Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Novel mixture of diethylene glycol diethylether and non-flammable methyl-nonafluorobutyl ether as safe electrolyte for lithium ion batteries

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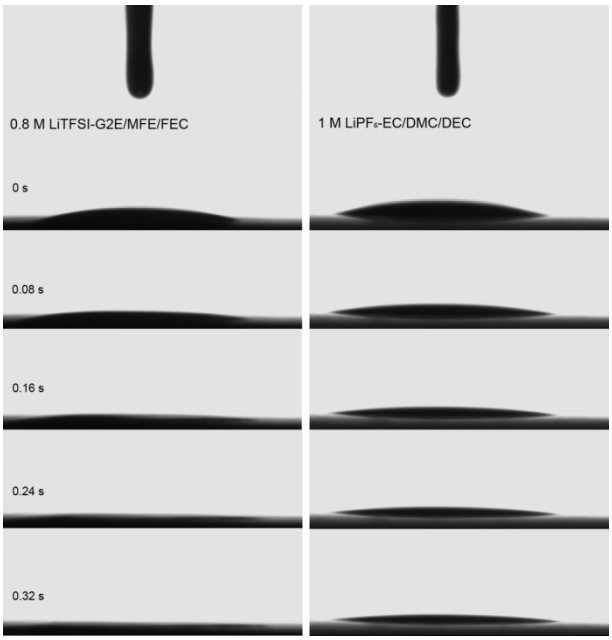

Fig. S1 Impregnation process of 0.8 M LiTFSI-G2E/MFE/FEC and 1M $LiPF_6$-EC/DMC/DEC electrolytes into $LiFePO_4$ cathode.

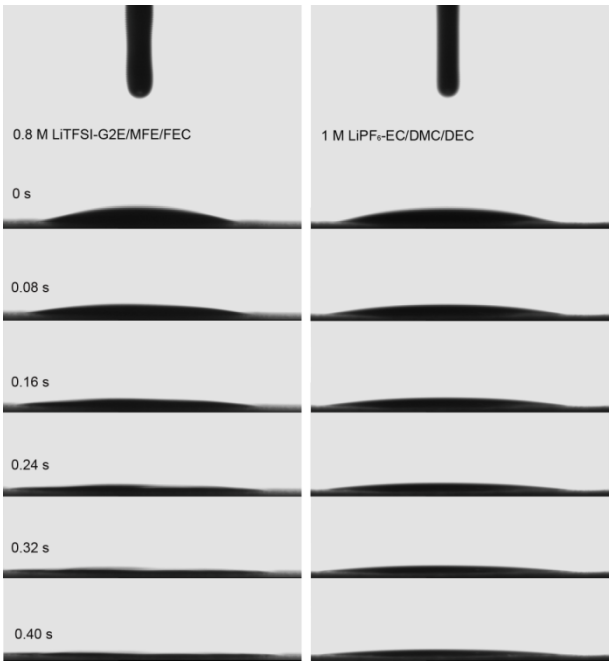

Fig. S2 Impregnation process of 0.8 M LiTFSI-G2E/MFE/FEC and 1M $LiPF_6$-EC/DMC/DEC electrolytes into graphite anode.

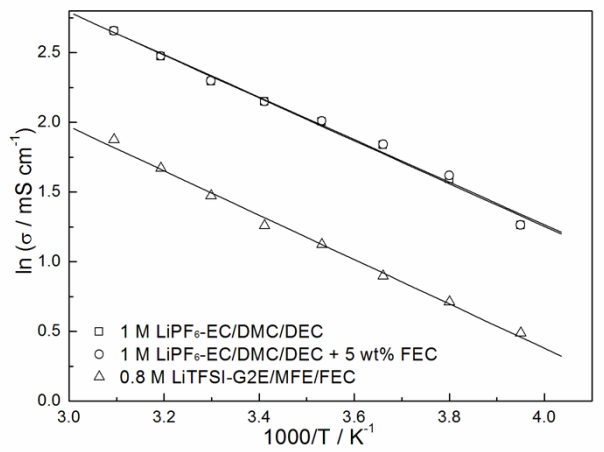

Fig. S3 Arrhenius plots of conductivity for different electrolytes.

