Electronic Supplementary Material (ESI) for Polymer Chemistry.

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

Zhecheng Shao and Patric Jannasch*

Polymer & Materials Chemistry, Department of Chemistry, Lund University,

P.O. Box 124, SE-221 00, Lund, Sweden.

*patric.jannasch@chem.lu.se

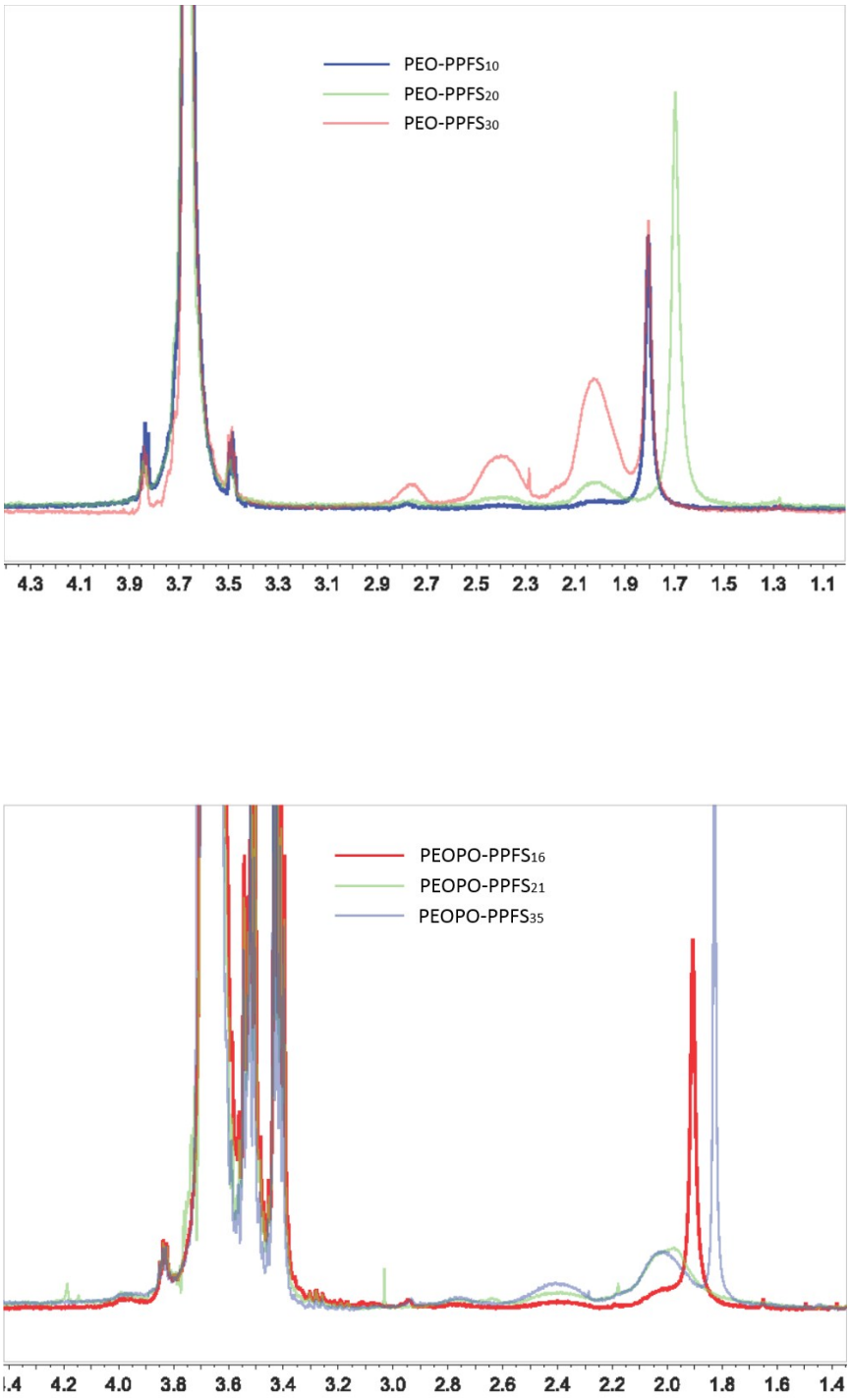

Figure S1. ^{1}H NMR spectra of the PEO-PPFS$_x$ (upper) and PEOPO-PPFS$_x$ (lower) block copolymers.

