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Layer-by-layer polyelectrolyte encapsulation of vanillin

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Abstract

The objective of this work was to microencapsulate vanillin by multilayer emulsion followed by spray drying, aiming to protect it and control its release. An electrostatic layer-by-layer deposition method was used to create the multilayered interfacial membranes around microcapsules with different compositions: (i) one-layer (Soy protein Isolate); (ii) two-layer (Soy protein Isolate - OSA starch); (iii) three-layer (Soy protein Isolate - OSA starch – Chitosan). The morphology of the microcapsules was analyzed by scanning electronic microscopy. The hygroscopicity, solubility, particle size, encapsulation efficiency, Fourier transform infrared spectroscopy and release into water (37 °C and 80 °C) were also examined. FTIR confirmed the interaction between the wall materials. All microcapsules were not very water-soluble or hygroscopic while three-layer microcapsules compared to one and two layer microcapsules have lower moisture content and predominantly shriveled surfaces. The results indicated it was possible to encapsulate vanillin with the techniques employed and that these protected the vanillin even at 80 °C. The reduced solubility and low release rates indicated the enormous potential of the vehicle developed in controlling the release of the vanillin into the food and pharmaceuticals.

Keywords: Multilayer, Vanillin, Controlled release, Soy protein isolate, OSA-starch, Chitosan

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