Elucidating the Origins of Rapid Capacity Fade in Hybrid Garnet-Based Solid-State Lithium Metal Batteries

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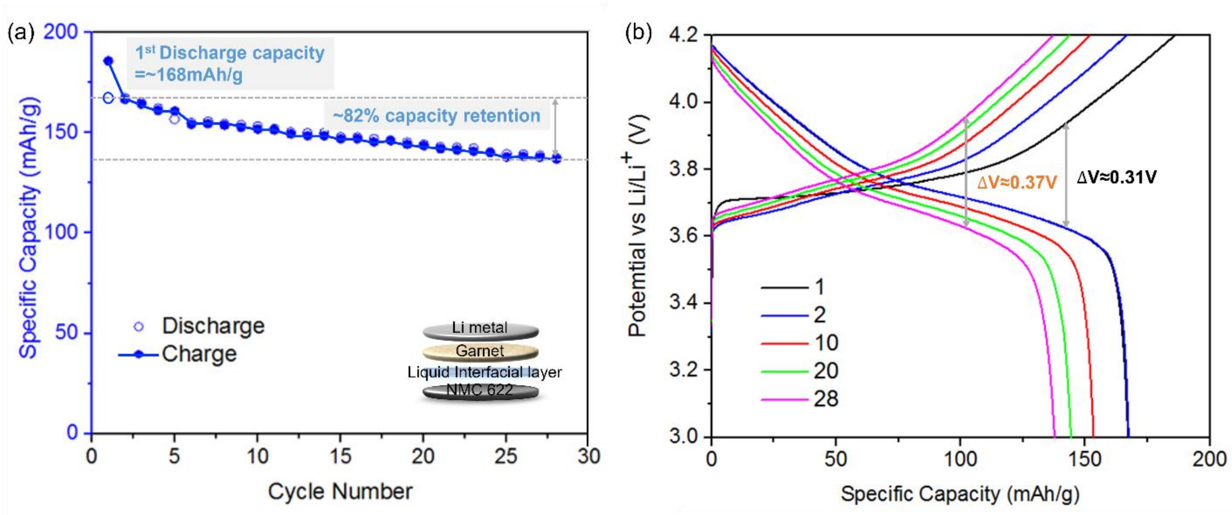

Figure S1 (a) Cycling performance at ~0.05C. (b) Galvanostatic charge/discharge curves at ~0.05C.

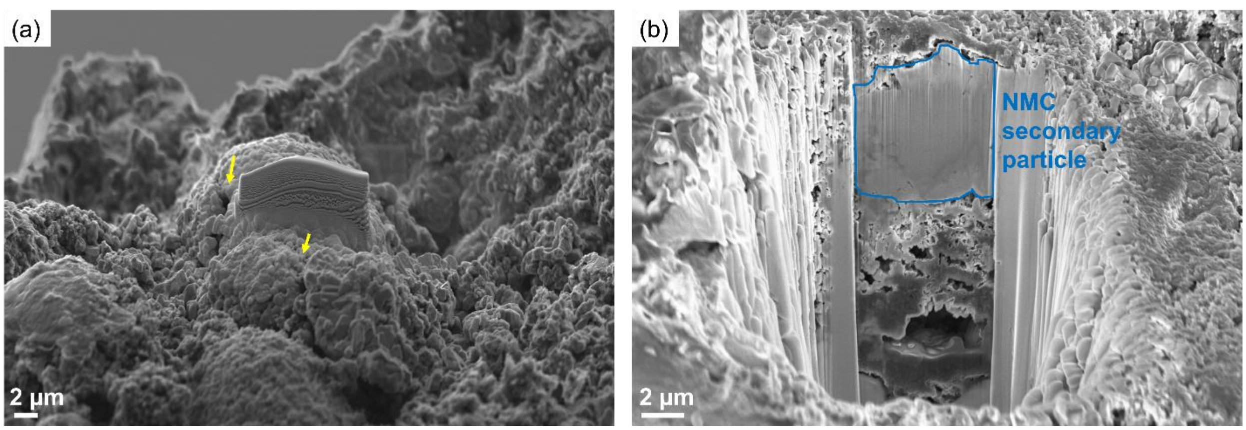

Figure S2 FIB-SEM image of NMC 622 secondary particles after 1 cycle. (a) Top view. Yellow arrows show various locations of cracks. (b) Cross-sectional view. The region highlighted in navy blue is one NMC 622 secondary particle.

