Short Communication

Copper removal and microbial community analysis in single-chamber microbial fuel cell

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Copper removal and microbial community analysis in single-chamber microbial fuel cell

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Abstract

In this study, copper removal and electricity generation were investigated in a single-chamber microbial fuel cell (MFC). Result showed that copper was efficiently removed in the membrane-less MFC with removal efficiency of 98.3% at the tolerable Cu^{2+} concentration of 12.5 mg L^{-1}, the corresponding open circuit voltage and maximum power density were 0.78 V and 10.2 W m^{-3}, respectively. The mechanism analysis demonstrated that microbial electrochemical reduction contributed to the copper removal with the products of Cu and Cu_2O deposited at biocathode. Moreover, the microbial community analysis indicated that microbial communities changed with different copper concentrations. The dominant phyla were *Proteobacteria* and *Bacteroidetes* which could play key roles in electricity generation, while *Actinobacteria* and *Acidobacteria* were also observed which were responsible for Cu-resistant and copper removal. It will be of important guiding significance for the recovery of copper from low concentration wastewater through single-chamber MFC with simultaneous energy recovery.

Keywords: Microbial fuel cell (MFC); Copper removal; Electricity generation; Mechanism; Microbial community

1. Introduction

Microbial fuel cell (MFC) is a novel microbial electrochemical technology (MET) that could extract chemical energy and realize resource recovery from organic matters through biocatalytic reactions. It has the advantages of biological technology and electrochemical technology, which can biocatalyze easily biodegradable organic material at anode to produce protons and electrons that will be accepted by electron accepter at cathode (Logan and Elimelech, 2012). In recent years, the application of MFC expanded to waste/wastewater treatment combined with electricity

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