Abstract Submitted
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Marangoni Effect on the Shape of Freely Receding Evaporating Sessile Droplets of Perfectly Wetting Liquids[1] YANNIS TSOUMPAS, SAM DEHAECK, ALEXEY REDNIKOV, PIERRE COLINET, Université Libre de Bruxelles — Freely receding evaporating sessile droplets of perfectly wetting liquids (HFE-7100, 7200 and 7500), with small finite contact angles induced by evaporation, are studied with a Mach-Zehnder interferometer. Surprisingly, the experimentally obtained profiles turn out to deviate from the classical macroscopic static shape of a sessile droplet (as determined by gravity and capillarity), often used when modeling evaporating droplets. These deviations can be seen in two ways. Namely, either the droplet appears to be inflated as compared to the classical static shape assuming the same contact angle and contact radius, or the apparent contact angle appears lower than the classical static one assuming the same volume and contact radius. In reality, the experimental profiles exhibit a local decrease of the slope near the contact line, which we attribute to the Marangoni effect in an evaporating sessile droplet. In this case, the radially inward (along the liquid-air interface) direction of the flow delivers more liquid to the center of the droplet making it appear inflated. When the Marangoni effect is weak, as in the case of the poorly volatile HFE-7500, no significant influence is noticed on the drop shape. The experimental results are compared with the predictions of a lubrication-type theoretical model that incorporates the evaporation-induced Marangoni flow.

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