Electronic Supplementary Information (ESI)

The facile preparation of carbon coated Bi_2O_3 nanoparticles/nitrogen-doped reduced graphene oxide hybrid as a high-performance anode material for lithium-ion batteries

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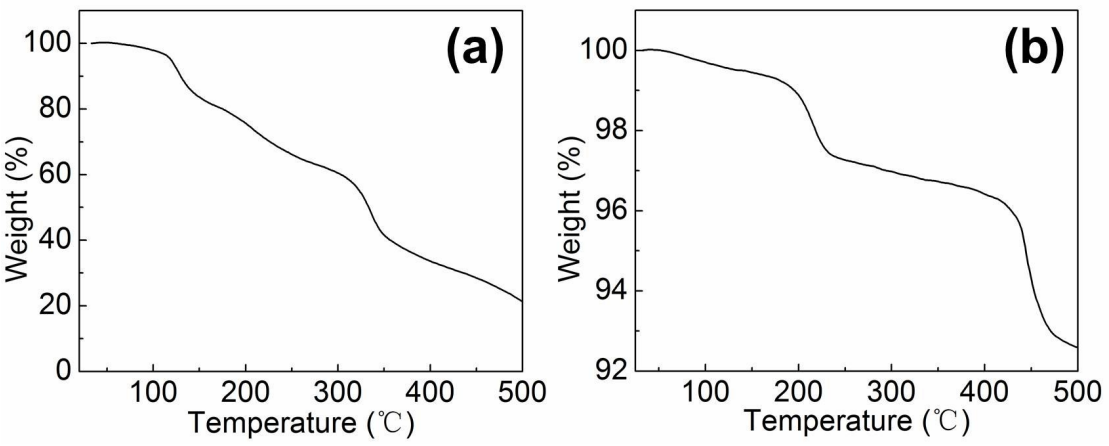

Fig. S1 TGA curves of (a) PTA and (b) GO.

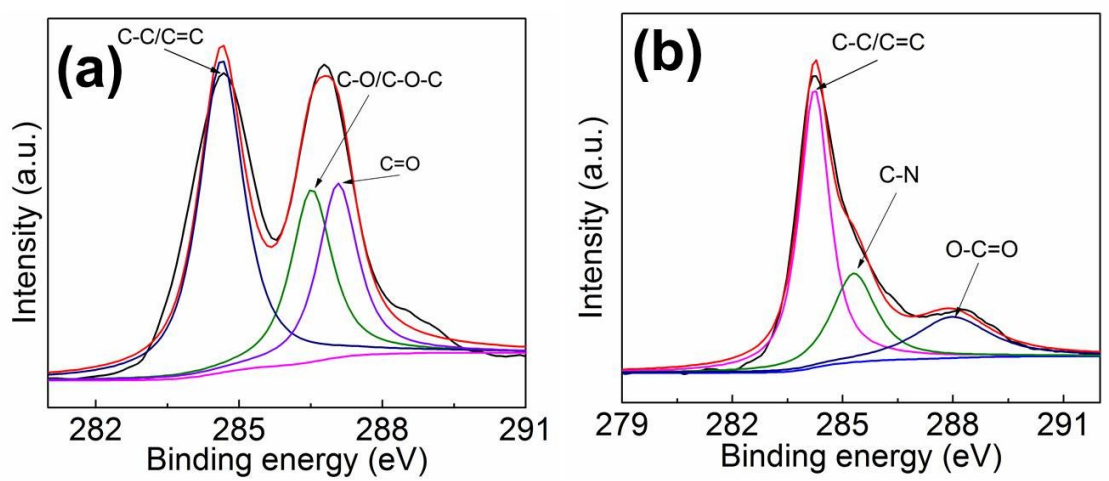

Fig. S2 High-resolution XPS spectra of C 1s of (a) GO and (b) Bi_2O_3@C@N-G.

