Supporting Information

for:

SINGLE-ION BLOCK COPOLY(IONIC LIQUID)S AS ELECTROLYTES FOR ALL-SOLID STATE LITHIUM BATTERIES

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Table S1. Polymerization conditions used for the synthesis of poly(PEGM)-b-poly(LiMTFSI) copolymers[a]

Sample	Monomer (mol × 10^{-3})	RAFT agent (mol × 10^{-5})	Initiator (mol × 10^{-5})	Solvent (ml)
poly(PEGM)	PEGM (21.3)	CPADB (18.2)	AIBN (1.83)	DMF (10.6)
LiBC-1	LiMTFSI (0.61)	poly(PEGM) (2.8)	AIBN (0.19)	DMF (2.3)
LiBC-2	LiMTFSI (0.69)	poly(PEGM) (2.4)	AIBN (0.24)	DMF (2.0)
LiBC-3	LiMTFSI (0.98)	poly(PEGM) (2.1)	AIBN (0.21)	DMF (2.0)
LiBC-4	LiMTFSI (1.74)	poly(PEGM) (1.4)	AIBN (0.27)	DMF (1.9)

[a]Polymerization temperature: 70°C; time: 8h.

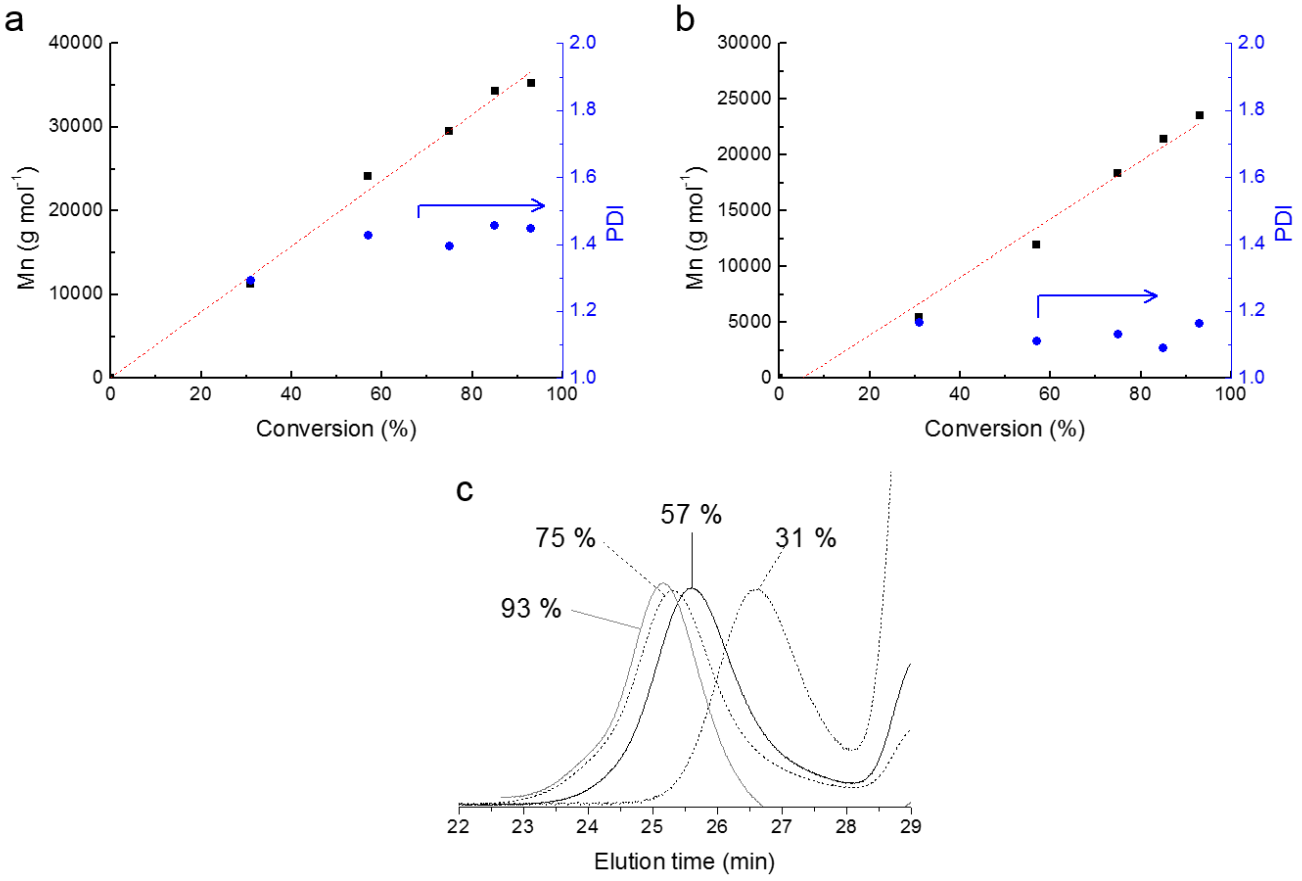

Figure S1. Molar mass and PDI evolution versus conversion for RAFT polymerization of PEGM determined in THF (a) and 0.1 M LiCl solution in H_2O/ACN mixture (4:1 v/v) (b). GPC traces for the poly(PEGM) precursors in THF (c).

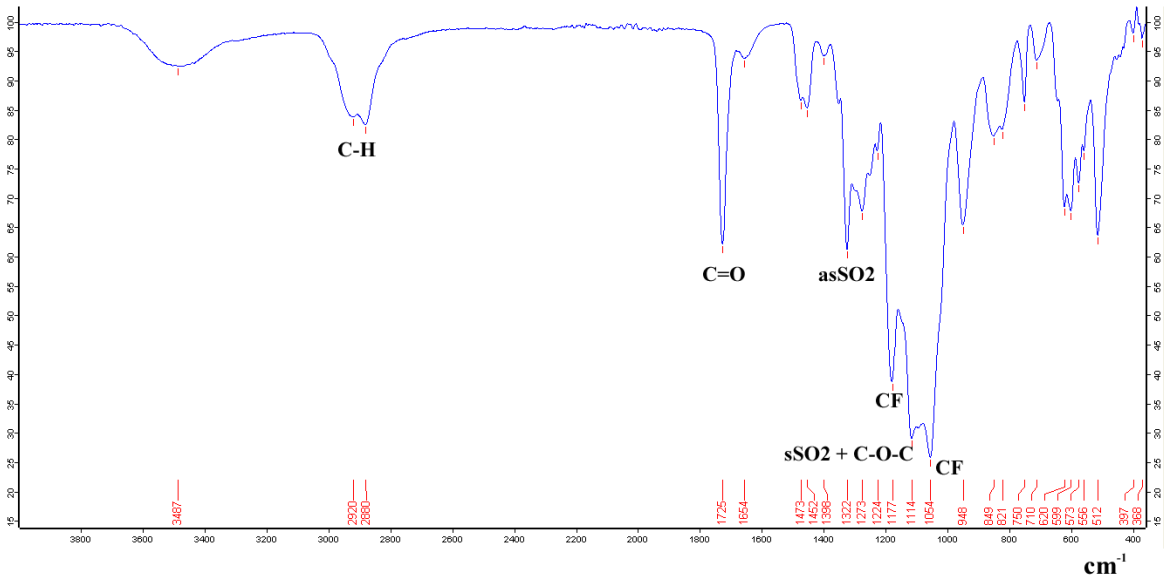

Figure S2. FTIR spectra of poly(PEGM-b-LiMTFSI) block copolymer (LiBC-1).

