Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Crystal Orientation of Polyethylene oxide in a Defect-Free 1D Confined System of Poly ethylene oxide-b-Polystyrene Diblock Copolymer Single Crystals MING-SIAO HSIAO, JOSEPH X. ZHENG, RYAN M. VAN HORN, RODERIC P. QUIRK, STEPHEN Z. D. CHENG, The University of Akron, BERNARD LOTZ, EDWIN L. THOMAS, HSIN-LUNG CHEN, THE UNIVERSITY OF AKRON TEAM, MIT COLLABORATION, INSTITUT CHARLES SADRON COLLABORATION, NATIONAL TSING-HUA UNIVERSITY COLLABORATION — Highly oriented crystalline-amorphous block copolymers under a large amplitude shear open a window for studying crystal orientation evolution within a one-dimensional confined environment at different degrees of supercooling; however, inevitable defects and internal stresses are the main cause of releasing the confinement effect on polymer crystallization. Defect-free, 1-D confined lamellae of 10 nm PS-b-PEO solution grown single crystal mats were used to study the crystal orientation evolution as a function of crystallization temperature (Trc) via recrystallization. From DSC and temperature dependent SAXS, it was found that a hard-confined environment for PEO crystallization is created by vitrified PS layers while the middle PEO layer is in the melt state. From the analysis of 2D WAXD patterns, it is shown that the PEO c-axis orientation changes from homogeneous at low Trc to homeotropic at higher Trc. The mechanism inducing crystal orientation change is investigated in detail in this publication.

Ming-Siao Hsiao
The University of Akron

Date submitted: 27 Nov 2007 Electronic form version 1.4