# THE BIOCATHODE IN A MICROBIAL ELECTROLYSIS CELL

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In the search for alternatives for fossil fuels and the reuse of the energy from waste streams, the microbial electrolysis cell is a promising technique. The microbial electrolysis cell is a two electrode system in which at the anode organic substances, including waste water, are used by microorganisms that release the terminal electrons to the electrode. These electrons are subsequently used at the cathode resulting in the production of a current. By addition of a small voltage, hydrogen gas can be produced by combining electrons and protons at the cathode. To catalyse the hydrogen evolution reaction at the cathode, expensive catalysts such as platinum are required. Recently, the use of biocathodes has shown great potential as an alternative for platinum. The microbial community responsible for the hydrogen evolution in such systems is, however, not well understood. In this study we focused on the characterization of the microbial communities of the microbial electrolysis cell biocathode using molecular techniques. The results show that the microbial community consists of 44% *Proteobacteria*, 27% *Firmicutes*, 18% *Bacteriodetes* and 12% related to other phyla. Within the major phylogenetic groups we found several clusters of uncultured species belonging to novel taxonomic groups at genus level. These novel taxonomic groups developed under environmentally unusual conditions and might have properties that have not been described before. Therefore it is of great interest to study those novel groups further.

Within the *Proteobacteria* a major cluster belonged to the *Deltaproteobacteria* and based on the known characteristics of the closest related cultured species, we suggest a mechanism for microbial electron transfer for the production of hydrogen at the cathode.

Abstract Category
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