

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Entanglement swelling in polymer glasses JOSHUA D. MCGRAW, KARI DALNOKI-VERESS, Department of Physics & Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada, L8S 4M1 — A polymer system in which the chains are much longer than the entanglement molecular weight, $M_+ \gg M_e$, is well entangled. When a thin, glassy polymer film is uniaxially strained, deformations which are almost visible to the naked eye called crazes may be formed. Measuring volume fractions of deformed to undeformed regions provides a method by which entanglement densities of similar systems can be compared¹. We present results of deformation experiments, probed using atomic force microscopy, in which well entangled polystyrene networks have been diluted with various weight fractions of polystyrene with molecular weight in the vicinity of M_e . Upon dilution the system assumes an effective reduction in the entanglement density. The effective entanglement density is predicted by a conceptually simple model with M_e as the only free parameter.

¹ACM Yang, EJ Kramer, CC Kuo, SL Phoenix, *Macromolecules* **19** 2020 (1986)

Joshua D. McGraw
Department of Physics & Astronomy and the Brockhouse Institute for
Materials Research, McMaster University, Hamilton, ON, Canada, L8S 4M1

Date submitted: 26 Nov 2008

Electronic form version 1.4