

Supporting Information

The Synergistic Effect of F⁻ Doping and LiF Coating on Improving the High-Voltage Cycling Stability and Rate Capacity of LiNi_{0.5}Co_{0.2}Mn_{0.3}O₂ Cathode Materials for Lithium-Ion Batteries

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Supporting Figures

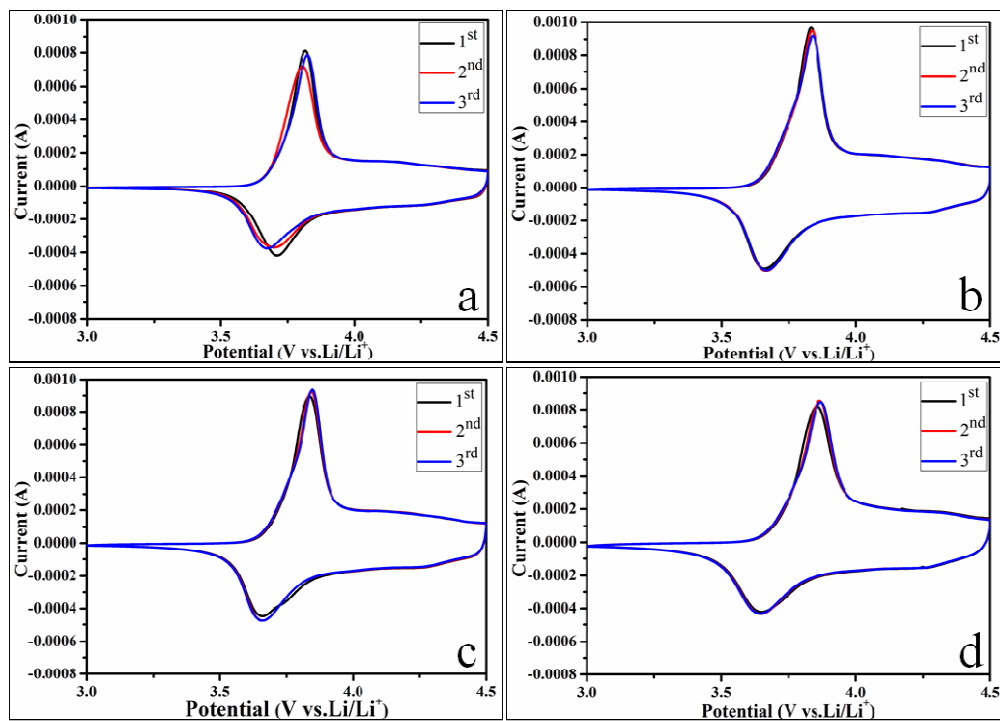


Figure S1. CV profiles of (a) LNCM, (b) LNCM-1, (c) LNCM-2, and (d) LNCM-3 at 0.2 mV s^{-1} at 3–4.5 V.

