Supporting Information

Towards an efficient anode material for Li-ion batteries: understanding the conversion mechanism of nickel hydroxy chloride with Li -ions

Sae Hoon Lim[a,†], Gi Dae Park[a,†], Dae Soo Jung[b], Jong-Heun Lee[a], and Yun Chan Kang[a,*]

Department of Materials Science and Engineering, Korea University, Anam-Dong, Seongbuk-Gu, Seoul 136-713, Republic of Korea.

[†] These two authors contributed equally to this work.

[*]Correspondence author. E-mail: yckang@korea.ac.kr (Yun Chan Kang, Fax: (+82) 2-928-3584)

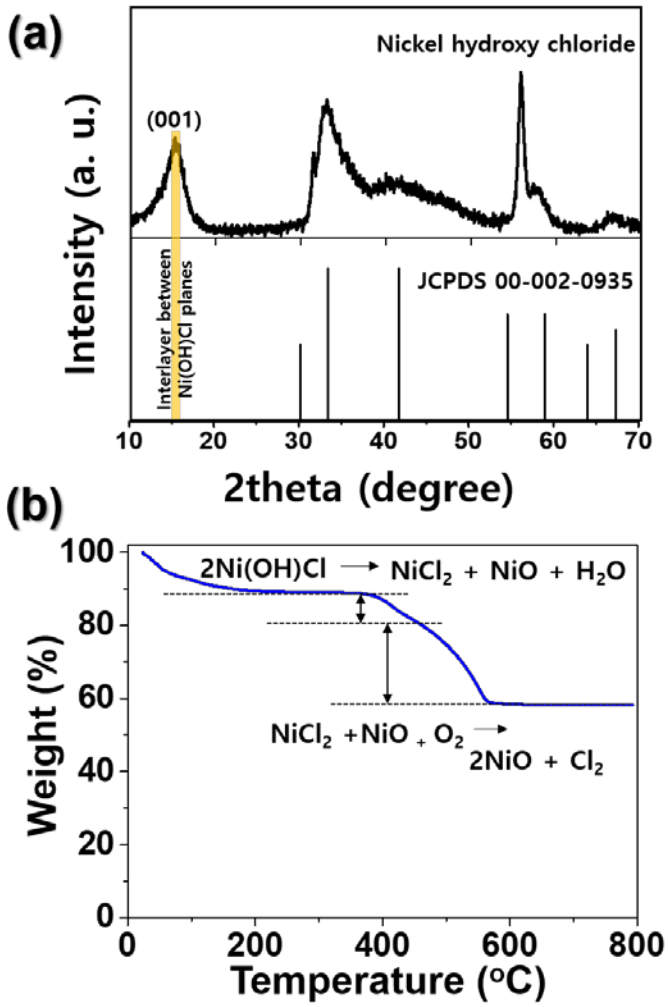


Fig. S1 (a) XRD pattern and (b) TG curve measured under air atmosphere of Ni(OH)Cl.

