

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Correlation between Structure and Vapor Sorption in Semi-crystalline Polymers: One Dimensional Nano-Swelling Measured using iVSANS**

MAN-HO KIM, Materials Science & Technology Research Division, Korea Institute of Science and Technology (KIST), GLINKA J. CHARLES, NIST Center for Neutron Research, National Institute of Standards and Technology — Changes in the nanoscale structure of semi-crystalline polyethylene (PE) resulting from the sorption/diffusion of n-hexane vapor have been observed and quantified by the *in-situ* Vapor Sorption Small-Angle Neutron Scattering (iVSANS). We found a linear correlation between vapor sorption/diffusion and nano-expansion of the amorphous phase within the lamellae confined in the spherulite domains. The diffusion coefficient measurements using (iVASNS) revealed that the molecular packing in amorphous phase is different between low and high crystalline PE. Furthermore, the one dimensional expansion is reversible during cyclic sorption and desorption processes, suggesting that the crystals were not destroyed unlike the inference of a previous study. These results are relevant to processing methods for tailoring the barrier and sorptive properties of semicrystalline polymer films. \* This work utilized facilities supported in part by the National Science Foundation under Agreement No. DMR-0454672. The author, MHK, acknowledges support by the KIST (2E20844).

Man-Ho Kim  
Materials Science & Technology Research Division,  
Korea Institute of Science and Technology (KIST)

Date submitted: 29 Nov 2008

Electronic form version 1.4