Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Supporting Information

Branched cellulose reinforced composite polymer electrolyte with upgraded ionic conductivity for anode stabilized solid-state Li metal batteries

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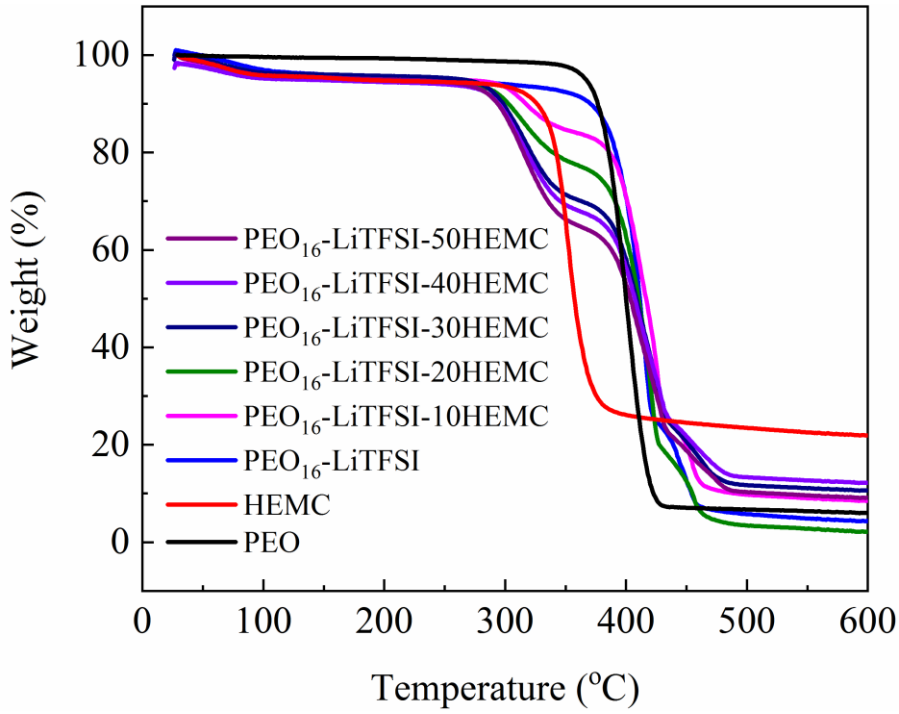

Figure S1. TGA curves of PEO, HEMC, PEO-SPE and PEO/HEMC-CPEs with HEMC filler of different content.

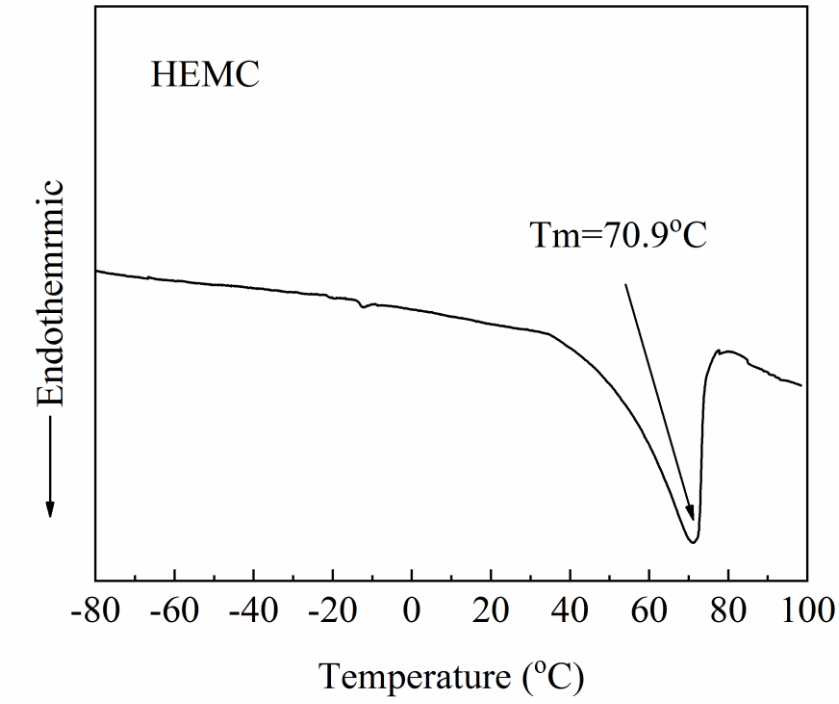

Figure S2. DSC thermogram of HEMC.

