Supporting information: Evaluation of the performance of SER

Unusual nonlinear rheological phenomenology in uniaxial extension of polystyrene solutions and melts

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Video recording was applied to determine how well SER performs uniaxial extension in the case represented by the circles in Fig. 7(b) involving a Hencky rate of 0.89 s^{-1}. Fig. 17(a) labels the moments when the snapshots from the video are presented in Fig. 17(b). From these photos, the variation of the sample width is measured and shown in Fig. 17(c) as a function of the melt stretching ratio λ. Fig. 17(a)-(c) indicate that SER imposes homogeneous extension, which can only terminate due to inherent strain localization. The tensile strain localization can be sharp, as in regime IV known as melt rupture or gradual as in regime III known as necking or less gradual as in regime II that we labeled as "tensile decohesion",[4] all due to chain disentanglement from either direct force imbalance,[22] or chain-scission triggered force imbalance.

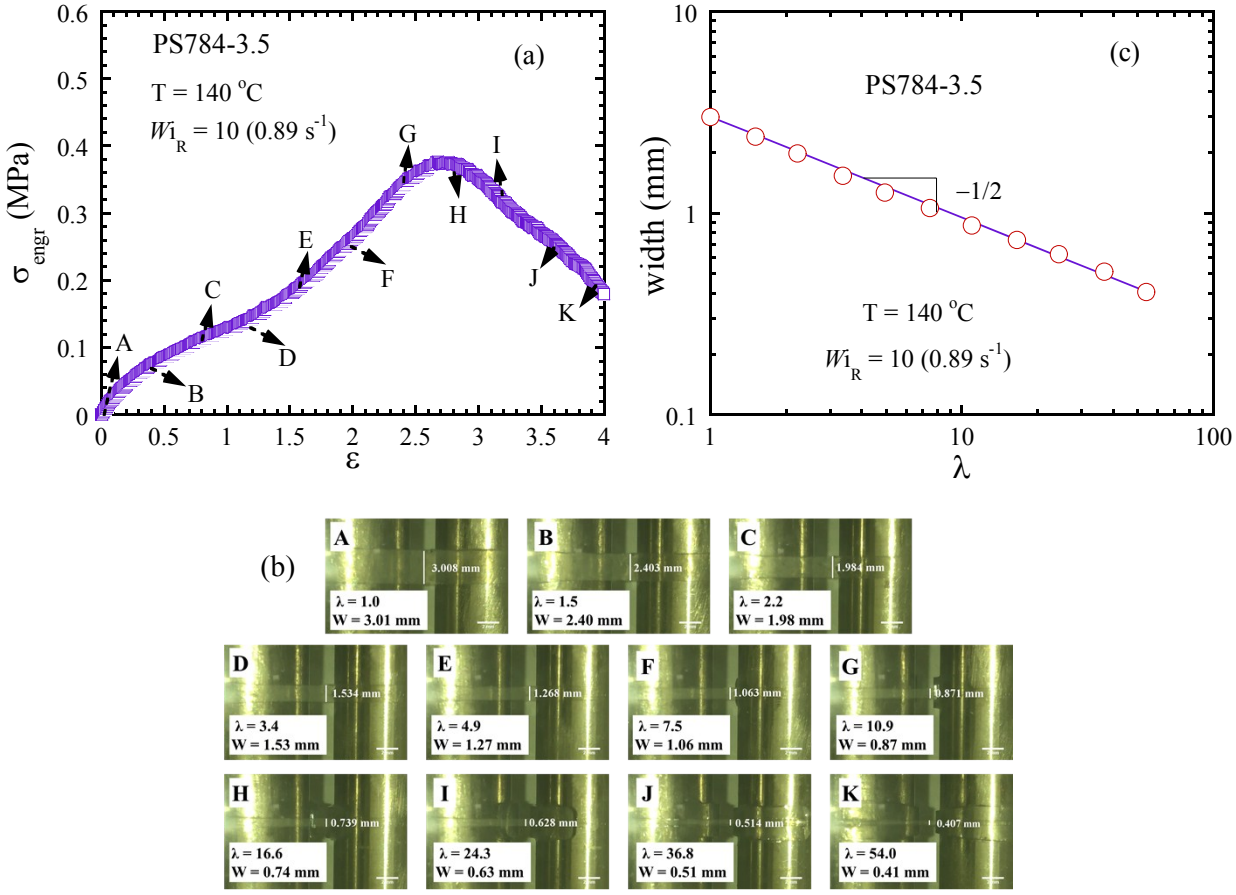

Fig. 17 (a) Engineering stress vs. Hencky strain of PS784-3.5 in uniaxial extension at T = 140 °C and Hencky rate of 0.89 s^{-1}. (b) Snapshots from the video recording of the SER test described in (a). (c) Measured width from the photos in (b) as a function of the stretching ratio $\lambda = \exp(\varepsilon)$, showing that w scales with $\lambda = L/L_0$ with exponent −1/2