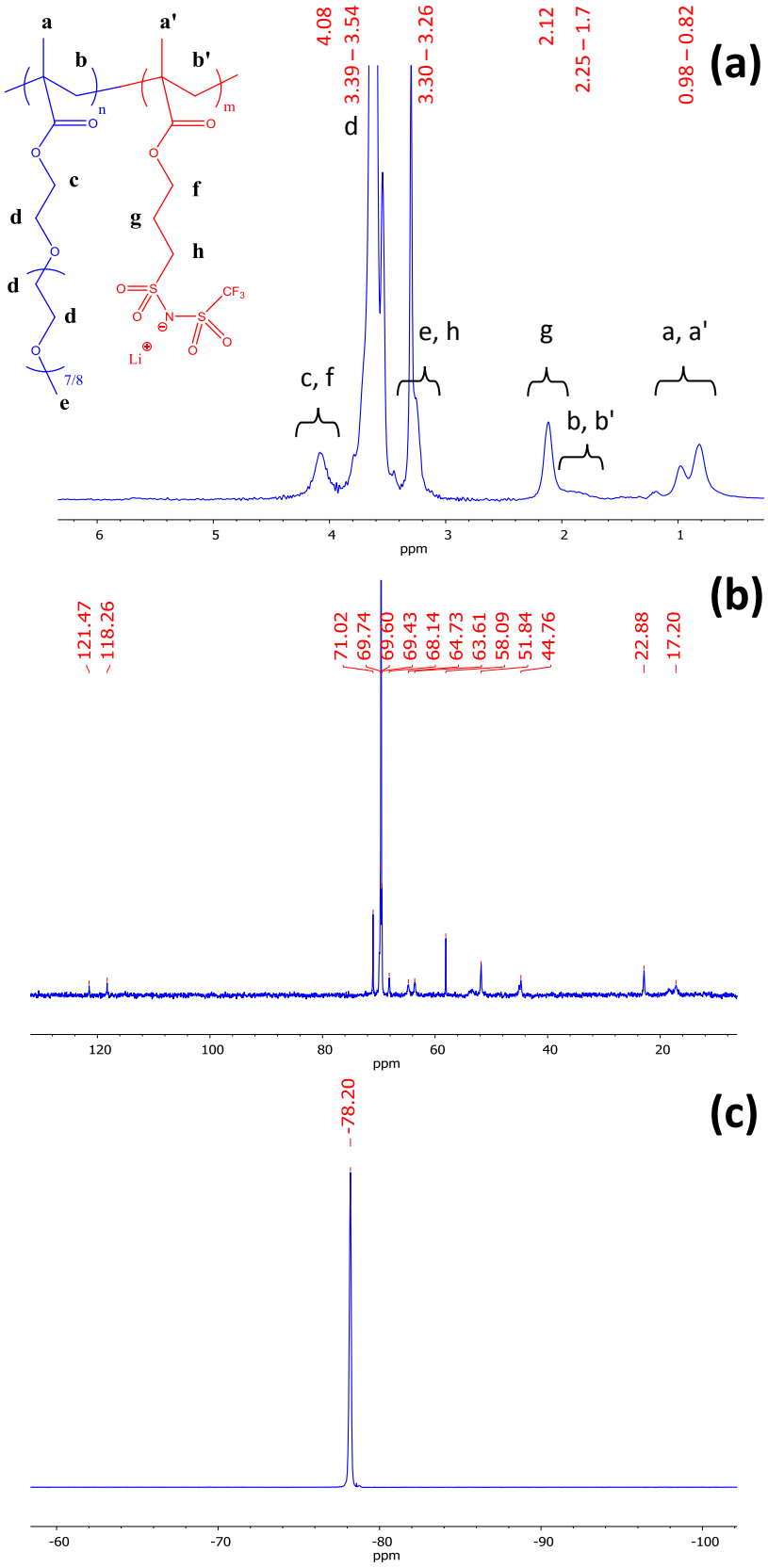

Figure S3. (a) ^{1}H NMR, (b) ^{13}C NMR and (c) ^{19}F NMR spectra of poly(PEGM)-b-poly(LiMTFSI) block copolymer (LiBC-1).

Table S2. Lithium ion transference number measurement[a]

	i ($\times 10^{-4}$ mA)	R (Ω)	t_{Li^+}
initial	9.62	2140	0.83
steady state	8.21	2182	

