
HL 15: Semicrystalline polymers (organized by CPP)

Lecture on the occasion of the Robert-Wichard-Pohl-Preis 2014 awarded to Gert Strobl

Time: Monday 13:15–13:45

Location: HSZ 02

Invited Talk

HL 15.1 Mon 13:15 HSZ 02

Semicrystalline polymers - pathway of crystallization and deformation properties — •GERT STROBL — Physikalisches Institut, Albert-Ludwigs-Universität Freiburg, 79104 Freiburg

On cooling a polymer melt, plate-like crystals with thicknesses in the nano-range are nucleated and grow in the two lateral directions. The final structure is semicrystalline and composed of stacks of such crystallites separated by entangled fluid chain sequences. Structure parameters vary with the crystallization temperature which can be chosen far below the equilibrium melting point, down to the transition into

the glassy state. The question about the mechanism of polymer crystallization has always been a central issue in polymer physics. Time- and temperature dependent X-ray scattering experiments carried out during the last two decades now led to the establishment of a set of laws which control the structure formation out of the entangled melt, recrystallization processes, and the final melting. The laws indicate the participation of an intermediate mesomorphic phase in the crystal formation process. The peculiar deformation behaviour of polymeric materials reflects their semicrystalline structure, including in a coupled fashion both the rubber-like properties of the fluid parts and the elasto-plastic properties of the crystallites.