

Supporting information

Novel in situ Growth of ZIF-8 in Porous Epoxy Matrix for Mechanically Robust Composite Electrolyte of High-Performance, Long Life Lithium Metal Batteries

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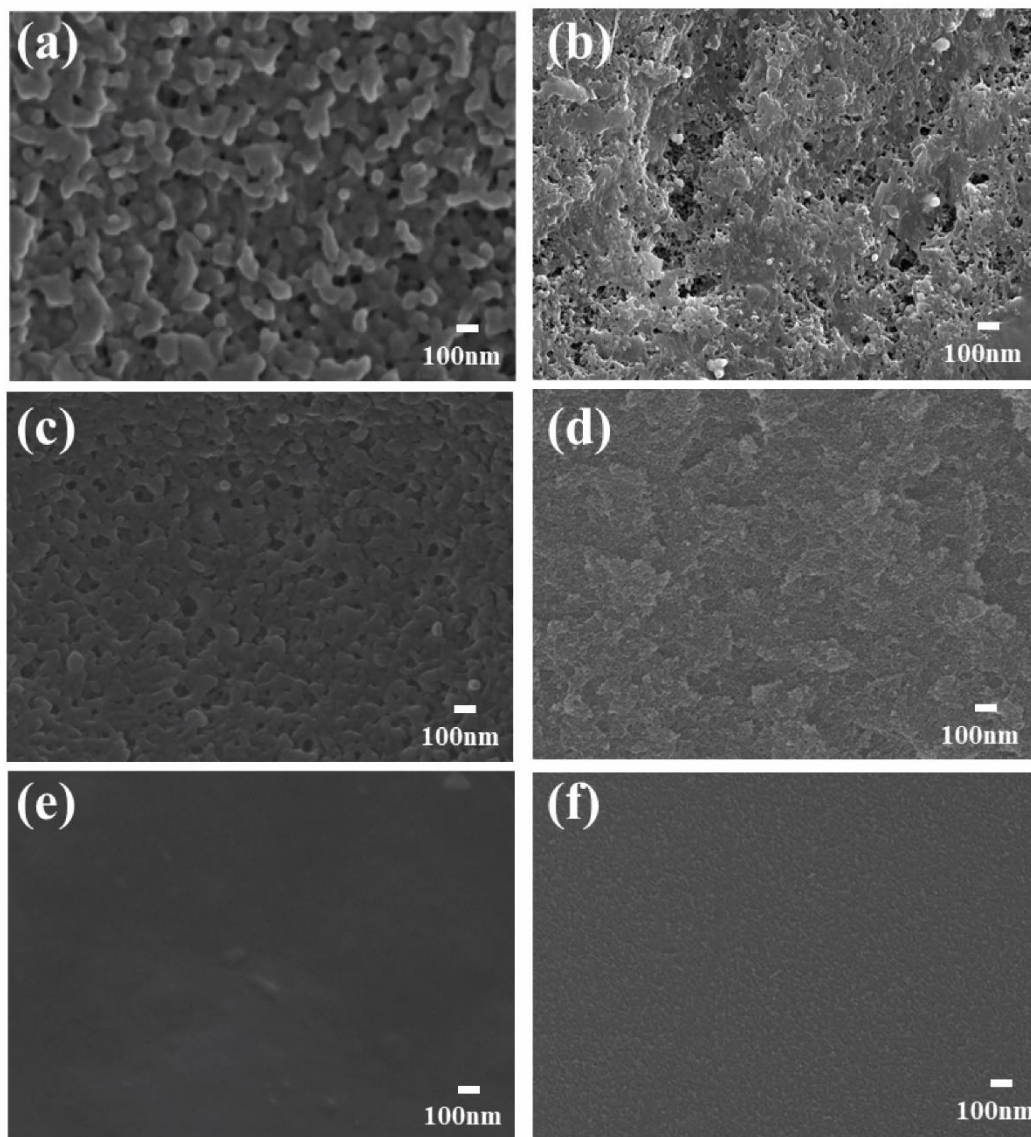


Figure S1. Surface and cross-sectional SEM images of (a-b) PEME-5:5, (c-d) PEME-7:3, (e-f) PEME-D230.

