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SIMULTANEOUS REMOVAL AND/OR RECOVERY OF Cr(VI) AND Cr(III) USING A DOUBLE MFC TECHNIQUE

Fang Li^{1,2}, Chunji Jin^{1*}, Chansoo Choi², Bongsu Lim³

¹Key Laboratory of Marine Environment and Ecology, Ministry of Education, Qingdao 266100, China

²Department of Applied Chemistry, Daejeon University, Daejeon 300-716, Republic of Korea

³Department of Environmental Engineering, Daejeon University, Daejeon 300-716, Republic of Korea

Abstract

In order to reduce Cr(VI) and Cr(III) simultaneously, a double microbial fuel cell (MFC) system was employed to treat Cr-containing wastewater. Cr(VI)-MFC used Cr(VI) as a catholyte to supply the generated power to Cr(III)-MFC, while the latter MFC functioned as an external load resistor of the former one. Buffer characteristics of the catholyte greatly affected the reduction of chromium ions. At an initial pH of 2.0, Cr(VI) removal increased from 49.9% to 99.9% when KH₂PO₄ was added. Keeping a concentration ratio of Cr(VI) and Cr(III) to 2:1 was found to guarantee Cr(III) reduction effectively. For a 10 hours reaction, the Cr(III) removal efficiency of the Cr(III)-MFC improved from 58% to 82% as the initial concentration of Cr(III) increased from 25 mg/L to 100 mg/L, indicating that a higher initial concentration could allow a higher removal efficiency of Cr(III).

Keywords: chromium recovery, double MFC system, electron acceptor, hydrogen peroxide

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* Author to whom all correspondence should be addressed: e-mail: jinhou@ouc.edu.cn; Phone: +86 13687647051; Fax: 0532-66781061