

Supporting Information

Glycerol triglycidyl ether crosslinker assisting in situ thermally
polymerized gel polymer electrolyte for advanced lithium metal batteries

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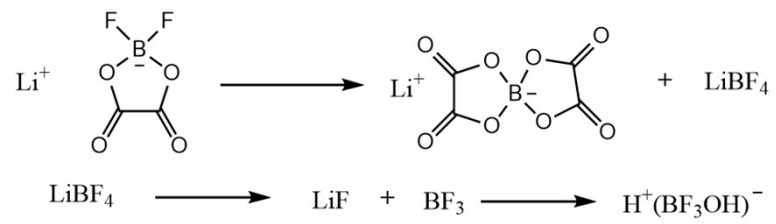


Fig. S1. Schematic diagram of thermal decomposition of LiDFOB

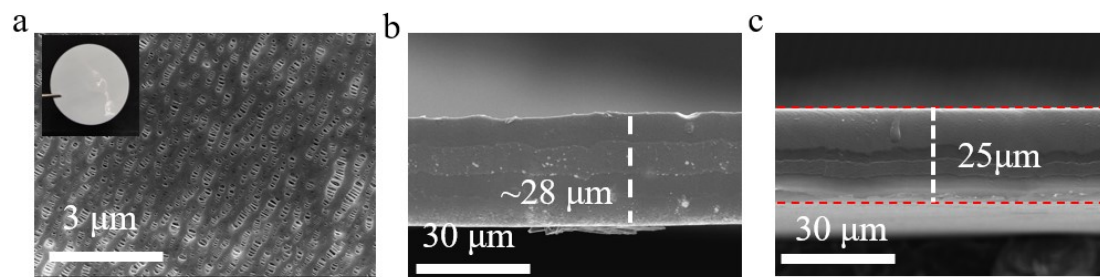


Fig. S2. (a) Top-view SEM image of a commercial separator sheet. The inset is a photograph. Cross-sectional SEM images of (b) PDOL-FEC-GTE and (c) the commercial separator.

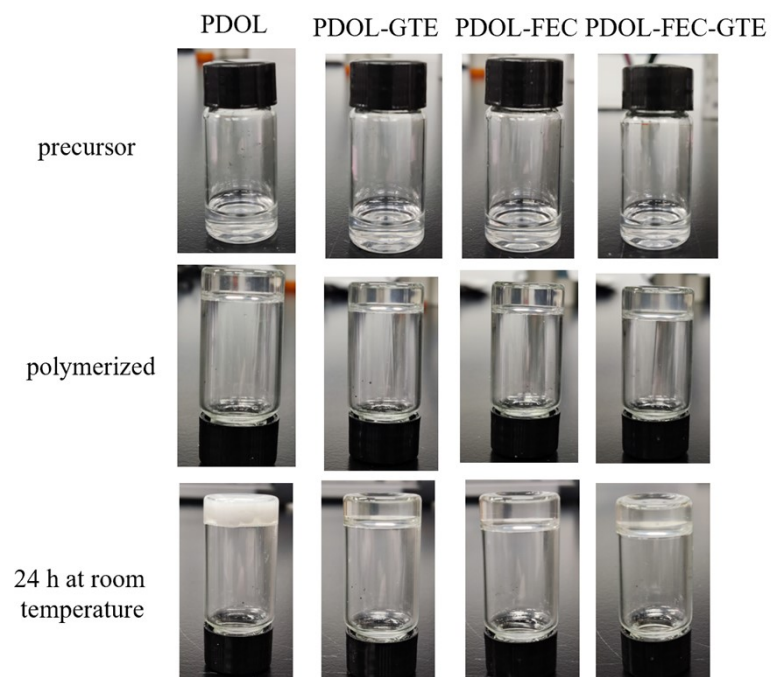


Fig. S3. Photographs of in situ polymerized precursor solutions at different states.

