Single lithium-ion conducting poly(tetrafluorostyrene sulfonate) – polyether block copolymer electrolytes

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Figure S1. $^1\text{H}$ NMR spectra of the PEO-PPFS$_{10}$ (upper) and PEOPO-PPFS$_{30}$ (lower) block copolymers.
Figure S2. SEC chromatograms of the non-ionic precursor homopolymers and block copolymers based on (a) PEO and (b) PEPO, respectively.

Figure S3. TGA traces of the non-ionic precursor homopolymers and block copolymers based on (a) PEO and (b) PEPO, respectively.
Figure S4. Isothermal TGA traces of sample PEO-sPPFSLi\textsubscript{25} under N\textsubscript{2} atmosphere. The maximum weight loss after 600 min. was 0.17% (at 120 °C).

Figure S5. DSC cooling (dashed lines) and heating (solid lines) traces of the non-ionic precursor homopolymers and block copolymers based on (a) PEO and (b) PEOPO, respectively.
Figure S6. Conductivity of PEO-sPPFSLi$_{25}$ at two different water contents, as determined by Carl Fischer titrations. The conductivity decreased by a factor ~2.5 above 50 °C when the water content was decreased from 400 ppm (dried under 2 Pa at 50 °C for 24 hours) to 75 ppm (dried under 0.2 Pa at 80 °C for 48 hours).

Figure S7. Measured AC conductivity versus frequency for sample PEO-sPPFSLi$_{25}$ obtained by electrochemical impedance spectroscopy from 90 to 20 °C in steps of 10 °C.
**Figure S8.** SAXS data of sample PEO-sPPFSi$_{25}$ recorded above and below its $T_m$ at 23 and 55 °C. The data showed no scattering peaks in the $q$-range between ~2 and 7 nm$^{-1}$, which corresponded to characteristic distances ($d$) between ~1 and 44 nm.

**Figure S9.** Measured conductivity data points and curves fitted to the VTF equation, \[ \log \sigma = \log \sigma_0 - \frac{E_v}{[R(T-T_v)]}. \] For the PEO-containing samples, only data measured above the $T_m$ of PEO was used in the fitting.