Supporting Information

Fig.S1 SEM image of pure Fe$_3$O$_4$ nanoparticles prepared by coprecipitation method

Fig.S2 SEM images of the precursors [NH$_3$(CH$_2$)$_6$NH$_3$][Fe$_{1.5}$F$_3$(SO$_4$)]·0.5H$_2$O, showing their layered structures.
Fig. S3 TG and DTA curves of the precursor [NH$_3$(CH$_2$)$_6$NH$_3$][Fe$_{1.5}$F$_3$(SO$_4$)]·0.5H$_2$O in Ar gas. There are two distinct weight losses consistent with the molecular formula. A sharp weight loss in the region 573-660 K corresponding to the loss of the water molecules, amine and HF [0.5H$_2$O+2NH$_3$+HF, exp = 17.6 %, cal = 17.3%]. The second major weight loss in the region 660-973 K corresponds to the removal of remaining fluorine, hydrogen and the decomposition of SO$_4^{2-}$ moiety, [5.5H$_2$ + F$_2$ + SO$_2$, exp = 31.8 %, cal = 31.0 %].
Fig. S4 Low-magnification TEM image of Fe$_3$O$_4$-NPs@C sample.

Fig.S5 Charge/discharge capacities of the Fe$_3$O$_4$-NPs@C samples calcinated under various temperatures.
Fig. S6 Charge/discharge capacities of the Fe$_3$O$_4$-NPs@C samples calcinated for various time.

Fig. S7 Nyquist plots for Fe$_3$O$_4$-NPs@C composite and pure Fe$_3$O$_4$ electrodes measured in the frequency range between 0.01 Hz and 1.0 MHz.