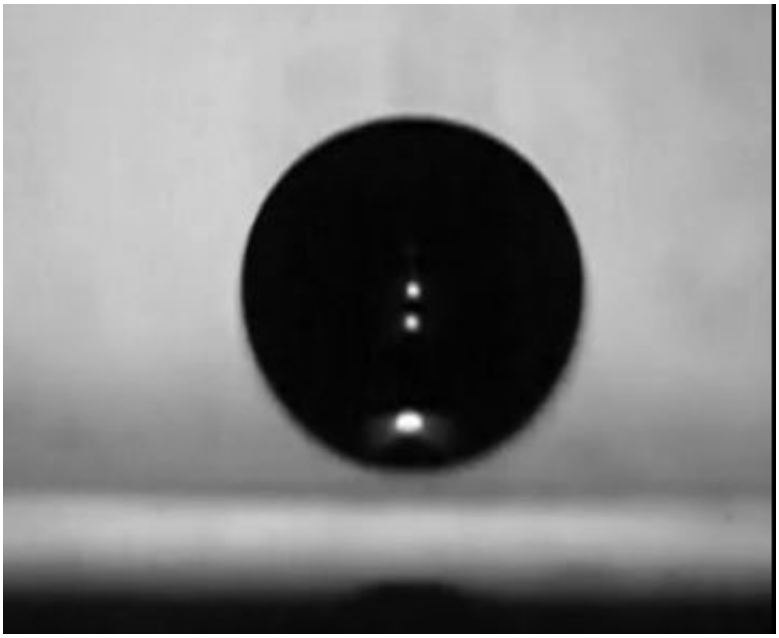
An air cushion for falling droplets

November 11 2014, by Kim Hovestad



Falling droplets bounce as many as fifteen times before they come to rest on a flat surface. In the past, it was believed that this phenomenon is limited to water drops on superhydrophobic surfaces.

Research performed by scientists from UT's MESA+ research institute, published today in the leading scientific journal *Nature Physics* shows that the phenomenon applies to a much broader class of materials including to oils and to wetting surfaces because the drops can bounce on a microscopic layer of entrapped air. This emerges from fundamental

research. According to prof. dr. Frieder Mugele, this knowledge is in part important for applications in the field of inkjet printing, medical inhalers and coating technology.

From previous research it was known that the behaviour of droplets falling on a surface was influenced by the presence of air, but the underlying physical principles were unclear. Researchers from the University of Twente therefore used high speed cameras to study the impact of millimeter-seized drops on perfectly flat surfaces. Despite bouncing several times, the drops actually do not touch the surface until they come to rest; high speed optical interferometry shows that the drops bounce on a microscopic layer of air about 200 nanometres thick that does not get squeezed out during the impact process (a nanometre is one million times smaller than a millimetre).

Bouncing fifteen times

With each bounce, the speed of the droplets decreases slightly. After bouncing a maximum of fifteen times, the layer of air breaks open, and then the droplet lands on the surface.

Fundamental physics research is involved but, according to prof. dr. Frieder Mugele, the acquired knowledge is, for example, important for applications where small droplets and a surface come together, as is the case with inkjet printing, medical inhalers and coating technology.

More information: Wettability-independent bouncing on flat surfaces mediated by thin air films, *Nature Physics*, DOI: 10.1038/nphys3145

Provided by University of Twente