Supporting Information

Polymerization of succinonitrile on garnet surface for preparing single-ion conducting composite solid-state electrolyte

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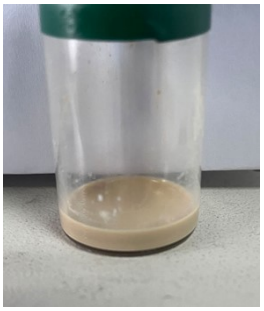

Figure S1. Optical images of the reaction product formed from the mixture of CSE60 and DMF solvent.

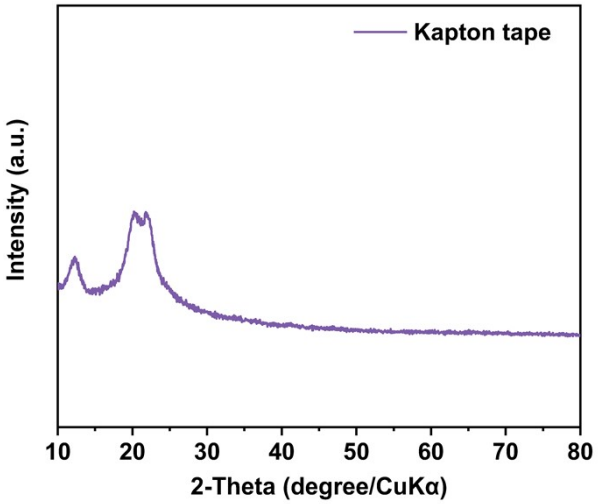

Figure S2. The XRD patterns of the Kapton tape.

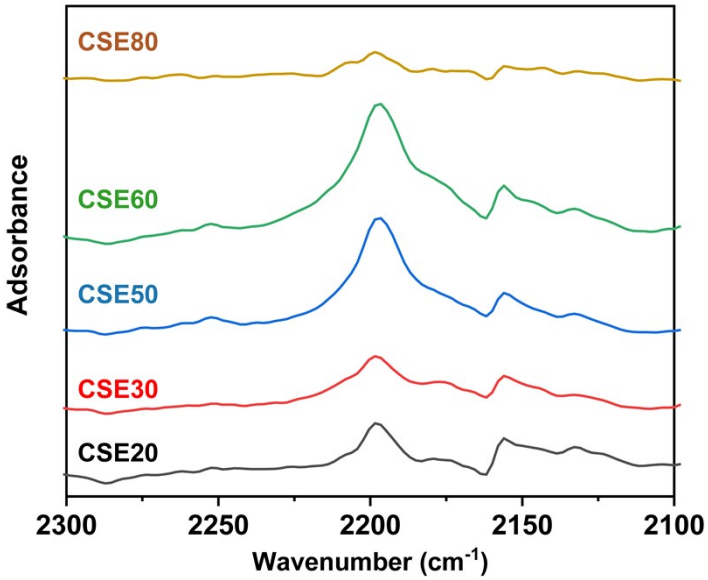

Figure S3. The FTIR spectra of CSE20, CSE30, CSE50, CSE60 and CSE80.

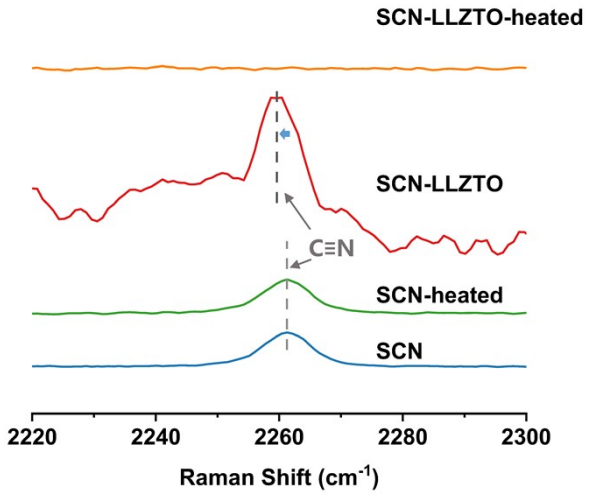

Figure S4. Raman spectra of SCN and SCN-LLZTO before and after high temperature treatment for promoting the reactions between SCN and LLZTO.

