

MAR16-2015-006212

Abstract for an Invited Paper
for the MAR16 Meeting of
the American Physical Society

Insights into the Dynamics of Polymers and Nanocomposites via Quasi-elastic Neutron Scattering

MADHU SUDAN TYAGI, NIST Center for Neutron Research

Neutron scattering is a powerful technique to study polymer dynamics. In particular, its angular momentum (Q) dependence provide a unique opportunity to study polymer motions at different length scales of interest. This is particularly important when examining some of the crucial aspects related with glass transitions and in particular chain behavior under confinement. Of particular interests are the examples of nanocomposites and ionomers. The interactions between polymer chain and nanoparticle in nanocomposites can cause significant heterogeneities in the polymer dynamics and strongly affect its properties. Dynamical perturbations are generally expected to be limited to interfacial polymer segments. However, composites with highly anisotropic nanoparticles usually exhibit very low percolation threshold and in such systems a complex polymer relaxation behavior can be observed that is not anticipated from dilute nanoparticle dispersions in polymer matrix. A lot of progress has been made over the last decade, however, the effect of chemical binding, physical adsorption and inclusion of nanoparticles in polymer matrix on the local and global dynamics of chain molecules still remains controversial subject. In this talk I will present some examples of our recent work where neutron scattering has been able to make some important breakthroughs in these topics.