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Supporting Information

Three-dimensional nickel hydroxide/graphene composite hydrogels and its transformation to NiO/graphene composites for energy storage

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SI-1 Additional data of obtained samples

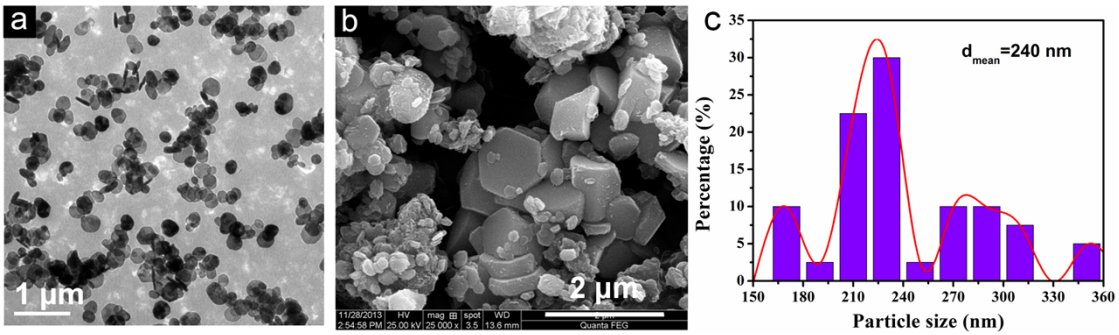

Fig. S1. (a) TEM image, (b) SEM image and (c) histogram of particle size distribution of freeze-dried $Ni(OH)_2$.

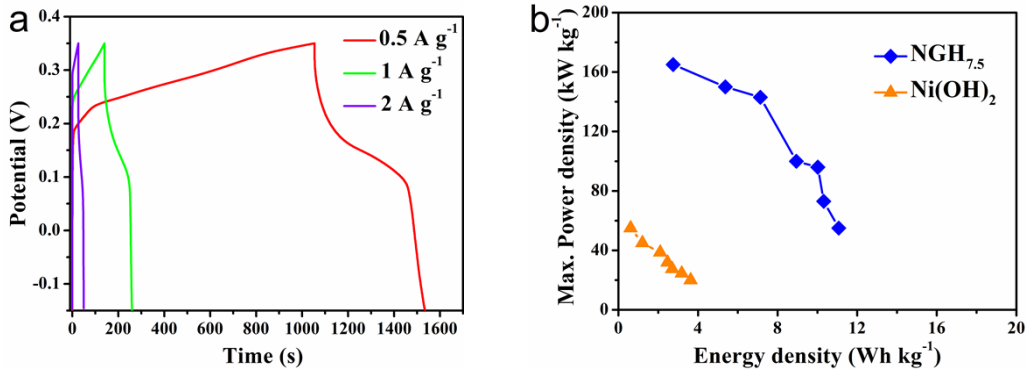

Fig. S2. (a) Galvonostatic charge-discharge curves of $NGC_{7.5}$ at different current densities, (b) Ragone plots of $NGH_{7.5}$ and $Ni(OH)_2$ (energy density *vs.* maximum peak power density) obtained through a two-electrode system.

