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Supplementary information

Synergistic regulation of lithium nucleation and anion-rich solvation structure via silver trifluoroacetate additive for stable lithium metal anodes

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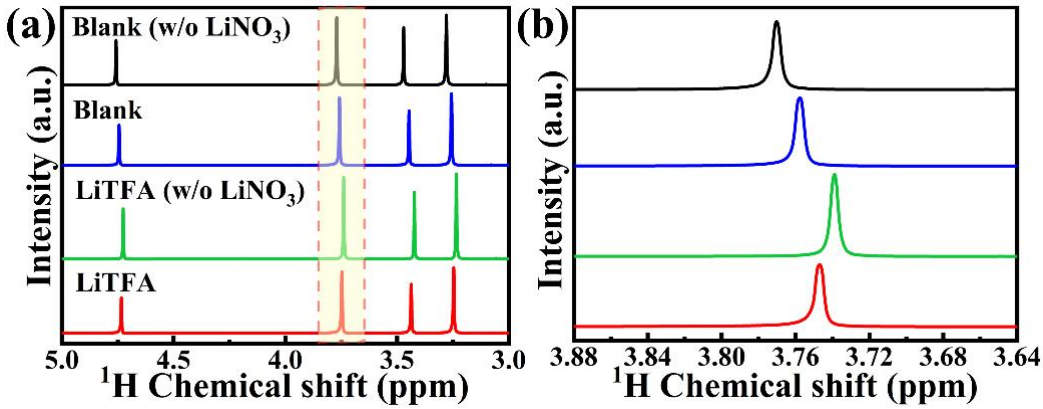

Figure S1. (a) ^{1}H NMR spectra and (b) partial enlarged image of the different electrolytes.

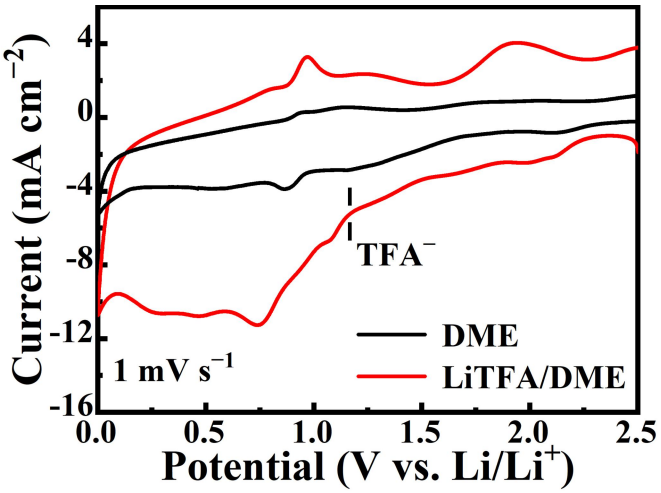

Figure S2. CV curves of Li||Cu cells using DME or 0.2 M LiTFA in DME as electrolyte.

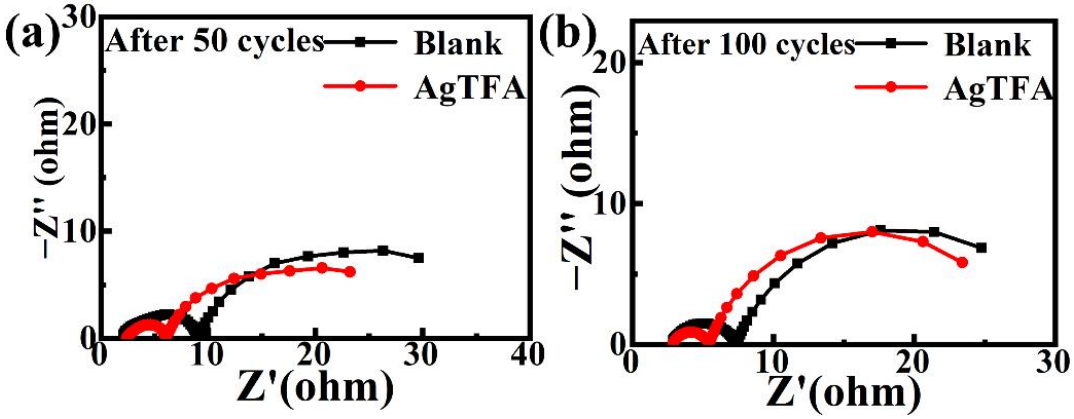

Figure S3. Electrochemical impedance spectra (a) after 50 cycles and (b) after 100 cycles of Li||Li cells with different electrolytes.

