Finding the right chemistryfor oil spill cleanups

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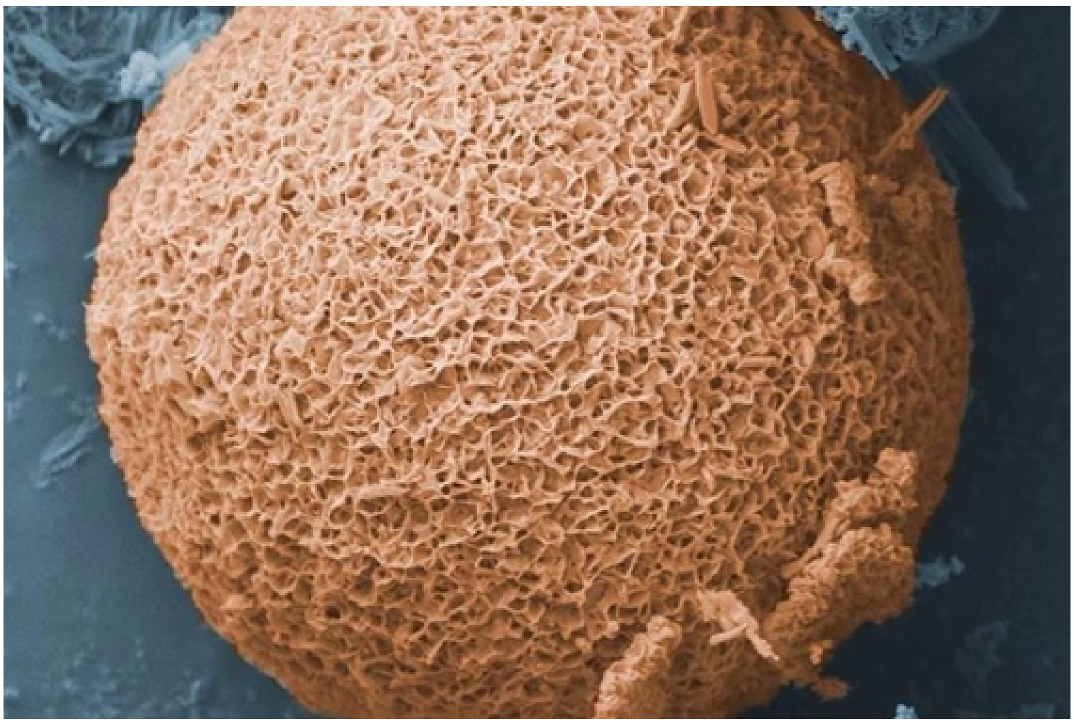

In the months after the largest oil spill in U.S. history, scientists faced the challenge of how best to clean up the millions of barrels of oil polluting seawater, marshes and beaches. In July 2010, Sudipta Seal and his co-principal investigator Larry Hench received a Rapid Response Grant (RAPID) from NSF's Division of Materials Research to develop a novel process for treating fly ash -- a byproduct of burning coal -- to absorb oil. When they applied for the grant, the researchers' goal was to create a material that could remove large volumes of oil from seawater economically and using a process that would be completely green. Seal, who is director of the NanoScience Technology Center and Advanced Materials Processing Analysis Center at the University of Central Florida, studies nanostructured materials such as carbon nanotubes, silica aerogels and graphene. For more than a decade, Seal had been researching the effects of chemically treating fly ash, a dry, gray, powdery waste product captured from power plant flue gases, before they reach industrial smoke stacks. In their natural state, fly ash particles do not absorb much oil because they have relatively small surface areas and pore sizes. Seal and his team developed a method of treating fly ash to yield a product called OOPS, which stands for "oil optimized particle surfaces." Credit: S. Seal, L. L. Hench, David Reid (G), Ian Goldstein, University of Central Florida

Sunlight plays a key role in the natural degradation of oil after a spill, oxygenating the oil so it dissolves in seawater and comes in contact with microbes that will break it down. But, under certain conditions, sunlight can have negative effects, too. With continued exposure, the energy in sunlight drives chemical reactions that transform liquid oil into a sludge that has a consistency similar to peanut butter: thick, pasty and sticky.

Supported by funding from the National Science Foundation (NSF), analytical chemist Matthew Tarr and his team at the University of New Orleans are using samples from the Deepwater Horizon oil spill to learn more about how crude oil breaks down in seawater when it's exposed to sunlight and dispersants. The researchers' goal is to help refine the computer models that responders use to make cleanup plans. The research also adds to everyone's overall understanding and helps mitigate environmental damage from future oil spills.

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