Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Dynamic Odd-Even Effects in a Network-Forming Ionic Glass Homologue KE YANG, Univ of Illinois - Urbana, MADHUSUDAN TYAGI, NIST Center for Neutron Research, NIST, JEFFREY MOORE, YANG ZHANG, Univ of Illinois - Urbana — Odd-even effects, the non-monotonic dependency of physical properties on odd/even number of structural units, are widely observed in homologous series of crystalline materials. However, such alternation is not expected for amorphous molecular materials because absence of periodic packing. Herein, we report the synthesis and characterization of a class of stable network-forming ionic glasses with specific structure to frustrate crystallization. We performed incoherent elastic neutron scattering measurements of the nanosecond mean squared displacement and quasi-elastic neutron scattering measurements of the nanosecond relaxation time. The results indicated that the even-numbered cations showed much slower dynamics than neighboring odd-membered cations, i.e. one-methylene unit structural difference causes an abnormal difference (about five times) in cations' diffusional dynamics. The observed difference in mobility exists both around T_g and extends to the liquid temperature regime well above T_g. The observed dynamic odd-even effect serves as another intriguing example of significant dynamic differences induced by insignificant structural changes, as is common in glass transition.

Ke Yang
Univ of Illinois - Urbana

Date submitted: 14 Nov 2014 Electronic form version 1.4