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Cluster Dominated Rheology of SWNTs based Polymer Nanocomposites TIRTHA CHATTERJEE, RAMANAN KRISHNAMOORTI, Dept. of Chemical and Biomolecular Engineering, University of Houston — An outstanding issue in the field of polymer nanocomposite has been to separate and quantify the roles of polymer-particle, particle-particle and polymer mediated particle-particle interactions in controlling properties of such systems. In this study, we have attempted to understand the linear and non-linear rheological properties of the nanocomposites in terms of their structure and the underlying polymer-particle interactions. The network structure of single walled carbon nanotube in polymeric matrices is investigated using SANS and USANS(The neutron scattering work utilized facilities supported in by the NSF under Agreement No. DMR-0454672). In their quiescent state, a hierarchical fractal network made of aggregated flocs or clusters inside which tubes overlap each other to form dense mesh, dominates the nanoparticle structure. We have identified that the floc-floc interactions provides the stress bearing capacity and are responsible for strong modulus scaling of these systems. The interaction is inversely related to the particle dispersion state which influences the absolute values of the viscoelastic parameters. More interestingly, under steady shear these nanocomposites show network independent behavior.

Tirtha Chatterjee
Dept. of Chemical and Biomolecular Engineering, University of Houston

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