

Support Information

Ultra Stable Lithium Plating Process Enabled by Nanoscaled Interphase of Macromolecular Additive

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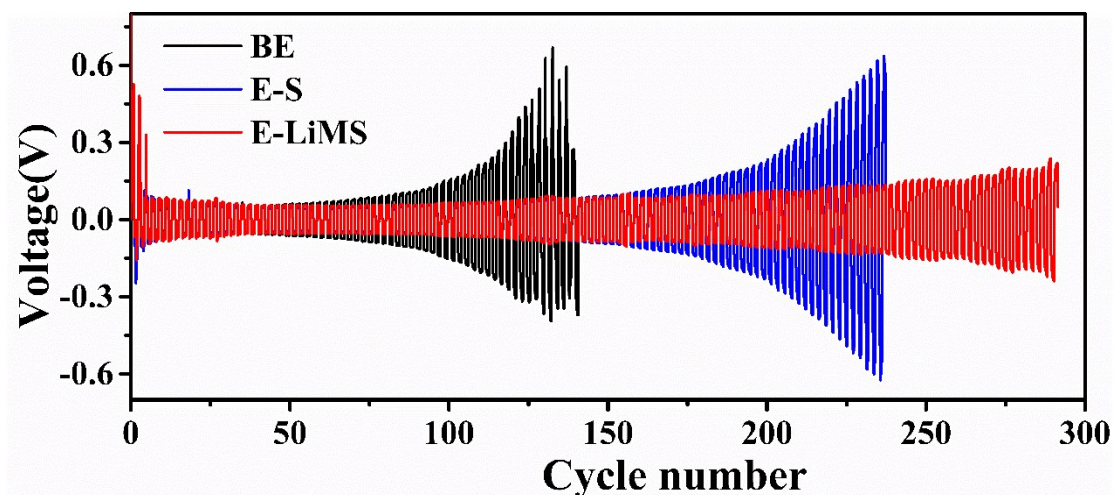


Fig. S1 Voltage profiles of symmetric cells at the current of 1.0 mA/cm^2 and the fixed areal capacity 1 mAh/cm^2 with the electrolytes of BE, E-S and E-LiMS.

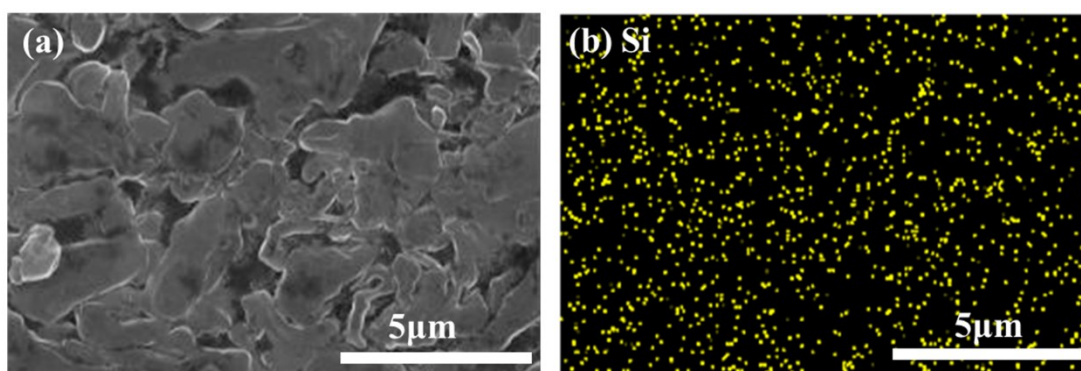


Fig. S2 Morphologies of lithium anodes after 20 cycles under the areal capacity of 1 mAh/cm^2 and current density of 0.5 mA/cm^2 , (a) surface morphology of lithium anode cycled with E-LiMS, and (b) the corresponding EDS mapping of silicon.

The EDS mapping illustrates that LiMS is distributed on the surface of lithium anode homogeneously.

