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Engineering and Physical Sciences Research Council
Biotechnology and Biological Sciences Research Council

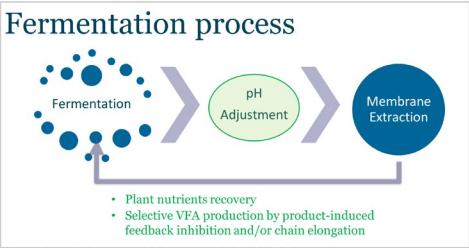
AF WG Small-scale test-the-concept studies

AIMS

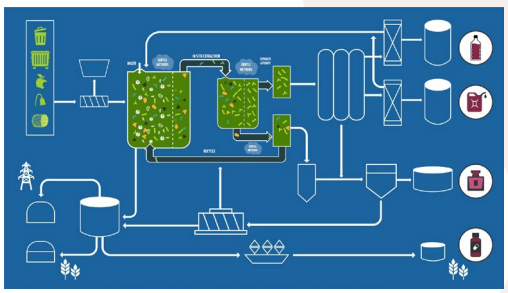
Mixed-culture fermentation is a powerful enabling industrial biotechnology for a circular bioeconomy especially for unavoidable and putrescible heterogeneous organic wastes.

Preliminary desk-based and small-scale test-the-concept laboratory studies on integrated anaerobic fermentation and product recovery were conducted between October 2024 and January 2025.

The laboratory study focused on the feasibility of chemical-free selective recovery of volatile fatty acids (VFA) and ammonia from fermentation broth, and major operating factors affecting it.

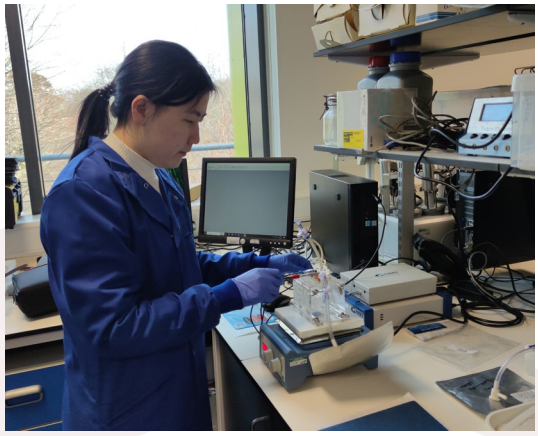


The desk-based study investigated the integration options between the main fermentation process and downstream product recovery steps based on the laboratory results, and the potential of the selective recovery and its feedback loop to be used to manipulate microbial communities of the fermentation to enhance preferred metabolic output by redirecting metabolic fluxes.



RESULTS

Preliminary comparisons were conducted between the tested concept and available recovery options with estimation of the benefits of chemical avoidance. While more comprehensive techno-economic analysis and life cycle assessment is required to verify its potential advantages, the work has contributed valuable data for this purpose.



The outputs of the studies provide essential evidence for more comprehensive investigation in this research line, and will contribute to a journal publication and research applications on mixed-culture fermentation with integrated chemical-free product recovery.

The study findings were incorporated in a presentation given to the EBNet & BBNet joint Anaerobic Fermentation Workshop in January 2025. The EBNet AF WG has also organised a webinar on this theme of VFA recovery.