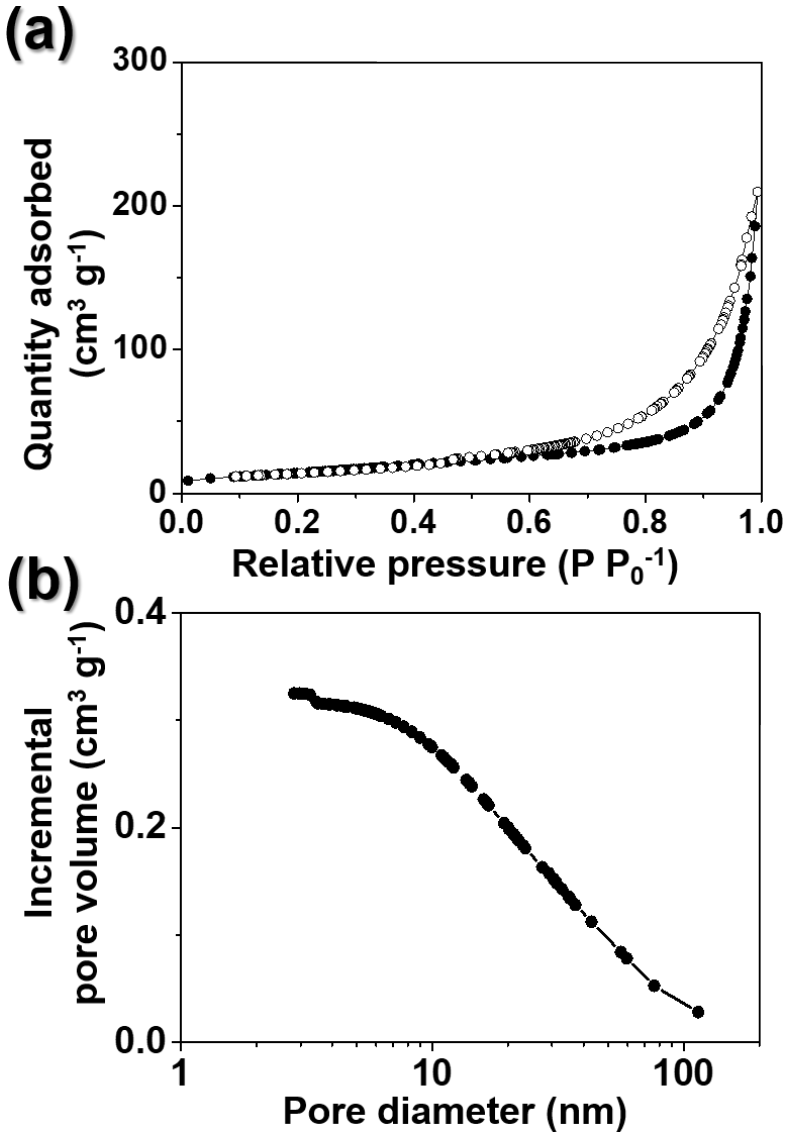


Fig. S2 (a) N_2 gas adsorption and desorption isotherm and (b) pore size distribution of Ni(OH)Cl.

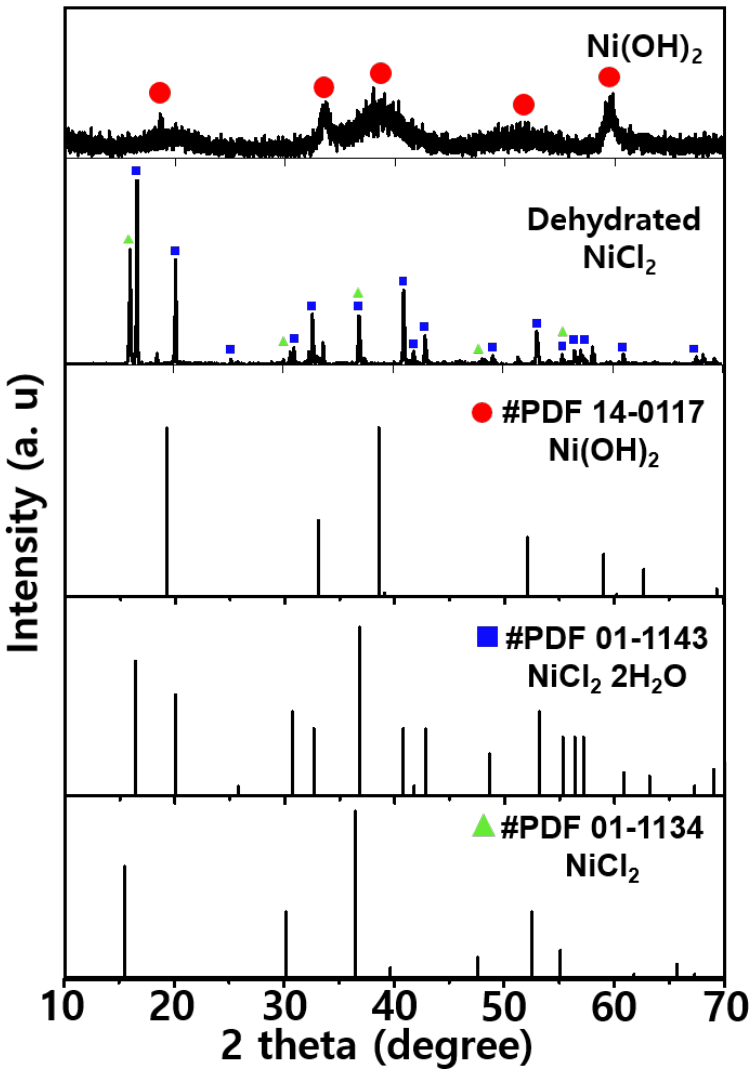


Fig. S3 XRD patterns of $Ni(OH)_2$ and dehydrated $NiCl_2$.

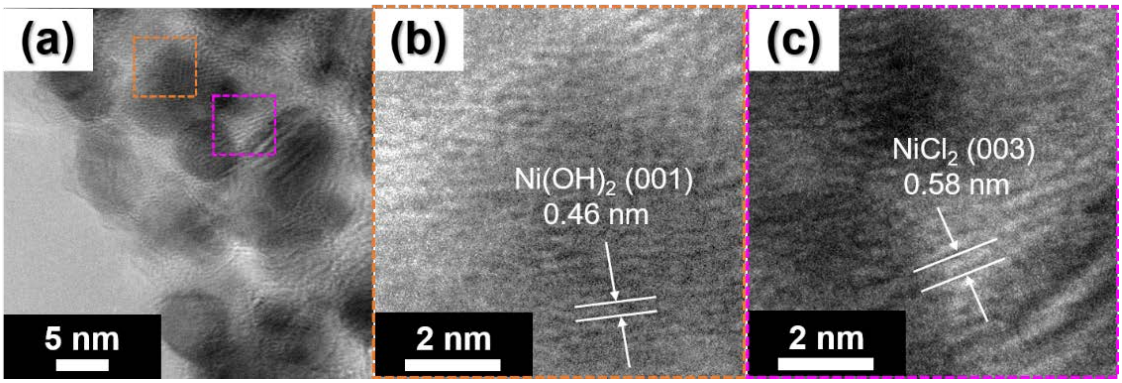
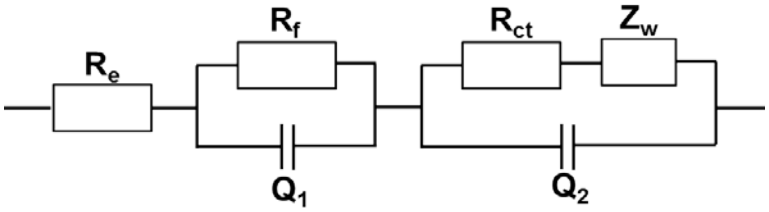


