Supplementary information

Self-assembly of CoFe$_2$O$_4$/graphene sandwich by a controllable and general route: towards high-performance anode for Li-ion batteries

Shuangyu Liu, Jian Xie,* Chengcheng Fang, Gaoshao Cao, Tiejun Zhu, and Xinbing Zhao

State key Laboratory of Silicon Materials and Department of Materials Science and Engineering, Zhejiang University, Hangzhou 310027, P. R. China.

Synthesis and morphology characterizations of CoFe$_2$O$_4$/graphene (CoFe$_2$O$_4$/G) with a larger size of CoFe$_2$O$_4$: CoFe$_2$O$_4$/G with a larger size of CoFe$_2$O$_4$ (50–200 nm) was synthesized with a similar route to CFO/GS except that the step of heating the dispersion at 80 °C for 1 h was omitted.

Fig. S1 SEM image of bare CFO.
Synthesis and morphology characterizations of MFe2O4/graphene (MFe2O4/G, M = Mn, Ni) sandwiches: MnFe2O4/G sandwich was synthesized with almost the same route to CFO/GS by using MnCl2·4H2O and FeCl3·6H2O as the precursors while keeping other conditions unchanged. NiFe2O4/G sandwich was synthesized using Ni(NO3)2·6H2O and FeCl3·6H2O as the precursors with somewhat modified conditions: (1) the solvent for synthesizing NiFe2O4/G was deionized water instead of EG; (2) the step of adding EG solution of sodium acetate and the step of heating the dispersion at 80 °C for 1 h were omitted; (3) the pH of the dispersion was adjusted to ~10 using 25 wt% ammonia water before the hydrothermal reactions. Other conditions were kept the same to those for CFO/GS.
Fig. S4 TG plot of CFO/GS nanocomposite.

Fig. S5 Voltage profiles of bare CFO charged and discharged at 50 mA g\(^{-1}\).

Fig. S6 Cycling stability of CFO/GS and CFO charged and discharged at 50 mA g\(^{-1}\).
Fig. S7 Coulomb efficiency of the CFO/GS nanocomposite charged at 800 mA g\(^{-1}\) and discharged at 50 mA g\(^{-1}\) for 300 cycles.

Fig. S8 Electrochemical performance of CoFe\(_2\)O\(_4\)/G with a larger size of CoFe\(_2\)O\(_4\): (a) Voltage profiles charged and discharged at 50 mA g\(^{-1}\) for the first three cycles, and (b) cycling stability at a charge density of 800 mA g\(^{-1}\).
**Fig. S9** Nyquist plots of CFO/GS and CFO before cycling. The insets show the equivalent circuit and the enlarged view of the high-middle frequency area.

**Fig. S10** (a) TEM image and (b) SAED patterns of CFO/GS after cycling.