

Supporting Information

A quasi-solid composite electrolyte with dual salts for dendrite - free lithium metal batteries

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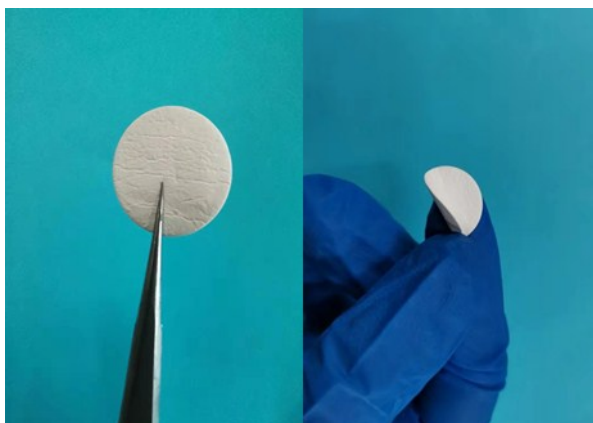


Fig. S1 Photos of the prepared electrolyte membrane with 30wt% $\text{Mg}(\text{ClO}_4)_2$.

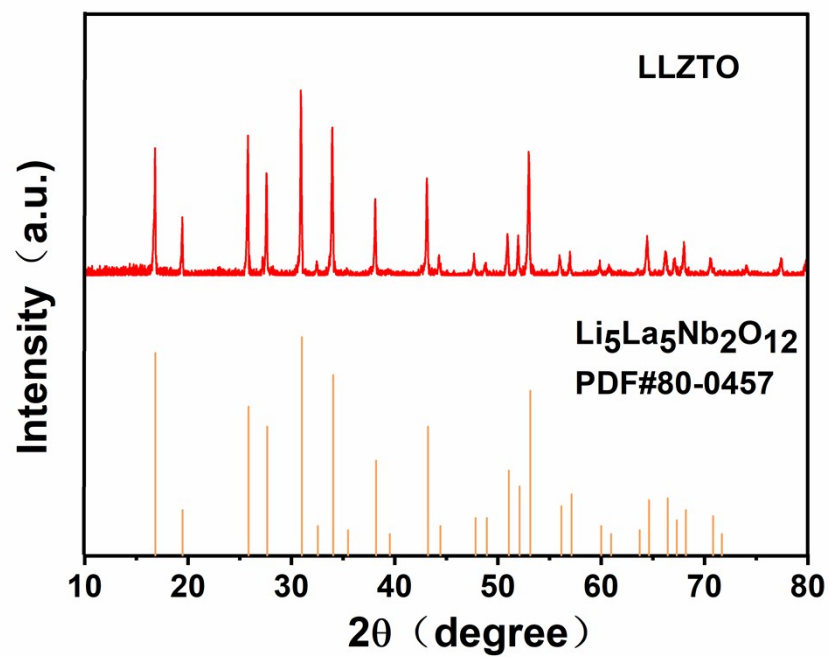


Fig. S2 XRD pattern of the as-prepared LLZTO powders.

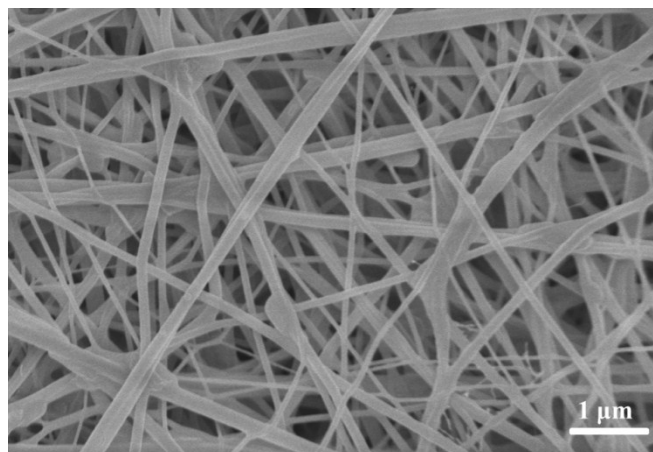


Fig. S3 SEM image of the surface of the electrolyte membrane.

