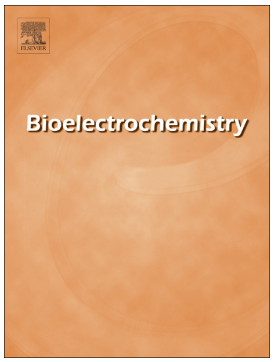

Challenges for successful implantation of biofuel cells

Abdelkader Zebda, Jean-Pierre Alcaraz, Pankaj Vadgama, Sergey Shleev, Shelley D. Minteer, François Boucher, Philippe Cinquin, Donald K. Martin

PII: S1567-5394(17)30423-1
DOI: doi:10.1016/j.bioelechem.2018.05.011
Reference: BIOJEC 7168

To appear in: *Bioelectrochemistry*

Received date: 20 August 2017
Revised date: 11 May 2018
Accepted date: 25 May 2018

Please cite this article as: Abdelkader Zebda, Jean-Pierre Alcaraz, Pankaj Vadgama, Sergey Shleev, Shelley D. Minteer, François Boucher, Philippe Cinquin, Donald K. Martin , Challenges for successful implantation of biofuel cells. Biojec (2017), doi:10.1016/j.bioelechem.2018.05.011

Challenges for successful implantation of biofuel cells

Abdelkader Zebda[1], Jean-Pierre Alcaraz[1], Pankaj Vadgama[2], Sergey Shleev[3], Shelley D. Minteer[4], François Boucher[1], Philippe Cinquin[1], Donald K Martin[1]

[1]: University Grenoble Alpes, SyNaBi, TIMC-IMAG/CNRS/INSERM, UMR 5525, F-38000, Grenoble, France

[2]: School of Engineering and Materials Science, Queen Mary University of London, Mile End Road, E1 4NS London, UK

[3]: Malmo Univ, Fac Hlth & Soc, Biomed Sci, SE-020506 Malmo, Sweden

[4]: Department of Chemistry and Materials Science and Engineering, University of Utah, 315 S 1400 E Rm 2020, Salt Lake City, UT 84112, USA

Abstract

There is a growing interest in the design and engineering of operational biofuel cells that can be implanted. This review highlights the recent progress in the electrochemistry of biofuel cell technologies, but with a particular emphasis on the medical and physiological aspects that impact the biocompatibility of biofuel cells operating inside a living body. We discuss the challenge of supplying power to implantable medical devices, with regard to the limitations of lithium battery technology and why implantable biofuel cells can be a promising alternative to provide the levels of power required for medical devices. In addition to the challenge of designing a biofuel cell that provides a stable level of sufficient power, the review highlights the biocompatibility and biofouling problems of implanting a biofuel cell that have a major