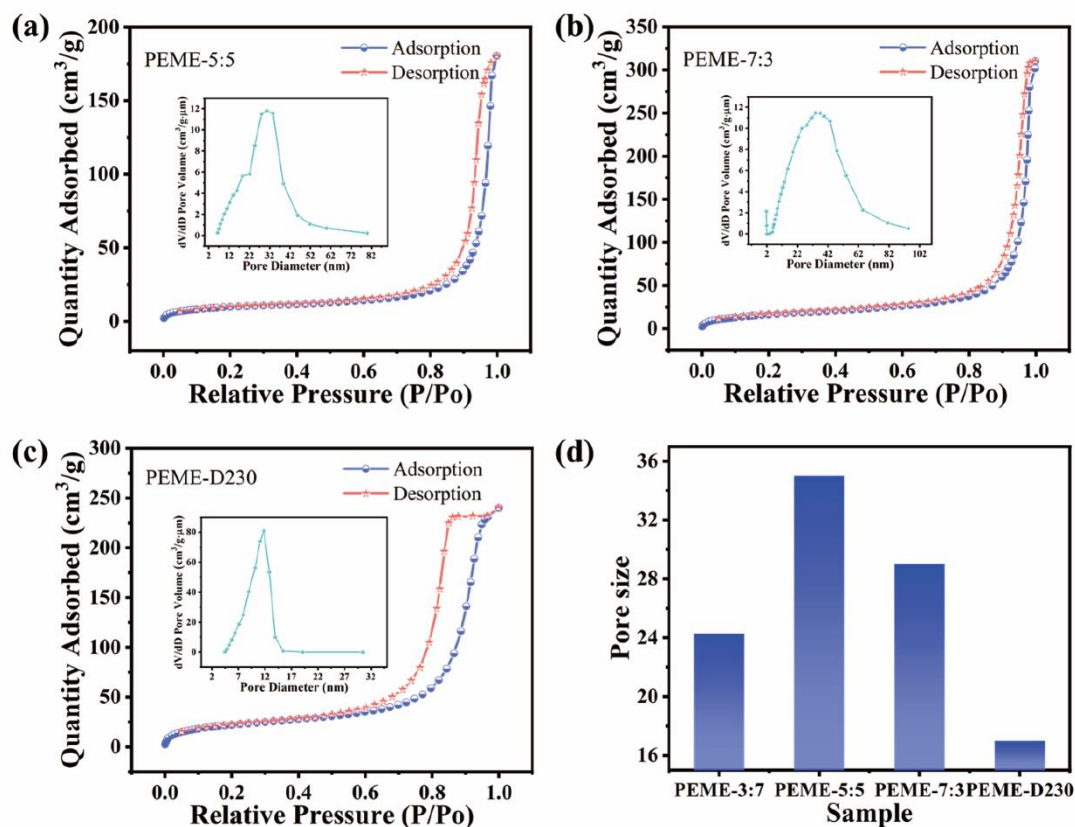


Figure S2. N_2 adsorption-desorption isotherm of (a) PEME-5:5 (b) PEME-7:3 (c) PEME-D230 (inset shows the pore size distribution of the membranes). (d) The pore size of different sample.

