# MICROALGAL GROWTH ANALYSIS THROUGH FLUORESCENCE AND IMAGES PROCESSING

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**Introduction.** Research on microalgae is being increased because of the potential application in several industrial areas; particularly we focus our work in *Chlamydomonas reinhardtii* (Chr) strain, due to its potential in hydrogen ($H_2$) production [1]. Additionally, we based our analysis on spectroscopic measures due to these technique gives good, rapid and minimally invasive information of change in homogeneous samples [2].
The main objective of this work is to develop on-line monitoring techniques to follow microalgae cultures. This is a scale-down approach to study microalgae growth kinetics.

**Methods.** Chr (CC-124) was purchased from Chlamydomonas Center (USA). Each experiment was prepared using three Roux culture bottles with 0.9 L of algae culture each, at the same control conditions. Sample were collected every 12 h during one week and analyzed through absorbance and fluorescence measures with a portable spectrophotometer (StellarNet, EPP2000). For fluorescence, an own cabin was designed, manufactured and coupled to the spectrometer. Additionally, a technique for images processing was implemented, which provide the possibility to shoot and analyze the cultures remotely using the same spectrometer.

**Results.** The variations in the fluorescence intensity and luminosity were successfully measured, according with the increment in Chr concentration. Figure 1 shows the results for a culture in a bottle with one fluorescence emission spectrum per day, during five days. The microalgae exhibit a peak at 685 nm and a broad shoulder around 740 nm; this is a general observation at room temperature for chlorophyll a [3]. It is possible to observe that while the peak at 685 nm has a maximum on day 3, the shoulder at 740 nm grows with time until a maximum on day 5. Figure 2 shows the correlation found between the absorbance (A) of the samples and the luminosity (L) of the shoot digital images for three Chr cultures, in reference to the values at the initial time ($A_0$ and $L_0$). Therefore, the kinetics of the microbial growth can be directly followed with the luminosity measurements of the images. Actually, the insert on Figure 2 shows the change of luminosity of the images with time for the cultures.

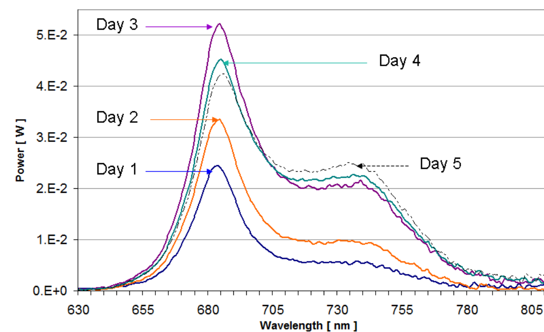


**Fig.1.** Fluorescence emission spectra; evolution every day, through 5 days, for the microalgae culture (25ºC).

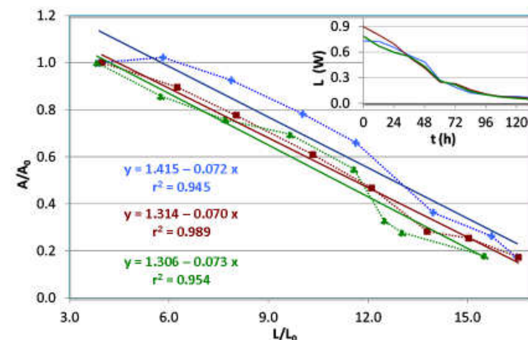


**Fig. 2.** Correlation of absorbance and luminosity for the culture growth. The insert shows the evolution of luminosity with time for the images of the culture.

**Conclusions.** A method to study microalgae cultures in real time through absorbance, fluorescence and luminosity is proposed here. Once perfected, these processes could be applicable in large-scale production. The images processing allows applying a methodology for remote measurements.

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**References.**

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