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Long term testing of Microbial Fuel Cells: comparison of different anode materials

D. Hidalgo ^{a,b}, T. Tommasi ^{a,*}, K. Velayutham ^{b,c}, B. Ruggeri ^b

^a*Center for Sustainable Futures, Istituto Italiano di Tecnologia, C.so Trento 21, 10129 Torino, Italy.*

^b*Applied Science and Technology Department, Politecnico di Torino, C.so Duca degli Abruzzi 24, 10129 Torino, Italy.*

^c*Department of Applied Science and Technology, Environmental Management Laboratory, A.C. Tech, Anna University, Chennai 600025, Tamil Nadu, India*

**Corresponding author:*

e-mail: tonia.tommasi@iit.it, Tel.: +390115091950; Fax: +390115091901

Abstract

This paper focuses on the long term operation and testing of three Microbial Fuel Cells (MFC) having three different anode materials: commercial carbon felt (C-FELT), polyaniline-deposited carbon felt (C-PANI) and carbon-coated Berl saddles (C-SADDLES). A mixed consortium from seawater was used as inoculum and acetate was used as substrate. Tests were conducted for four months under 1000 Ω external load. The maximum power generation was obtained by C-SADDLES (102 $\text{mW}\cdot\text{m}^{-2}$) followed by C-FELT and C-PANI, respectively. A similar trend was obtained with the evaluation of electrical energy produced: C-SADDLES (2222 J), C-PANI (2183 J) and C-FELT (2114 J). However, the performance of C-PANI decreased over time, most evidently due to degradation or deactivation of deposited polyaniline by the microorganisms' activity. These results provide evidence that the three-dimensional structure, C-SADDLES, offers excellent biocompatibility, high specific surface area, high conductivity and most importantly these properties are maintained for a long period of time.

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