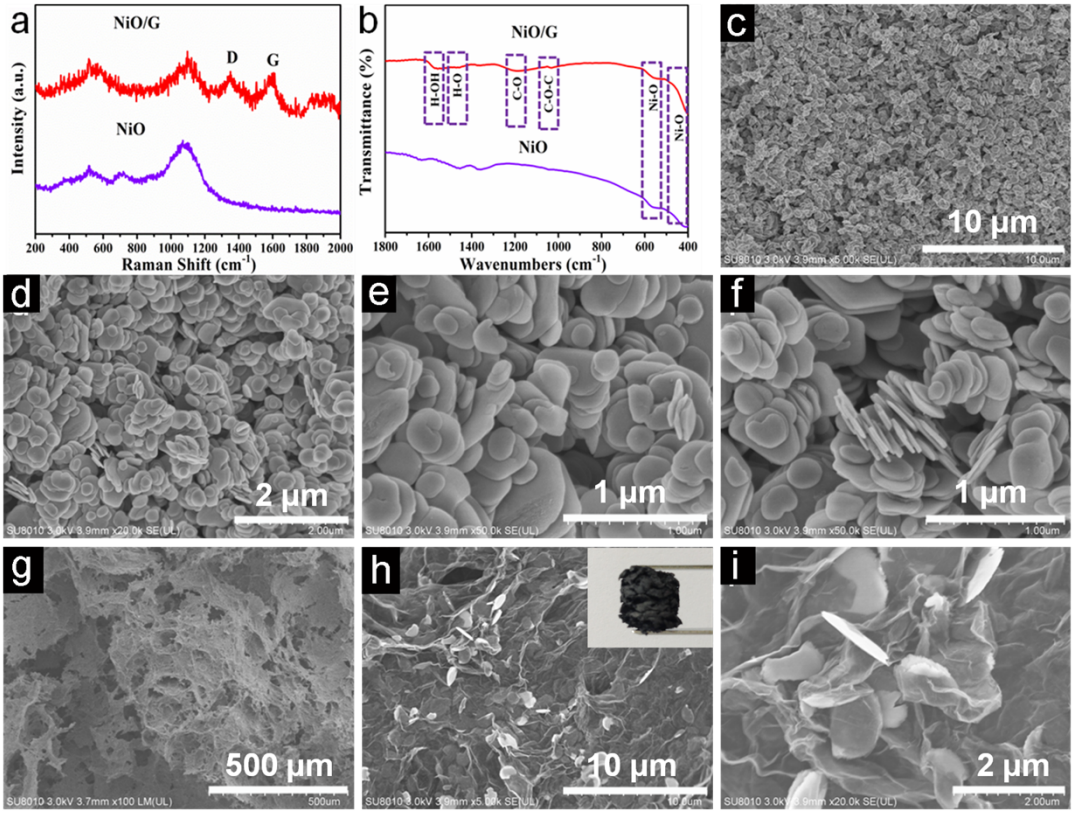

Fig. S3. (a) Raman spectra, (b) FT-IR of NiO and NiO/G, (c-f) SEM images of NiO, and (g-i) SEM images of NiO/G. The inset of (h) is the photograph of NiO/G.

SI-2 Electrochemical measurements with a two-electrode system

For $Ni(OH)_2$ powder, the working electrodes were fabricated by mixing the prepared samples with 5.3 mg of active materials and 1 mg of acetylene black, adding 33 μL (1 wt%) of polytetrafluoroethylene (PTFE) binder to produce a homogeneous paste. The paste was directly attached on each Pt foil. The mixture coated on Pt foil was dried at 60 ^{o}C for 12 h. For $NGH_{7.5}$, the hydrogels were directly used as the electrodes. The water in the hydrogels was exchanged with 6 M of KOH electrolyte for several hours. Then two pieces of hydrogel were attached onto each Pt foil. The symmetric two-electrode system was assembled with a neutral paper sandwiched

between the active materials. A platinum wire was clipped onto the foil by a clip at the end of each platinum, which was last wrapped with parafilm. The electrodes were then connected to a CHI760D electrochemical workstation. Both electrodes were activated by 100 cycles of cyclic voltammetry from 0 to 1 V at 50 mV s^{-1} in 6 M of KOH aqueous solution and then used as a working electrode in the electrochemical measurements. The galvanostatic charge/discharge tests were carried out between 0 and 1 V at current densities between 0.2 and 20 A g^{-1}. The specific capacitance, energy density and maximum peak power density of were calculated according to the equation reported previously.[1]

1 X. Yang, J. Zhu, L. Qiu and D. Li, *Adv. Mater.*, 2011, **23**, 2833-2838.