CDD 2026

ID de Contribution: **61**   Type: **Poster**

Experimental studies and numerical modeling of PFAS concentration using foam fractionation, optimization for the recovery of short- and ultra-short-chain PFAS

lundi 30 mars 2026 13:40 (20 minutes)

Abstract. This study addresses the current challenges of understanding and managing PFAS contamination. It pays particular attention to the limitations of existing separation technologies and the incomplete description of the mechanisms of PFAS behaviour in air water phase. Through an examination of recent literature, the study identifies key unresolved questions concerning interfacial adsorption, foam formation and the implementation of foam-based separation techniques on a process scale.

Foam fractionation (FF) has been discussed as a promising technique for removing surface-active PFAS, particularly long-chain compounds [1],[2]. However, the efficiency of PFAS enrichment depends not only on intrinsic interfacial properties and foamability, but also on operational parameters such as the air injection rate, the distribution of bubble sizes, the characteristics of porous spargers, the conditions of liquid flow, and the overall column hydrodynamics [3]. The combined influence of these physicochemical and operational factors remains insufficiently systematised.

The proposed research aims to investigate the relationship between PFAS interfacial behaviour, foamability, and enrichment performance in foam fractionation systems in a structured manner. Initially, the work will focus on formulations relevant to AFFF, where complex PFAS mixtures will provide a realistic representation of environmental contamination. Subsequent controlled experiments will focus on individual PFAS compounds in order to isolate the governing interfacial mechanisms. The investigation will then extend to short- and ultra-short-chain PFAS, whose reduced surface activity poses further challenges for foam-based separation processes.

Through surface tension measurements, foam characterisation and controlled foam fractionation experiments, this research will clarify the mechanisms governing PFAS enrichment in foam systems and identify parameters that could inform future process optimisation.

References

[1] Philip McCleaf, Ylva Kjellgren, and Lutz Ahrens. Foam fractionation removal of multiple per- and polyfluoroalkyl substances from landfill leachate. AWWA Water Science, 3(5):e1238, September 2021.

[2] Craig Klevan, Oren Van Allen, Kelly Mukai, Andre Gomes, Shana Xia, Seth Caines, Matthew J. Woodcock, and Kurt D. Pennell. Removal of long- and short-chain PFAS from groundwater by foam fractionation. Environmental Science: Water Research & Technology, 11(10):2295–2307, 2025

[3] Angel Chyi En We, Arash Zamyadi, Anthony D. Stickland, Bradley O. Clarke, and Stefano Freguia. A review of foam fractionation for the removal of per- and polyfluoroalkyl substances (PFAS) from aqueous matrices. Journal of Hazardous Materials, 465:133182, March 2024..

Speaker information

PhD 1st year

Auteur: KAMASH, Medet (IPGP)

Classification de Session: Poster

Classification de thématique: Earth and Environment

Auteur: KAMASH, Medet (IPGP)

Classification de Session: Poster

Classification de thématique: Earth and Environment