

Scientists Glimpse Nanobubbles on Super Non-Stick Surfaces

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Could lead to design of water-shedding materials for applications in energy, medicine, and more

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UPTON, NY — Scientists at the U.S. Department of Energy's Brookhaven National Laboratory have obtained the first glimpse of miniscule air bubbles that keep water from wetting a super non-stick surface. Detailed information about the size and shape of these bubbles — and the non-stick material the scientists created by “pock-marking” a smooth material with cavities measuring mere *billionths* of a meter — is being published online today in the journal *Nano Letters*.

“Our results explain how these nanocavities trap tiny bubbles which render the surface extremely water repellent,” said Brookhaven physicist and lead author Antonio Checco. The research could lead to a new class of non-stick materials for a range of applications, including improved-efficiency power plants, speedier boats, and surfaces that are resistant to contamination by germs.

Non-stick surfaces are important to many areas of technology, from drag reduction to anti-icing agents. These surfaces are usually created by applying coatings, such as Teflon, to smooth surfaces. But recently — taking the lead from observations in Nature, notably the lotus leaf and some varieties of insects — scientists have realized that a bit of texture can help. By incorporating topographical features on surfaces, they've created extremely water repellent materials.

“We call this effect ‘superhydrophobicity,’” said Brookhaven physicist Benjamin Ocko. “It occurs when air bubbles remain trapped in the textured surfaces, thereby drastically reducing the area of liquid in contact with the solid.” This forces the water to ball up into pearl shaped drops, which are weakly connected to the surface and can readily roll off, even with the slightest incline.

“To get the first glimpse of nanobubbles on a superhydrophobic surface we created a regular array of more than a trillion nano-cavities on an otherwise flat surface,

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and then coated it with a wax-like surfactant,” said Charles Black, a physicist at Brookhaven’s [Center for Functional Nanomaterials](#) [3].

This coated, nanoscale textured surface was much more water repellent than the flat surface alone, suggesting the existence of nanobubbles. However, because the nanoscale is not accessible using ordinary microscopes, little is known about these nanobubbles.

[SOURCE](#) [4]

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