Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.


# Supporting Information

## Enhancing the long-cycling performance of $LiNi_{0.8}Co_{0.15}Al_{0.05}O_2$@$LaNiO_3$ cathode material by Surface Modification

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### Experimental S1

The dissolved amount of transition metal is investigated by the following steps: immerse the uncirculated positive electrode in the electrolyte (vacuum oven) at 55°C, and take out 10ml of the electrolyte after 1-3 weeks to analyze the content.

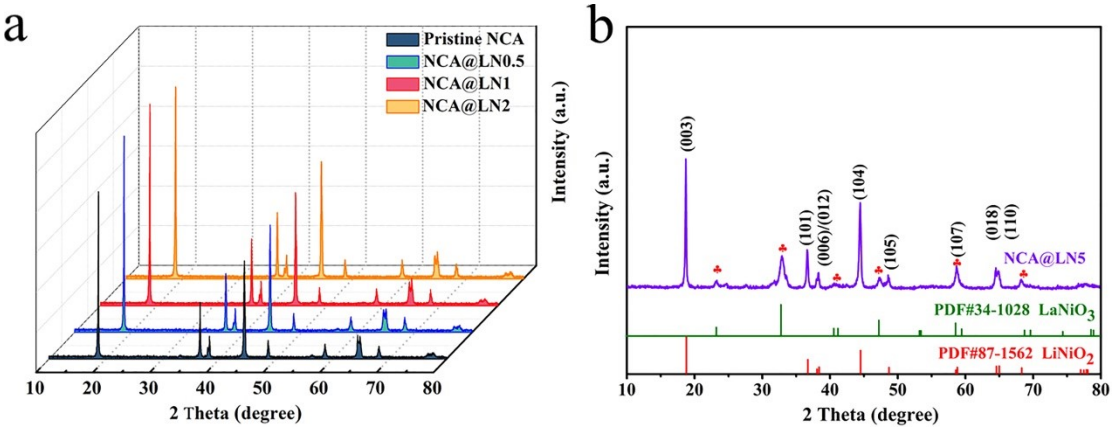