Fig. S4 Ex-situ HR-TEM images of $Ni(OH)_2$ and $NiCl_2$ at the fully charged states.



R_e : the electrolyte resistance, corresponding to the intercept of high frequency semicircle at Z_{re} axis

R_f : the SEI layer resistance corresponding to the high-frequency semicircle

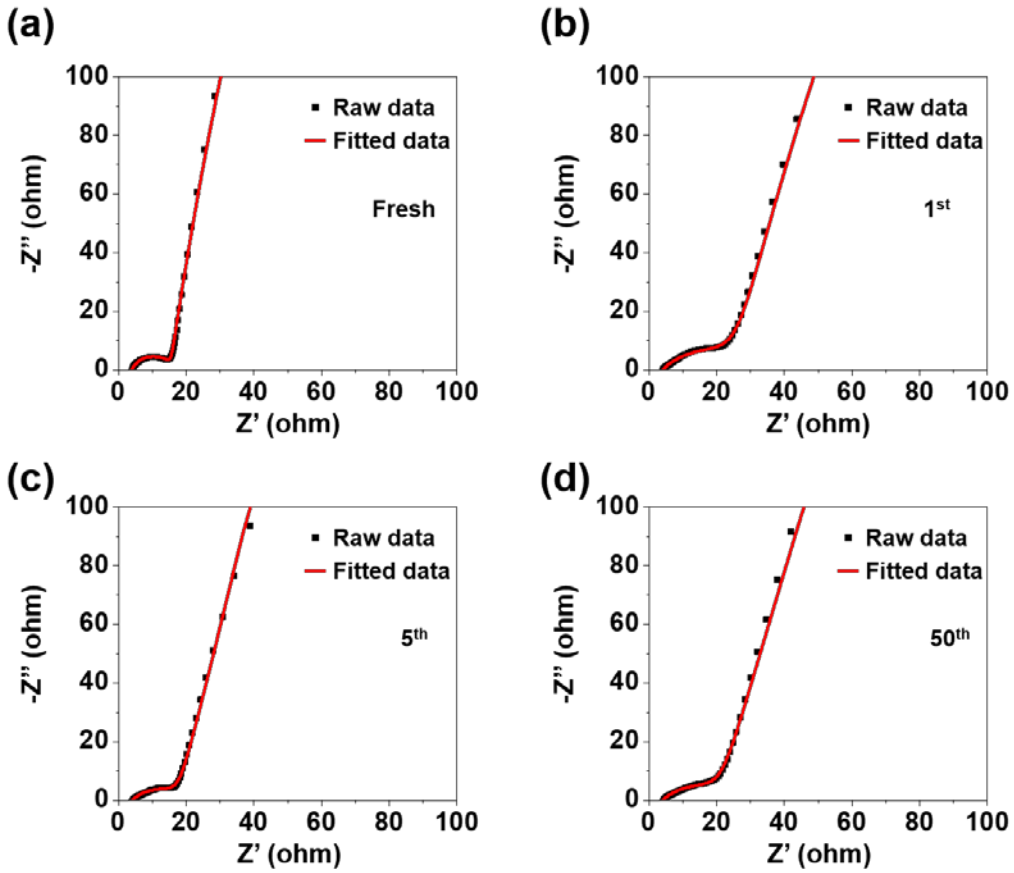
Q_1 : the dielectric relaxation capacitance corresponding to the high-frequency semicircle

R_{ct}: the denote the charger transfer resistance related to the middle-frequency semicircle

Q_2 : the associated double-layer capacitance related to the middle-frequency semicircle

Z_w : the Li-ion diffusion resistance

Fig. S5 Equivalent circuit model used for ac impedance fitting.



Cycle	R_s	R_f	R_{ct}
Fresh	4.1	-	12.5
1st	4.0	11.8	15.3
5th	4.1	10.7	7.0
50th	4.0	12.0	12.9

Fig. S6 Nyquist plots and fitted curves and equivalent element parameters obtained from the model of equivalent circuit at fresh state and after 1st, 5th, and 50th cycle.