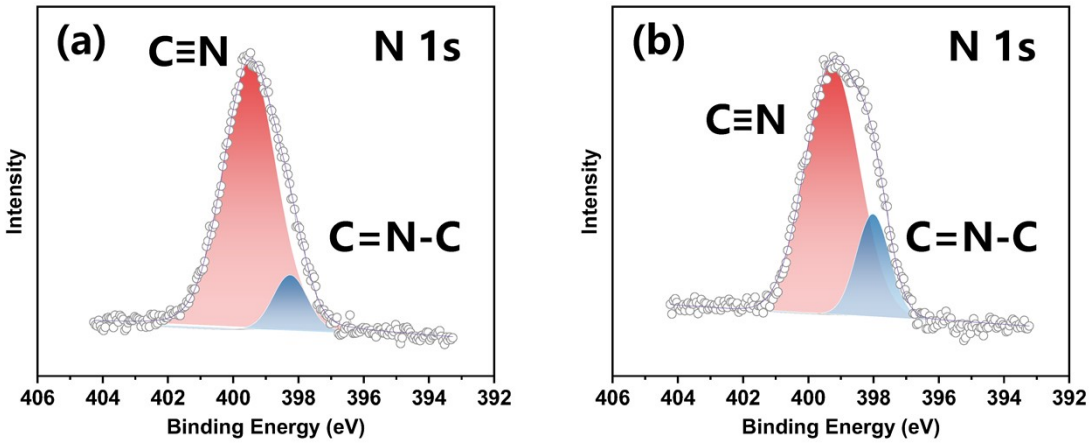

Figure S5. High-resolution XPS spectra of N 1s of (a) CSE20, (b) CSE80.

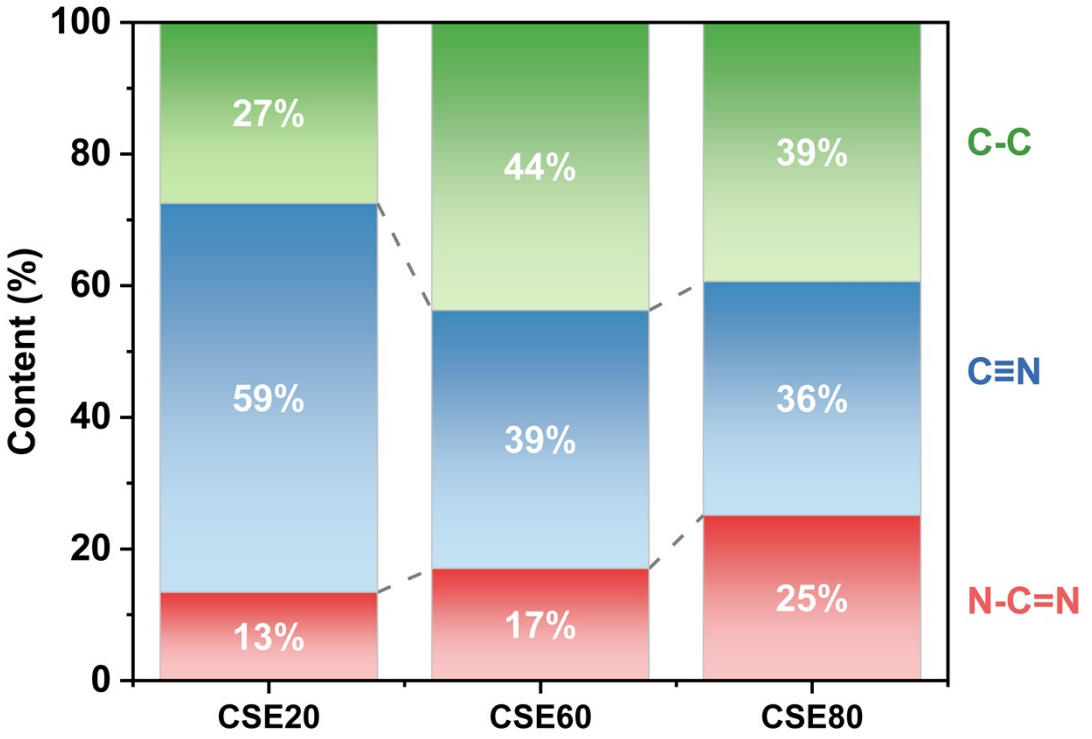

Figure S6. The relative abundance of functional groups collected from the XPS results of C 1s in CSE.

