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An apparatus for in situ x-ray scattering studies of polymer melts during homogenous uniaxial extensional flow WESLEY BURGHARDT, RUI INAN MAO, Northwestern University — In situ x-ray scattering methods have been broadly applied to study the structural dynamics of polymers and other complex fluids under flow, and can provide deep insights into the microstructural origins of complex non-Newtonian flow characteristics. Most studies in this vein have employed either homogenous shear flow, or processing flows such as fiber spinning which are complicated by inhomogenous deformation histories and/or nonisothermal operation. Here we present the design and implementation of a new apparatus for in situ x-ray scattering studies of polymer melts during homogenous uniaxial extensional flow. The experiment is based on the commercially-available SER extensional flow fixture, which employs two counter-rotating drums to deform a sample strip of polymer melt. This fixture has been incorporated into a custom-fabricated convection oven designed to facilitate x-ray access to the sample, and operation in a typical synchrotron beam line environment. Preliminary data on extensional flow induced orientation of ordered block copolymers will be used to illustrate the capabilities of this device.

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