Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

SAXS/WAXS studies of flow-induced crystallization of poly(1-butene) in shear flow BINBIN LUO, WESLEY BURGHARDT, Northwestern University — Flow-induced crystallization of poly(1-butene) was studied in shear flow, produced using a Linkam shear cell modified to allow x-ray access for in situ synchrotron x-ray scattering measurements. After loading in the the shear cell, samples were first heated well into the melt, and then cooled to a crystallization temperature selected such that negligible quiescent crystallization would occur on reasonable time scales. A short burst of shear flow was then applied at various rates, after which simultaneous wide- and small-angle x-ray scattering (SAXS and WAXS) data were collected to study the resulting accelerated crystallization kinetics, as well as the morphology of the resulting crystallites (e.g. degree of crystallite orientation). SAXS and WAXS data provided generally self-consistent measures of the extent of crystallization, although WAXS data consistently reported a higher degree of crystallite orientation than SAXS. Average crystallite orientation was found to decrease over the course of crystallization. The impact of both deformation rate and total applied strain on the crystallization process were examined. The sample was also studied under similar flow conditions using (i) turbidity and (ii) linear viscoelasticity as probes of the developing crystallinity.

Wesley Burghardt
Northwestern University

Date submitted: 15 Nov 2013 Electronic form version 1.4