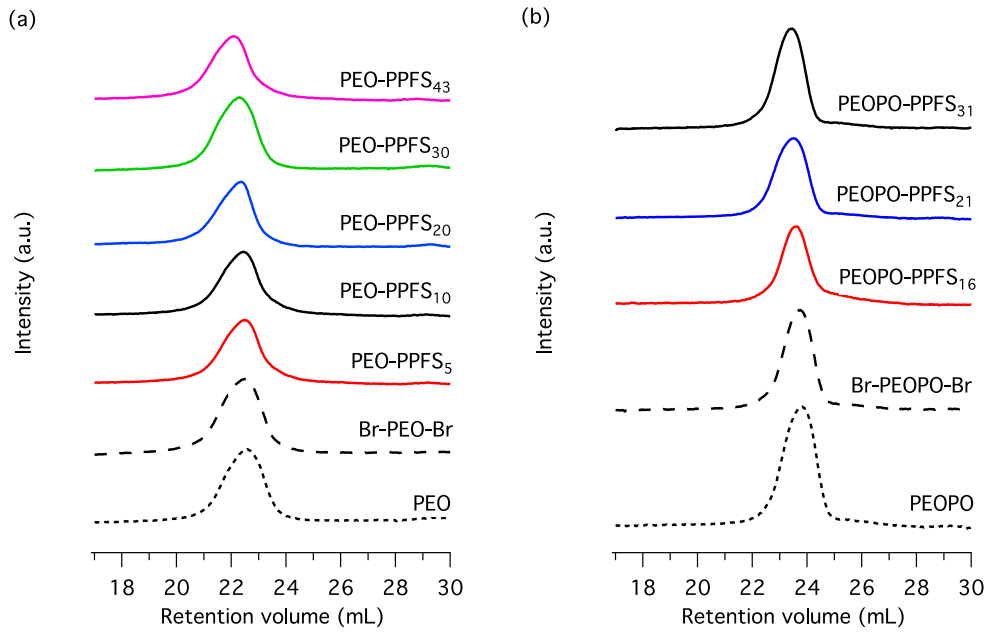

Figure S2. SEC chromatograms of the non-ionic precursor homopolymers and block copolymers based on (a) PEO and (b) PEOPO, respectively.

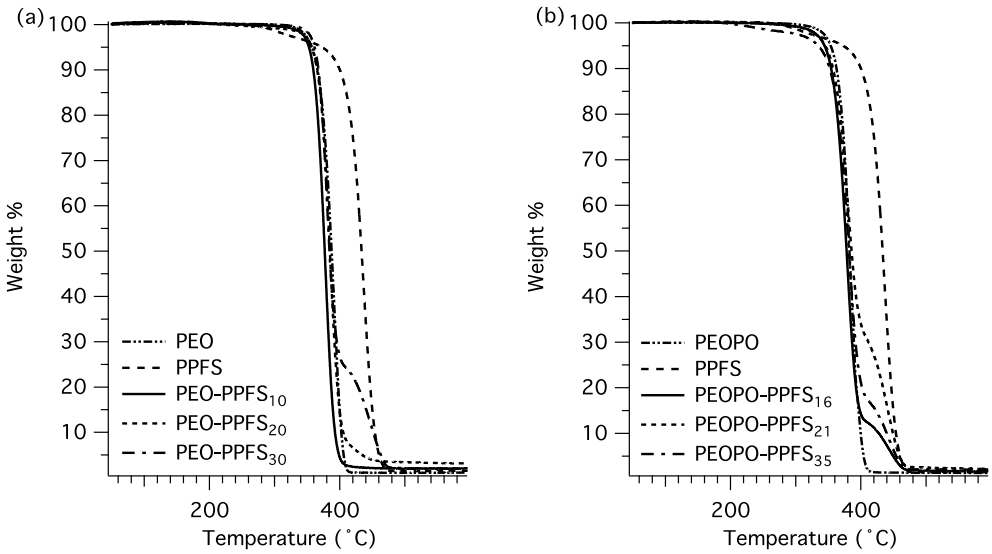

Figure S3. TGA traces of the non-ionic precursor homopolymers and block copolymers based on (a) PEO and (b) PEOPO, respectively.