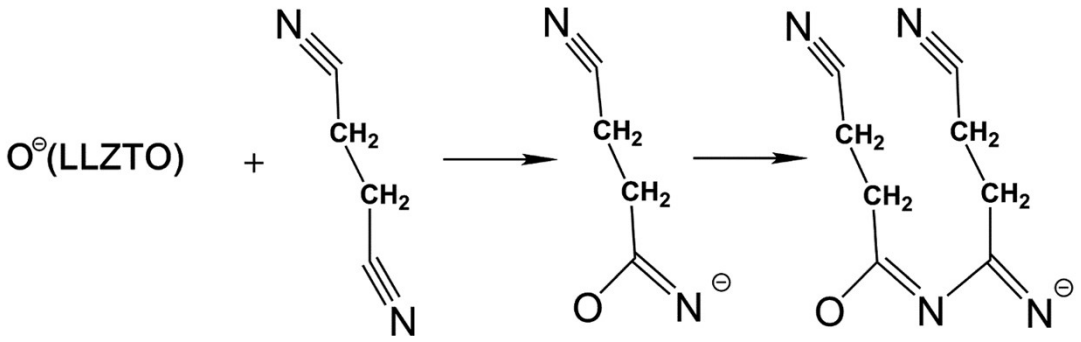

Figure S7. Schematic that illustrates the proposed reaction route of nitrile groups in SCN.

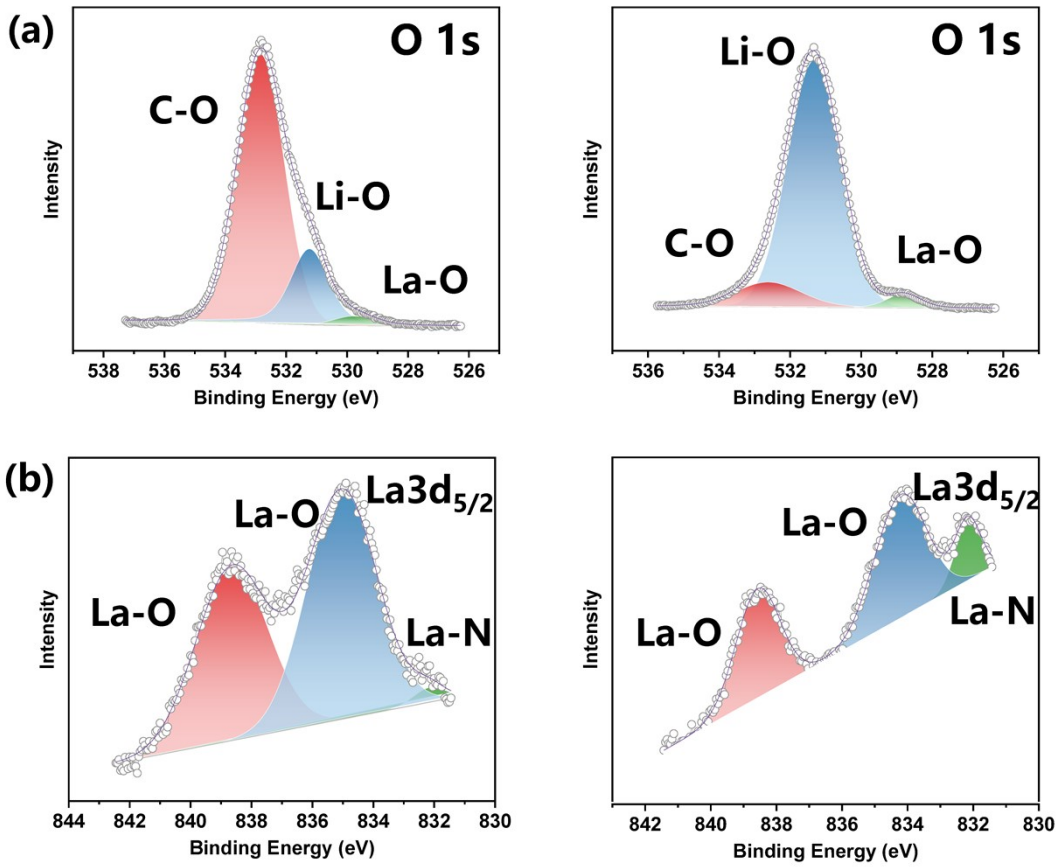

Figure S8. High-resolution XPS spectra of (a) O 1s of CSE20 and CSE80, (b) La 3d of CSE20 and CSE80.

