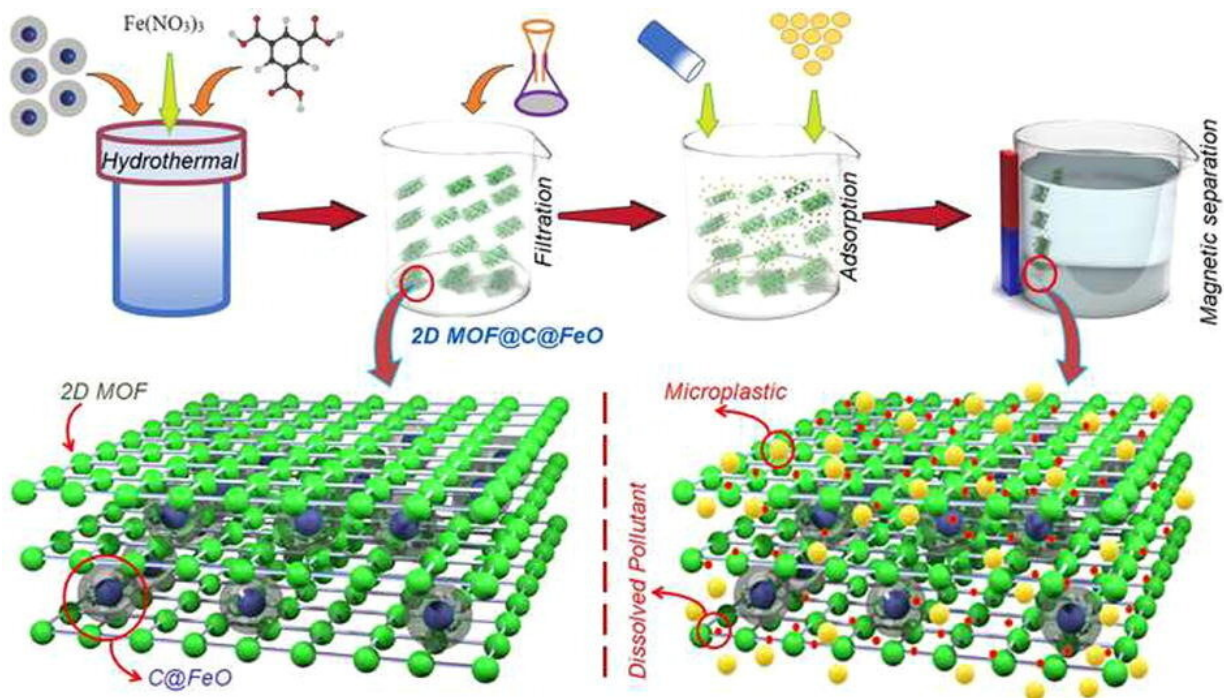


Magnetic material mops up microplastics in water

November 29 2022



Graphical abstract. Credit: *Chemical Engineering Journal* (2022). DOI: 10.1016/j.cej.2022.140390

Researchers at RMIT University have found an innovative way to rapidly remove hazardous microplastics from water using magnets.

Lead researcher Professor Nicky Eshtiaghi said existing methods could take days to remove microplastics from water, while their cheap and

sustainable invention achieves better results in just one hour.

The team says they have developed adsorbents, in the form of a powder, that remove microplastics 1,000 times smaller than those currently detectable by existing [wastewater treatment plants](#).

The researchers have successfully tested the adsorbents in the lab, and they plan to engage with industry to further develop the innovation to remove microplastics from waterways.

The research results are published in the *Chemical Engineering Journal*.

"The nano-pillar structure we've engineered to remove this pollution, which is impossible to see but very harmful to the environment, is recycled from waste and can be used multiple times," said Eshtiaghi from RMIT's School of Environmental and Chemical Engineering.

"This is a big win for the environment and the circular economy."

How does this innovation work?

The researchers have developed an adsorbent using nanomaterials that they can mix into water to attract microplastics and dissolved pollutants.

Muhammad Haris, the first author and Ph.D. candidate from RMIT's School of Environmental and Chemical Engineering, said the nanomaterials contained iron, which enabled the team to use magnets to easily separate the microplastics and pollutants from the water.

"This whole process takes one hour, compared to other inventions taking days," he said.

Co-lead researcher Dr. Nasir Mahmood said the nano-pillar structured

material was designed to attract microplastics without creating any secondary pollutants or carbon footprints.

"The adsorbent is prepared with special surface properties so that it can effectively and simultaneously remove both microplastics and dissolved pollutants from water," said Mahmood from Applied Chemistry and Environmental Science at RMIT.

"Microplastics smaller than 5 millimeters, which can take up to 450 years to degrade, are not detectable and removable through conventional treatment systems, resulting in millions of tons being released into the sea every year. This is not only harmful for [aquatic life](#), but also has significant negative impacts on human health."

What are the next steps?

Developing a cost-effective way to overcome these significant challenges posed by microplastics was critical, Eshtiaghi said.

"Our powder additive can remove microplastics that are 1,000 times smaller than those that are currently detectable by existing wastewater treatment plants," she said.

"We are looking for industrial collaborators to take our invention to the next steps, where we will be looking at its application in wastewater treatment plants."

Eshtiaghi and her colleagues have worked with various water utilities across Australia, including with Melbourne Water and Water Corporation in Perth on a recent Australian Research Council Linkage project to optimize sludge pumping systems.

More information: Muhammad Haris et al, Self-assembly of C@FeO

nanopillars on 2D-MOF for simultaneous removal of microplastic and dissolved contaminants from water, *Chemical Engineering Journal* (2022). [DOI: 10.1016/j.cej.2022.140390](https://doi.org/10.1016/j.cej.2022.140390)

Provided by RMIT University

Citation: Magnetic material mops up microplastics in water (2022, November 29) retrieved 25 April 2024 from <https://phys.org/news/2022-11-magnetic-material-mops-microplastics.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.