[a] potential bias applied: 10 mV

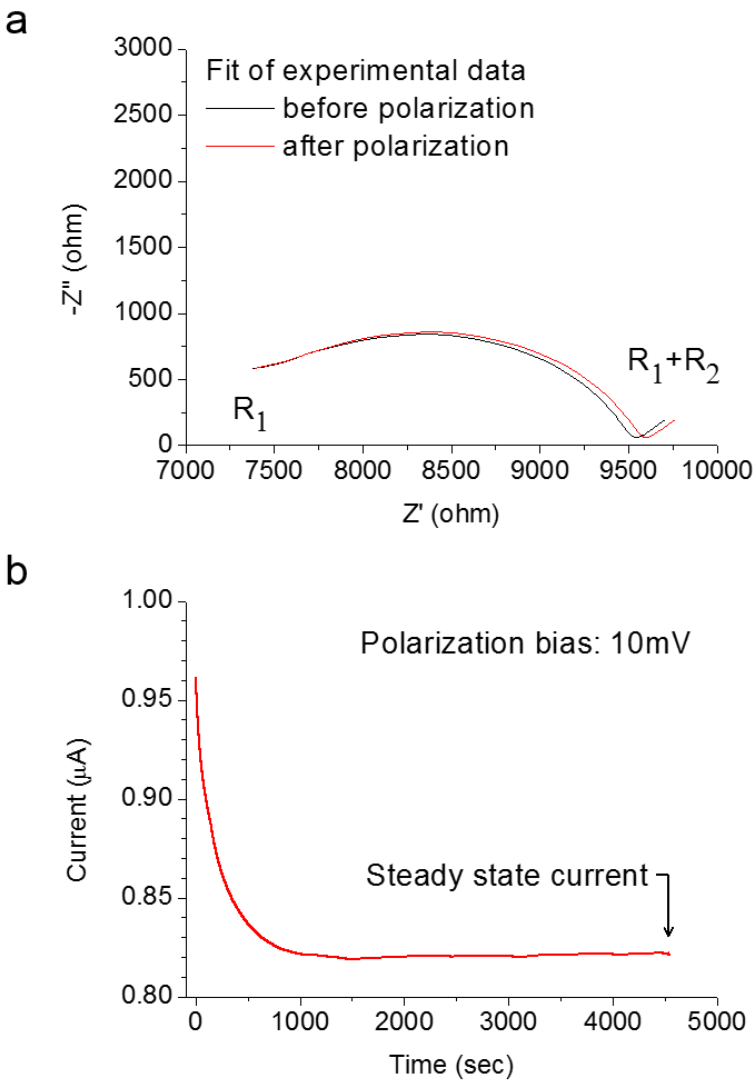

Figure S4. Lithium-ion transport number analysis: (a) Typical Nyquist plot of the a.c. impedance of a Li | LiBC-1 | Li cell at 70°C, (b) current variation with time during polarization of the symmetrical lithium cell.

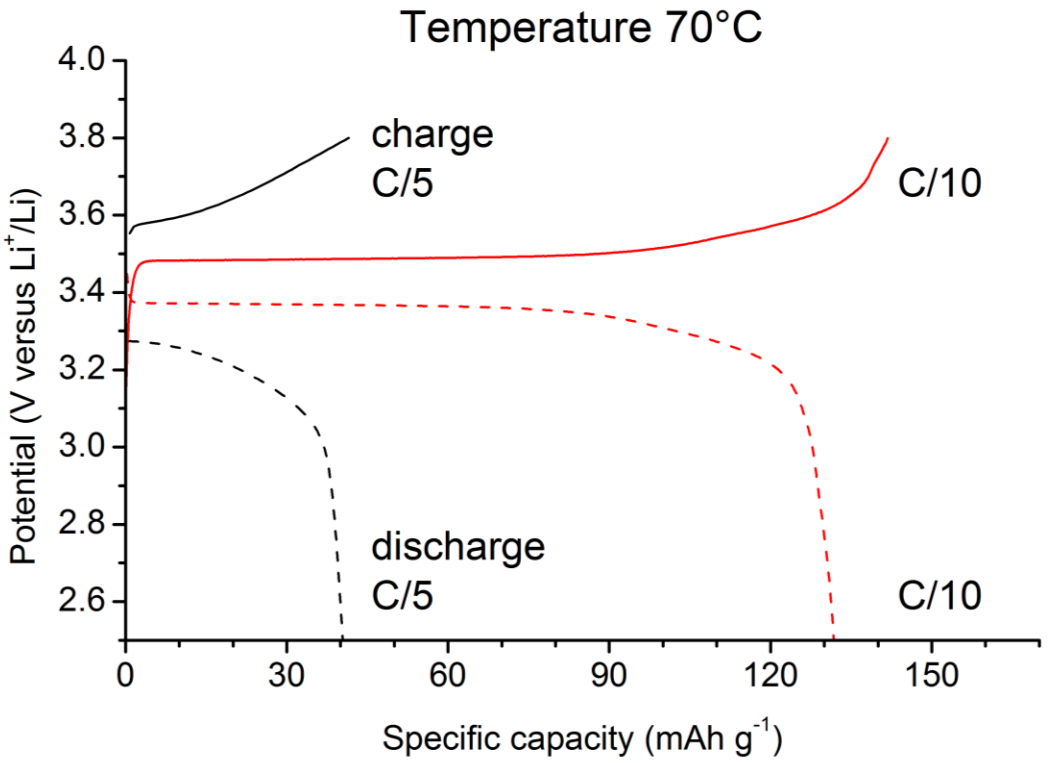

Figure S5. Constant current charge/discharge potential *vs.* specific capacity profile extracted from cycle 2 at C/10 rate and cycle 50 at C/5 rate