

Microwave technology improves the properties of grape-derived products

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The WINESENSE project has successfully developed a novel extraction process for grape marc, resulting in higher polyphenol content. The consortium is already working on products for the cosmetics industry.

Beyond the fruit itself and the wine that results from its fermentation, grapes, and more particularly their polyphenolic content, holds much value for the food, pharmaceutical and cosmetics industry. The WINESENSE (Research on extraction and formulation intensification processes for natural actives of wine) project is hoping to tap into this potential through an improved extraction process based on Solvent Free Microwave Extraction, Microwave Assisted Extraction (MAE), and emulsion-Template techniques combining high pressure and antisolvent effects.

Prof Maria José Concerro Alonso, coordinator of the project, discusses its results ahead of the final project conference that took place in June 2017.

What are the main shortcomings of current extraction processes?

One of the main shortcomings of natural product extraction processes is the degradation of active components under high extraction temperatures and duration. The properties of natural products, for example its antioxidant capacity, natural colour, or flavour, are lost to a great extent.

How is WINESENSE a solution to these problems?

WINESENSE has developed a process intensification to reduce operation time. Our [microwave technology](#) allows for obtaining more selective extracts with operation times of a few minutes.

In addition, the process intensification technologies used in our formulation of the final product improve its quality. Emulsion-template techniques combining pressure and antisolvent effects allow for achieving extract formulations of high quality. Formulation of non-water-soluble antioxidants in biopolymers has opened opportunities for the use of non-soluble polyphenols in food and cosmetic applications.

How did you proceed to improve the extraction of polyphenols?

The use of [microwave](#) technologies for the extraction of polyphenols from grape marc increases the contained amount of polyphenols, in particular anthocyanins and flavonoids. Anthocyanins are easily degradable polyphenols, and the reduction of extraction time to 2 minutes avoids its degradation.

Furthermore, the decrease in residence time reduces the concentration of sugars from the grape marc in the extract, so that post-treatment sugar fractioning steps are no longer necessary. Microwave extracts have an increased antioxidant capacity, mainly in easily degradable antioxidants.

What would you say were the most important achievements of the project?

The results of the project led to obtaining regional funding (Castilla y León Equipment Funding) to develop a continuous microwave

technology able to extract polyphenols from agricultural sub-products.

The collaboration with Prof Monzo Electrical Engineering Research Group from Cartagena University (Spain) has led to the development of a continuous microwave with an energy absorption efficiency of 98% and excellent heating homogeneity. The extremely high-energy efficiency allows for minimised consumption of microwave electrical power, which will in turn facilitate the commercialisation of microwave extract products.

What kind of products do you foresee for commercialisation? With what benefits?

I can give you two examples for the cosmetics industry. Quercetin booster (quercetin concentration 1800 ppm) encapsulated quercetin is enclosed in micronized liposomes made of natural lecithin. This formulation enhances penetration of the quercetin through the layers of your skin. Only natural compounds are used, and this formulation is produced by emulsion template technologies with pressurised water as an antisolvent. With this technology, we achieve a very efficient encapsulation, and it does not require expensive facilities. So, it could be used for small companies producing natural cosmetics.

Polyphenols extract formulates in food proteins are also undergoing epithelial cell in-vitro studies at the premises of WINESENSE partner IBET in Portugal, to develop new natural cosmetics.

What has been the feedback from industry so far?

Our results will be presented during the WINESENSE School being organised by WINESENSE partner The Matarromera Company in Valbuena de Duero (Spain), on 21-22 June 2017. The event is open to

both companies and researchers. Ribera de Duero is one of the best-known vineyards and wineries in Spain.

When do you expect the first commercial products to enter the market?

We are ready for it, now the ball is in the hands of industry!

More information: Project page: cordis.europa.eu/project/rcn/110027

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