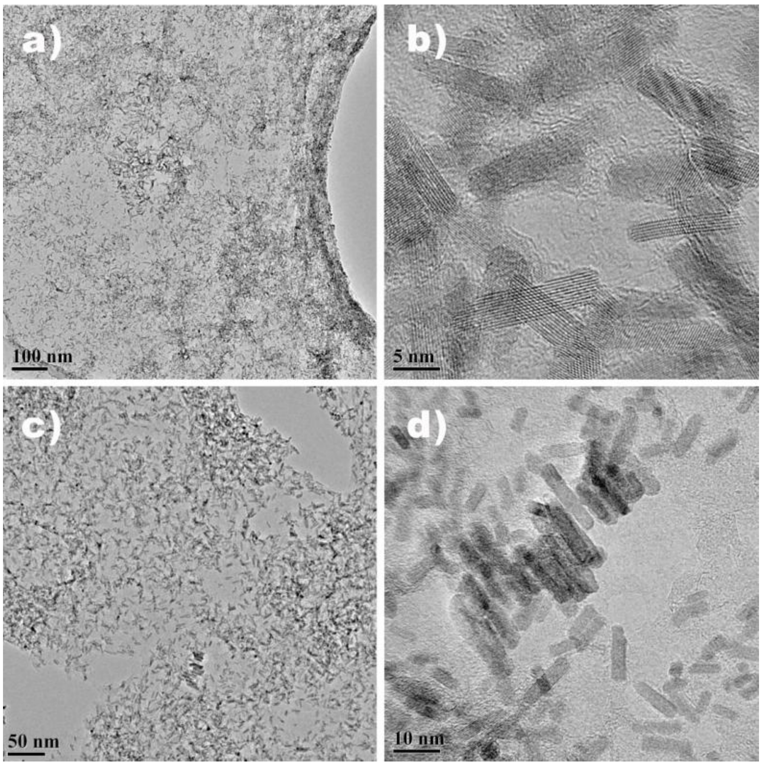

Figure S2 TEM and HRTEM images of the SnO_2/GS-N composites obtained at (a-b) 3 and (c-d) 8 h. The reaction time have greatly influence on the morphology of the composites. As shown in Figure S2, we can see many shorter and smaller nanorods are apperared on the surface of graphene. And also, a better crystallinity nanocrystals were obtained with long reaction time Figure S1.

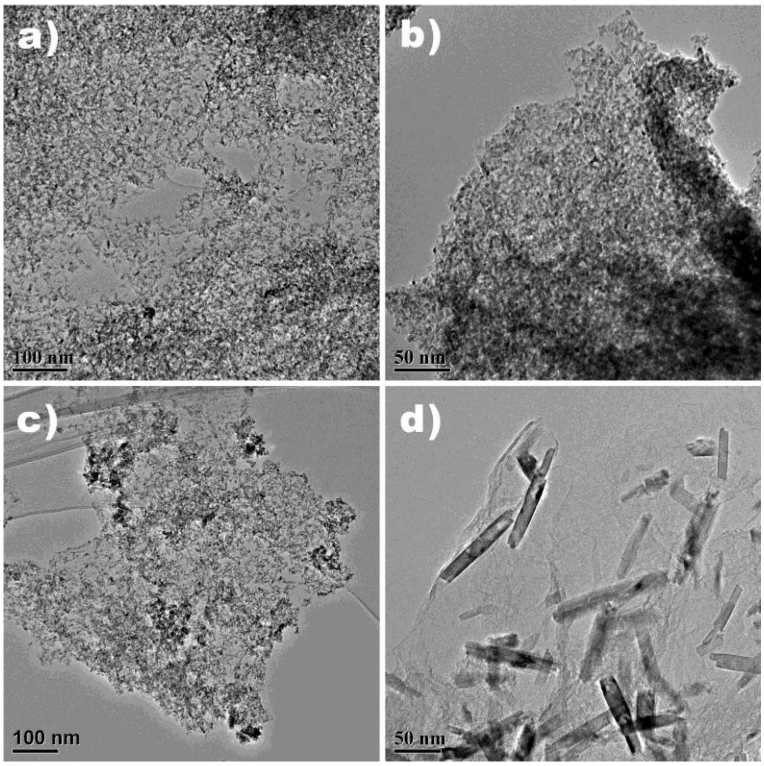

Figure S3 TEM images of the SnO_2/GS-N composites obtained at various conditions, (a) 75 and (b) 100 mg of stannic chloride. (c) 150 ^oC for 24 h. (d) urea free sample. The contents of stannic chloride and reaction temperature have great influence on the morphology of the composites. From the TEM images, the ultrathin SnO_2 nanorods are deposited on the surface of GS. However, serious aggregations are occurred as it shown in the images (a-b and c). We also investigated the role of urea on the morphology of SnO_2. If no urea is added into the solutions, composites with individual SnO_2 nanorods of 10-20 nm in diameter and 100-200 nm in length are obtained as shown in Figure S3d.