Table S1 Activation energies E_σ, constants A and the linear fitting parameters R^2 calculated from the Arrhenius plots of conductivity

Electrolyte	E_σ / kJ mol^{-1}	A / mS cm^{-1}	R^2
0.8 M LiTFSI-G2E/MFE/FEC	13.22	847	0.997
1 M $LiPF_6$-EC/DMC/DEC	12.77	1633	0.996
1 M $LiPF_6$-EC/DMC/DEC + 5 wt% FEC	12.67	1573	0.995

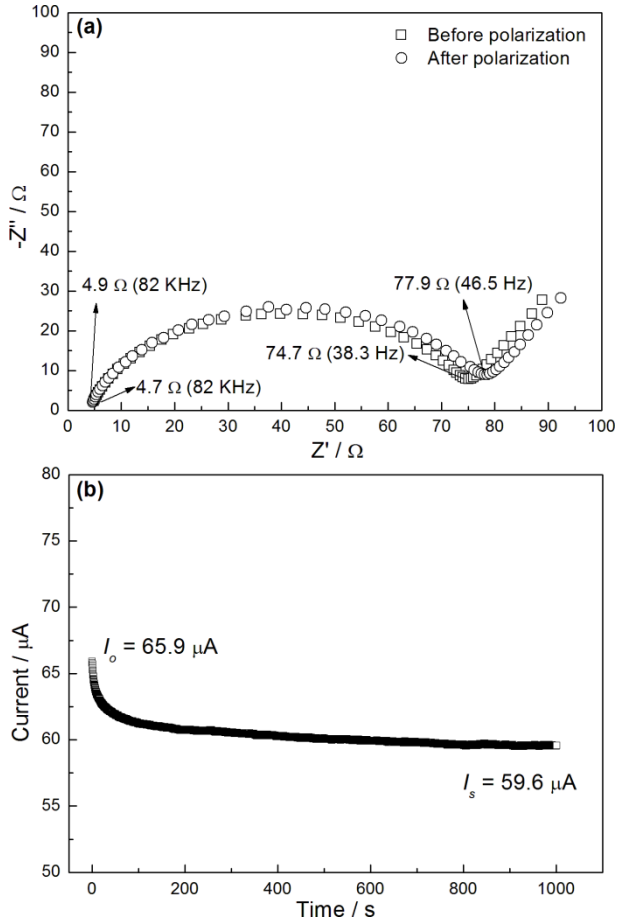

Fig. S4 (a) EIS plots and (b) time-dependence response of dc polarization of lithium symmetric cell using 0.8 M LiTFSI-G2E/MFE/FEC electrolyte at room temperature. Polarization voltage is 5 mV.

Table S2 Parameters obtained from EIS and dc polarization analysis of lithium symmetric cell using 0.8 M LiTFSI-G2E/MFE/FEC electrolyte at room temperature

R_b^o / Ω	R_i^o / Ω	R_b^s / Ω	R_i^s / Ω	I_o / μA	I_s / μA	ΔV / mV
4.9	69.8	4.7	73.2	65.9	59.6	5

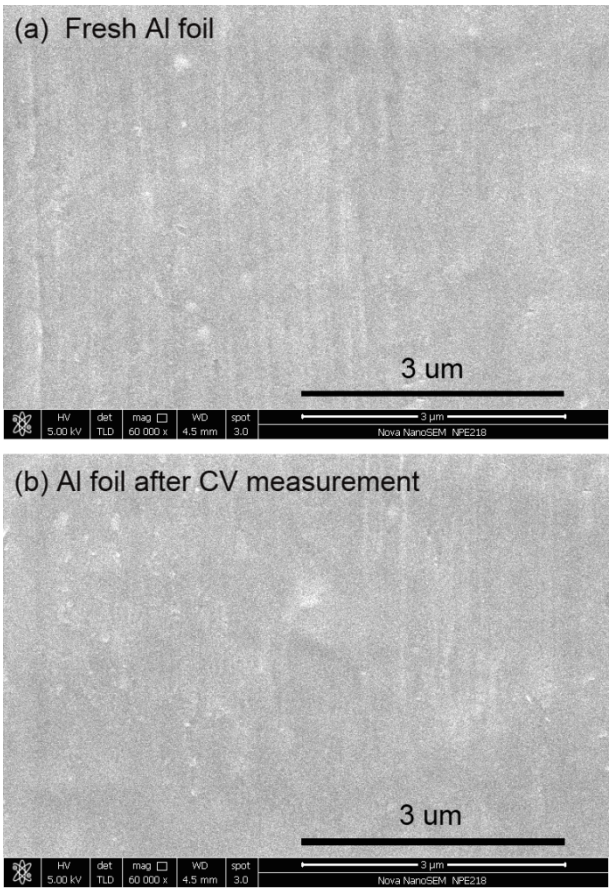

Fig. S5 SEM images of (a) fresh Al foil and (b) Al foil after CV measurement (in Fig. 6a).

Table S3 Resistance parameters calculated from the EIS plots (Fig. 7c)

Electrolyte	R_b / Ω	R_{SEI} / Ω	R_{ct} / Ω
0.8 M LiTFSI-G2E/MFE/FEC	4.1	57.1	15.2
1 M $LiPF_6$-EC/DMC/DEC	2.7	89.1	30.9
1 M $LiPF_6$-EC/DMC/DEC + 5 wt% FEC	2.8	91.8	29.4