# How water advances on superhydrophobic surfaces

Frank Schellenberger[1*], Noemí Encinas[1], Doris Vollmer[1], Hans-Jürgen Butt[1]

[1]*Max Planck Institute for Polymer Research, Mainz, Germany*

**schellen@mpip-mainz.mpg.de*

To a certain degree, it is possible to control the macroscopic wetting properties of a surface by its nano- and microstructure. In particular, super liquid-repellant-surfaces have received interest due to their many potential applications, such as anti-fouling for for example. Super liquid-repellency can be achieved by nano- and microstructuring a low energy surface in a way, that the structure can entrap air underneath the liquid. The common criteria for super liquid-repellency are a high apparent advancing contact angle and a low contact angle hysteresis.

For a better understanding of how a drop advances and recedes on such a structured surface, we imaged the motion of a water drop on a superhydrophobic array of micropillars by laser scanning confocal microscopy (LSCM). With LSCM, we imaged an advancing water front on a superhydrophobic surface at a resolution of 1 µm. The results give a qualitatively new picture of how water advances on the microscopic scale. We demonstrate that in contrast to traditional goniometer measurements, the advancing contact angle is close to 180° or even higher.

In contrast, the apparent receding contact angle is determined by the strength of pinning. We propose that the apparent receding contact angle should be used for characterizing super liquid-repellent surfaces [1,2].

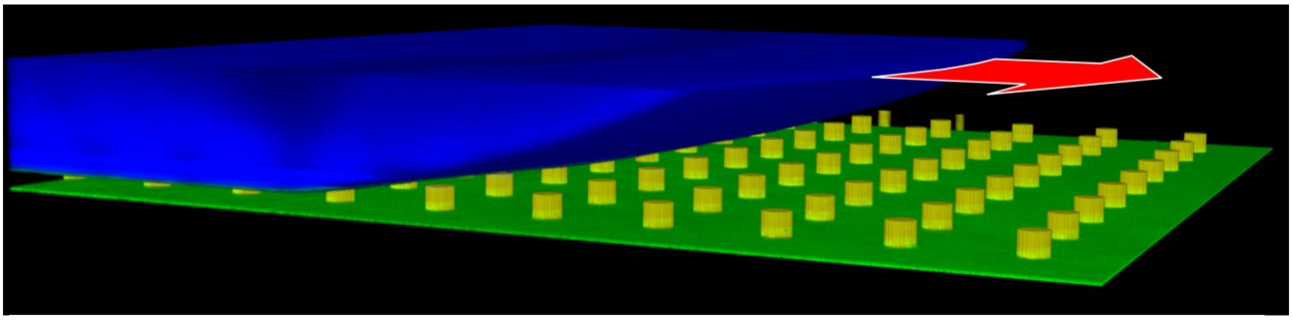

**Figure 1:** 3D confocal microscopy image of a water drop (blue) advancing on a superhydrophobic pillar surface (green/yellow).

[1] F. Schellenberger et al., Phys. Rev. Lett. 116, 096101 (2016)
[2] P. Ball, Nature Materials 15, 376 (2016)