

Supporting information

Insights into Li Incorporation Effect in Ni/Co Free P2-type $\text{Na}_{0.6}\text{Mn}_{0.8}\text{Cu}_{0.2}\text{O}_2$ for Sodium-Ion Batteries

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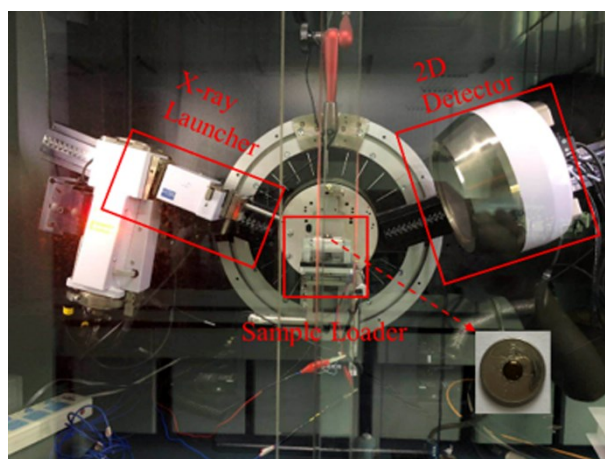


Figure S1. Photos of an assembled cell for in situ XRD and the in situ XRD test equipment.

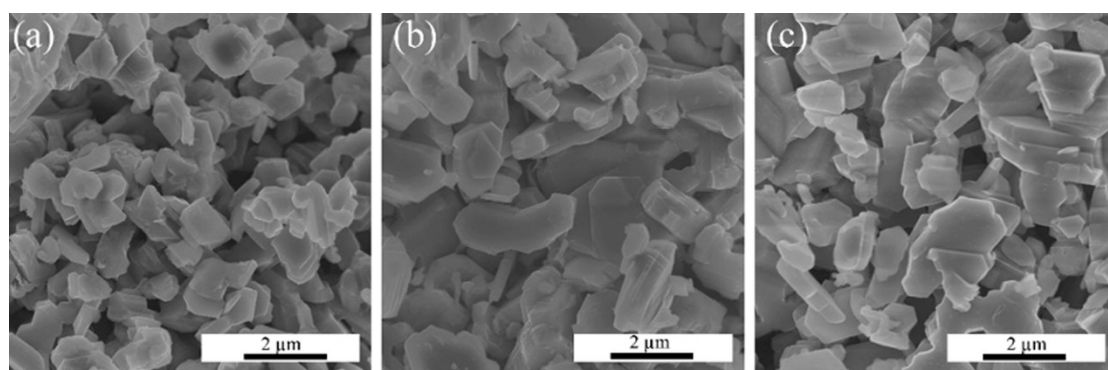


Figure S2. SEM images of (a) NCM0.05, (b) NCM0.1 and (c) NLCM0.2 composites.

Table S1. Summary of fitted parameters in Rietveld Refinement of XRD patterns.

Sample	a (Na-P2)	c (Na-P2)	Rwp (%)	GOF
NCM	2.878	11.228	1.17	1.81
NLCM0.05	2.872	11.209	1.60	1.75
NLCM0.1	2.866	11.172	1.36	1.51
NLCM0.15	2.868	11.133	1.49	1.34
NLCM0.2	2.871	11.129	1.57	1.38