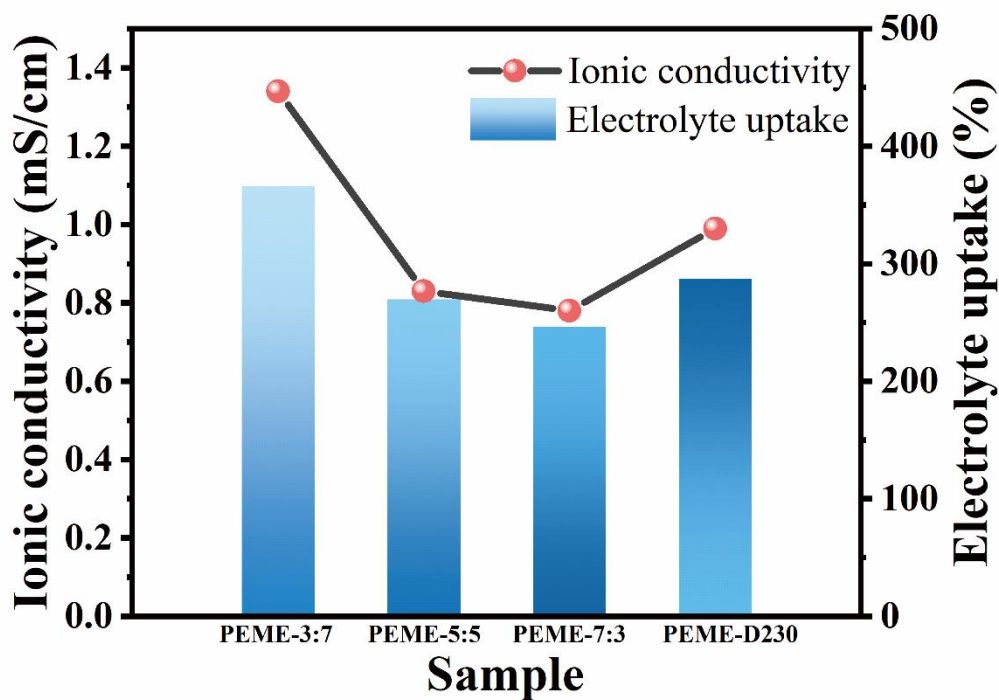


Figure S3. Absorbance histogram for PEME-x with different curing agent ratios.

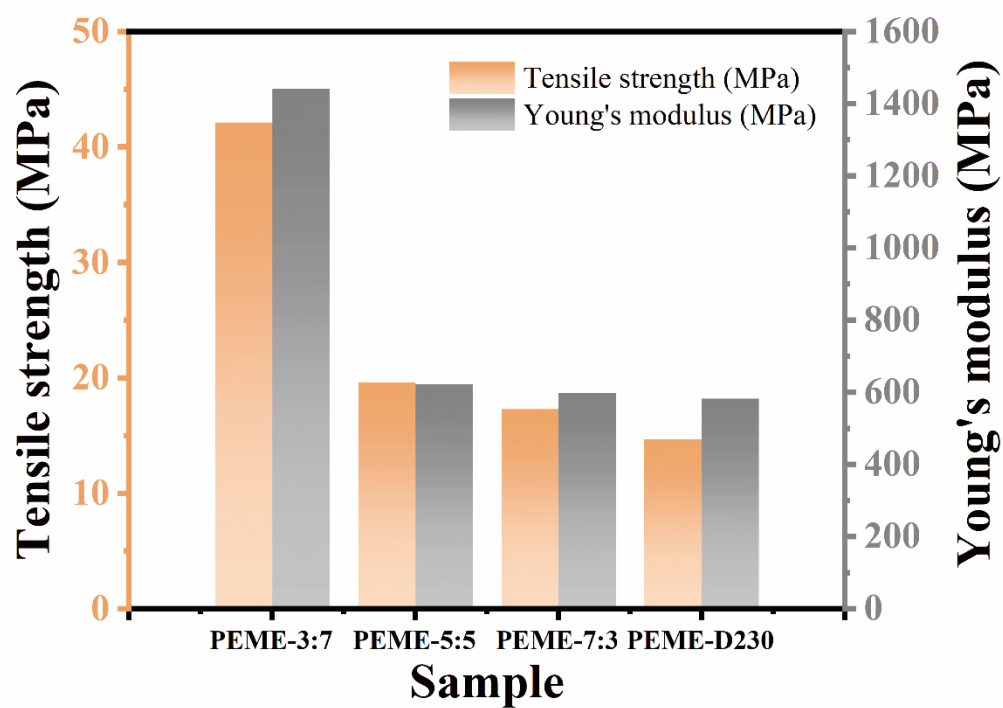


Figure S4. The tensile strength and Young's modulus histogram of PEME-x with different curing agent ratios.

