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Exploring chain tension in cold drawing of polymer glasses[1] SHI-WANG CHENG, PANPAN LIN, MESFIN TSIGE, SHI-QING WANG, University of Akron — Ductile polymer glasses can undergo large tensile extension (cold draw) to double its original length either homogeneously or through necking. The corresponding tensile stress is typically much higher than the rubbery elastic modulus. Apart from the plastic component, there is also an energetic contribution to the mechanical stress. The origin of this elastic stress appears to arise from the existence of a chain network. The elastic yielding phenomenon [1] indicates that significant chain tension builds up during the cold drawing. Atomistic molecular dynamics simulation is carried out to delineate the nature of the chain tension and explore the suggestion of bond distortion in deformation of polymeric glasses. In a simple model to mimic a polymer glass with sufficient chain networking, we found evidence for the bond distortion that grows with the degree of extension.

[1] "Elastic yielding in cold drawn polymer glasses well below the glass transition temperature," S. W. Cheng and S. Q. Wang, *Phys. Rev. Lett.* **110**, 065506 (2013).

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