Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Understanding thermal Marangoni flow in water sessile evaporating drops via 3D-PTV[1] MASSIMILIANO ROSSI, ALVARO MARIN, CHRISTIAN J. KAEHLER, Bundeswehr University Munich — Understanding the flow inside sessile evaporating drops is of great interest both from a fundamental and technological point of view. Despite strong research efforts in the recent years, a complete picture on the phenomena involved in this process and a way to control them is still far to be reached. This is due to a lack of reliable experimental data on the internal flow but more dramatically on the interfacial flow. A relevant open debate concerns the role played by the Marangoni flow induced by thermal gradients. We recently show how 3D particle tracking techniques are suitable to measure the internal flow of drops and to derive quantities such as surface shear and surface tension differences (Marin et al., Soft Matter, 2016). Such experiments also indicated an increase of the thermal Marangoni flow as the droplet becomes thinner, in disagreement with current theoretical models and simulations. A possible reason for that could be a discrepancy of the imposed boundary conditions in the simulations and the experimental ones. This work follows up these observations with fully 3D time-resolved measurements of the flow inside drops evaporating on a quartz substrate, which temperature is controlled using a feedback temperature control and a microscope incubator system.

[1]Supported by DFG, grant no. KA 1808/22

Massimiliano Rossi
Bundeswehr University Munich

Date submitted: 31 Jul 2016 Electronic form version 1.4