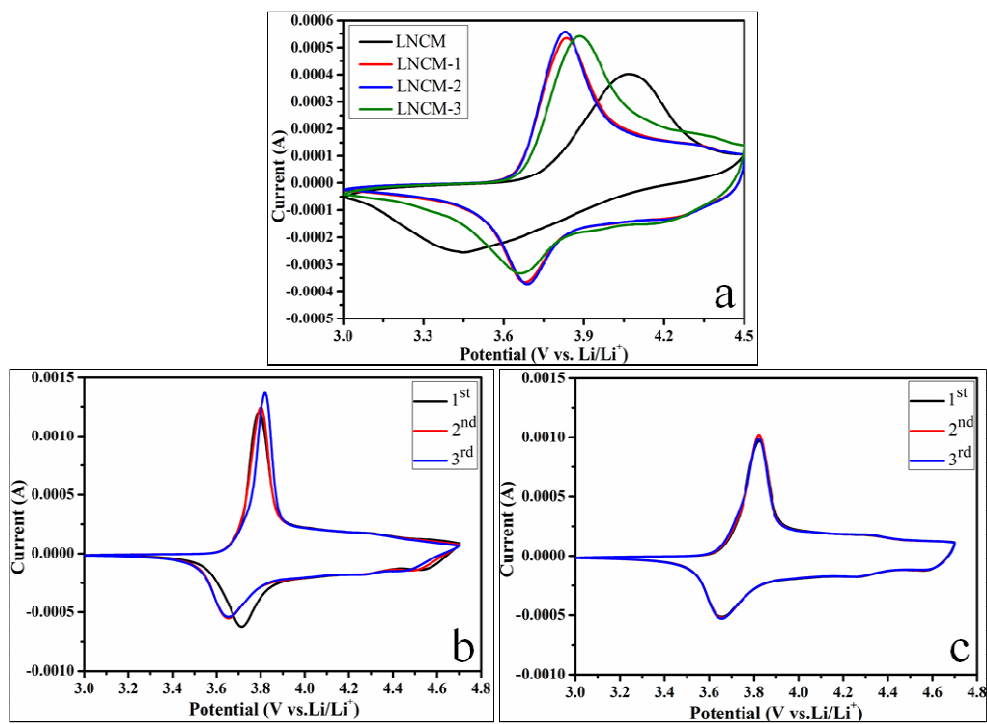


Figure S2. (a) CV curves of LNCM, LNCM-1, LNCM-2, and LNCM-3 at 0.2 mV s⁻¹ at 3-4.5 V after 100 cycles; CV profiles of (b) LNCM and (c) LNCM-2 for the first three cycles at 0.2 mV s⁻¹ at 3-4.7 V.

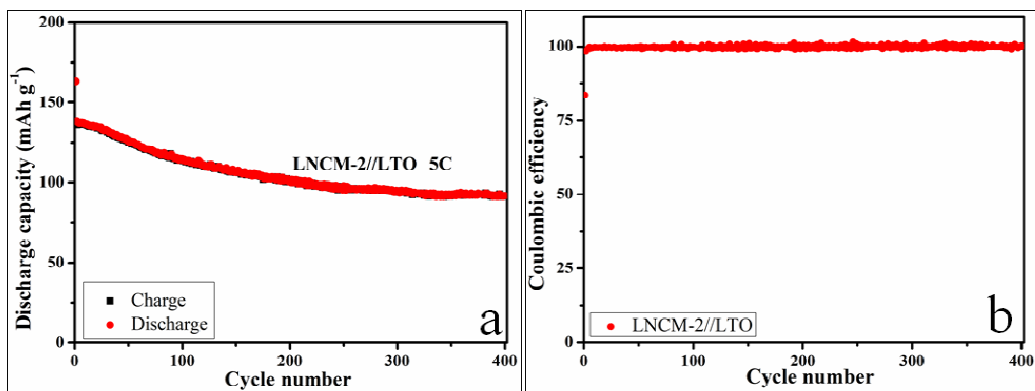


Figure S3. (a) Cycles performance and (b) Coulombic efficiency of full battery (LNCM-2//LTO) at 5 C between 1.2 and 3 V.

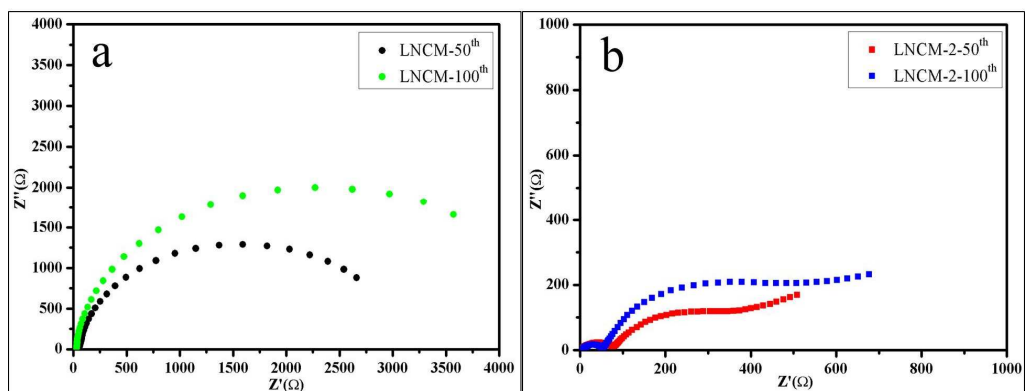


Figure S4. Nyquist plots of electrochemical impedance of (a) LNCM and (b) LNCM-2 measured at the fully discharged state, around 3 V, after 50th and 100th cycles.

