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USING PLANT MACROMOLECULES TO PRODUCE FLAVOR MICROCAPSULES BY SPRAY-DRYING MULTILAYERED OIL/WATER EMULSIONS

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ABSTRACT Conventional oil-in-water emulsions could be considered as an important delivery system of lipophilic molecules because of their relative ease of preparation and low cost. However, these conventional emulsions generally suffer from physical instability when exposed to environmental stresses such as heating, chilling, freezing, drying, pH or ionic strength variation. Interfacial engineering was used in this work to produce spray-dried microencapsulated oil droplets containing flavor compounds. Pea proteins and pectin gave multilayered emulsions with a significantly higher stability to spray-drying process than emulsions stabilized by pea protein alone. To interpret these results, we propose that pectin, an anionic polysaccharide, formed a protective layer around the protein interfacial film surrounding the oil droplets that could improve their stability to spray-drying. In fact, the emulsions formed consist of oil droplets surrounded by multilayer interfacial coatings, which are comprised of an inner protein layer and an outer pectin layer. This second pectin layer was also effective to improve the protective efficiency of encapsulated food flavor compounds. On one other hand, results obtained in this study showed that the dextrose equivalent (DE) of the starch hydrolysates, used as drying matrices, had a marked influence on the microencapsulation efficiency. Therefore, glucose syrup (DE 28) could be recommended for the high flavor retention during spray-drying process as well as the ability to reconstitute emulsion with approximately similar droplet size. The plant macromolecules used provide alternative encapsulating agents to animal proteins such as gelatin and milk proteins or to gum Arabic for microencapsulation of food ingredients and drugs.

Keywords: Microencapsulation ; Spray-drying ; Emulsions ; Interfacial engineering ;