

Seminar

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Homogeneous versus heterogeneous nucleation in carbon nanotube filled polymers

Crystallization is commonly considered as nucleation followed by a growth process. Nevertheless, a complete description of polymer crystallization is far from being achieved. Here we apply the recently developed technique, differential fast scanning calorimetry (DFSC), for a unique, new look at the crystal growth of poly(ϵ -caprolactone) (PCL) and PCL carbon nanotube composites from 185 K, below the glass transition temperature, to 330 K, close to the equilibrium melting temperature. The DFSC allows temperature control of the sample and determination of its heat capacity during temperature treatments by employing cooling and heating rates from 50 to 100,000 K/s. First, the crystal nucleation and overall crystallization half times were determined simultaneously in the range of temperatures where crystallization of PCL occurs. The key problems which are attempted to be resolved concern the differences between the structures of the various entities identified and their mechanisms of growth. The structures seem to range from having practically unmeasurable latent heats of ordering (nuclei) to being clearly-recognizable, ordered species with rather sharp disordering endotherms at temperatures from the glass transition to equilibrium melting (increasingly perfect and larger crystals). The mechanisms and kinetics of growth (if any) involve a detailed understanding of the interaction with the surrounding rigid amorphous fraction (RAF) in dependence of crystal size and perfection.

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Hörsaal Makromolekulare Chemie, Stefan-Meier-Str. 31

Invited by: Günter Reiter

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