FASTEST AND MOST REPRODUCIBLE OPTICAL CONTACT ANGLE DETERMINATION USING THE NOVEL LIQUID NEEDLE

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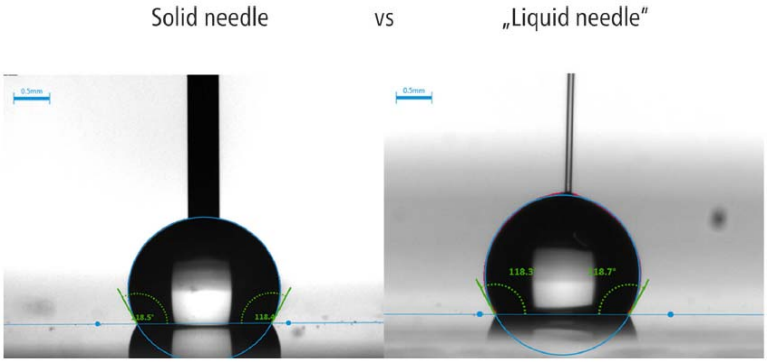

Generally, the optical determination of static and advancing contact angle (CA) is made on drops applied or extended, respectively, onto a substrate through the use of solid needles. Although this method is used extensively, this way of dosing can be time consuming, cumbersome and if not performed meticulously can lead to erroneous results. Recently, we established a novel "liquid needle" dosing as promising and advantageous alternative (compare figure and [1]). Herein, we will review the main concepts of the liquid needle and illustrate using novel data why the liquid needle can provide the most precise, i.e. reproducible optical CA. For this, we present a static contact angle study on 14 different surfaces with up to four different liquids utilizing the two different dosing systems. In addition we studied the capillary waves of the deposited droplets captured through high speed recordings. These waves are generated during both the solid needle and the liquid needle dosing process. Our observations will be further supported by calculations based on fluid dynamics. Next to this scientifically fundamental advantages, we will demonstrate that optical (static and advancing) CA measurements using the liquid needle are two orders of magnitude faster, facilitate drop deposition on super hydrophobic surfaces, and automatic CA mappings not being possible with a traditional solid needle dosing thus far. Therefore, we believe that our contribution will be relevant and beneficial for everyone who uses optical CA measurements to assess surface properties.

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[1] Ming Jin, Raymond Sanedrin, Daniel Frese, Carsten Scheithauer, Thomas Willers; Colloid Polym. Sci. (2016), DOI 10.1007/s00396-015-3823-1