Electronic Supplementary Information

Constructing aligned $\gamma$-Fe$_2$O$_3$ nanorods with internal void space anchored on reduced graphene oxide nanosheets for excellent lithium storage

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**Fig. S1** (a) FESEM image, (b-d) TEM, SAED pattern and HRTEM images of the as-prepared precursor.
Fig. S2 XRD pattern of the as-prepared precursor.
Fig. S3 EDX pattern of the $\gamma$-$\text{Fe}_2\text{O}_3$ IVS-NRs/rGO nanocomposites.
Fig. S4 Raman spectra for the $\gamma$-Fe$_2$O$_3$ IVS-NRs/rGO nanocomposites and commercial $\gamma$-Fe$_2$O$_3$ nanopowders.
Fig. S5 TEM characterizations of commercial $\gamma$-$\text{Fe}_2\text{O}_3$ nanoparticles. The particles possess spherical morphology with an average diameter of ~20 nm. EDX result shows that the particles are composed of Fe and O with an atomic ratio of ~2:3. From the HRTEM image, the lattice spacing of $d$ ~3.70 Å is determined, which corresponds to the (210) plane of cubic $\gamma$-$\text{Fe}_2\text{O}_3$. The diffraction rings of SAED pattern can also be assigned to the planes of $\gamma$-$\text{Fe}_2\text{O}_3$. 
Fig. S6 TG curve of the $\gamma$-Fe$_2$O$_3$ IVS-NRs/rGO nanocomposites measured by using TG 2050 thermogravimetric analyzer under an air atmosphere at the temperature range of 25-800 °C with a heating rate of 10 °C min$^{-1}$. The weight loss before 300 °C could be ascribed to surface water adsorption, while the weight loss after ~300 °C could be ascribed to the oxidation of graphene in the nanocomposites, which yielding the weight fraction of rGO in the nanocomposites of about 19.2%.
Fig. S7 Charge/discharge curves of the first cycle for the γ-Fe$_2$O$_3$ IVS-NRs/rGO nanocomposites (blue line) and commercial γ-Fe$_2$O$_3$ nanopowders (black line) electrodes between 0.05 and 3 V versus Li/Li$^+$ at a current density of 0.1 C.
**Fig. S8** (a) SEM and (b) TEM images of the $\gamma$-Fe$_2$O$_3$ IVS-NRs/rGO nanocomposites electrode after cycling performance testing (50 cycles, current rate 0.1 C, 0.01-3 V versus Li/Li$^+$. )