

Abstract Submitted
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Crystallization studies of polyethylene -poly(ethylene glycol) graft copolymers¹ P.R. MARK, G.E. HOVEY, N.S. MURTHY, K. BREITENKAMP, M. KADE, T. EMERICK, University of Massachusetts, Amherst — Structure and crystallization behavior of three copolymers obtained by grafting poly(ethylene glycol) (PEG) chains to polyethylene (PE) main chain was investigated by variable temperature x-ray diffraction and thermal analysis. The results show that PEG side chains and PE main chains crystallize into separate domains. This is especially true when grafted chains are long (50 and 100 repeat units), in which the PEG domains are same as in PEG homopolymer both in structure and in melting behavior. In the copolymer with shorter chains (25 repeat units), the PEG crystals are not distinct and melting is broad. The PEG domains can be dissolved in water or ethanol without altering the mechanical integrity of the film. PE crystallites in both samples are similar to that in PE homopolymer. For instance, the thermal expansion of the basal cell plane (a- and b-axes) of the PE domains agrees well with that of PE homopolymer over the entire temperature range from ambient to melt. However, the chain-axis dimension PE-lattice in the copolymer is shorter by ~ 0.05 Å and the basal dimensions are larger by ~ 0.05 Å. The changes in these dimensions due to the changes in the length of the grafted PEG chains were investigated.

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