SFB TRR 102

Polymers under Multiple Constraints

Polymer- & Soft-Matter-Seminar

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Monday,
14th October 2019

at: **5.15pm**

VDP 4 1.27,
Von-Danckelmann-Platz 4
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"Ductility of glassy semicrystalline polymers"

Commodity polymers, the very majority of all polymer productions, are a key class of modern materials, due to their high specific strength. Thus, it is a central task in polymer science and engineering to study how to acquire adequate mechanical properties and improve the mechanical performance. As strong solid materials, polymers need to be either glassy or crystalline with a significant level of crystallinity. While the study of the molecular origin of ductility in purely glassy polymers belong to another lecture, we focus in this talk on the nascent developments in my lab concerning mechanical behavior of semicrystalline polymers. Against the background of massive literature on the effect of external deformation on crystallization (commonly known as "flow induced crystallization") in polyethylene and polypropylene, which we categorize as class A semicrystalline polymers, we turn our attention to polymers that belong to class B semicrystalline polymers, e.g., PET and PLA. This classification according to T_g is more than for convenience because a different strategy can be implemented to study class B polymers. Our current work aims to answer why class B polymers are brittle at room temperature when they are fully crystalline. The lecture explores a molecular perspective about how the mechanics of semicrystalline polymers may be understood at a molecular level through the critical knowledge developed from our research experiences with melt rheology[1] and molecular mechanics of glassy polymers.

[1] Nonlinear polymer rheology: macroscopic phenomenology and molecular foundation, Wiley (2018)