Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Synthesis of 3D Nitrogen-Doped Graphene /Fe_3O_4 by a Metal Ion Induced Self-Assembly Process for High-Performance Li-Ion Batteries

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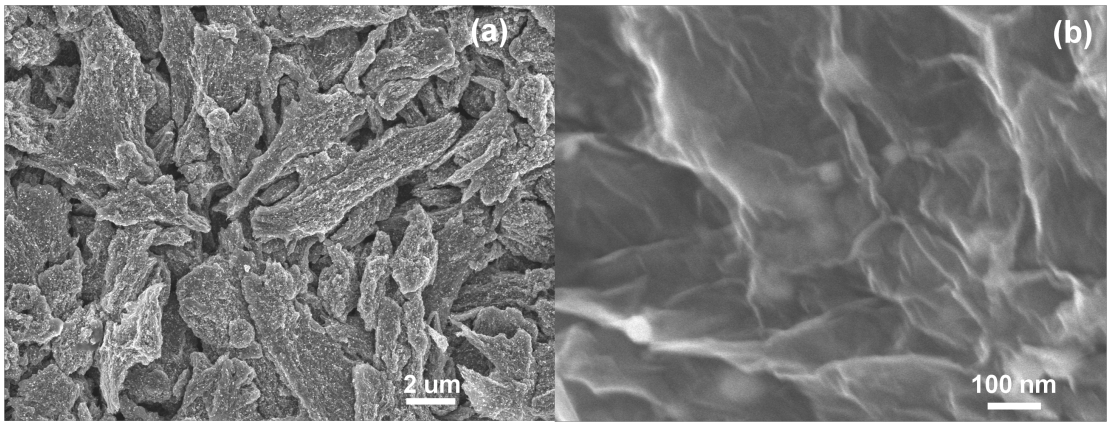

Figure S1. SEM images of (a) 3D N-G/Fe_3O_4-2; (b) 3D N-G/Fe_3O_4-3.

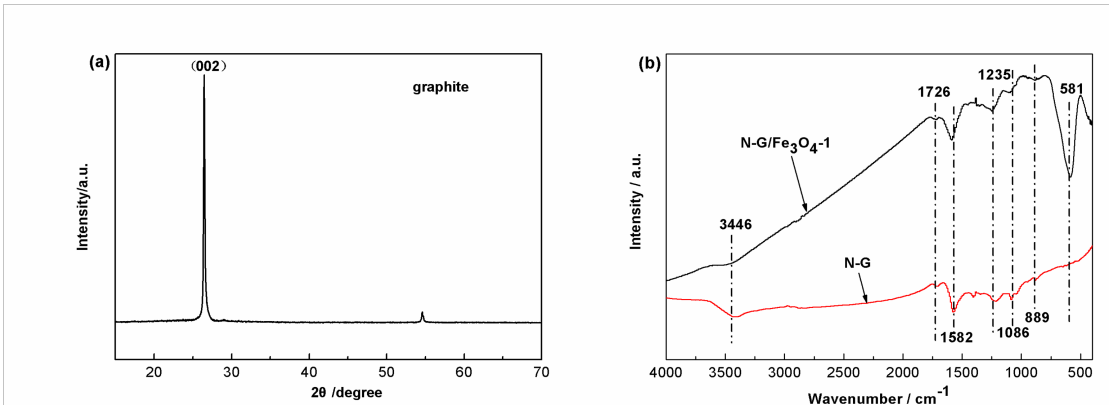

Figure S2. (a) XRD patterns of natural graphite, (b) FTIR spectra of N-G and N-G/Fe_3O_4-1.

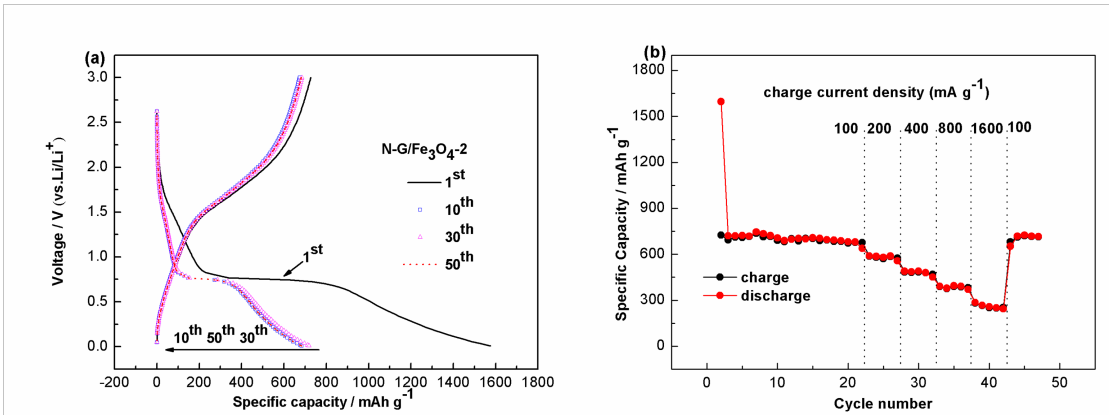

Figure S3. (a) the discharge/charge curves of N-G/Fe_3O_4-2 for 1st, 10th, 30th and 50th cycles at a current density of 100 mA g^{-1}, respectively; (c) rate performance of N-G/Fe_3O_4-2.

