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Orientation of Polypropylene Films Having Row Nucleated Lamellar Morphology

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Five different polypropylene resins were characterized by rheology to study the effect of melt rheology on the structure development during the cast film process .The arrangement and orientation of the crystalline and amorphous phases were examined by WAXD (wide angle X-ray diffraction) and FTIR (Fourier transform infrared) method and the their relationship with the rheological characteristics was studied. Tensile tests were carried out to examine the effect of orientation on the tensile behavior of the samples. It was found that the molecular weight as evaluated from rheology and the processing conditions plays a crucial role on the orientation of the crystal and amorphous phases and, in turn, affects significantly the tensile response. The molecular weight was the main parameter that controlled the orientation and it was found that the resin with higher molecular weight had a tendency to form a planar crystalline morphology as draw ratio in extrusion increased.