

New water treatment zaps 'forever chemicals' for good

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UBC researchers devised a unique adsorbing material that is capable of capturing all the PFAS present in the water supply. Credit: Mohseni Lab/UBC



Engineers at the University of British Columbia have developed a new water treatment that removes "forever chemicals" from drinking water safely, efficiently—and for good.

"Think Brita filter, but a thousand times better," says UBC chemical and biological engineering professor Dr. Madjid Mohseni, who developed the technology.

Forever chemicals, formally known as PFAS (per-and <u>polyfluoroalkyl</u> <u>substances</u>) are a large group of substances that make certain products non-stick or stain-resistant. There are more than 4,700 PFAS in use, mostly in raingear, non-stick cookware, stain repellents and firefighting foam. Research links these chemicals to a wide range of health problems including hormonal disruption, <u>cardiovascular disease</u>, developmental delays and cancer.

To remove PFAS from drinking water, Dr. Mohseni and his team devised a unique adsorbing material that is capable of trapping and holding all the PFAS present in the water supply.

The PFAS are then destroyed using special electrochemical and photochemical techniques, also developed at the Mohseni lab and described in part in a new paper published recently in *Chemosphere*.

While there are treatments currently on the market, like activated carbon and ion-exchange systems which are widely used in homes and industry, they do not effectively capture all the different PFAS, or they require longer treatment time, Dr. Mohseni explained.





Graphical abstract. Credit: *Chemosphere* (2023). DOI: 10.1016/j.chemosphere.2023.137743

"Our adsorbing media captures up to 99 percent of PFAS particles and can also be regenerated and potentially reused. This means that when we scrub off the PFAS from these materials, we do not end up with more highly toxic solid waste that will be another major environmental challenge."

He explained that while PFAS are no longer manufactured in Canada, they are still incorporated in many <u>consumer products</u> and can then leach into the environment. For example, when we apply stain-resistant or



repellent sprays/materials, wash PFAS-treated raingear, or use certain foams to put down fires, the chemicals end up in our waterways. Or when we use PFAS-containing cosmetics and sunscreens, the chemicals could find their way into the body.

For most people, exposure is through food and consumer products, but they can also be exposed from drinking water—particularly if they live in areas with contaminated water sources.

Dr. Mohseni, whose research group also focuses on developing water solutions for rural, remote and Indigenous communities, noted, "Our adsorbing media are particularly beneficial for people living in smaller communities who lack resources to implement the most advanced and expensive solutions that could capture PFAS. These can also be used in the form of decentralized and in-home water treatments."

The UBC team is preparing to pilot the new technology at a number of locations in B.C. starting this month.

"The results we obtain from these real-world field studies will allow us to further optimize the technology and have it ready as products that municipalities, industry and individuals can use to eliminate PFAS in their water," said Dr. Mohseni.

More information: Fatemeh Asadi Zeidabadi et al, Electrochemical degradation of PFOA and its common alternatives: Assessment of key parameters, roles of active species, and transformation pathway, *Chemosphere* (2023). DOI: 10.1016/j.chemosphere.2023.137743

Provided by University of British Columbia



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