

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Elastic yielding after γ -irradiation of cold-drawn polymer glasses¹

PANPAN LIN, Univ of Akron, QUAN XU, China University of Petroleum, ABRAHAM JOY, SHI-QING WANG, Univ of Akron — Elastic yielding shows up when a considerable retractive stress rises from a piece of cold-drawn polymer glass during annealing at temperatures above storage temperature[1,2]. This phenomenon indicates significant chain tension built up during cold drawing. To explore the role of chain networking, we applied γ -irradiation to produce chain scission and cause partial breakdown of the chain network in the pre-necked polymer glasses. To demonstrate universality, four different glasses, i.e., polycarbonate (PC), polystyrene (PS), poly(methyl methacrylate) (PMMA), and poly(2,6-dimethyl-1,4-phenylene oxide) (PPE) were first subjected to uniaxial extension at room temperature before the irradiation. Our data shows that the retractive stress significantly decreases in magnitude with increasing dosage of the γ -irradiation. The diminishing elastic yielding effect may be due to the loss of chain tension by chain scission brought about by the irradiation. [1] S. Cheng and S.-Q. Wang, Phys. Rev. Lett. **110**, 065506 (2013). [2] S. Cheng and S.-Q. Wang, Macromolecules **47**, 3661 (2014).

¹This work is support, in part, by ACS-PRF (54047-ND7).

Panpan Lin
Univ of Akron

Date submitted: 06 Nov 2015

Electronic form version 1.4