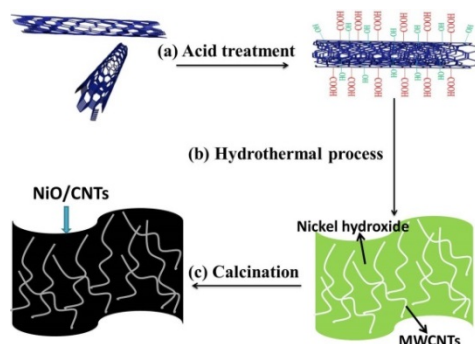


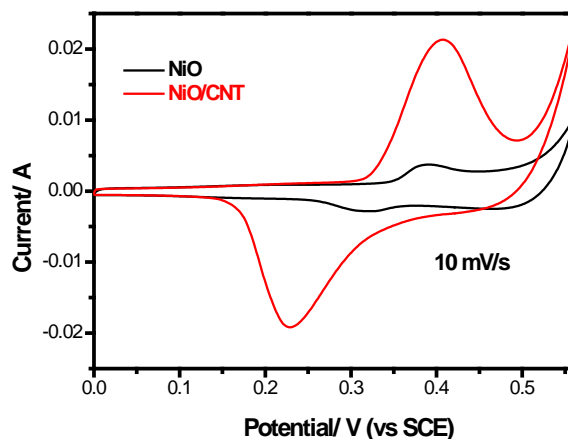
COMMUNICATION

Electronic supplement information (ESI):

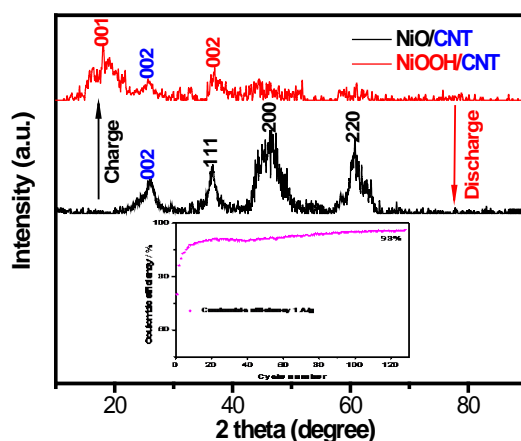
The preparation of the NiO nanosheet anchored with CNTs is schematically shown in Scheme S1, and the details are given as follows. At first, 15 mg acid pre-treated CNTs (30-50 nm in diameter) was immersed into a mix-solvent of 48 mL ethanol and 1 mL water for 40 min. Then, 1.4 mL  $\text{Ni}(\text{Ac})_2$  (0.72 mmol) solution was dropwise added into the MWCNT dispersion, and finally 2 mL ammonia solution ( $\text{NH}_3 \cdot \text{H}_2\text{O}$ , 25%) was added into the mixture solution. The as-obtained mixture was transferred into a Teflon-lined stainless steel autoclave and soaked at 150 °C for 6 h. After filtering, drying at 80 °C for 12 h, and further calcifying at 250 °C in air atmosphere for 3 h, NiO/CNT hybrid was achieved. The ratio of CNTs in the composite was calculated to be 21.8 wt.%. In the meanwhile, a hydrothermally prepared nanostructured NiO without MWCNTs under the same reactive condition was also used as a control.



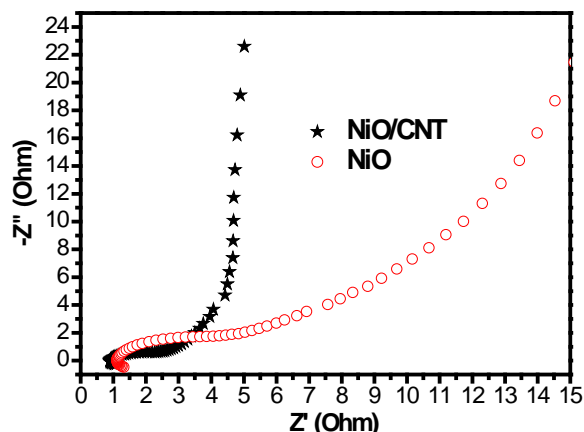
**Scheme S1.** Schematic illustration of the preparation of NiO/CNTs composite.



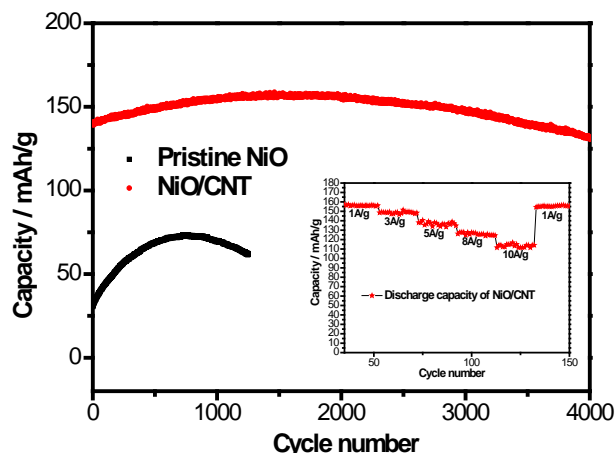
**Figure S1** Cyclic voltammograms (CVs) of NiO and NiO/CNTs at 10 mV s<sup>-1</sup> using Ni mesh as the counter electrode in 1 M KOH.



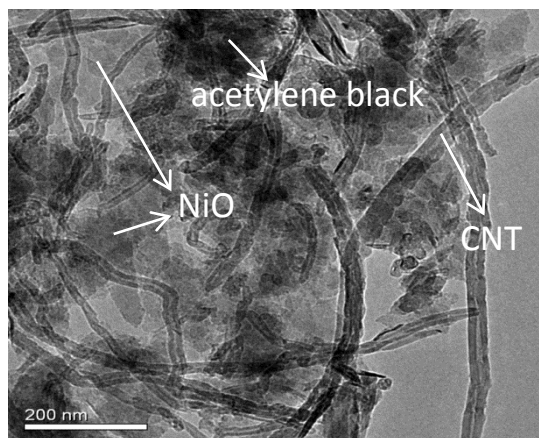
**Figure S2** Verification of mechanism during the charge/discharge process by X-ray diffraction patterns of the NiO/CNT positive electrode after 128 cycles with coulombic efficiency of 98% (inset) and NiOOH/CNT after one additional charge.



**Figure S3** Nyquist plots of NiO/CNTs and the pristine NiO before the charge in 1 M KOH aqueous solution in the frequency range of 0.01 Hz – 10000 Hz.



**Figure S4** Cycling performance of the NiO/CNT composite and the pristine NiO and rate capability of the NiO/CNT composite (inset) tested between 0-0.5 V (vs. saturated calomel electrode) by using Ni mesh as the counter electrode in 1 M KOH solution.



**Figure S5** TEM micrograph of NiO/CNTs after 4000 cycles tested between 0-0.5 V (vs. saturated calomel electrode) by using Ni mesh as the counter electrode in 1 M KOH solution.