Regeneration of Spent NCM622: Reconstructing Rich Lattice Oxygen Surface towards High-stable Properties

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Fig.S1. Rietveld refinement for S-NCM and F-NCM.



Fig.S2. High-resolution Ni 2p spectrum of R-NCM-700°C and R-NCM-900°C.



Fig.S3. High-resolution O 1s spectrum of R-NCM-700°C, R-NCM-900°C and C-

NCM.



Fig.S4. The SEM images of all of the samples.



Fig.S5. The TEM images of S-NCM, F-NCM and R-NCM-800°C.



Fig.S6. The HRTEM images and the corresponding SAED patterns of F-NCM.



Fig.S7. The cycling performance of S-NCM and C-NCM at 1.0 C.





Fig.S8. The charge-discharge curves for S-NCM and F-NCM at 5.0 C.

Fig.S9. The CV curves of S-NCM and F-NCM in the voltage range of 2.8-4.3 V.



Fig.S10. The rate capabilities of S-NCM and C-NCM.



Fig.S11. CV curves of all of the samples at different scan rates ranging from 0.3 to 1.1 mV s^{-1} .



Fig.S12. The diffusion coefficient for all of the samples.



Fig.S13. The contour maps of CV curves about S-NCM at different scan rates.



Fig.S14. Nyquist plots for regenerated samples after 2 and 102 cycles.



Fig.S15. The equivalent circuit.



Fig.S16. Schematic diagram of the measured voltage points and in situ EIS of cycled regenerated samples during charge/discharge.



Fig.S17. XPS spectra of O 1s, and F 1s for regenerated samples after 200 cycles at 1.0 C.



Fig.S18. SEM images of cathode electrode after 200 cycles at 1.0 C.



Fig.S19. Raman spectra of pristine F-NCM and after 200 cycles at 1.0 C.

Samples	Li contents
S-NCM	0.78
F-NCM	1.07
R-NCM-700°C	1.08
R-NCM-800°C	1.08
R-NCM-900°C	1.03

Table S1. The Li contents (the relative molar ratio of transition metals and Li ions) for all of the samples.