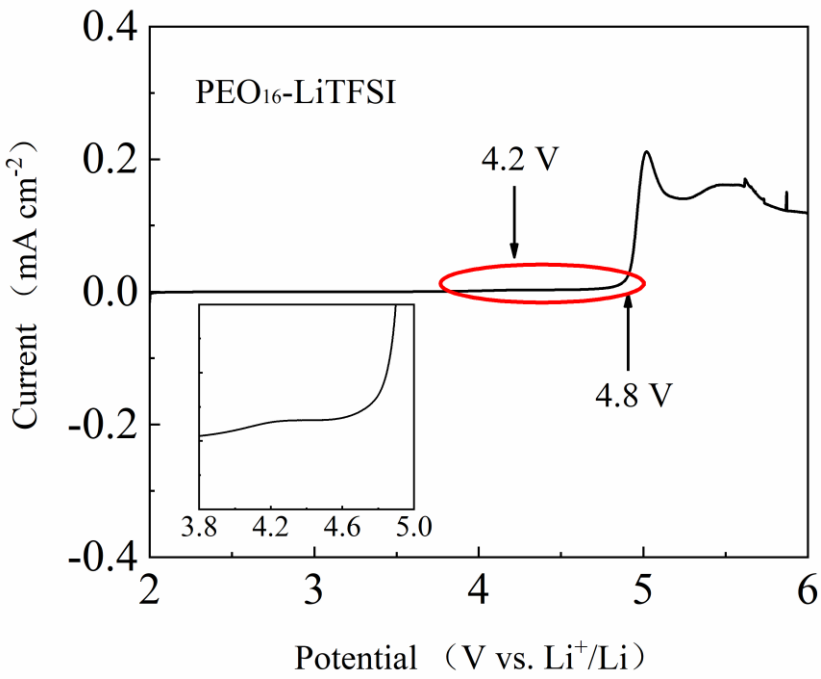

Figure S3. Liner sweep voltammogram of PEO-SPE with local magnification to disclose the position of current uptilting as shown in inset.

