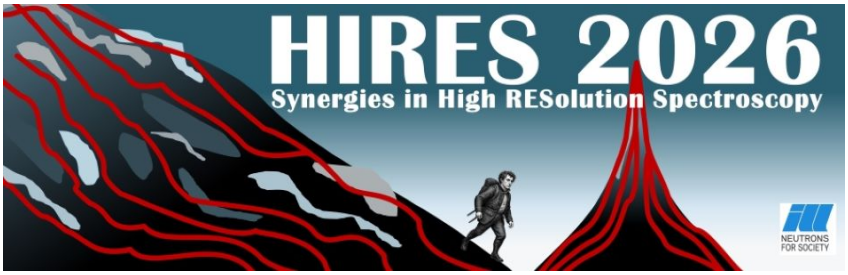

Contribution ID: **43** Type: **Oral**

Correlating QENS with Rheology in Polymer Nanocomposites

Polymer Nanocomposites (PNC) can enhance the mechanical properties over the host polymer. Greater understanding of their microstructure and dynamics is needed to effectively design PNC with improved characteristics. A model system of well-dispersed elongated silica nanoparticles in strongly adsorbed poly(ethylene oxide) is used to investigate the shape effects of nanoparticles with comparison to literature data for other silica particle systems. Quasi-elastic neutron scattering is used to obtain information about the polymer at the interface between the nanoparticles and bulk polymer. Interfacial polymer Rouse dynamics and the extent of the interface is obtained from two possible modifications of the Rouse model for the interface. The first of these suppresses longer range Rouse modes to account for additional topological constraint imposed by adsorption to the nanoparticle. The second of these modifications treats the interface as experiencing the same type of Rouse dynamics as the bulk, but on a longer timescale, indicated a higher relaxation time. These results are connected to rheology to explain the large effect of a small amount of nanoparticles commonly observed in PNC.

Session

Soft Condensed Matter

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Session Classification: Soft Condensed Matter