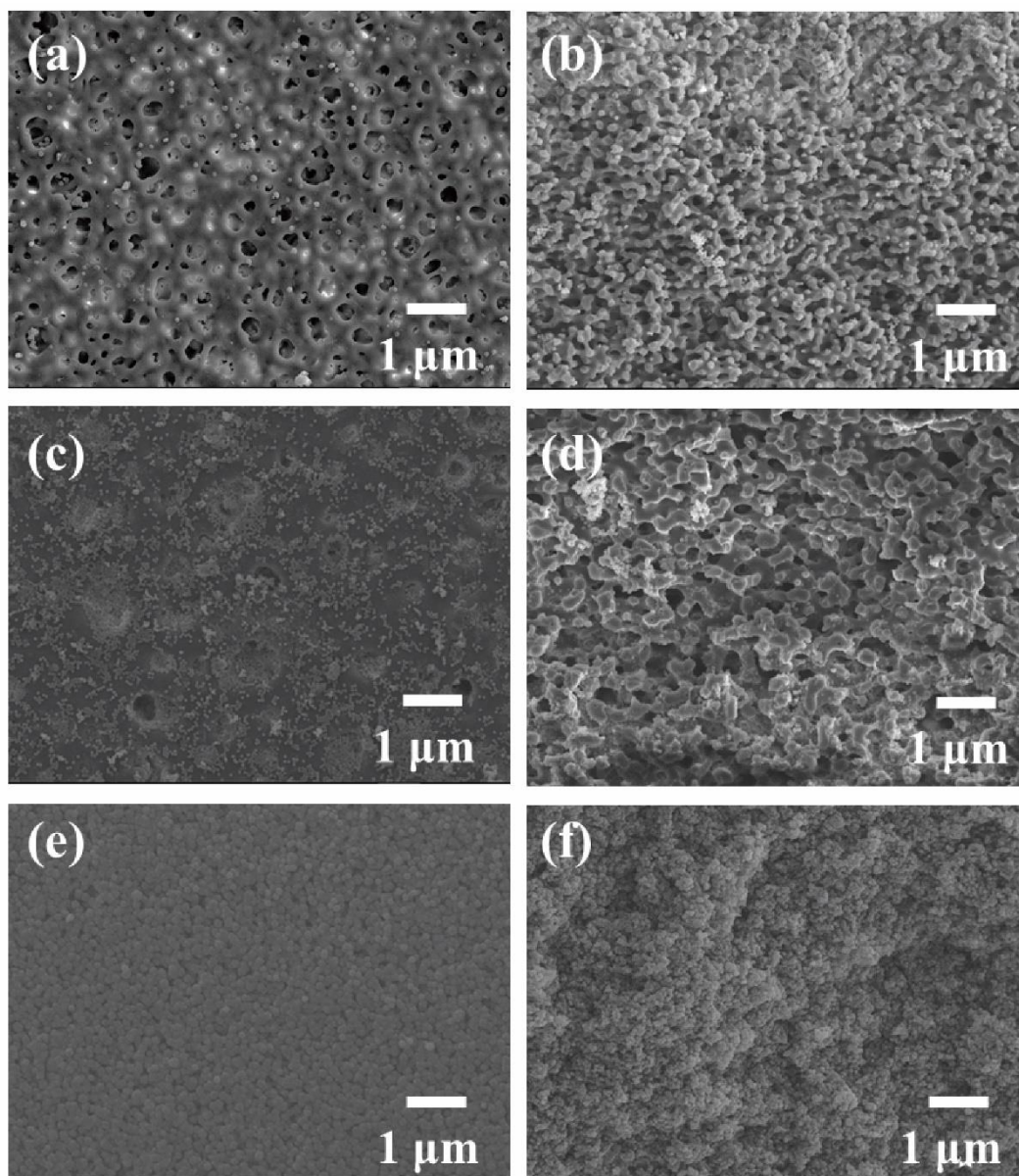


Figure S5. Surface and cross-sectional SEM images of (a-b) PEME-3:7/ZIF-8(5%), (c-d) PEME-3:7/ZIF-8(10%), (e-f) PEME-3:7/ZIF-8(20%).

