W0333

Dynamical Responses in Polymer-Clay Solutions. P.D. Butler[1], M.M. Malwitz[3], L. Porcar[2], S. Lin-Gibson[2], G. Schmidt[3], [1]Oak Ridge National Laboratory, Oak Ridge TN 37831, [2]National Inst. of Standards & Technology, NCNR, Gaithersburg, MD 20899, [3]Louisiana State Univ., Baton Rouge, LA, 70803.

Polymer-clay systems are generating tremendous interest as novel materials exhibiting unique mechanical, electrical, optical, and thermal properties. Understanding and controlling these properties requires an understanding of the structure and interactions within the material. In this work we begin to address some of these questions by studying the response to an applied shear of two different clays, Laponite and Montmorillonite, each in an aqueous poly(ethylene)oxide (PEO) solution, using small angle neutron scattering (SANS) along with rheology and ultra small angle neutron scattering (USANS). Besides obtaining structural information with and without flow, an external field ubiquitous in industrial processing, the shear rates required for a given structural change and the relaxation of that change can give insight into some of the interactions involved. Despite being relatively dilute solutions, both systems exhibit similar macroscopic behavior, being relatively strong gels from which micron diameter fibers, meters in length, can be pulled. However, scattering shows that their microscopic responses to shear are quite different.