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Effects of cation and anion solvation on ion transport in functionalized perfluoropolyethers electrolytes KSENIA TIMACHOVA, MAHATI CHINTAPALLI, Univ of California - Berkeley, KEVIN OLSEN, JOSEPH DESIMONE, University of North Carolina - Chapel Hill, NITASH BALSARA, Univ of California - Berkeley — Advances in polymer electrolytes for use in lithium batteries have been limited by the incorporation of selective lithium binding groups that provide necessary solvation for the lithium but ultimately restrict the mobility of the lithium ions relative to anions. Perfluoropolyether electrolytes (PFPE) are a new class of nonflammable liquid polymer electrolytes that have been functionalized with solvating groups for both lithium ions and fluorinated anions. PFPEs with different endgroups mixed with $LiN(SO_2CF_3)_2$ salt have shown substantial differences in conductivity and allows us to investigate the effects of varying solvating environments on ion transport. To study the independent motion of cations and anions in these systems, the individual diffusion coefficients of the Li+ and $(SO_2CF_3)_2$- ions were measured using pulsed-field gradient nuclear magnetic resonance (PFG-NMR). Comparing conductivity calculated using these diffusion coefficients with electrochemical measurements yields an estimation for the number of charge carrier in the system. The amount of salt dissociation, not the mobility of the salt, is the primary driver of differences in electrochemical conductivities between PFPEs with different solvating groups.

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