Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information for

Carbon coated Fe_3O_4 nanoparticles in-situ grown on 3D cross-linked carbon nanosheets as anodic materials for high capacity lithium and sodium ion batteries

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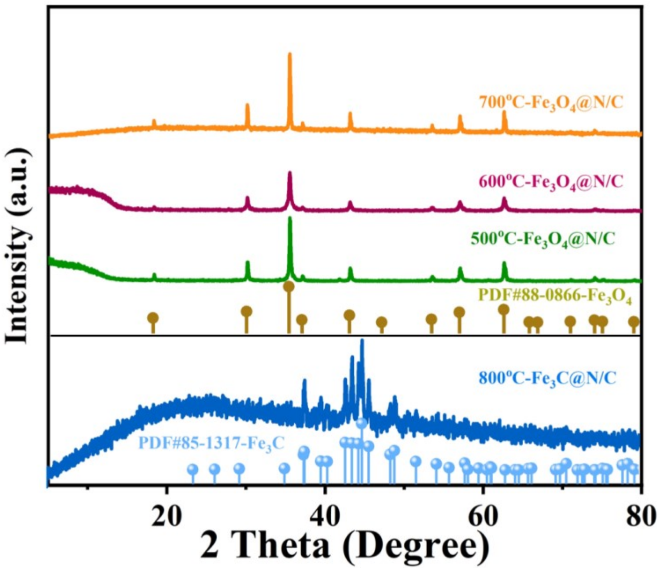

Fig. S1. XRD patterns of samples at different calcination temperatures.

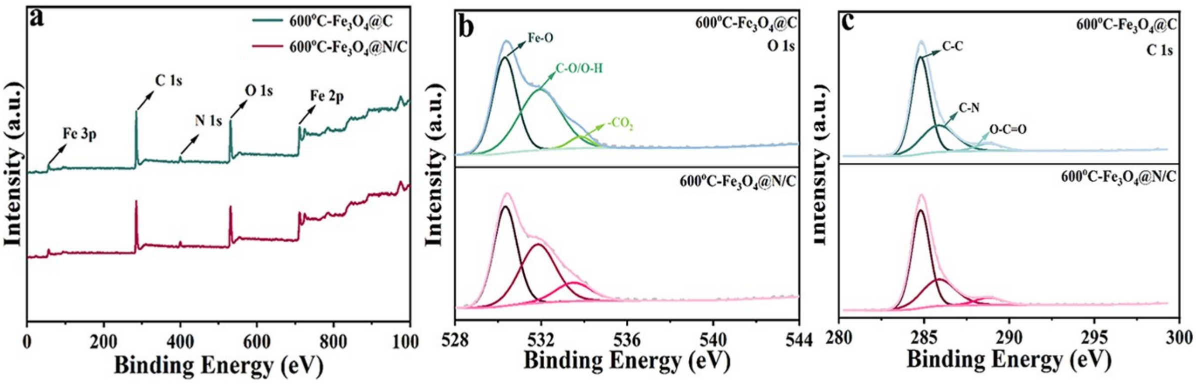

Fig. S2. (a) XPS survey and high-resolution XPS spectra of (b) C 1s and (c) O 1s of 600°C-Fe_3O_4@N/C and 600°C-Fe_3O_4@C.

