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Melt State Morphology Evolution in Precise Acid Copolymers as a Function of Strain[1] LURI MIDDLETON, University of Pennsylvania, JOSEPH CORDARO, Sanida National Labratories, KAREN WINEY, University of Pennsylvania — Acid- and ion-containing polymers have specific interactions that produce complex and hierarchical morphologies that provide a remarkable combination of mechanical properties. Historically, correlating the hierarchical structure and the mechanical properties of these polymers has been challenging because (1) the polymers have random arrangements of the acid or ionic groups along the backbone and (2) structural characterization is typically performed ex situ relative to mechanical testing. We addresses both of these challenges through in situ deformation of PRECISE acid copolymers. PRECISE acid copolymers were synthesized by from well-defined macromonomers via acylic diene metathesis (ADMET). The precision of the molecular structure imposes uniformity in the polymer morphologies through precise separation between acid groups leading to better defined lamellae thickness and well-defined interaggregate spacings. Here, we report the first results from simultaneous synchrotron X-ray scattering and melt state uniaxial extensional flow of precise acid copolymers. These in situ studies will be discussed alongside ex situ studies of the mechanical properties.

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