

VALUEMAG

Valuable Products from Algae Using New Magnetic Cultivation and Extraction Techniques

Summary

It is estimated that by the 2050 world population will exceed nine billion adding pressure to the demand for more energy, food, recycled nutrients and water. Interdisciplinary research projects like VALUEMAG have the potential to offer a valid alternative: large-scale rapid biomass production.

Micro-algae produce approximately one half of the oxygen generated on earth while simultaneously consuming CO₂ during photosynthesis and fixing NO_x during their anabolism. Moreover, biomass from micro-algae is a promising source of primary/secondary metabolite products with considerable use in the aquaculture, food additive industry, bio-fertilization, pharmaceutical and cosmetic industry.

VALUEMAG aims to provide ground-breaking solutions for microalgae production and harvesting as well as scaling up biomass transformation systems in order to provide new technologies for aquatic/marine biomass integrated bio-refineries.



VALUEMAG

<https://www.valuemag.eu/>

Type of Action:

Research & Innovation Action

Value Chain: Aquatic biomass

Start date: 01 April 2017

End date: 31 March 2020

BBI JU contribution: € 4,789,000.00

Objectives

The VALUEMAG project's main objective is to develop an advanced magnetic method for micro-algae cultivation and to utilise this knowledge to produce micro-algae for food, cosmetic and nutraceutical use at minimum possible cost.

Micro-algae cultivation - Cost reduction objectives

- Set up a method to introduce superparamagnetic iron oxide nanoparticles (SPANs) into micro-algae cell protoplasm in order to obtain magnetic modified micro-algae (MAGMA)
- Immobilization of MAGMA using a soft magnetic conical surface (SOMAC)
- Develop economic & viable magnetic Photo-BioReactors (mPBR) for fast growing and easy harvesting of biomass, using the above mentioned SOMAC covered with immobilized MAGMA and a thin water layer

Objectives for the production of added-value products from harvested micro-algae,

Expected impacts

The EU's blue economy represents 5.4 million jobs and a gross added value of just under €500bn a year. Europe's seas and coasts are drivers of the economy and the aquatic-biomass bio-refineries are a new dynamic field in this blue economy.

VALUEMAG will demonstrate and scale up the pilot production and harvesting of integrated algae products and bring them nearer to the market in an economically, environmentally and socially sustainable manner.

VALUEMAG will have an impact in several areas of technology including:

- Development of magnetic nanoparticles
- Uptake of magnetic nanoparticles by micro-algal cell and their consequent magnetic activation (MAGMA).
- Soft magnetic cone (SOMAC) with the ability of trapping magnetically activated micro algae (MAGMA)
- Production of valuable products from micro-algae cells, such as cosmetics,

- Implement methods for holistic food production from microalgae biomass
- Extraction of commercially valuable products (nutraceutical, cosmetics) from micro-algae biomass, including a selective magnetic separation method for better, faster and cheaper extraction process
- Develop CO₂ capturing and water re-cycling methodologies based on mPBR

- nutraceuticals, food etc
- Sustainable water re-cycling
- Sustainable CO₂ capture

Achievements & milestones

Magnets are being used to extract algal molecules for the beauty and bioplastics industries

22 August 2019

Entrepreneurs in the aquaculture sector face a problem – extracting all the valuable molecules from seaweed and algal cells is still really difficult. But marine enzymes and magnets are now making it easier to remove precious molecules and can even turn microalgae into magnetically-guided ‘vehicles’ for targeted drug delivery. The BBI JU VALUEMAG project is developing cutting-edge magnetic technology to this end. [Read more](#)

Project coordination

- National Technical University of Athens (Greece)
- Università degli Studi della Campania "Luigi Vanvitelli" (Italy)
- ENEA - Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile (Italy)

Email: info@bio-industry.eu

- Nonasolima (Cyprus)
- Theracell Advanced Biotechnology Ltd (United Kingdom)
- Fyzikalny Ustav Slovenskej Akademie Vied (Slovakia)
- Pno Innovation (Belgium)
- Innovacio i Recerca Industrial i Sostenible SI (Spain)
- Exergy Ltd (United Kingdom)
- Vertech Group (France)
- Ecoduna Produktions Gmbh (Austria)

Organisation name: National Technical University of Athens (Greece)