Encapsulation technologies for stabilization and functionality of olive leaves bioactive compounds

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Some food components contribute to overall health and prevention of diseases beyond mere nutrition, among which plant polyphenols have been widely studied. The high reactivity and sensitivity of these compounds have been overcome by applying micro-/nanoencapsulation technologies by which bioactives are coated or embedded in a capsule or matrix of a carrier to protect from degradation by reducing reactivity with environment, modification of physicochemical characteristics and controlled release of microcapsule contents [1].

Encapsulates obtained by moisture removal as in spray-/freeze-drying are most commonly applied in food industry for plant polyphenols. On the contrary, technologies applied on low moisture/anhydrous systems (e.g. melt extrusion) are limited due degradation effects of labile compounds. Ball milling, generally used to produce powders and to increase the specific surface area, has been recently applied to amorphyse, disperse and entrap compounds of interest (e.g. volatiles) [2], thus representing an interesting technology for encapsulating also bioactive components .

In this work, encapsulated olive leaf phenolic-rich extracts (OLE) were produced by freeze-drying and co-milling using maltodextrin/trehalose as carriers and their structural (microscopy), physicochemical and thermal stability were investigated.

A response surface methodology approach was used to study effect of total solids, matrix component and ratio core:wall in freeze-drying encapsulation. Experimental values fitted well the predicted model, showing that presence of trehalose decreased encapsulation efficiency and also depressed the glass transition temperature, while lower core:wall ratio further retained phenolic compounds. Longer co-milling resulted in increasing OLE encapsulation/entrapment and a homogeneous distribution of OLE onto the matrix. The results of this research will contribute to better understand the effect of matrix component on core retention and physicochemical stability of amorphous, low moisture encapsulated matrices.

1. Augustin, M.A. and Y. Hemar, *Nano- and micro-structured assemblies for encapsulation of food ingredients.* Chem Soc Rev, 2009. **38**(4): p. 902-12.
2. Pittia, P., *Physical state of sugar matrices and aroma-sugars interactions at nanoscale.* 2016.