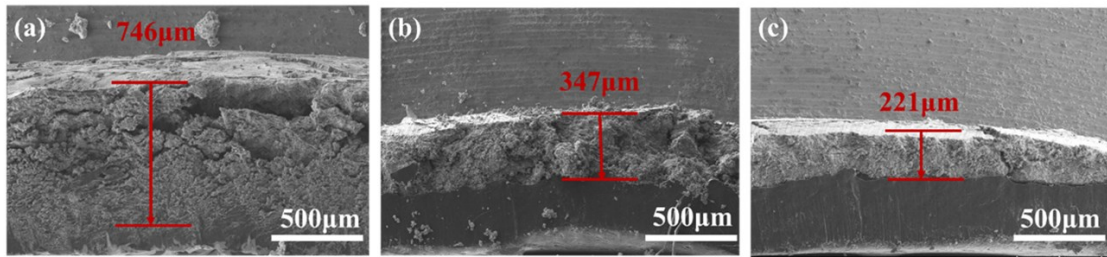


Fig. S3 SEM cross-section images after Li||Li symmetric batteries cycling 280 h (1.0 mA/cm^2 , 1 mAh/cm^2) with different electrolytes, (a) BE, (b) E-S, (c) E-LiMS.

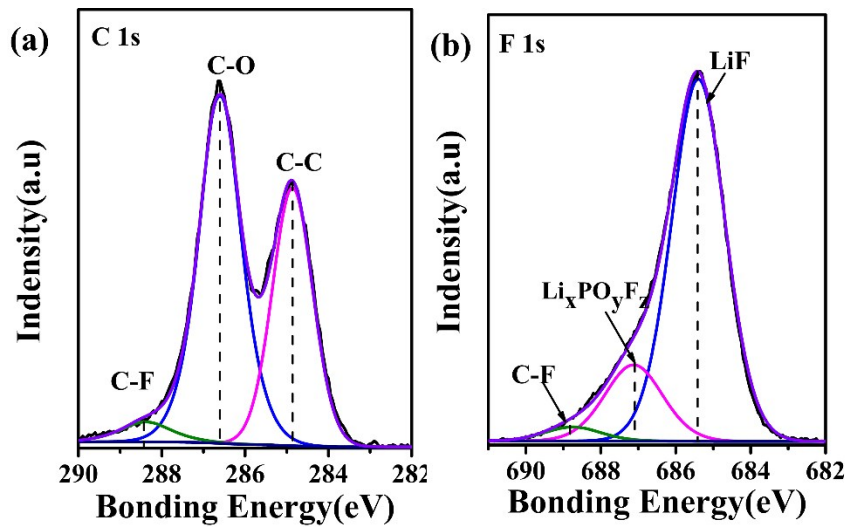


Fig. S4 XPS results after LiPF_6 and PEO reacted for 1 h at $60 \text{ }^\circ\text{C}$, (a) C 1s, (b) F 1s.

