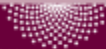




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Preliminary Investigation of Electricity Production Using Dual Chamber Microbial Fuel Cell (DCMFC) with *Saccharomyces cerevisiae* as Biocatalyst and Methylene Blue as an Electron Mediator

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Abstracts

Microbial fuel cell (MFC) is one of promising fuel cell technologies. MFC utilizes biochemical activity of microorganism to convert the substrate to produce electricity through metabolism processes. Although the generation of the electricity is still in mW scale, MFCs has a great potential for the future application. The aim of this study was to investigate the performance of MFCs with and without the methylene blue (MB) as an electron mediator utilizing *Saccharomyces cerevisiae* as biocatalysts and glucose as substrate to generate electricity. Methods performed comprise of the *S. cerevisiae* yeast culture rejuvenation, preparation of the inoculum, preparation of the MFC reactor, preparation of MFC medium with 2% of glucose with and without MB mediator, periodical sampling, determination of growth curve, measurement of current, potential, calculation of power density, energy, glucose consumption, and production of bioethanol. MFC with mediator generated 5.5×10^{-5} A of current, 0.886 V of potential, 4.48×10^{-3} W/m² of power density, 4.14×10^{-3} J of energy, 95.0% of glucose consumption and 0.74% (v/v) of bioethanol produced during the MFC process, while MFC without mediator generated 4.5×10^{-5} A of current, 0.689 V of potential, 2.12×10^{-3} W/m² of power density, 1.96×10^{-3} J of maximum energy, 96.3% of glucose consumption and 0.74 % (v/v) of bioethanol produced. Power density yields from both type of MFC are still very low and not differ significantly. From the present study, it can be concluded that MB mediator only effected on potential yield in MFC using the condition applied in this study.

Keywords: Dual chamber microbial fuel cell; electricity; methylene blue; *Saccharomyces cerevisiae*

1. Introduction

Microbial fuel cell (MFC) is a bioelectrochemical cell which utilizes electrogenic bacteria to oxidize a variety of substrates including acetate¹, glucose², volatile fatty acids³, and inorganic substances such as sulfides⁴ and nitrite⁵, to form electrical current. Through the oxidation process electrons and protons are generated at anode and recombined at the cathode to produce water^{6,7}.

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