Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

**Non-Gaussian chain stretching in simple shear of branched polystyrene solutions**[1] GENGXIN LIU, Department of Polymer Science, The University of Akron, HYOJOON LEE, Department of Chemistry, Pohang University of Science and Technology, HONGWEI MA, SHIWANG CHENG, RODERIC QUIRK, Department of Polymer Science, The University of Akron, TAIHYUN CHANG, Department of Chemistry, Pohang University of Science and Technology, SHI-QING WANG, Department of Polymer Science, The University of Akron, DEPARTMENT OF POLYMER SCIENCE THE UNIVERSITY OF AKRON TEAM, DEPARTMENT OF CHEMISTRY, POHANG UNIVERSITY OF SCIENCE AND TECHNOLOGY TEAM — Entangled polymers with long chain branching (LCB) exhibit a higher apparent viscosity than the zero-rate viscosity upon startup uniaxial extension whereas polymers either of linear chains or with LCB only show a lower transient viscosity than the zero-rate viscosity envelope. We report for the first time that simple shear of well-entangled polystyrene solutions with LCB produces a higher transient viscosity than the zero-shear envelope. In presence of sufficient LCB, non-Gaussian stretching can even show up in simple shear, which was previously observed only in uniaxial extension. Moreover, LCB resists against a structural breakdown of the entanglement network, postponing the stress overshoot to an unprecedented high shear strain of 30 units when the backbone of the PS would be nearly straightened without retraction and resulting elastic recovery as high as 20 strain units.

[1]This work is supported by NSF under DMR 1105135.

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Date submitted: 01 Nov 2012 Electronic form version 1.4