

Summer 2018

Investigating the Impacts of Varying External Power on Bio-electrochemical Denitrification

Autumn Lineback

Montana Tech

Daqian Jiang

Montana Tech

Taymee Brandon

Montana Tech

Follow this and additional works at: https://digitalcommons.mtech.edu/urp_aug_2018

Recommended Citation

Lineback, Autumn; Jiang, Daqian; and Brandon, Taymee, "Investigating the Impacts of Varying External Power on Bio-electrochemical Denitrification" (2018). *2018 Undergraduate Research*. 3.
https://digitalcommons.mtech.edu/urp_aug_2018/3

This Book is brought to you for free and open access by the Other Undergraduate Research at Digital Commons @ Montana Tech. It has been accepted for inclusion in 2018 Undergraduate Research by an authorized administrator of Digital Commons @ Montana Tech. For more information, please contact sjuskiewicz@mtech.edu.



Investigating the Impacts of Varying External Power on Bio-electrochemical Denitrification

Autumn Lineback (Environmental Engineering)

Faculty Advisor: Daqian Jiang (Environmental Engineering)

Mentored by: Taymee Brandon (Environmental Engineering)

Background

- Nitrate discharge leads to eutrophication, the largest water quality problem globally
- Eutrophication results in “dead zones” in oceans and considerable economic losses
- Bio-electrochemical denitrification is a promising solution because bacteria directly use electrons to reduce nitrate and produce nitrogen gas

Objectives

- Determine optimal nitrate removal performance using varying external power
- Identify microbial communities within the biofilms on the cathode

