

عنوان مقاله:

Response Surface Modeling and Optimization of Microbial Fuel Cells with Surface-Modified Graphite Anode Electrode
by ZSM- δ Nanocatalyst Functionalized

محل انتشار:

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خلاصه مقاله:

Nanocatalyst materials can achieve a synergistic effect through complementarity components, which are essential for improving electrode performance. In this research, a novel anode electrode (G-ZSM- δ /Fe/Ni) was made by modifying the surface of a simple graphite rod electrode with a ZSM- δ /Fe/Ni nanocatalyst to increase the efficiency of microbial fuel cells. The results of cyclic voltammetry (CV) and square wave voltammetry (Sqw) analysis showed a 27.95% increase in the current efficiency of this electrode compared to the simple graphite electrode. Electrode modifications with conductive and nanostructured ZSM- δ /Fe/Ni were recognized as an efficient approach to improve the interaction between electrode surface and bacteria and electrical conductivity for boosting the performance of microbial fuel cells (MFCs). Moreover, to optimize the influencing process parameters, three variables of temperature, retention time, and stirring rate were each investigated through the surface response method (RSM) with essential responses such as current output (I) and percentage of chemical oxygen demand removal efficiency, after which the best conditions were provided. In the proposed model, the temperature of 28 °C, the retention time of 37 h, and the stirring rate of 50 rpm were determined as optimal conditions, in which the maximum current production and the percentage of chemical oxygen demand removal efficiency were 1099 mA and 40.53%, respectively. Therefore, this synthesized nanocatalyst is a promising candidate as a biocompatible anode material in MFC.

کلمات کلیدی:

Microbial Fuel Cells (MFCs), ZSM- δ /Fe, ZSM- δ /Ni, ZSM- δ /Fe/Ni, I, COD

