

Miniaturização de eletrodos compostos por fibras flexíveis de carbono para aplicação em biocélulas a combustível de etanol

Miniaturization of electrodes composed of flexible carbon fibers for application in ethanol biofuel cells

T. Bertaglia*, K. C. Pagnoncelli and F. N. Crespilho

Instituto de Química de São Carlos, Universidade de São Paulo (IQSC-USP), Avenida
Trabalhador São-carlense, 400 – São Carlos – SP - Brasil

Abstract: Carbon materials have been widely used in electrochemistry due to their attractive physicochemical and electrochemical properties [1]. Moreover, electrodes composed of flexible carbon fibers (FCF) are promising platforms for the fabrication of enzymatic bioelectrodes. The development of miniaturized biofuel cells has been studied due to the potential application of these devices in different areas of medicine, such as health monitoring. However, micromanipulation procedures related to the miniaturization of electrodes are still a topic of great importance and more solid results are needed [2]. The goal of this study is the miniaturization of FCF electrodes and the evaluation of the bioelectrocatalysis of the enzyme alcohol dehydrogenase (ADH) in bioanodes based on miniaturized FCF. In this work, the development of miniaturized electrodes from the fiber commonly used in our group is reported. Thus, electrodes with different diameters were obtained from the FCF. Electrochemical results demonstrated a linear variation of the peak currents from the pair $K_3Fe(CN)_6/K_4Fe(CN)_6$ using the miniaturized electrodes. The bioelectrocatalysis of ethanol using the enzyme alcohol dehydrogenase (ADH) immobilized on the miniaturized electrodes surface was evaluated by cyclic voltammetry (CV). Values of current density obtained were practically unchanged and the variation is very small when compared between of different types of electrodes. It can be observed from these results that the miniaturization of the system is possible and viable. FCF miniaturized electrodes are active as demonstrated by CV using hexacyanoferrate electrolyte. Besides, the loss of current density is minimal. The system proposed here showed that the miniaturization of the electrodes for futures applications in microdevices such as miniaturized biofuel cells is possible.

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References:

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* main author e-mail: thiagober2@gmail.com