

Upcycling: new resources from waste for the pharmaceutical and cosmetic market

The environmental damages encourages some reflections and changes in attitude also in the production world. The desire to optimize resources and costs promotes the enhancement of raw materials obtained, for example, from waste still rich in bioactives from the agri-food industry - transforming them from waste with a high environmental impact to renewable resources. We indicate "Upcycling", a process in which new life is given to materials that would otherwise be eliminated, thus reducing the use of energy, pollution and the consumption of new resources. The result is an active ingredient of value for the environment and for human activity, therefore more "eco-friendly" and valuable.

During the PhD program this issue will be addressed using precisely the waste residues from the processing of agro-food products as sources of new bioactive compounds with antioxidant, anti-inflammatory and immunostimulating activity. These biologically active molecules will be extracted, characterized and subjected to an in vitro skin permeation screening with Franz cells in order to evaluate their ability to cross the skin and permeate into the bloodstream. At this point, the new pharmaceutical or cosmetic active ingredients, will be insert in the appropriate delivery systems that will make these active ingredients bioavailable more efficiently and effectively. Their effectiveness will then be evaluated by in vitro tests on cell cultures, in ex vivo for example on hair strands, and those destined for the cosmetic channel will be analyzed in vivo with non-invasive studies on healthy volunteers using medical bioengineering devices. In addition, the development of this research project involves the collaboration of raw materials companies in the pharmaceutical, cosmetic, biotech sector and the Institute for Advanced Chemistry of Catalonia (IQAC), where a research period will be carried out.

This project is part of the circular economy perspective in which a work of reconceptualization and remodeling of language is required. Terms such as "waste" are replaced by words such as "resources", "sources" and "possibilities", a great difference with the linear economy, where raw materials are sent for production, transformed into consumer products and then become waste.