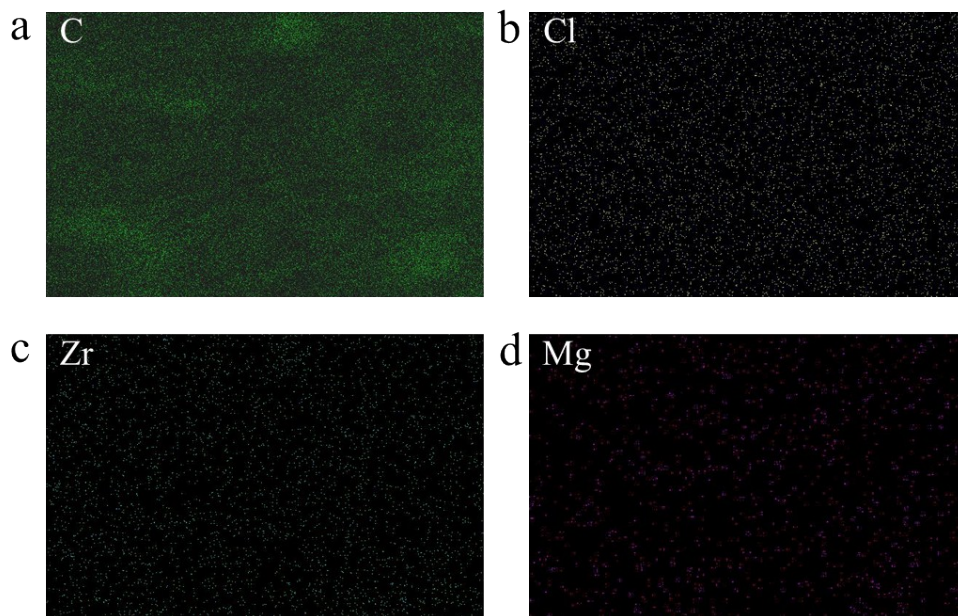


Fig. S4 EDS elemental mappings of the electrolyte membrane. (a) C, (b) Cl, (c) Zr, and (d) Mg.

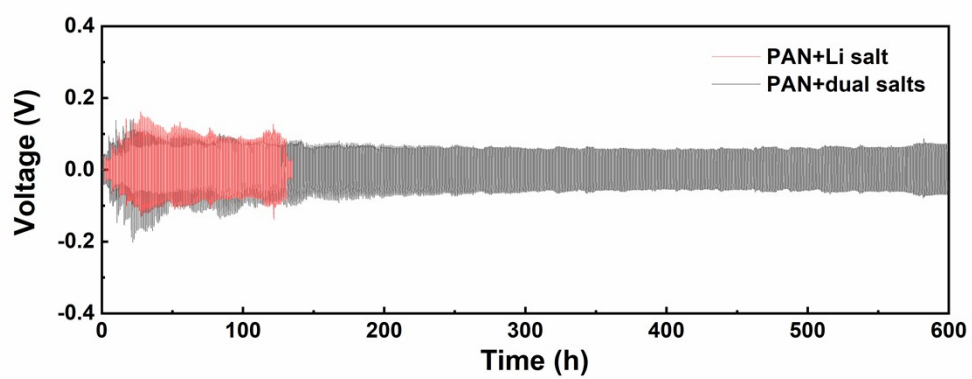


Fig. S5 Voltage profile of the lithium plating/stripping cycling in the symmetrical Li|HSE|Li cells with magnesium salt added electrolyte and electrolyte without magnesium salt.

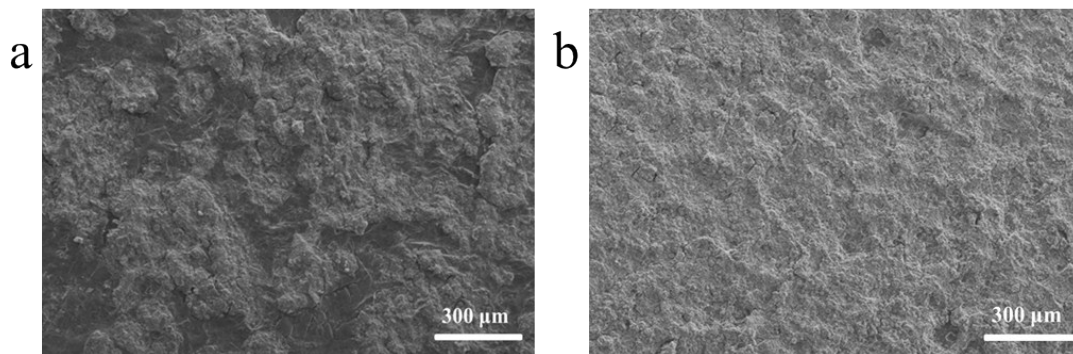


Fig. S6 (a) SEM image of the surface of metal lithium electrode in $\text{LiFePO}_4|\text{HSE}|\text{Li}$ cells without magnesium salt added electrolyte after 200 cycles. (b) SEM image of the surface of metal lithium electrode in $\text{LiFePO}_4|\text{HSE}|\text{Li}$ cells with magnesium salt added electrolyte after 200 cycles.