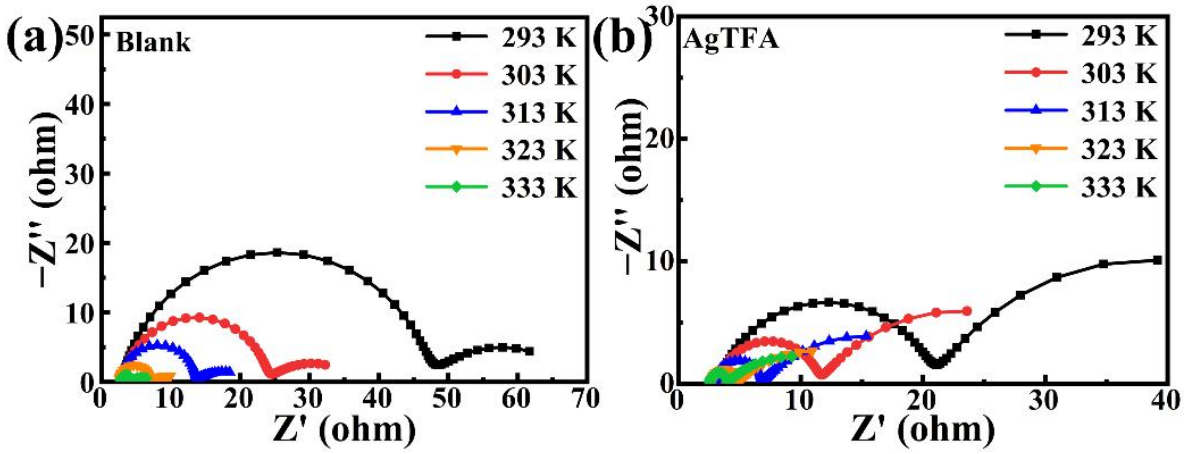

Figure S4. Electrochemical impedance spectra of Li||Li cells under different temperatures from 293 to 333 K with (a) the blank electrolyte and (b) the AgTFA electrolyte.

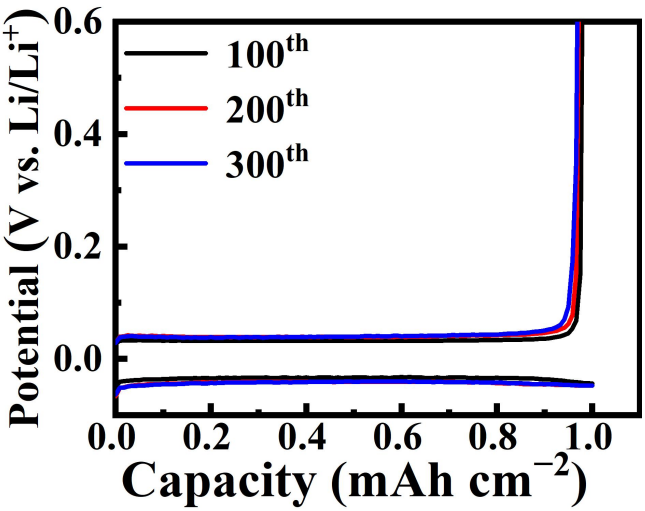

Figure S5. Voltage-capacity curves of Li||Cu cells with different electrolytes.

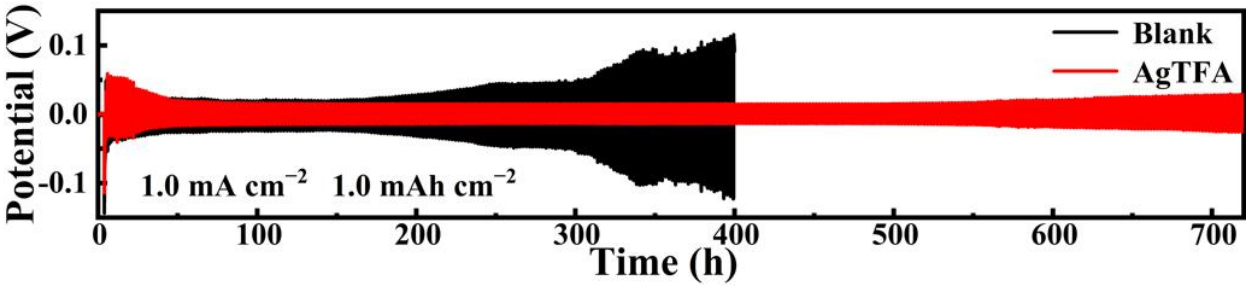

Figure S6. Cycling performance of the Li||Li cells with different electrolytes at 1.0 mA cm^{-2} for 1.0 mAh cm^{-2}.

