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Encapsulation of Active Molecules in Microparticles Based on Natural Polysaccharides

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Abstract - This mini-review is focused on an engineering approach to produce polysaccharides-based microparticles for nutraceutical and pharmaceutical purposes. A brief introduction about the fundamental properties of polysaccharides and their use as microsystems in food, cosmetics, and pharmaceuticals, and a summary of the most important methods of preparation are described. Then, a novel method based on the ultrasonic atomization of solutions of the two most used polysaccharides, alginate and chitosan, followed by ionotropic gelation to produce enteric microsystems for oral administration and, in particular, the basic mechanisms of the encapsulation of molecules with different size and hydrophilicity, are investigated. This mini-review will show therefore the pathway to correctly design a polysaccharide microcarrier for the encapsulation of active molecules with different properties: from the choice of materials features, to the selection and the optimization of production methods with the aim to reduce costs and energy (ionotropic gelation coupled to ultrasonic atomization), to the control of the final carrier size (by purposely developed predictive models), at last to the optimization of encapsulation properties (predicting by model the drug leakage and providing different solutions to avoid it).