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S E M I N A R

aus

Halbleiterphysik und Nanotechnologie

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Hörsaal für Physik

"Directional wetting on chemically patterned substrates"

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The ability to control liquid behaviour at surfaces is highly relevant for a number of application areas, including for example the performance and reliability of inkjet nozzles. Generally, the wettability of solid substrates can be modified both by morphological micro-and nanostructuring as well as by chemical functionalization. Here we explore the potential of chemically defined patterns consisting of hydrophobic self-assembled monolayers (fluoroalkylsilane) on hydrophilic (pristine SiO_2) substrates to control dynamic liquid behaviour on morphologically flat surfaces.

We review our recent results on the wetting behaviour of chemically stripe-patterned anisotropic surfaces. The equilibrium shapes of asymmetric droplets, arising from patterns of alternating hydrophilic and hydrophobic stripes with dimensions in the low-micrometer range are investigated in relation to the stripe widths. Owing to the well-defined small droplet volume, the equilibrium shape as well as the observed contact angles exhibit unique scaling behaviour. Additionally, high-speed camera measurements reveal the kinetics involved in the formation of the asymmetric droplets.

We also present results of experiments investigating the motion of the liquid from surface areas with low macroscopic wettability towards areas with a higher wettability. The density of self-assembled fluoroalkylsilane monolayers as defined by the chemical patterning proves to be of paramount importance. Both linear and radial patterns are presented, which induce liquid movement across chemically defined gradients in surface energy.