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Electrohydrodynamic Processing for Probiotic Encapsulation

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Electrohydrodynamic processing has been recently suggested to be a simple and straightforward method to generate micro- and nanostructures and pointed as an emerging technology, which can be employed as a tool for the encapsulation of functional ingredients. Some of its advantages are: no requirement of high temperatures (i.e. sensitive ingredients can be encapsulated without any activity loss) and the possibility of using only water-based solutions. Electrohydrodynamic processes such as: electro spinning and electro spraying were used for the production of bio-based structures systems for probiotics encapsulation that can be then used in food and pharmaceutical applications. The two processes are very effective to produce bio-based nanostructures with several advantages that overcome the existing technology limitations, such as: different sizes range (micro to nano) and type of structures (fibres and particles), no temperature required, ability to scale-up (multi-nozzle systems), versatility in morphology (porosity and roughness) and low or no organic solvents requirement. Moreover, they guarantee high encapsulation efficiencies, a good stability and a possible controlled release.

Several materials were tested (whey protein isolate, ethylcellulose, zein) to produce those structures, being possible to obtain fibres and particles according to the solutions conditions (concentration of biopolymer and ethanol concentration) and processing conditions (voltage and needle diameter). Results showed that whey protein isolate is the most effective material to encapsulate probiotics, being possible to obtain capsules with sizes ranged between 5 and 0.5 μm. The encapsulation efficiency was 100% being the probiotics stable after processing. The probiotics stability was performed during 3 months showing good results when compared with freeze-dried probiotics.

Electrohydrodynamic processes showed to be a good option to replace spray-drying and freeze-drying technologies for the encapsulation of probiotics.

Biography:

Prof. Lorenzo Pastrana has a PhD in Pharmacy (1991) by the University of Santiago (Spain). He was postdoctoral fellow (1992-1993) in the Centre de Transfert en Microbiologie et Biotechnologie INSA at Toulouse (France). In 1991 he joined the University of Vigo and since 2010 is Professor of Food Science. He founded the Galician Agri-Food Technology Platform (2006). He worked in pre production of bacteriocins and probiotics as well as its applications in food industry. Currently he is working in the production of nanostructures with food grade polymers for controlled or mucoadhesive release of bioactives in food packaging/processing applications. In September 2015 he joined the INL as Head of the Department of Life Sciences.