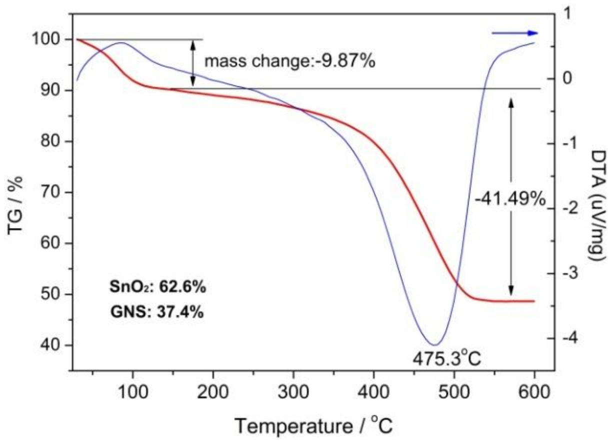

Figure S4. TG-DTA curves of the ultrathin SnO_2/GS-N composites. There is ~9.87% weight loss attributed to dehydration of SnO_2/GS composites. The contents of GS and SnO_2 are caculated by geting rid of the weight loss of adsorption water.

$$C_{SnO_2} = 1 - \frac{C_{GS}}{1 - C_{H_2O}} = 1 - \frac{0.4149}{1 - 0.0987} = 62.6\% \quad (1)$$

$$C_{GS} = 1 - \frac{C_{SnO_2}}{1 - C_{H_2O}} = 1 - 0.626 = 37.4\% \quad (2)$$

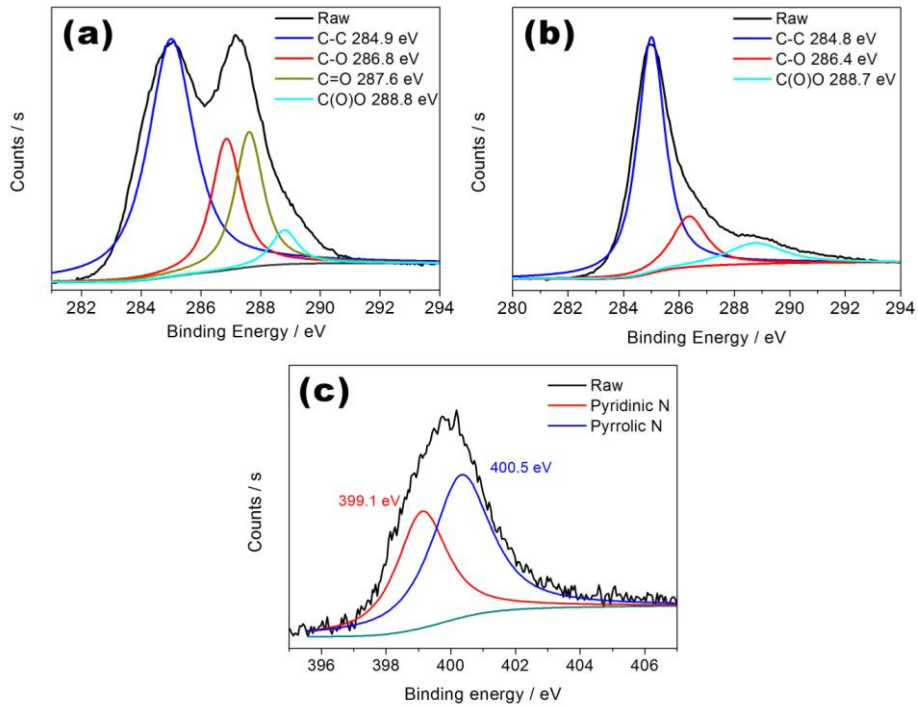

Figure S5 (a) The deconvoluted C1s of GO, C1s of GS (d) and N1s of GS-N (c).