#EUGREENWEEK

PRISTINE

Innovative and versatile integrated solution to remove contaminants of emerging concern in water treatment systems

DEVELOPMENT OF AN ADSORPTION CAPSULE SYSTEM FOR CESs ELIMINATION IN DRINKING WATER AND WASTEWATER

Magdalena Olkiewicz

EURECAT, Chemical Technology Unit

04.06.2025

Integrated solution to enhance the CECs adsorption

PRISTINE

Environmental Science Water Research & Technology

PAPER

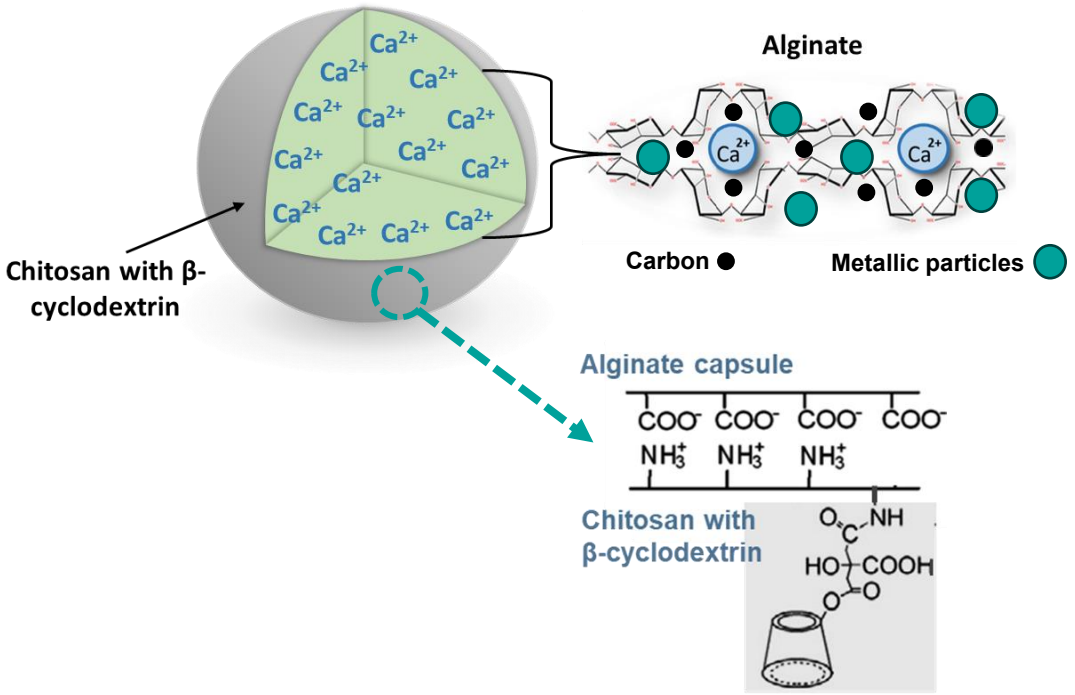
View Article Online
View Journal | View Issue

Check for updates

Cite this: *Environ. Sci.: Water Res. Technol.*, 2019, 5, 1844

Removal of per- and polyfluoroalkyl substances (PFASs) from contaminated groundwater using granular activated carbon: a pilot-scale study with breakthrough modeling†

Charlie J. Liu, [a] David Werner[b] and Christopher Bellona *[a]



polymers

MDPI

Review

An Updated Overview of Magnetic Composites for Water Decontamination

Adelina-Gabriela Niculescu [1,2], Bogdan Mihaiescu [1,2], Dan Eduard Mihaiescu [3], Tony Hadibarata [2,4] and Alexandru Mihai Grumezescu [1,2,*]

Contents lists available at ScienceDirect

European Polymer Journal

journal homepage: www.elsevier.com/locate/europolj

ELSEVIER

Chitosan adsorbent reinforced with citric acid modified β-cyclodextrin for highly efficient removal of dyes from reactive dyeing effluents

