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Broadband Dielectric Spectroscopy and Quasi-Elastic Neutron Scattering on Single-Ion Polymer Conductors CHRISTOPHER SOLES, HUA-GEN PENG, KIRT PAGE, CHAD SNYDER, NIST Polymers Division, ASHOUTOSH PANDY, YOUMI JEONG, JAMES RUNT, Pennsylvania State University, NIST POLYMERS DIVISION COLLABORATION, PENNSYLVANIA STATE UNIVERSITY COLLABORATION — The application of solid polymer electrolytes in rechargeable batteries has not been fully realized after decades of research due to its low conductivity. Dramatic increases of the ion conductivity are needed and this progress requires the understanding of conduction mechanism. We address this topic in two fronts, namely, the effect of plasticizer additives and geometric confinement on the charge transfer mechanism. To this end, we combine broadband dielectric spectroscopy (BDS) to characterize the ion mobility and quasi-elastic neutron scattering (QENS) to quantify segmental motion on a single-ion model polymer electrolyte. Deuterated small molecules were used as plasticizers so that the segmental motion of the polymer electrolyte could be monitored by QENS to understand the mechanism behind the increased conductivity. Anodic aluminum oxide (AAO) membranes with well defined channel sizes are used as the matrix to study the transport of ions solvated in a 1D polymer electrolyte.

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