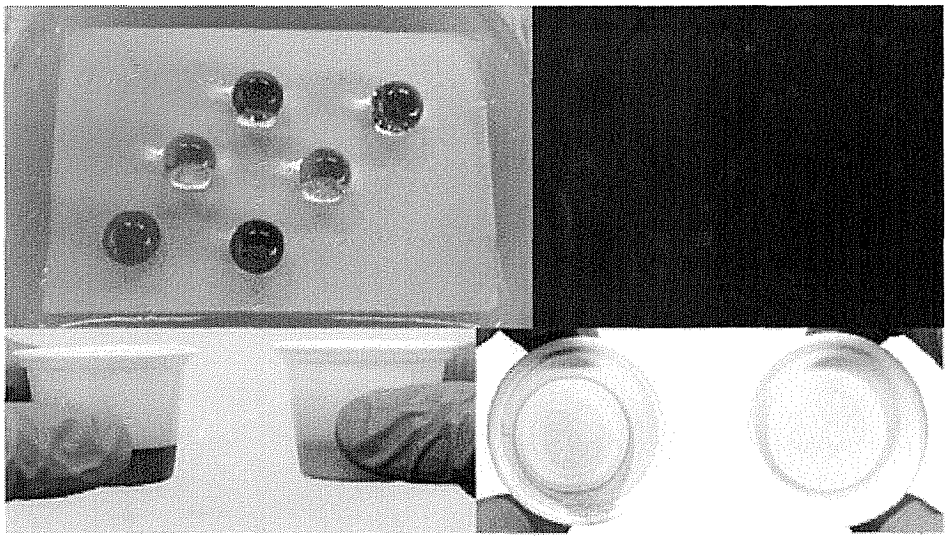
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Waste not: Edible wax coating slicks liquids with ease

(*Nanowerk News*) When we reach the end of a ketchup bottle, there's always a little left, stuck to the sides. A Colorado State University lab offers a fix: a nontoxic, nonstick coating that lets loose every last drop.

Materials scientists led by Arun Kota, assistant professor in the Department of Mechanical Engineering and the School of Biomedical Engineering, have created a "superhydrophobic" coating that easily slicks away viscous liquids like syrup, honey and ketchup. That's right - never waste ketchup or maple syrup again.

They detail the engineering feat in *Applied Materials and Interfaces* ("Superhydrophobic Coatings with Edible Materials"). The paper describes synthesizing and testing coatings made from beeswax and carnauba wax, which are edible and nontoxic.



The researchers used FDA-approved, edible materials to fabricate superhydrophobic coatings in a simple, low cost, scalable, single step process. The coatings display high contact angles and low roll off angles for a variety of liquid products consumed daily and facilitate easy removal of liquids from food containers with virtually no residue. Even at high concentrations, our coatings are nontoxic, as shown using toxicity tests. (© ACS)

Superhydrophobic coatings are not new, but they're typically fabricated with fluorocarbons. These materials, while generally safe in low doses, are labeled as "emerging contaminants" because of their potential decomposition into perfluorooctanoic acid, a known human toxin,

according to the paper. The use of coatings in food-related applications is regulated by the Food and Drug Administration.

The FDA recently banned three perfluorinated compounds (PFCs), which are used in food packaging for grease-proofing pizza boxes and other items.

"Companies are very specific about toxicity levels in these products, which is why they don't get into the market very easily," Kota said of hydrophobic coatings.

Kota's research lab pushes the boundaries of novel coatings with superior properties, including superomniphobicity. For this latest project, they set out to make a simple, nontoxic, extremely liquid-repellant coating specifically for, but not limited to, food packaging.

One of Kota's students came up with the idea of trying to make such a coating out of beeswax. Its chemical properties are similar to non-sticky fluorocarbons, but even at extremely high doses, they are safe to ingest. The researchers came up with a way to spray the coating onto a surface by first dissolving the wax.

Their coating allows a wide range of aqueous liquids to bounce and roll away. They tested a long list of substances, including Lipton green tea, Gatorade, pancake syrup, Coca-Cola, orange juice, milk and coffee. They used common polystyrene cups for their demos.

There is room for improvement in the mechanical durability of their coatings, which currently can't withstand harsh and abrasive environments, according to the paper.

Source: *Colorado State University*

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