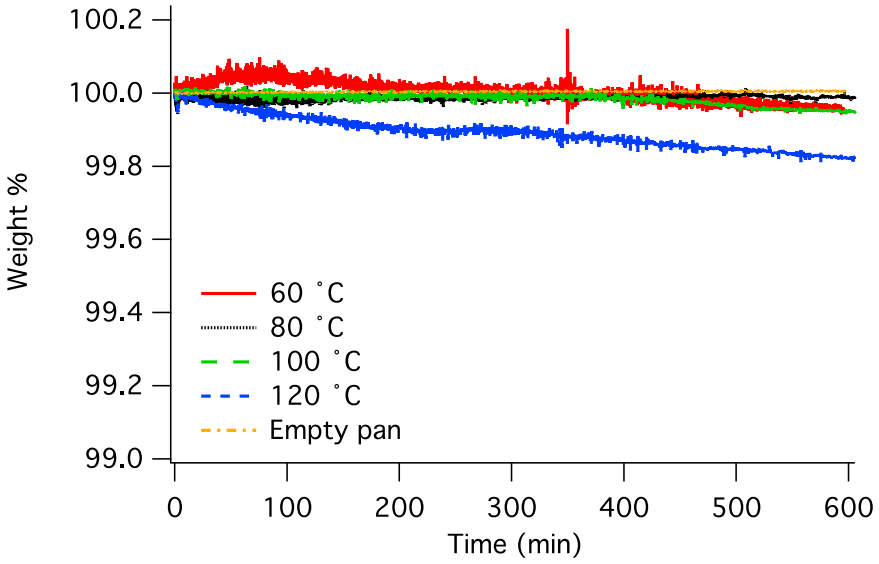

Figure S4. Isothermal TGA traces of sample PEO-sPPFSLi$_{25}$ under N_2 atmosphere. The maximum weight loss after 600 min. was 0.17% (at 120 °C).

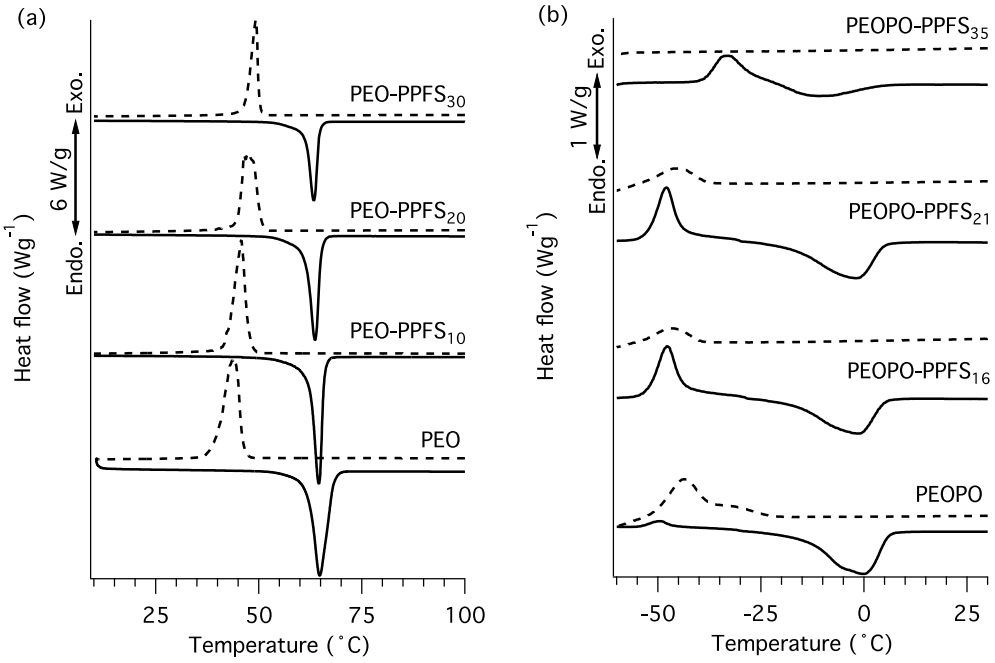

Figure S5. DSC cooling (dashed lines) and heating (solid lines) traces of the non-ionic precursor homopolymers and block copolymers based on (a) PEO and (b) PEOPO, respectively.

