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Measurement of the Structure and Molecular Dynamics of Ionic Solutions for Redox Flow Battery ZHIXIA LI, LILY ROBERTSON, JEFFERY MOORE, YANG ZHANG, Univ of Illinois - Urbana — Redox flow battery (RFB) is a promising electrical energy storage technology with great potential to finally realize alternative energy sources for the next-generation vehicles and at grid scales. The design of RFB is unique as the power scales separately from the energy capacity. The latter depends on the size of storage tanks and the concentration of the active materials. Redox-active organic molecules are excellent candidates with high synthetic tunability for both redox properties as well as, importantly, solubility. However, upon increasing concentrations, the flow cell has less cycling stability and more capacity fade. Further, after charging the battery, the viscosity increases while the ionic conductivity decreases, and thus the cell becomes overall ineffective. To understand the mechanism of the increased viscosity, we performed differential scanning calorimetry, wide and small angle X-rays scattering, and quasi-elastic neutron scattering measurements. Herein, we will present the measurement results and relative analysis.

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