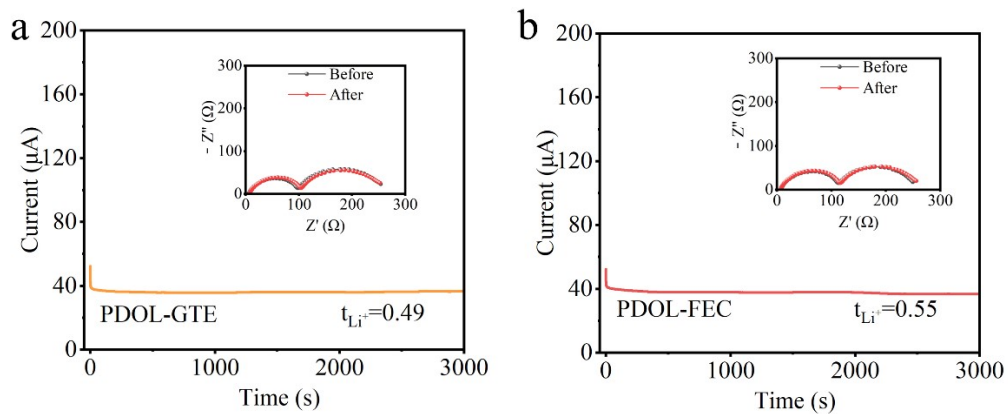


Fig. S4 Chronoamperometry curves of (a) PDOL-GTE and (b) PDOL-FEC. The insets show the EIS plots before and after polarization.

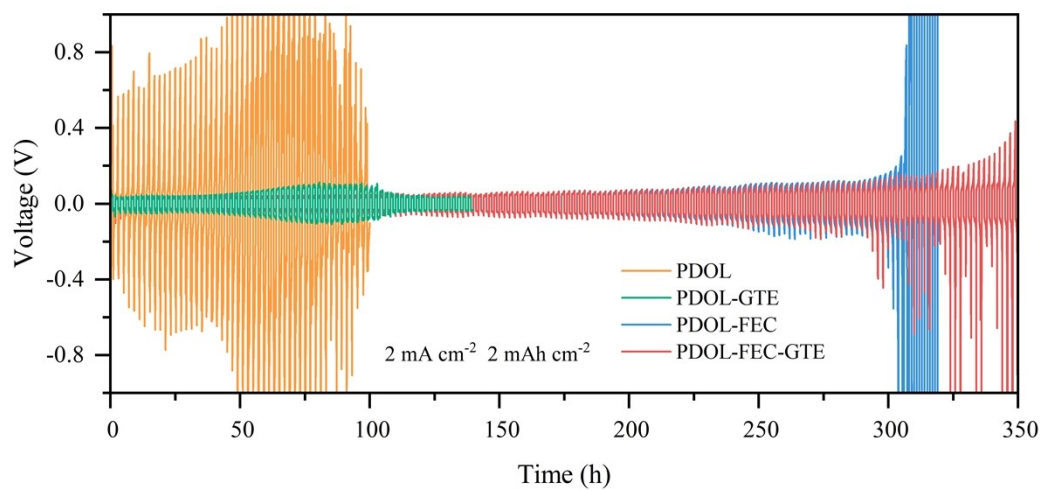


Fig. S5 Voltage profiles of Li||Li symmetrical cells that contain different electrolytes in room temperature at 2 mA cm⁻² and 2 mAh cm⁻².

