Potential Of Porous Co_3O_4 Nanorods As Cathode Catalyst For Oxygen Reduction Reaction In Microbial Fuel Cells

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ABSTRACT

This study aims to investigate the potential of porous Co_3O_4 nanorods as the cathode catalyst for oxygen reduction reaction (ORR) in aqueous air cathode microbial fuel cells (MFCs). The porous Co_3O_4 nanorods were synthesized by a facile and cost-effective hydrothermal method. Three different concentrations (0.5 mg/cm^2, 1 mg/cm^2, and 2 mg/cm^2) of Co_3O_4 nanorods coated on graphite electrodes were used to test its performance in MFCs. The results showed that the addition of porous Co_3O_4 nanorods enhanced the electrocatalytic activity and ORR kinetics significantly and the overall resistance of the system was greatly reduced. Moreover, the MFC with a higher concentration of the catalyst achieved a maximum power density of 503 ± 16 mW/m^2, which was approximately five times higher than the bare graphite electrode. The improved catalytic activity of the cathodes could be due to the porous properties of Co_3O_4 nanorods that provided the higher number of active sites for oxygen.

KEYWORDS: Microbial fuel cell; Co_3O_4 nanorods; Oxygen reduction reaction

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