

Scientists achieve more than 98% efficiency in removing nanoplastics from water

August 13 2024, by Eric Stann



Once mixed with water and allowed to recombine, the solvent floats back to the surface, carrying the nanoplastics within its molecular structure. Credit: Sam O'Keefe/University of Missouri

University of Missouri scientists are battling against an emerging enemy

of human health: nanoplastics. Much smaller in size than the diameter of an average human hair, nanoplastics are invisible to the naked eye.

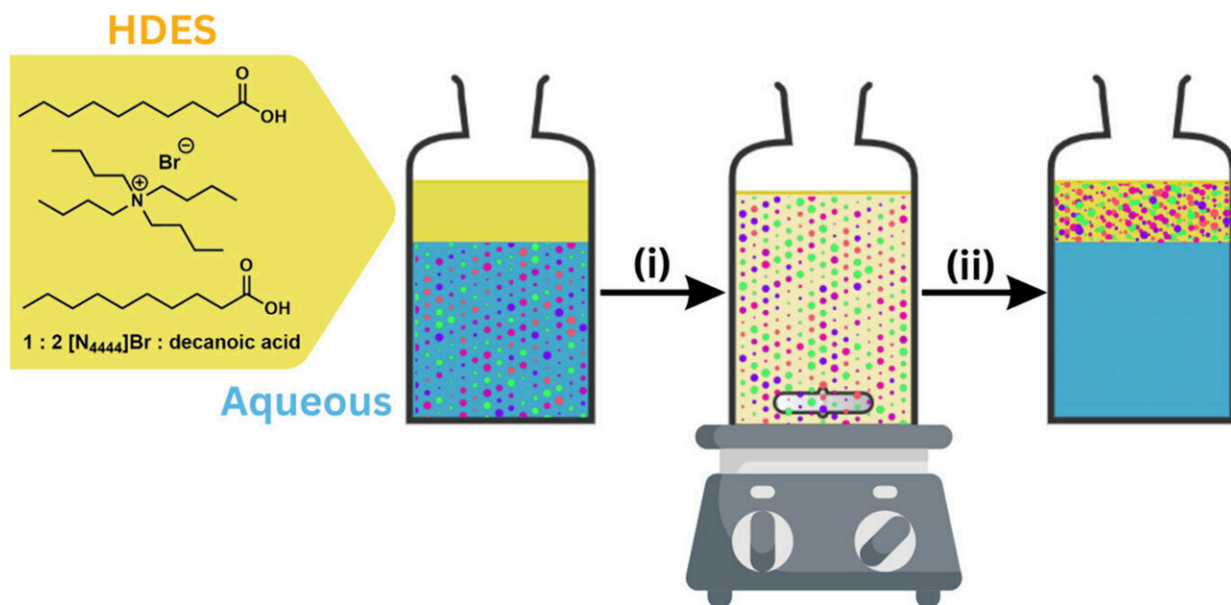
Linked to cardiovascular and [respiratory diseases](#) in people, nanoplastics continue to build up, largely unnoticed, in the world's bodies of water. The challenge remains to develop a cost-effective solution to get rid of nanoplastics while leaving [clean water](#) behind.

That's where Mizzou comes in. Recently, researchers at the university created a new liquid-based solution that eliminates more than 98% of these microscopic plastic particles from water.

A paper describing this work is [published](#) in the journal *ACS Applied Engineering Materials*.

"Nanoplastics can disrupt [aquatic ecosystems](#) and enter the [food chain](#), posing risks to both wildlife and humans," said Piyuni Ishtaweera, a recent alumna who led the study while earning her doctorate in nano and materials chemistry at Mizzou. "In layman's terms, we're developing better ways to remove contaminants such as nanoplastics from water."

The innovative method—using water-repelling solvents made from [natural ingredients](#)—not only offers a practical solution to the pressing issue of [nanoplastic](#) pollution but also paves the way for further research and development in advanced water purification technologies.



This illustration outlines the two-step extraction method. Credit: Gary Baker

"Our strategy uses a small amount of designer solvent to absorb plastic particles from a large volume of water," said Gary Baker, an associate professor in Mizzou's Department of Chemistry and the study's corresponding author. "Currently, the capacity of these solvents is not well understood. In future work, we aim to determine the maximum capacity of the solvent. Additionally, we will explore methods to recycle the solvents, enabling their reuse multiple times if necessary."

