

Abstract Submitted
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Disentanglement and Re-entanglement of Polymer Solutions after Large Step Shearing Deformation YANGYANG WANG, SHI-QING WANG, University of Akron — Double-step strain and elastic recovery experiments were carried out to explore the disentanglement and re-entanglement kinetics in entangled 1,4-polybutadiene solutions after large step shearing deformation. In double-step strain experiments, startup shear measurements were interrupted at different strains, and resumed after different waiting times. When the interrupted strain was small, the magnitude of stress overshoot in the resumed shear remained unchanged. However, at a large strain, the magnitude of stress overshoot would first decrease with increasing waiting time and only become higher after longer waiting time. This observation reveals evidence that disentanglement occurs after a large step deformation. Subsequent healing in the form of re-entanglement allows the sample to relax normally in quiescence. In elastic recovery experiments, the data at small strains fall onto a master-curve, whereas the recovery at large strains shows much stronger strain dependence, confirming occurrence of chain disentanglement beyond a critical strain amplitude.

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