

Abstract Submitted  
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**Suppression of Segmental Relaxation as the Origin of Strain Hardening in Polymer Glasses** KENNETH SCHWEIZER, KANG CHEN, University of Illinois — A nanometer scale dynamical theory is proposed for the post-yield large amplitude strain hardening phenomenon in polymer glasses. The physical picture is that external deformation induces anisotropic chain conformations which modifies interchain packing, resulting in density fluctuation suppression and intensification of localizing dynamical constraints and activation barriers. The strain amplitude dependence of the resulting stresses are well described by classic rubber elasticity form. However, the hardening stress is of interchain origin and arises primarily from prolongation of segmental relaxation, not single strand entropic elasticity. Theoretical predictions for the magnitude, temperature and deformation rate dependence of the hardening modulus are consistent with experiments and simulations.

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