Beitrag ID: **14** Typ: **Talk**

RHEOLOGY OF POLYMER SOLUTION DETERMINES THE EARLY STAGE OF THE DROP SPREADING

Dienstag, 5. Dezember 2023 11:30 (25 Minuten)

Spreading of drops over solid substrate plays an important role in many industrial and natural systems. These systems are important for applications from printing and coating to agriculture. For low viscosity liquids, e.g. water, it is known that spreading consists of two regimes; inertia dominated regime and viscous dominated one. During the inertia regime, the spreading radius increases with the square root of time (r~t^(1/2)). Thereafter, the spreading rate decreases into the viscous regime (r~t^(1/10)).
Additionally, for liquids that are more viscous e.g. mixture of water and glycerin, the first steps of spreading slightly deviates from the square root of time law and the time exponent depends more on the wettability of the surface. The early stage of spreading happens in few milliseconds, which leads to high spreading velocity and a region high shear close to the contact line. We correlate the shear rate-dependent rheological properties of the drop to the dynamics of drop spreading. We use solution of water and PEO (Polyethylene Oxide) as shear thinning liquids and mixture of water and glycerin as the Newtonian liquid. At the same zero shear viscosity, viscoelastic (shear-thinning) drops spreads faster than a Newtonian drop. We discuss the influence molar mass and concentration of the polymer on the dynamics of drop spreading and give a qualitative model to describe the influence of shear-rate dependent viscosity on drop spreading.

Hauptautor: ROSTAMI, Peyman

Co-Autoren: SCHUBOTZ, Simon; Herr AZIZMALAYERI, Reza (Leibniz-Institut für Polymerforschung Dresden e.V.); Dr. AUERNHAMMER, Günter K.

Vortragende(r): ROSTAMI, Peyman

Sitzung Einordnung: Short Talks