

Supporting Information

Single Ion Solid-State Composite Electrolytes with High Electrochemical Stability Based on Poly(perfluoroalkylsulfonyl)imide (PFSI) Ionene Polymer

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Lithium ion transport number

The lithium-ion transport number was determined by combining alternating-current (AC) impedance and direct-current (DC) polarization measurements using a symmetric Li/PEO-PFSILi/Li cell, introduced by Bruce–Evans–Vincent. First, AC impedance test was performed to obtain a total resistance R_{cell} . Then DC polarization was carried out to obtain a stable current I_{DC} . The lithium-ion transference number was calculated by the formula^[1,2]:

$$t_{\text{Li}^+} = \frac{I^s R_b^s (\Delta V - I^0 R_{el}^0)}{I^0 R_b^0 (\Delta V - I^s R_{el}^s)}$$

Table S1 Calculation of lithium ion transport number

$R_b^0(\Omega)$	$R_{el}^0(\Omega)$	$I^0(\mu\text{A})$	$I^s(\mu\text{A})$	$R_b^s(\Omega)$	$R_{el}^s(\Omega)$	ΔV (mV)	t_{Li^+}
88.8	144.1	26.4	14.5	159.5	225.7	10	0.908

Reference

1. K. M. Abraham, Z. Jiang and B. Carroll, *Chem. Mater.* **1997**, *9*, 1978.
2. P. G. Bruce and C. A. Vincent, *J. Electroanal. Chem.* **1987**, *225*, 1.