



Studies into design and operation of microbial fuel cells using oxygen gas diffusion electrodes

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ABSTRACT

The use of microbial fuel cells (MFCs) represents a new concept to generate energy by anaerobic biological wastewater treatment. Using oxygen gas diffusion electrodes (GDEs) can facilitate the cell design since proton exchange membranes and a cathode chamber are not required. In this laboratory scale study, different GDEs were investigated. GDE type 1 with silver as electrocatalyst and type 2 with carbon nanotubes as electrocatalyst showed the best performance under the chosen conditions. Power density was affected by the electrode material and the availability of organic compounds (acetate, raw wastewater). MFC operation resulted in *Geobacteraceae* spp. enrichment at the anode. In a long-term operation with GDE type 1 over 10 weeks, biofilm formation also was observed at the GDE cathode, without negative impact on MFC performance. Our results emphasise the consideration of GDEs in up-scaling approaches.

Keywords: Microbial fuel cells; Electricity generation; Oxygen gas diffusion electrode; Cathode

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