DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Pseudomonas aeruginosa as opportunistic pathogen is of great therapeutic concern due to its high intrinsic resistance and great genome plasticity that allows high fitness and adaptability to environmental changes. One of critical factors hindering eradication of the *P. aeruginosa* is biofilm formation. The bacterial biofilm is a unique complex community, which is a part of survival strategy of many microorganisms. The most infectious diseases are caused by bacteria which proliferate within quorum sensing (QS) mediated biofilms. Efforts to disrupt the biofilms have enabled the identification of bioactive molecules, which may act as quenching the QS system. Therapeutics that inhibit the QS could attenuate the virulence of the bacterium and assist the host immune system in clearing the infection. Moreover, the natural bacteria predators – bacterial viruses (bacteriophages) are used as anti-biofilm agents.

The proposed project is aimed at development of an innovation technology that will combine different approaches to highly bioactive hydrogels with anti-bacterial components (furanones and lytic phages). The project is designed to explain an important issues related to biofilm eradication and prevention in wounds infected by *Pseudomonas aeruginosa*.

The interdisciplinary project combines knowledge two topic areas such as natural science (microbiology, virology) and nanotechnology (synthesis and surface modification of materials). The study will be focused on an investigation of new biocomposites containing phage particles, furanones, and copper to evaluate their biocompatibility, antibacterial, anti-virulent, and anti-biofilm properties. Our proposal is considering an aspect that has great importance in the case of an optimization of physicochemical parameters of multifunctional biomaterials with respect to the secretory activity of furanone, viral compounds and copper ions. To date, there are no published studies addressed to bioactive hydrogels combined with anti-bacterial components (furanones and phage particles). The project would increase the knowledge of novel nanobiocompounds and biocomposites activity.