

RESEARCH PROJECT

Positions offered: 1 Master research project (6-9 month), 1 Undergraduate project (2 to 6 month).

Metabolic and Bioprocessing Engineering towards to production of high value metabolites based on sustainable feedstocks

Summary:

In the 21st century, many industrial processes use microbial cell factories to produce a broad diversity of compounds such as recombinant proteins, amino acids, biopolymers or fatty acids. Nevertheless, most of those are based on the usage of sugars and other food-derived raw materials as substrates which lead to an unwanted competition with the food supply. Therefore, a key challenge for the nowadays-biotechnological industry is to develop new sustainable production processes based on non-food material.

Acetic acid has traditionally been considered as cell growth inhibitor rather than a potential carbon source. Nevertheless, it has the potential to substitute sugar material because i) it can be sustainably produced from different sources like from natural gas, biomass or even through the electrochemical reduction of CO₂, ii) it can be assimilated by a great variety of cells including the most common industrial hosts, iii) its lower price (\$350 – 400 per ton) compared to glucose (\$500 per ton) and iv) its easiness to handle and transport compared other sustainable alternatives such as lignocellulose or CO₂.

Objective: This project aims to study acetic acid as non-food feedstock for microbial cell factories. The student will define, together with the supervisors, the workflow of the master project depending on the Project stage. This can be focused on the following topics (could be more than one):

- a) Characterization of different metabolic engineering strategies (p.e. overexpression assimilation pathway, impact of co-assimilation).
- b) Development of well-suited expression system (p.e. constitutive vs inducible systems, antibiotic-free selection marker).
- c) Optimization of operational modes (p.e Fed-batch triggered by pH, oxygenation) and scale-up studies of a recombinant product.

Technical skills: Genetic engineering, molecular biology, Bioreactor utilization, Experimental Design, HPLC analysis, R project.

More information at: <https://planaslab.iqs.edu/research/bioprocess-technology-for-the-production-of-recombinant-proteins-and-high-value-metabolites/>

Researchers: Dr. Marc Carnicer (marc.carnicer@iqs.url.edu); Dr. Pablo Leivar (pablo.leivar@iqs.url.edu); Dr. Antoni Planas (Antoni.planas@iqs.url.edu).

Contact: Dr. Marc Carnicer (marc.carnicer@iqs.url.edu)