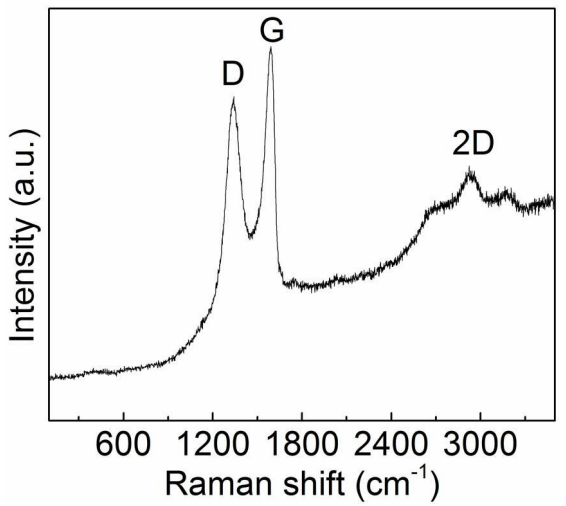

Fig. S3 Raman spectrum of Bi_2O_3@C@N-G.

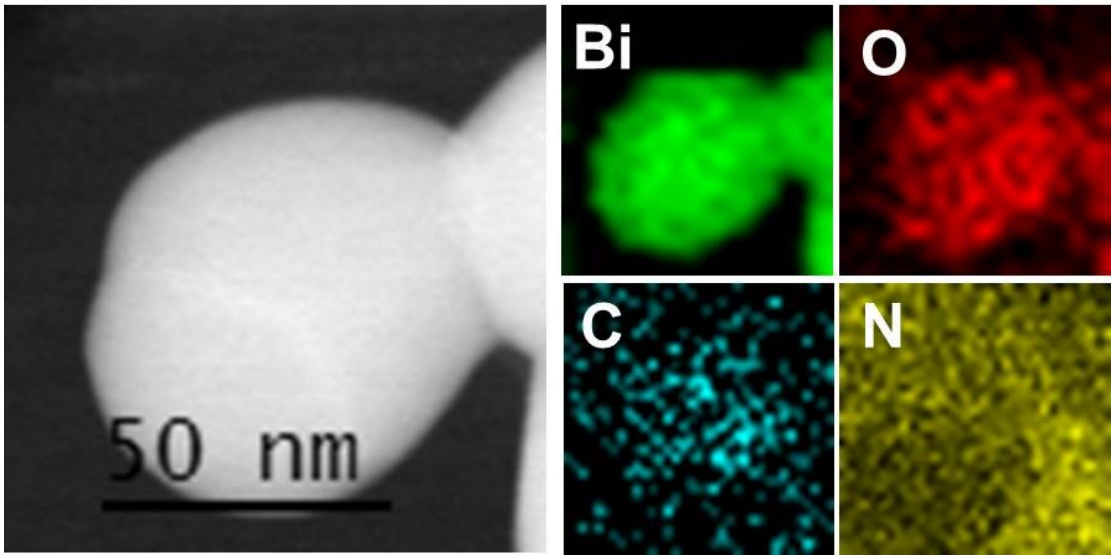

Fig. S4 HAADF-STEM image and elemental mapping results of Bi_2O_3@C@N-G.

