Beitrag ID: **11** Typ: **Poster**

Understanding Microscopic Contact Angle on Super-Smooth Monolayer Silanized Surface Using Atomic Force Microscopy

The phenomenon of wetting holds considerable significance, particularly when examined at the microscale, where it underpins a plethora of technological and fundamental advancements. In this study, we employ Atomic Force Microscopy to delve into the size-dependency of microdroplets, focusing on a scale where surface forces and gravity effects are minimal. To achieve this, we employ a post-silanization technique called peel-off to fabricate smooth surfaces with reduced pinning sites. The roughness values show a dramatic decrease after peel-off down to approximately 1.5 Angstrom. Subsequently, we subject droplets of various non-volatile glycols to impingement from a heated liquid pool. Our findings reveal a non-linear relationship between the contact angle profile and droplet size, which stabilizes at a steady-state value beyond a critical size. This critical size coincides with a significant lengthscale in coalescence theory, where the interplay of capillary, pinning, and viscous energies reaches equilibrium, resulting in a nullification of net available energy. To support this observation, we develop a theoretical model based on energy balance within a merging droplet system, yielding a physically meaningful equation for predicting the size dependency of microscale wetting. Theoretical predictions align well with experimental data and offer insights applicable to diverse liquid-surface combinations.

Hauptautor: Prof. AUERNHAMMER, Günter K. (IPF Dresden)

Co-Autoren: HORMOZI, Mohammadali (TU Darmstadt); Dr. SOLTWEDEL, Olaf (TU Darmstadt); Herr ROSTAMI, Peyman (IPF Dresden); Prof. KLITZING, Regine v. (IPF Dresden)

Vortragende(r): Prof. AUERNHAMMER, Günter K. (IPF Dresden)