

## **DESCRIPTION FOR THE GENERAL PUBLIC**

Hydrogels are natural or synthetic polymeric networks capable of absorbing large amounts of water or biological fluids. Hydrogels have been commonly used in a wide range of applications, such as hygiene products, contact lenses, tissue engineering, drug delivery systems and wound dressings. Polymers could be converted into hydrogels through reactions with cross-linkers (small molecules which are able to bond one polymer chain to another).

The aim of the project is to develop methods of synthesis of novel hydrogels based on poly- $\gamma$ -glutamic acid ( $\gamma$ -PGA) cross-linked using different molecules, such as saccharide derivatives. The  $\gamma$ -PGA is a biopolymer produced by several species of bacteria during fermentation process. The  $\gamma$ -PGA is water soluble, biodegradable, non-toxic for humans and the environment and edible, therefore this biopolymer as well as  $\gamma$ -PGA-based hydrogels have been applied in wide range of fields, for example in food industry, water treatment or medicine. In this project, the  $\gamma$ -PGA-based hydrogels will be prepared through different synthetic approaches using various cross-linkers. Obtained hydrogels will be examined as delivery systems of drugs and probiotic bacteria in order to determine their suitability for these types of applications. The drug delivery systems are used to transport drugs in the body to safely achieve its desired therapeutic effect. Probiotic bacteria are living microorganisms which, when administered in adequate amounts, provide health benefits for the host. The delivery system for the probiotic bacteria should improve their survival under conditions of the gastrointestinal tract, because to act as probiotics, the bacteria must survive in the acidic stomach and have to be delivered to the intestines at high numbers.

The implementation of tasks planned in the project should provide a series of novel  $\gamma$ -PGA-based hydrogels with prospective applications in the field of delivery system of drugs and probiotics. Known  $\gamma$ -PGA-based hydrogels have shown properties suitable for various medical-related applications, therefore further development of hydrogels based on this biopolymer should provide other promising materials for these kind of applications. Continuous development of materials for medical applications is reasonable due to the need for improving existing medical solutions and to provide better effectiveness in the health care.