# CHEMICAL ENGINEERING

## PNRR Ammin/Vortex - Valorization of agri-food waste by-products for innovative products in cosmetics, nutraceuticals, food, and green chemistry

| | |
|---|---|
| **Funded By** | Politecnico di TORINO [P.iva/CF:00518460019] - Vortex SRL [P.Iva 12472140016] |
| **Supervisor** | FINO DEBORA - debora.fino@polito.it |
| **Contact** | |
| **Context of the research activity** | The project aims to enhance waste by-products from the agri-food industry to create innovative items for the cosmetic, nutraceutical, food, and green chemistry domains. Research will involve extracting bioactive compounds naturally occurring in recovered raw materials, or their sustainable and environmentally friendly fermentation using low-impact technologies.<br><br>Progetto finanziato nell'ambito del PNRR - Bando NODES - CUP E13B22000020001 |
| **Objectives** | The issue of agri-food by-products poses both environmental and economic challenges. These by-products often lead to waste disposal problems, contributing to environmental pollution and resource depletion. However, there's a significant opportunity for valorization. Valorization involves turning these by-products into valuable resources. Through innovative processes like extraction, fermentation, and transformation, bioactive compounds can be harnessed from these materials. These compounds have applications in cosmetics, nutraceuticals, and even green chemistry. This approach not only reduces waste but also generates new revenue streams and contributes to a more sustainable and circular economy. It's a win-win scenario that addresses the problem of waste while creating avenues for economic growth and environmental protection. The aim of this project is to harness the untapped potential of agricultural and food industry waste by-products for the creation of high-quality cosmetic and nutraceutical products. By utilizing advanced extraction and processing techniques, bioactive compounds present in these waste materials will be isolated and transformed into valuable ingredients for cosmetics and food. This initiative not only addresses the pressing issue of waste management but also contributes to the development of sustainable, eco-friendly solutions. Through the valorization of agri-food waste, the project strives to offer innovative, environmentally conscious products while promoting a circular economy in the cosmetic and nutraceutical industry. The project will be conducted with the collaboration of VORTEX an innovative start-up and a Benefit Company that enhances agri-food by-products through the creation of innovative ingredients. VORTEX developed a proprietary process that allows to transform of agri-food by- |

| | |
|---|---|
| | products into innovative and functional raw materials, with versatile applications. They started in the cosmetic industry, using them as key ingredients in their products sold online and offline. Currently, they also working on expanding the use of our raw materials into new sectors, including nutraceuticals. The Ph.D. candidate will initiate a close collaboration between the university and the VORTEX company studying the possible valorization of agri-food waste through extraction techniques unlocking the hidden potential of discarded materials. The Ph.D. candidate will focus on modern extraction techniques, such as solvent extraction, supercritical fluid extraction, and enzymatic extraction, carefully targeting and on separation of valuable bioactive compounds from the waste matrix. These compounds could include antioxidants, vitamins, polyphenols, and essential oils, which possess beneficial properties for skin care and other industries and can be integrated in cosmetics and food. By efficiently extracting and isolating these compounds, at the end of this project, agri-food waste is transformed into valuable resources, reducing waste and supporting sustainable practices. This approach aligns with the principles of the circular economy, where waste is minimized, and resources are optimized, contributing to environmental preservation and innovative product development |

| | |
|---|---|
| **Skills and competencies for the development of the activity** | The PhD candidate should possess a combination of technical, research, and interdisciplinary skills to effectively contribute to the project's success. The PhD candidate for a project in agro-food waste valorization needs competencies in waste characterization, process optimization, interdisciplinary collaboration, sustainability awareness, data analysis, and effective communication. These skills span chemistry, biology, engineering, and environmental impact considerations. |