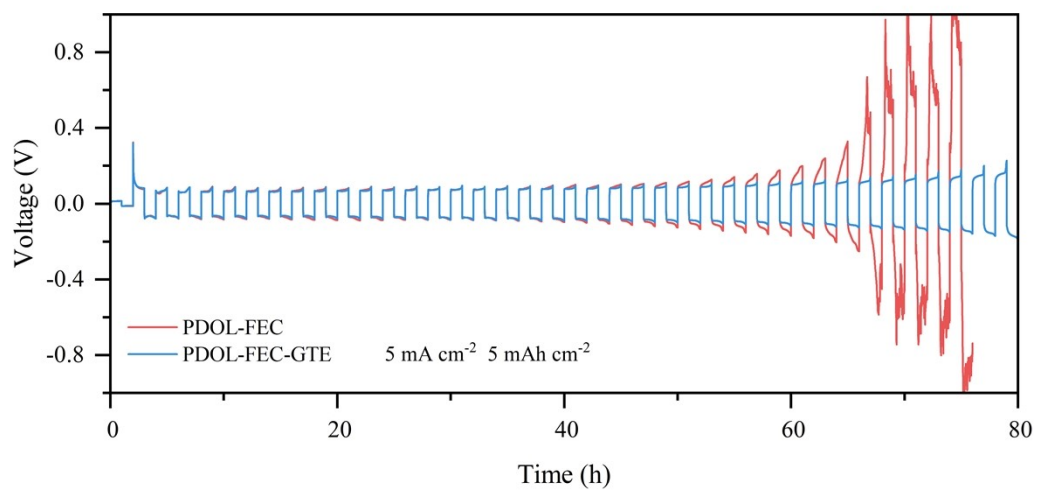


Fig. S6 Voltage profiles of Li||Li symmetrical cells that contain different electrolytes in room temperature at 5 mA cm^{-2} and 5 mAh cm^{-2} .

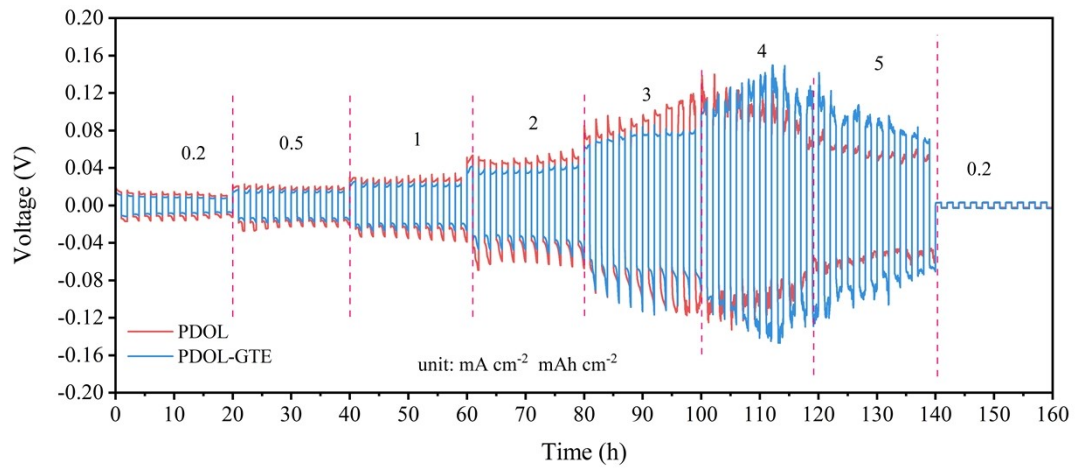


Fig. S7. Voltage profiles of Li||Li cells at PDOL and PDOL-GTE

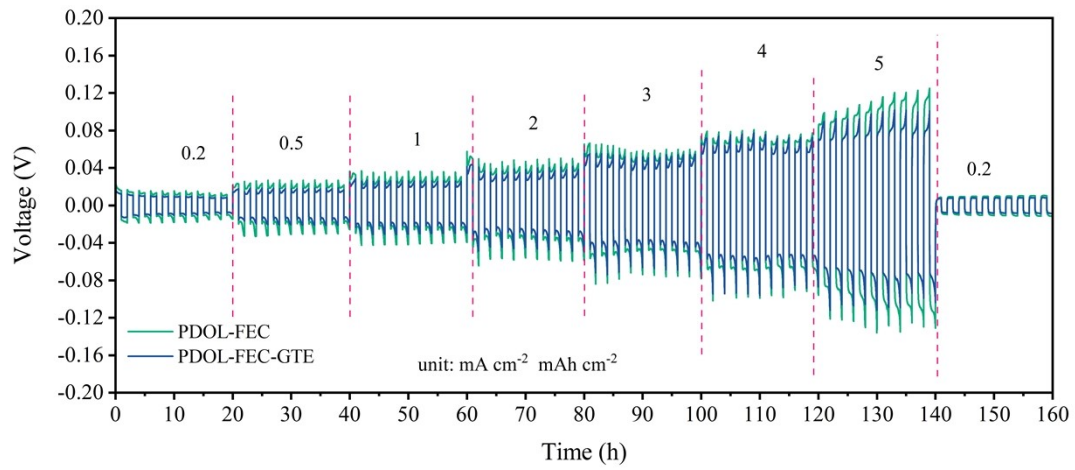


Fig. S8. Voltage profiles of Li||Li cells at PDOL-FEC and PDOL-FEC-GTE.