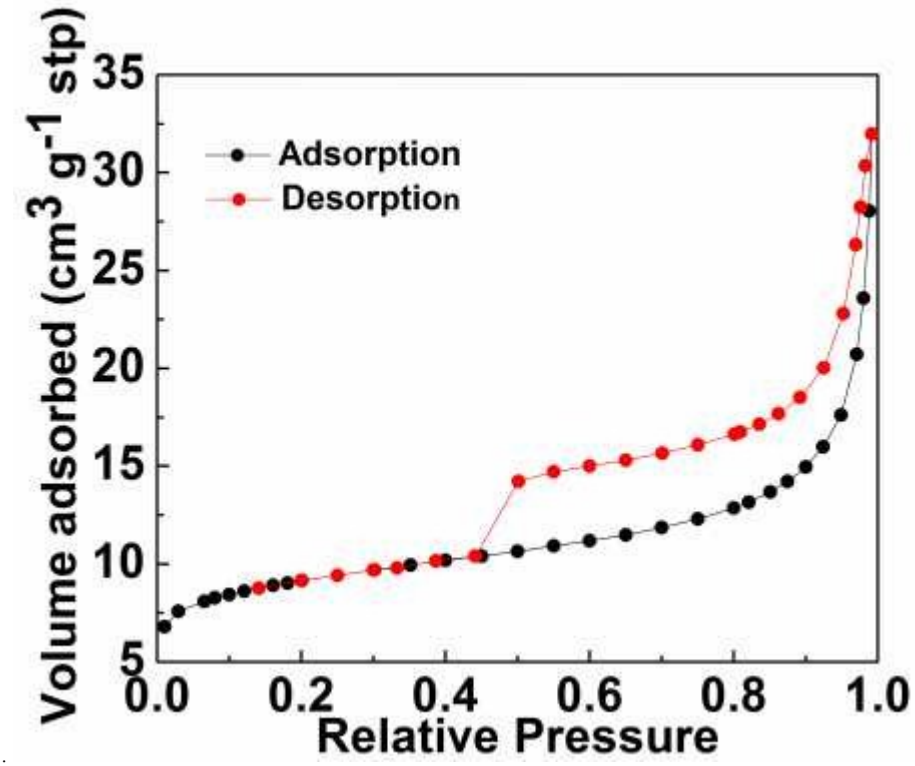

Fig. S5 Nitrogen adsorption and desorption isotherms of Bi_2O_3@C@N-G.

