

PhD in Chemical Engineering

Research Title:

Valorization of food waste through green extraction techniques

Funded by	Fondazione Istituto Italiano di Tecnologia
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Context of the research activity	<p>The increase of industrial, agricultural and food sector activities, lead to a continuous rise in food waste generation. These wastes are produced in all the phases of the food life cycle, from cradle to household consumption and it represents an important source of valuable compounds such as bioactive and nutraceuticals ones. At present, the European Union legislation encourages the valorization of these by-products and several countries have allocated funds to research and technological developments to mitigate food waste issues. This valorisation can be achieved through the extraction of high-value products such as proteins, polysaccharides, fibres, flavour compounds and other components which can be re-used as nutritionally and pharmacologically functional ingredients. Several studies already exist on this issue but they need to be implemented with a more circular approach in order to create an integrated process which exploits the food waste materials in all its parts in the most sustainable way and with minimum energy needs so that the by-products of an operation represent the raw material of another. Relevant steps of this approach are represented by innovative and more green extraction technologies that exploit the implementation of ultrasound, microwave or enzymes with respect to more conventional solvent extractions.</p>

Objectives	<p>The objectives of this PhD are:</p> <ul style="list-style-type: none">-Characterize food waste sources in order to identify the high-value molecules that can be extracted leading to a complete valorisation of the waste;-Selection of the best extractive technology suitable for each food waste source and each desired product;-Study and optimize operative conditions of the extractive process with regards to high yields and purity of the products;-Performing a techno-economic analysis (TEA) to verify the economic feasibility of the process through the combination of process modelling and engineering design with economic evaluation.
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Skills and competencies for the development of the activity	<p>We seek to recruit an individual who investigates fundamental questions addressing at sustainable extraction of high-value products through innovative and green techniques.</p> <p>We expect that you:</p> <ul style="list-style-type: none">• embrace the responsibility to plan and execute modelling and experimental research;• are interested in chemical and biochemical processes, and are eager to explore new research areas;• have excellent engineering skills and an analytical mindset;• are motivated to contribute to technology enabling sustainable products ;• appreciate teamwork and have the ability to interact and collaborate with researchers and laboratory technicians in a very cross-disciplinary environment.
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