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Effect of Aprotic Solvents on the Dynamics of a Room Temperature Ionic Liquid NARESH OSTI, Oak Ridge National Laboratory, TN, USA, KATHERINE VAN AKEN, Drexel University, PA, USA, MATTHEW THOMPSON, FELIX TIET, Vanderbilt University, TN, USA, DE-EN JIANG, University of California, Riverside, CA, USA, PETER CUMMINGS, Vanderbilt University, TN, USA, YURY GOGOTSI, Drexel University, PA, USA, EUGENE MAMONTOV, Oak Ridge National Laboratory, TN, USA — Room temperature ionic liquids (RTILs) have attracted much attention as electrolytes in energy storage devices because of their peculiar physical and chemical characteristics. However, their remarkably high viscosity, which results in low conductivity and diffusivity, may adversely affect the charging and discharging rates. Despite changing molecular configurations, use of aprotic solvent allows to enhance the transport properties of ionic liquids by disrupting the cation-anion interactions. We explore the impact of dipole moment of aprotic solvents on the cation-anion interaction and transport in 1-butyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide, [BMIM+][Tf₂N⁻], RTIL using molecular dynamics (MD) simulations and quasi-elastic neutrons scattering (QENS) measurements. We observed an increase in cation diffusivity with the increasing dipole moment of the solvent. This effect is due to a decrease in the solvation free energy induced by the increasing solvent polarity. A clear nano-phase separation into ionic liquid-rich and ionic liquid-poor phases as observed by QENS will be also discussed.

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