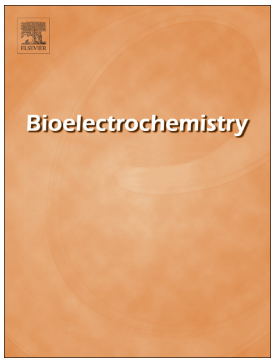

Biofuel cells – Activation of micro- and macro-electronic devices

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Biofuel Cells – Activation of Micro- and Macro-Electronic Devices

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Abstract:

The article represents a short conceptual overview of biofuel cell applications, rather than their design and operation. Special attention is given to interfacing enzyme-based biofuel cells with power consuming microelectronic devices. Importance of electronic management of the power extracted from biological sources is emphasized. In addition to several briefly explained examples collected from recent publications, one system demonstrating powering of a standard glucometer with an implantable or wearable biofuel cell is described in details. The opinion on the biofuel cell applications and limitations represents the personal vision of the authors and might be not fully in accordance with the opinions of other experts.

Keywords: Biofuel cell; Microbial fuel cell; Enzymes; Microelectronics; Biomedical application; Glucometer; Power management

1. Introduction

Biofuel cells, represented by microbial [1-3] and enzyme-based [4-15] bioelectrochemical devices, are aimed at production of electrical energy upon electrochemical oxidation of biomolecular species (e.g., glucose) at an anode and oxygen reduction at a cathode. The important feature of the biofuel cells is their operation in a biological environment and power generation from biological materials. Most of designed biofuel cells represent very small devices producing micro-scale