Major breakthrough to help clean up toxic PFAS pollution

June 6 2019

A joint research project between the University of South Australia and Flinders University has developed a new technique to clean up toxic polyfluorinated alkyl substances (PFAS) from waterways.

PFAS are a class of man-made chemicals used in firefighting foam, non-stick cookware, water-repellent fabrics, lubricants and some cosmetics, and exposure to them has been implicated in a variety of health issues including liver disease, thyroid disease, and kidney and testicular cancers.

PFAS pollution has been widely identified in ground and surface water, and as these substances don't break down naturally, effective removal has become a priority.

Current filtration techniques use powdered activated carbon (PAC) to remove pollutants from water, but the process is hampered by the tendency for PAC to cake and block filters and membranes, making it expensive and complicated. There are also additional safety hazards associated with the use of PAC, including dust inhalation and flammability.

The UniSA and Flinders research team have added a sulphur polymer derived from waste cooking oil to the PAC process, drastically reducing caking and improving filtration speed and efficiency. By using the polymer as a support for PAC, the associated dust and flammability hazards are also negated.

The new remediation technique was tested on surface water contaminated with firefighting foam near a RAAF base, with results showing PFAS content reduced by 85 percent, from 150 parts per trillion (ppt) to less than 23 ppt, which is well within the 70 ppt drinking water limit issued by the Australian Department of Health.

These results were recently published in *ACS Sustainable Chemistry & Engineering*, and lead author, Flinders University Ph.D. candidate Nicholas Lundquist notes, "Our canola oil polysulfide was found to be highly effective as a support material for powdered activated carbon, enhancing its efficiency and prospects for implementation in PFAS remediation."

UniSA's Dr. Martin Sweetman was a co-author on the study and says, "This successful project has laid the groundwork for significant ongoing, collaborative research between UniSA and Flinders University as well as with our two industry partners, Puratap and Membrane Systems Australia."

Dr. Sweetman says the next step for the team, which is co-directed by UniSA's Associate Professor Sally Plush and Professor John Hayball, and Flinders University's Dr. Justin Chalker, is to test the technique on a commercial scale.

"The activated carbon and the polymer in this sorbent blend can, in principle, be made entirely from industrial waste and repurposed biomass, so it is very scalable and sustainable," Dr. Sweetman says.

"Now we need to test it in purifying thousands of litres of water, but we are optimistic about the likely outcomes of such large-scale use."

Provided by University of South Australia

Citation: Major breakthrough to help clean up toxic PFAS pollution (2019, June 6) retrieved 27 April 2024 from https://phys.org/news/2019-06-major-breakthrough-toxic-pfas-pollution.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.