

Anomalous elastic properties of polymer nanocomposites

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ABSTRACT Elastic properties of polymeric micro composites have been widely studied. Studies reveal that the contribution of filler particles to elasticity is a strong function of the inter and intra particle attractions. As the particle size decreases this interaction becomes larger, and affects the elastic properties more significantly. For polymer nanocomposites, particle size and surface functionality have a strong bearing on yield stress, normal stress and extensional viscosity. Normal stress function becomes dependent on the morphology of the system and cannot just be explained in term of the applied stresses. In this paper the normal stress behaviour of clay based polymer nanocomposites will be discussed and compared with the published result for silica based macro composites. Presence of clay doesn't affect the normal stress for intercalated systems. However normal stress is found to decrease with increase in clay for exfoliated systems. Reduction of normal stresses for exfoliated clay-polymer nanocomposites will be explained in terms of particle-polymer chain contacts, interaction and mobility of polymer chains within the matrix. **Keywords:** Nanocomposites, Elastic properties, Normal stresses, extensional viscosity