207e Viscoelastic Investigations of End-Tethered Silica-Poly(Butyl Acrylate) Nanocomposites

Vivek Goel, Joanna Pietrasik, Krzysztof Matyjaszewski, and Ramanan Krishnamoorti

Structure-property relations in soft colloidal gels consisting of poly(butyl acrylate) chains end-tethered to silica hard spheres, forming multi arm colloidal stars will be reported. Small strain dynamic oscillatory shear measurements on these materials reveal the formation of a percolated network as evidenced by a plateau in the modulus at low oscillatory frequencies. The mechanism of stress relaxation of the network at different step strain amplitudes was investigated in light of the results of the oscillatory shear data, and onset of non-linear deformation identified. In addition, the mechanism of network relaxation after rupture due to application of large strains explored via steady shear and flow-reversal measurements, will be demonstrated.

As part of the rich dynamics of these intermediate states of soft colloids, between those of hard spheres, and polymeric behavior, the viscoelastic properties of these materials is investigated on dilution of the stars with linear chains, in order to map out a kinetic phase space indicating the behavior of the plateau modulus with dilutions of the stars with linear polymeric chains. The blending of the stars with linear chains presented an opportunity to study the morphological development over the neat stars, and were investigated via Force Microscopy measurements and scattering measurements.