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**Neutron scattering studies of glassy $Li^+$ superionics** TOM HEITMANN, University of Missouri Research Reactor, LEO ZELLA, New Mexico State University, ALI ZAIDI, Missouri State University, MUNESH RATHORE, ANSHUMAN DALVI, Birla Institute of Technology and Science, SAIBAL MITRA, Missouri State University — Two distinct neutron scattering techniques were implemented in the study of glassy superionic materials composed of a complex network of their interconnected sub-units: $Li_2O$, $NH_4H_2PO_2$, and $Li_2SO_4$. The use of disordered materials underlies an effort to promote $Li^+$ mobility, while suppressing $e^-$ conductivity, which makes them good candidates for use as electrolytes in lithium ion batteries. We present triple-axis spectrometer results of energy resolved vs. energy integrated neutron scattering that indicate the presence of a broad range of dynamic processes in the materials, rather than well-defined excitations. Additionally, we report on neutron diffraction data that demonstrates the formation of crystallites within the material upon annealing up to 450 °C. Such crystallites hinder the performance of the materials as electrolytes, which is evident in thin film devices where heating is unavoidable during fabrication.

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