Accepted Manuscript

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PII: S0045-6535(17)32028-3

DOI: 10.1016/j.chemosphere.2017.12.058

Reference: CHEM 20438

To appear in: *ECSN*

Received Date: 25 September 2017

Revised Date: 8 December 2017

Accepted Date: 9 December 2017

Please cite this article as: Qiao, S., Yin, X., Zhou, J., Wei, Li'., Zhong, J., Integrating anammox with the autotrophic denitrification process via electrochemistry technology, *Chemosphere* (2018), doi: 10.1016/j.chemosphere.2017.12.058.

Integrating anammox with the autotrophic denitrification process via electrochemistry technology

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ABSTRACT: In this study, an autotrophic denitrification process was successfully coupled with anammox to remove the nitrate by-product via electrochemical technology. When the voltage applied to the combined electrode reactor was 1.5 V, the electrode reaction removed nitrate by using the autotrophic denitrification biomass without affecting the anammox biomass. The nitrogen removal efficiency of the combined electrode reactor reached 99.1% without detectable nitrate at an influent NO_2^--N/NH_4^+-N ratio of 1.5. On day 223, using the model calculations based on reaction equations, 19.7% of total nitrogen was removed via the autotrophic denitrification process, while the majority of nitrogen removal (approximately 79.4%) was attributed to the anammox reaction. Small variations of the population numbers and community structure of artificial bacteria according to electron microscopy