Supporting Information for

**Controlled Growth of SnO$_2$@Fe$_2$O$_3$ Double-sided Nanocombs as Anodes for Lithium-Ion Batteries**

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Experimental

Synthesis: The SnO$_2$@Fe$_2$O$_3$ double-sided nanocombs were prepared by a simple two-step process, which can be easily scaled up. The Fe$_2$O$_3$ nanoflakes were firstly synthesized by heating the polished (by sand paper) and cleaned (with distilled water) Fe foil (Aldrich, 0.1 mm thick, 99.9+ %) on a hotplate at 400 ºC for 24 h in air. Then, a piece of as-obtained Fe foil covered by Fe$_2$O$_3$ nanoflakes was placed in a 50 mL sealed Teflon autoclave filling with 30 mL aqueous solution containing 0.174 g of SnCl$_4$.2H$_2$O and 0.534 g of NaOH. After growing at 220 ºC for 3 h, the substrate was removed from the solution, rinsed with distilled water, and dried with N$_2$ blow.

Material Characterization: Samples were characterized by powder X-ray diffraction (XRD) (Bruker D-8 Avance), scanning electron microscopy (SEM) (JSM-6700F, 10.0 kV), transmission electron microscopy (TEM) (JEM-2010, 200 kV).

Electrochemical Characterization: Electrochemical measurements were performed using two-electrode CR2016 coin-type cells with lithium foil serving as both counter and reference electrodes at room temperature. The SnO$_2$@Fe$_2$O$_3$ nanocombs on Fe foil were directly used as working electrode. Besides, the Fe$_2$O$_3$ nanoflakes on Fe foil were also tested for comparison. The electrolyte used was 1.0 M LiPF$_6$ in a mixture of ethylene carbonate and diethyl carbonate (1:1 by volume). Cell assembly was carried out in an argon-filled glovebox with both moisture and oxygen contents below 0.1 ppm. Galvanostatic charge/discharge tests were performed using a NEWARE battery tester at a voltage window of 0.005–3 V. Cyclic voltammetry (CV, 0.005–3 V, 0.5 mV s$^{-1}$) and Impedence measurement (0.1-30000 Hz) were performed on the as-made cells using an electrochemical workstation (CHI 760D).
Supplementary Figures

Fig. S1. (a) XRD pattern and (b) Raman spectrum of the as-obtained Fe$_2$O$_3$ nanoflakes.
Fig. S2. TEM images of SnO$_2$@Fe$_2$O$_3$ nanocombs after being sonicated for 0.5 h, suggesting the strong adherent forces between the SnO$_2$ branches and Fe$_2$O$_3$ cores.

Fig. S3. SEM image of the product gained after 2 h of hydrothermal growth of SnO$_2$ branches, showing the initial nuclei of SnO$_2$. 

Electronic Supplementary Material (ESI) for Nanoscale
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**Fig. S4.** Optical image of our samples, showing that the working electrodes, namely Fe$_2$O$_3$ and SnO$_2$@Fe$_2$O$_3$, can be simply obtained by cutting the as-gained products into platelets with certain sizes.