MOF-derived, N-doped porous carbon coated graphene sheets as high-performance anodes for lithium-ion batteries

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**GO:** Graphite oxide (GO) was synthesized from natural graphite powder by a modified Hummers method. Graphite powder (3 g) was added into an 80 °C solution of concentrated H$_2$SO$_4$ (12 mL) with K$_2$S$_2$O$_8$ (2.5 g) and P$_2$O$_5$ (2.5 g). The mixture was kept at 80 °C for 4.5 h using a hotplate. Successively, the mixture was cooled to room temperature and diluted with 0.5 L of de-ionized (DI) water and left overnight. Then, the mixture was filtered and washed with DI water using a filter to remove the residual acid. The product was dried under ambient condition overnight. This pre-oxidized graphite was then subjected to oxidation by Hummers’ method described as follows. Pre-oxidized graphite powder was put into 0 °C concentrated H$_2$SO$_4$ (120 mL). Then, 15 g KMnO$_4$ was added gradually under stirring and the temperature of the mixture was kept to be below 20 °C by cooling. Successively, the mixture was stirred at 35 °C for 2 h, and then diluted with 250 mL DI water and the addition of water was carried out in an ice bath to keep the temperature below 50 °C. After adding all of the 250 mL of DI water, the mixture was stirred for 2 h, and then additional 0.7 L of DI water was added. Shortly after the dilution with 0.7 L of water, 20 mL of 30% H$_2$O$_2$ was added to the mixture, and the color of mixture changed into brilliant yellow along with bubbling. The mixture was filtered and washed with 1:10 HCl aqueous solution (1 L) to remove metal ions followed by 1 L of DI water to remove the acid. The resulting solid was dried in air and diluted to make a GO dispersion.
Fig.S1 (a and b) SEM images and (c and d) TEM images of the ZIF-8/GO and NPCGS. The inset of (d) is a selected-area electron diffraction pattern of NPCGS.

Fig.S2 TG curves of the ZIF-8/GO under Ar flow.
**Fig. S3** Nitrogen adsorption–desorption isotherms of NPCGS. The inset shows the pore size distribution.

**Fig. S4** Cycling performance of the NPCGS anode with different ratio of NPC and rGO at the rate of 0.5 A g⁻¹.
Fig. S5 Cycling performance of physical mixture of N-doped porous carbon and rGO at the rate of 0.5 A g⁻¹.