Supporting Information

## Sandwiched Graphene Inserted with Graphene-encapsulated Yolk-shell γ-Fe$_2$O$_3$ Nanoparticles for Efficient Lithium Ion Storage

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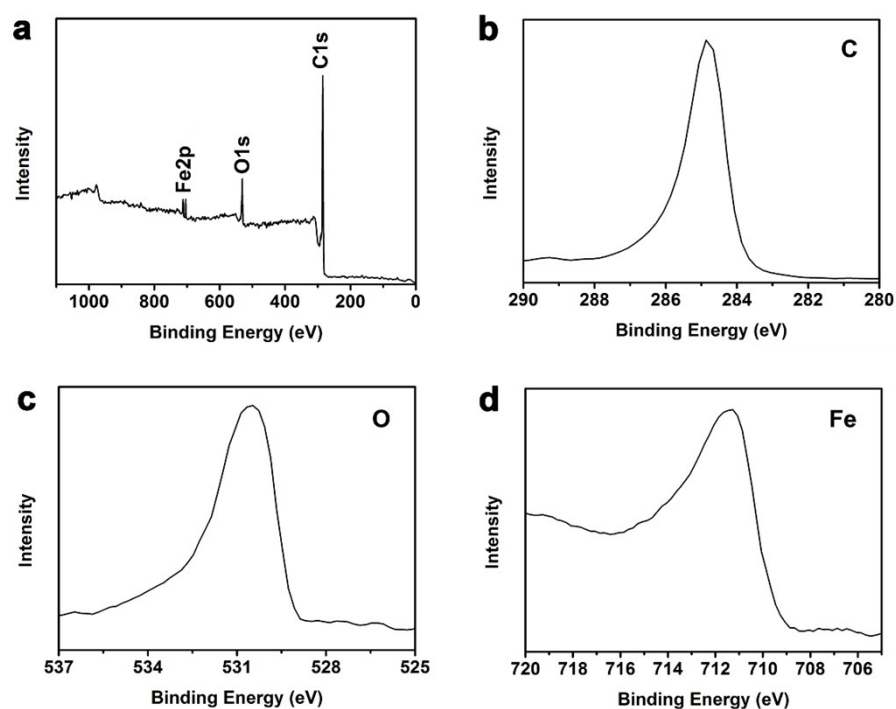
Figure S1 XPS spectra of a representative YS-γ-Fe$_2$O$_3$@G-GS composite. (a) Entire XPS spectrum, (b) carbon, (c) oxygen and (d) iron.
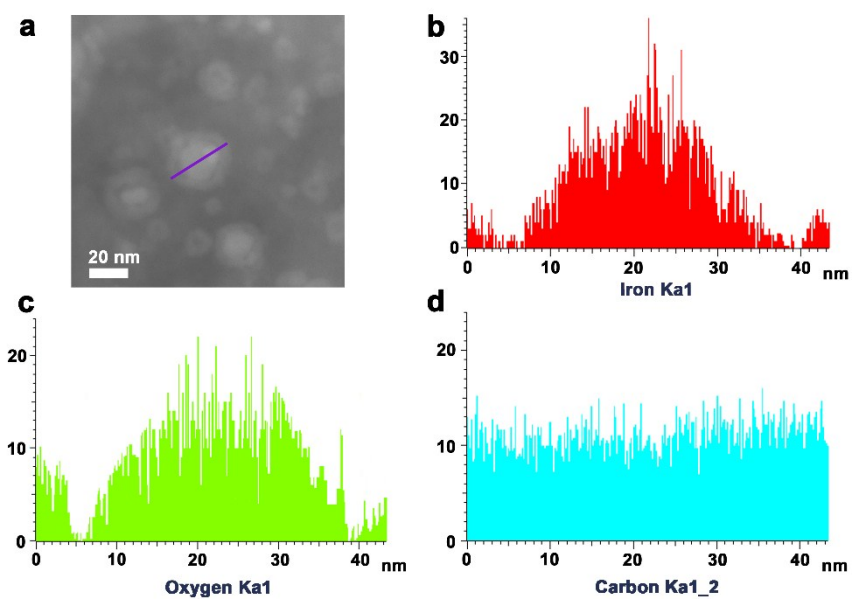
Figure S2 (a) STEM image and cross sectional composition line profiles of YS-γ-Fe$_2$O$_3$@G-GS, in which (b) the red one is Fe, (c) the green one is oxygen and (d) the blue one is carbon.
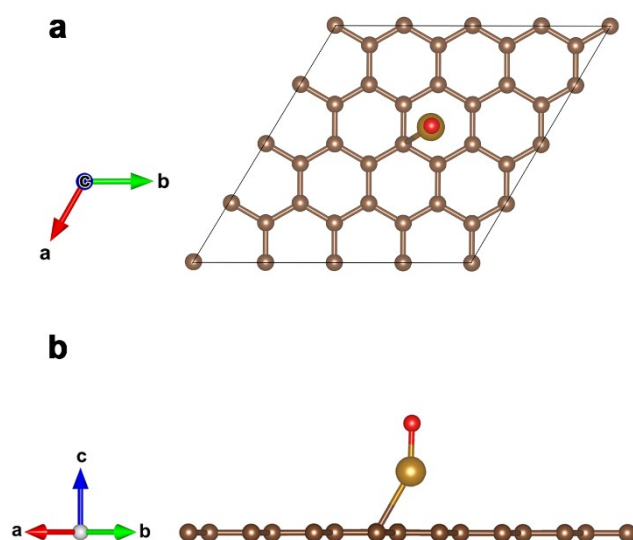
Figure S3 Schematic drawing of O atom placed on top of graphene-Fe surface in top (a) and side (b) views. (Red sphere represent the O atom, yellow sphere represent the Fe atom and brown spheres represent the C atoms). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)

Table S1 Detailed information of rate cycle performance of YS-γ-Fe$_2$O$_3$@G-GS and Fe$_2$O$_3$-GS composite electrode corresponding to **Figure 6**c

Rate cycle number	Step number	Number of cycle	Charge/discharge rate (C, 1 C=1 A/g)	Average reversible capacity of YS-γ-Fe$_2$O$_3$@G-GS (mAh/g)	Average reversible capacity of Fe$_2$O$_3$-GS (mAh/g)
1	1	20	0.1	800	506
	2	40	0.2	661	426
	3	60	0.5	599	342
	4	80	1	526	261
	5	100	2	469	210
	6	120	5	357	147
	7	140	10	284	50
2	8	160	0.1	1050	492
	9	180	0.2	935	
	10	200	0.5	852	
	11	220	1	708	
	12	240	2	578	
	13	260	5	451	
	14	280	10	335	
3	15	300	0.1	1173	
	16	320	0.2	989	
	17	340	0.5	827	
	18	360	1	737	
	19	380	2	574	
	20	400	5	443	
	21	420	10	350	
4	22	460	0.1	1187	