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Heterogeneous Dynamics During Creep of Rod Containing Polymer Nanocomposites GREGORY TOEPPERWEIN, University of Wisconsin, ROBERT RIGGLEMAN, University of Pennsylvania, JUAN DE PABLO, University of Wisconsin — Polymer glasses exhibit regions of locally higher or lower mobility leading to heterogeneous dynamics. While heterogeneous dynamics have been examined in some detail in pure polymers, less is known about polymer nanocomposites (PNCs). We have previously studied PNCs, providing descriptions of how particles alter the network of entanglements, measuring local mechanical heterogeneity, demonstrating strain response under uniaxial deformation, and examining crazing and failure under multiaxial deformation. In the present work, we examine dynamic heterogeneity in rod-containing PNCs by performing creep deformation simulations and monitoring several measures of mobility. We are able to directly probe how dynamic heterogeneity evolves during deformation, and explore the origins of molecular mobility in polymer glasses. Examination of the segmental motion of a PNC undergoing creep reveals that the glassy heterogeneity of these systems decreases significantly following the onset of flow. It is found that the more heterogeneous distribution of relaxation times characteristic of PNCs in the bulk remains unaltered regardless of deformation state. It is found that the mobility and heterogeneity of PNCs are less susceptible to change upon deformation than those for the pure polymer.

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