Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

SAXS/WAXS measurements of HDPE crystallization during uniaxial extensional flow ERICA MCCREADY, WESLEY BURGHARDT, Northwestern University — We report studies of flow-induced crystallization of high density polyethylene during uniaxial extensional flow. Flow was applied using an SER extensional fixture housed in a custom built oven designed to facilitate in situ synchrotron x-ray experiments. Samples were loaded onto the fixture, heated to well above the melting temperature, and then cooled to the desired crystallization temperature. Extent of crystallization, orientation of crystallites, and extensional viscosity were determined throughout the entire uniaxial extensional flow, using simultaneous small- and wide-angle x-ray scattering (SAXS and WAXS) and torque measurements. Both temperature and extension rate were varied. SAXS patterns show distinct shapes characteristic of shish kebab morphology formation. WAXS peaks indicate high alignment of unit cell structure along the flow direction. Evolution of both SAXS and WAXS patterns can be correlated to each other and to extensional viscosity features during the crystallization process.

Wesley Burghardt
Northwestern University

Date submitted: 14 Nov 2014 Electronic form version 1.4