Electronic supplementary information for

**Self-stacked Co₃O₄ nanosheets for high-performance lithium ion batteries**

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Experimental

*Synthesis of self-stacked Co$_3$O$_4$ nanosheets*: 1 g of Co(CH$_3$COO)$_2$ 4H$_2$O, and 0.05 g of PVP (Mw = 30000 g/mol) were loaded into a 100 mL poly(tetrafluoroethylene) (PTFE)-lined stainless steel autoclave, which was then filled with 80 mL mixture solution of ethylene glycol and water. The autoclave was sealed and maintained at 180-200 °C for 12-24 h, and then cooled down to room temperature. The final products were centrifuged, rinsed with distilled water and ethanol several times to remove any impurities. The as-prepared precursors were finally calcined at 350 °C in N$_2$ for 3 h.

*Synthesis of Co$_3$O$_4$ hollow spheres*: 1 g of Co(CH$_3$COO)$_2$ 4H$_2$O and 0.05 g of PVP (Mw = 30000 g/mol) were loaded into a 100 mL poly(tetrafluoroethylene) (PTFE)-lined stainless steel autoclave, which was then filled with 80 mL ethylene glycol. The autoclave was sealed and maintained at 180-200 °C for 12-24 h, and then cooled down to room temperature. The final products were centrifuged, rinsed with distilled water and ethanol several times to remove any impurities. The as-prepared precursors were finally calcined at 350 °C in N$_2$ for 3 h.

*Synthesis of Co$_3$O$_4$ nanoplates*: 1 g of Co(CH$_3$COO)$_2$ 4H$_2$O were loaded into a 100 mL poly(tetrafluoroethylene) (PTFE)-lined stainless steel autoclave, which was then filled with 80 mL ethylene glycol. The autoclave was sealed and maintained at 180-200 °C for 12-24 h, and then cooled down to room temperature. The final products were centrifuged, rinsed with distilled water and ethanol several times to remove any impurities. The as-prepared precursors were finally calcined at 350 °C in N$_2$ for 3 h.

*Synthesis of Co$_3$O$_4$ nanoflowers*: 1 g of Co(CH$_3$COO)$_2$ 4H$_2$O were loaded into a 100 mL poly(tetrafluoroethylene) (PTFE)-lined stainless steel autoclave, which was then
filled with 80 mL mixture solution of ethylene glycol and water. The autoclave was sealed and maintained at 180-200 °C for 12-24 h, and then cooled down to room temperature. The final products were centrifuged, rinsed with distilled water and ethanol several times to remove any impurities. The as-prepared precursors were finally calcined at 350 °C in N₂ for 3 h.

**Characterization.** X-ray powder diffraction (XRD) patterns were recorded on a Philips X’Pert PRO MPD X-ray diffractometer operated at 35 kV and 45 mA with Cu Kα radiation. Transmission electron microscopy (TEM) images were taken on a JEOL JEM-2010 transmission electron microscope with an accelerating voltage of 200 kV. FE-SEM measurement was carried out with a field-emission microscope (JEOL S-F4800) operated at an acceleration voltage of 10 kV. The nitrogen adsorption-desorption spectra of the samples were determined by nitrogen adsorption-desorption isotherm measurements at 77 K (Micromeritics Automatic Surface Area Analyzer Gemini 2360, Shimadzu).

**Electrochemical Characterization:** Electrochemical experiments were performed using Swagelok-type cells and 2032-type coin cells. The working electrodes prepared by mixing the Co₃O₄ samples, acetylene black, and poly (vinyl difluoride) (PVDF) at a weight ratio of 70:20:10, were pasted on pure Cu foil (99.6%, Goodfellow). Glass fiber (GF/D) from Whatman was used as a separator. Lithium foil was used as the counter electrode. The electrolyte consisted of a solution of 1 M LiPF₆ in ethylene carbonate (EC)/dimethyl carbonate (DMC)/diethyl carbonate (DEC) (1:1:1, in wt %) obtained from Novolyte Technologies (Suzhou) Co. Ltd. A galvanostatic cycling test of the assembled cells was carried out on an LAND CT2001A system in the voltage range of 0.01-3.0 V (vs. Li⁺/Li) at different current density.
Fig. S1 XRD pattern of the obtained stacked Co$_3$O$_4$ nanosheets calcined at 350°.
**Fig. S2** A low-magnification SEM image of the self-stacked $\text{Co}_3\text{O}_4$ nanosheets.
Fig. S3 N$_2$ adsorption–desorption isotherm of the self-stacked Co$_3$O$_4$ nanosheets.
Fig. S4 The dark-field TEM image of Co$_3$O$_4$ nanosheets and EDX mapping images of O, Co, and C elements.
Fig. S5 TG curve of precursors calcined in air.
Fig. S6 HRTEM image of a Co$_3$O$_4$ nanoplate.
Fig. S7 Low- and high-magnification SEM images of the self-stacked Co₃O₄ nanosheets exhibiting highly curved nanoplates.