

BISIGODOS project, a European funded project (FP7/2007-2013) under grant agreement n° [613680], aims to address the production of valuable algae derived chemicals, amino acids and high added-value bio-resins starting from algae biomass fed directly with CO₂ from industrial emissions (cement, steel factory, thermal power plants, etc.) as a cost-effective and renewable raw material. The process is assisted by solar radiation, nutrients and sea water microalgae. The BISIGODOS consortium brings together a wealth of expertise and resources within the areas of:

- Microalgae and photo-bioreactors production and optimization
- Manufacture of amino acids for food products
- Production of conductive polymer coatings
- Bio-resin development for water-based inks
- Bio-surfactants production and bio-PU adhesives manufacturing
- End-users in the food, flexible packaging, hair care, metal industry and paints products.

The presence of main actors in the whole value chain demonstrates the critical mass of complimentary resources that will enable the BISIGODOS project to achieve its targeted industrial, scientific and societal breakthroughs and commercial success.

To develop these new technologies, the project will adopt several innovative approaches:

- New algae strains production optimization and CO₂ energetic balance improvement.
- Optimization of photo-bioreactors. Reduction up to 65% of CO₂ emissions in industrial plants to produce high added value products
- Study and adaptation of separation of algae components based on hybrid technologies.
- Production of algae derived chemicals for surfactants applications and amino acids for food applications. Obtention of a broad range of amino acids and protein hydrolyzates products.
- Production of bio-based resins from algae based fatty acids and bio-oil aromatic moiety.

The selection of each product is related with the advantages provided. It is summarized in the following table.

Product to develop	Current source	Advantages to microalgae growth in photo-bioreactors
Food applications	Amino acids	High performance. High percentage of protein content
Conductive polymer	Petrol based	High performance, high yield source, cheaper.
Gemini surfactants	Petrol based & food oils	Biodegradable, non-food source, high performance, cheaper.
Acrylic-styrene analogues	Petrol based	Bio-based, non-food competition, low VOCs, cost competitive, good performance.
Diols-Diisocyanates	Petrol based & food oils	Non-food source, high content and purity of monounsaturated free fatty acids, cost competitive

The approach for the strains selection for the production required two consecutive phases: screening in accordance with the specifications of BISIGODOS end users' requirements and an industrial screening.

In BISIGODOS project the separation of components from the liquid phase is the most important challenge. The HTL step produces 60-200 compounds and from 20-30 different chemical groups both in aqueous phase and in oil phase. In the separation, components are divided to groups based on their physical or chemical properties.

This is due to the fact that components from different chemical groups can have the same physical property like boiling point.

It has to be taken into account that several parameters affect the HTL process, such as type of biomass, temperature, water content, catalyst used and space time used. Change in these

properties results in the modification of the product composition. Modifications in the product composition can lead to changes in the needed separation steps.

The partners of BISIGODOS project are the following: AIMPLAS (coordinator), PDC, PHYCOSOURCE, GBR.AT, CASPEO, VTT, 3V TECH, BECKERS, SUNCHEM, CUSA, CRODA, BFS, BANGOR and WARWICK.

Project scheme



