Here, we studied the contact between an oil in water emulsion (stabilized by surfactants) and pure water. We show how the emulsion only

**Principle and experimental setup**

- Single drop or
- Continuous rate of oil in
- Water emulsion

- Synchronizing two high speed cameras for both top and side view observations + laser sheet for vertical deformations

**Emulsion and liquid pool parameters**

- Continuous phase: aqueous solution of surfactant (SDS, CnTAB) 1 CMC or [Surf] = 40 CMC
- Dispersed phase: decane, silicone oil, olive oil
- Pool of water with the same surfactant as in the emulsion

**Results obtained in the continuous regime**

At very low flow rates, a steady-state regime, with a well-defined dilute zone between the central spot and the outside corona. One can then easily vary the parameters and measure the diameter of the dilute zone for various emulsion and bulk surfactant concentrations.

**Single drop deposit**

- direct high speed video observations:
  - a spreading regime,
  - then stationary...
  - and final retraction!

**Bulk effects on the dynamics**

Using CnTAB, we can tune the adsorption/desorption balance:

- The retraction speeds and the spreading diameter also strongly depend on the "affinity" of the surfactant for the interface, described by the Szyszkowski concentration, α

**Interfacial deformation**

By looking at the reflection of a laser sheet:

- A vertical deformation at the corona

**The retraction**

- The emulsion stable corona at the edge of the spreading zone also corresponds to a vertical jump of the interface

The unusual arrested-spreading results from both adsorption to the bulk and high viscous drag of the oil droplets.

The even more unusual retraction appears to be also linked to the surfactant desorption and to the collapse of the vertical jump at the boundary: higher effective surface tension inside the corona?

**Many analogies with different jumps**

- The results show a behavior far from a trivial "dilution scheme" of the emulsion droplet!

**Tables and graphs**

- The results presented in the graphs are limited to one drop, and the effect of the other drop is not considered.

- The unusual arrested-spreading results from both adsorption to the bulk and high viscous drag of the oil droplets.

- The even more unusual retraction appears to be also linked to the surfactant desorption and to the collapse of the vertical jump at the boundary: higher effective surface tension inside the corona?