Jiangbin Zhao[a], Zhengdong Zou[a], Ru Ren[a], Xiaofeng Sui[a,b], Zhiping Mao[a], Hong Xu[a], Yi Zhong[a], Linping Zhang[a], Bijia Wang[a,b,*]

ACS central science

http://pubs.acs.org/journal/acscii

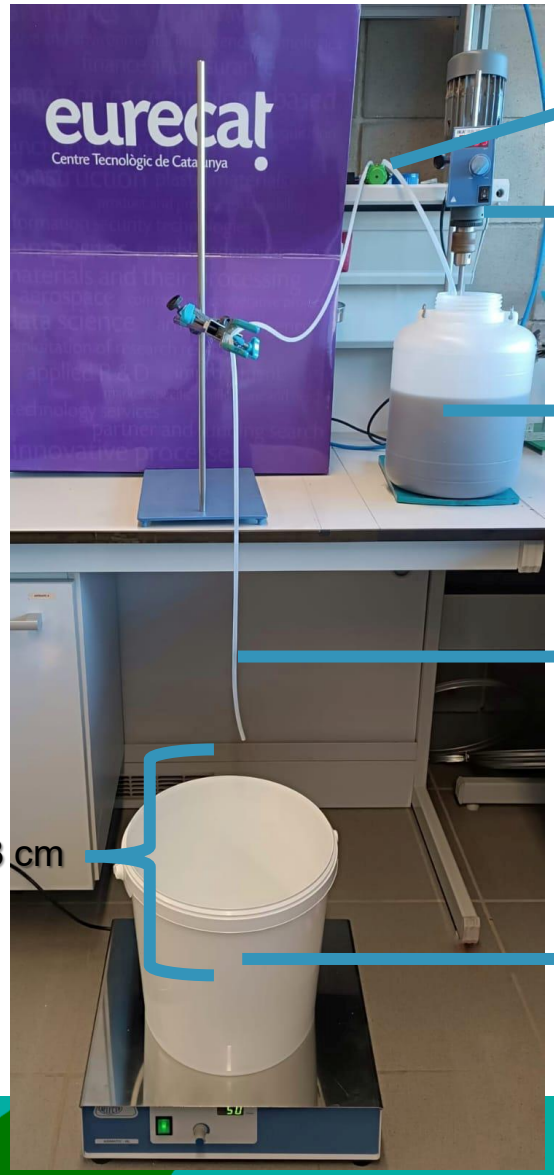
Research Article

A Tunable Porous β-Cyclodextrin Polymer Platform to Understand and Improve Anionic PFAS Removal

Ri Wang,[§] Zhi-Wei Lin,[§] Max J. Klemes,[§] Mohamed Ateia, Brittany Trang, Jieyuan Wang, Casey Ching, Damian E. Helbling,* and William R. Dichtel*

Prototype preparation

Laboratory set up for adsorbent capsules preparation



Pump

Mechanical agitation

Polymeric solution - 5L (1.95% Alginate, 0.49% AC, 2.5% metallic particles)

Tube - Ø 7 mm

Coagulation bath - 50L (2% $CaCl_2$ solution), 24 h under magnetic stirring (100 rpm)

Capsules formation

5 L of polymeric solution

1.9 L of capsules

Diameter = 4.61 ± 0.09 mm
Weight = 57.6 ± 1.59 mg
Density = 0.46 ± 0.02 g/mL

Prototype preparation

Scaled-up system for adsorbent capsules production

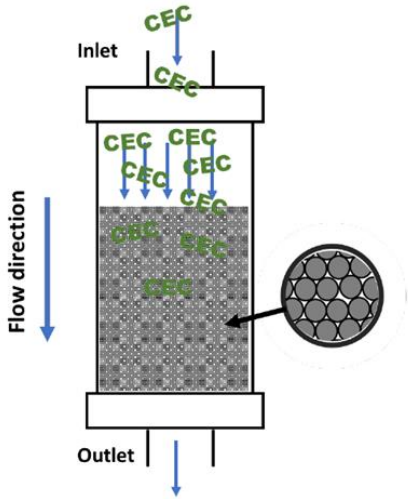


Figure 8: Adsorbent capsules packed bed reactor.

