Description of Funded Research Projects
1st Call for H.F.R.I. Research Projects to support Post-Doctoral Researchers

H.F.R.I.
Hellenic Foundation for Research & Innovation

Research Project Title:

Unravelling Ariadne's thread into the microbiome of Anaerobic Digestion labyrinth

Principal Investigator:

Panagiotis G. Kougias

Popular Title:

Unravelling Ariadne's thread into a labyrinth of microbial processes for energy production from wastes

Scientific Field:

Engineering and Technology Sciences

Host Institution:

Aristotle University of Thessaloniki

H.F.R.I.
Hellenic Foundation for Research & Innovation

The objective of “MicroAD: Unravelling Ariadne’s thread into the microbiome of Anaerobic Digestion labyrinth” is to elucidate the functional organisation of engineered anaerobic microcosms, such as the one populating biogas reactors, by a novel platform based on utilisation of modern molecular and analytical tools and models. Anaerobic digestion is a biological process, mediated by different groups of microorganisms, which follow diverse metabolic pathways to produce biogas. Biogas is a mixture of gases (mainly composed by methane and carbon dioxide) and is used for the production of electricity, heat, or after processing, transport fuel. Organic matter used as a substrate for biogas production is usually agro-industrial or urban waste, manure and food residues. The composition, the relative abundance and the interactions within this microbial community, in combination with substrate characteristics, are pivotal to the performance of the bioreactor. Furthermore, the microbial communities change in response to different environmental conditions, so that the biogas reactor can be considered as a dynamic system requiring a constant and reliable monitoring and control.

The final outcomes of the project are: a) to develop an innovative platform in which the newest and most advanced DNA and RNA sequencing technologies will be employed, b) to gain new deep insights into the structure and function of anaerobic digestion microbiome, c) to significantly increase the understanding of the parameters that influence digester efficiency and stability by correlating the dynamic of the microbial communities in biogas reactors with status indicators, d) to model the processes in anaerobic digestion, based on the new fundamental insights and data gained by the molecular and analytical tools. The obtained knowledge will lead to the optimization of the anaerobic process and hence to the increase of the quantity of biogas produced and will contribute to the development of circular bio-economy.

Project Impact on Society

The MicroAD project will create a true revolution in the world of biogas production. The entire process would be taken to a higher scientific level, as the MicroAD platform will create an entirely new link between fundamental AD process knowledge, process performance and modelling. MicroAD will provide researchers with new insights into the possibilities for process improvement through microbial and biochemical manipulations. Also, project results can be exploited by existing biogas plants with enormous potential for future application and commercialization.

Thus, MicroAD will create new opportunities for employment in both research and industry. It is important that the technologies, tools and model that will be developed in the project could be extended to other anaerobic biotechnological processes. Consequently, the resulting know-how will lead to the optimization of the anaerobic process, and hence, to the production of green energy, which in turn will contribute to the development of circular bio-economy.

H.F.R.I.
Hellenic Foundation for Research & Innovation

To me, H.F.R.I. funding would mean...

“

The funding of Hellenic Foundation for Research & Innovation (H.F.R.I) is an important springboard for my way back to Greece in order to conduct high level research. At the same time, the grant gives me the opportunity to create my own research group by which we will jointly expand our horizons on the production of bioenergy from waste. I believe that the allocation of research funding significantly contributes to the exploitation of human resources and can give a tremendous boost to the development of innovative products and start-up companies.

The Principal Investigator,
Panagiotis G. Kougias

Funding

Amount: **179,685 €**

Duration: **36 months**

Foundation: **H.F.R.I.**

H.F.R.I.
Hellenic Foundation for Research & Innovation

CONTACT

127, Vasilissis Sofias Avenue
115 21 Athens, Greece
info@elidek.gr
www.elidek.gr

HELLENIC REPUBLIC
MINISTRY OF DEVELOPMENT AND INVESTMENTS

GSRT
GENERAL SECRETARIAT FOR RESEARCH AND TECHNOLOGY