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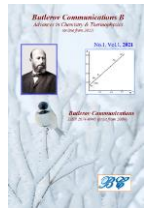

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Study of relaxation properties of biopolymer fibrous-porous material

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Keywords: reaction spectroscopy, deformation properties, fibrous-porous material, collagen fibers, structure of fibrous-porous material.

Abstract

The article presents the results of comparative studies of the relaxation properties of fibrous-porous materials using the Relax computer measuring complex.

The deformation properties of fibrous-porous materials are closely related to the nature of the components that form its structure. The study of relaxation characteristics allows you to get an idea of the elements that form the structure of the material and the structure as a whole.

The obtained relaxation spectra made it possible to trace the change in the nature and rate of relaxation of structural elements of different levels of material organization.

As objects, fibrous-porous material obtained using cryostructuring based on collagen fibers and collagen dispersion was considered. For comparison, samples of natural skin and artificial fibrous material with a polymer coating were used. The use of the relaxation spectroscopy method made it possible for the first time to obtain data on the structure of the new fibrous-porous material "cryoderm." It was established the presence of two structural levels of the organization, which have a dominant effect on the relaxation properties of the studied material. The effect of porosity on relaxation processes is shown, the greater the porosity of the material, the lower the amplitude of relaxation rates, the sinusoidal nature of the spectrum is "smoothed," while relaxation processes caused by elements of the microstructure are accelerated. It is noted that there is no rectilinear dependence of relaxation processes on the magnitude of the initial load, which confirms the complex nature of the behavior of various elements in the relaxation process.

Basic possibility of assessment of structure of fibrous porous material on relaxation spectra and, first of all, presence of different levels of structure organization is shown.

Relaxation processes in such complex systems, essentially composite materials with a semi-rigid matrix, are cooperative in nature, and the total result of relaxation is influenced by many factors, and primarily the qualitative and quantitative characteristics of porosity, which have yet to be studied.

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