Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Twinning and Growth Kinetics of Lamellar Grains THOMAS CHASTEK, TIMOTHY LODGE, University of Minnesota — The kinetics and grain growth behavior during a thermally induced transition from disorder to lamellae have been determined by polarized optical microscopy (POM). Measurements were made on a poly(styrene-b-isoprene) copolymer, $f_{PS} = 0.50$, in solution with dioctyl phthalate (DOP), at a 70% polymer volume fraction. Upon cooling from above the order-disorder transition temperature, four distinct types of grain were observed: ellipsoidal single grains, twinned ellipsoidal grains, 2-fold twinned grains, and spherulites. These grain types cover a range of lamellae orientation. For example, the surface of a 2- fold twinned grain is composed of lamellar edges, whereas the spherulite surface is composed of lamellar planes. The specific grain types that arise give insight into the thermodynamic and kinetic forces governing lamellae ordering. Furthermore, growth front velocities of individual grains were measured after rapid quenches from above T_{ODT}. These results were quantitatively compared to the predictions of Goveas and Milner, with good agreement observed. The results will be compared to analogous studies on cylinders and gyroid.

Thomas Chastek
University of Minnesota

Date submitted: 29 Nov 2004 Electronic form version 1.4