Electronic supplementary information (ESI):

# Steric effect on $Li^+$ coordination and transport properties in polyoxetane-based polymer electrolytes bearing nitrile groups

*Ryansu Sai,[1] Kazuhide Ueno,[2*] Kenta Fujii,[1] Yohei Nakano,[1,3] Hiromori Tsutsumi[1*]*

[1]Department of Applied Chemistry, Graduate School of Sciences and Technology for Innovation, Yamaguchi University, 2-16-1 Tokiwadai, Ube, 755-8611, Japan

[2] Department of Chemistry and Biotechnology, Graduate School of Sciences and Technology for Innovation, Yokohama National University, 79-5 Tokiwadai, Hodogaya–ku, Yokohama, 240-8501, Japan

**Present address:** [3] Department of Materials and Life Sciences, Sophia University, 7-1 Kioi-cho, Chiyoda-ku, Tokyo, 102-8554, Japan

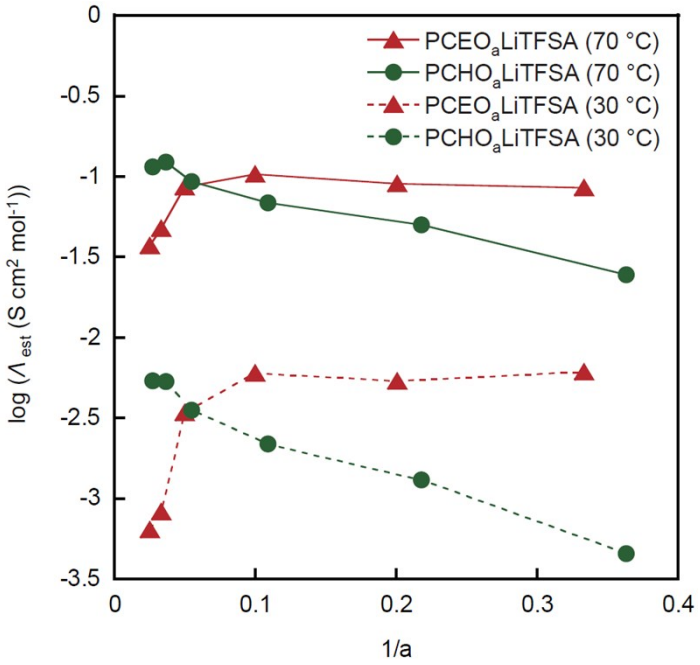


**Figure S1.** Estimated molar conductivity ($\Lambda_{est}$) of the PEs as a function of LiTFSA content ($1/a$ = [Li salt]/[monomer unit]) at 30 °C and 70 °C. The $\Lambda_{est}$ values were calculated by dividing the conductivity at each temperature by $c_{Li}$ at room temperature.

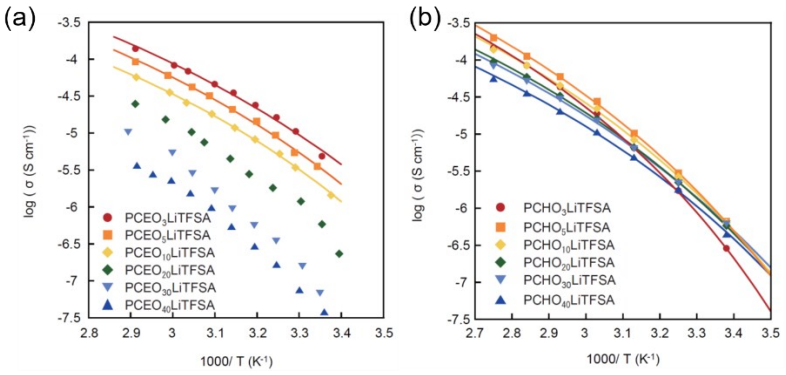


**Figure S2.** Temperature dependencies of the ionic conductivity for (a) PCHO$_a$LiTFSA and (b) PCEO$_a$LiTFSA. The solid lines represent the Vogel-Tammann-Fulcher fit results.