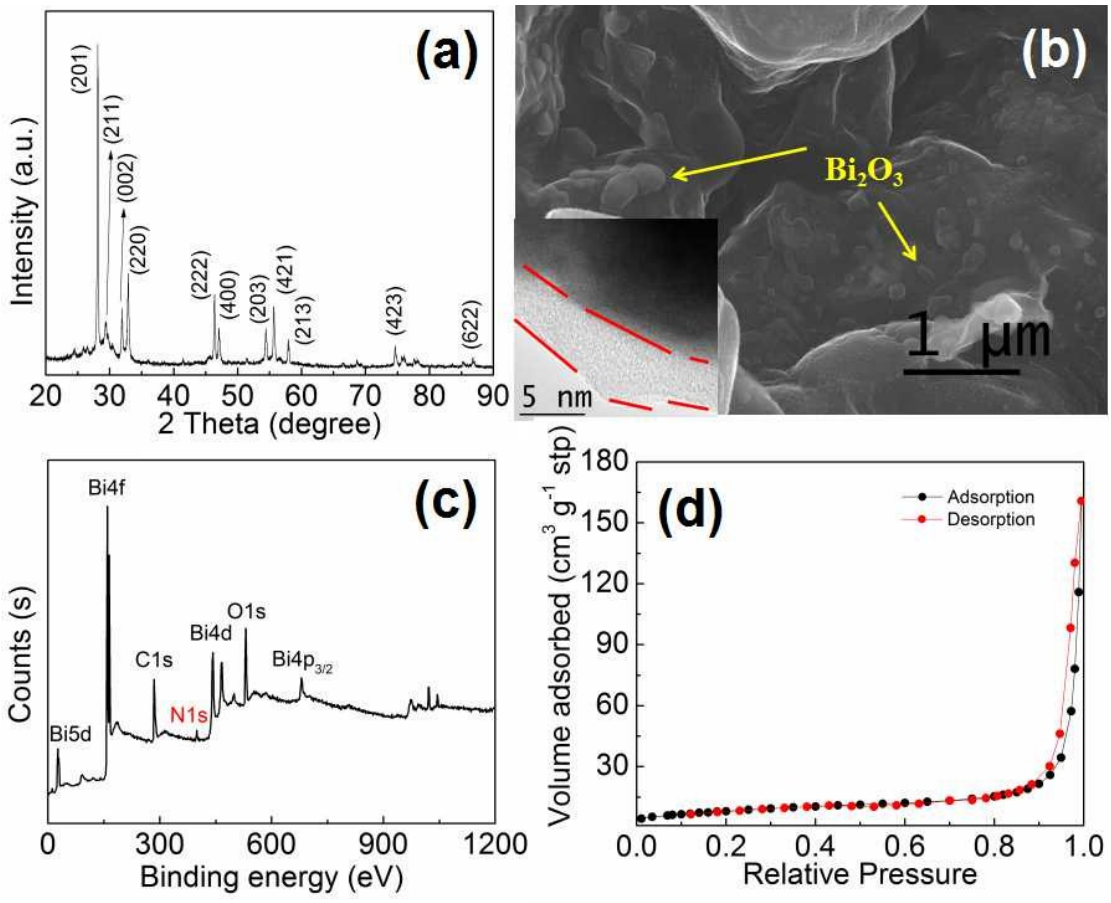

Fig. S6 The characterization of Bi_2O_3@C@N-RGO. (a) XRD pattern. (b) SEM image (inset: HRTEM image). (c) Survey XPS spectrum. (d) Nitrogen adsorption and desorption isotherms. In XRD pattern, all the diffraction peaks could be indexed to tetragonal Bi_2O_3 phase. HRTEM image shows that Bi_2O_3 nanoparticle is uniformly and continuously coated by a thin carbon layer with a thickness of about 4 nm, as indicated by the red dashed line. The wide XPS spectrum of Bi_2O_3@C@N-RGO confirms the existence of Bi, O, C and N elements. Carbon content in Bi_2O_3@C@N-RGO is calculated to be around 13.8 wt% by soaking the hybrid in HCl solution and weighing the residue.

