Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Exploring the role of long-chain branching in large deformation of entangled melts GENGXIN LIU, Department of Polymer Science , University of Akron, Akron, OH, United States, KWSTAS NTETSIKAS, APOSTOLOS AVGEROPOULOS, Department of Materials Science and Engineering, University of Ioannina, Ioannina, Greece, SHI-QING WANG, Department of Polymer Science , University of Akron, Akron, OH, United States, UNIVERSITY OF AKRON COLLABORATION, UNIVERSITY OF IOANNINA COLLABORATION
— Most of our past studies have focused on nonlinear responses to large deformation of entangled polymers made of linear flexible chains. Little is known about nonlinear rheological behavior of entangled polymers containing long-chain branching (LCB), apart from the literature work on low-density polyethylene (LDPE). In this work, we present a first study to compare linear polyisoprene with a well-defined dendritic polyisoprene. Consistent with the extensional rheological behavior of LDPE, we find LCB to impede shear yielding so that the entanglement network could extend significantly more before failure during uniaxial extension. This study also investigated its shear deformation behavior to explain the absence of necking like failure in uniaxial extension. The research is funded, in part, by a grant from the National Science Foundation (DMR-1105135).

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Date submitted: 14 Dec 2011 Electronic form version 1.4