



PhD Program in Civil, Chemical and Environmental Engineering May 2022 Call, XXXVIII cycle - Starting date: November 1 st 2022

Curriculum: Chemical, Materials and Process Engineering
Thematics: Plants and bioprocesses

Project: Treatment of agro-industrial wastewaters using microalgae

Keywords: photobioreactors, new plant development, microalgal biomass exploitation, lipid recovery.

Brief Description:

The increasing of urbanization and industrialization leads to the production of large quantities of wastewater around the world. Part of this waste can be exploited for the growth of microalgae, reducing their cultivation costs, and making chemicals recovery and biofuel production more feasible.

Using the mixotrophic metabolism, microalgae are able to absorb and use many of the organic molecules contained in wastewater, reducing its polluting load, leading to the production of additional microalgal biomass and to the purification of the water used.

After the growth, the microalgae biomass can be collected and used for the production of biofuels and for the recovery of chemicals of interest.

Batch and continuous microalgal growth systems are available in the laboratory of the research group. By means of these plants, wastewater (e.g.: olive mill and winery wastewaters, landfill leachate, sewage wastewaters, etc.) will be micro-phytotrophically treated and then analysed.

An *ad hoc* plant for the growth and the collection of microalgae in wastewaters will be studied and tested, reaching the goal to work in a full continuous mode. A pumping system, operating with variable flow rates, will be carefully developed to make the device less energy intensive and to reduce the hydraulic retention time. Downstream of the cultivation system, a plant will be designed for microalgal biomass settling, and the microalgal biomass will be collected using new methodologies, such as electro-coagulation.

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