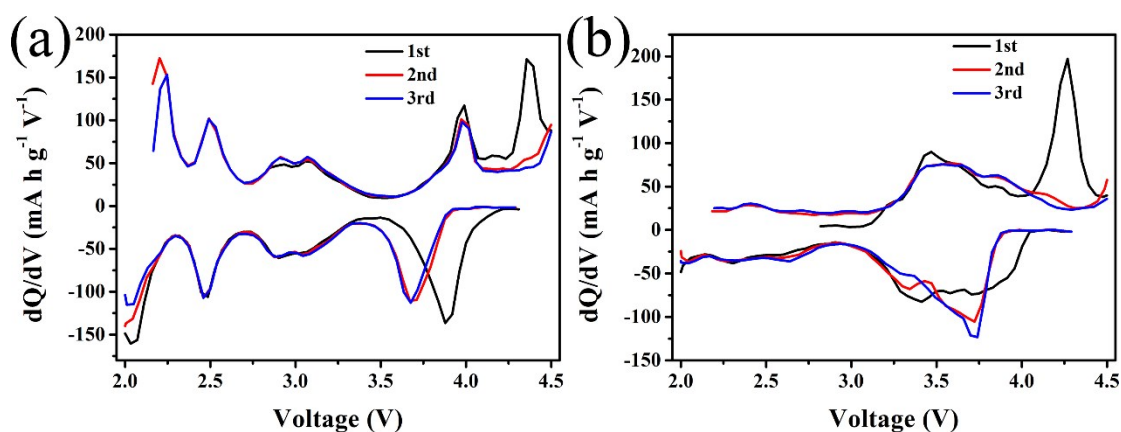


Figure S3. The dQ/dV curves of (a) NCM cell and b) NLCM0.15 cell.

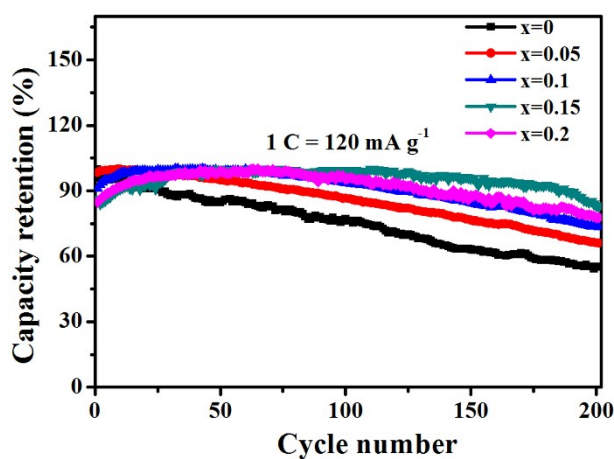


Figure S4. The capacity retention rates as a function of cycling number for $\text{Na}_{0.6}\text{Mn}_{0.8-x}\text{Li}_x\text{Cu}_{0.2}\text{O}_{2-\delta}$ ($x=0, 0.05, 0.1, 0.15$ and 0.2) cells.

