Supporting Information

Figure S1. TEM images of Fe(OH)$_3$/GO obtained by mixing Fe(OH)$_3$ sol and GO solution with (a) or without (b) adding hydrazine. (c) SEM image of the above Fe(OH)$_3$/GO with adding hydrazine. (d) XRD patterns of the Fe(OH)$_3$/GO and Fe(OH)$_3$/GO after adding hydrazine.
Figure S2. TEM images of Fe$_3$O$_4$/rGO-180 (a) and Fe$_2$O$_3$/rGO (b), and XRD pattern of Fe$_2$O$_3$/rGO (c). Fe$_2$O$_3$/rGO was obtained from hydrothermal reaction with Fe(OH)$_3$, GO as precursors and hydrazine as reductants.
Figure S3. BET surface area of Fe$_3$O$_4$, rGO and Fe$_3$O$_4$/rGO.

Figure S4. TEM images of Fe$_3$O$_4$ nanoparticles at different magnifications. Fe$_3$O$_4$ was obtained from hydrothermal reaction using Fe(OH)$_3$ as precursors, and VC and hydrazine as reductants.
Figure S5. (a) TEM images of Fe$_3$O$_4$/rGO-180. (b and c) SEM images of Fe$_3$O$_4$/rGO at different magnifications.
Figure S6. The first cycle charge-discharge profiles of cells with Fe$_3$O$_4$, rGO, Fe$_3$O$_4$/rGO-180 or Fe$_3$O$_4$/rGO.

Figure S7. (a) Coulombic efficiencies of cells with rGO, Fe$_3$O$_4$, Fe$_3$O$_4$/rGO-180 or Fe$_3$O$_4$/rGO at a current density of 0.5 A g$^{-1}$. (b) Long-term charge-discharge Coulombic efficiencies of cells with Fe$_3$O$_4$ or Fe$_3$O$_4$/rGO.
Figure S8. The equivalent circuit used for fitting cell resistances.