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Formation and stability of multilayer emulsions O/W, stabilized by lupin protein-xanthan gum-chitosan membranes, as a system of microencapsulation

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The oil-in-water (O/W) emulsions have been largely used to encapsulate various lipophilic bioactive molecules. However, conventional emulsions are often prone to physical instability when exposed to environmental stresses, such as heating, refrigeration, freezing, drying, pH and ionic strength changes. Recently, the possibility of producing stable emulsion (O/W) containing oil droplets surrounded by multiple layer interfacial membranes from food grade ingredients has been demonstrated. Therefore, the objective of this study was to develop a multilayer emulsion with different ionic biopolymers (Lupin protein isolate (LPI), Xanthan gum (XG) and Chitosan (CH)) and to determine the further improvement on emulsion stability under different environmental stresses. Emulsions containing oil droplets stabilized by LPI-XG-CH membranes were formed using the electrostatic layer-by-layer deposition technique. The emulsions were more stable when using different ionic biopolymers (LPI, XG, CH) than when using lupin protein alone. The droplets in these emulsions had a good stability to aggregation over a wide range of pH values and salt concentrations. The emulsions stabilized with LPI alone were unstable at pH, salt concentrations, and thermal treatments. The emulsions with LPI-XG membranes were stable to droplet aggregation and creaming at 30-90°C, at 100-500 mMNaCl, and at pH 5-7, whereas the emulsion stabilized with LPI-XG-CH membranes were stable at 30-90°C, at 100-300 mMNaCl, and at pH 3-7. This technology could be used in the food industry for creating O/W emulsions with improved properties, e.g. improved stability under environmental stresses, encapsulation of volatile compounds (flavor), controlled release, and triggered release.

Biography

César Burgos-Díaz completed his PhD on Biotechnology at University of Barcelona (Spain), where his studies were focused on production and characterization of biosurfactants. Currently, he is a researcher at Agriaquaculture Nutritional Genomic Center (CGNA) in Temuco-Chile. His main research interest is the interaction between ionic biopolymers in order to encapsulate and protect aromatic compounds (flavors). In fact, in 2013 he was granted a FONDECYT postdoctoral project (N°3140001) about encapsulation of flavors specifically related to the evaluation of multilayer emulsions with ionic biopolymers subjected to spray drying. Additionally, he has published different papers in reputed journals.

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