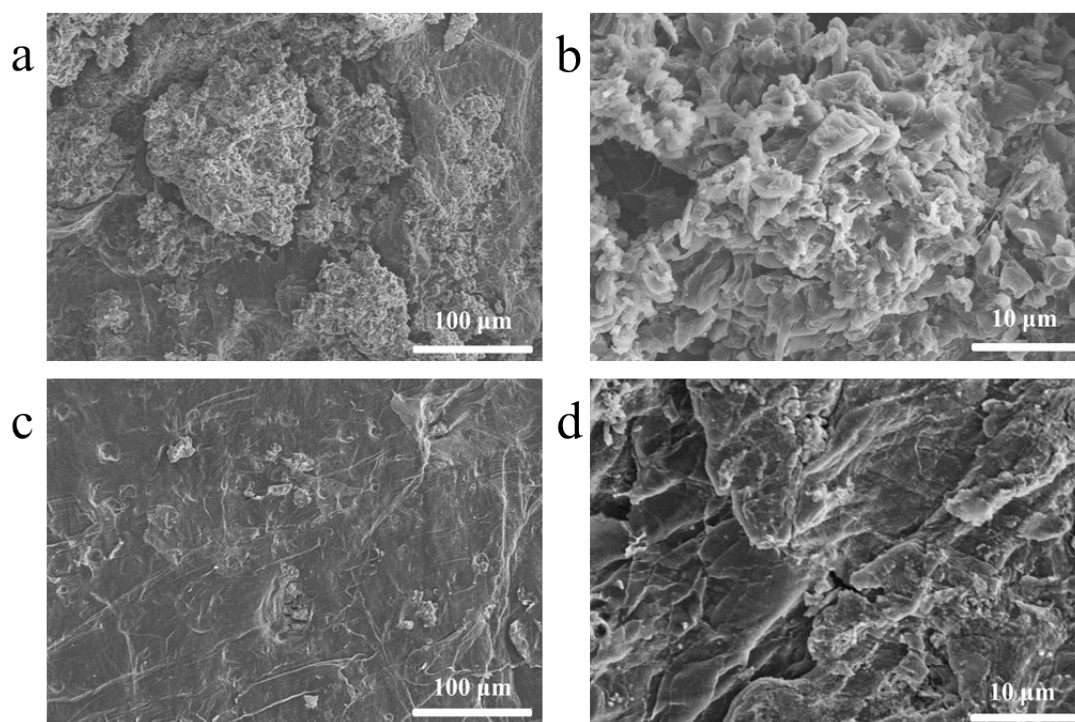


Fig. S7 (a,b) SEM image of the surface of metal lithium electrode in Li|HSE|Li cells without magnesium salt added electrolyte after tested at different current densities from 0.045~0.36 mA cm⁻² for 400 h. (c,d) SEM image of the surface of metal lithium electrode in Li|HSE|Li cells with magnesium salt added electrolyte after tested at different current densities from 0.045~0.36 mA cm⁻² for 400 h.

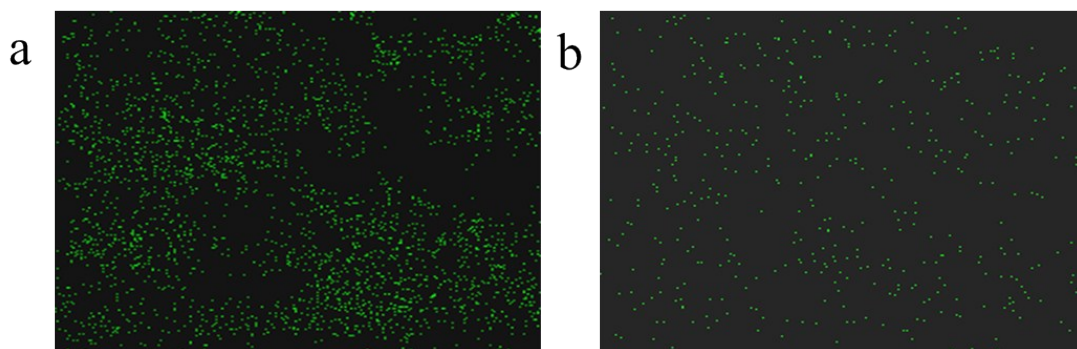


Fig. S8 EDS elemental mappings of the Li electrode of the cell with the magnesium salt added electrolyte. (a) F, and (b) Mg.

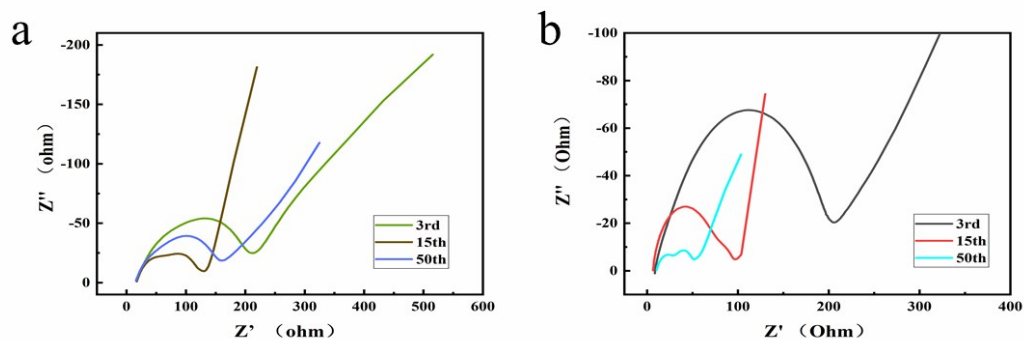


Figure S9. Nyquist impedance spectra of the cells after different cycles : (a) without magnesium salt added electrolyte and (b) with magnesium salt electrolyte.