

# Spectral Characterization of Bacterial Presence in Algal Cultures

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## ABSTRACT

As global economies continue to advance, the need for more sustainable sources of energy increases. Biofuels, such as those produced by the transesterification of microalgae, provide a valid avenue for biodiesel production<sup>1</sup>. However, the quantity of biofuels currently produced does not match the large need for biodiesels globally. Abiotic, biotic, and operational factors often negatively impact biofuel production. Nearly 30% of biomass is lost from predation alone<sup>2</sup>. In this project, the effect of the obligate cyanobacteria *Vampirovibrio chlorellavorous* on *Chlorella Sorokiniana* and *Chlorella Variabilis* was studied using a dual-channel fiber coupled spectroradiometer. The downwelling irradiance and upwelling radiance were collected and the reflectance calculated and interpreted using MATLAB. This data was then utilized to characterize the interaction between the specified bacterium and algal species. By knowing these specific characteristics, preventative action may then be taken in order to optimize the amount of viable algae produced and subsequently positively impact the success of biofuels on their path to market.

## METHODS

- Apparatus cloaked in black cloth with sample placed on stir plate with incandescent light ( $\sim 50 \mu\text{M}$ )
- SpectraSuite utilized to obtain upwelling radiance and downwelling irradiance
- Reflectance calculated in MATLAB
- Daily PAM and absorbance measurements taken to monitor algal growth

## RESULTS

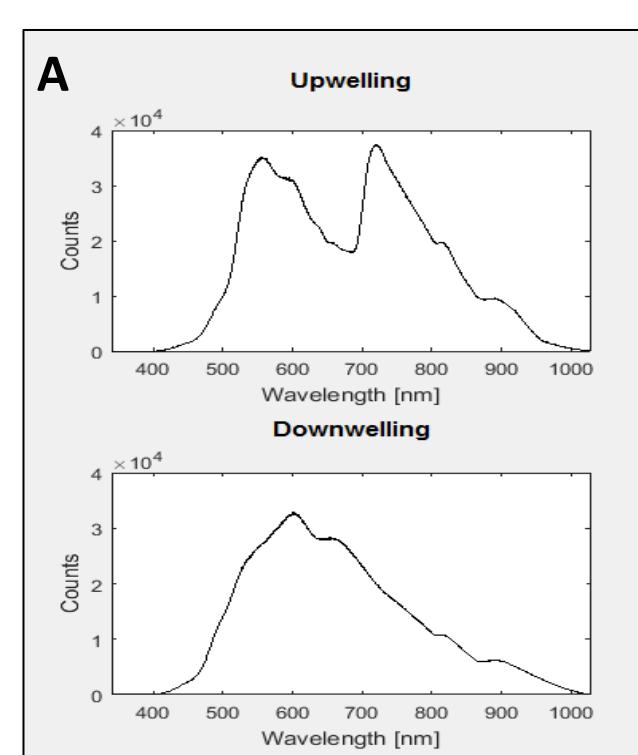


Figure 2: A) Upwelling radiance and downwelling irradiance generated by SpectraSuite for healthy *C. Sorokiniana* culture. B) Calculated reflectance outputted from MATLAB program. C) Absorbance multitude outputted from MATLAB.

## DISCUSSION

- Obstacles encountered due to unexpected reflectance from baffled flask, condensation, and angle of fiber impacted progress
- Currently, fine tuning code for future use in both healthy culture studies and infection studies
- In the future, we intend to compare outputted data for the two cultures, infected vs. uninfected, and develop detection method based on determined characteristics

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## REFERENCES

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