Seminar

Prof. Bernard Lotz

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The structure of crystalline polymers: contributions of electron microscopy and AFM

Crystalline polymers are made of small (several micrometers) and thin (one to several tens of nanometers) lamellae, which amounts to ≈10^{-12} grams of material. Electron microscopy is therefore an ideal tool for their investigation, in spite of the high susceptibility of polymers to electron beam damage.

The use of single crystals produced in thin films or solution, as well as epitaxially crystallized materials yields unusual structural and morphological details on the crystalline core and the fold structure. These simple morphologies provide essential clues to analyze more complex lamellar morphologies observed in spherulites.

Even though detailed information is frequently available, the molecular analysis (or even better, sometimes, the *sub*-molecular analysis) remains difficult. Several "classical" structural problems have remained unsolved for decades! To overcome such difficulties, gathering and combining information provided by different polymers may become essential.

The presentation is intended to be very didactic. Among others, it will illustrate (a) the use of dark field imaging to visualize and investigate crystal-crystal transformations (b) the combined use of epitaxial crystallization, electron diffraction and AFM to observe the structure of polymers with methyl group resolution (≈4Å) (c) the concept of frustrated packing in crystalline polymers (d) the investigation of the fold structure and associated surface stresses that induce twisted and scrolled lamellar morphologies.

Wednesday, June 20th, 14h15

Hörsaal Makromolekulare Chemie, Stefan-Meier-Str. 31

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