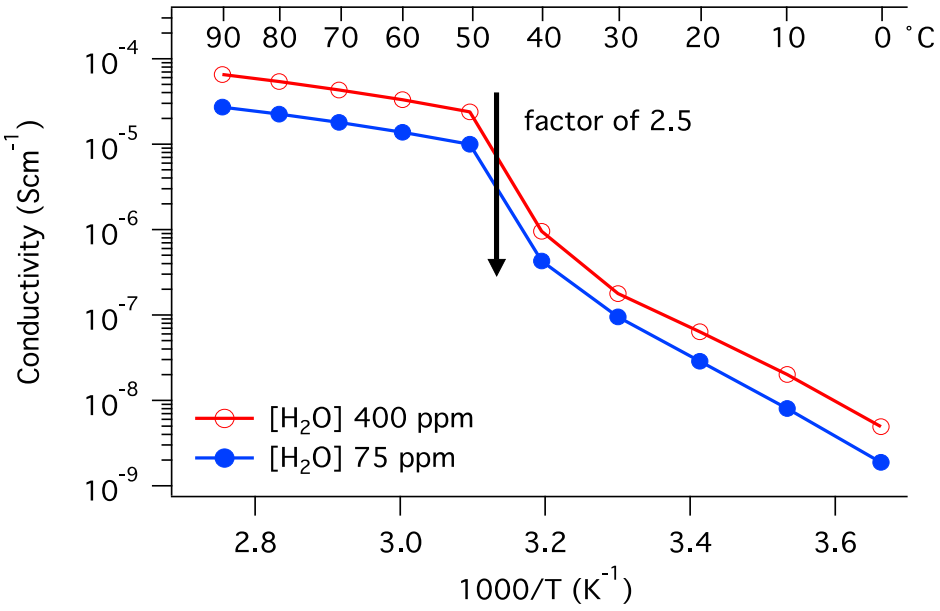

Figure S6. Conductivity of PEO-sPPFSLi$_{25}$ at two different water contents, as determined by Carl Fischer titrations. The conductivity decreased by a factor ~2.5 above 50 °C when the water content was decreased from 400 ppm (dried under 2 Pa at 50 ˚C for 24 hours) to 75 ppm (dried under 0.2 Pa at 80 ˚C for 48 hours).