Prototype preparation

Magnetic properties of prepared capsules

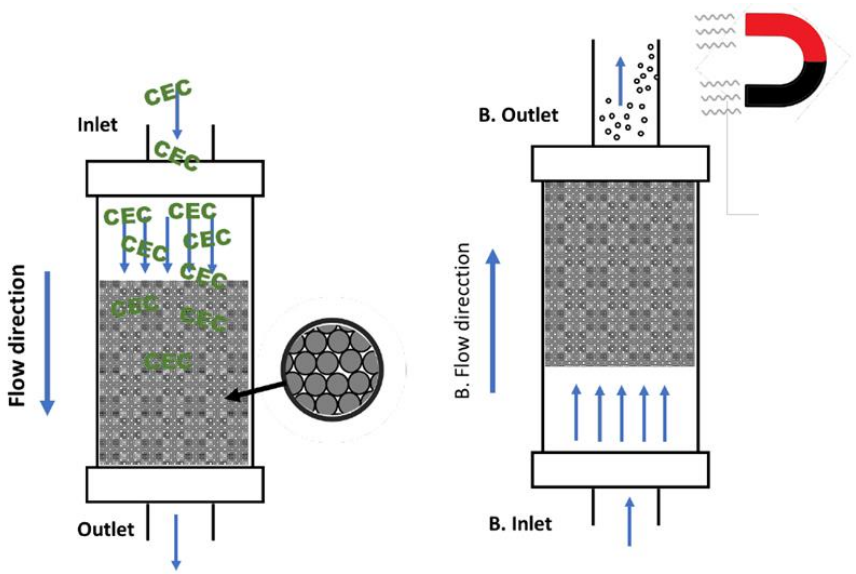
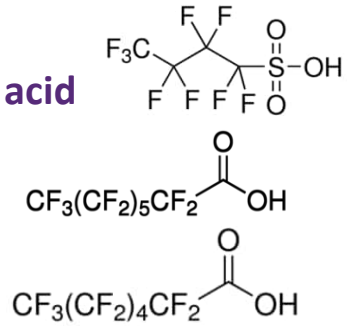


Figure 8: Adsorbent capsules packed bed reactor. On the left, regular operation. On the right, backwash operation. In this scenario some fines and fragments may detach from capsules, but magnetic particles inside will allow their recovery.

Evaluation of adsorbent efficiency for CECs removal

Model solution of PFAS

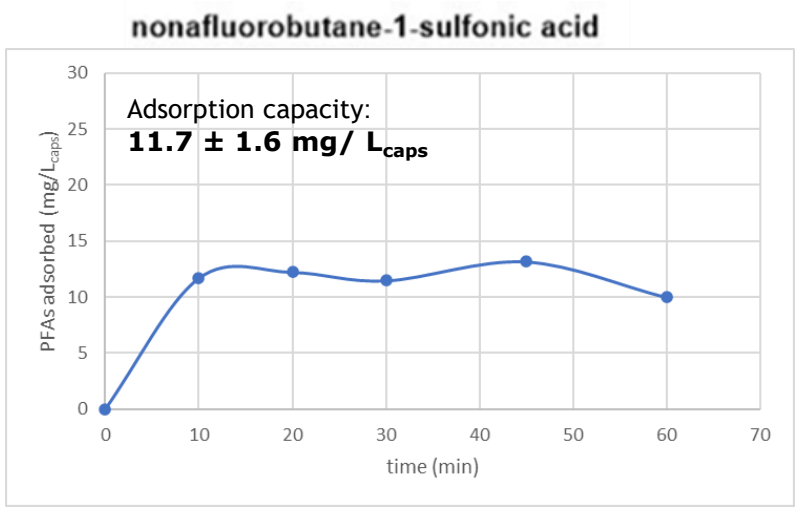
- ❑ **Nonafluorobutane-1-sulfonic acid**
- ❑ **Perfluorooctanoic acid**
- ❑ **Perfluoroheptanoic acid**

