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PII: S1385-8947(18)30332-2
DOI: https://doi.org/10.1016/j.cej.2018.02.119
Reference: CEJ 18598

To appear in: *Chemical Engineering Journal*

Received Date: 3 January 2018
Revised Date: 24 February 2018
Accepted Date: 27 February 2018

Please cite this article as: A. Ding, D. Zhao, F. Ding, S. Du, H. Lu, M. Zhang, P. Zheng, Effect of inocula on performance of bio-cathode denitrification and its microbial mechanism, *Chemical Engineering Journal* (2018), doi: https://doi.org/10.1016/j.cej.2018.02.119

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ABSTRACT

Bio-cathode denitrification is a new and unique technology for autotrophic nitrogen removal, which uses electricity instead of chemical matter as electron donor. Functional microorganisms are the driver of bio-cathode denitrification and inocula are the origin of functional microorganisms, so three typical inocula, denitrifying, denitratating and anammox (anaerobic ammonia oxidizing) sludge, were chosen to investigate their effect on the performance of bio-cathode denitrification in this work. The results showed that the nitrogen removal rate of denitrifying, denitratating and anammox bio-cathodes was around 101.79 mg/L·d, 47.31 mg/L·d and 100.04 mg/L·d respectively. The output power was 24.01 mW/m^2, 14.11 mW/m^2 and 45.93 mW/m^2. The denitrifying, denitratating and anammox biofilms were observed to grow on cathodes, indicating that the functional microorganisms could use electricity as the sole electron donor and so they were named as electrotrophic microorganisms. The growth rate and the cell yield of denitrifying, denitratating and anammox biofilms