

Accepted Manuscript

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PII: S0960-8524(18)30787-9
DOI: <https://doi.org/10.1016/j.biortech.2018.06.008>
Reference: BITE 20025

To appear in: *Bioresource Technology*

Received Date: 19 April 2018
Revised Date: 30 May 2018
Accepted Date: 4 June 2018

Please cite this article as: Rossi, R., Yang, W., Zikmund, E., Pant, D., Logan, B.E., In-situ biofilm removal from air cathodes in microbial fuel cells treating domestic wastewater, *Bioresource Technology* (2018), doi: <https://doi.org/10.1016/j.biortech.2018.06.008>

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Date: May 30, 2018
Submitted to: *Bioresource Technology*

In-situ biofilm removal from air cathodes in microbial fuel cells treating domestic wastewater

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Abstract

One challenge in using microbial fuel cells (MFCs) for wastewater treatment is the reduction in performance over time due to cathode fouling. An in-situ technique was developed to clean air cathodes using magnets on either side of the electrode, with the air-side magnet moved to clean the water-side magnet by scraping off the biofilm. The power output of the magnet-cleaned cathodes after one month of operation was $132 \pm 7 \text{ mW m}^{-2}$, which was 42% higher than the controls with no magnet ($93 \pm 4 \text{ mW m}^{-2}$) (no separator, NS), and 110% higher ($116 \pm 4 \text{ mW m}^{-2}$) than controls with separators (Sp, $55 \pm 7 \text{ mW m}^{-2}$). Cleaning cathodes using magnets reduced the biofilm by 75% (NS) and 28% (Sp). The in-situ cleaning technique thus improved the performance of the MFC over time by reducing biofouling due to biofilm formation on the air cathodes.

Keywords: MFC; fouling; cathode cleaning; wastewater

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