

## Accepted Manuscript

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PII: S1385-8947(18)30336-X  
DOI: <https://doi.org/10.1016/j.cej.2018.02.123>  
Reference: CEJ 18602

To appear in: *Chemical Engineering Journal*

Received Date: 22 December 2017  
Revised Date: 27 February 2018  
Accepted Date: 28 February 2018

Please cite this article as: S. Narayanasamy, J. Jayaprakash, Improved performance of *Pseudomonas aeruginosa* catalyzed MFCs with graphite/polyester composite electrodes doped with metal ions for azo dye degradation, *Chemical Engineering Journal* (2018), doi: <https://doi.org/10.1016/j.cej.2018.02.123>

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**Improved performance of *Pseudomonas aeruginosa* catalyzed MFCs with graphite/polyester composite electrodes doped with metal ions for azo dye degradation**

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## **Abstract**

High internal resistance that reduces the power produced in the microbial fuel cells (MFCs) is mainly due to the low electron transfer between the bacterial catalysts and the anode/cathode. In this study, a bulk modified Graphite Polyester composite electrodes (GPECE) doped with metal salts (MS-GPECE) were prepared by casting. Crystallinity, surface morphology, chemical composition and electrochemical properties of all modified electrodes were investigated. Influence of redox behavior of electrodes suited to bacterial metabolism and enhanced biofilm formation have been examined. A laboratory-scale H-shaped *Pseudomonas* catalyzed microbial fuel cell (MFC) was investigated with different metal doped Graphite Polyester composite electrodes, for its performance in decolorizing synthetic wastewater containing azo dye methyl orange. Among the different combinations of electrodes were tested in MFC, the best performing MFC with the highest power density ( $1575 \pm 223.26 \mu\text{W}/\text{m}^2$ ) was seen with Ni-GPECE as the cathode and graphite block as an anode and simultaneous increase in decolorization ( $89 \pm 1.41\%$ ) was also observed. These studies have suggested that the MFC technology can discharge the dual duty of degrading the azo dyes and simultaneous power production.

## **1. Introduction**

A fuel cell is an electrochemical device that converts the chemical energy from any fuel such as hydrogen, methane, propane, methanol, etc., into electrical energy using oxygen or an oxidizing agent [1]. Microbial fuel cell (MFC) is a specific type of fuel cell, where the conversion of the chemical energy from the organic or inorganic compounds using a microbe as a catalyst.

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