

***Application of FT-IR spectroscopy for algal biomass production compared to fluorescent measuring techniques***

Christian Jebsen, Heiko Wagner, Christian Wilhelm

Universität Leipzig  
Institut für Biologie I, Abteilung Pflanzenphysiologie  
Johannisallee 21-23, 04103 Leipzig, Germany

Due to their high growth rates algae are best candidates as biomass producers, known to accumulate high contents on lipids or carbohydrates. Furthermore, the content of lipids and carbohydrates can be increased by nutrient limitation.

In order to optimize growth rate and accumulation of high valuable products a fast and reliable method is highly desirable to assess the overall biomass composition. To assess the biomass formation measurements of photosynthesis by fluorescence and oxygen evolution are tested with respect to their capability to monitor growth rates under nutrient limitation.

These data are compared with Fourier transformed infrared (FT-IR) spectroscopy as a new tool to characterize cell internal nutrient composition like C:N and C:P of microalgae. Both are applied to chemostate cultures with different nutrient limiting conditions and defined growth rates.

It is shown that FT-IR spectroscopy can be used not only to estimate the cell internal content of lipids and carbohydrates but also to develop models for an estimation of the growth potential from different major algae groups.

The results of the FT-IR spectroscopy analysis will be discussed as an important tool for optimizing and controlling biomass production. The potential of FT-IR spectroscopy is compared to the usually applied techniques of measuring photosynthesis to estimate algal growth under changing environmental conditions.