

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Isothermal and Self-Seeding Crystallization from Polyethylene Solution¹ HOWARD WANG, NARAYAN CH DAS, KAIKUN YANG, Department of Mechanical Engineering and Institute of Materials Research, Binghamton University, SUNY, Binghamton, NY 13902, BOUALEM HAMMOUDA, National Institute of Standards and Technology, Gaithersburg, MD 20899 — We have applied time-resolved small angle neutron scattering (SANS) to studying self-seeding and isothermal crystallization kinetics of low molecular weight polyethylene in solution. In one example, SANS spectra of isothermal crystallization of 2.1 kg/mol PE at 78.8 °C from a solution containing 4.3 % PE by mass show both the characteristic form and structure factors of stacked lamellae. The intensity hump around 0.025 Å⁻¹ indicates the correlation among lamellae. On the other hand, SANS from the same solution after quenched from melt to the room temperature, then stored at 90 °C for 5 min, followed by quenching to 78.7 °C are different from those of isothermal crystallization; the first correlation peak from the structure factor is not obvious, implying that crystals are dominantly in single or few lamellae forms. A morphological model that accommodates arbitrary distributions of structures from individual lamellae to infinite stacks has been used to analyze the SANS data. A possible lyotropic transition from isolated to stacked lamellae is suggested.

¹This work is supported by the National Science Foundation.

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Date submitted: 04 Dec 2007

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