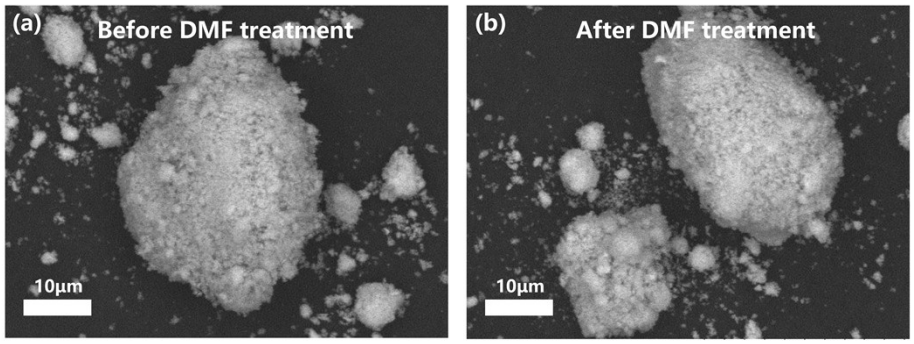

Figure S9. SEM images of LLZTO: (a) before DMF treatment; (b) after DMF treatment.

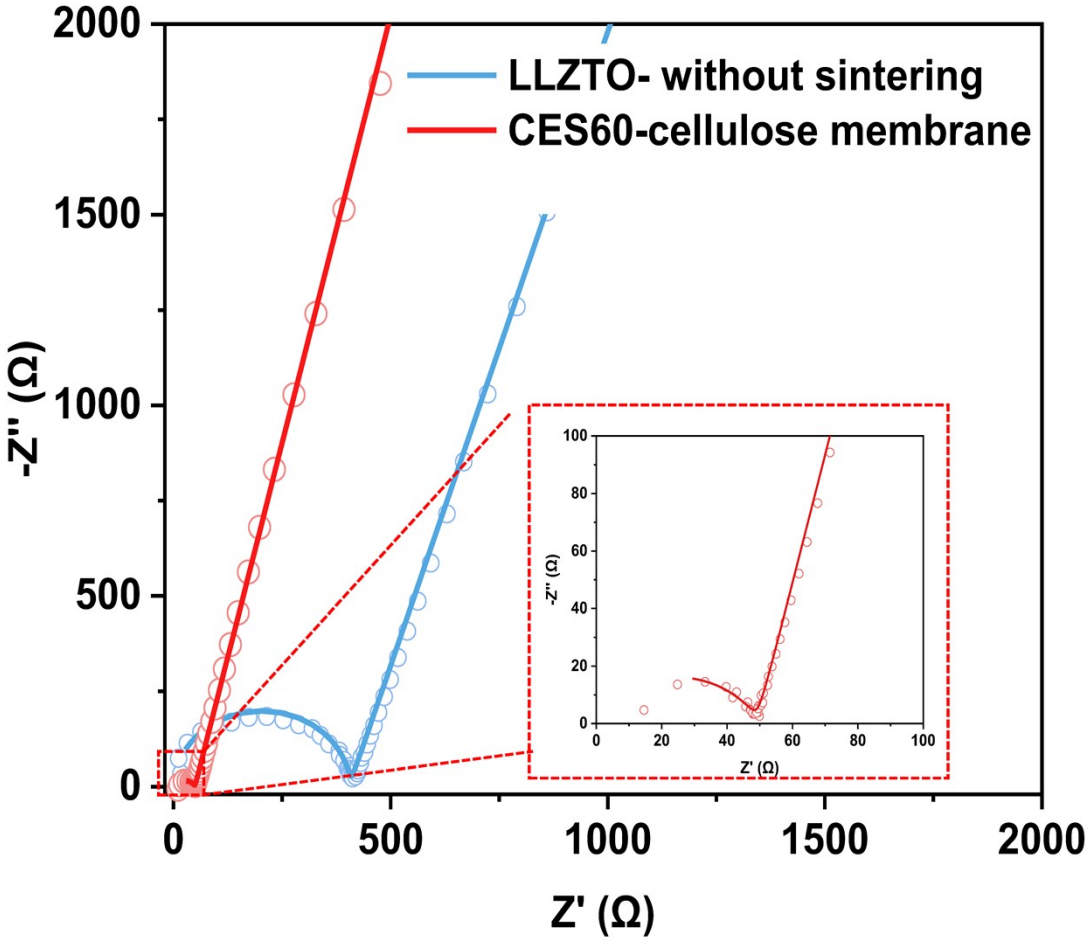

Figure S10. Nyquist plots of the electrochemical impedance spectra for LLZTO without sintering and CSE60-cellulose membranes against ion-blocking stainless steel (ss) electrodes.

