PANDA: capturing fast dynamics of interfacial surfactant loading

1. Introduction: Capture interfacial dynamics of surfactants

Surfactants are important in:
- Household - industrial processes - ...
- biological¹ and microorganism related studies².

Here we study their influence on drying droplets, undergoing the coffee ring effect, via microscopy and pendant drops analysis.

3. Fast confocal flow study of bacteria

Furthermore, a fast confocal is used with tracers (bacteria and nanoparticles), to study the flow in surfactant loaded droplets.

4. PANDA study of (bio)surfactants

Investigation of multiple surfactants and biosurfactant (rhamnolipids). In our case the recurrent time scale of the microscopy study was proven to be the loading of molecules to the interface.

5. Conclusion: surfactant induced Maragoni force and fast surfactant loading of interface

We improved the pendant drop, nicknamed PANDA, via inversion of the phases (air-liquid). This allowed faster oscillating interfaces and a tenfold gain in temporal information, as to capture relevant time scales related to surfactant loading of the interface. We studied geometrically equivalent evaporating droplets, which showed an unique internal flow profile due to capillary and surfactant induced Marangoni forces. By PANDA the recurrent time scales of confocal measurements could be related to the surfactant adsorbing on the interface.

References:
2) W. Sempels & R. De Dier et al. (2013) Nature Communications 4, 1 757 doi:10.1038/ncomms2746

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