

APPENDIX D

Data used to calculate the number densities of PEMA/PVdF–HFP–LiTf–BMII system

The density for PEMA, PVdF–HFP, LiTf and BMII = 1.11, 1.78, 1.90 and 1.49 g cm⁻¹ respectively. The density for PEMA/PVdF–HFP (70:30) is taken to be 1.311 g cm⁻¹. The molecular weight of LiTf and BMII are 156.01 and 266.12 g mol⁻¹ respectively. The number of mole of LiTf in this system is calculated using the fixed amount of salt present in the composition of the optimized 70 wt.% PEMA/PVdF–HFP–30 wt.% LiTf sample. The number density of (Li⁺ + Tf⁻) ions and (BMI⁺ + I⁻) ions are calculated separately, after which both values are summed up to obtain the number density of total number of ions, n . Table below lists the parameters used to calculate the number densities of free [Li⁺+Tf⁻] and [BMI⁺+I⁻] ions.

Sample	No. of mole of LiTf	No. of mole of BMII	FI of Tf (%)	FI of I (%)	σ (S cm ⁻¹)	V _{PEMA/PVdF-HFP (70:30)} (cm ³)	V _{LiTf} (cm ³)	V _{BMII} (cm ³)	V _{Total} (cm ³)	n of free [Li ⁺ +Tf ⁻] ions (cm ⁻³)	n of free [BMI ⁺ +I ⁻] ions (cm ⁻³)	n of total ions (cm ⁻³)
BI-5	2.75 × 10 ⁻³	2.83 × 10 ⁻⁴	9.63	100	3.88 × 10 ⁻⁷	1.311	0.814	0.112	2.24	1.42 × 10 ²²	1.52 × 10 ²²	2.94 × 10 ²²
BI-10	2.75 × 10 ⁻³	5.96 × 10 ⁻⁴	68.91	100	4.94 × 10 ⁻⁷	1.311	0.814	0.236	2.36	9.65 × 10 ²²	3.04 × 10 ²³	1.27 × 10 ²³
BI-12.5	2.75 × 10 ⁻³	7.67 × 10 ⁻⁴	92.30	100	4.86 × 10 ⁻⁵	1.311	0.814	0.304	2.43	1.26 × 10 ²³	3.80 × 10 ²²	1.64 × 10 ²³
BI-15	2.75 × 10 ⁻³	9.47 × 10 ⁻⁴	18.82	100	1.38 × 10 ⁻⁵	1.311	0.814	0.376	2.50	2.49 × 10 ²²	4.56 × 10 ²²	7.05 × 10 ²²
BI-17.5	2.75 × 10 ⁻³	1.14 × 10 ⁻³	11.50	100	6.63 × 10 ⁻⁷	1.311	0.814	0.451	2.58	1.48 × 10 ²²	5.32 × 10 ²²	6.80 × 10 ²²
BI-20	2.75 × 10 ⁻³	1.34 × 10 ⁻³	5.42	100	2.43 × 10 ⁻⁷	1.311	0.814	0.532	2.66	6.75 × 10 ²¹	6.08 × 10 ²²	6.76 × 10 ²²