**Figure S1.** XRD patterns of (a) pristine NCA, NCA@LN0.5, NCA@LN1, and NCA@LN2, (b) NCA@LN5.

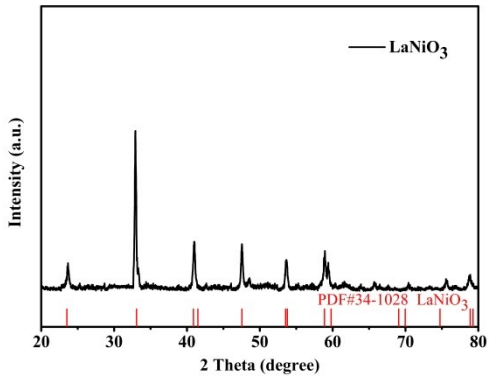


**Figure S2.** XRD patterns of $LaNiO_3$.

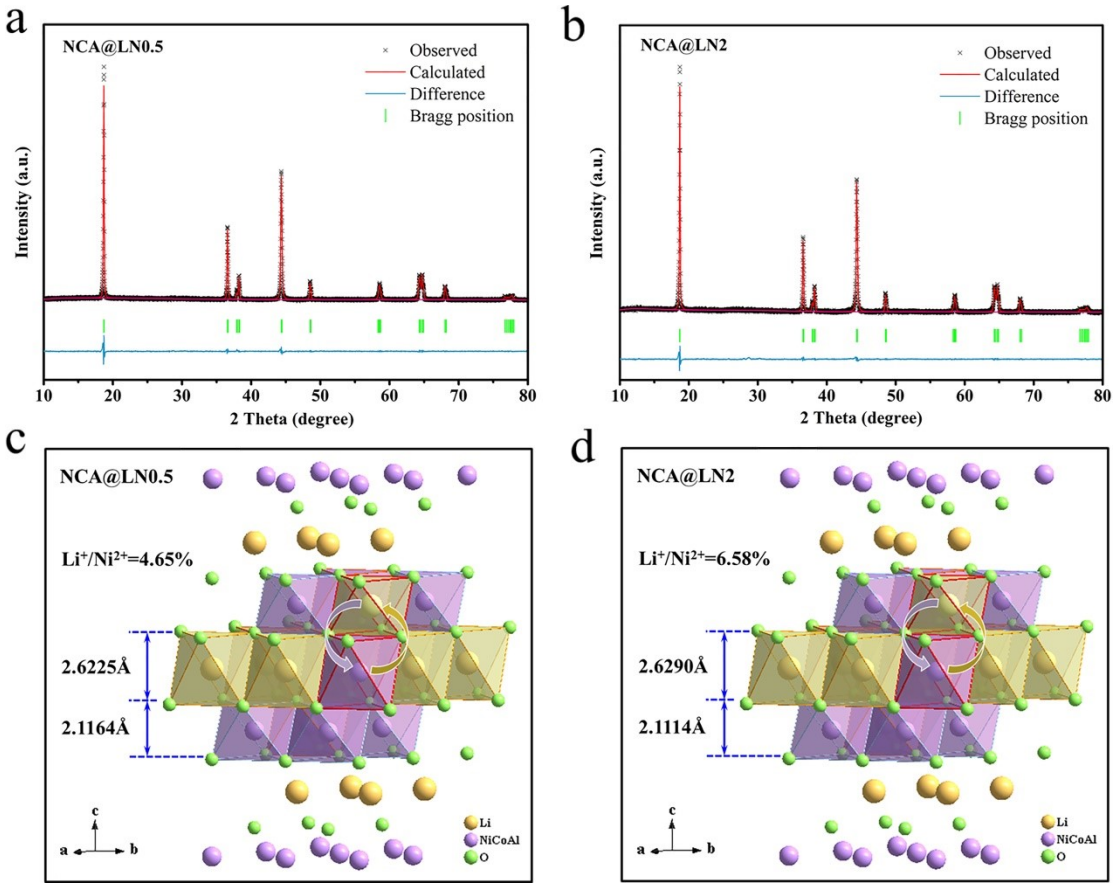


**Figure S3.** XRD patterns of (a) NCA@LN0.5 and (b) NCA@LN2 cathode materials; The crystal structures of (c) NCA@LN0.5 and (d) NCA@LN2 cathode materials by Rietveld refinement.

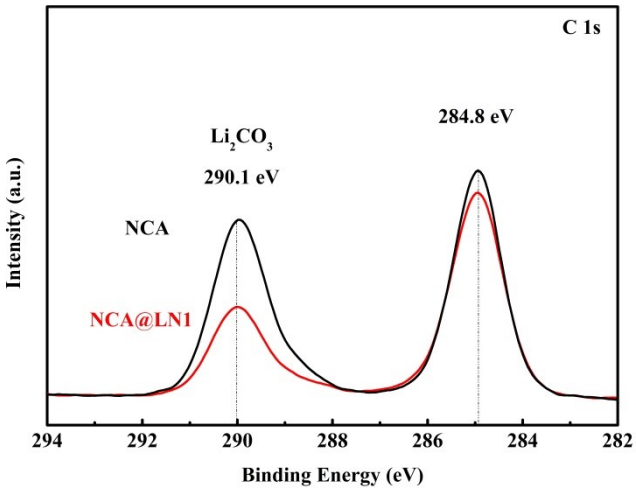


**Figure S4.** C 1s spectra of pristine NCA and NCA@LN1.

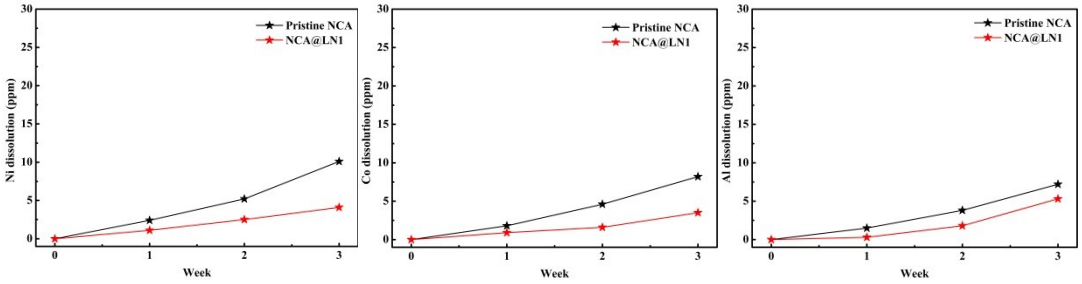


**Figure S5.** Dissolved amounts of metals of Ni, Co, and Al under different storage times at 55 °C.