

Nowadays, a growing problem in the world is the increasing amounts of the chemicals added to the everyday products to ensure the stability and the purity during their storage. At the same time, more often consumers are choosing products containing natural additives or compounds obtained in the environmentally friendly processes. In addition, much attention is paid on a reduction of impact of excessively high doses of chemicals present in household chemicals or cosmetics, by a reduction of their concentration with concomitant retaining their bactericidal activity. For this reason, researchers with increased intensity are searching for new compounds with antioxidant and antimicrobial activities, which can be obtained using environmentally friendly processes and used as a new antibiotics or stabilizers of the products for everyday use. Currently, much attention is paid to the development of new environmentally friendly technologies of these compounds synthesis based on the action of the enzyme biocatalysts. One enzyme that may replace the chemical catalyst is fungal laccase, a biocatalyst which may take part in the transformation of many organic compounds with diverse chemical structures into the products about new physicochemical properties, including the novel compounds having antibacterial and antioxidant activities. The only limitation of its use on an industrial scale is limited number of precursors with a good solubility in aqueous media. To solve this problem, the laccase-mediated transformation process can be performed in two-component transformation system containing small concentration of organic solvents or ionic liquids, increasing the solubility of the precursors. The use of these reaction co-solvents can also affect the selectivity of the biotransformation what provides improving of products obtained homogeneity. The aim of the project is to assess the impact of the presence of organic solvents and ionic liquids on laccase-mediated synthesis of products having antioxidant and antimicrobial properties and to propose the mechanism of this product reaction synthesis. The use of fungal laccases for the synthesis of new bioactive compounds is environmentally friendly alternative to classical organic chemistry, it does not require the use of toxic coupling agents, and this biocatalysis reaction takes place under mild conditions of pH, temperature and pressure values.