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Crystallization of a bimodally distributed copolymer system and a blend containing propylene-ethylene moieties ONYENKACHI WAMUO, YING WU, SHAW HSU, University of Massachusetts, Amherst, CHARLES(CHUCK) PAUL, ANDREA EODICE, Henkel Corporation — The competitive crystallization behavior of a multicomponent system is fundamentally interesting and has significant practical implications. The relative molecular weight and molecular architecture of the polymers involved needs to be considered carefully in the characterization of the entire crystallization process; nucleation and the crystal growth phase. We have considered two types of propylene-ethylene copolymers with virtually the same chemical composition but different block sequences. A comparison is being made between a bimodally distributed copolymer and a random copolymer. The unique feature of the bimodal system is the presence of a two-step crystallization process, where the longer sequences nucleated first and additional shorter segments are transported onto the crystal growth front. This system is compared to a copolymer of virtually identical random copolymer that is nucleated differently. Calorimetric, diffraction and spectroscopic measurements have been employed in order to understand the dynamics and mechanism of crystallization and the size and perfection of the crystals formed. The relative efficiency of crystallization by controlling the polymer configuration can then be compared to the traditional approach using a nucleation agent to affect the crystallization behavior. This new approach not only provides extremely fast crystallization but also overcomes practical considerations such as dispersion of the nucleation agents.

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