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Effect of nitrate on electricity generation in single-chamber air cathode microbial fuel cells

Haobin Huang, Shaoan Cheng^{*}, Jiawei Yang, Chaochao Li, Yi Sun, Kefa Cen

State Key Laboratory of Clean Energy, Department of Energy Engineering, Zhejiang

University, Hangzhou 310027, PR China

Abstract

Microbial fuel cells (MFCs) have the potential for simultaneous electricity generation and nitrogen removal in the treatment of wastewater that contains nitrate, but the denitrification of nitrate might affect electricity generation in single-chamber MFCs. In this study, the effect of nitrate on electricity generation in single-chamber air cathode MFCs was investigated. The chemical oxygen demand (COD) was removed faster by denitrification ($0.977 \pm 0.013 \text{ g COD g}^{-1} \text{ NO}_3^-$) than by electricity generation in the MFCs. When the concentration of COD that excluded the COD removed by denitrification, was no less than $300 \text{ mg O}_2 \text{ L}^{-1}$, denitrification only resulted in the decrease in the voltage of the MFCs at the denitrification stage, but did not affect the stable voltage and maximum power density (MPD) of the MFCs after the denitrification stage. The average MPDs during the 660-day batch operation

Abbreviations: COD, chemical oxygen demand; MPD, maximum power density; CE, coulombic efficiency; CCE, corrected coulombic efficiency; rCOD, the COD excluding the COD removed by the denitrification of nitrate

*corresponding author.

Fax: +86-571-87951616; Tel: +86-571-87952038.

E-mail address: shaoancheng@zju.edu.cn (SA, Cheng)

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