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Examination of Flow-Induced Crystallization Precursor Structures in Polyethylene Blend Films by Reversed Melting Method J. KEUM, R. SOMANI, F. ZUO, L. YANG, I. SICS, B. HSIAO, Department of Chemistry, Stony Brook University, H. CHEN, R. KOLB, C.-T. LUE, Univation Tech. Inc. —
In-situ. SAXS (small-angle X-ray scattering) and WAXD (wide-angle X-ray diffraction) techniques were used to investigate melting behavior of the confined blown films that consist of structures formed during film blowing. The PE blend consisted of 95wt % LLDPE ($\bar{M}_{\rm W}$ ∼116 Kg/mole) and 5wt % HDPE. The HDPE possessed a bimodal molecular weight distribution with 80 % of low molecular weight fraction (LMW-HDPE, $\bar{M}_{\rm W}$∼99 Kg/mole) and 20 % high molecular weight fraction (HMW-HDPE, $\bar{M}_{\rm W}$∼1,100 Kg/mole), respectively. Thus, the final blend contained 1 wt % of HMW-HDPE in the range of the overlap concentration, 0.5 wt %. The study was for examining the evolution of flow-induced crystallization precursors and their thermal stability. The results of the blend compared to neat LLDPE showed that the HMW-HDPE species in the blend significantly improved the crystal orientation. We speculate that the HMW-HDPE formed a network of extended-chain crystals due to their long relaxation times, which, subsequently, generated a scaffold of the oriented nuclei that defined the final morphology.

J. Keum

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