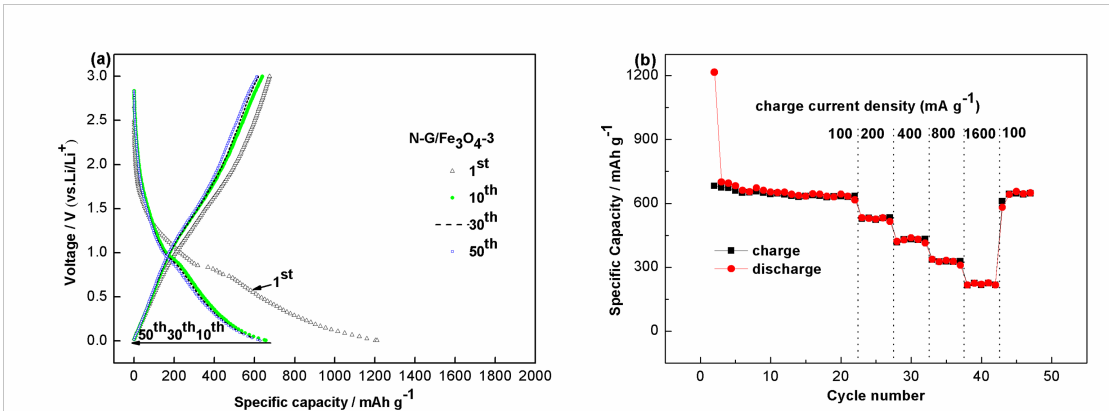

Figure S4. (a) the discharge/charge curves of N-G/Fe_3O_4-3 for 1st, 10th, 30th and 50th cycles at a current density of 100 mA g^{-1}, respectively; (c) rate performance of N-G/Fe_3O_4-3.

The mass ratio of N-G to iron oxide in the product can be controlled by changing the feedstock ratios of them. The effects of the mass ratios of N-G to iron oxide on the performance in LIBs have also been done, and as shown in Figure 4, Figure S3(a) and Figure S4(a). The initial discharge capacity of 1750 mAh $g^{-1}$and charge capacity of 1037 mAh g^{-1} in the first cycle for the N-G/Fe_3O_4-1 electrode with 30 wt% of Fe_3O_4, while they are 1576 mAh g^{-1} and 723 mAh $g^{-1}$for the N-G/Fe_3O_4-2 electrode with 41 wt% of Fe_3O_4, 1209 mAh g^{-1} and 673 mAh $g^{-1}$for the N-G/Fe_3O_4-3 electrode with 17 wt% of Fe_3O_4. The performance in LIBs of N-G/Fe_3O_4 electrodes are impacted by the synergistic effects of 3D porous nitrogen-doped nanostructures and Fe_3O_4 concent. It seems that there has no linear relationship between the mass ratio of N-G to iron oxide and the performance in LIBs.

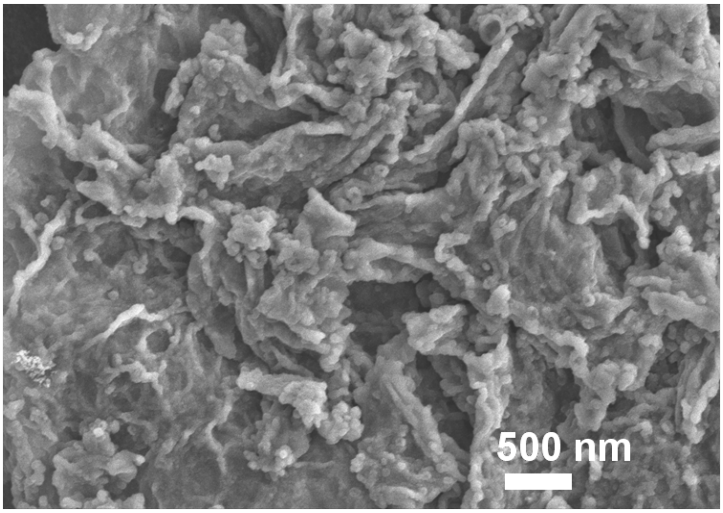

Figure S5. SEM image of N-G/Fe_3O_4-1 after 200 cycles.