timefornano

7

instructions

# hydrophobic textile

## Health and safety

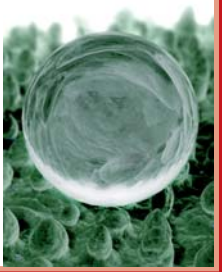
The textile should not be rubbed too much as it could damage the fabric

## What happens in this experiment?

This experiment mimics the natural 'lotus effect' in which water is repelled by a surface.

Something that can repel water is known as 'hydrophobic' (from the Latin words 'hydro' meaning water and 'phobic' meaning hating). The 'lotus effect' is named after the leaves of the lotus plant which are particularly hydrophobic.

Lotus leaves repel water due to nanoscale structures on their leaves (see the image of the leaf above). Normally, surface tension affects only the top of a water droplet - the bottom sticks to whatever surface it is on. But on a lotus leaf something very different happens: nanoscale bumps on the leaf's surface prop the drop up, so it is almost entirely surrounded by air. This creates surface tension on all sides making the water bead up more tightly thus sticking to the leaf less.



Just a tiny movement of the leaf makes the water droplet roll smoothly off, taking any dirt particles with it, making lotus leaves self-cleaning. This protects the plant by removing dust, fungi, algae and spores.

## Applications

Technologies inspired by the lotus leaf structure include self-cleaning windows and self-cleaning paint. For example, Lotusan® paint has been applied to over half a million buildings since its launch a decade ago.

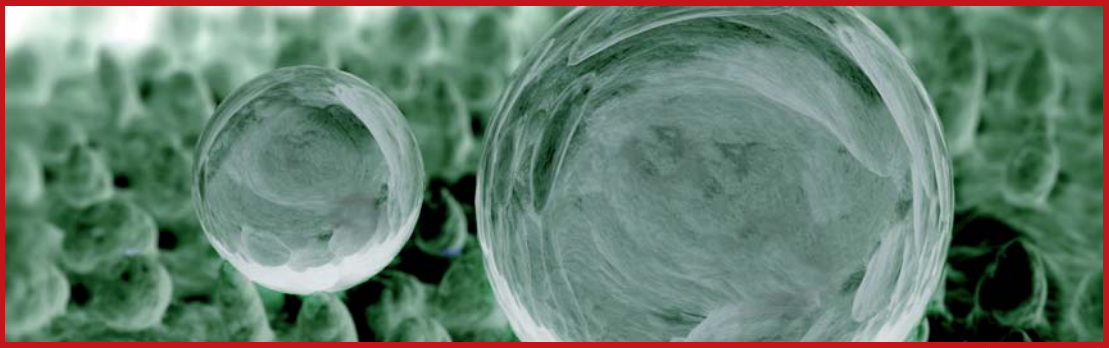
Fabrics coated with nanotextured surfaces aren't entirely self-cleaning. However, just a small amount of water will roll around the surface of the fabric attracting dirt particles. This means far less detergent and water can be used to clean these fabrics, which in turn is better for the environment.

## Ideas for conducting the activity or discussion

- Ask participants how they think the lotus effect works and where they can see it in nature.
- Ask them of what kind of applications they can think of for hydrophobic surfaces.
- You could compare the hydrophobic textile with the next activity, 'anti fog', as it too is a self-cleaning technology, but one that works in the opposite way.

## Learning objectives or school curriculae

- To understand how nanoscale structures affect the physical properties of a surface at the macroscale.
- To learn about hydrophobicity.
- To discover an application of nanotechnologies.



© W. Thielicke (w.th@gmx.de)