Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Structural response of a pre-aligned cylindrical block copolymer to uniaxial extensional flow ERICA MCCREADY, WESLEY BURGHARDT, Northwestern University — In situ small angle x-ray scattering (SAXS) is used to probe structural changes in a cylindrically ordered triblock copolymer melt during uniaxial extensional flow. The sample is a styrene-ethylene butylene-styrene triblock copolymer melt. Sheets of macroscopically oriented polymer were produced using a lubricated planar squeezing flow die, from which sample strips were cut. Uniaxial extensional flow was imposed in the melt state using an SER extensional flow fixture housed in a custom built convection oven that allows x-ray access, to facilitate SAXS measurements of microdomain re-orientation and deformation during stretching and subsequent relaxation. Individual sample strips were cut from the molded sheet to facilitate measurements in which the stretching was imposed either parallel or perpendicular to the pre-alignment axis. Offline measurements of transient extensional rheology were also conducted using the SER fixture in a conventional rotational rheometer, using similar samples in order to explore connections between, and impact of initial orientation state one, both structural and mechanical responses.

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Date submitted: 09 Nov 2012 Electronic form version 1.4