# Electricity generation in a microbial fuel cell with textile carbon fibre anodes.

Farber P, Gräbel J, Kroppen N, Pötschke L, Roos D, Rosenbaum M, Stegschuster G, Ueberholz P (2019) Electricity generation in a microbial fuel cell with textile carbon fibre anodes. *Comput Math Appl* 83, 4-23.

Details

**Abstract**

Commercial Computational Fluid Dynamics (CFD) codes offer a great flexibility to model complex 3D geometries. They have many physical models on board, nevertheless reactions in a Microbial Fuel Cell (MFC) are not included. In this paper, we discuss the extension of Ansys Fluent commercial CFD code to simulate a model of an anode in a Microbial Fuel Cell. The biofilm around the anode is a mixed culture dominated by *Geobacter sulfurreducens* and is treated as a conductive material. Besides the stationary 3D Navier–Stokes equation for fluid flow and the species balance equation for acetate in the water and in the biofilm, the model includes a model for the species mass fraction of acetate at the boundary between water and biofilm. Furthermore, we added a sink for acetate as well as a source for electrons and a stationary electric potential equation in the biofilm. Using this extended commercial CFD code and a 128 core compute cluster allowed us to explore the impact of different textile carbon fibre based anode configurations on the electrical performance of the anode in a MFC. The results show that the size of the outer surface of the biofilm determines the quantity of the electrical power delivered by the biofilm.

## Involved units

Bio Pilot Plant Miriam Agler-Rosenbaum Read more

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**Identifier**

**doi:** 10.1016/j.camwa.2019.11.019