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Dynamic Responses in Nanocomposite Hydrogels. Elena Loizou[1,2], Paul Butler[2], Lionel Porcar[2,3], Gudrun Schmidt[1], [1]Louisiana State Univ., Baton Rouge, LA, 70803, [2]National Institute of Standards and Technology, Gaithersburg, MD, 20899, [3]Univ. of Maryland, College Park, MD, 20742.

In recent years, polymer-clay nanocomposites are generating tremendous interest as materials with novel properties both in solution and in bulk. Several studies have tried to understand, control, and exploit the structure of nanocomposites, their interactions, and their shear-induced structural changes. Many physical properties depend on the structural changes in the nanometer level, such as the orientation of the anisotropic clay within the nanocomposite, which can be greatly affected by shear flow. The ability to alter properties to the desired application by controlling the nanoscopic structure can optimize the material's performance for a variety of applications. Here we report on a study of polyethylene oxide - clay hydrogels with different polymer molecular weights. We explore the structural changes that occur at various length scales in response to a shear field by means of rheology, small angle neutron scattering and microscopy. The polymer chain length and the cross-linking between the clay platelets, allow us to explore the effects of bridging on structure and dynamical responses.