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Strain Hardening in Bidisperse Polymer Glasses MARK O. ROBBINS, Johns Hopkins University, ROBERT S. HOY, Materials Research Laboratory, University of California, Santa Barbara — The connections between glassy and rubbery strain hardening have been a matter of great controversy in recent years. Recent experiments and our earlier simulations have suggested that the hardening modulus G_R is proportional to the entanglement density in glasses, as it is to the crosslink density in rubbers. In this work we present more extensive studies of strain hardening in bidisperse glasses and its relation to microscopic conformational changes. The mixtures contain chains of very different lengths but equivalent chemistry. G_R does not scale simply with the entanglement density. Instead it obeys a simple mixing rule, with G_R equal to the volume fraction weighted average of the moduli of the two pure components. As in recent studies of monodisperse systems (R. S. Hoy and M. O. Robbins, Phys. Rev. Lett. **99**, 117801 (2007)), the stress is directly correlated to the degree of chain orientation. Chains of a given length undergo almost the same degree of alignment in pure systems and mixtures, explaining why the simple mixing rule applies. The connection to recent analytic theories by K. Chen and K. S. Schweizer (PRL, in press) will be discussed.

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