

## Targeting N-Acyl-Homoserine-Lactones to Mitigate Membrane Biofouling based on Quorum Sensing using a Biofouling Reducer

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**Abstract:** Exploring novel biological anti-quorum sensing (QS) agents to control membrane biofouling is of great worth in order to allow sustainable performance of membrane bioreactors (MBRs) for wastewater treatment. In recent studies, QS inhibitors have provided evidence of alternative route to control membrane biofouling. This study investigated the role of Piper betle extract (PBE) as an anti-QS agent to mitigate membrane biofouling. Results demonstrated the occurrence of the N-acyl-homoserine-lactone (AHL) autoinducers (AIs), correlate QS activity and membrane biofouling mitigation. The AIs production in bioreactor was confirmed using an indicator strain *Agrobacterium tumefaciens* (NTL4) harbouring plasmid pZLR4. Moreover, three different AHLs were found in biocake using thin layer chromatographic analysis. An increase in extracellular polymeric substances (EPS) and transmembrane pressure (TMP) was observed with AHL activity of the biocake during continuous MBR operation, which shows that membrane biofouling was in close relationship with QS activity. PBE was verified to mitigate membrane biofouling via inhibiting AIs production. SEM analysis further confirmed the effect of PBE on EPS and biofilm formation. These results exhibited that PBE could be a novel agent to target AIs for mitigation of membrane biofouling. Further work can be carried out to purify the active compound of Piper betle extract to target the QS to mitigate membrane biofouling.

**Keywords:** Quorum sensing, Membrane biofouling, Piper betle extract, N-Acyl-homoserine-lactone, Autoinducers

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