Supplementary Information for

Mesoporous β–$Ni(OH)_2$: synthesis and enhanced electrochemical performance

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Scheme S1 The synthesis of mesoporous β–$Ni(OH)_2$ assisted by CTAB. ●: CTAB micelles

Fig. S1 SEM images of mesoporous β–$Ni(OH)_2$ (a, b: $Ni(OH)_2$–1 and c, d: $Ni(OH)_2$–2).

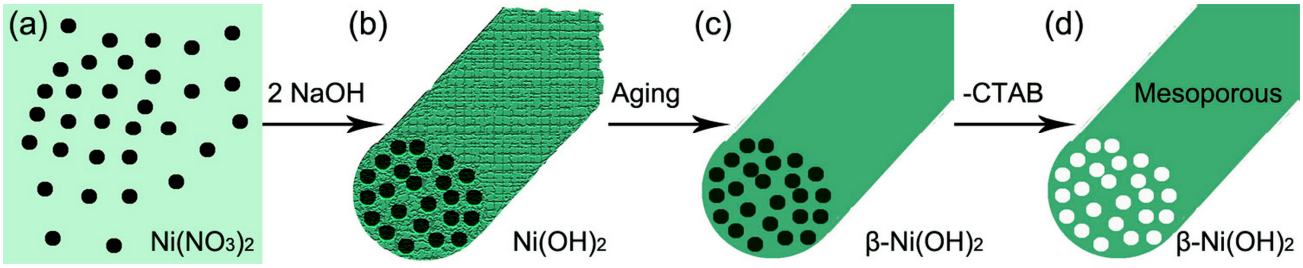
Fig. S2 TEM images of mesoporous β–$Ni(OH)_2$ (a: $Ni(OH)_2$–1 and b, c: $Ni(OH)_2$–2).

Fig. S3 FTIR spectrum of (a) CTAB, (b–d) samples of β–$Ni(OH)_2$ containing CTAB obtained at various time, and (e) pure mesoporous β–$Ni(OH)_2$.

Experimental

Reagents. Nickel nitrate, sodium hydroxide, Cetyl trimethyl ammonium bromide (CTAB), and ethanol were analytical purity reagents obtained from commercial resources and used without further purification.

Characterization of mesoporous β-$Ni(OH)_2$. X–ray diffraction patterns were recorded on a Panalytical X' pert Pro powder diffraction system using Cu K*a* radiation (Ni filter, λ=0.15418 nm, 40 kV and 40 mA) in the range $10°\leq 2\theta \leq 80°$. The scanning electron microscopy (SEM) images were taken with a JEOL JSM 5610 LV apparatus. Transmission electron microscopy (TEM) images were obtained on a JEOL JEM–2010 instrument at an acceleration voltage of 200 kV. Fourier transform infrared (FTIR) spectra were recorded on a Bruker Vector 22 spectrometer. Raman spectrum was recorded on a Renishaw RM–1000 with excitation from the 514.5 nm line of an Ar–ion laser with a power of about 5 mW. N_2 adsorption–desorption was tested on ASAP 2020 (Micromeritics, USA). Thermal analysis proceeded on SETERAM TG–DTA/DSC thermal analyzer. Cyclic voltammogram tests were conducted on Shanghai Chenhua CHI660 electrochemical workstation. Three-electrode system was adapted and the electrolyte was KOH (6 M, containing 15 gL^{-1} LiOH). The scan range was –0.05–0.55 V, and the scan rate was 5 mV S^{-1}. Hg/HgO electrode was as reference electrode, Pt electrode was the counter electrode, and mesoporous $Ni(OH)_2$–1 was the active material of working electrode. Battery performance was determined on the LAND battery testing system Shenzhen Liuwei Technology Co., Ltd.. Using mesoporous β–$Ni(OH)_2$ as the working electrode, foam nickel as the counter electrode and Hg/HgO electrode as reference electrode. The working electrode is composed of active material, carbon, and PTFE with ratio $m_A:m_C:m_{PTFE}$ =80:15:5. The electrolyte was KOH (6 M, containing 15 gL^{-1} LiOH) and the weight of β–$Ni(OH)_2$ in the working electrode was used to estimate the discharge capacity of the battery.



