Materials Proceedings

MDPI

Abstract

Encapsulated Microbial Propionic Acid as Additive for Texture-Defined Bread †

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† Presented at the 2nd Coatings and Interfaces Web Conference, 15–31 May 2020; Available online: https://ciwc2020.sciforum.net/.

Published: 14 May 2020

Abstract: The main goal of the ELBE-NH (Increased effectiveness of lignin-biorefineries by valorization of hydrolysates) project funded by the Federal Ministry of Education and Research (BMBF), Germany, is the utilization of the by-products of lignocellulosic biorefinery as high valuable compounds. One of the 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. Due to its astringent smell and strong acid taste, PA is rarely used in the food industry as a free acid. Our aim is to test the possibility of (a) using encapsulated hydrophilic PA (0.3% *w*/*v*) in β-cyclodextrin (*β-CD*)/maltodextrin blends as the wall materials (19:1 or 17:3% *w*/*v*), spray-dried as additives incorporated directly into texture-defined bread products, and (b) incorporating it 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 products. 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 bread with a soft, gel-like structure that is easy to swallow and can be consumed without chewing, intended for people suffering from swallowing and chewing disorders. The texture-defined bread will have a high protein content that is 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

Funding: The research leading to these results has received funding from the Federal Ministry of Education and Research (BMBF) Germany, program no. 031B0091, "BIORAFFINERIE 2021", and grant agreement No. 031B0660, "ELBE-NH".

Conflicts of Interest: The authors declare no conflict of interest.