# From Waste to New Products: Recovery and Applications of Bioactive Compounds from Agri-Food Industry By-Products

**ABSTRACT**

Waste valorization is one of the most important challenges to improve circular economy and to approach the zero-waste goal. Agri-food industry produces huge amount of by-products, often containing several bioactive molecules, like antioxidants, whose recovery can provide valuable compounds for applications in pharmaceutical, cosmetic, and food industries. This solution is able also to respond to the increasing demand of the market towards naturally-derived compounds, due to consumers who are more aware and pay a lot of attention to their lifestyle. The complex chemical composition of biomasses deriving from the agri-food sector led to many proposals reported in literature for their reuse and their valorization. Albeit several strategies are valuable, a higher impact on the economic sustainability of the processes involving agri- food industry by-products could be identified firstly in the recovery of high-added value compounds, and then the solid residue of the extraction could be further exploited for biofuels and chemicals production, in agreement with the hierarchical approach proposed by biorefineries. In this context, the extraction step plays a pivotal role, due to the nature of target compounds. Innovative techniques like microwave-assisted extraction, ultrasound-assisted extraction and high-pressure and temperature extraction can increase the performance of process allowing to protect the activity of recovered compounds. Indeed, antioxidants, like polyphenols and carotenoids are able to prevent oxidative stress in our body, counteracting aging and the development of several chronic diseases such as cancer, stroke and type 2 diabetes, and can exert antimicrobial action. Their bioactivity makes them suitable for producing innovative products like nutraceuticals and active food packaging enhanced with antioxidant properties to prolong food shelf life. Nevertheless, thermosensitivity of such compounds requires innovative strategies for their recovery and for products formulation.

This talk aims to discuss the role of non-conventional extraction techniques, the optimization of process variables and post-processing methods in the recovery of bioactive compounds from agri-food waste and to explore new potential applications of the extract in the food sector.