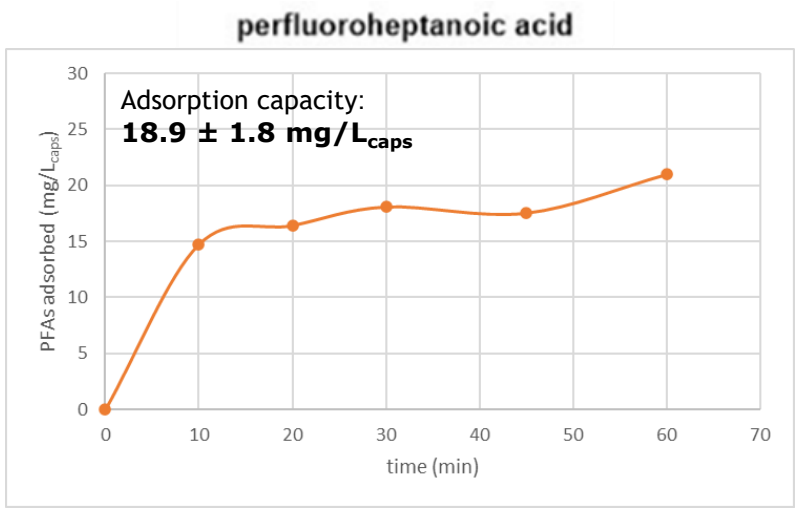


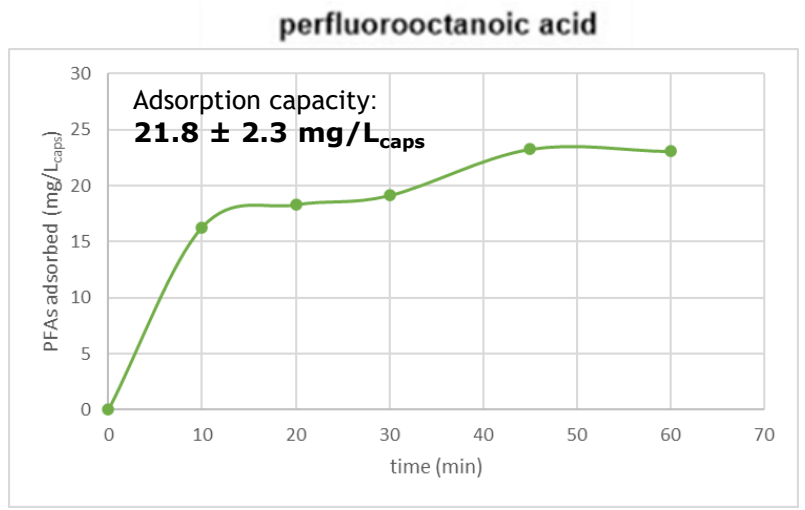
PFAS adsorption

- ❑ 50 mL of capsules (≈320 capsules)
- ❑ 100 mL of PFAs solution (50 mg/L)
- ❑ 25 ºC, magnetic stirring for 1h

PFAs analysis by HPLC/MS







Drinking Water Directive (EU) 2020/2184:

- ➢ **Sum of 20 Specific PFAS:** max 0.1 µg/L (0.0001 mg/L)
- ➢ **Total PFAS: max** 0.5 µg/L (0.0005 mg/L)

#EUGREENWEEK

PRISTINE

Innovative and versatile integrated solution to remove contaminants of emerging concern in water treatment systems

Thank you!

Magdalena Olkiewicz

Eurecat

Chemical Technology Unit

magda.olkiewicz@eurecat.org

04.06.2025

This project has received funding from the European Union's LIFE Programme (Project Reference: 101074430)