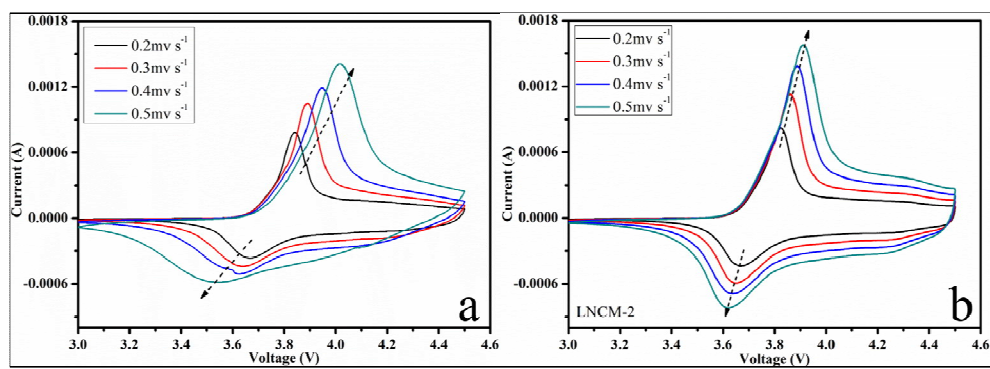


Figure S5. CV curves of (a) LNCM and (b) LNCM-2 at different sweep speeds from 0.2 mV s^{-1} to 0.5 mV s^{-1} .

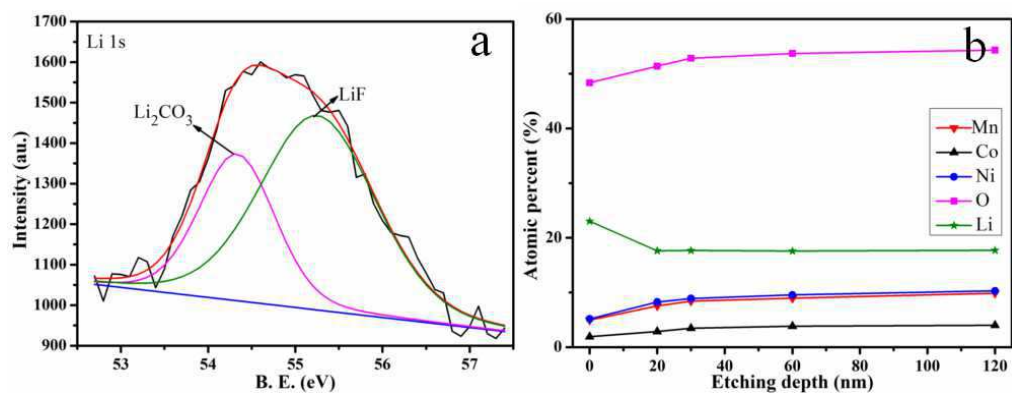


Figure S6. (a) Li 1s XPS spectra of LNCM-2; (b) Atomic percent of Li, Ni, Mn, Co, and O in XPS spectra of LNCM-2 with different etching depths.

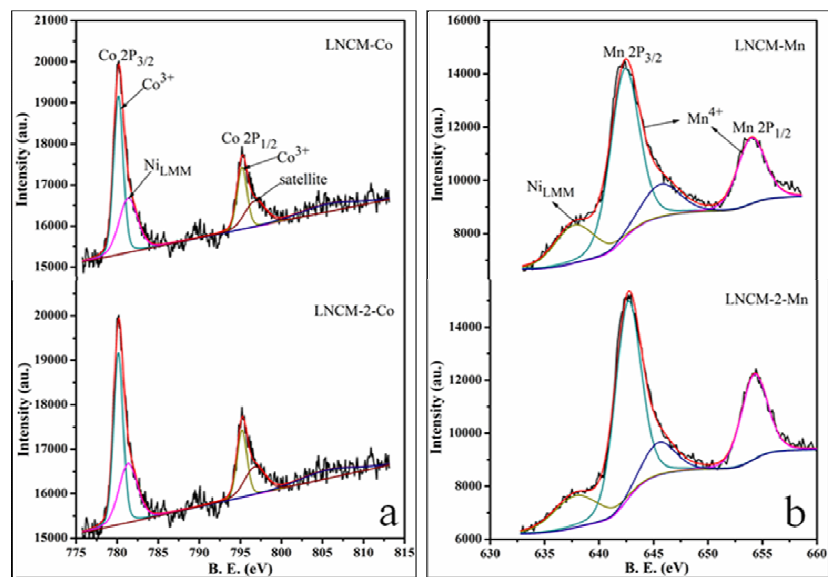


Figure S7. XPS survey spectra of (a) Co and (b) Mn.