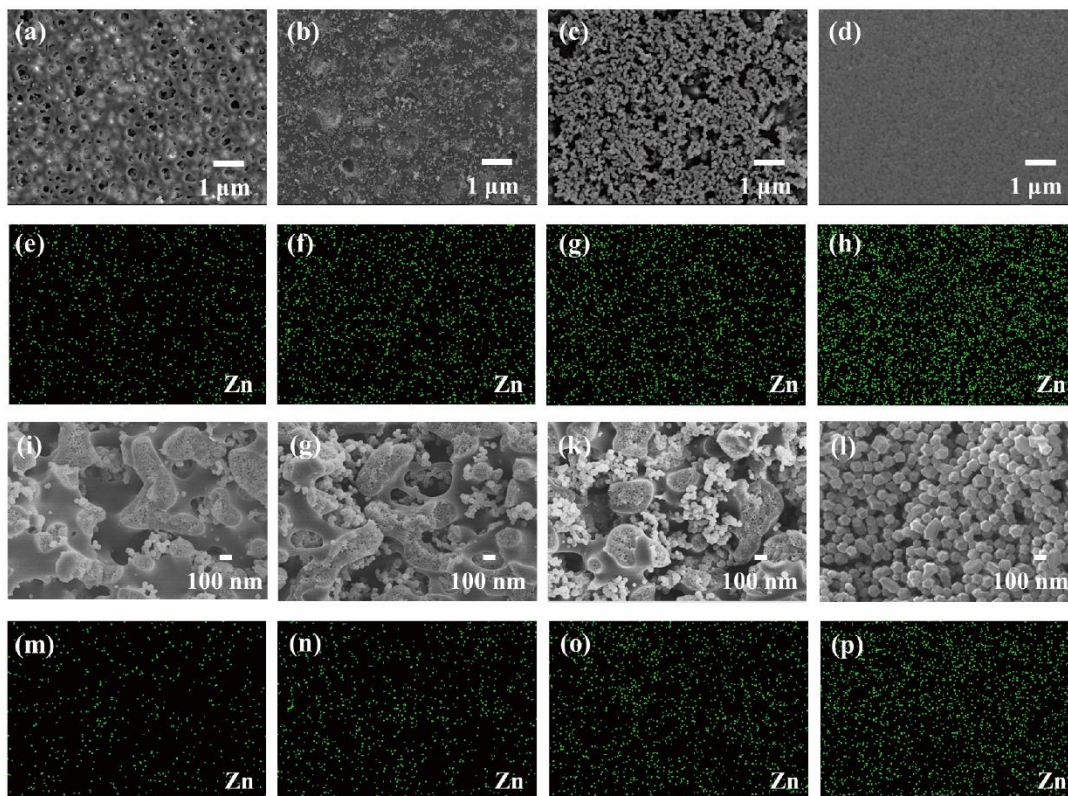


Figure S6. The (a-d) surface SEM images (e-h) surface Zn EDS mappings (i-l) cross-sectional SEM images (m-p) cross-sectional Zn EDS mappings of PEME-3:7/ZIF-8(5%), PEME-3:7/ZIF-8(10%), PEME-3:7/ZIF-8(15%), PEME-3:7/ZIF-8(20%) membranes.