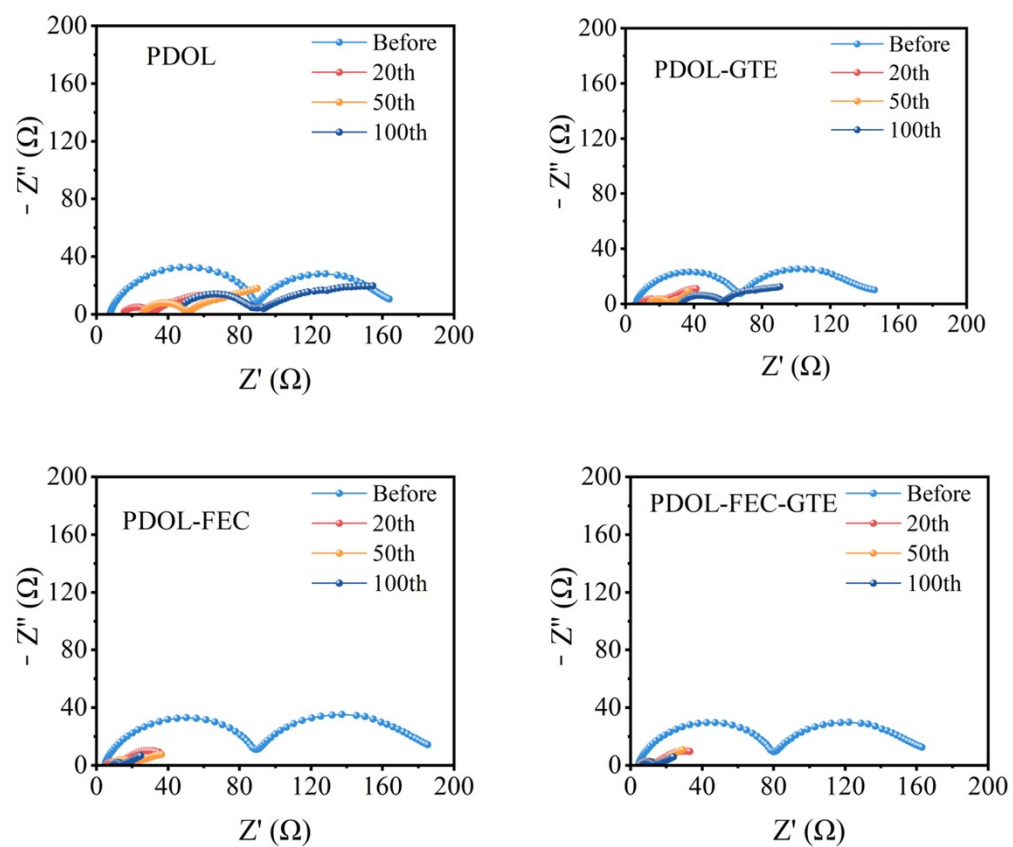


Fig. S9 The EIS plots of the cycled Li||Li cells with the (a) PDOL, (b) PDOL-GTE, (c) PDOL-FEC and (d) PDOL-FEC-GTE GPE sheet.

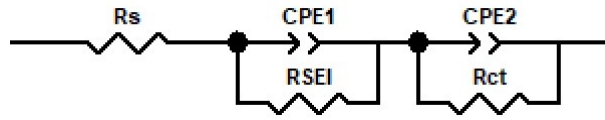


Fig S10 Equivalent circuit for fitting Nyquist plots of Li||Li symmetric cells.

