

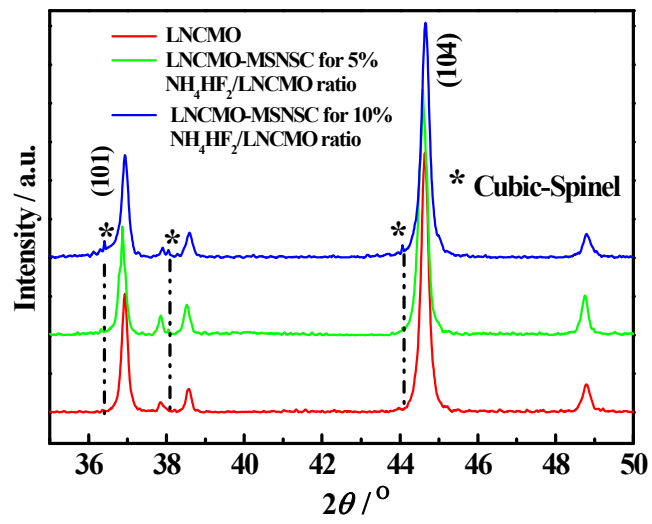
Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A  
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## Supporting Information

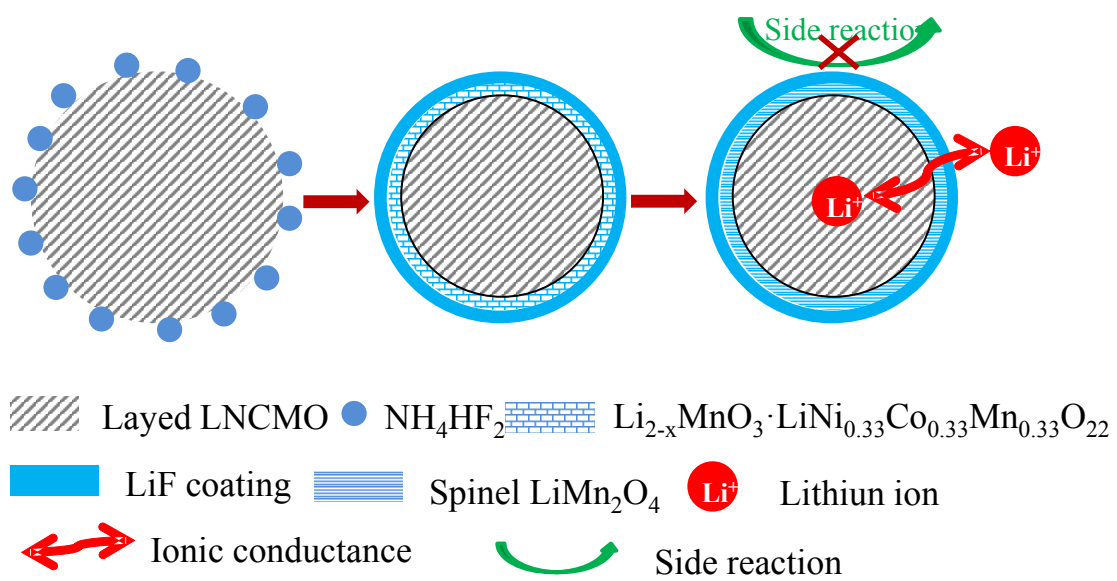
### A Li-Rich Oxide Cathode Material with Mosaic Spinel Grain and Surface Coating for High Performance Li-Ion Batteries

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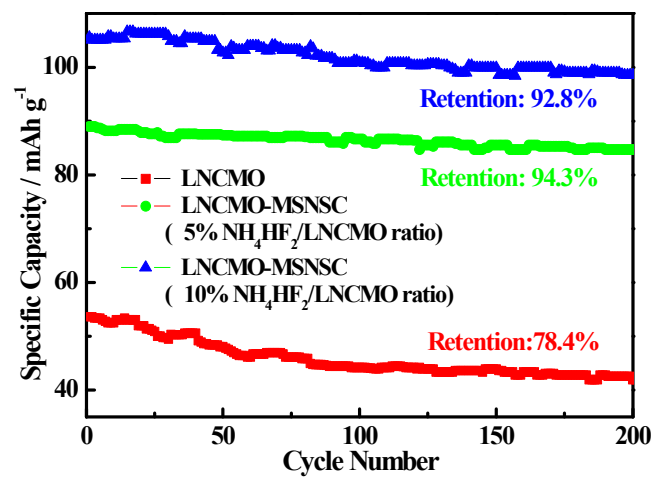
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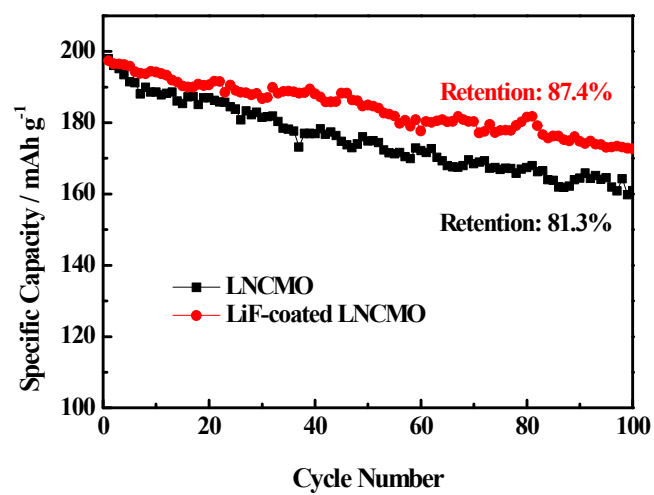
**Figure S1.** Powder XRD patterns of the LNCMO and LNCMO-MSNSC materials in 35°-50° region.



