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Exploring *Bdellovibrio bacteriovorus* as a Biological Strategy to Inhibit Biofilms and Metal MIC

Information

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(1) *Bdellovibiro bacteriovorus*
(2) Biofim
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Résumé (Abstract)

Microbial corrosion, caused or accelerated by microorganisms, poses a serious challenge to many industrial sectors. Although 316L stainless steel is widely used for its corrosion resistance, it remains vulnerable to microbial corrosion. To address this issue, environmentally friendly biological approaches are being explored. This study investigates the effect of *Bdellovibrio bacteriovorus* HD100, a predatory bacterium with specific prey activity, on biofilm formation and microbial corrosion of 316L stainless steel.

Coupons of 316L stainless steel were exposed for eight months in three simulated cooling water systems containing sterile tap water, non-sterile tap water, and non-sterile tap water supplemented with *B. bacteriovorus* HD100. Physicochemical parameters and aerobic heterotrophic bacterial counts were monitored monthly. Biofilm development was analysed through extracellular polymeric substance quantification, bacterial counts, metagenomic sequencing (Illumina MiSeq), and 3D optical profilometry. Microbial corrosion was evaluated using weight loss measurements and SEM/EDS analysis.

The system containing the predatory bacterium exhibited reduced bacterial richness and diversity, lower protein content in the biofilm matrix, and decreased corrosion damage compared to the non-sterile system without the predator. In contrast, significant and progressive weight loss was observed in coupons exposed to non-sterile water lacking *B. bacteriovorus*. This study provides the first evidence of the inhibitory effect of *B. bacteriovorus* HD100 on environmental biofilm development and microbial corrosion of 316L stainless steel. These findings highlight its potential as an eco-friendly biological control strategy for stainless steel-based industrial equipment. Further studies are required to optimize its application, including molecular investigations and determination of optimal predator concentrations.