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Effect of ppm Levels of Long Chain Branching on the Crystallization of Isotactic Poly(propylenes) from the Melt and from Solution RUFINA G. ALAMO, JUAN P. FERNANDEZ-BLAZQUEZ, SYED A. ABDULLAH, MADHAVI VADLAMUDI, FAMU-FSU College of Engineering — Small concentrations of long chain branching (LCB) added via copolymerization with a diene to a linear poly(propylene) chain have a dramatic effect on crystallization. LCB iPPs with diene levels between 100 and 400 ppm show greatly enhanced nucleation density, increasing with diene content. The increased nucleation observed in optical micrographs, is also evident in the crystallization half-time observed by DSC in isothermal crystallization as a function of crystallization temperature. Isothermal crystallization studies from dilute solution measured by light scattering gave the same trend with diene content and rule out any effect of gel structures affecting the nucleation rate. The linear growth rates are unchanged. The increase in nucleation rate is not linear with the increase of diene as revealed from studies of blends of LCBiPPs with the linear matrix, suggesting that length of molecules and connectivity of the LCB structure are more important than the chemical nature of the junction. The enhanced nucleation levels off at concentrations of diene that approach the critical concentration for coil overlapping (c*) as calculated for chains generated by a Monte Carlo simulation of the LCB molecules having the experimental molecular weight distribution.

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