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Supplementary Materials

Lithium Salt Catalyzed Ring-Opening Polymerized Solid-State Electrolyte with Comparable Ionic Conductivity and Better Interface Compatibility for Li-Ion Batteries

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Table S1. The explanation of main abbreviation words and used in this article.

Abbreviation	Full Name
LiFSI	lithium bis(fluorosulfonyl)imide
FTIR	Fourier transform infrared
^{1}H-NMR	Proton nuclear magnetic resonance
FE-SEM	Field emission scanning electron microscopy
EIS	Electrochemical impedance spectroscopy
LSV	Linear sweep voltammetry
GPEs	Gel polymer electrolytes
SPEs	Solid-state polymer electrolytes
CROP	Cationic ring-opening polymerization
EOM	3-ethyl-3-oxetanemethanol
CV	Cyclic voltametric
t_{Li}	Li-ion transference number
ESW	Electrochemical stability window
CD	charge-discharge
Csp	discharge specific capacity
η	coulombic efficiency

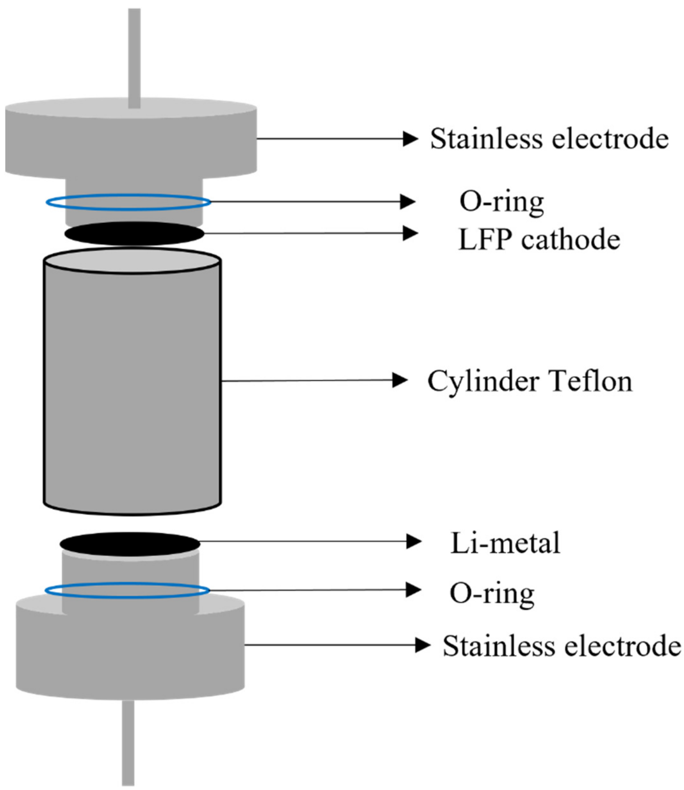

Figure S1. Configuration of symmetry Swagelok cell.

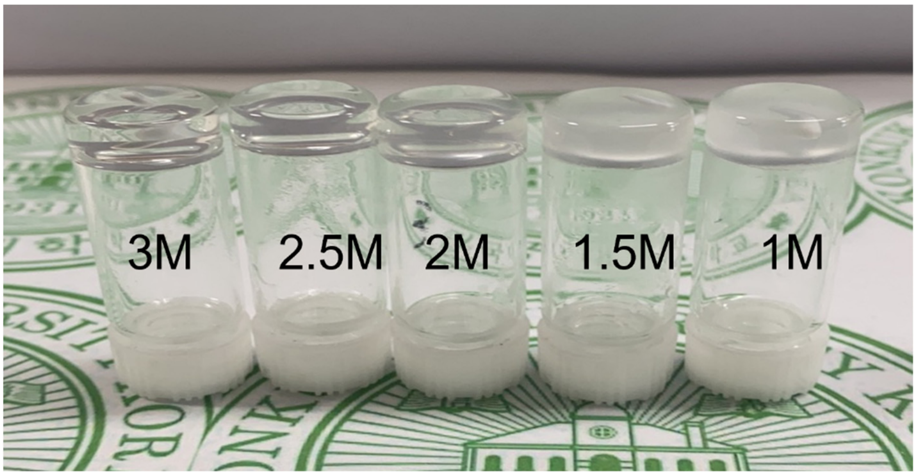

Figure S2. Photographing of varied concentrated LiFSI with EOM after 54 hrs.