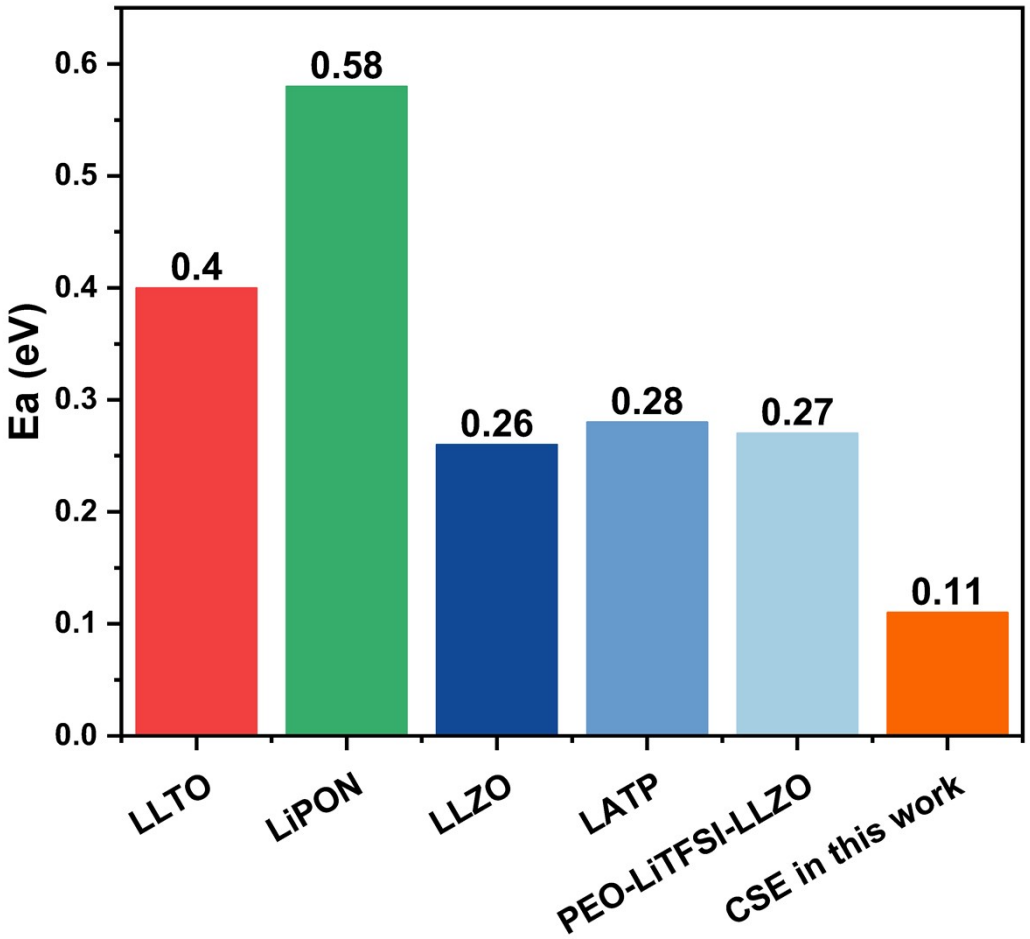

Figure S11. Comparison of the Ea of CSE60-cellulose membrane with other solid-state electrolyte reported in the previous literature [1-5].

