Abstract Submitted
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Determining the melt miscibility of commercial polyolefin blends by Small-Angle Light Scattering PING PENG, YVONNE AKPALU, Rensselaer Polytechnic Institute — The melt miscibility of high-density polyethylene (HDPE) (M_w = 52 kg/mol, PDI = 2.9) and linear low-density polyethylenes (LLDPEs) based on homogeneous ethylene-1-butene copolymers (EB0187: 18.7 mol% butene branches, M_w = 58.1 kg/mol and EB0059: 5.9 mol% butene branches, M_w = 70 kg/mol) is determined by Small-Angle Light Scattering (SALS) under parallel-polarized optical alignment. Blends with branching density differences (Δy) ranging from 5.9 to 18.7 mol% were studied. For the HDPE/EB0187 blend, (Δy = 18.7%), cooling and isothermal measurements (2 h) in the melt can be used to determine the miscibility and the phase boundary. When this blend is rapidly cooled room temperature, the resulting SALS patterns show that the size of phase separated domain ($\sim$ 1 μm) is much smaller than the average spherulite size (68 μm). These results consist with our microscopic observations and the transmitted light measured simultaneously with the V_V scattering in the melt. From the compositions studied, we can conclude that this blend exhibits UCST behavior. For blends with lower Δy, isothermal measurements provide a sensitive means for determining the melt miscibility. Based on the above observations, we can conclude that SALS can be used to determine the melt miscibility of polyolefin blends.

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