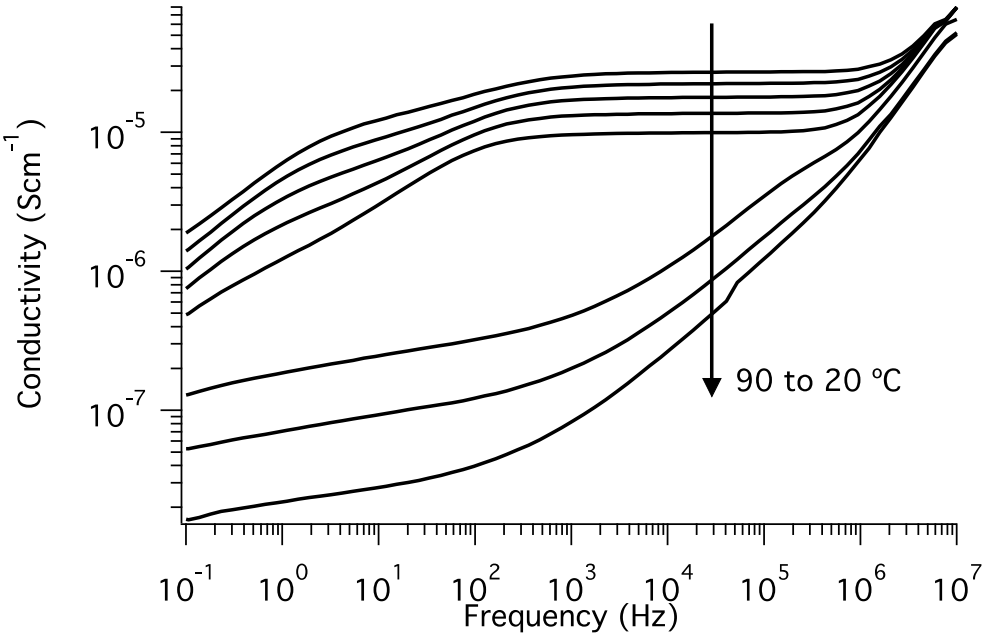

Figure S7. Measured AC conductivity versus frequency for sample PEO-sPPFSLi$_{25}$ obtained by electrochemical impedance spectroscopy from 90 to 20 °C in steps of 10 °C.

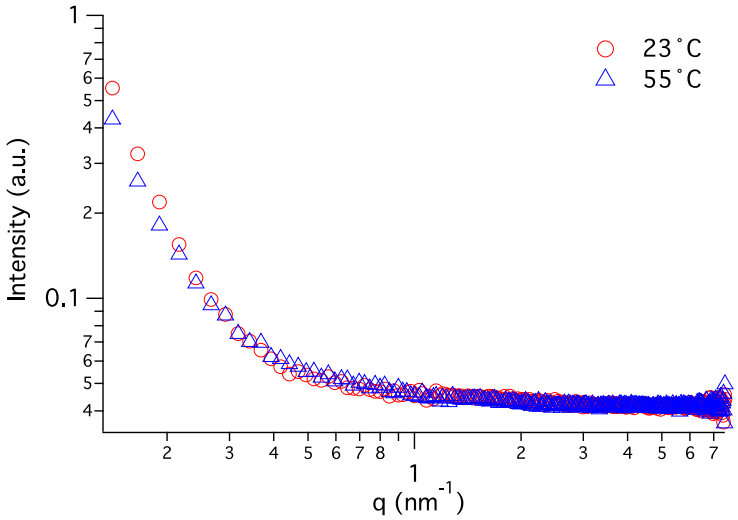

Figure S8. SAXS data of sample PEO-sPPFSLi$_{25}$ recorded above and below its T_m at 23 and 55 °C. The data showed no scattering peaks in the q-range between ~2 and 7 nm^{-1}, which corresponded to characteristic distances (d) between ~1 and 44 nm.

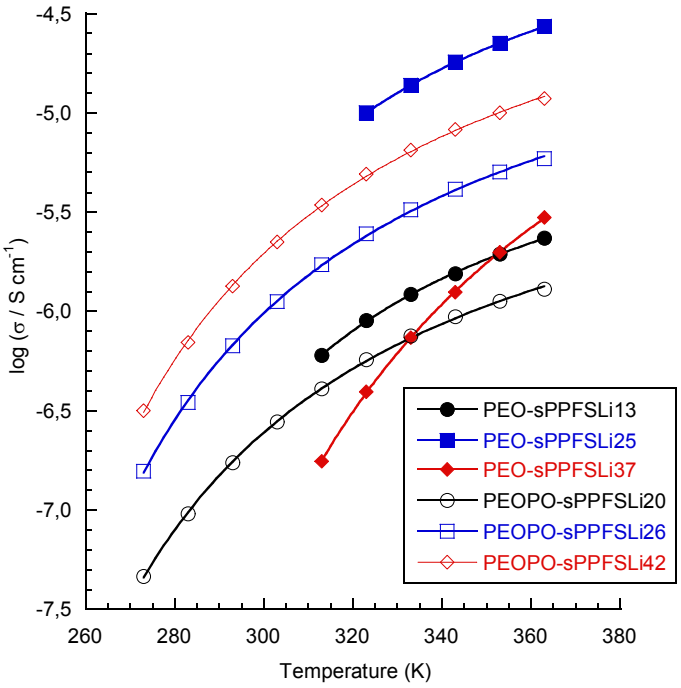

Figure S9. Measured conductivity data points and curves fitted to the VTF equation, log σ = log σ_0 - E_v/[R(T-T_v)]. For the PEO-containing samples, only data measured above the T_m of PEO was used in the fitting.