

## Seminar im Rahmen des GRK 2078

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Referee: **Prof. Dr.-Ing. Alexander Lion**  
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Date: Tuesday, March 30, 2021  
Time: 14:00 h  
Format: IRTG Online-Seminar

Title: **Part 2: On the representation of polymerphysical phenomena in  
continuum mechanics**

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### Abstract

Amorphous and semicrystalline polymers are applied in nearly all disciplines of engineering and daily life. For short-term applications under usual temperature conditions they exhibit a certain number of advantages but during larger times their mechanical material properties undergo significant changes. Caused by their chemical structure polymeric materials behave completely different in comparison with metals. They exhibit moderate characteristic temperatures which characterise glass transitions, melting and crystallisation regions or the onset of chemical ageing and diffusion processes. If, during the production of a polymer part or in a certain application, such a temperature is exceeded, their mechanical material properties can change enormously. In consequence, detailed experimental investigations, the physical understanding, the constitutive representation in continuum mechanics or thermodynamics and the numerical simulation of polymers and parts which are made of them are essential and define big challenges in scientific research.

In this presentation, three important polymerphysical phenomena, namely the glass transition, crystallisation and melting as well as the diffusion of fluids in polymers are highlighted in detail. The formulation of the constitutive models is done in accordance with the basic laws of thermodynamics. To this end, the physical motivation and all fundamental ideas as well as the related assumptions and constitutive theories are presented and discussed. The main properties of the different approaches are visualised using simulations and are discussed in the context of experimental data.

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Alle Interessenten sind herzlich eingeladen.

Prof. Dr.-Ing. Thomas Böhlke  
(Sprecher des GRK 2078)