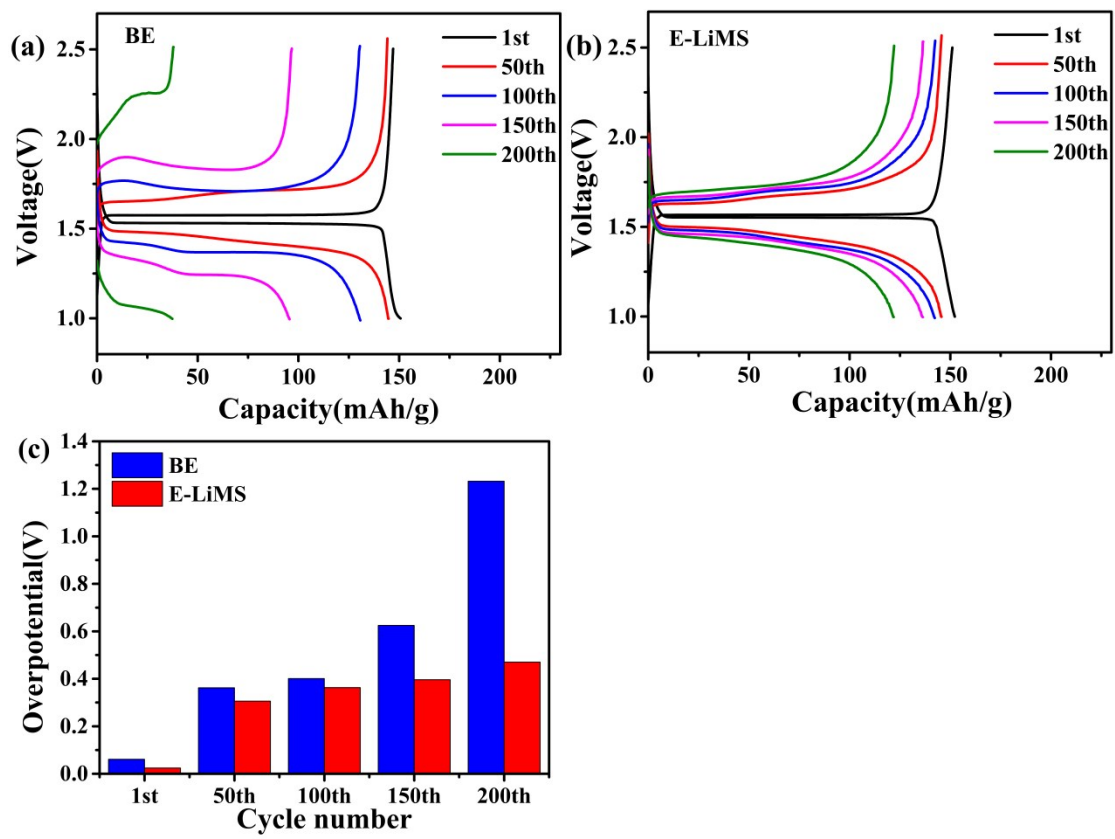


Fig. S5 Charge/discharge profiles of Li||LTO cells with different electrolytes under 60 °C at 5 C (a)

BE, (b) E-LiMS, (c) potential hysteresis of batteries with different electrolytes at selected cycles.

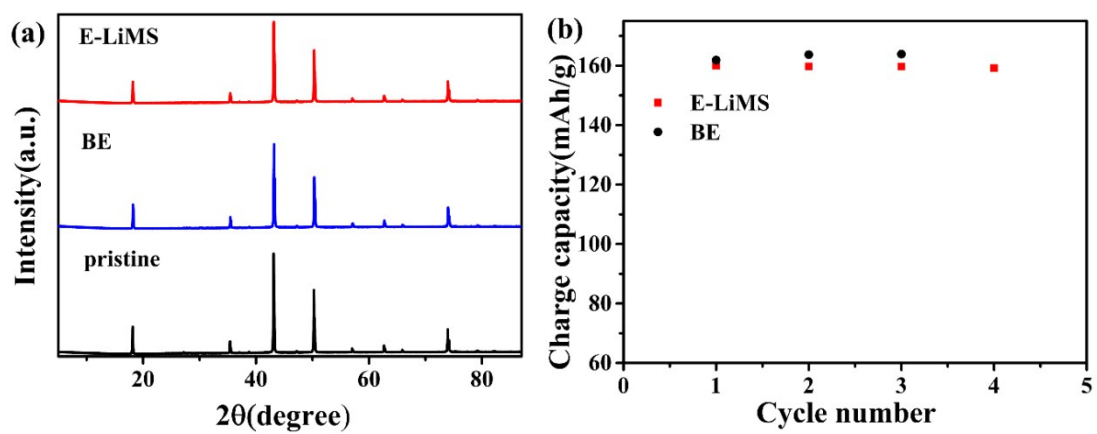


Fig. S6 Characterization of LTO electrode after cycling 200 cycles under 60 °C at 5 C, (a) XRD, (b) cycling performance of reassembled batteries with the cycled LTO electrode and fresh lithium metal anode, 0.2 C.

