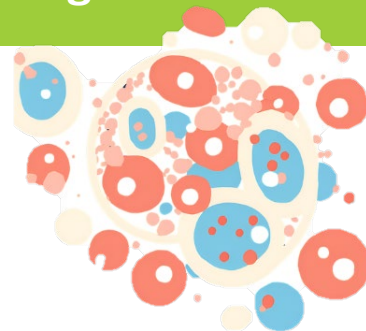


Granules vs Flocs: Decoding Seasonal Retention of Functional Bacteria in Aerobic Sludge

Microbial communities, especially functional bacteria for nutrient removal, are vital in biological wastewater treatment. Aerobic granular sludge (AGS) has gained attention in the last two decades for its superior settling ability, resilience to operational fluctuations, and capacity to support diverse microbial populations, while flocculent sludge (FS), though less efficient in settling, remains widely implemented. Despite their shared reliance on microbial activity, the community structures and bacteria retention capability of AGS and FS could be different, which may influence overall nutrient removal performance.



An important research question is whether granules are more capable of retaining functional bacteria than flocs for biological nutrient removal especially when subject to temperature change in different seasons.

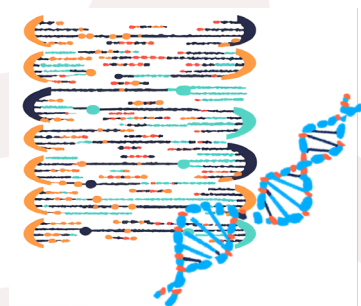
AIM: To provide a comprehensive comparison of microbial community structures especially functional bacteria in aerobic granular sludge and flocculent sludge from full-scale wastewater treatment plants, focusing on how seasonal change and process difference influence microbial diversity and functional bacteria retention in AGS and FS.



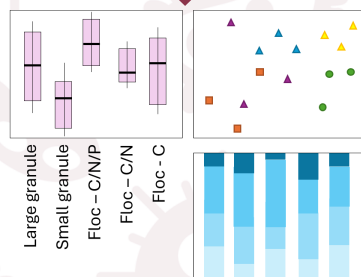
AGS and FS are collected monthly from five full-scale wastewater treatment plants in the UK, from October 2024 to March 2025



Sludge characteristics and wastewater quality are analysed



Microbial community in AGS and FS are analysed using 16S rRNA amplicon sequencing



The study is to determine whether granular sludge demonstrates superiority over flocs in terms of functional bacteria retention and resilience to seasonal changes. Additionally, it aims to examine the effects of granule size on the retention of functional bacteria, providing scientific evidence for the selection of appropriate technology or for enhancing current operational practices.

Work carried out by [Aerobic Granulation Processes WG](#)

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