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Ion transport and softening in a polymerized ionic liquid RAJEEV KUMAR, Center for Nanophase Materials Science & Computer Science and Mathematics Division, Oak Ridge National Laboratory, Oak Ridge, TN, VERA BOCHAROVA, Chemical Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN, EVGHENI STRELCOV, Center for Nanophase Materials Science, Oak Ridge National Laboratory, Oak Ridge, TN, VERONIKA STREHMEL, Hochschule Niederrhein University of Applied Sciences, Krefeld, Germany, JOSHUA SANGORO, Department of Chemical and Biomolecular Engineering, University of Tennessee, Knoxville, TN, ALEXEI SOKOLOV, Department of Chemistry, University of Tennessee, Knoxville, TN, SERGEI KALININ, BOBBY SUMPTER, Center for Nanophase Materials Science, Oak Ridge National Laboratory, Oak Ridge, TN — Polymerized ionic liquids (PolyILs) are promising materials for various solid-state electronic applications such as dye-sensitized solar cells, lithium batteries, actuators, and field-effect transistors. However, fundamental understanding of interconnection between ionic transport and mechanical properties in PolyILs is far from complete. In this work, local charge transport and structural changes in films of a PolyIL are studied using an integrated experiment-theory based approach. Kinetics of charging, steady state current-voltage relations and softening of the PolyIL films beyond certain threshold voltages are studied by applying electric field through a scanning probe microscopy (SPM) tip. All of the experimental data can be explained by a modified Poisson-Nernst-Planck formalism for the charge transport, which takes into account the dissociation of ions under an applied electric field (the Wien effect).

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