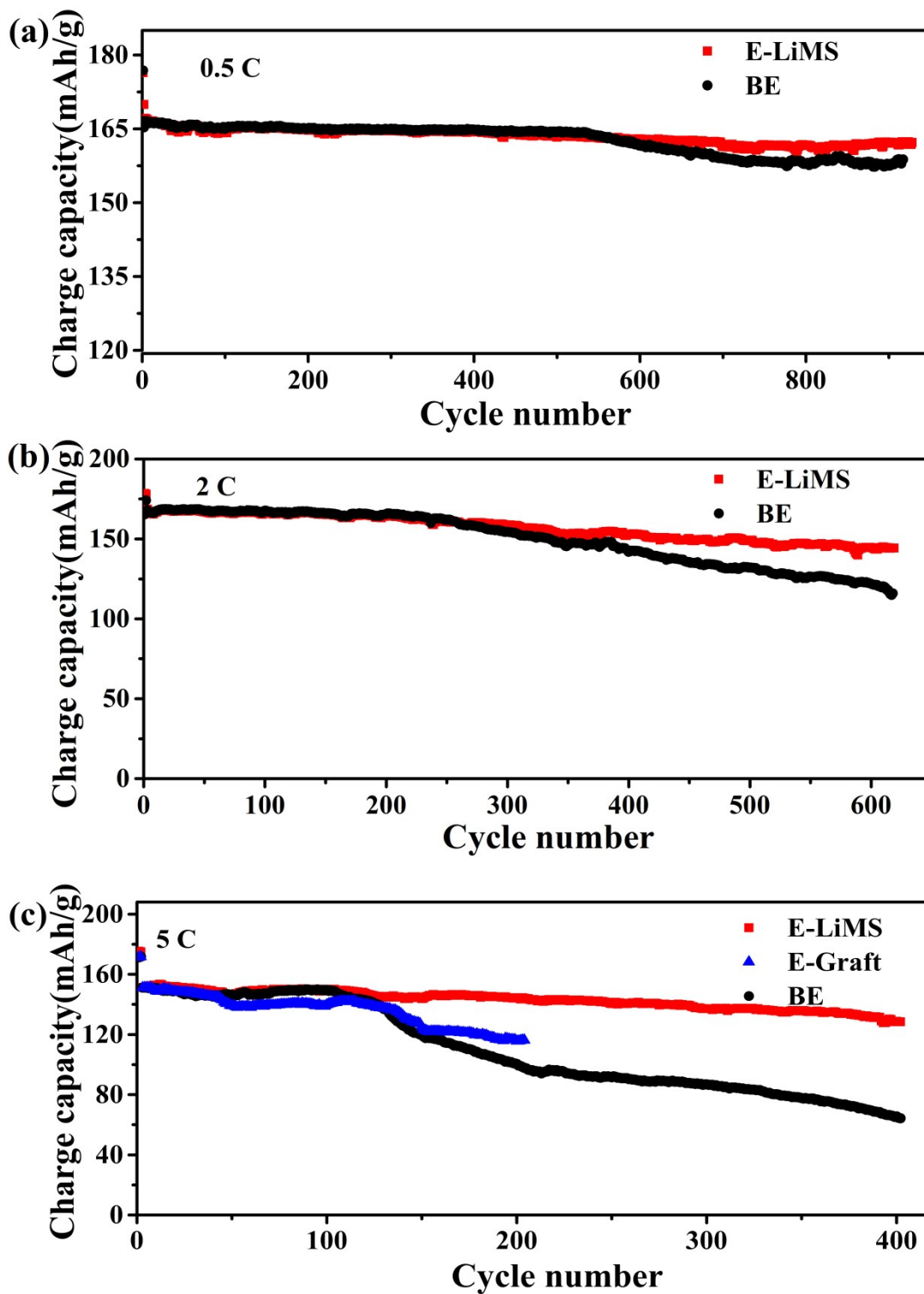


Fig. S7 Long-term stability performance of Li||LTO batteries with different electrolytes under room temperature, (a) 0.5 C, (b) 2 C, (c) 5 C.

