

Supplementary Material for

Liquid Structures and Transport Properties of Lithium Bis(fluorosulfonyl)amide/Glyme Solvate Ionic Liquids for Lithium Batteries

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Table S1. Viscosity (η), density (ρ), molar concentration of Li[FSA] (c), ionic conductivity (σ), and self-diffusion coefficients of electrolytes of Li[FSA]/glyme (glyme = G3 or G4) at 30 °C.

Molar ratio $c_{\text{Li}}/c_{\text{G3}}$	η /mPa s	ρ /gcm ⁻³	c /mol dm ⁻³	σ /mS cm ⁻¹	Diffusion coefficient / 10 ⁻⁷ cm ² s ⁻¹		
					D_{G3}	D_{Li}	D_{FSA}
2	1403	1.528	5.53	0.223	0.09	0.11	0.41
1.667	673.9	1.480	5.03	0.497	0.20	0.22	0.71
1.429	364.4	1.439	4.62	0.769	0.36	0.36	1.03
1	139.0	1.355	3.71	1.65	1.01	1.01	0.99
0.5	34.8	1.227	2.23	3.038	3.41	2.59	3.23
0.25	7.78	1.124	1.25	5.471	15.84	9.27	12.08
0.125	3.69	1.057	0.66	4.62	31.25	17.19	22.05
0.02	2.02	0.990	0.11	0.78	NA	NA	NA
0.0025	1.82	0.978	0.014	0.075	NA	NA	NA

Molar ratio $c_{\text{Li}}/c_{\text{G4}}$	η /mPa s	ρ /gcm ⁻³	c /mol dm ⁻³	σ /mS cm ⁻¹	Diffusion coefficient/10 ⁻⁷ cm ² s ⁻¹		
					D_{G4}	D_{Li}	D_{FSA}
2	1701	1.493	5.01	0.215	0.06	0.08	0.42
1.667	750.6	1.395	4.35	0.392	0.16	0.18	0.68
1.429	387.7	1.410	4.12	0.684	0.30	0.30	0.39
1.25	211.8	1.378	3.78	1.08	0.53	0.52	0.67
1	94.0	1.331	3.25	1.98	1.17	1.16	1.38
0.5	32.0	1.212	1.92	2.76	3.47	2.68	3.51
0.25	10.1	1.123	1.04	3.72	10.95	6.95	9.48
0.125	5.53	1.067	0.54	2.80	19.49	11.40	15.47
0.02	3.33	1.013	0.09	0.44	NA	NA	NA
0.0025	3.02	1.003	0.011	0.040	NA	NA	NA

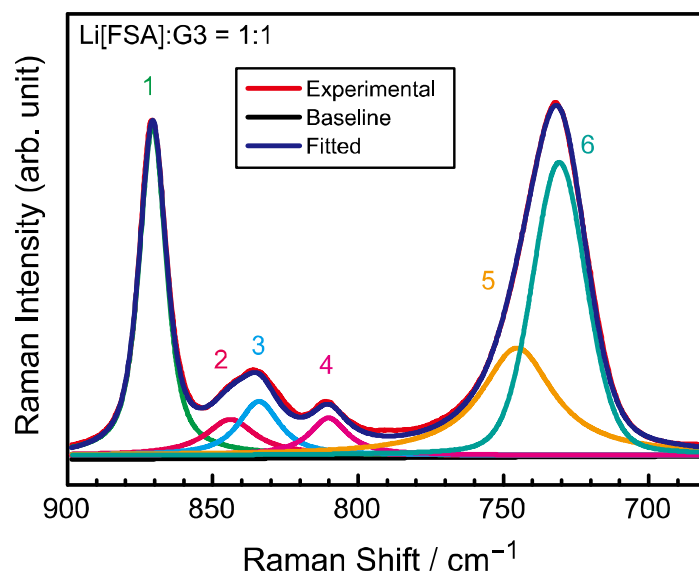


Figure S1. Raman spectrum of Li[FSA]/G3 = 1 deconvoluted into 6 peaks.

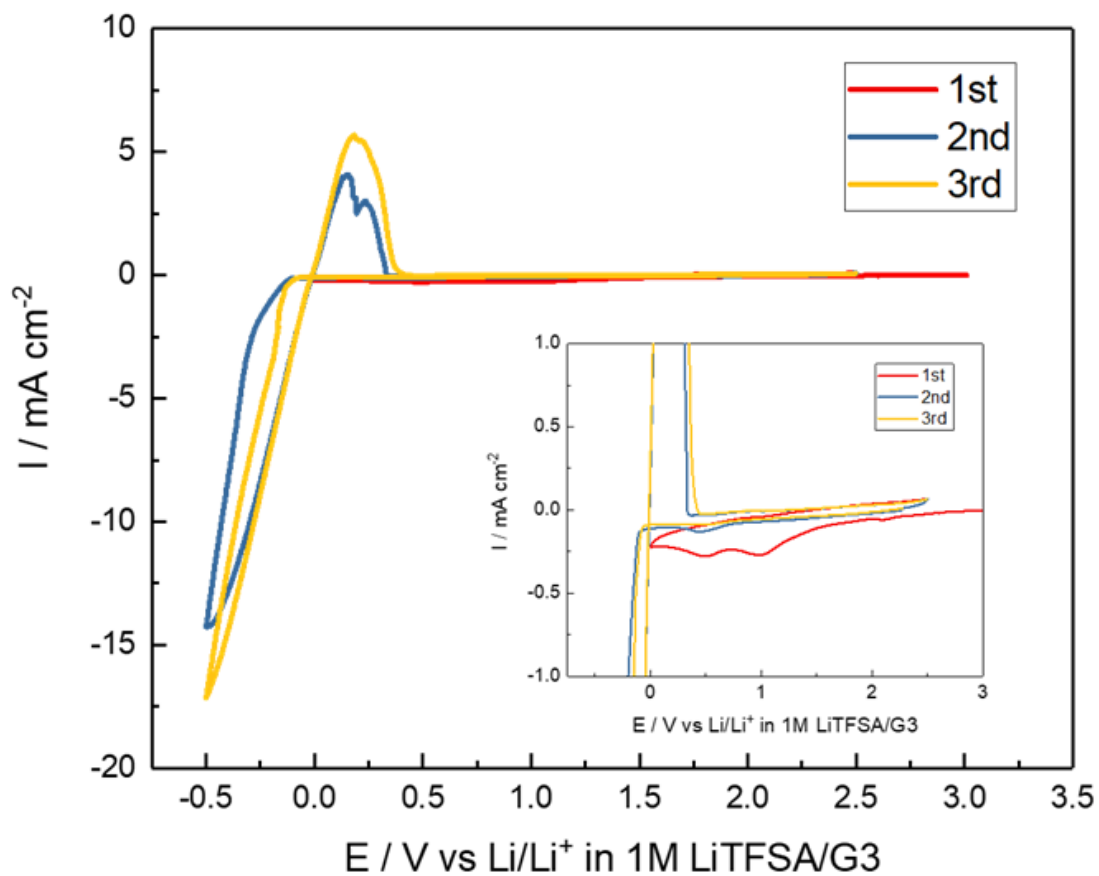


Figure S2. Cyclic voltammograms of electrolyte of Li[FSA]/G3 = 0.25 measured with a Cu electrode at a scan rate of 1 mV s⁻¹. Inset depicts an enlarged view of current density.