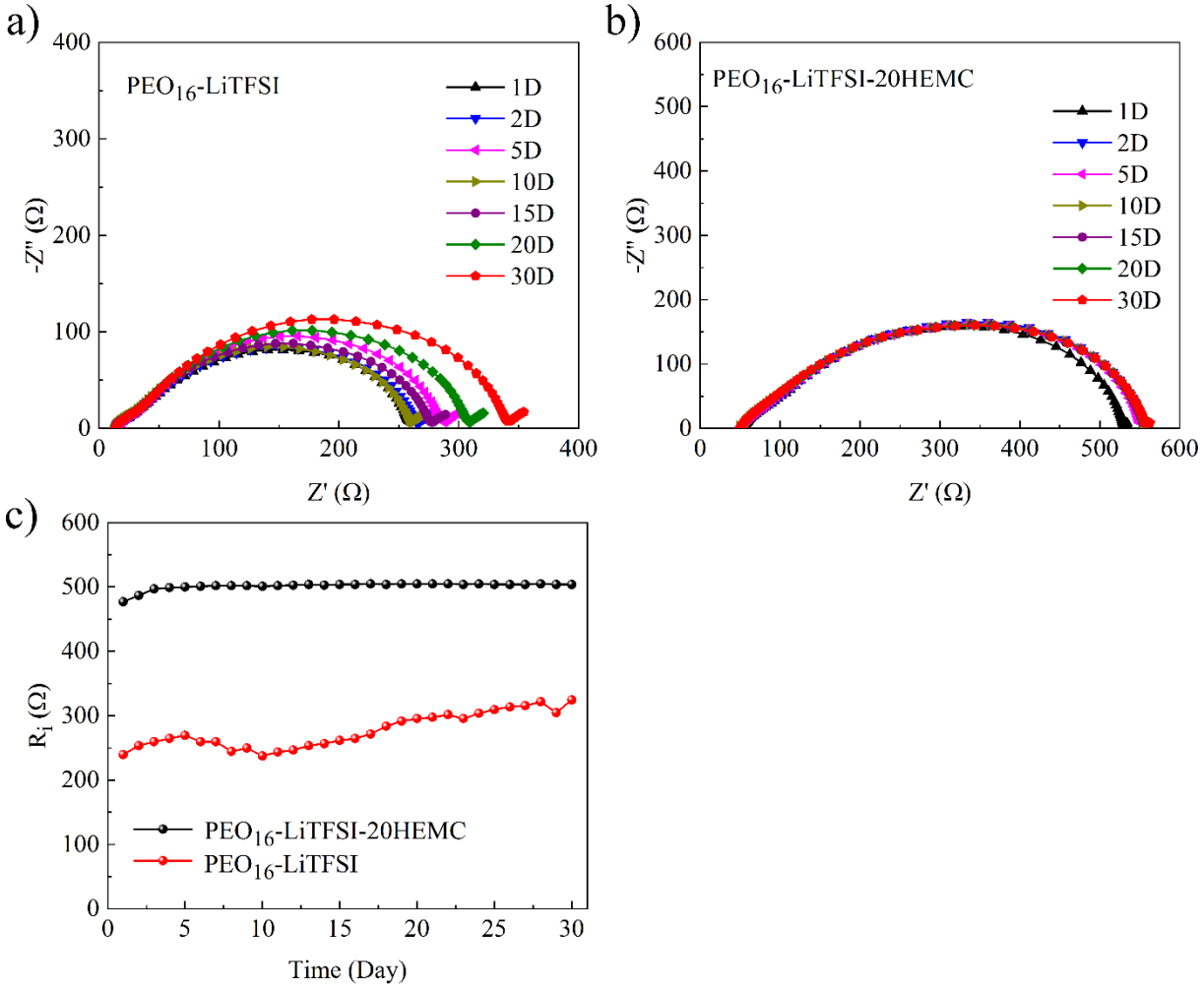

Figure S4. Impedance spectra of a) Li|PEO_{16}-LiTFSI|Li and b) Li|PEO_{16}-LiTFSI-20HEMC|Li symmetric cells for different aging time at 60 ℃. c) Corresponding interfacial resistance evolution depending on different storage time.