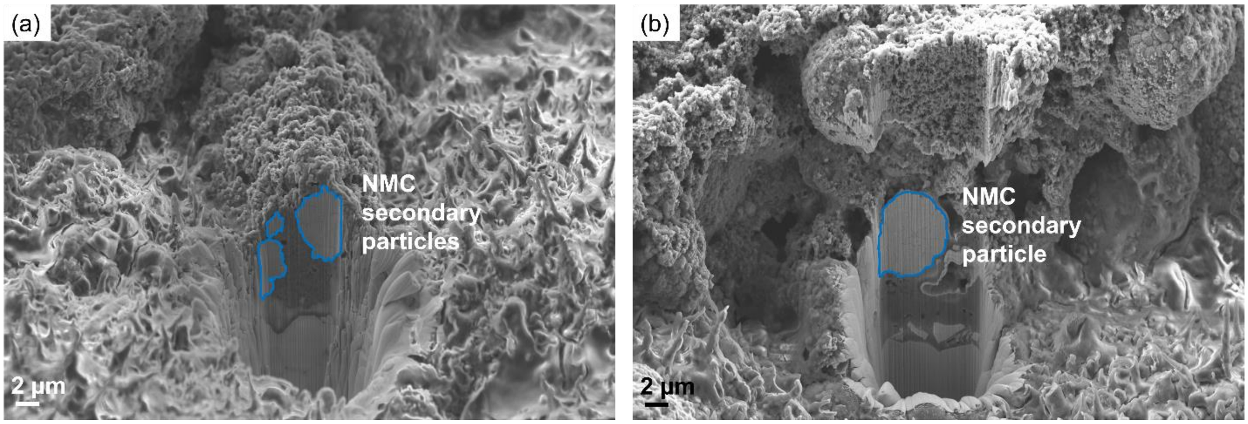

Figure S3 (a)-(b) Cross-sectional view FIB-SEM images of NMC 622 secondary particles from different spots after 28 cycles. The regions highlighted in navy blue are NMC 622 secondary particles.