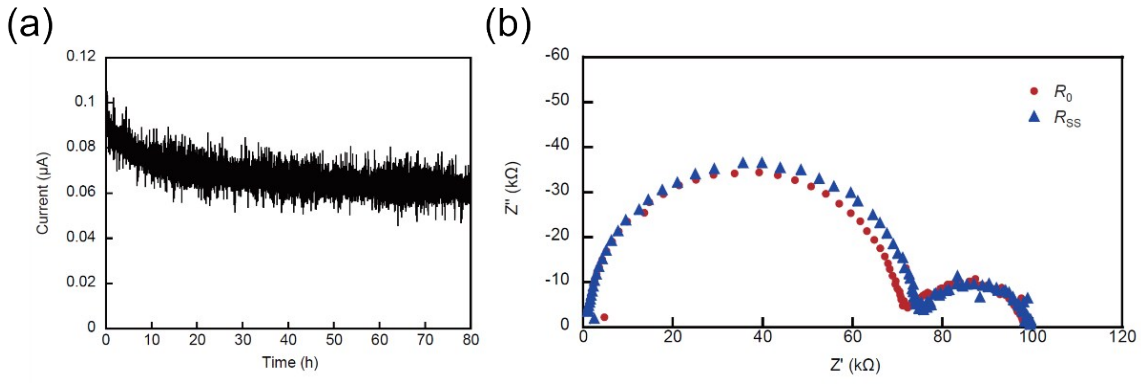


**Figure S3.** Data for various electrochemical measurements used to calculate the transference number of $PCEO_5LiTFSA$ at 50 °C. (a) Current with respect to time and (b) Nyquist plots of the initial ($R_0$) and steady state ($R_{SS}$).

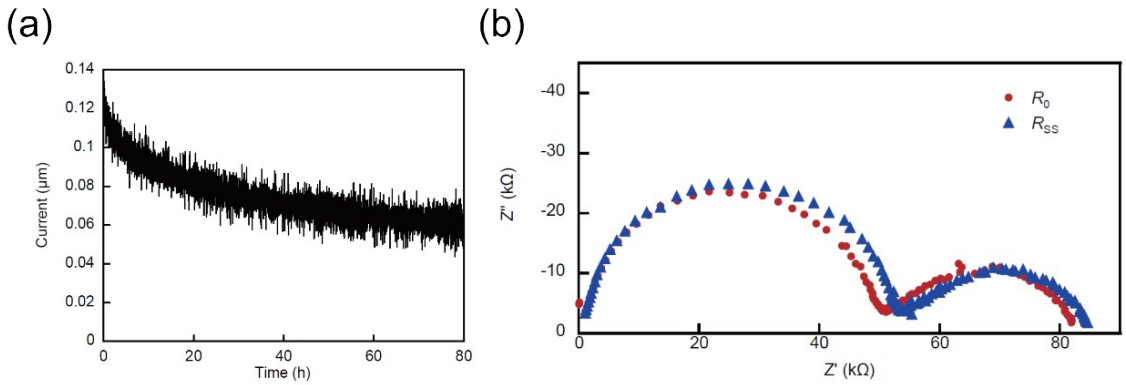


**Figure S4.** Data for various electrochemical measurements used to calculate the transference number of $PCHO_5LiTFSA$ at 50 °C. (a) Current with respect to time and (b) Nyquist plots of the initial ($R_0$) and steady state ($R_{SS}$).

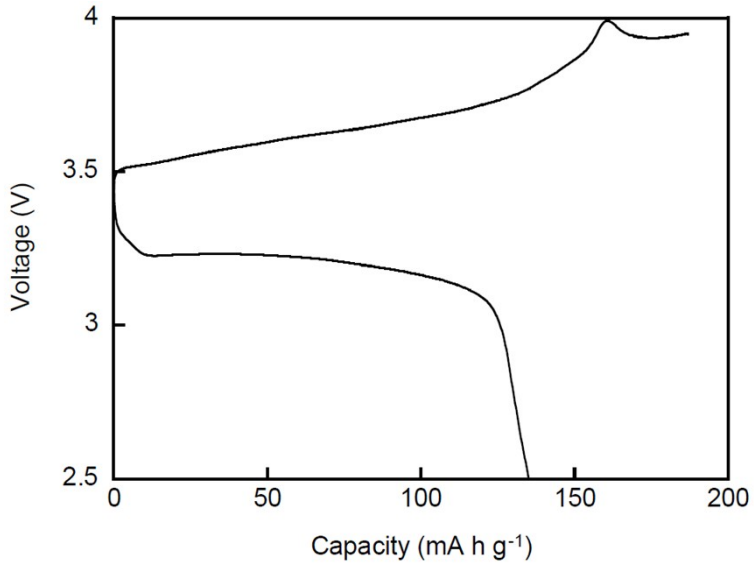


**Figure S5.** Charge/discharge curves of a Li/PCEO$_5$LiTFSA/LiFePO$_4$ cell at a 0.05 C rate and 70 °C. The measurements were carried out in a range of 2.5–4.0 V (1 C = 117 μA, 149 μA cm$^{-2}$).