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Using Backscattering Spectrometers to Study Dynamics of Soft Matter and Complex Systems

Friday, 2 September 2016 15:00 (20 minutes)

Molecular motion in soft matter, including polymers, reaches a high degree of complexity, far beyond that observed in small molecules. Chain connectivity plays a major role and, as a result, dynamic processes extend over an exceedingly wide time and length scale. Therefore, a complete, accurate picture of molecular motion in these systems can only be achieved by combining experimental techniques which sample complementary frequency (or time) ranges. In this respect, quasi-elastic neutron scattering (QENS) has proven to be a unique tool, capable of providing simultaneous frequency and spatial information on molecular motions that are relevant for understanding mechanical and rheological properties of bulk polymers.

In this talk, selected experimental data collected in the past twenty five years on a range of backscattering spectrometers such as IRIS (ISIS, UK), IN10 and IN16 (ILL, France) will be discussed. Starting from early measurements on sub-T_g relaxations in polymer-polymer mixtures, the aim is to demonstrate how a combination of backscattering spectrometers can be exploited to separate dynamic processes but also to understand the effect of topology on polymer motion and the interplay between components in complex systems such as polymer blends and nanocomposites.

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Session Classification: Major Science Fields tackled with Backscattering