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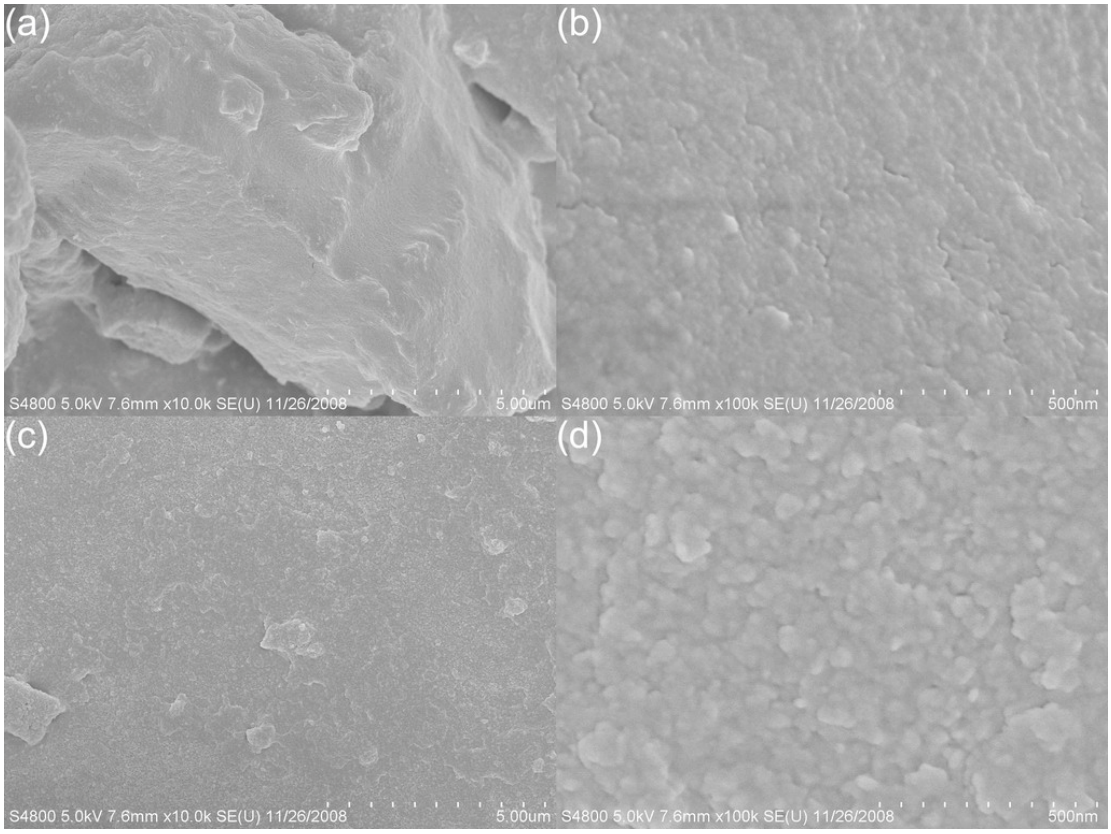