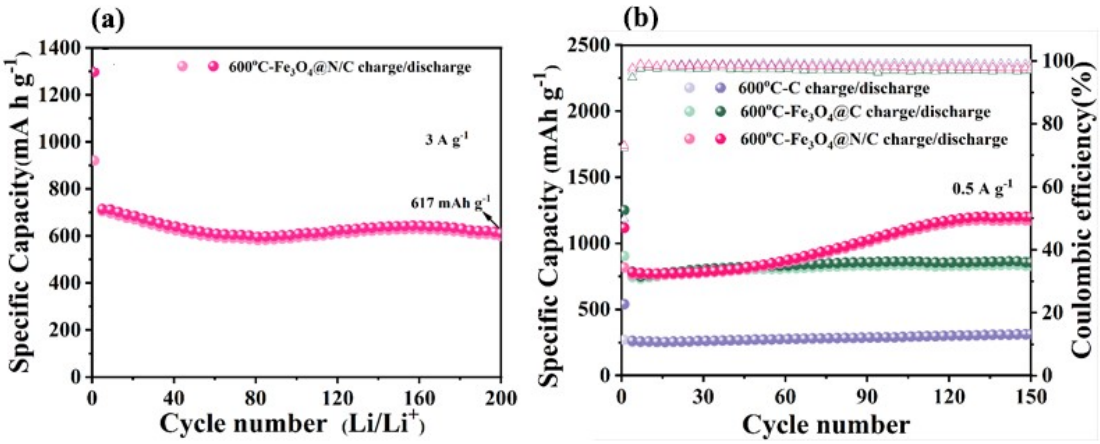

Fig. S3. (a) Cycling performance of the 600°C-Fe_3O_4@N/C at current densities of 3 A g^{-1}; (b) Cycling performance of the 600°C-C, 600°C-Fe_3O_4@C, and 600°C-Fe_3O_4@N/C at 0.5 A g^{-1}.

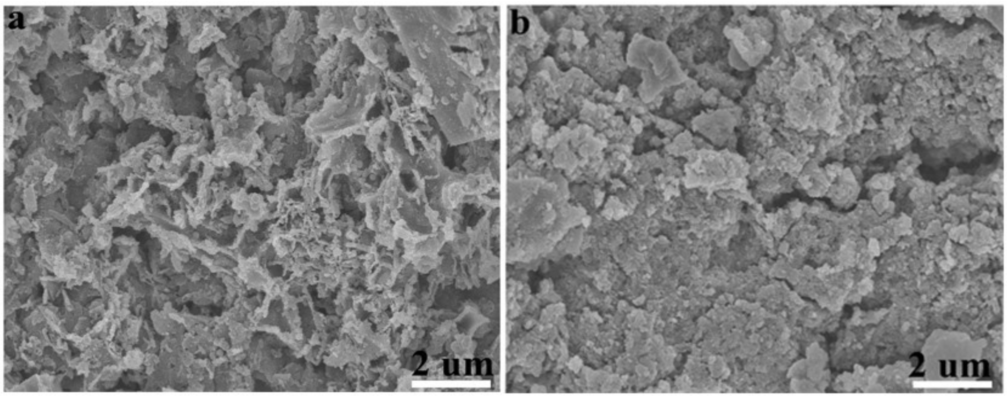

Fig. S4. SEM images of samples after cycles: (a) 600°C-Fe_3O_4@N/C; (b) 600°C-Fe_3O_4@C.

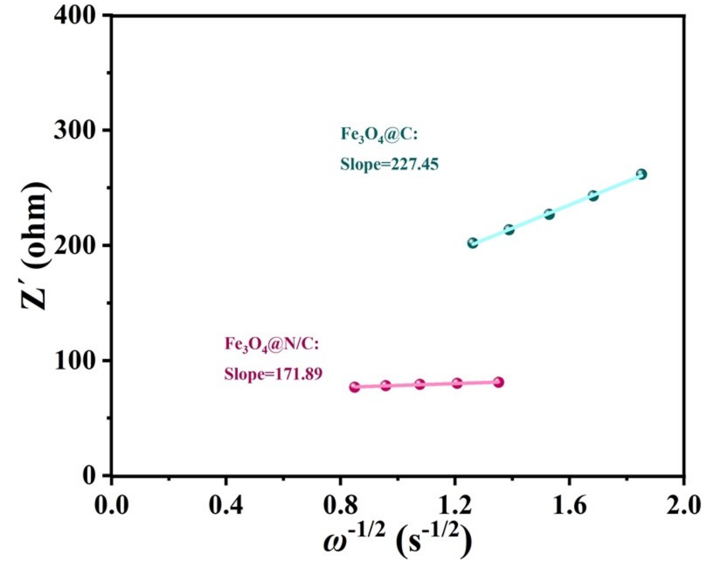

Fig. S5. Linear plots between Z′ and $\omega^{-1/2}$ in the low-frequency region.

