Structural investigation of Fe$_3$O$_4$/reduced graphene oxide with enhanced electrochemical performances towards lithium storage

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**Fig. S1** (a) XPS survey spectrum, (b) Fe 2p core level XPS spectrum and C 1s core level XPS spectrum of Fe$_3$O$_4$/RGO composites.

**Fig. S2** Charge/discharge capacity of the Fe$_3$O$_4$/RGO anode at various rates for 40 cycles.
Fig. S3 (a) Typical TEM image and (b) HRTEM image of Fe$_3$O$_4$/RGO-2 composites with a mass loading of 0.81 mg cm$^{-2}$. RGO sheets are covered with a high density of Fe$_3$O$_4$ NPs, and some NPs have aggregated together. However, some isolated particles with active surfaces attached by carbon layers still can be observed in the HRTEM image (marked by white arrows), indicating that RGO still play the important role of protecting the highly active surfaces of the NPs.

Fig. S4 Morphological features of the Fe$_3$O$_4$/RGO composites. (a) TEM image. (b) HRTEM image. The inset is a possible schematic illustrating the uniformly-dispersion of Fe$_3$O$_4$ NPs anchored on RGO.