

Abstract Submitted
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Microstructure of a polymer glass overaged by application of instantaneous shear strains¹ BELA JOOS, University of Ottawa, MATTHEW L. WALLACE, Université Louis Pasteur, Strasbourg — When applying a transient shear on jammed colloidal suspensions, Viassnoff and Lequeux (*Phys. Rev. Lett.* **89**, 065701 (2002)) observed both rejuvenation and overaging in the system, as the relaxation times are altered in a non-trivial way. Application of instantaneous, one-time shear deformations on a polymer glass by molecular dynamics simulations produces a similar behavior (M.L. Wallace and B. Joós, *Phys. Rev. Lett.*, in press). Two regimes are observed corresponding to elastic and plastic strains. Of particular interest are deformations in the plastic regime, above the yield strain ($\epsilon > 0.1$), where the characteristic relaxation times $\tau_{1/2}$ increase exponentially with ϵ , after a long waiting time t_w following the deformation. We are in the process of understanding the nature of this state of the glass. There is a slight increase in the average energy of the inherent structures $\langle e_{IS} \rangle$, in particular in the inter-chain component. The bond orientational order parameter appears to increase especially in the elastic regime. The shear modulus decreases. And there are significant changes in the distribution of relaxation times. The average shifts to larger times, and the distribution broadens and resembles more a Gaussian. These properties suggest that, above the yield strain, the system becomes more homogeneous, and possibly less jammed.

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