Recently, there has been a growing interest in conducting research in obtaining chemical compounds, energy and fuels from renewable energy sources. The main focus is on developing effective technological solutions that may become a potential equivalent for the processing of fossil fuels in the future. Attention is also drawn to the fact that huge amounts of carbon dioxide are emitted into the atmosphere during the combustion of conventional fuels, which contributes to climate change, including global warming.

The rapidly shrinking resources of non-renewable energy sources may contribute to an increase in the prices of energy, fuels and chemicals. Growing consumption together with an increase in the production costs of conventional fuels may cause an economic crisis that will be hardest hit by countries with medium and low GDP.

One of the interesting and promising solutions is the processing of lignocellulosic biomass, which is waste from various industries, such as forest, agricultural or paper, as well as all organic, food or municipal waste. Conversion of waste, including lignocellulosic biomass, can contribute to achieving sustainable waste management, the production of valuable renewable energy carriers, and above all, reducing the progressive climate change, including the reduction of toxic waste during its processing.

Biorefinery processes are usually carried out with the participation of catalysts, therefore an important issue, apart from the preparation of the raw material charge and the selection of process conditions, is also the selection of the appropriate catalytic material. These materials should be characterized by a low price, the presence of numerous active centers and a developed specific surface. However, the search for suitable catalysts for a particular type of reaction is still on the basis of trial and error. This is due to the limited knowledge about their operation, and more precisely about the operation of active sites and the reactions taking place on them.

Catalytic conversion of lignocellulosic biomass may constitute a potential new chemical pathway to obtain valuable compounds, including support for the currently existing technological solutions. It may also contribute to limiting the processing of non-renewable energy sources, and thus potentially reduce production costs, through the use of waste and non-toxic catalysts.

The aim of this project is to functionalize natural clinoptilolite by giving it catalytic properties. The *one-pot* method of converting the cellulose fraction (glucose) into carboxylic acids (**lactic acid, pyruvic acid, levulinic acid and formic acid**) will be carried out on the designed clinoptilolite catalysts. The products obtained during the conversion of biomass with the use of non-toxic catalysts can potentially be used in the food and cosmetics industries. The development of a new technology and conditions for conducting the catalytic process may constitute a promising new technological solution that will support the growing demand for this type of chemicals.