

## QUORUM QUENCHING: AN EFFECTIVE STRATEGY FOR MBR MEMBRANE FOULING

## **Abstract**

Quorum quenching (QQ) has emerged as an effective strategy for mitigating membrane fouling in membrane bioreactor (MBR) systems, which remains one of the major challenges limiting operational stability and cost efficiency. In this study, a facultative QQ bacterium, *Microbacterium* sp., was successfully isolated and applied for membrane fouling control in an anaerobic MBR system. To enhance its practical application, Alginate–Powdered Activated Carbon–QQ (APQ) beads were developed, providing a robust and scalable approach for fouling mitigation during industrial wastewater treatment.

Beyond membrane fouling control, the introduction of the QQ strain also induced a shift in the anaerobic microbial community structure, which led to an improvement in process performance. Notably, methane yield was promoted, highlighting the dual benefits of QQ application: reducing membrane fouling while simultaneously enhancing energy recovery. This work demonstrates the potential of integrating quorum quenching strategies with MBR technology as a sustainable solution for both wastewater treatment and bioenergy generation.





