Determination of resource allocation of *Thalassiosira weissflogii* using FTIR microspectroscopy

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Biodiesel and manufacturing production suggest the use of waste waters and flue gases, known for their high contents of nutrients and CO\textsubscript{2}, as a growth medium for algae cells. To accomplish this, cultures containing *Thalassiosira weissflogii* in an established growth medium was prepared. The growth rate and doubling time of the cells was determined by counting the number of cells daily. The cells were monitored through a period of 15 days, where single cell spectra of the samples were acquired at certain times. Single cell FTIR spectra were obtained to analyze the composition of *T. weissflogii* that was exposed to high CO\textsubscript{2} and nutrient concentrations. The FTIR was sensitive to the macromolecular pools of the algae: lipids, proteins, and carbohydrates/silica, which make up great deal of the algae’s whole composition. The use of synchrotron light source allowed studies of single cells (spatial resolution of 10μm x 10μm) in a population. By obtaining 30 single FTIR cell spectra for each time point, the variability among a population was monitored. FTIR spectra for individual cells showed that cells acclimated to high CO\textsubscript{2} conditions within 15 days. Future projects include determining, quantitatively, the protein, lipid and carbohydrate concentrations of the cells, and the use of chemical imaging to monitor the distribution of the macromolecular pools inside the cells and in vivo studies to observe the macromolecular changes in a single cell.

References