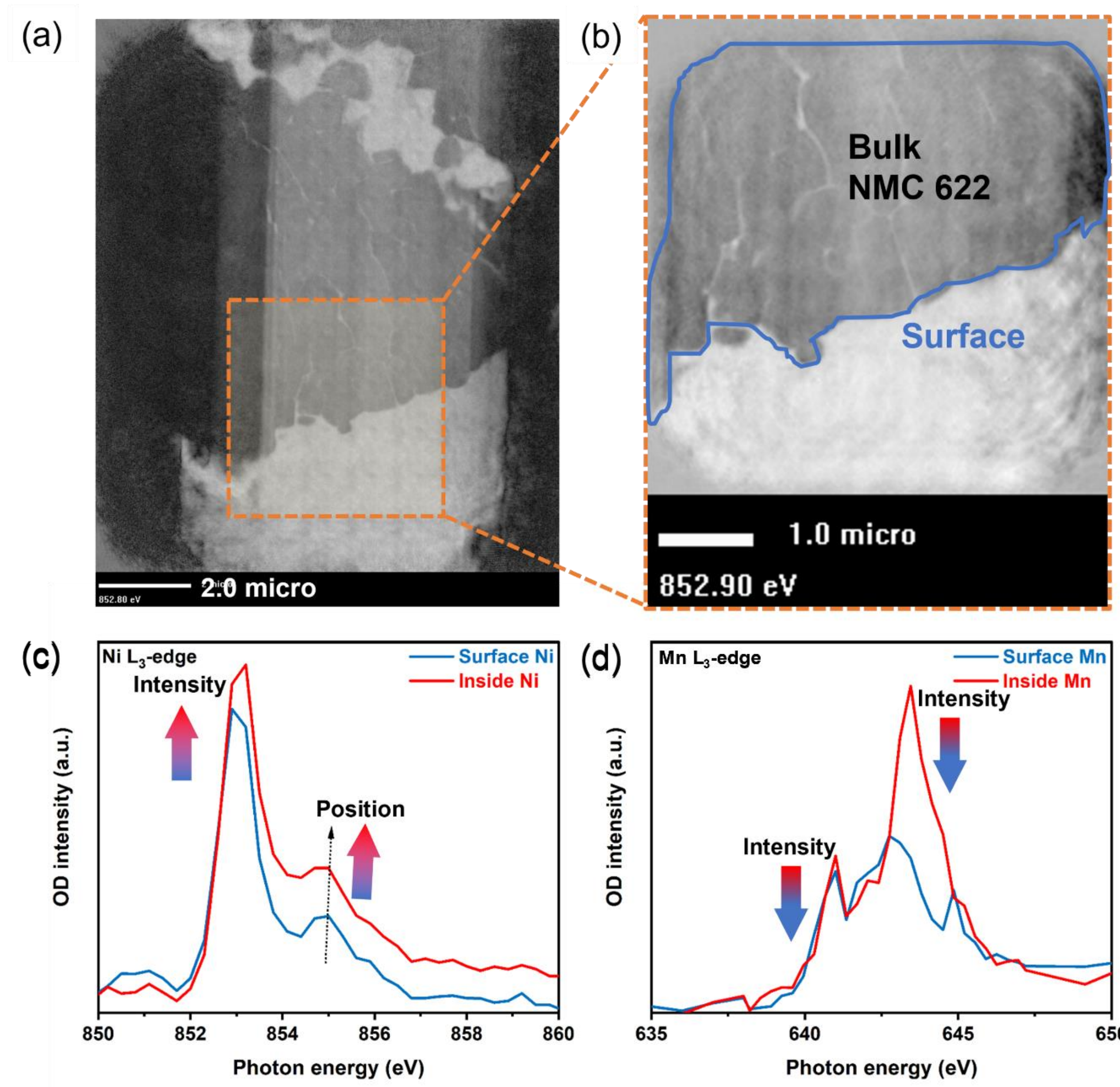

Figure S4 (a)-(b) Ptychography STXM amplitude images for surface and inside (bulk) of 1-cycled NMC 622 secondary particles. (c)-(d) XAS spectra for surface and inside (bulk) of 1-cycled NMC 622 secondary particles.

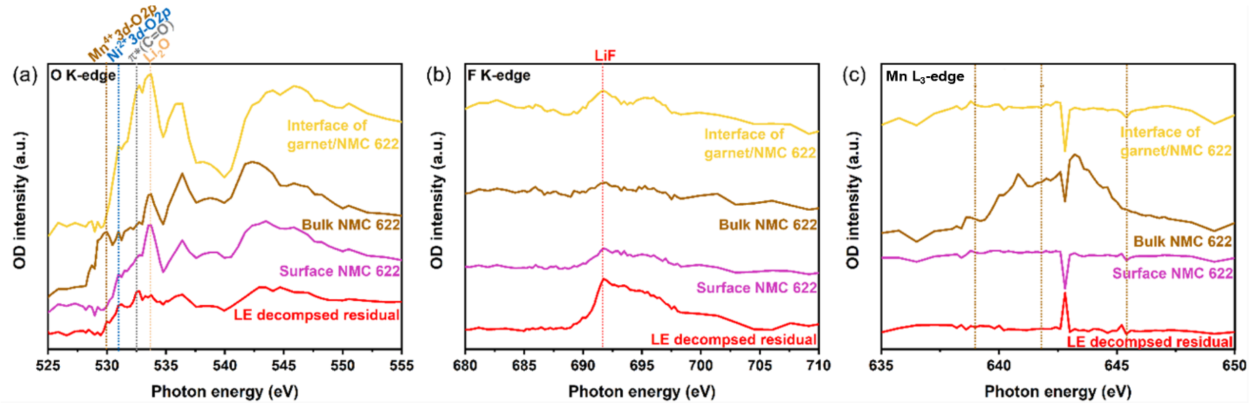

Figure S5 XAS spectra for NMC_28. (a) O K-edge; (b) F K-edge; (c) Mn L_3-edge from repeated STXM mapping of the same sample region.

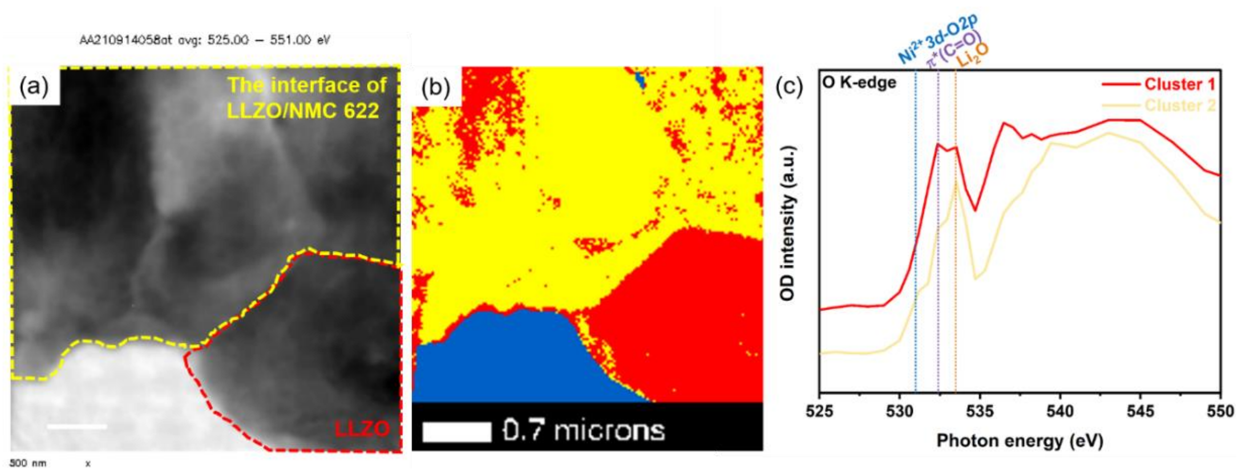

Figure S6 (a) Ptychography STXM amplitude image. (b) Elemental distribution mapping at the O K-edge of the region between the 28-cycled cathode and the garnet electrolyte. (c) XAS spectra of the O K-edge.