Smart Filter Technology Uses Gravity, Not Chemicals, to Clean Up Oil Spills

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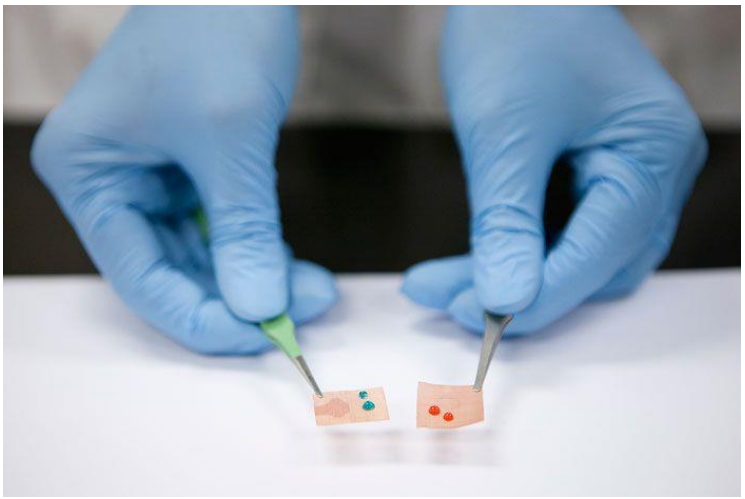

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Megan Treacy

Oil spill cleanup can be a messy endeavor. With the Deepwater Horizon Spill, chemical surfactants and dispersants were added to the water to aid in collecting the oil, but they only helped so much and they were carried health risks themselves. Researchers at the University of Michigan believe that they have developed a next generation oil cleanup technology that could forgo chemicals and could cleanup water through gravity instead.

The smart filter technology is able to essentially strain the oil from the water because of a novel nanomaterial coating that repels oil, but attracts water.

The university explains, "The researchers created a filter coating that repels oil but attracts water, bucking conventional materials' properties. Most natural substances soak up oil, and the few that repel it also repel water because water has a higher surface tension...The new coating is a blend of a rubbery, commercially-available polymer and a novel nanoparticle. The polymer can readily form hydrogen bonds with water. The nanoparticle, developed by project collaborators at the Air Force Research Laboratory, is very low in surface energy and does not get wet by oil."

Essentially, the coating creates a smart filter that only lets the water through, but not the oil.

To test the material, the team dipped postage stamps and small scraps of polyester in the solution, cured them with ultraviolet light and tested them in various oil and water mixtures and emulsions, including things like mayonnaise. Amazingly, with 99.9 percent efficiency the material was able to separate out all the different oil and water combinations.

"This is one of the cheapest and most energy efficient ways to separate oil and water mixtures," lead author Anish Tuteja said. "It has never been demonstrated before."

"We've shown that, even when you add surfactants and dispersants to the mixture, as was done in the Deepwater Horizon oil spill, we can efficiently separate the oil from the water. The important thing is that we don't need any additional chemicals or high-pressure sources. We can do it with gravity alone."

The coating proved to be resilient to repeated use too with the researchers able to use the coated filters for more than 100 hours without clogging.

The researchers have filed a patent and are looking for commercial partners to develop the smart filters, which could also be used in wastewater treatment. Below is a video demonstrating the technology.

Click here to watch “Better oil spill clean-up”:
https://www.youtube.com/watch?v=WnpCcioGaQ4