

APPENDIX E

Data used to calculate the number densities of PEMA/PVdF-HFP-LiTf-BMITf system

The density for PEMA, PVdF-HFP, LiTf and BMITf = 1.11, 1.78, 1.90 and 1.29 g cm⁻³ respectively. The density for PEMA/PVdF-HFP (70:30) is taken to be 1.311 g cm⁻³. The molecular weight of LiTf and BMITf are 156.01 and 288.29 g mol⁻¹ respectively. For this system, the area of free ions of Tf⁻ obtained come from both LiTf and BMITf. Hence, number of moles of LiTf and BMITf are summed up to calculate the number density of free Tf⁻ ions. The number density of (Li⁺ + Tf⁻) ions and (BMI⁺ + Tf⁻) ions are obtained by multiplying the value of number density of free Tf⁻ ions, n by a factor of two. Table below lists the parameters used to calculate the number densities of free [Li⁺+Tf⁻] and [BMI⁺+Tf⁻] ions.

Sample	No. of mole of LiTf	No. of mole of BMITf	Total no. of moles	FI of Tf ⁻ (%)	σ (S cm ⁻¹)	V _{PEMA/PVdF-HFP} (cm ³)	V _{LiTf} (cm ³)	V _{BMITf} (cm ³)	V _{Total} (cm ³)	n of free Tf ⁻ ions from LiTf and BMITf (cm ⁻³)	n of total ions (cm ⁻³)
BT-10	2.75 × 10 ⁻³	5.50 × 10 ⁻⁴	3.30 × 10 ⁻³	23.36	6.50 × 10 ⁻⁷	1.311	0.814	0.205	2.33	1.99 × 10 ²²	3.98 × 10 ²²
BT-20	2.75 × 10 ⁻³	1.24 × 10 ⁻³	3.99 × 10 ⁻³	28.38	8.05 × 10 ⁻⁷	1.311	0.814	0.462	2.59	2.63 × 10 ²²	5.27 × 10 ²²
BT-30	2.75 × 10 ⁻³	2.12 × 10 ⁻³	4.87 × 10 ⁻³	32.62	1.00 × 10 ⁻⁶	1.311	0.814	0.791	2.92	3.28 × 10 ²²	6.56 × 10 ²²
BT-40	2.75 × 10 ⁻³	3.30 × 10 ⁻³	6.05 × 10 ⁻³	33.26	5.32 × 10 ⁻⁶	1.311	0.814	1.231	3.36	3.61 × 10 ²²	7.22 × 10 ²²
BT-50	2.75 × 10 ⁻³	4.96 × 10 ⁻³	7.70 × 10 ⁻³	43.71	1.72 × 10 ⁻⁵	1.311	0.814	1.846	3.97	5.11 × 10 ²²	1.02 × 10 ²³
BT-60	2.75 × 10 ⁻³	7.43 × 10 ⁻³	1.02 × 10 ⁻²	61.71	8.59 × 10 ⁻⁵	1.311	0.814	2.769	4.89	7.73 × 10 ²²	1.55 × 10 ²³