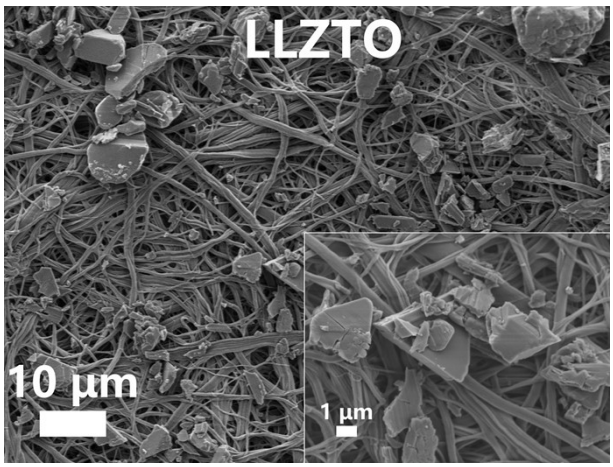

Figure S12. SEM images of the surface morphology of LLZTO on cellulose membrane.

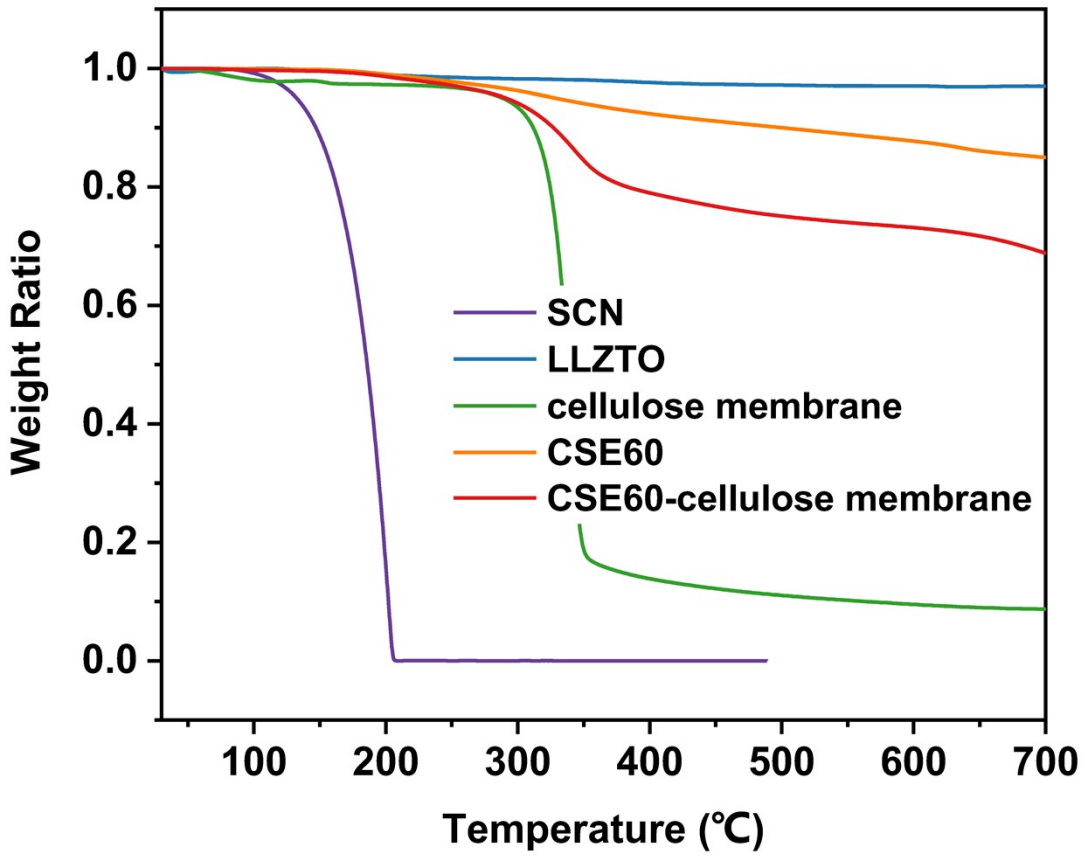

Figure S13. TGA curves of different components in the composite electrolyte.

