One of the major purposes of scientific research is to understand the processes that take place in living organisms. A special type of such transformations is the metabolism. The scientists try to study this process using known methods. However, due to the complexity of the process, it requires a special research effort. Metabolic pathways are linked series of life-sustaining chemical transformations within the cells of living organisms. The reactants, products, and intermediates of this biological pathways also known as metabolites, are modified by a sequence of chemical reactions catalysed by enzymes. The scientists try to mimic this processes *in vitro* by combining chemical or enzymatic reactions in cascades to obtain complex organic molecules. Several different methods have been used to emulate this complex processes. Such cascades formed from the combination of chemical and enzymatic reaction, are efficient tools for synthesises of complex products like peptides or their analogues called peptidomimetics. The most convenient cascade reactions are the combination of various types of chemical transformations. Very interesting type of reaction that was not previously studied in cascade systems are the multicomponent reactions (MCRs). Among MCRs, the Passerini and Ugi reactions that are based on isocyanide chemistry, are of the particular interest. The products of such reaction are peptidomimetics. The advantage of these transformations is that they conducted in water as well as in organic solvents. This important feature will be used in a project. **The main goal of this project is to establish new chemoenzymatic platform which is the fusion of the multicomponent reactions (MCRs) and biocatalytic transformations conducted as the chemoenzymatic cascades. Additionally, extensive studies under the influence of different factors on the course of chemoenzymatic cascades combined with MCRs will be investigated e.g. the role of enzyme.** We also plan to perform numerous precisely design and deliberated chemoenzymatic cascades combined with MCRs using modified enzymes. We will also study the influence of enzyme type and methods of enzyme immobilization on chemoenzymatic cascade. The literature recognized cascades are limited only to two sequential reactions what makes them inefficient in mimicking of the natural metabolic pathways. Due to this fact and limitations we desire to evaluate chemoenzymatic cascades which consist of more than two reactions providing reliable models of natural chemoenzymatic cascades. It seems extremely important to study whether such cascade may consist of a larger number of reactions, or if we can design the cascade reaction conducted in water as well as in an organic solvent. We also would like to know if in the case of such "artificial metabolism" the mechanisms of self-regulation will be observed as in living organisms. The positive answer to these questions can open a new chapter in chemical research through the development of the general concept of the synthesis of complex organic compounds from simple compounds, just as it happens in living organisms. In addition, the obtaining scientific data can be the crucial hint explaining the overall biological processes in which chemical and enzymatic transformations occur simultaneously in the living systems.