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ABSTRACT BOOK

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IUFoST International Union of Food Science and Technology

EFFoST European Federation of Food Science and Technology

CEI Central European Initiative

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THE PROSPECT OF USING BIOPOLYMERS TO CONTROL THE NANOSTRUCTURE AND FUNCTIONAL PROPERTIES OF BUTTER

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One of the most important current social issues today is creating functional products, aiming at preventing diseases and preserving people's health. Special attention is paid to using food supplements of raw vegetable material. We created new types of butter containing pectin and inulin biopolymers, obtained from raw vegetable materials. According to the results of clinical studies the designed types of butter are recommended by Ministry of Health to use in prophylactic nutrition and diet.

Complex research showed us, that pectin and inulin polysaccharides in the butter heterosystem are surface-active substances (SAS). Butter micro- and nanostructure consists of crystalline aggregates, nanoblocks and nanograins, that form during the process of its self-organizing. The mechanism of nanostructure self-organization is based on phase transformations and glyceride fractioning.

Primary stage of crystalline fat phase formation is generation of crystalline embryos out of most high-melting glycerides. During the process of growth of nanograins, nanoblocks and aggregates there's glycerides fractioning on solidification, conformation and polymorphic forms. Identic glycerides pack into lamels; noncrystallized glycerides and liquid phase with dissolved biopolymers are pushed back on periphery. Crystalline nanograins about 5-10 nm in diameter form lamels, on their bounds adsorptive layers of biopolymers and liquid phase are formed. The nanostructure of crystalline aggregates and nanoblocks consists of nanograin alternate lamels and liquid phase streaks. Amorphous crystalline polysaccharide lipidic layer is formed on the surface of aggregates and nanoblocks.

It has been established, that bringing in pectin and inulin polysaccharides stimulates the reduction of butter structural elements by 5-25 times, bigger part of the elements varies from 1 to 100 nm. The amount of liquid phase dispersed at nanolevel increases to about 60%. This slows down microbiological and oxidating processes of product spoilage, and therefore increases its biological value. Thus, the rise of biological value of butter types that contain inulin and pectin is connected with functional properties of these polymers as well as with nanostructure peculiarities of these types of butter.

Everything mentioned above proves the prospect of using biopolymers for nanostructure control, control of functional and physical-chemical butter properties and other food products that contain fat, and for creation their nanotechnologies.