An Investigation Correlating Bioluminescence and Metal Reduction Utilizing *Shewanella woodyi*

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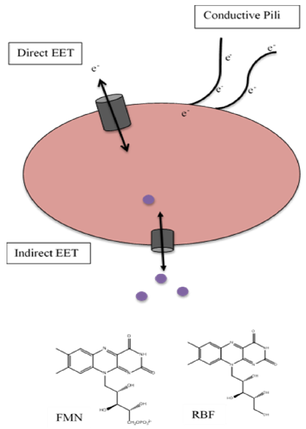
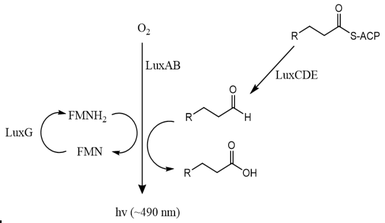
Background

The transfer of electrons is a vital component for a variety of cellular reactions. In the absence of soluble electron acceptors, some microbes posses the ability to perform extracellular electron transfer (EET).



Redox states are important in another microbial process of bioluminescence where reduced FMN is required for light generation. The study was performed to evaluate if a relationship existed between EET and bioluminescence.

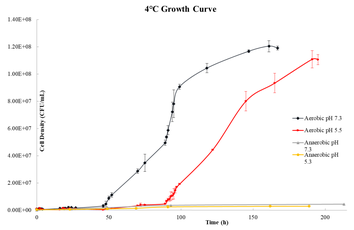


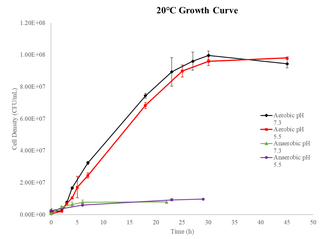
Methods

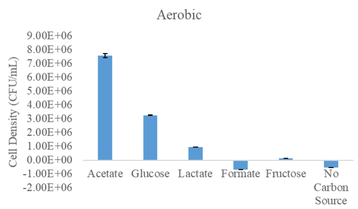
- *S. woodyi* cultured at 20℃ in neutral pH in 10mM glucose ONR7a media
- Luminescence assays performed in 96 well high throughput plates under microaerophilic conditions
- Potentiometry and cyclic voltammetry experiments performed under anaerobic conditions

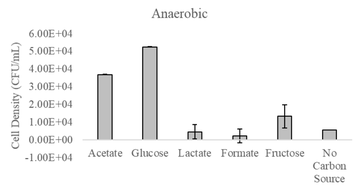
Results

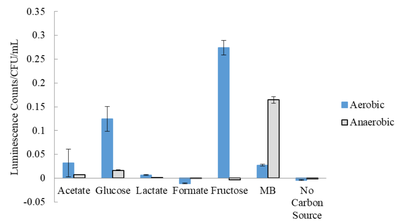
Preliminary Growth Studies



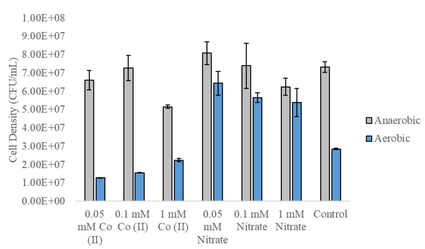


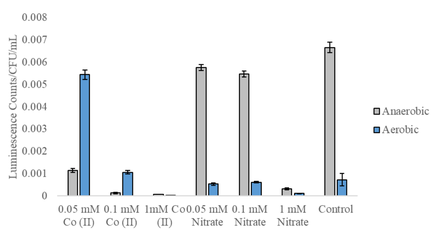


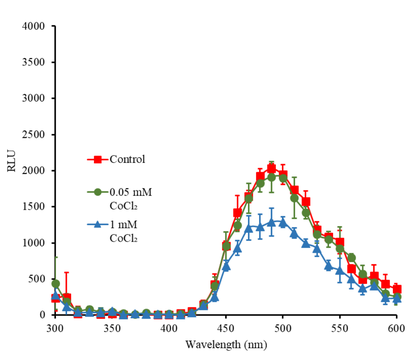


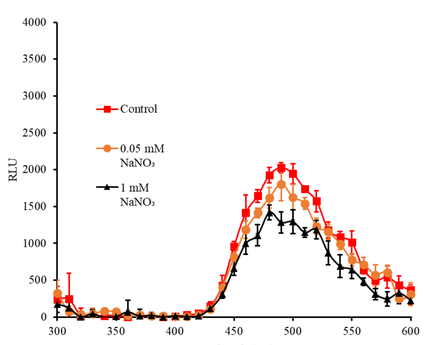


Bioluminescence with Electron Acceptors

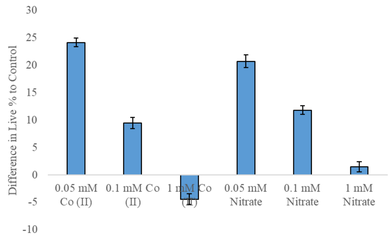


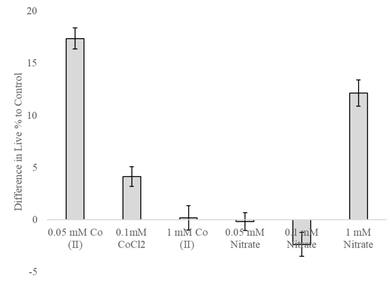




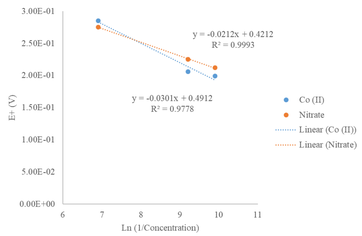


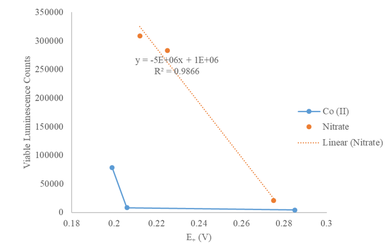
Toxicity Assay



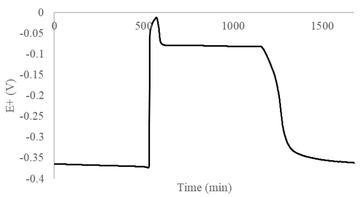


Electrochemistry

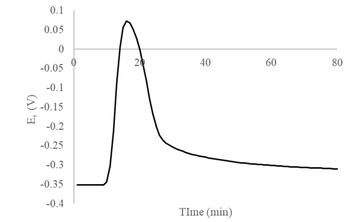




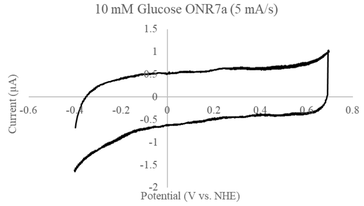
1mM Nitrate Addition



1mM Co (II) Addition



10 mM Glucose ONR7a (5 mA/s)



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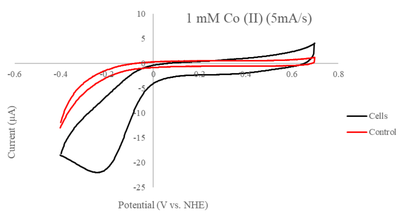

Conclusions and Future Work

- Relationship between media potential and bioluminescence in *S. woodyi*
- Media potentials greater than 0.26 V shut off bioluminescence
- Implement ion chromatography to determine products of Co (II) and nitrate reduction, quantitate FMN secretion from cells