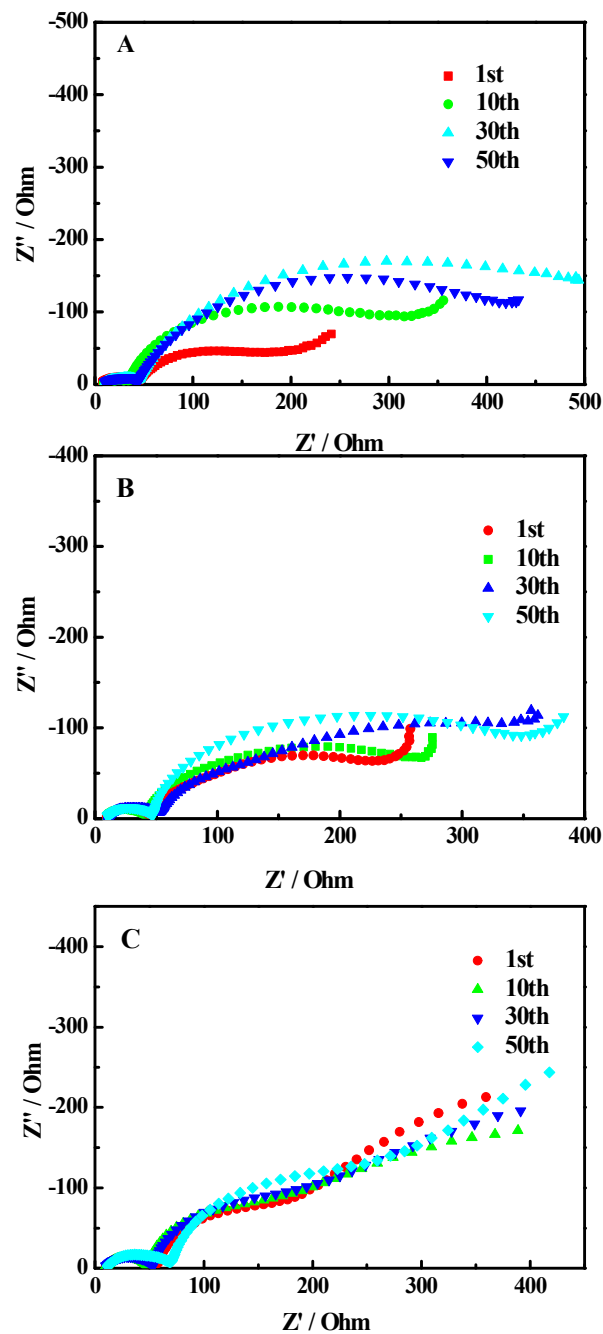
**Figure S2.** Schematic diagram of layer-to-spinel phase transformation during the surface modification and beneficial effects of LiF coating and Spinel



**Figure S3.** Cycling performance of the LNCMO and LNCMO-MSNSC electrodes between 2.0 V and 4.6 V at a current density of 1000 mA g<sup>-1</sup>.



**Figure S4.** Cycling performance of the LNCMO and LiF-coated LNCMO electrodes between 2.0 V and 4.6 V at a current density of 30 mA g<sup>-1</sup>.



**Figure S5.** Nyquist plots of (A) LNCMO, (B) LNCMO-MSNSC for 5%  $\text{NH}_4\text{HF}_2/\text{LNCMO}$  ratio, and (C) LNCMO-MSNSC for 10%  $\text{NH}_4\text{HF}_2/\text{LNCMO}$  ratio electrodes at 4.3 V.