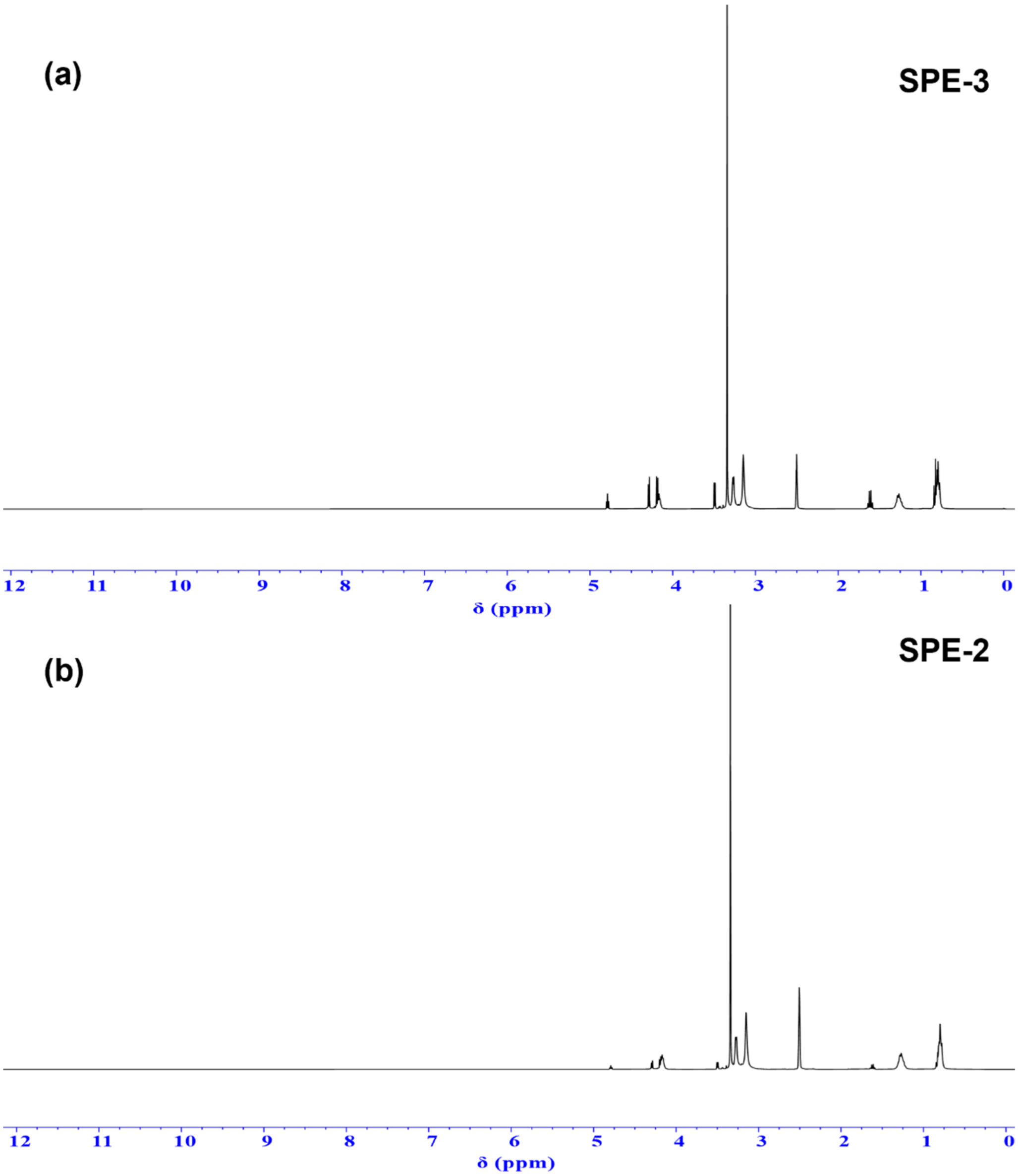

Figure S3. ^{1}H-NMR spectrum of SPE-3(a) and SPE-2(b).

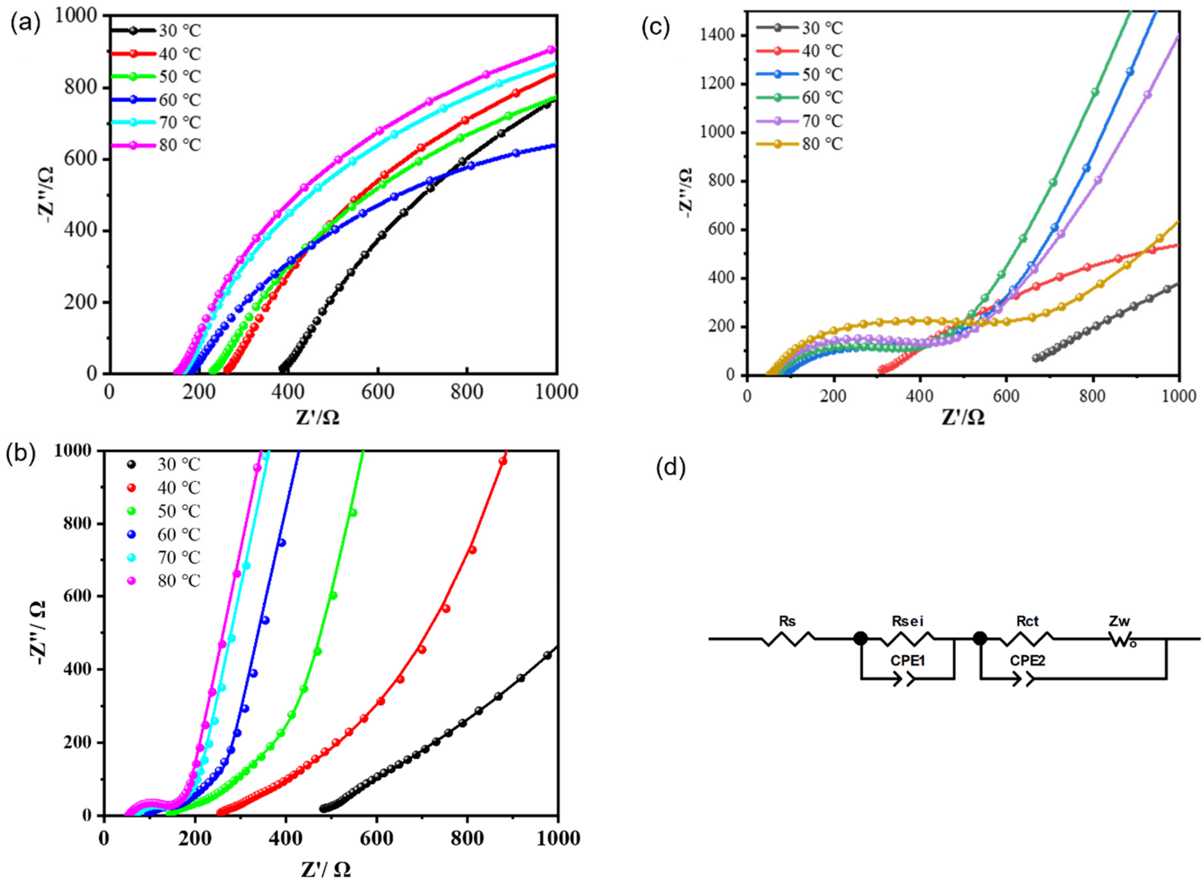

Figure S4. Nyquist curves of SPE-2(**a**), SPE-2.5(**b**) with fitting plots, and SPE-3(**c**); equivalent circuit (**d**).