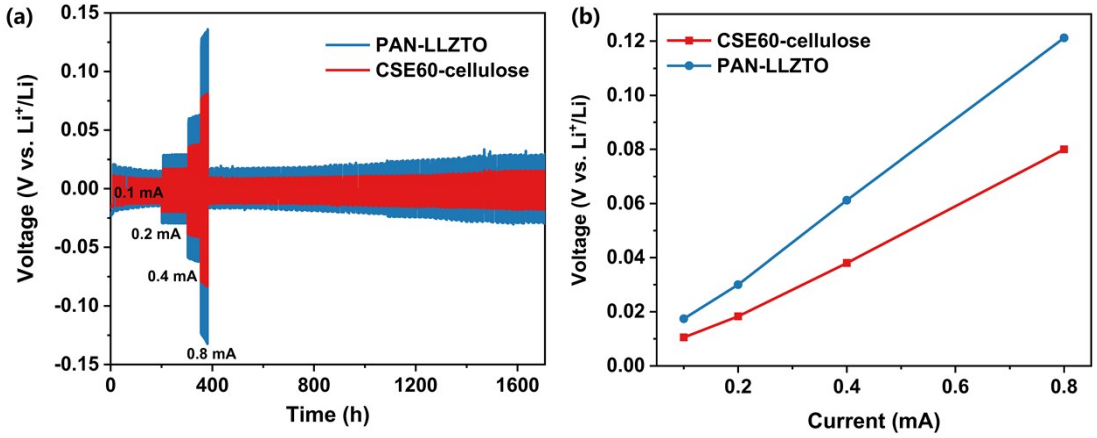

Figure S14. (a) Voltage profiles for lithium plating/stripping in Li/ CSE60-cellulose membrane /Li and Li/ PAN-LLZTO30/Li symmetric cells at 35 ℃ and at the current of 0.1 mA, 0.2mA, 0.4mA and 0.8mA, respectively, and the corresponding polarization voltage (b).

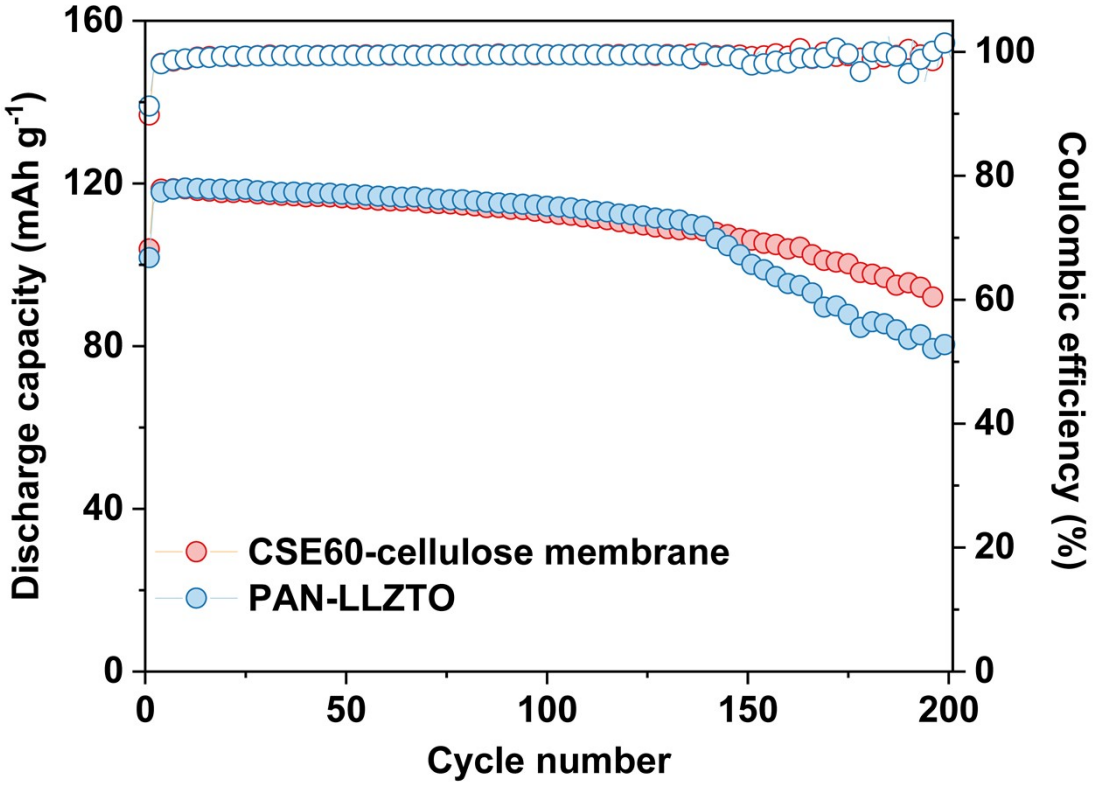

Figure S15. Cycling stability and Coulombic efficiency of Li/LNMO cells with CSE60-cellulose membrane and PAN-LLZTO at 1C.

References

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