

## **DESCRIPTION FOR GENERAL PUBLIC**

The polymer structures of a three-dimensional porous network used as biomaterials and matrices for biomedical and electronic studies have attracted a great deal of attention. 3D printing, one of the methods of manufacturing the constructs, has become increasingly popular in the last decade as it can produce complex objects directly from computer-aided designs (CAD) with various shapes and sizes from many biodegradable and biocompatible polymeric materials such as personalized drug delivery systems, and suppositories as well as many other biomedical (tools, biosensors) and non-biological applications (electronic devices). 3D printing will revolutionize medical, electronic, material and chemical industries, and will make it possible to print three dimensional structures of damaged tissues as well as wound dressings, suppositories and pills from biomaterials containing antimicrobial agents, drugs and mineral components or even the whole cells, directly in hospitals.

3D printing of structures consisting of various active substances is quite new area of interests (last few years) and there are only few articles relating to design and preparation of three-dimensional composite systems, and some phenomena have not been fully investigated and explained. Thus, there is a great need for conducting more experiments in order to improve our knowledge in this area.

Our task was to synthesize and characterize various three-dimensional polymer constructs containing germ-destroying agents such as antibiotics, antifungal substances, silver nanoparticles and natural compounds (antioxidants) using 3D bioprinter with syringe extruder. Not all essential factors that influence the synthesis, ensure stability of composite structures and the diffusion of active substances from the differently shaped matrices are known, which is why additional experiments are required. The effect of printing parameters (speed, temperature, pressure, nozzle diameter, pathheight and pathspace), the chemical composition of composites, method of crosslinking and network geometry on the stability and antimicrobial activity of the structures will be evaluated. Moreover, one of the research steps is such a modification of biodegradable polymers as to obtain anti-germ features. The goal of this stage is to develop the material that is biodegradable, biocompatible and printable and has antimicrobial properties that are constant over time in comparison to composites that release active substances in a controlled manner.