Cavitation bubbles bursting with cleaning power

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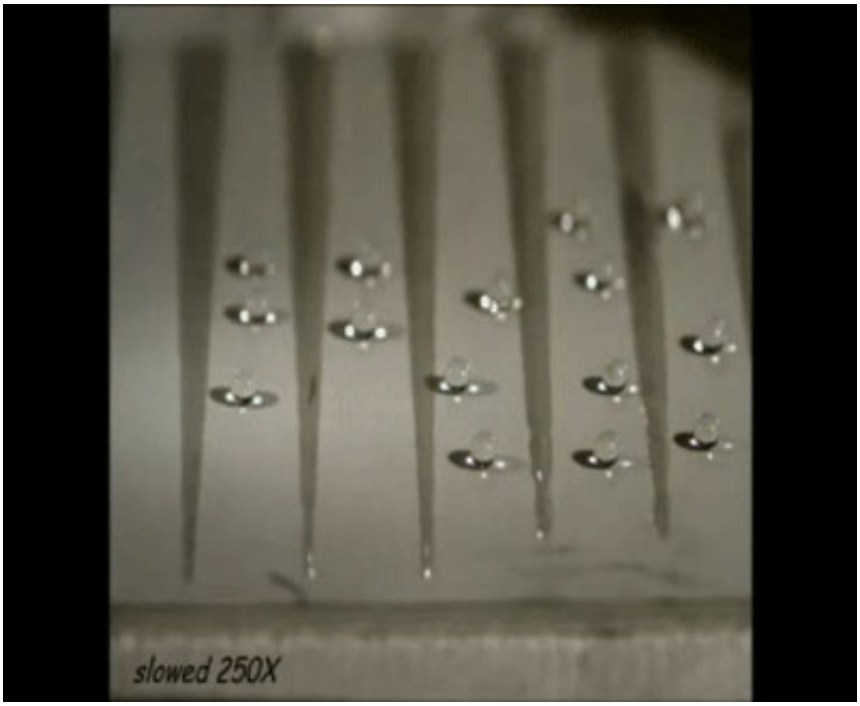

Using various methods to create intricately patterned surfaces, engineers can make materials that attempt to closely mimic the beetle's back. What researchers have done is create surfaces that so excel at repelling or attracting water, they've added a "super" at the front of their description: superhydrophobic or superhydrophilic. By varying the layout of these surfaces, researchers can now trap, direct and repulse small amounts of water for a variety of new purposes. "We can now do things with fluids we only imagined before," says mechanical engineer Constantine Megaridis of the University of Illinois at Chicago. Megaridis has used his bio-inspired designs to put precise, textured patterns on inexpensive materials, making microfluidic circuits. Plastic strips with superhydrophilic centers and superhydrophobic surroundings that combine or separate fluids have the potential to serve as platforms for diagnostic tests.

Devices such as these--created in engineering labs--are now working their way to the marketplace.

It's easy to think of soap suds when one thinks of bubbles, but these bubbles can clean without chemicals. These are cavitation bubbles, which are created when air is churned up in water. And what researchers are learning could ultimately lead to chemical-free cleaning methods for fruits and vegetables.

With support from the National Science Foundation (NSF), biofluid scientist Sunghwan "Sunny" Jung and his team at Virginia Tech are studying how a cavitation bubble creates a suctioning effect when it collapses, pulling everything close by toward it.

Cavitation bubbles are already in use for certain industrial applications, such as cleaning water at treatment plants. Jung's fluid mechanics lab is working with food scientists to see how effective cavitation bubbles are at pulling everything from soil to E. coli and Salmonella away from the smooth surface of a tomato or the bumpy surface of a cantaloupe. In the future, Jung envisions bubble machines as a common appliance at farmer's markets and maybe even in households.

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