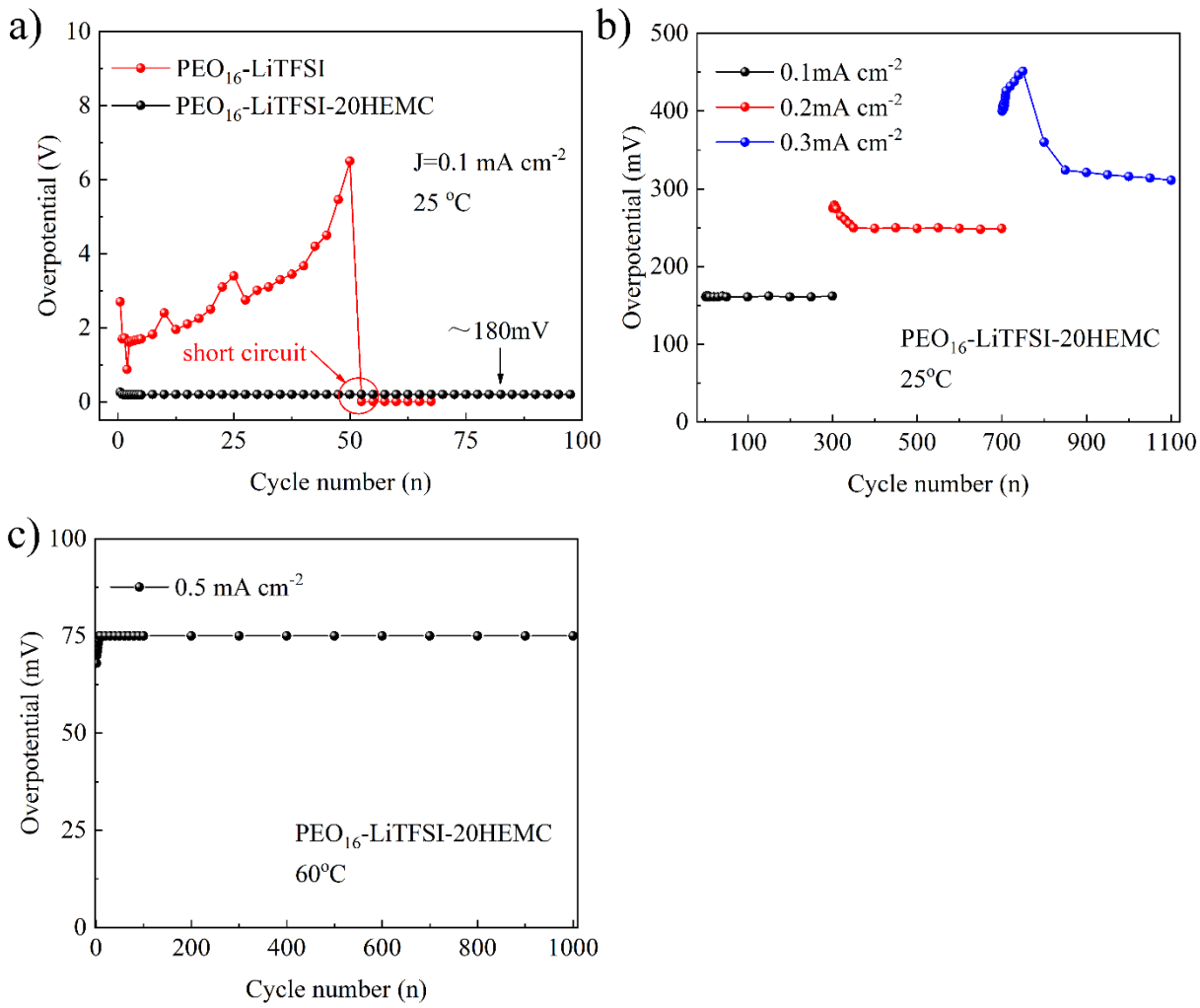

Figure S5. a) Overpotential comparison of Li|PEO_{16}-LiTFSI|Li and Li|PEO_{16}-LiTFSI-20HEMC|Li symmetric cells depending on cycle number at 0.1 mA cm^{-2} based on 1 h plating and 1 h stripping under room temperature. b) Overpotential evolution of Li|PEO_{16}-LiTFSI-20HEMC|Li symmetric cell under different current density of 0.1, 0.2 and 0.3 mA cm^{-2} as sequence under room temperature. c) Overpotential evolution of Li|PEO_{16}-LiTFSI-20HEMC|Li cell at a constant current density of 0.5 mA cm^{-2} under 60 ℃.

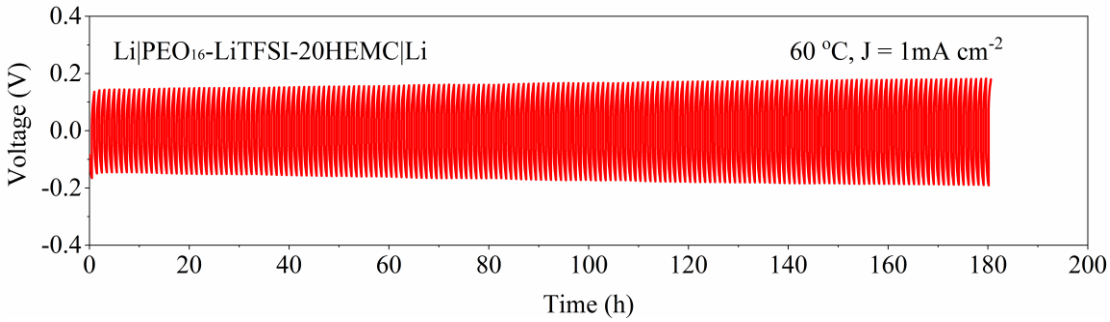

Figure S6. Galvanostatic cycling of Li|PEO_{16}-LiTFSI-20HEMC|Li symmetrical cell based on a current density of 1 mA cm^{-2} at 60 ℃.