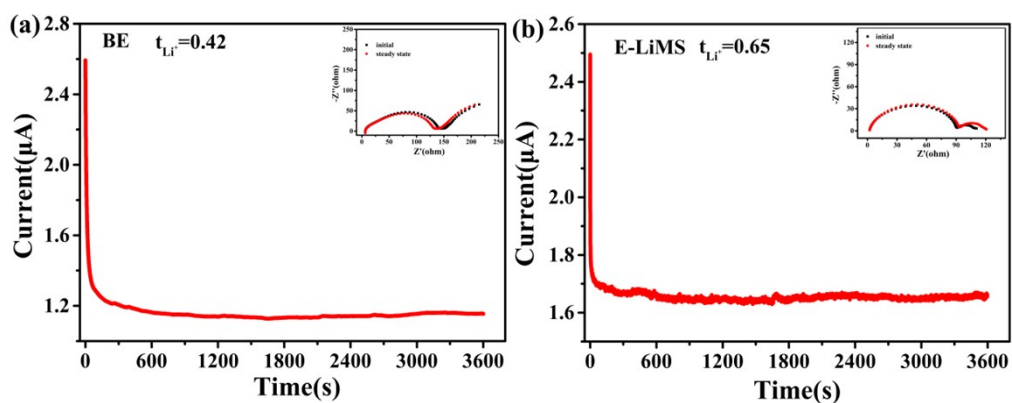


Fig. S8 The transfer number of Li^+ with different electrolytes, (a) BE, (b) E-LiMS.

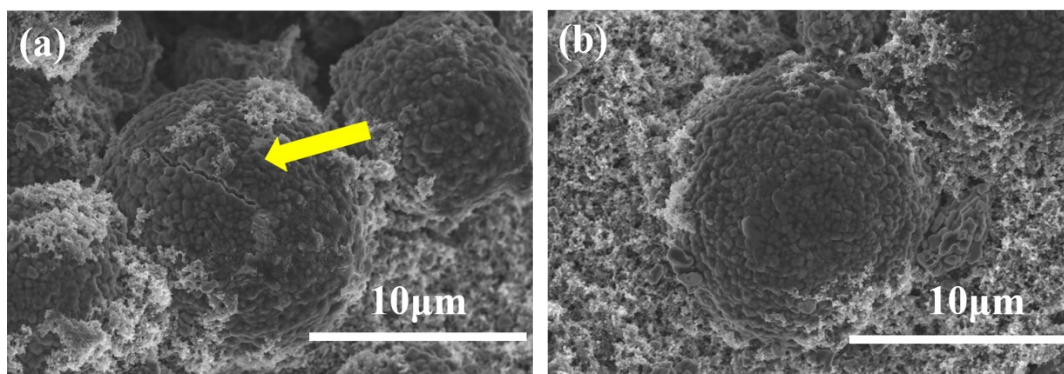


Fig. S9 SEM images of NCM811 electrode after 105 cycles between 3~4.5V, 2 C rate using different electrolytes, (a) BE, (b) E-LiMS.

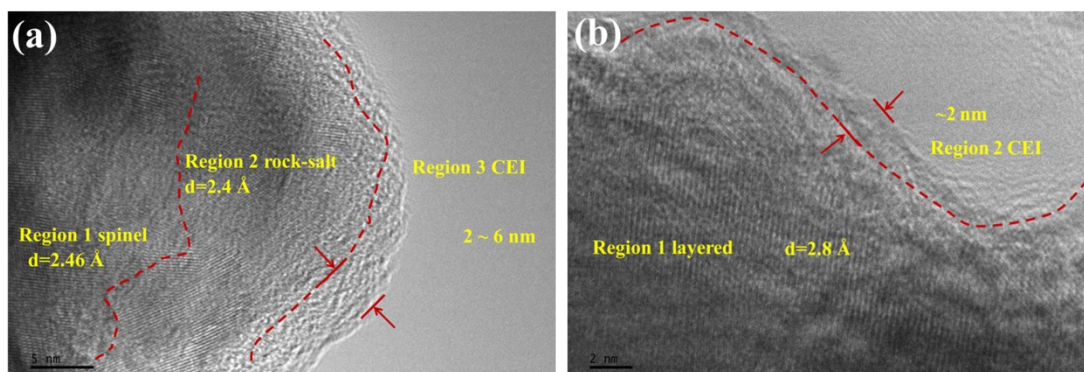


Fig. S10 TEM images of NCM811 electrode after 105 cycles between 3~4.5V, 2 C rate using different electrolytes, (a) BE, scale bars 5 nm, (b) E-LiMS, scale bars 2 nm.