Environmental Engineering and Management Journal *November 2016, Vol.15, No. 11, 2497-2504*
http://omicron.ch.tuiasi.ro/EEMJ/

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EFFECTS OF HYDRODYNAMIC STRESS AND FEED RATE ON THE PERFORMANCE OF A MICROBIAL FUEL CELL

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Abstract

There has been a growing amount of work on microbial fuel cells (MFCs) in the last years, both on the microbiological issues and on the engineering ones, which managed to increase power outputs by an order of magnitude. However, they are technically still far from attaining acceptable levels of power output. Therefore, it is necessary to go deeper in understanding the mechanisms involved in electricity production with MFCs and use this new knowledge to achieve significant increases in power output and wastewater treatment. This can be obtained with the optimization of the operational conditions such as shear stress and feed rate. In this work, an experimental study on the performance of an in-house developed dual chamber MFC is described. The influence of the shear stress and feed rate over the chemical oxygen demand (COD), Coulombic efficiency and on the cell performance is presented. A maximum power density of 37.3 mW/m^2 and Coulombic efficiency of 41.9% was achieved for a 22317 Reynolds number of agitation. The COD removal was always higher than 74% for all the operating conditions tested. The results clearly demonstrate the influence and importance of the shear stress and feed rate on MFC energy production and wastewater treatment.

Key words: feed rate, microbial fuel cells, power output, shear stress, wastewater treatment

Received: September, 2012; Revised final: June, 2013; Accepted: June, 2013

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