

Chitosan is a biopolymer which, through the presence of functional groups, can be subjected to various modifications in order to obtain desirable biological activity.

The aim of this project is to investigate the biological properties of modified chitosan nanocomposites, and the relationship between the chemical structure (containing mineral components) of these compounds and their biological activity. Due to intensive technological development, the demand for natural materials with unique physical, chemical and biological properties, which are fully biodegradable, non-toxic and do not pose a threat to humans is increasing.

The study will involve the examined of modified chitosan nanocomposites with a different content of mineral components (graphene oxide, V_2O_5 , ZnO, Fe_2O_3 , Ti_2O_3). It is hypothesized that their addition can improve the physicochemical properties of chitosan films and thereby increase their mechanical and thermal stability, as well as their antimicrobial activity as compared to unmodified chitosan. The study will include the determination of microbial activity of these nanocomposites, their mechanisms of action on microorganisms and impact on eukaryotic cells in order to exclude their possible cyto-, hemo- and genotoxicity and biodegradability.

The research will certainly contribute to extending the knowledge in the area of biological activity of chitosan with selected compounds (grapheme oxide, V_2O_5 , ZnO, Fe_2O_3 , Ti_2O_3) and will also allow verifying their potential use in the future as alternatives to the currently used materials.