

Department of Chemistry

## Wastewater treatment and valorization

Biochemical and Process Engineering Group



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(Post-Doc, since 2012)

- 2012: PhD in Biotechnology by Escola Superior de Biotecnologia - UCP
- 2005-2007: Researcher
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## Objectives

The integrated treatment and valorization of organic waste streams with the production of value added fine chemicals, materials, biofuels and water is a new and challenging development.

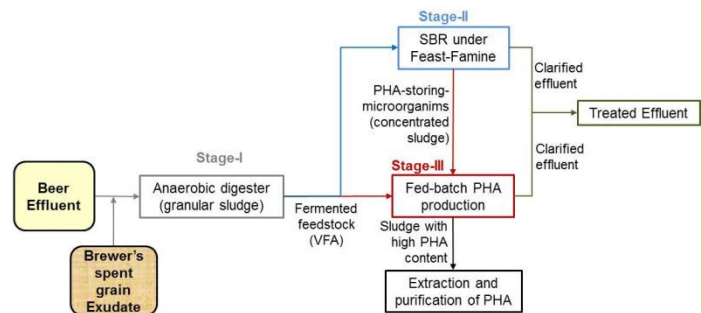
The main aim of this research is to investigate a strategy for the **simultaneous treatment and valorization of wastewater** from brewery industry **through biopolymer production** using **mixed microbial cultures**. A lab scale plant will be operated and the impact of operating parameters on Polyhydroxyalkanoates (PHAs) production and on the quality of effluent produced will be evaluated.



## Methodology

PHAs production by mixed cultures can be reached by a **three-step process** comprising (i) an anaerobic digestion that converts organics into volatile fatty acids (VFA), (ii) a culture enrichment step where alternating periods of short presence of carbon substrate and long absence of carbon substrate are employed and (iii) a PHA production step.

3-STAGE PROCESS FOR BREWERY WASTEWATER TREATMENT AND VALORIZATION



\*VFA – Volatile Fatty Acids; SBR – Sequencing Batch Reactor; PHA – Polyhydroxyalkanoate.

## Expected Results

In the near future, wastewater treatment plants will be converted into biorefineries, producing energy (CH<sub>4</sub>, H<sub>2</sub> and ethanol), fertilizers and biomaterials, such as PHA, in which the “production” of treated water is no longer the sole requirement.

Several food companies are currently disposing their wastes, effluents and surplus paying for it. Food processing activities produce in Europe large amounts of by-products and waste (about 2.5 x 10<sup>8</sup> ton/year) along with relevant amounts of high COD effluents. Brewery is a traditional and large scale industry. There is an excellent opportunity to valorize brewery effluents through the simultaneous production of PHAs with wastewater treatment.

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