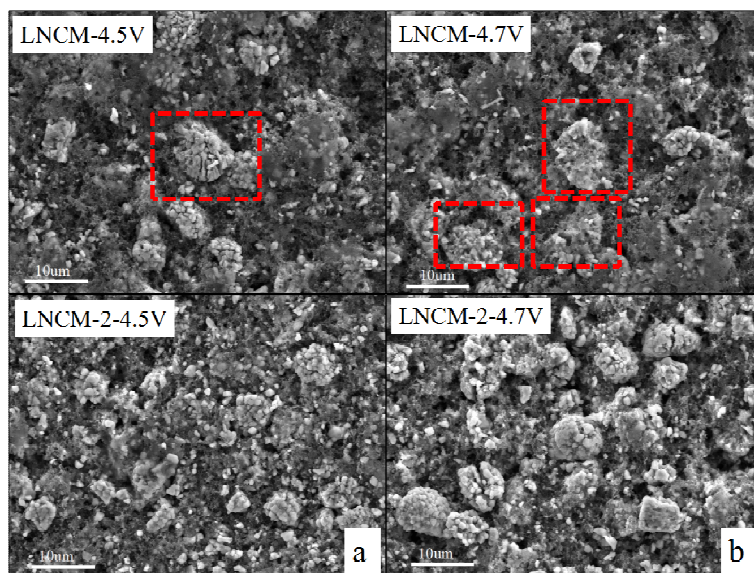


Figure S8. Original SEM images of LNCM and LNCM-2 after 100 cycles at 0.5 C at (a) 3-4.5 V; or (b) 3-4.7 V.

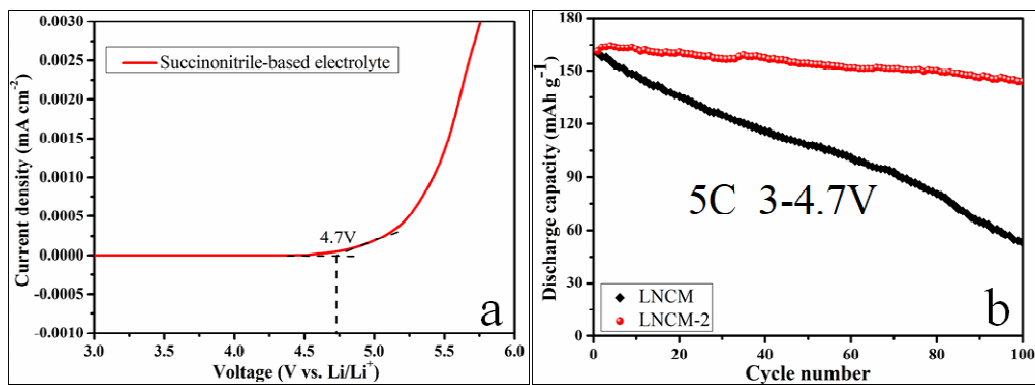


Figure S9. (a) Linear sweep curve of succinonitrile-based electrolyte at 0.5 mV s^{-1} ; (b) Cycles performance of LNCM and LNCM-2 at 5 C at 3-4.7 V vs. Li/Li⁺.

Supporting Tables

Table S1. S_{specific} and V_{pore} of LNCM, LNCM-1, LNCM-2, and LNCM-3.

	S_{specific} ($\text{m}^2 \text{ g}^{-1}$)	V_{pore} ($\text{cm}^3 \text{ g}^{-1}$)
LNCM	18.624	1.764×10^{-2}
LNCM-1	29.263	2.268×10^{-2}
LNCM-2	42.008	3.48×10^{-2}
LNCM-3	30.687	2.566×10^{-2}