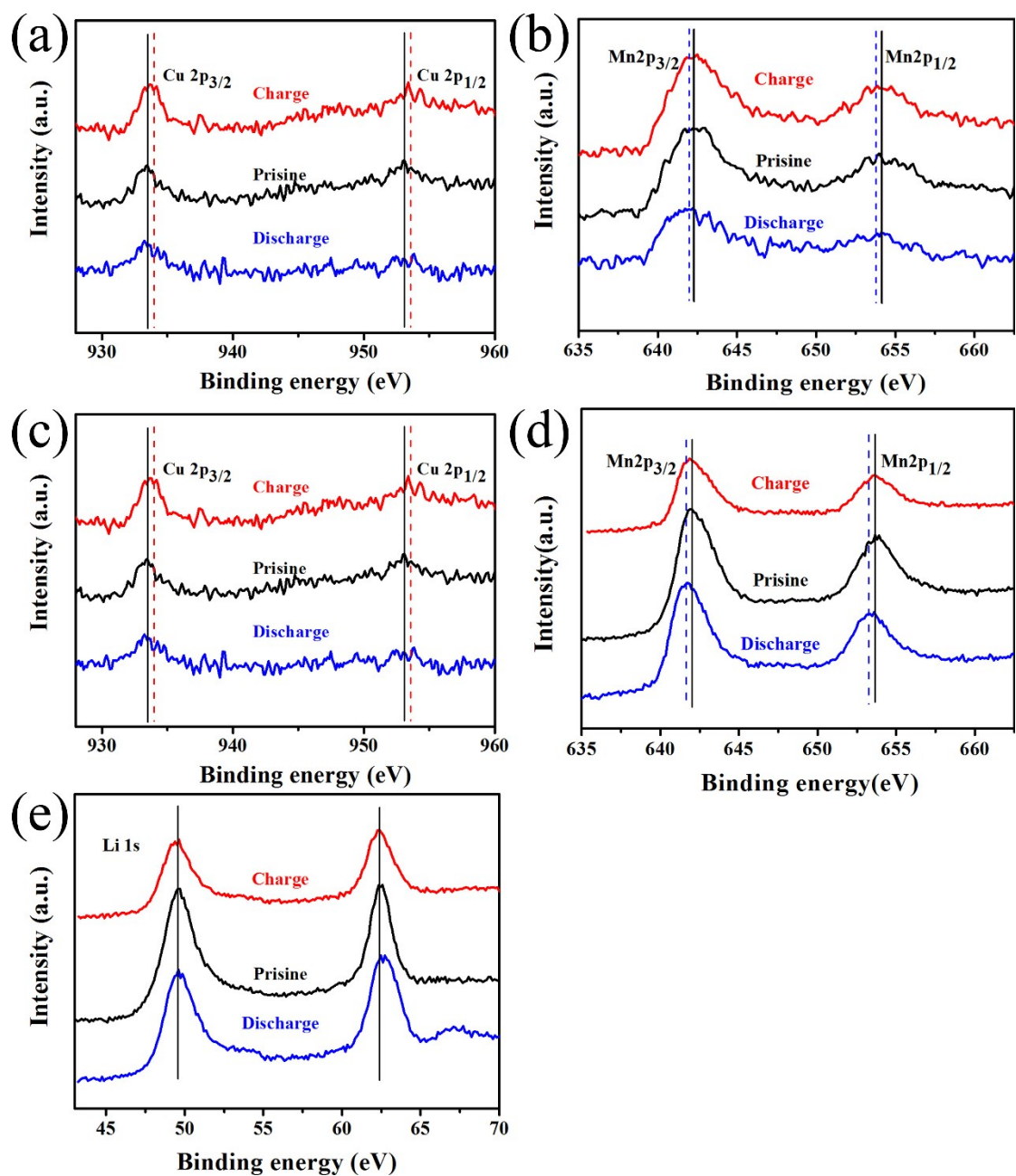


Figure S5. XPS spectra of (a) Cu 2p and (b) Mn 2p of the NCM electrodes at different states; XPS spectra of (c) Li 1s peaks, (d) Cu 2p and (e) Mn 2p XPS of NLCM0.15 electrodes at different states.

