

Abstract Submitted  
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**Effect of Counteranion on Caged-like Dynamics of 1-alkyl-3-methylimidazolium-based Ionic Liquids** JENNY KIM, CHEOL JEONG, MADHU TYAGI, CHRISTOPHER SOLES, NIST - Natl Inst of Stds & Tech — Understanding physicochemical properties of ionic liquids (ILs) is essential to realize task-specific ILs. To better understand the structural and dynamic heterogeneity in ILs, we conducted quasielastic neutron scattering (QENS) measurements that cover time ranges from picosecond to nanosecond. Series of 1-alkyl-3-methylimidazolium-based ILs is chosen to explore the relationship between local dynamics and long-range translational dynamics. Two distinct dynamical processes have been examined: caged-like dynamics and jump-diffusion processes. Size and shape of a dynamic cage can be obtained by fitting elastic incoherent structure factor (EISF) with spherical and cylindrical Bessel functions. The cage geometry turns out to be strongly dependent on the counteranion. Residence time of ions or molecules attained from jump-diffusion model increased by several factors for the ILs with smaller and more isotropic cage which will lead to slower diffusion. Mean square displacements coupled with viscosity and conductivity by generalized localization model also confirms the relevance of caging to the ion transport and structural relaxation of ILs.

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