

## Popular summary of the project

Indispensable element of our times is permanent development of new technologies undoubtedly connected with still increasing demand for more sophisticated materials dedicated to specific applications. Intensive research conducted in the field of organometallic chemistry has been particularly focused on catalytic processes taking place in the presence of transition metal catalysts, which permit obtaining compounds with clearly defined structure and desired properties. In view of the variety of catalytic processes and high requirements of modern industry, the search for new catalysts and their use in new materials synthesis is an important course of studies undertaken by organometallic chemists in many renowned scientific centers on the whole world.

The assumptions of the project reflect challenges met by the scientists dealing with widely understood synthesis and organometallic catalysis. The main aim of the project is the synthesis of a number of bulky *N*-heterocyclic carbene ligands (NHC) precursors and their application as ligands to formation of new platinum and rhodium complexes. The research work involves multistage synthesis starting with selection of the right method, through optimization of each step to finally develop the method for isolation of the products from the postreaction mixture. Examination of series of NHC carbene ligands differing in possibly largest scope of stereoelectronic and structural properties, would allow determination of their influence on catalytic activity of the complexes. All complex compounds obtained within the project will be isolated and fully characterized by available methods of identification of chemical compounds such as nuclear magnetic resonance spectroscopy, elementary analysis or high-resolution mass spectrometry. If obtained in mono-crystals, their X-ray analysis will be conducted to get information on their structure. Catalytic activity of rhodium and platinum complexes will be studied in a number of test reactions, including acetylene dimerization and hydrosilylation of unsaturated compounds. For all of the processes the optimization tests will be made to select the most efficient reaction systems leading to desired products. The reactions of platinum and rhodium catalysts with equimolar amounts of substrates and will be performed and attempts will be made to isolate the intermediate products. Getting knowledge about the reaction mechanisms and isolation of well-defined catalysts in investigated processes should allow optimization of the reaction systems, i.e. obtaining high yield of desired products with full stereo- and regioselectivity in the possibly mildest reaction conditions.

The research theme of the project perfectly fits the mainstream of studies undertaken by the best international scientific groups dealing with advanced synthesis and organometallic catalysis. The planned tests concerning synthesis of new catalysts and their practical use in order to obtain pure, well-defined organic and metalorganic compounds should result in significant expansion of the knowledge in rapidly developing field of contemporary chemistry.