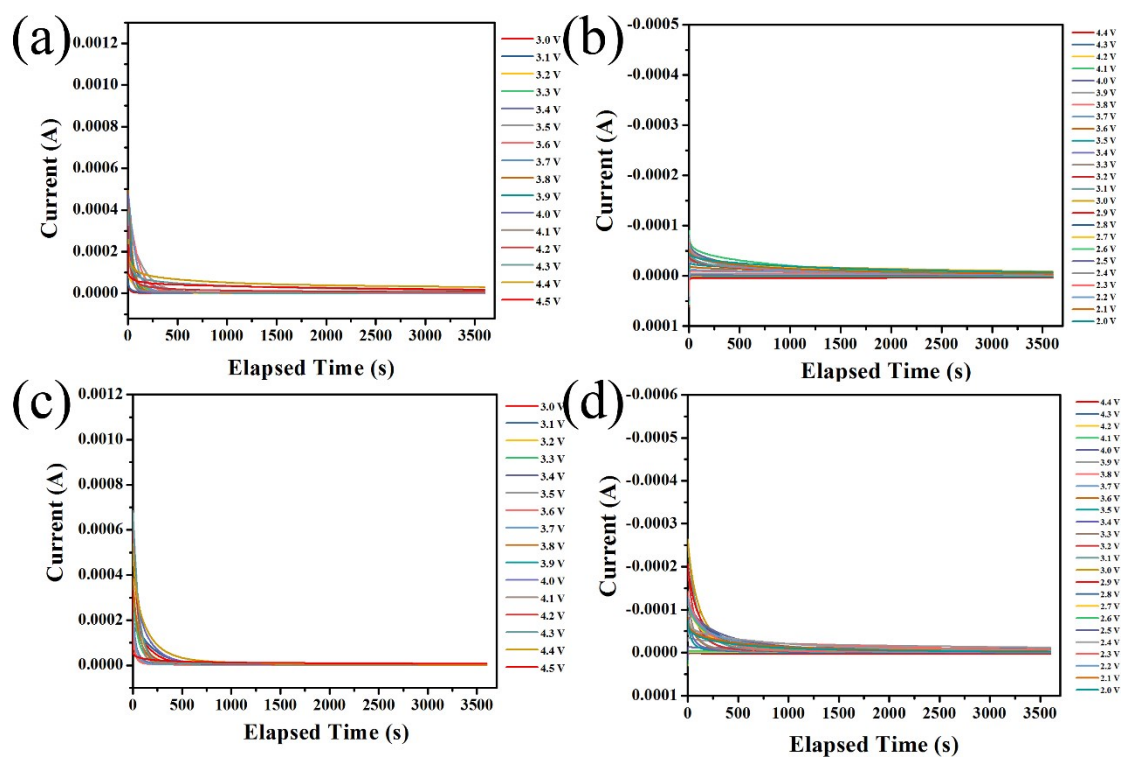


Figure S6. Plots of current as a function of elapsed time in the charge process and discharge process for (a, b) NMC cell and (c, d) NLCM0.15 cell.

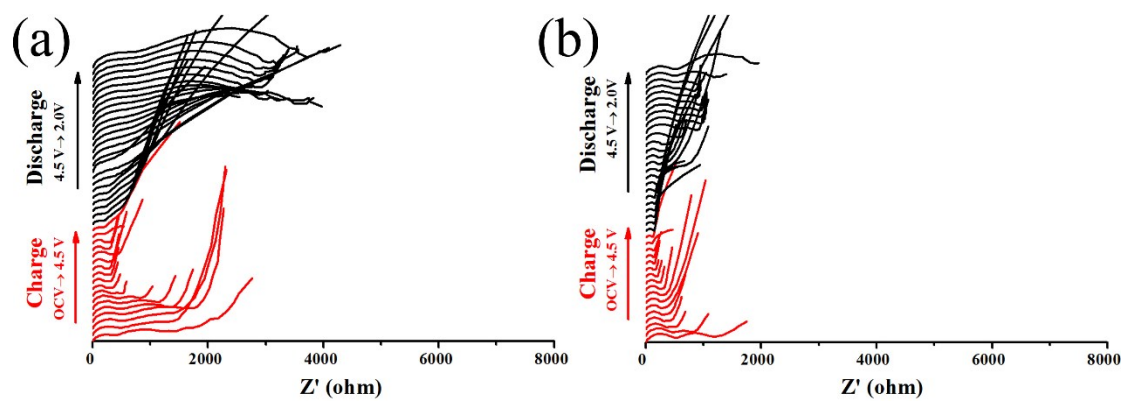


Figure S7. Nyquist plots of (a) NCM and (b) NLCM0.15 under different potentials in the voltage range of 2.0–4.5 V.

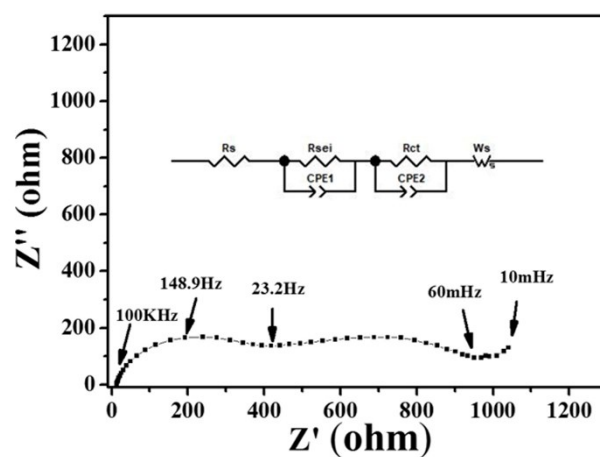


Figure S8. Nyquist plots of fresh NLCM0.15 electrodes with corresponding equivalent circuit.

Table S2. Fitted resistance of NCM and NLCM0.15 after 0 cycle, 50 cycles, 100 cycles and 200 cycles.

Sample	R(Ω)	0 Cycle	50 th Cycle	100 rd Cycle	200 rd Cycle
NCM	R_{SEI}	403.3	117.1	303.9	436.2
	R_{CT}	1074.4	264.4	329.2	518.5
NLCM	R_{SEI}	372.9	199.2	347.8	350.6
	R_{CT}	545.6	260.6	239.5	243.1