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Experimental Investigation of Entangled Polymer Flow Behavior
PRASHANT TAPADIA, The University of Akron, SHI-QING WANG, The University of Akron — In this presentation, we report additional features of entangled polymer solutions and melts undergoing either continuous shear at high stresses comparable to the dynamic plateau modulus or step shear at large strain amplitudes, following the initial observations of a yield-like bulk flow transition in entangled polybutadiene solutions, made of ultra-high molecular weight PBD and lower molecular weight PBD (as the "solvent") [1]. Specifically, the dynamics of the flow transition have been first examined as a function of the chain length of the solvent. In a separate investigation, the stress responses after large step-strain deformation have been studied in detail for several PBD melts and solutions. In both cases, flow birefringence observations using white light were made to delineate the spatial distribution of the optical retardation and to provide further information on the microscopic origins of the observed flow behavior, with the polarized light incident onto either 1,2 plane or 1,3 plane. [1] Tapadia, P.; Wang, S. Q. *Phys Rev. Lett*, **91**, 198301 (2003); Tapadia, P.; Wang, S. Q. *Macromolecules* **37**, 9083 (2004).

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