Drops on slippery surfaces

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Here, we consider the shape of a sessile drop embedded in a lubricant film spread on a planar solid substrate both experimentally and theoretically. The lubricant film forms a liquid meniscus around the central drop. In particular the meniscus height is analyzed because it is relevant for a possible drainage and depletion of the lubricant film by sliding drops. Experimentally, a quantitative examination of the shape of the interface between both liquids is generally hindered by poor optical contrast. Laser scanning confocal microscopy enables to measure all curvatures and angles between the different interfaces.

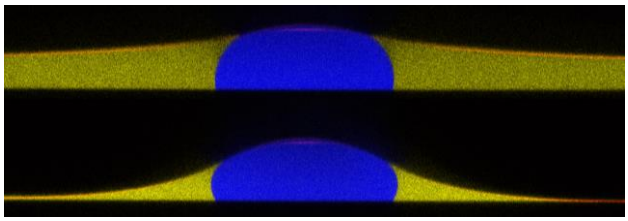

Abb. 1: Snapshots of a drop of ionic liquid (blue) embedded in n-decane (yellow). Top: Initial situation. Bottom: The height of the lubricant film decreased due to evaporation.

We investigated the temporal evolution of the interfaces, the angles and the shape of the wetting ridge for a nonvolatile drop (blue) embedded in a film of slowly evaporating lubricant (yellow). The experimental data quantitative agree with the calculated data for the shape of the drop, the wetting ridge, the Neumann triangle and its evaporation induced rotation.

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[1] F. Schellenberger, J. Xie, N. Encinas, A. Hardy, M. Klapper, P. Papadopoulos, H.-J. Butt, D. Vollmer; Soft Matter (2015), 11, 7617.