Supporting Information for

The Coordination-driven of Self-assembly: Construction of Fe$_3$O$_4$/Graphene Hybrid 3D Framework and Its Long Cycle Lifetime for Lithium-ion Batteries

Zhimin Ren, Siqi Yu, Xinxin Fu, Lin Shi, Chunxiao Sun, Chenyao Fan, Qi Liu, Guodong Qian and Zhiyu Wang*

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

Corresponding Author Zhiyu Wang: Tel/Fax: +86-571-87952267; E-mail: wangzhiyu@zju.edu.cn.

Fig. S1. Digital photographs of Fe$_3$O$_4$/Graphene hybrid framework (a, c and e) and pure graphene (b and d) by hydrothermal with different volume of GO solution. a, b)
$V_{GO}=6 \text{ mL}; \ c, d) V_{GO}=4 \text{ mL}; \ e) V_{GO}=2 \text{ mL}; \ f) \text{ Photographs of the product under the same condition with (a) except the different Fe}^{3+} \text{ source, indicating the existence of synergistic effect of self-assembly between Fe}_3\text{O}_4 \text{ and graphene.}$

**Fig. S2.** Size distribution of a) bare Fe$_3$O$_4$; b) Fe$_3$O$_4$/G hybrid framework
Fig. S3. The TEM images of Fe₃O₄/G with different volume of GO: a) 4 mL; b) 6 mL; c) 8 mL; d) 10 mL.

Fig. S4. N₂ adsorption/desorption isotherms and pore size distribution of (a, b) Fe₃O₄-
G mixed and (c, d) bare Fe$_3$O$_4$.

**Fig. S5.** The full spectrum (a) and core-level O1s (b) XPS spectra of Fe$_3$O$_4$/G hybrid framework.
Fig. S6. (a) Cyclic voltammogram curves of bare Fe$_3$O$_4$ at a scan rate of 0.1 mVs$^{-1}$; (b) Charge and discharge profiles of the bare Fe$_3$O$_4$ electrode at a current density of 500 mAg$^{-1}$. 