Università degli Studi di Napoli Federico II

PhD in Biotechnology - 34th cycle

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Microalgae exploitation: biorefinery development

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Captured CO2 bio fixation by photosynthetic microorganisms has been considered an appropriate strategy to mitigate CO2 emissions through a sustainable way and a promising process under biorefinery concept [1]. Among these microorganisms, microalgae and some photosynthetical bacteria have been considered as a promising Carbon Capture and Utilization strategy due to their high carbon content and a wide biochemical pool available, including lipid to biodiesel production and carotenoids and antioxidants for healthcare applications [2]. The main challenges are photobioreactors operating conditions optimization and valuable macromolecules extraction, taking care of their bioactivity preservation and environmental impact. Microalgae biorefinery modelling is a key step to quantify carbon capture capability and to evaluate economic feasibility of this process. The present work is focused on microalgae exploitation under biorefinery approach. To this purpose, about 100 strains selected from *ACUF* collection will be cultivated into closed photobioreactors, metabolites will be extracted from harvested biomass and experimental data will be exploited to develop a process model and a potential flowsheet of the overall process from microalgae cultivation to ready-to-market product.

References

1. John R. Benemann, Ian Woertz, and Tryg Lundquist. Autotrophic Microalgae Biomass Production: From Niche Markets to Commodities Industrial Biotechnology. Feb 2018.3-10.
2. Dineshkumar R., R Sen Review, 2020.: A sustainable perspective of microalgal biorefinery for co-production and recovery of high-value carotenoid and biofuel with CO2 valorization,; Biofuels, Bioprod. Bioref. 14:879–897 (2020).