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Influence of electrode spacing and fed-batch operation on the maximum performance trend of a soil microbial fuel cell

Meshack Imologie Simeon [a,b,*], *Ruth Freitag* [a]

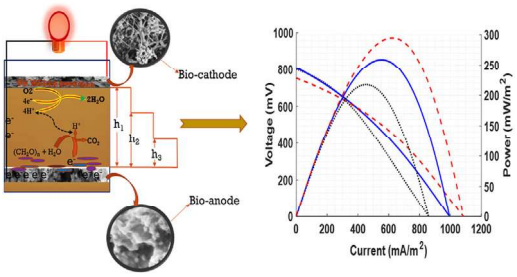
[a] *Chair of Process Biotechnology, Faculty of Engineering Science, University of Bayreuth, Universitätsstraße 30 FAN-D, 2. Stock, 95447 Bayreuth, Germany*

[b] *Department of Agricultural and Bioresources Engineering, PMB 65, School of Infrastructure, Process Engineering and Technology, Federal University of Technology, Minna, Nigeria*

HIGHLIGHTS

- Soil MFC is optimized for efficient substrate utilization and long-term sustainable power generation.
- The effect of long-term fed-batch operation on the MFC performance with varying electrode spacing is investigated.
- Soil MFC performance stability is time dependent on electrode spacing under fed-batch operation.
- Smaller electrode spacing results in initially better performance due to lower internal resistance.
- Larger electrode spacing takes a longer time for the MFC to reach stable and maximum performance.

GRAPHICAL ABSTRACT



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ABSTRACT

The effect of electrode spacing on a soil microbial fuel cell (MFC) performance under fed-batch treatment with synthetic urine medium (SUM) was investigated at 2, 5, and 8 cm electrode spacing. The electrodes consisted of stainless-steel mesh with coarse layers of carbon-black. The MFCs were fed with SUM when the natural substrate of the medium was exhausted. Initial feeding resulted in 79.6, 108.7, and 103.1% increase in OCV with a proportional percentage increase in power at 2, 5, and 8 cm electrode spacing. Six days after the first feeding, the power was 189.9, 150.7, and 108. 5 mW/m^2 in ascending order of

* *Corresponding author*. Chair of Process Biotechnology, Faculty of Engineering Science, University of Bayreuth, Universitätsstraße 30 FAN-D, 2. Stock, 95447 Bayreuth, Germany.
E-mail addresses: s.imologie@futminna.edu.ng (M.I. Simeon), bioprozesstechnik@uni-bayreuth.de (R. Freitag).

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