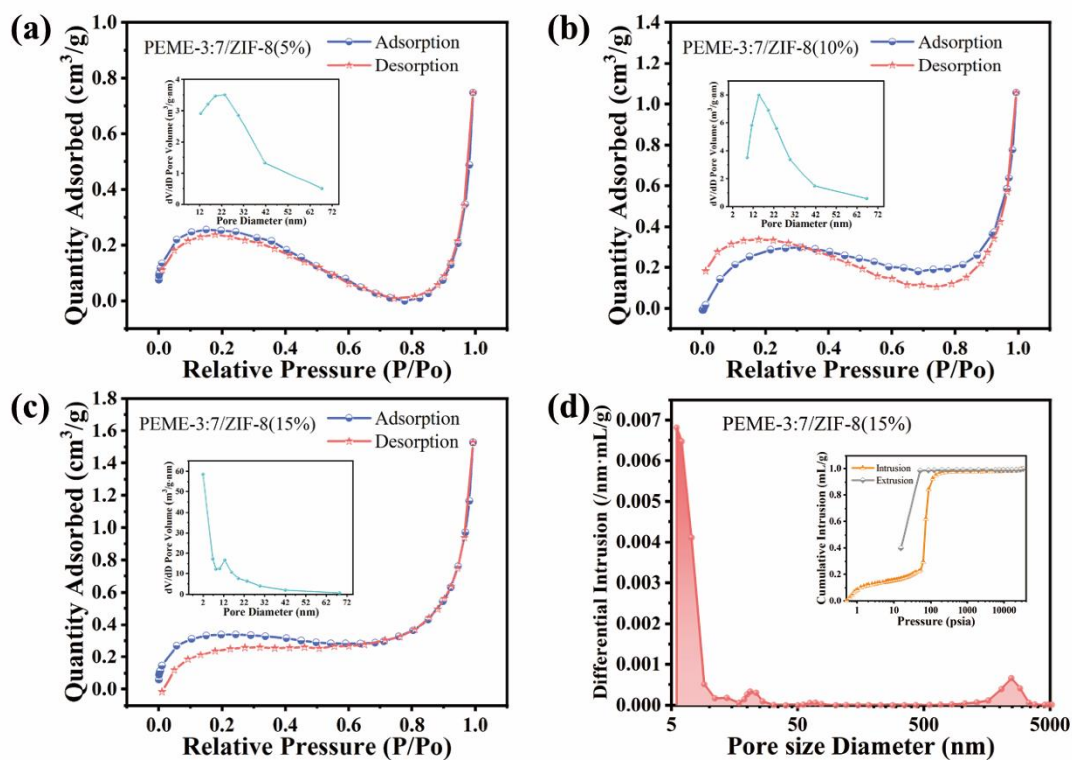


Figure S7. N₂ adsorption-desorption isotherm of (a) PEME-3:7/ZIF-8(5%) (b) PEME-3:7/ZIF-8(10%) (c) PEME-3:7/ZIF-8(15%) (inset: the pore size distribution of the membrane). (d) Pore size distribution of PEME-3:7/ZIF-8(15%) membrane under mercury intrusion test (inset: the mercury intrusion-evolution curve of the membrane).

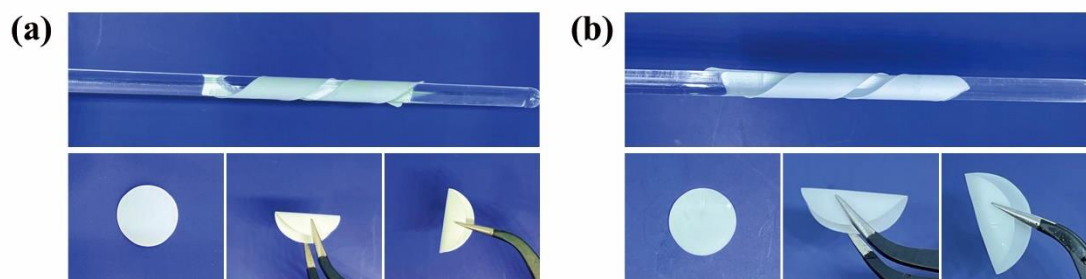


Figure S8. The flexibility measurement of PEME-3:7/ZIF-8(15%) membrane (a) before liquid electrolyte immersion, (b) after liquid electrolyte immersion.

