

During the project we want to develop technology for **generation and application of stable thin films of surface** formulated from mixtures of **hypoallergenic, non-toxic biological polymers**, mainly **biosurfactants (proteins, polysaccharides, glycolipids and phospholipids)**. The biological film compositions will be enhanced by the addition of biopolymers with huge **antibacterial, fungicidal or regenerative for skin** activities. Such surface thin film could in the close future become basis of the **cosmetic and dermatological composition** for the multiple use products. Thanks for them the skin will be simultaneously **protected, lubricated and regenerated**. The medical impact of the biological film will be further strengthened by the addition of silver nanoparticles. Similar multicomponent film layer would be the **first line of the skin body defense against a various pathogens**. Similar thin surface film could be also used as a pathogen barrier in **food industry as a natural preservatives**. The same technology may be utilized in the agricultural production in natural **green pesticides**. The similar application of the technology let us in close future **reduce the amount of synthetic surfactants incorporated into the natural environment**.

We will study the adsorption process in multicomponent biological surface active agent solutions. Similar research hasn't been presented yet in the literature of subject. The various scientific manuscript present the adsorption analysis of mono or two components biological systems. It could be assume, that due to high complexity of similar measurements and the need to perform of multiple intersection tests discourages scientists to conduct similar research. But it must be pointed that similar multicomponent system exist in the pharmaceutic and cosmetic technology. Unfortunately the technological knowledge aren't supported by the scientific research and analysis. In the result the most of produced and used cosmetic products includes many times more surfactants (synthetic or biological) than it is necessary. In the result the problems connected with the skin allergies (caused by the cosmetics) and water pollution (from cosmetic wetting agents or detergents) still increase.

During the project we want to designate the minimum necessary concentrations of surface active or wetting agents in our composition. Even in the case of biosurfactants we want to use the minimum enough concentrations. Thanks for this we prevent allergy and environmental problems now and in future. To obtain it we must perform the long and accurate adsorption analysis for each study by us biopolymer. The adsorption properties in solutions of single biosurfactants and mixtures consisting its compositions will be studied by the dynamic and equilibrium surface tension, surface elasticity, surface viscoelasticity, bulk viscosity and by optical fluorescence microscopy methods. In the case of compositions with the proper surface active properties, the adsorption layer will be applied on the surface of specially designated solid plates gold, silica or mica). The plates would be covered before by the special layer, similar to the artificial skin. The obtained thin surface layer (from studied solutions or mixtures composition) will be next analyzed by the quartz crystal microbalance (in the case of gold sensors), atomic force microscopy, contact angle (which describe the surface energy of solid), cryogenic scanning electron microscopy, confocal microcopy and other new, innovative and sophisticated methods. Thanks for it we will be able to characterize the thickness of the layer, adsorption degree, biopolymers composition, the single biopolymer molecule size, shape and orientation over the simulated artificial skin layer.

We hope that our result in future could will have the strong impact on the cosmetic and pharmaceutic industry. The hypo allergic, non-toxic biological thin film can be a modern, innovative and green product of the XXI century.