One of the major threats associated with the development of civilization is a depletion of fossil fuel reserves and increasing pollution of the environment. It can be minimized by the use of renewable feedstock both for the production of fuels and chemicals of high industrial importance.

The conducted research suggests that an application of lignocellulosic biomass to the production of fuels can provide a very attractive alternative in comparison to the use of traditional resources. It is relatively cheap, does not compete with food production and can contribute to reduction of carbon dioxide emission.

It was demonstrated that the yield and selectivity of the biomass conversion process can be strongly improved by using heterogeneous catalysts. These catalysts usually consist of metallic phase introduced onto the support which allows to increase stability and dispersion of the metal on the surface.

Therefore, the main goal of the project is a development of efficient method for the production of valuable chemicals and biofuels by the conversion of waste biomass using the catalyst based on non-noble metals. The use of such metals are less expensive in relation to the application of i.e. rhodium, platinum or palladium (this can be achieved, if it is possible to obtain satisfactory activity of the catalyst with simultaneous maintaining the stability of the prepared material in the reaction medium).

Synthesized catalysts will be tested in different types of reactions which lead to the formation of valuable chemicals, such as gamma-valerolactone, which can be used as a biofuel additive.

Optimization of physicochemical and catalytic properties of the prepared materials will be possible by the selection of a suitable support and conditions of catalyst treatment or introduction of various additives to the catalyst structure. As a result, we would like to create systems with the activity greater than those which were based on the precious metals.

Physicochemical properties of the tested catalysts will be determined by the use of modern instrumental methods, such as electron microscopy, mass spectrometry or X-ray diffraction analysis. Activity tests will be carried out in autoclaves using standards and real biomass samples. Additionally the effect of impurities from the biomass on the catalytic activity will be investigated.