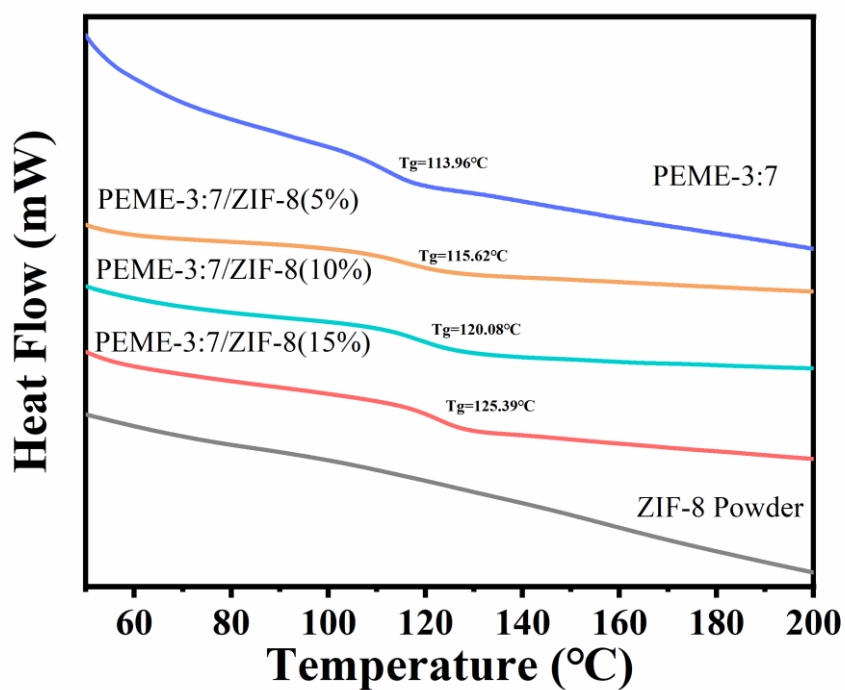


Figure S9. DSC test curves of different components.

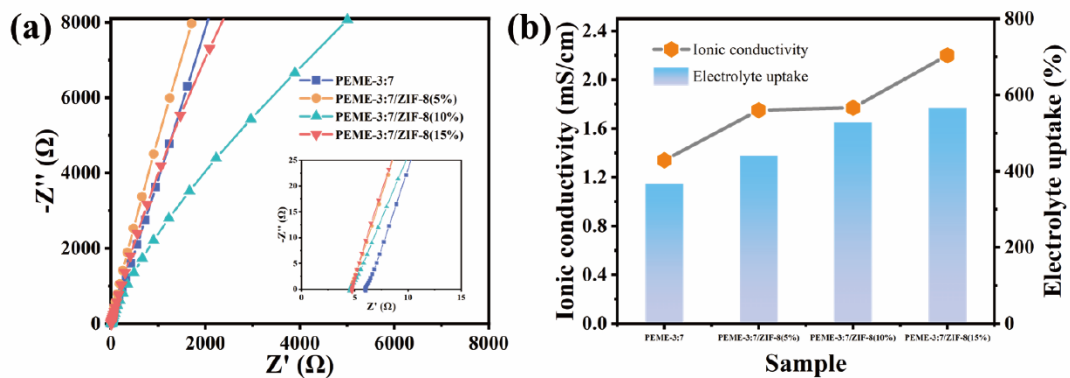


Figure S10. (a) Impedance spectrum of SS//PEME-3:7/ZIF-8(0-15%)//SS cells at room temperature. (b) absorbance histogram for PEME-3:7/ZIF-8(0-15%).

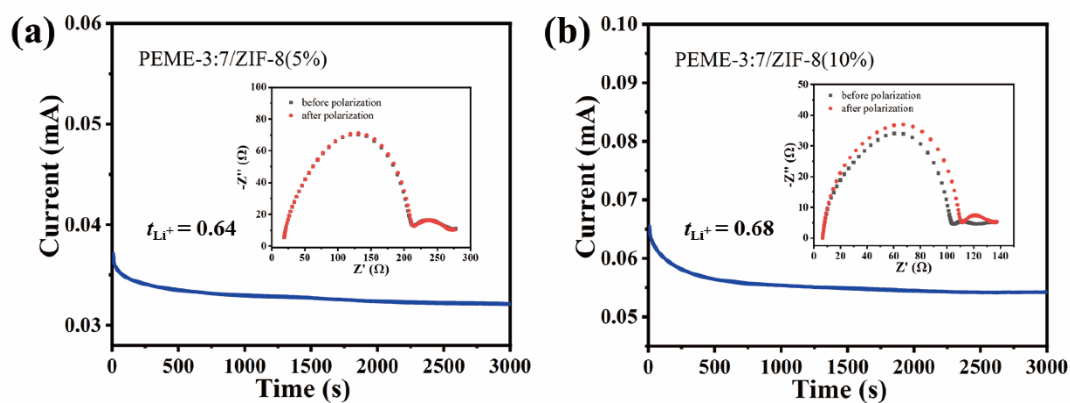


Figure S11. (a) Li//PEME-3:7/ZIF-8(5%)//Li and (d) Li//PEME-3:7/ZIF-8(10%)//Li cells with an applied potential difference of 10 mV (insets: the AC-impedance spectra of the cells before and after the polarization).