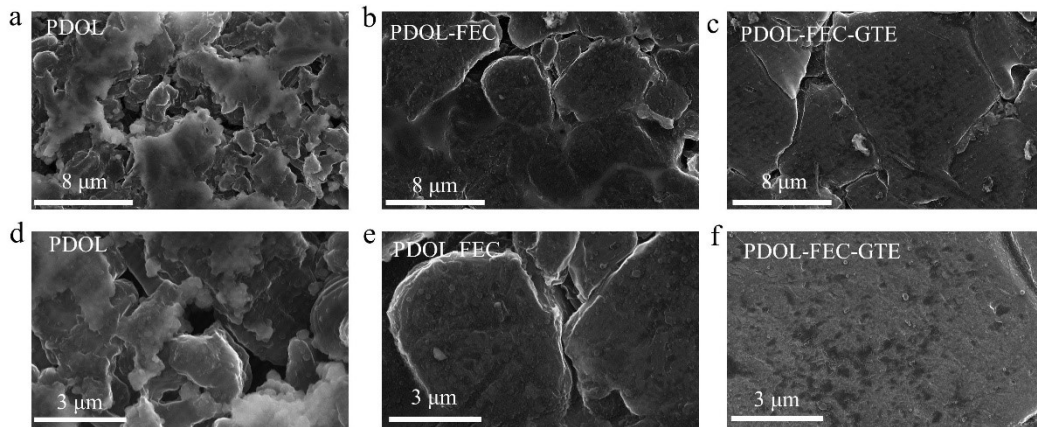


Fig. S11 Top-view SEM images of Li metal anodes after 100 cycles with (a, d)PDOL, (b, e)PDOL-FEC, (c, f)PDOL-FEC-GTE.

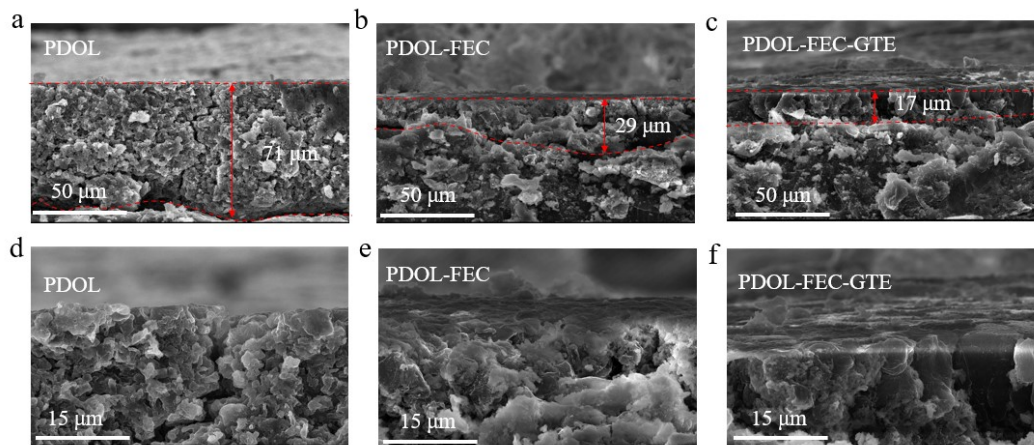


Fig. S12 Cross-sectional SEM images of Li metal anodes after 100 cycles with (a and d)PDOL, (b and e)PDOL-FEC, (c and f)PDOL-FEC-GTE.

