



Environment

## Estimation of Alga Growth Stage and Lipid Content Growth Rate

Using light in different wavelength ranges to estimate algae growth stage and algae growth rates

NASA has invented a novel technology for estimating algae growth stages and lipid content using light absorption or reflection in selected wavelengths. This invention provides simultaneous information about both algae growth and lipid content and it does not depend solely on the time of growth. It implicitly includes variables due to environmental parameters such as nutrient deprivation or other stresses. This is helpful for subsequent processing of the algae into nutraceuticals, pharmaceuticals, animal feed, fertilizer, or biofuels.

### BENEFITS

- An accurate approach
- Does not depend solely on time of growth
- Implicitly factors in the variable environmental parameters
- Provides a useful error estimate for alga growth stage
- Takes account of environmental history of growth of the alga

technology solution



# NASA Technology Transfer Program

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## THE TECHNOLOGY

This invention, provides a method using light in different wavelength ranges to estimate (i) algae growth stage and (ii) algae growth rates in media (e.g., fresh water or marine water). Absorption of light is measured for a beam having a specified light intensity in each of two or more specified narrow wavelength ranges. Optionally, light absorption is corrected for absorption in the same wavelength range by the medium. Then absorption of light is compared with a reference set of absorption values for the algae at different growth stages. Algorithm is applied to determine differences between measured absorption values and reference absorption values to estimate growth stage. Compensation for light reflection from a liquid (absent algae) is similar. Lipid content of the algae is measured at each of a selected set of growth stages. The estimated growth stage is correlated with a time variable to estimate time for initiation of growth of algae under specified conditions. One or more relevant environmental parameters (light intensity or wavelength, temperature, or nutrients) is varied in the growth medium for the algae and the time required for their grow this determined and related to the system described here.



The invention provides simultaneous information about both algae growth and lipid content

## APPLICATIONS

The technology has several potential applications:

- ➔ Diesel and fuel production
- ➔ Algae production
- ➔ Cultivating aquatic organisms
- ➔ Agriculture and fertilizer industry
- ➔ Renewable energy
- ➔ Lipid-based chemical production
- ➔ Biofuels harvesting
- ➔ Dewatering sewage
- ➔ Pharmaceutical industry
- ➔ Nutraceuticals industry

## PUBLICATIONS

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