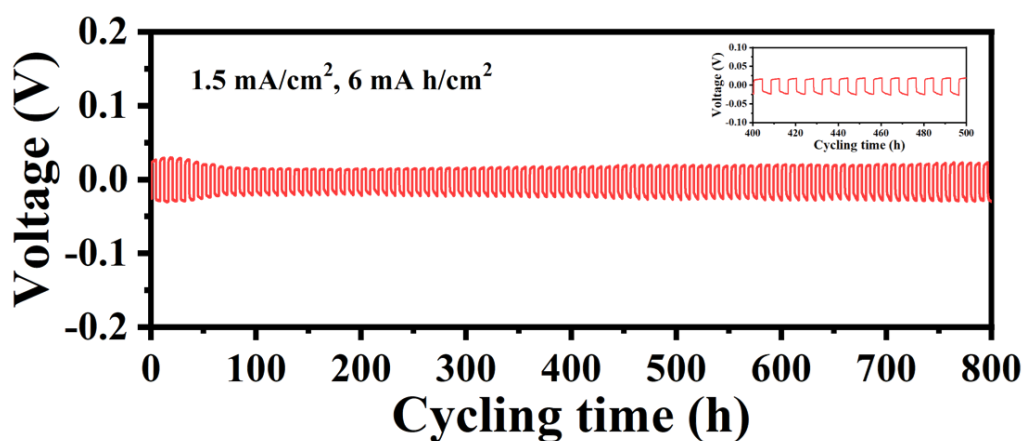


Figure S12. Voltage curves of Li//PEME-3:7/ZIF-8(15%)//Li at current density of 1.5 mA/cm² for 6 mA h/cm².

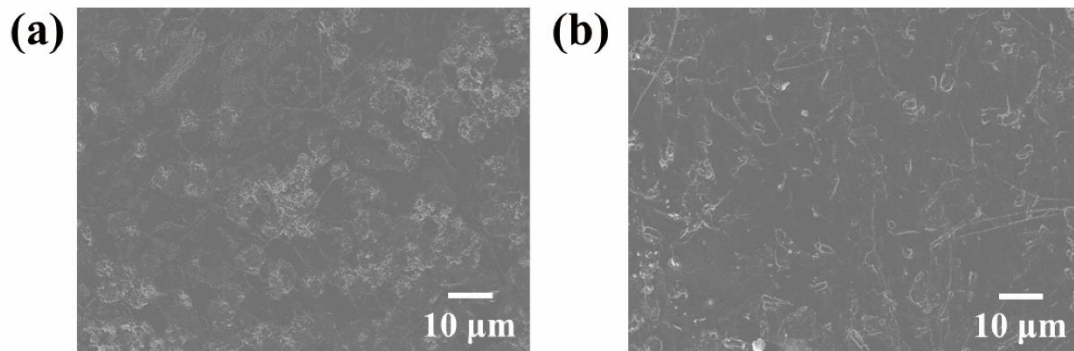


Figure S13. Surface SEM image of (a) Li anode of Li||Celgard 2400||Li (b) Li anode of Li||PEME-3:7||Li after 500 cycles at 1.5 mA/cm² current density.

Table S1. The formulations of the porous epoxy resin membranes.

Samples	DGEBA (g)	PEG200 (g)	D230 (g)	PACM (g)
PEME-3:7	1	2.75	0.088	0.188
PEME-5:5	1	2.75	0.146	0.134
PEME-7:3	1	2.75	0.205	0.080
PEME-D230	1	2.75	0.293	0

Table S2. The ionic conductivity at room temperature and electrolyte uptake of PEME-3:7/ZIF-8(0-15%).

Samples	bulk resistance (Ω)	ionic conductivity (S/cm)	electrolyte absorption (%)
PEME-3:7	5.97	1.34×10^{-3}	366.1
PEME-3:7/ZIF-8(5%)	4.65	1.75×10^{-3}	439.7
PEME-3:7/ZIF-8(10%)	4.5	1.77×10^{-3}	528.9
PEME-3:7/ZIF-8(15%)	4.75	2.2×10^{-3}	566.7