

# ELECTROCHEMICAL PERFORMANCE AND BIOFILM MORPHOLOGY OF *DESULFUROMONAS ACETEXIGENS* IN MICROBIAL ELECTROLYSIS CELLS

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*Desulfuromonas acetexigens* has recently attracted interest as a biocatalyst in microbial electrolysis cells (MECs) because it cannot use hydrogen as an electron donor, a characteristic that promotes favourable Coulombic efficiencies (CE). This study compares the electrochemical activity and biofilm development of *D. acetexigens* with those of the model organism *Geobacter sulfurreducens* in flow cell MECs. Biofilm architecture was investigated using optical coherence tomography (OCT), allowing quantification of parameters such as spatially resolved thickness, volume, and anode surface coverage. Both strains reached comparable maximum current densities under identical operating conditions; however, *D. acetexigens* formed electroactive biofilms more quickly, generating current after approximately four days, while *G. sulfurreducens* showed an initial lag phase of about eight days. For *D. acetexigens*, limitations in extracellular electron transfer were observed at lower average biofilm volumes ( $\overline{BV}_{J_{max}} \approx 16 \pm 6 \mu\text{m}^3 \mu\text{m}^{-2}$ ) than for *G. sulfurreducens* ( $\overline{BV}_{J_{max}} \approx 40 \pm 5 \mu\text{m}^3 \mu\text{m}^{-2}$ ). Taxonomic classification showed that the introduced target organisms remained the only anode-respiring microorganisms, even in the presence of homoacetogenic and clostridial contaminants.

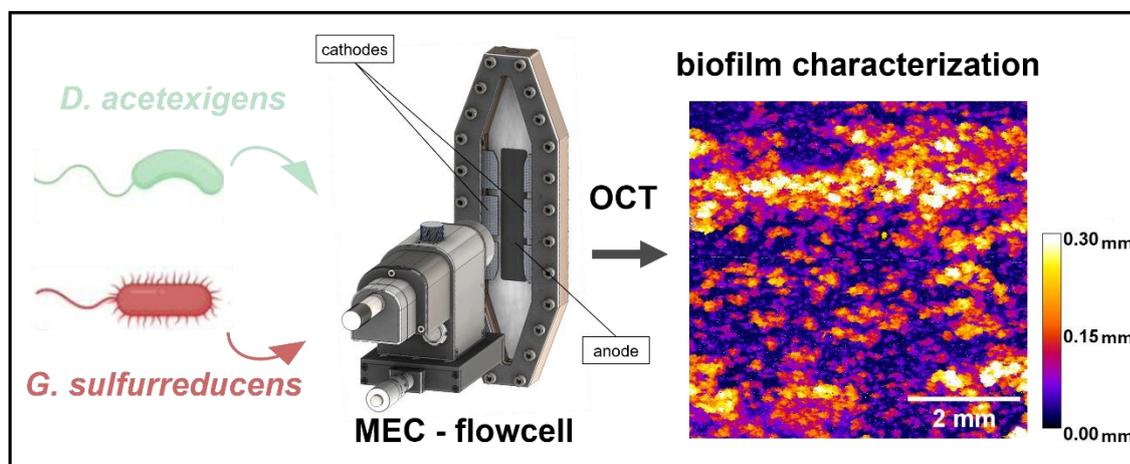


Figure. Graphical Abstract

The production of short-chain fatty acids in these cultivations suggested metabolic interactions, leading to the hypothesis of electrode-mediated syntrophic ethanol-to-acetate fermentation by electroactive microorganisms and the ethanol-utilising homoacetogen *Sporomusa sphaeroides*.