

# Structure of Blown Films of Polyethylene/Polybutene-1 Blends

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The structure of blown films of blends of low-density polyethylene (PE-LD) and isotactic polybutene-1 (iPB-1) with different content of iPB-1 up to 20 m-% was investigated using wide-angle and small-angle X-ray scattering (WAXS and SAXS), transmission electron microscopy (TEM), and polarizing optical microscopy (POM). TEM proves formation of a matrix – particle phase structure due to immiscibility of the blend components. The iPB-1 particles exhibit plate-like geometry with the longest dimension parallel to the machine direction (MD) and thickness dimension parallel to the film surface. Furthermore, in these particles needle-like crystals are observed, with the c-axis of the hexagonal form I crystal lattice and long axis of the needles oriented parallel or close-to parallel to MD. The PE-LD matrix shows two populations of crystals. WAXS data indicate that the majority of crystals is oriented with the c-axis of the orthorhombic crystal lattice perpendicular to MD, while SAXS data prove additional presence of stacks of lamellae, oriented parallel to MD (Fig. 1). Quantitative measurement of the birefringence shows that the majority of molecule segments in the specific blown tubular films of the present study is oriented in direction of the circumference of the film, confirming qualitatively the WAXS data. The crystal orientation of the blown films has direct impact on properties which is demonstrated by measurement of the anisotropy of the modulus of elasticity.

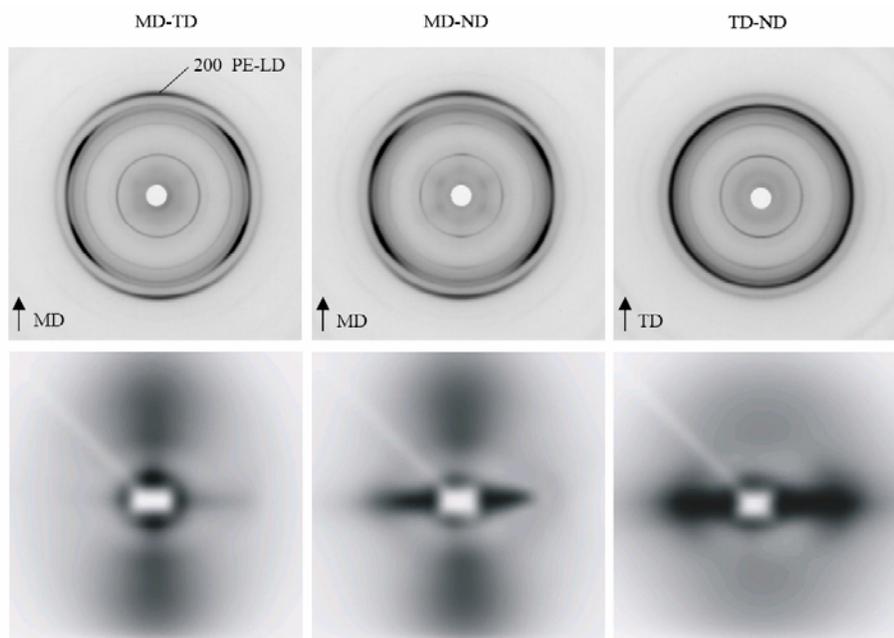


Figure 1: WAXS (top) and SAXS (bottom) images of PE-LD/iPB-1 85/15 m-%