

# Crystallization of nanocomposites of an isotactic random butene-1/ethylene copolymer and layered double hydroxide

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The effect of the presence of layered double hydroxide (LDH) nanofiller on the crystallization behavior of a random isotactic butene-1/ethylene copolymer was investigated. Addition of LDH enhanced heterogeneous nucleation of the ordering process of the polymer matrix leading to an increase of the temperature of formation of the Form II mesophase on cooling the melt. In contrast, the Form II mesophase – Form I crystal phase transition kinetics and the final crystallinity were not affected by the presence of LDH. Addition of the LDH nanofiller led to a beneficial increase of the stiffness which suggests a route for compensating of the lower stiffness of the random copolymer compared to the homopolymer. Random copolymerization accelerates the disadvantageous room-temperature mesophase – crystal transition but results in a reduction of the crystallinity. As such, the addition of LDH counterbalances the lowering of the crystal fraction. In Figure 1 a typical temperature-resolved WAXS experiment to evaluate the effect of LDH on the Form II/Form I polymorphism of the polymer matrix is shown. A sample which contained stable Form I crystals was heated to obtain a relaxed melt and then cooled. On cooling, there is formation of metastable Form II mesophase which then on immediate heating disorders. If the mesophase would be kept at ambient temperature then it would convert isothermally to Form I crystals.

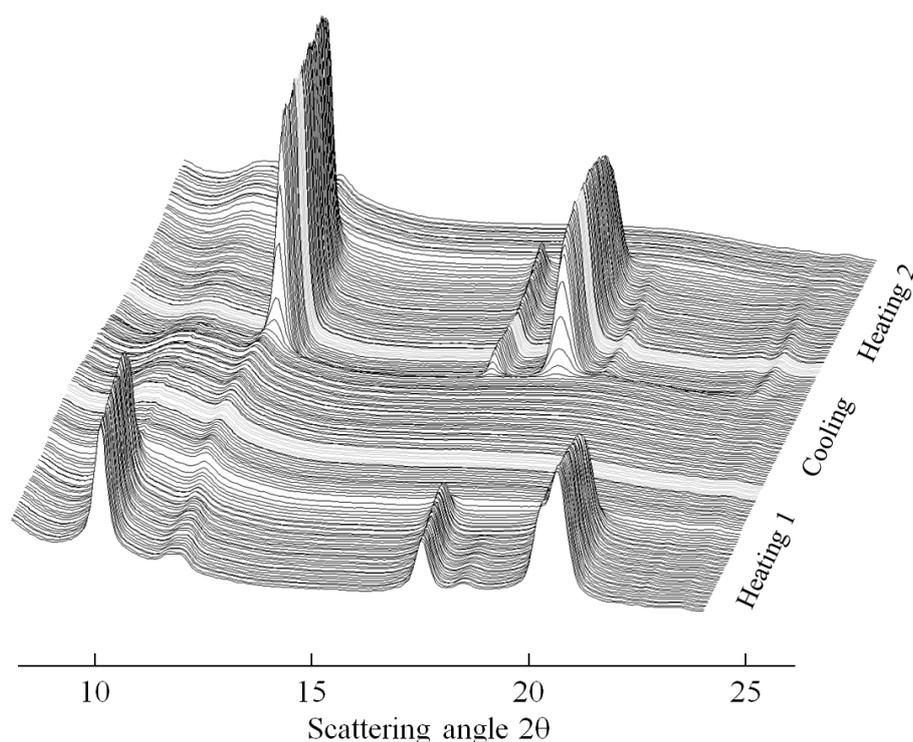


Figure 1: Series of WAXS curves, intensity as a function of scattering angle, of an isotactic butene-1/ethylene copolymer with 5 m% LDH, collected during heating, cooling, and reheating at rates of temperature change of 5 K min<sup>-1</sup>. The gray curves indicate isothermal holding of the temperature at either 423 or 298 K, for periods of 3 min each. Data need to be read from bottom to top, with an increment of 2.5 K or 30 s between two subsequent curves.