# CALL FOR ABSTRACTS

## 2nd EUALGAE WORKSHOP OF ALGAE BIOPRODUCTS FOR EARLY CAREER INVESTIGATORS

**Date: March 6th 2018**

**Venue:** Aristotle University Dissemination Center, Thessaloniki, Greece

**Target attendees:** Early Career Investigators[1] (prioritized) and PhD students from countries participating in the COST Action EUALGAE (http://eualgae.eu/). Only those candidates selected for oral presentation will be reimbursed.

**Workshop structure (1 day):** 15 Oral presentations (15 min presentation + 5 min questions) selected based on scientific relevance (evaluated from the abstracts submitted to the Working Group Leaders). Selection criteria will also include Working Group balance, country balance and gender balance. **ONLY ONE ABSTRACT PER RESEARCH GROUP WILL BE CONSIDERED**

**Local Organizers:** Aristotle University of Thessaloniki, Greece, Dr. Spyros Gkelis (sgkelis@bio.auth.gr)

Abstract MUST BE SUBMITTED TO radoslava.metodieva@imdea.org BEFORE FEBRUARY 1ST 2018.

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, Working Group classification (click here to check the Working Groups), the principal results and major conclusions. The abstract should not be greater than 350 words (SEE TEMPLATE ATTACHED). Make sure to include your name, institution (research group), country, date of the PhD/doctorate (ECIs) and contact data.

ARISTOTLE UNIVERSITY OF THESSALONIKI

cost EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

[1] ECI= researcher whose career spun less than 8 years between the date of the PhD/doctorate (or similar experience) and the date of involvement in the COST Action. Periods of career leave have to be added to this time span.

# Working Group 4 - UNDERSTANDING THE ROLE OF MICROALGAE PROTEINS ON ANAEROBIC DIGESTION

C. Gonzalez-Fernandez, I. de Godos, E. Tomás-Pejó and M. Ballesteros

Biotechnological Processes Unit, IMDEA Energy, Madrid, Spain

* Corresponding author: cristina.gonzalez@imdea.org

Carbohydrates have been traditionally recognized as the responsible for the low microalgae anaerobic digestibility. Additionally, microalgae biomass exhibits a typically high protein content. Thus, in this study, two groups of biocatalysts, namely carbohydrases (e.g. cellulases) and proteases were used to for hydrolyze *Chlorella vulgaris* prior to anaerobic digestion. When *C. vulgaris* was subjected to cellulases hydrolysis, the process resulted in 25-29% organic matter hydrolysis efficiency and methane yield of 170 mL $CH_4$ g COD $in^{-1}$ when the digestion was conducted in batch mode. On the other hand, protease addition resulted in higher organic matter solubilisation (±50%) and higher methane yield (1.7-fold increase compared to raw biomass, 142 mL $CH_4$ g COD $in^{-1}$). Since the proteases gave promising results in batch mode digestion, further investigation using this biocatalyst was assessed in semicontinuously fed reactors (CSTR). In contrast to that attained in batch anaerobic digestion, feeding the CSTR with protease pretreated biomass showed lower methane production and volatile fatty acids accumulation as a result of ammonium inhibition. To overcome this issue, two strategies were followed, namely the reduction of the protein content of microalgae biomass by cultivating the microalgae under nutrients limited conditions (wastewater was used a sole nutrient source) and the use of ammonium tolerant anaerobic inoculum. The first strategy enhanced methane yield by 5- fold while the second increased it by 7.2-fold compared to raw biomass (25 mL $CH_4$ g COD $in^{-1}$).

Those years of research devoted to microalgae biomass pretreatment by means of biocatalysts revealed that proteins are the main responsible for the low anaerobic conversion efficiency rather than the carbohydrate fraction. Biomass protein content hampered the anaerobic digestion in two ways, firstly as a polymer embedded in microalgae cell wall decreasing the access of anaerobes for degradation and secondly, by causing methanogens inhibition due to the high ammonium concentration reached in the anaerobic digester when feeding protease pretreated biomass. Potential solutions (pretreatment with proteases, enrichment of biomass in carbohydrate fraction and use of ammonium tolerant inoculum) to overcome the negative effects of high protein content of this microalgae biomass are nowadays better understood paving the way out to further proceed with the optimization of biogas production using microalgae feedstock grown in residual streams