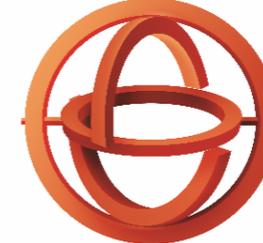


Description of Funded Research Projects

1<sup>st</sup> Call for H.F.R.I. Research Projects  
to support Post-Doctoral Researchers

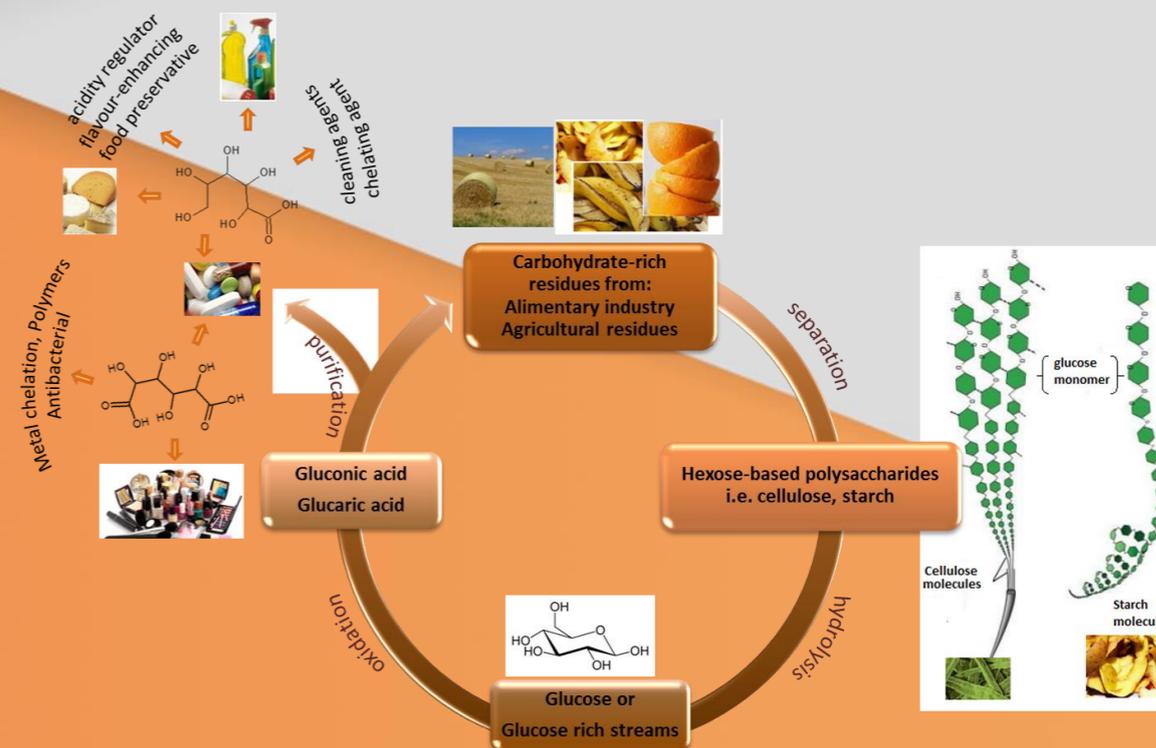


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Research Project Title:

**Sustainable conversion of agro-  
industrial REsidues and WAste-  
streams to high-added value  
CHEMicals (ReWardChem)**

**Principal Investigator:**  
**Chrysoula Michailof**



**Popular Title:**

**Converting fruit and vegetable residues (i.e. pruning residues, peels, kernels etc.) to chemicals**

**Scientific Field:**

**Engineering and Technological Sciences**

**Host Institution:**

**Aristotle University, Greece**



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In the framework of circular economy and green chemistry, increasing scientific effort is placed on the exploitation of waste towards the production of bio-fuels and bio-chemicals. Particular emphasis is assigned to the valorization of waste/residual biomass, as one of the most abundant, renewable and sustainable sources of alternative feedstock, simultaneously fulfilling the need to preserve cultivable land for food production. Thus, ReWardCHEM project's objective is the development of a sustainable, green, chemo-catalytic route for the valorization of agricultural by-products (e.g. tree branches, cotton mill waste) and food processing waste (e.g. vegetable and fruit kernels, pulp and peel) available in the Southern Mediterranean area and in Greece in particular, so as to produce the high added value versatile platform chemicals gluconic and glucaric acid.

Gluconic and glucaric acids are the products of glucose oxidation. As chemicals they have multiple applications ranging from the alimentary and pharmaceuticals to chemical and materials (polymers) industry. Indicatively, gluconic acid and its derivatives are used as food additives and food acidity regulators, glucaric acid may be used for the synthesis of bio-based adipic acid, while specific glucaric acid salts and lactones possess anti-carcinogenic properties. The current production of both acids is restricted to small volumes and is performed mainly biotechnologically from glucose, which accounts for their small scale production and increased price. Evidently, unlocking alternative glucose sources (i.e. lignocellulosic biomass or food processing waste) combined with the development of an efficient heterogeneously catalyzed process for their production, holds significant scientific and commercial potential. The goals and work plan set by the ReWardCHEM project, aspire to advance the scientific knowledge of these reactions and contribute to the realization of a sustainable green process with practical and realistic implementation perspective, for the production of gluconic and glucaric acid from agro-industrial and food waste..

ReWardChem aspires to achieve the following socio-economic impact: a) increase of revenue of farmers and processing facility owners according to the volumes of handled crops by marketing resulting residues, thus contributing to the development of local economies with indigenous material and human resources; b) the proposed process could be implemented in local agro-industrial businesses, contributing to the creation of job positions and entrepreneurship opportunities in rural areas. In turn this is expected to influence the demographic profile, by attracting younger people and families, thereby contributing to the decrease of the current urbanization trend; c) reduction of the environmental pollution and degradation by exploiting residues that would be left in the fields, thus assisting to the protection of the scenery of rural areas that also serves as an attraction for eco-/agro-tourism and outdoor activities; and d) decreasing dependence on fossil resources for common chemicals and associated products..

“



I believe that the fields of Green Chemistry and Catalytic Processes are amongst those that exhibit substantial scientific and societal interest, as they are both engaged in the challenge of either creating novel chemical processes or improving existing ones in order to ameliorate environmental and social impacts. Under this light, H.F.R.I. funding allows me the opportunity to tackle a scientific challenge that requires the association of both disciplines. Thus, the funding proposes a unique and multilayered opportunity: to participate in the advancement of science on the selected topic, to further expand my scientific expertise, to conduct an independent self-sufficient research and cooperate with esteemed colleagues. Furthermore, this funding will contribute to the creation of a new research position at CERTH for a young scientist and the creation of a novel process with entrepreneurship potential.

*The Principal Investigator,  
Chrysoula Michailof*

## Funding

Amount: **155,050 €**

Duration: **36 months**

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





**H.F.R.I.**  
Hellenic Foundation for  
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