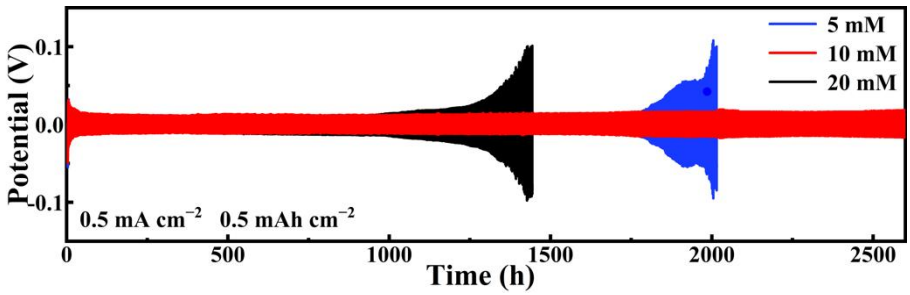

Figure S7. Cycling performance of Li||Li cells with electrolytes containing different concentrations of AgTFA additive.

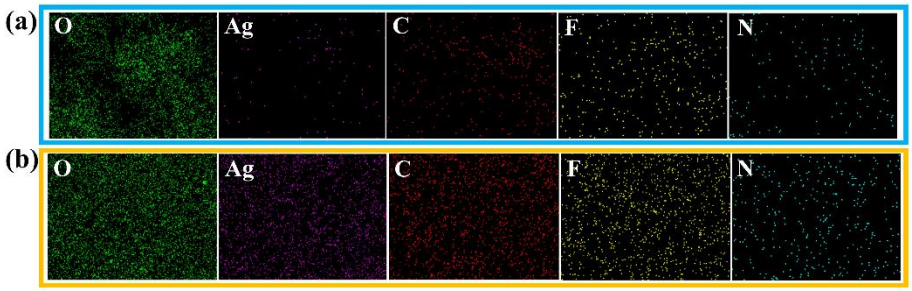

Figure S8. EDS mappings of Li metal anode surface after 10 cycles in (a) blank electrolyte and (b) AgTFA electrolyte.

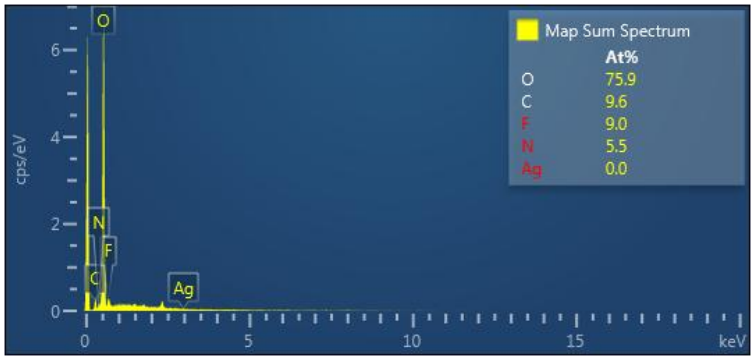

Figure S9. EDS analysis of Li metal anode surface after 10 cycles in blank electrolyte.

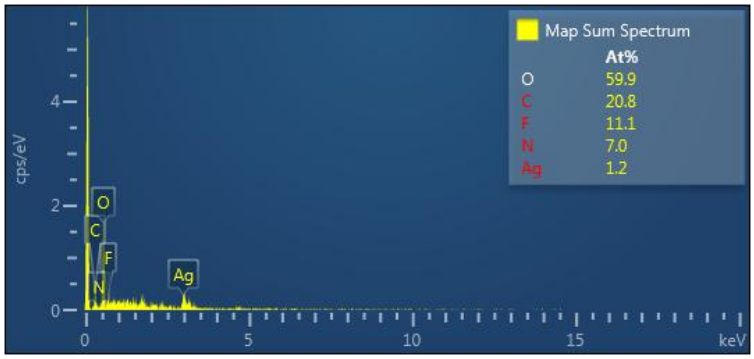

Figure S10. EDS analysis of Li metal anode surface after 10 cycles in AgTFA electrolyte.