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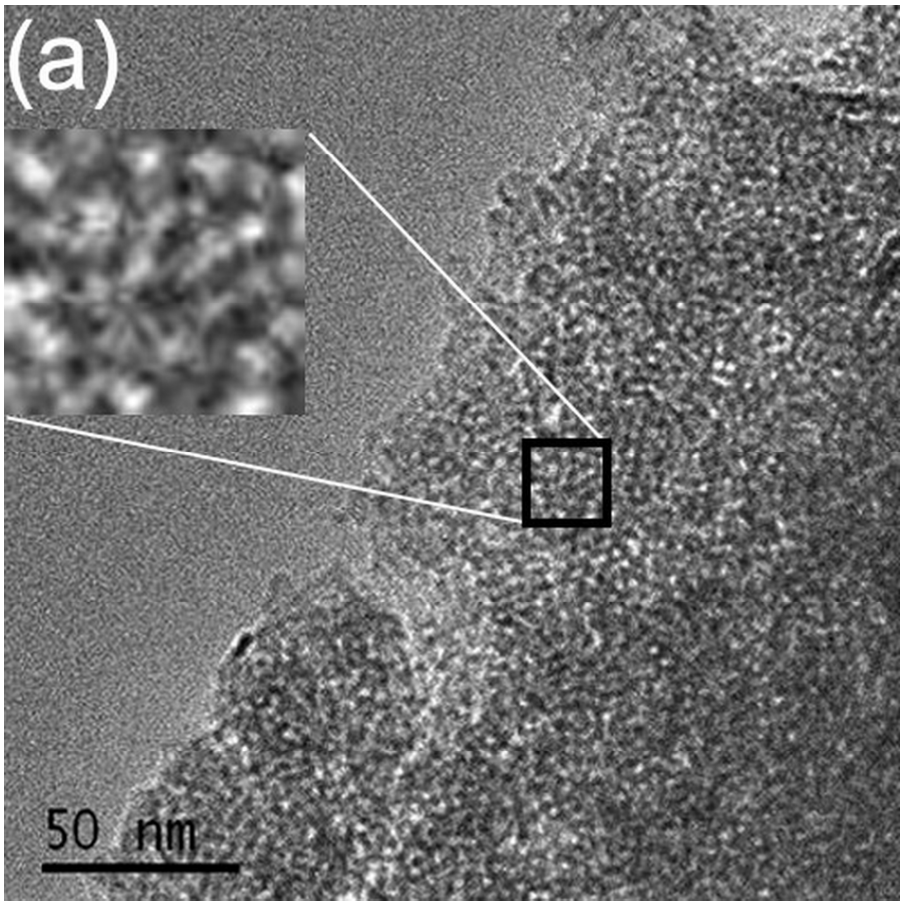
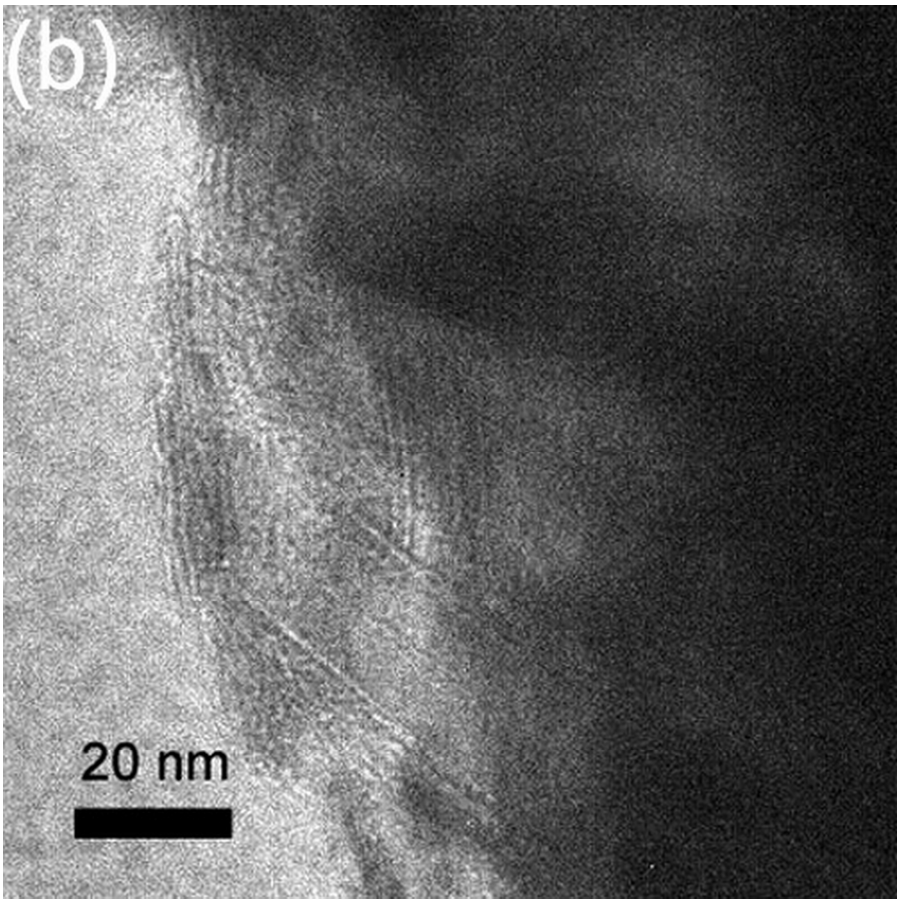

