

## INVESTIGATIONS OF THE INTERNAL STRUCTURE AND THERMAL PROPERTIES OF THE HOMOGENEOUS ETHYLENE-1-OCTENE COPOLYMERS

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Performed investigations were part of a broader program dedicated to the studies on relationships between the molecular structure of homogeneous copolymers, their crystallization, solid state morphology and melting behavior. Two problems were investigated:

- 1) The influence of short 1-alkene side branches existing in the macromolecules of copolymers on the structure of their crystalline and amorphous phases,
- 2) A dual melting phenomenon occurring in isothermally crystallized ethylene-1-alkene copolymers.

Wide angle- (WAXS) and small angle- (SAXS) x-ray scattering methods were main sources of information. Simultaneous, real time WAXS and SAXS investigations were performed during crystallization and melting of the copolymers with high time- and temperature- resolution. The measurements took place in the EMBL laboratory of DESY in Hamburg. In the case of the second problem, two additional methods:

differential scanning calorimetry (DSC) and small angle light scattering (SALS) were also used apart from x-ray scattering. A combination of these four methods resulted in a comprehensive, dynamic picture of the structural transformations taking place in the copolymers during melting and crystallization at different levels of molecular organization: from unit cell up to spherulitic structure. Performed investigations have given interesting data on the mechanisms of the deformation of crystalline structure caused by the presence of side branches in investigated copolymers as well as on the influence of temperature and the length of those branches on the type of deformation. It was shown, that as a result of segregation of the fragments of macromolecular chains, taking place in the initial stage of crystallization, two populations of crystalline lamellae of different thermal stability and consequently different melting temperature are formed.