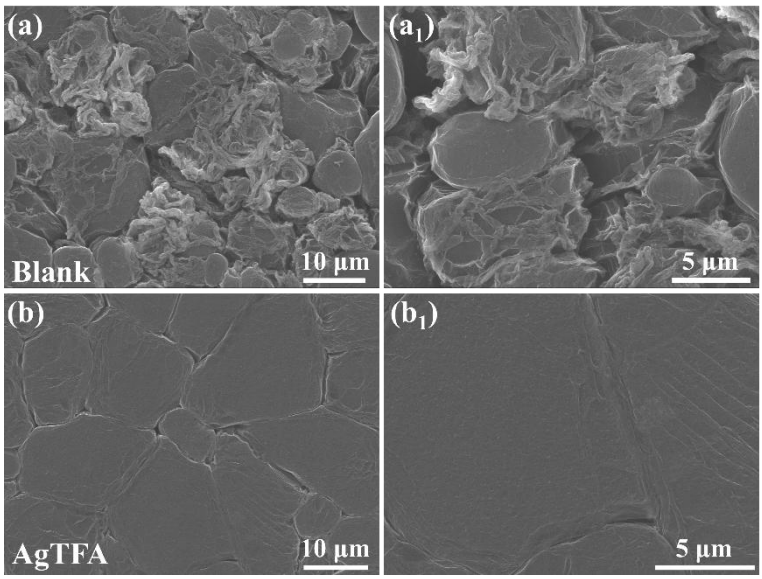

Figure S11. SEM images of Li metal anode surface after 200 cycles in (a) blank electrolyte and (b) AgTFA electrolyte.

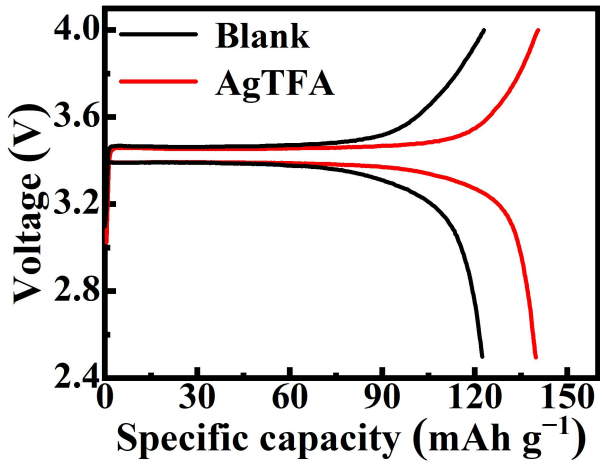

Figure S12. The 200th charge/discharge curves of Li||$LiFePO_4$ cells at 1.0 C.

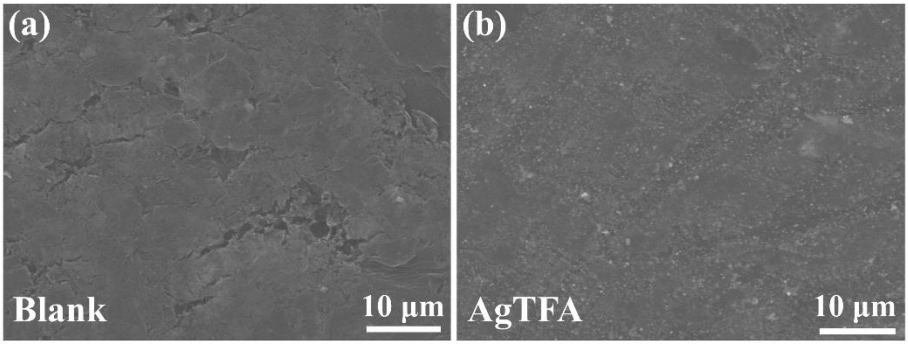

Figure S13. SEM images of Li metal anodes of Li||$LiFePO_4$ full cells using different electrolytes after 100 cycles at 1.0 C.

Table S1. The atomic percentages of F, N, and Ag elements at different depths in blank electrolyte.

Depth	F (at%)	N (at%)	Ag (at%)
0 min	3.32	1.08	0
2 min	6.35	2.77	0
4 min	5.48	2.44	0

Table S2. The atomic percentages of F, N, and Ag elements at different depths in AgTFA electrolyte.

Depth	F (at%)	N (at%)	Ag (at%)
0 min	4.19	2.05	0.28
2 min	9.4	5.43	0.5
4 min	10.92	5.13	0.71