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Encapsulated Microbial Propionic Acid as Additive for Texture-Defined Bread

Monica Trif^{1,*}, Ann-Kristin Schwarze², Berta Alvarez Penedo², Malte Bethke³ and Alexandru Vasile Rusu²

¹ Department of Food Research, Centiv GmbH, 28857 Syke, Germany

² Biozoon Food Innovations GmbH, 27572 Bremerhaven, Germany;

³ Department of Process Technology, Centiv GmbH, 28857 Syke, Germany;

* Correspondence: mt@centiv.de

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Abstract: The main goal of ELBE-NH project funded by Federal Ministry of Education and Research (BMBF) Germany, is the utilization of the by-products of lignocellulosic biorefinery into high valuable compounds. One of such targeted compounds selected is propionic acid (PA) (obtained by microbiological conversion of the hydrolysates). PA is particularly suitable for use in industrially produced bread and baked goods, for preservation (antifungal abilities) as free acid or as sodium/calcium salts. Because of its astringent smell and strong acid taste, PA is rarely used in the food industry as free acid. Our aim is to test the possibility of (a) using encapsulated hydrophilic PA (0.3% w/v) into β -cyclodextrin (β -CD)/maltodextrin blends as the wall materials (19:1 or 17:3% w/v) spray-dried as additives incorporated direct into texture-defined bread product; and (b) into polysaccharide-based (e.g. carboxymethylcellulose (2% w/v) or chitosan (2% w/v)) biodegradation-resistant edible film (as carriers of PA antimicrobial agent (1.5-15% w/v)) with \ without addition of β -CD (5% w/v) to the film matrix, as packaging material to enhance the safety and shelf life of texture-defined bread product., The benefit of adding β -CD, during film preparation, consists in the forming of hydrogen bond interactions with PA, resulting in high amounts of PA encapsulation due to the “fully immersed” complexation phenomenon. The texture-defined bread is a soft gel-like structure bread, easy to swallow and can be consumed without chewing, for people suffering from swallowing and chewing disorders. The texture-defined bread will have a high protein content up to 15 % higher than that of conventional bread and can thus make an important contribution to combating malnutrition.

Keywords: propionic acid; fermentation; additive; encapsulation

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