Droplets are not only part of our everyday life but they also play a role in many technological processes, sometimes wanted and sometimes not. Down to a diameter of a micron as function of size there is no qualitative difference in the behavior of droplets. They are mainly determined by surface tensions. (For large droplets also gravity comes into play.) However, nano-droplets behave differently. Their dynamics is determined by long-ranged material specific dispersion forces.

For a macroscopic droplet on a substrate with a step (see Figure 1) it does not matter whether it is above or below the step. Once it has reached its equilibrium shape it does not move any more. But nano-droplets respond to the presence of the step over a distance of up to 100 nm. This interaction is quantified by the disjoining pressure, which is shown in Figure 2 for two different materials, both with a contact angle of \( \theta = 90^\circ \). On the first material (Fig. 2(a)), the droplet is attracted to the

Figure 1: Nano-droplets on a substrate with a step. They feel the presence of the step over a distance of up to 100 nm. If they are small enough they are set in motion by dispersion forces. The direction of motion is determined by the sign of the Hamaker constant and not by the equilibrium contact angle.
step on the upper side and repelled on
the lower side. On the second substrate
(Fig. 2(b)) a droplet responds differently:
it always moves to the left.
The direction of motion is determined by
the sign of the Hamaker constant, i.e., the
long-ranged part of the intermolecular
interactions, while the contact angle is
determined by the balance of long- and
short-ranged interactions. This means that
nano-droplet can behave very differently
on macroscopically equivalent substrates.

Based on the publication:
Motion of nanodroplets near edges and wedges,
A. Moosavi, M. Rauscher, and S. Dietrich,

Onward to New Shores

Prof. Dr. Fritz Aldinger was given emeriti-
us status on September 30. He is a Scien-
tific Member and was Director of the
Department “Materials Synthesis and
Microstructure Design” as well as holding
a Chair at the Universität Stuttgart. The
main emphasis of his research work was
the synthesis of new ceramic materials and
the underlying reaction mechanisms and
phase equilibria.

Both scientists could successfully transfer
the knowledge they obtained through funda-
mental research to practical applica-
tions, giving new impetus and leading to
approaches which also have practical rele-
vance. This is once again shown by their
contributions on the following two pages.

While Mr Arzt has now centred his life at
the Saar, Mr Aldinger, for private reasons,
regularly comes to the Elbe in Dresden.

The Board of Directors and all the staff
wish them all the best for their future
undertakings at “new shores”.

Figure 2: Disjoining pressure in the vicinity of a step in a homogeneous substrate for two different materials
with equal contact angle $\theta = 90^\circ$ but with Hamaker constants of opposite sign (negative in (a) and positive
in (b)). In the vicinity of a step nano-droplets move in the step-down direction for negative Hamaker cons-
tants and in the opposite direction for positive Hamaker constants.