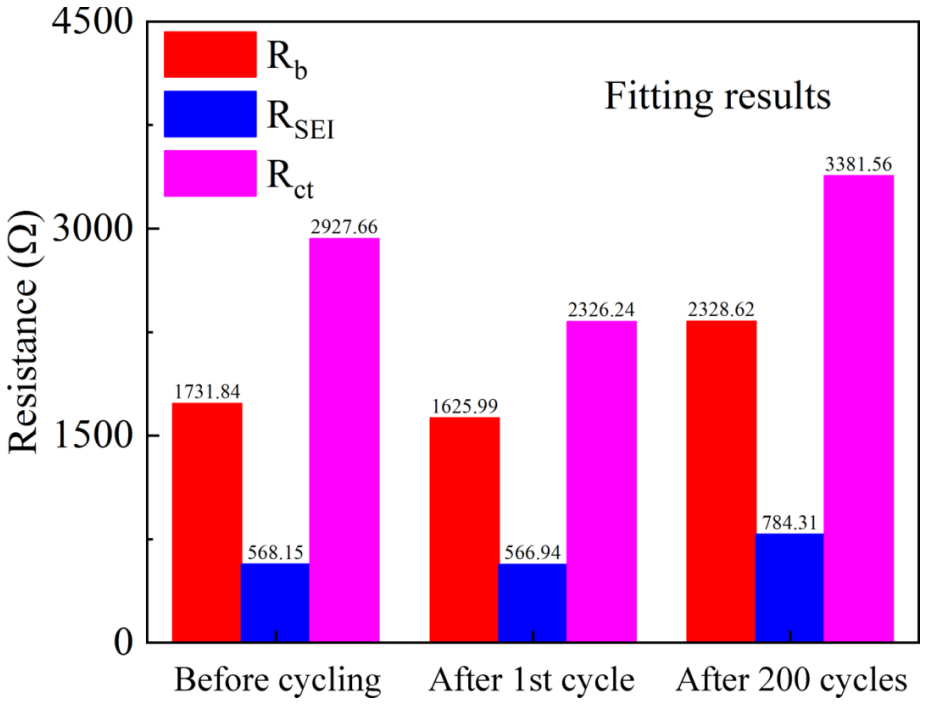

Figure S7. Fitting results of R_b, R_{SEI} and R_{ct} values of Li|PEO_{16}-LiTFSI-20HEMC|$LiFePO_4$ cell after different cycling stages at a current density of 0.5 C under ambient temperature.

