**INFLUENCE OF NANOSILICA ON THE WATER PHASE TRANSITIONS IN HYGROSCOPIC SYSTEMS**

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By low-temperature 1Н NMR spectroscopy and thermogravimetry methods, the effect of hydrophobic (AM1) and hydrophilic (A-300) nanosilica on the process of evaporation and freezing water, linked to hygroscopic grape seed extract, bio-preparation Enoxil (Ex), has been studied. It is shown that in composite systems based on hygroscopic bio-preparation (Enoxil) the nanosilica change the character of binding water. The total amount of water retained in the composites is significantly smaller than in pure bio-preparation. It varies in the series Ex > Ex/A-300 > Ex/(A-300 + AM1) > Ex/AM1, which is reflected in the amounts of absorbed water, as well as in the values of interfacial energy and concentration of strongly bonded water, as well as in the cluster size of adsorbed water. In terms of the mass of bio-preparation present in the composite, the absorption of water increases at high humidity and significantly decreases at low humidity, which is particularly evident for the composite based on hydrophobic AM1 nanosilica.

One can assume that the effect of nanosilica on the processes of condensation, evaporation and freezing of water is due to the large difference in the water ability to dissolve in the bulk and nanostructured biomaterials. If the size of distributed particles of Enoxil on the nanosilica surface is measured in nanometers, water forms preferably a liquid shell from the outside of the particles and only partially dissolves in the bulk of the biomaterial. This water is weakly bound to the interface boundary. Accordingly, it condenses easier at high humidity and evaporates easily at low humidity. The effect increases with decreasing the surface hydrophilicity and becomes maximal for the composite based on hydrophobic silica.It is suggested that the observed effect is due to the formation of nanoparticles of bio- preparation in which the solubility of water is substantially less than in the Ex bulk. This effect can be used to stabilize lyophilized biological tissues and cell cultures.