Stress relaxation following uniaxial extension of polystyrene melt and oligomer dilutions - DTU Orbit (08/11/2017)

Stress relaxation following uniaxial extension of polystyrene melt and oligomer dilutions

The filament stretching rheometer has been used to measure the stress relaxation following the startup of uniaxial extensional flow, on anarrow molar mass distribution (NMMD) polystyrene melt and styrene oligomer dilutions thereof. All samples used here were characterizedin molecular weight, mechanical spectroscopy, and constant strain rate uniaxial extension in the work of Huang et al. [Macromolecules 46,5026–5035 (2013); ACS Macro Lett. 2, 741–744 (2013)]. The stress relaxation following the steady extensional stress was measured on a285 kg/mole NMMD polystyrene and two 1.92 kg/mole styrene oligomer dilutions thereof {PS-285k, PS-285k/2k-72, and PS-285k/2k-44 inthe work of Huang et al. [Macromolecules 46, 5026–5035 (2013)]}. The two dilutions contained 28 and 56 wt. % oligomer, respectively.Further, the stress relaxation on a 545 kg/mole NMMD polystyrene diluted with 48 wt. % 0.972 kg/mole styrene oligomer {PS-545k/1k-52 inthe work of Huang et al. [ACS Macro Lett. 2, 741–744 (2013)]} was measured as well. All the terminal relaxations could be predicted by aDoi and Edwards, e.g., pure configurational, type of model. At smaller time scales, agreement with a molecular stress function type ofconstitutive representation was observed for all measured relaxations.VC 2016 The Society of Rheology.

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