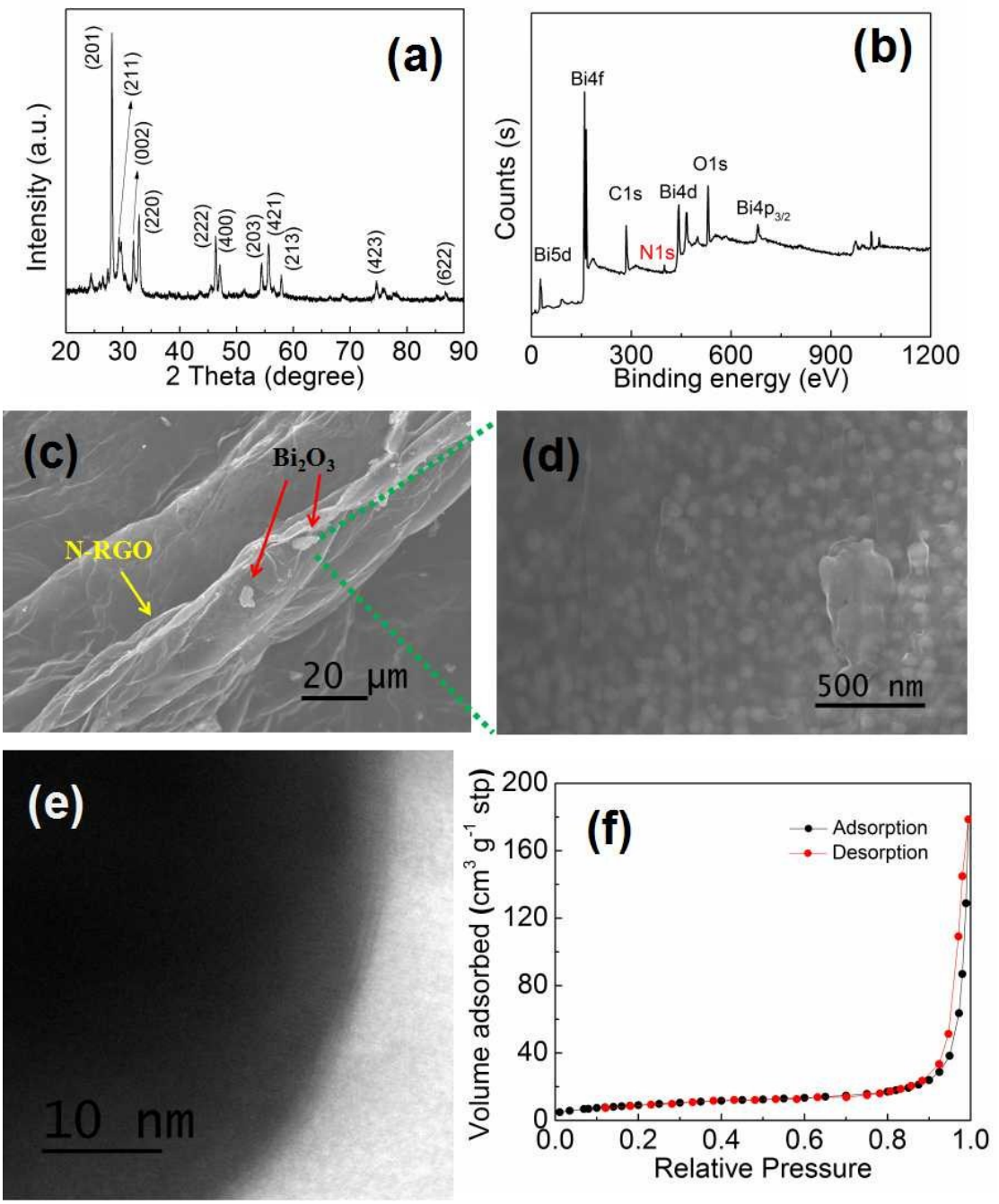

Fig. S7 The characterization of Bi_2O_3@N-RGO. (a) XRD pattern. (b) Survey XPS spectrum. (c) SEM image. (d) Locally enlarged SEM. (e) HRTEM image. (f) Nitrogen adsorption and desorption isotherms. XRD pattern shows that all the diffraction peaks could be indexed to tetragonal Bi_2O_3 phase. Wide XPS spectrum of Bi_2O_3@N-RGO confirms the existence of Bi, O, C and N elements. HRTEM image shows that Bi_2O_3 nanoparticle isn't coated by a thin carbon layer. Carbon content in Bi_2O_3@N-RGO is calculated to be around 7.0 wt% by soaking the hybrid in HCl solution and weighing the residue.

