

Abstract Submitted
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Design of a Condensation-Based Contact Angle Goniometer¹

AJAY ROOPESH, VIRAJ DAMLE, KONRAD RYKACZEWSKI, Arizona State University — Condensation of low surface tension fluids such as refrigerants, natural gas, and carbon dioxide is important to a variety of industrial processes. Condensation of these fluids often occurs at elevated pressures and/or cryogenic temperatures, making measurement of their wetting properties using standard approaches challenging. It was recently demonstrated that these properties are critical in designing omniphobic surfaces for low surface tension fluid condensation rate enhancement [1]. To this end, we have developed an alternative goniometer design capable of contact angle measurement at wide pressure and temperature range. In this design, droplets are not dispensed through a pipette but generated through localized condensation on a tip of a preferentially cooled small metal wire encapsulated within a thick thermal insulator layer. Here we present a computational and an experimental study of the relation between the condensation-based goniometer geometry, subcooling, and droplet generation rate. We also compare water contact angle measurements using standard and condensation-based goniometer.

[1] Rykaczewski et al., *Sci. Rep.*, 4, 2014.

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Konrad Rykaczewski
Arizona State University

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