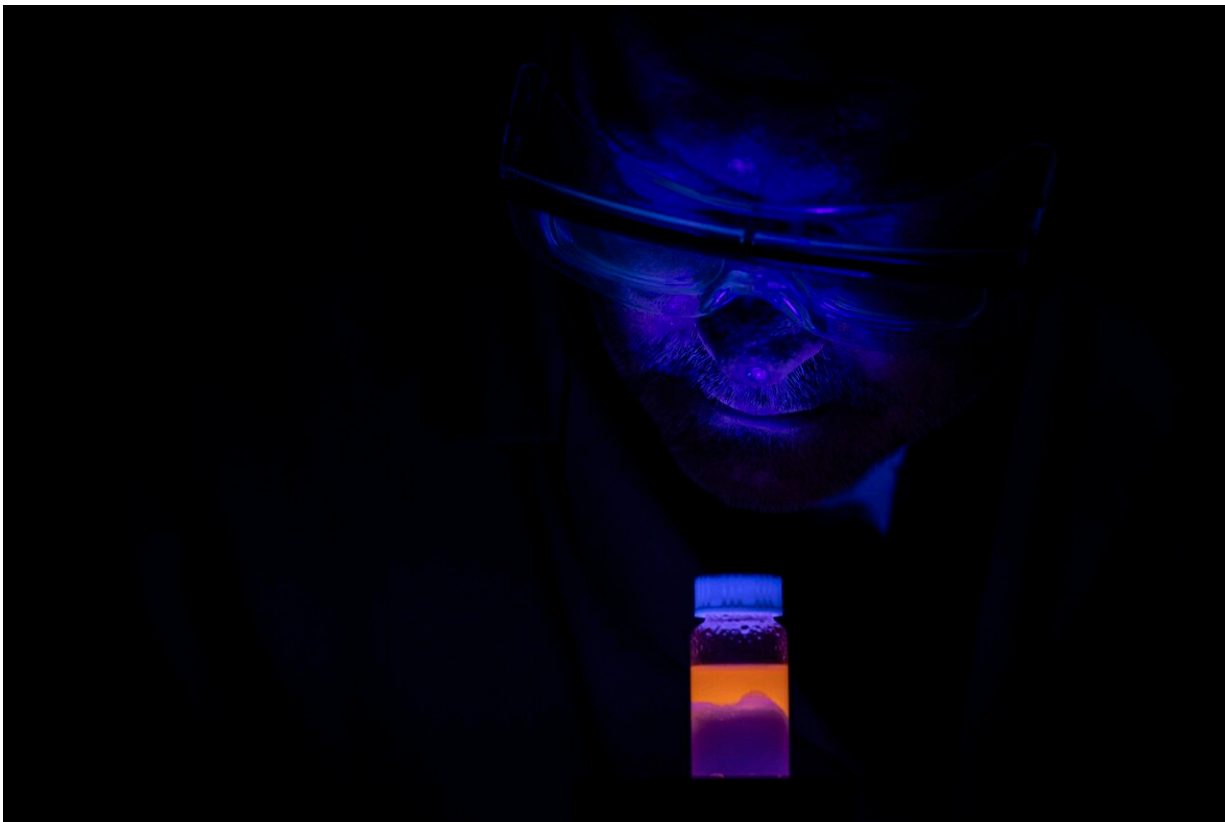
Initially, the solvent sits on the water's surface the way oil floats on water. Once mixed with water and allowed to separate again, the solvent floats back to the surface, carrying the nanoplastics within its molecular structure.

In the lab, the researchers simply use a pipette to remove the nanoplastic-laden solvent, leaving behind clean, plastic-free water. Baker said future studies will work to scale up the entire process so that it can be applied

to larger bodies of water like lakes and, eventually, oceans.



"Our strategy uses a small amount of designer solvent to absorb plastic particles from a large volume of water," said Gary Baker, an associate professor in University of Missouri's Department of Chemistry. Credit: Sam O'Keefe/University of Missouri



Gary Baker, an associate professor in the University of Missouri's Department of Chemistry, looks at a bottle of a new liquid-based solution that eliminates more than 98% of microscopic plastic particles from water. Credit: Sam O'Keefe/University of Missouri

Ishtaweera, who now works at the U.S. Food and Drug Administration in St. Louis, noted that the new method is effective in both fresh and saltwater.

"These solvents are made from safe, non-toxic components, and their ability to repel water prevents additional contamination of water sources, making them a highly sustainable solution," she said. "From a scientific perspective, creating effective removal methods fosters innovation in filtration technologies, provides insights into nanomaterial behavior and

supports the development of informed environmental policies."

The Mizzou team tested five different sizes of polystyrene-based nanoplastics, a common type of plastic used in the making of Styrofoam cups. Their results outperformed previous studies that largely focused on just a single size of plastic particles.

Additional research co-authors are Collen Ray, Wyland Filley and Garrett Cobb.

More information: Piyuni Ishtaweera et al, Nanoplastics Extraction from Water by Hydrophobic Deep Eutectic Solvents, *ACS Applied Engineering Materials* (2024). [DOI: 10.1021/acsaenm.4c00159](https://doi.org/10.1021/acsaenm.4c00159)

Provided by University of Missouri

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