(a)
50 nm


(b)
20 nm

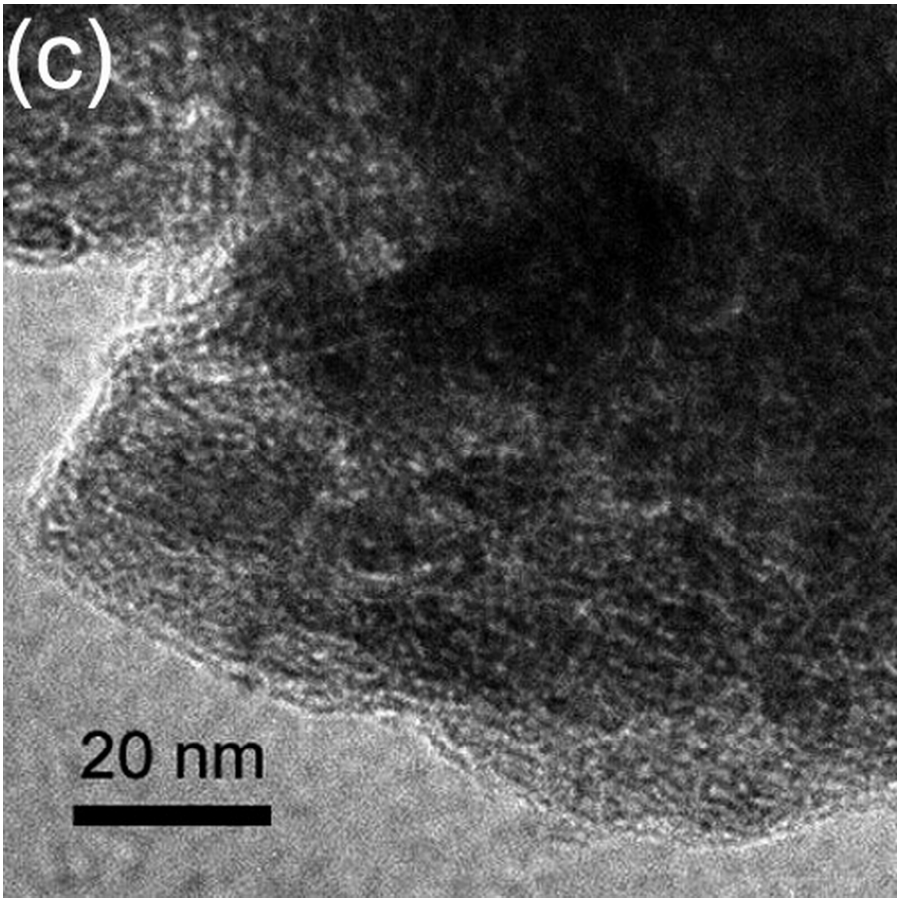
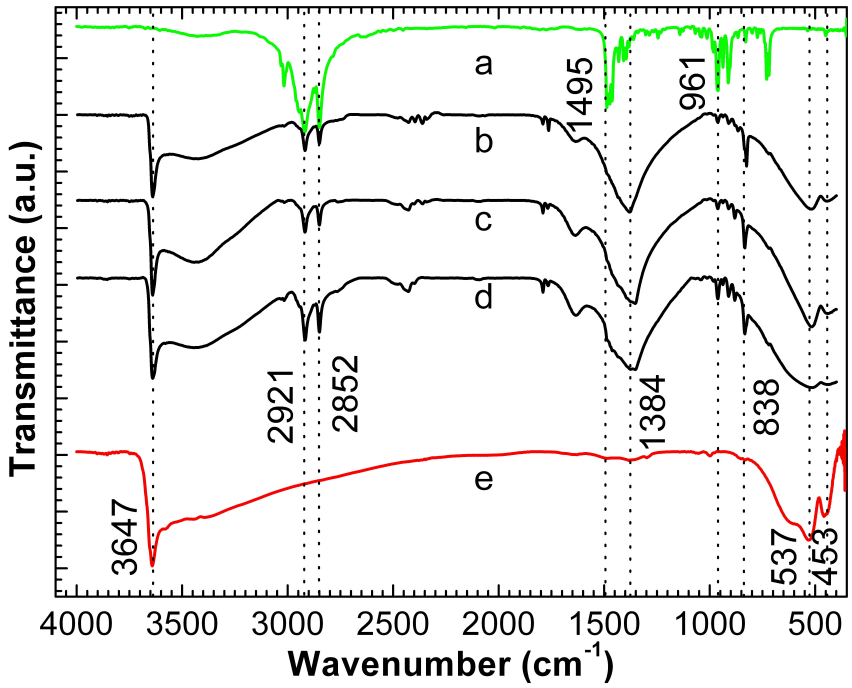


Fig. S2 TEM images of mesoporous β–$Ni(OH)_2$ (a: $Ni(OH)_2$–1 and b, c: $Ni(OH)_2$–2).



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