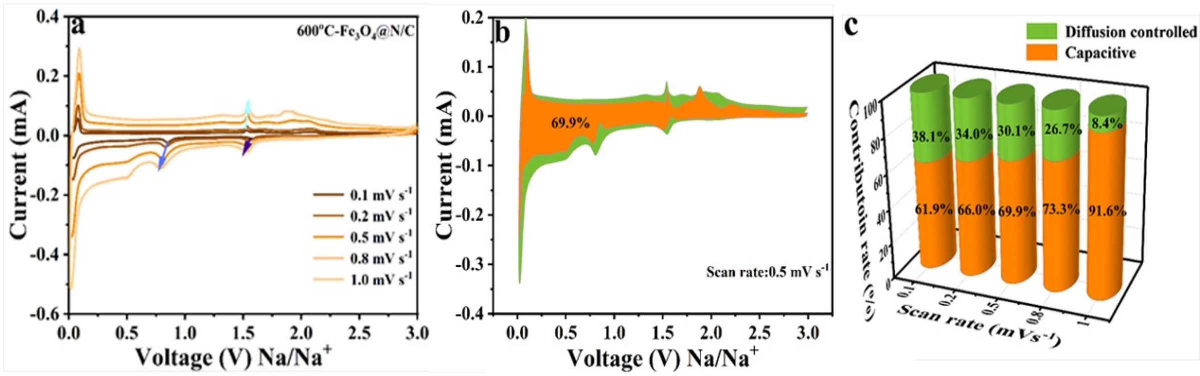

Fig. S6. (a) Cyclic voltammetry curves at different scan rates from 0.1 to 1 mV s^{-1}; (b) Separation of the capacitive (yellow region) and diffusion (green region) currents in 600°C-Fe_3O_4@N/C at a scan rate of 0.5 mV s^{-1}; (c) Contribution ratio of the capacitive and diffusion-controlled charges at different scan rates.

Table S1. The fit resistance values and ionic diffusion coefficient of samples.

Sample	R_s	R_{ct}	D (cm^2 s^{-1})
600°C-Fe_3O_4@N/C	4.782	8.625	9.39×10^{-14}
600°C-Fe_3O_4@C	2.655	92.600	3.62×10^{-14}

Table S2. Electrochemical performance of some transition metal oxides for LIBs.

Materials	Current density [A g^{-1}]	Capacity retention[mAg^{-1}]	Ref.
Fe_3O_4@CTP QDs	0.1	810	1
Fe_3O_4-RGO	0.5	636	2
Fe_3O_4@NCG	0.5	895	3
Fe_3O_4@C	0.5	849	4
H-Fe_3O_4@C/GNSs	1	870.4	5
Fe_3O_4@N-HPCNs	1	581	6
OH-Fe_3O_4@NC	1	725	7
Fe_3O_4@C	1	514	8
IOC-Fe_3O_4	1	800	9
h-Fe_3O_4	1	714.6	10
GNSs/Fe_3O_4 NPs	1	530	11
Fe_3O_4@ppy	1	796	12
GF-Fe_3O_4	1	1220	13
This work	**1**	**1200**	
H-Fe_3O_4@C/GNSs	10	285	5
Fe_3O_4@N-HPCNs	10	290	6
OH-Fe_3O_4@NC	10	361	7
This work	**10**	**426**	

Table S3. Electrochemical performance of some transition metal oxides for NIBs.

Materials	Current density [A g^{-1}]	Capacity retention [mAg^{-1}]	Ref.
RGO/Fe_3O_4	0.04	208	11
Fe_3O_4/graphene	0.1	216	14
Fe_3O_4@C@G	0.1	180	15
Fe_3O_4@CNT	0.1	377	16
Fe_3O_4@N-HG	0.1	440	17
H-CMFe_3O_4@void@N-C	0.16	522	18
R-Fe_3O_4@C	0.2	160.3	19
Graphene-Fe_3O_4	0.5	220	9
Fe_3O_4@C	1	206	4
R-Fe_3O_4@C	2	160	20
h-Fe_3O_4@CNT	3.2	118	10
Fe_3O_4@C	4	142	21
Fe_3O_4 QD@C-GN	5	234	22
This work	**5**	**237.5**	
Fe_3O_4 QD@C-GN	10	149	22
This work	**10**	**176**	

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