Work Completed

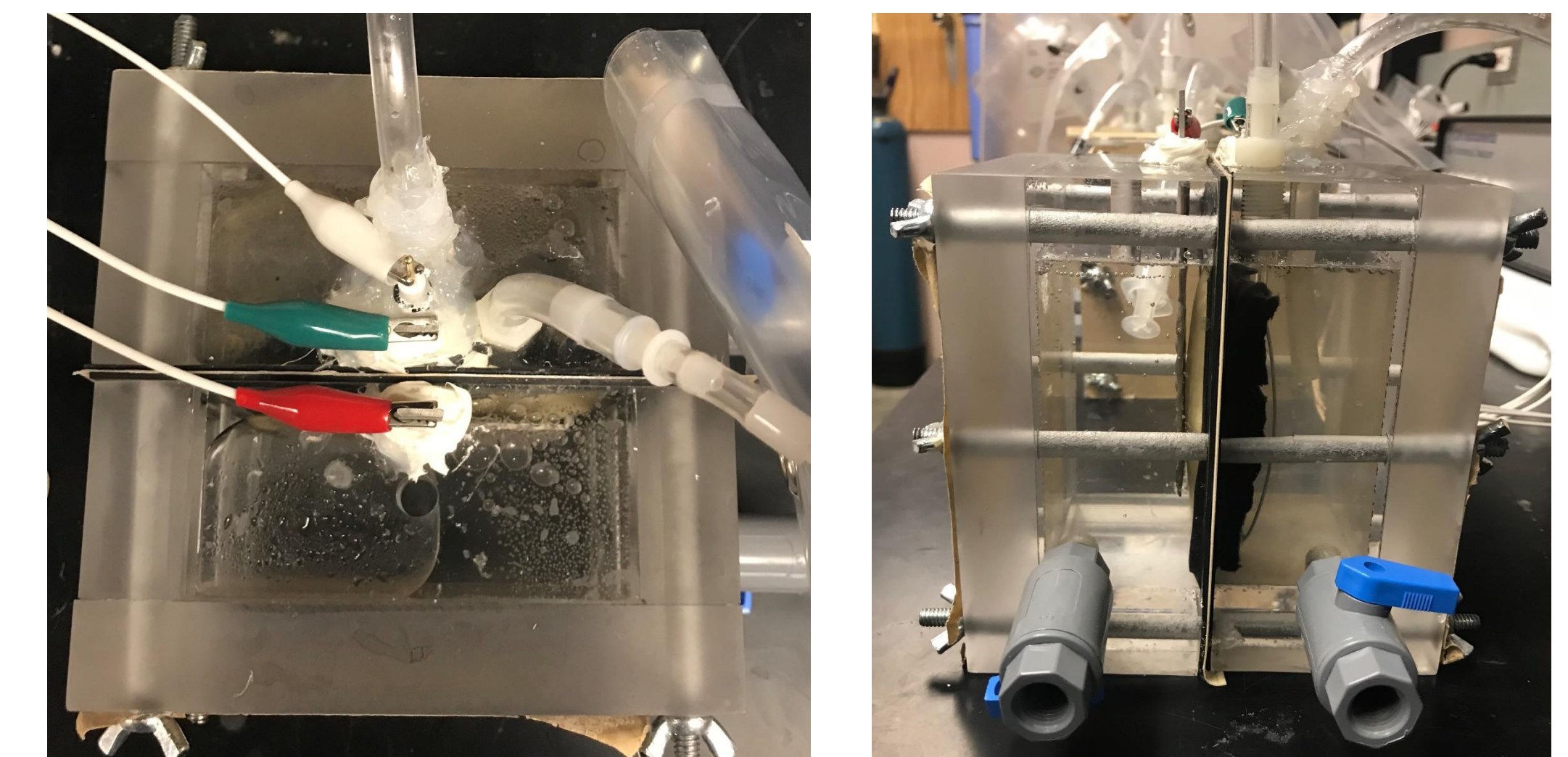
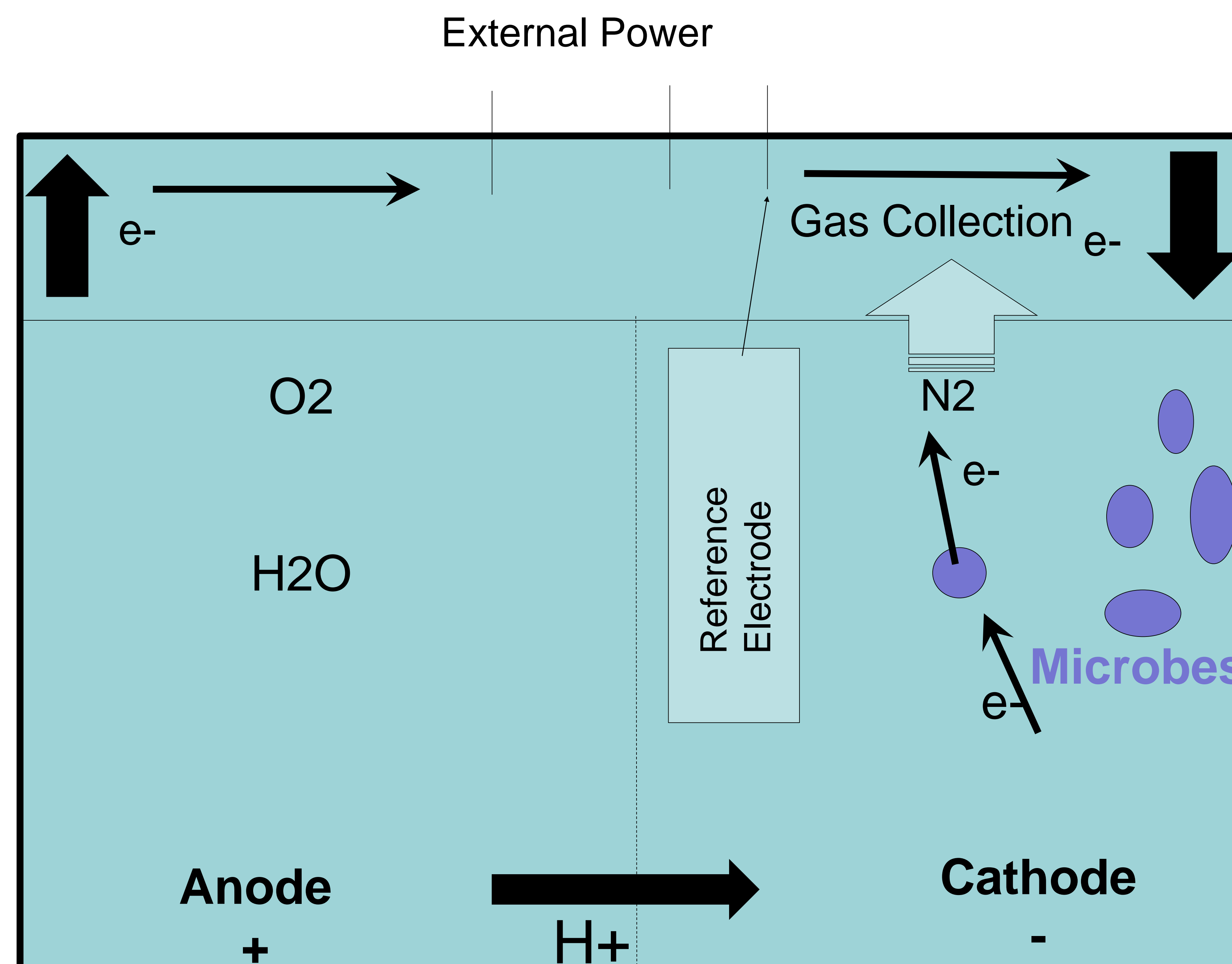
- Monitored for two months, including:
 - Daily reactor maintenance
 - Measured ammonia, nitrate, nitrite and PH in both anode and cathode
 - Changed anode and cathode solutions, as well as making new solutions to replenish the reactors

References

- Shi, L., Dong, H., Reguera, G., Beyenal, H., Lu, A., Liu, J., . . . Fredrickson, J. K. (2016, August 30). Extracellular electron transfer mechanisms between microorganisms and minerals
- Clauwaert, P., Rabaey, K., & Aelterman, P. (n.d.). Biological Denitrification in Microbial Fuel Cells.

Expected Results

- This project will continue through the academic year and generate:
 - More reactor performance data
 - Characterization of the microbial communities under varying external power



Acknowledgments

- This work was supported by Montana Tech's Summer Undergraduate Research Fellowship (SURF) and Bringing Research into the Classroom (BRIC).