Preconditioning electroactive biofilms to improve substrate turnover and cathode research to improve energetic efficiency of microbial electrochemical technologies.

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Abstract:

Microbial fuel cells and microbial electrolysis cells (MEC) are part of a developing and widely diversified microbial electrochemical technology platform [1]. All of these technologies utilize electrochemically active microorganisms (EAM) to catalyze one or both of the reduction as well as oxidation half-reactions at the anode and/or cathode. MECs use EAMs at the anode to convert e.g. organic carbon in a wastewater stream into a current flow to the cathode, at which an inorganic molecule e.g. hydrogen gas, is formed.

This study mainly focuses on two aims: Firstly, on approaches for sophisticated biofilm growth or preconditioning procedures, which lead to enhanced and sustained electrocatalytic biofilm turnover rate [2] at an improved efficiency, in a complex artificial wastewater. Secondly, on the dimensioning of a MEC by balancing the required amount – surface area of the – cathode, based on its electrocatalytic properties, against the current flow from the EAMs at the anode. This study also addresses the transfer of these laboratory results to real wastewater applications both in terms of the possible increase in effective treatment capacity [3] as well as the associated energetic considerations.

Literature:

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