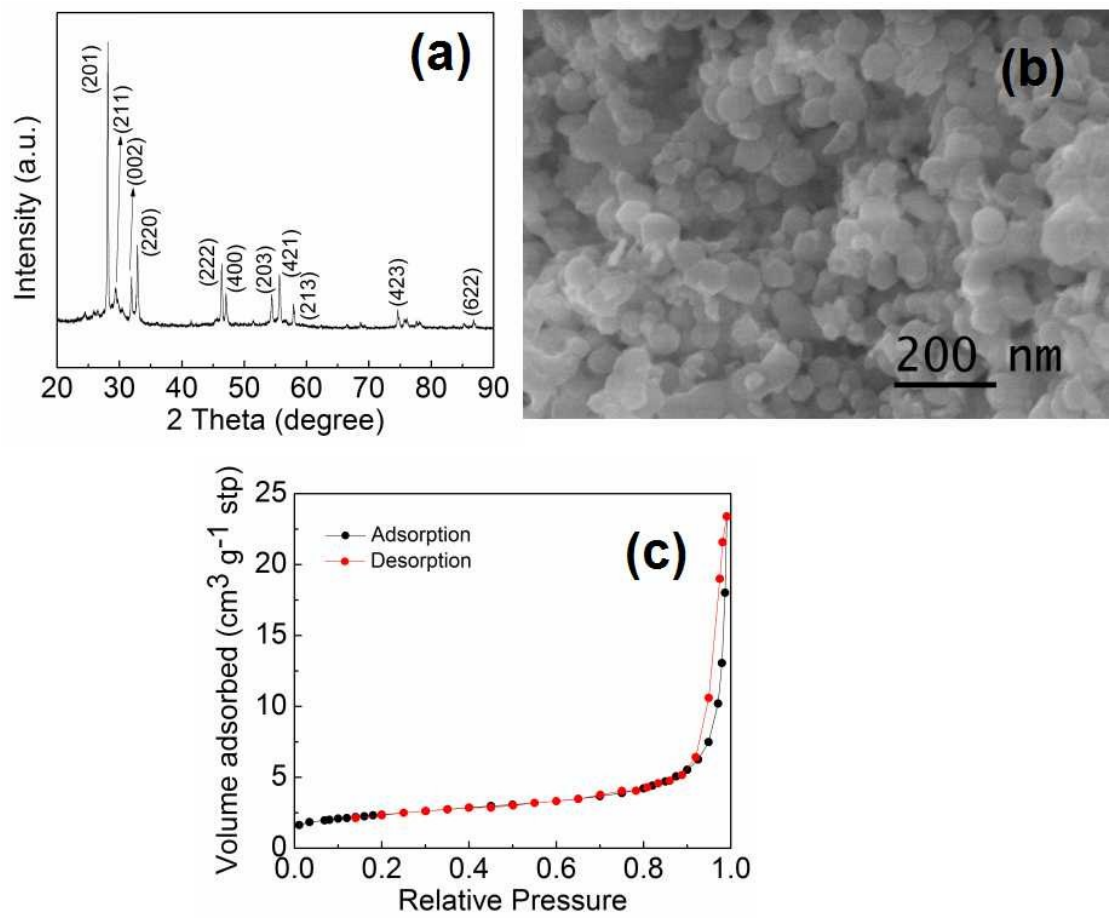

Fig. S8 The characterization of Bi_2O_3@C. (a) XRD pattern. (b) SEM image. (c) Nitrogen adsorption and desorption isotherms. XRD pattern shows that all the diffraction peaks could be indexed to tetragonal Bi_2O_3 phase.

Table S1 Comparison of lithium storage between Bi_2O_3@C@N-G and previous Bi_2O_3-based material.

Sample	Cycle ability	Rate capability	Reference
Bi_2O_3-Bi_2S_3	433 mAh g^{-1} after 100 cycles at 600 mA g^{-1}	295 mAh g^{-1} at 6 A g^{-1}	*Sci. Rep.*, 2014, **5**, 9307
Bi_2O_3/Ni	782 mAh g^{-1} after 40 cycles at 100 mA g^{-1}	668 mAh g^{-1} at 800 mA g^{-1}	*J. Mater. Chem. A*, 2013, **1**, 12123-12127
Bi_2O_3@C@N-G	391 mAh g^{-1} after 250 cycles at 3000 mA g^{-1}	326 mAh g^{-1} at 4800 mA g^{-1}	This work

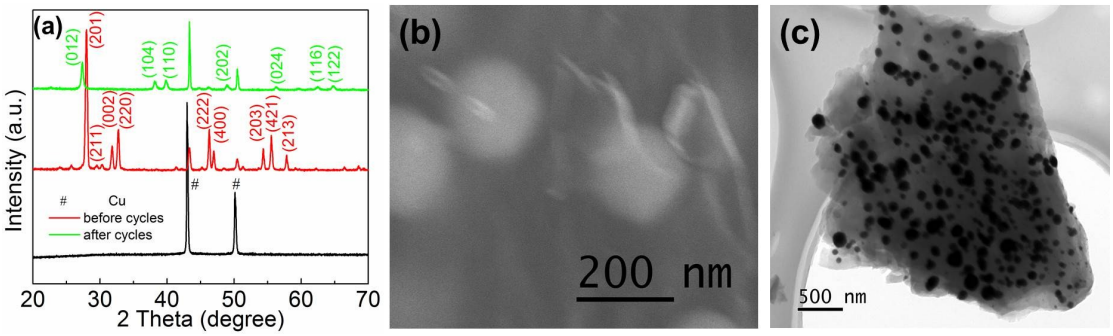

Fig. S9 (a) XRD profiles of Bi_2O_3@C@N-G electrode after and before 250 cycles at 3 A g^{-1}. (b) SEM and (c) TEM images of Bi_2O_3@C@N-G after 250 cycles at 3 A g^{-1}.