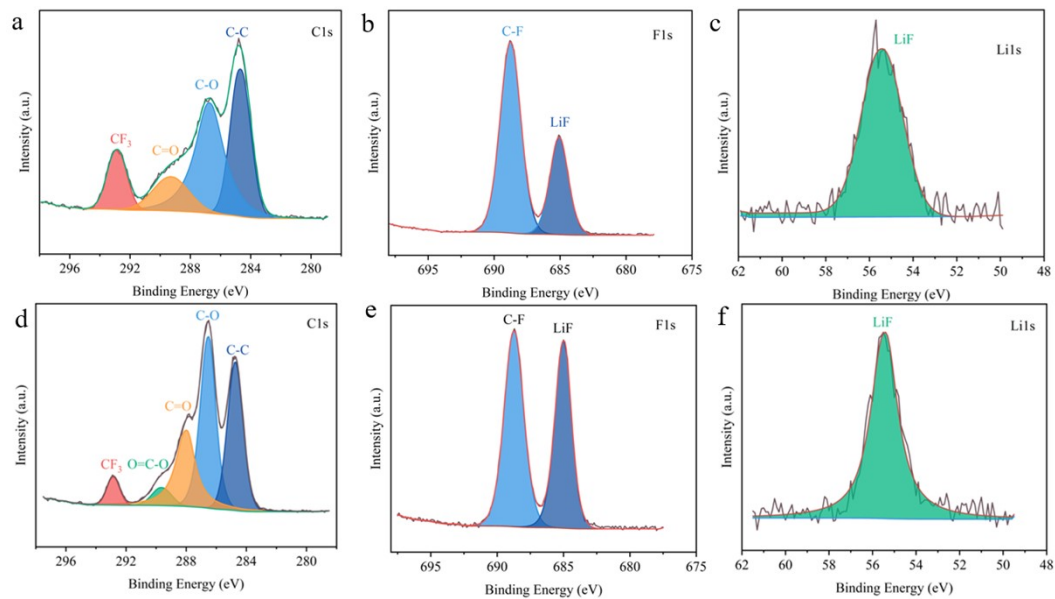


Fig. S13 XPS spectra (C 1s, F 1s and Li 1s spectra) of the Li metal surface from the cycled Li||Li cells after 50 h at 1 mA cm⁻² for 1 mA h cm⁻²: (a, b and c) LE cell and (d, e and f) GPE cell (PDOL-FEC-GTE)

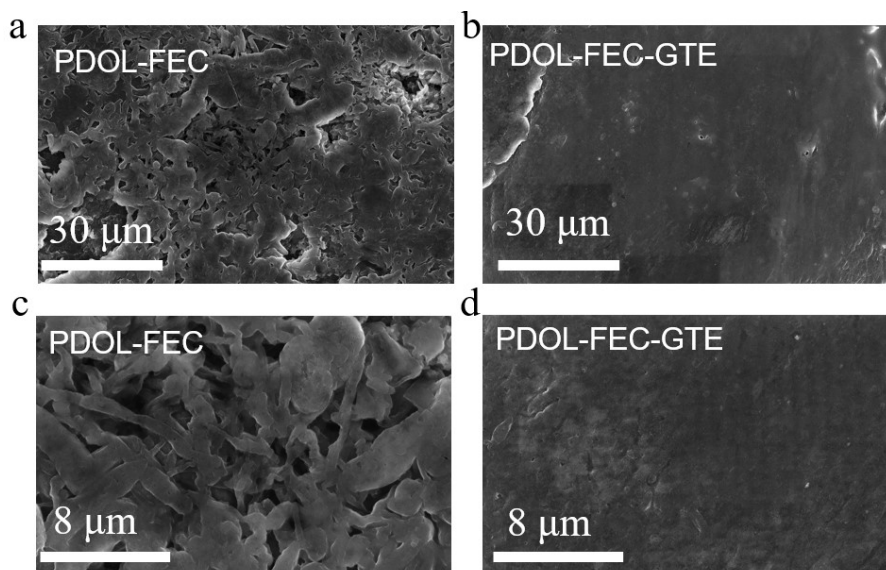


Fig. S14 the SEM images of Li metal surface of (a and c)LFP|PDOL-FEC|Li and (b and d)LFP|PDOL-FEC-GTE|Li after 60 cycles

Table S1 Effect of different polymerization conditions on ionic conductivity

Name	GTE	LiDFOB	Resistance	Ionic conductivity
PDOL-5GTE-5	5 wt%	0.5 M	175.6 Ω	8.1×10^{-6}
PDOL-5GTE-2	5 wt%	0.2 M	79.8 Ω	1.8×10^{-5}
PDOL-2GTE-5	2 wt%	0.5 M	85.4 Ω	1.7×10^{-5}
PDOL-2GTE-2	2 wt%	0.2 M	6.6 Ω	2.2×10^{-4}

Table S2 The fitted EIS parameters of Li|PDOL|Li , Li|PDOL-GTE|Li, Li|PDOL-FEC|Li and Li|PDOL-FEC-GTE|Li cells

		R_s	R_{SEI}	R_{ct}
Li PDOL Li	Before	7.563	82.12	74.78
	20th	14.24	16.72	53.06
	50th	25.85	22.83	88.45
	100th	44.26	42.43	108.1
Li PDOL-GTE Li	Before	5.998	59.88	77.75
	20th	9.451	9.855	57.45
	50th	14.03	12.01	10.11
	100th	31.95	25.19	31.04
Li PDOL-FEC Li	Before	5.611	82.21	81.93
	20th	6.675	7.182	30.7
	50th	10.57	6.992	12.55
	100th	9.629	5.914	10.7
Li PDOL-FEC-GTE Li	Before	4.408	74.82	85.04
	20th	5.46	7.748	34.65
	50th	5.842	8.339	14.35
	100th	6.507	6.904	12.76