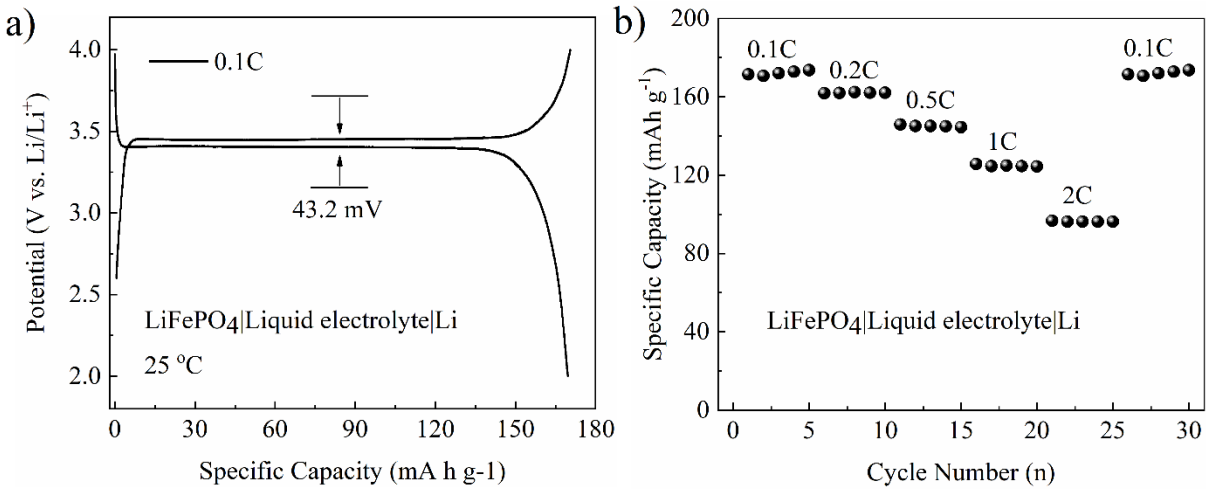

Figure S8. a) Typical charge-discharge curves and b) rate performance of Li|Liquid electrolyte|$LiFePO_4$ cell operated at ambient temperature.

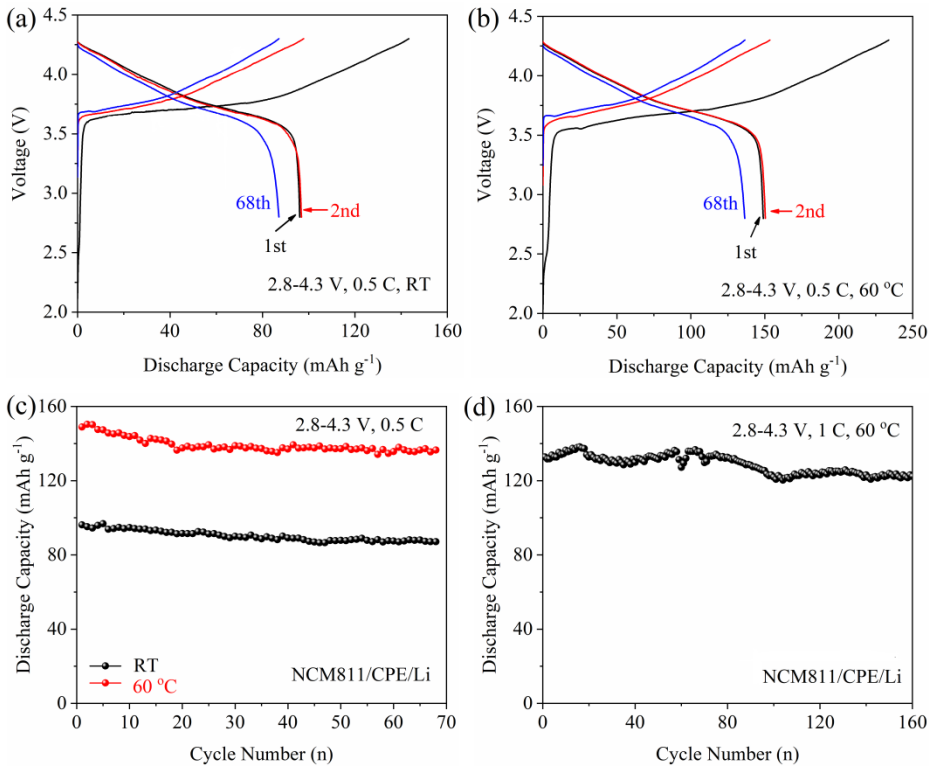

Figure S9. Charge-discharge profiles of Li/PEO_{16}-LiTFSI-20HEMC/NCM811 cells in different cycling stages at 0.5 C measured at (a) room temperature and (b) 60 ℃. Cycling performance of Li/PEO_{16}-LiTFSI-20HEMC/NCM811 cells (c) at 0.5 C measured at room temperature and 60 ℃ and (d) at 1 C measured at 60 ℃.