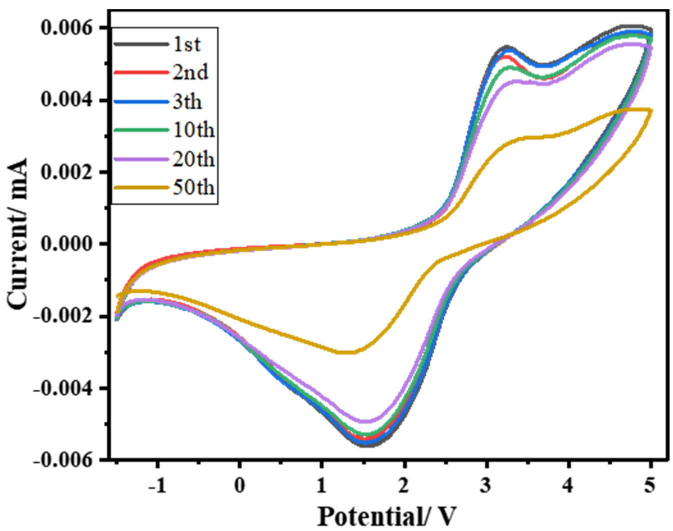

Figure S5. CV sweeping 50 cycles of SPE-2.5 electrolyte with the dummy cell over the potential range from −1.5 to 5V, scan rate at 25mv/s.

Table S2. Analytical parameters for the calculation of t_{Li+} of SPE-2.5.

ΔU (V)	I_0 (μA)	I_s (μA)	R_0 (Ω)	R_s (Ω)	t_{Li+}
0.01	2.92	2.13	160	225	0.75

Table S3. Comparison of properties of polymer electrolyte reported based on ring-opening polymerization.

Components	Salt/Pasticizer/Solvent	σ (mS/cm) [a]	t_{Li^+} [b]	Stability vs (Li^+/Li) (V) and Cathode	Ref.
PEO	LiTFSI/no/ACN	0.0004	0.4	4.8	[1]
DGEPEG, PEGDA	LiTFSI/no/no	0.053	N/A	4.7, LFP	[2]
POSS, P(EO-co-PO)	LiTFSI/ no/THF	0.11	0.62	5.4, LFP	[3]
GLYMO, EDGE	LiTFSI/no/Ethanol	0.026	0.37	4.9, LTO	[4]
GLYMO, DGEPEG	LiClO4/no/no	0.12	N/A	N/A	[5]
SPE-2.5	LiFSI/no/no	0.45	0.75	3.75, LFP	This work

[a] at 25 °C

[b] All lithium cation transference numbers (t_{Li^+}) reported in Table S2 were measured using the Bruce-Vincent method.

acetonitrile (ACN), tetrahydrofuran (THF), lithium bis(trimethanesulfonyl)imide (LiTFSI), LiFePO4-LFP, $Ni_{1/3}Mn_{1/3}Co_{1/3}O_2$ -NMC, $Li_4Ti_5O_{12}$(LTO), Poly (ethylene oxide) (PEO), Diglycidylether of polyethylene glycol (DGEPEG), Poly (ethylene glycol) diacrylate (PEGDA), Polyhedral oligomeric silsequioxane (POSS), Poly (ethylene-co-propylene oxide) (P (EO-co-PO)), (3-glycidyloxypropyl) trimethoxy silane (GLYMO), Ethyl glycol diglycidyl ether (EDGE),.

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