

## Popular summary of the project entitled

### “ Non-noble metal complexes bearing NHC ligands from renewable feedstocks as catalysts for sustainable synthesis of functionalized materials”

Stereoselective synthesis of compounds of expanded and strictly defined structure has been for many years a subject readily undertaken by many research groups from renowned centres all over the world. It is a consequence of civilization progress and increasing demand for advanced materials dedicated to specific applications. It has been estimated that about 90% of fine chemicals, like e.g. pharmaceuticals, have been obtained by the methods based on catalytical processes. A vast majority of the currently applied catalytic transformations take place in the presence of noble metal complexes, that besides the well-documented benefits show some serious drawbacks that do not permit their use in industrial processes. The greatest problems are their high cost and poor stability responsible for generation of much waste, pollution of final products and impossibility of the reuse of such catalysts. These drawbacks have driven the search for new catalysts based on cheaper metals, commonly present in the Earth crust and on non-toxic ligands of natural origin. This approach is consistent with the principles of Green Chemistry, that is an important contribution to sustainable development, and one of significant challenges of organometallic synthesis in a broad sense.

In view of the necessity of minimization of threats to the natural environment caused by human activity, the main aim of the project will be design of new sustainable and economically justified procedures for the syntheses of a wide range of functionalized organic and organometallic compounds commonly used in pharmaceutical industry and production of the so-called *fine chemicals*. This aim will be realized through working out the procedures for syntheses of new generation of well-defined manganese, cobalt and nickel complexes, supported on the skeletons of appropriately modified theophylline or caffeine. The obtained complexes will be fully characterized and tested as possible catalysts of selected catalytic processes. An important part of the study will be a wide range of optimization tests of each transformation proposed performed in order to select the most effective systems permitting the highest possible efficiency and selectivity of synthesis of desired products in the mildest possible conditions. Finally the optimized reaction systems will be used for the syntheses of extended range of organic compounds. Other novelties of the study will be the synthesis of a number of heterobimetallic complexes that would permit tandem reactions with no need of isolation of intermediate products. Apart from the above, results of the project are expected to provide information on the mechanisms of the methods proposed and identification of the actual catalysts.

The subject of the proposed project fits perfectly in the area of research work of interest to the many groups working on advanced synthesis and organometallic catalysis. The planned tasks including syntheses of new, inexpensive and nontoxic catalysts and their practical use in order to obtain pure, well-defined organometallic compounds should considerably enrich the knowledge on the studied issues and contribute to sustainable development.