

METALLOSUPRAMOLECULAR ARCHITECTURES BASED ON FLEXIDENTATE PYRIDYL- β -DIKETONATE LIGANDS – SYNTHESIS, PROPERTIES AND CATALYTIC APPLICATIONS

Metallosupramolecular complexes are of great interest because of their aesthetic appeal, fascinating topologies, tailored properties and inherently incredible versatility. Such multicomponent systems, built up by joining together organic ligands and metal cations, adopt various architectural forms that can be relatively easily engineered in respect of prospective functions. Over the past few decades, research in the field of coordination and supramolecular chemistry has led to the development of a wide variety of complexes with a high degree of complexity and a precisely defined structure, such as metallocages and macrocycles, but also more extensive multidimensional coordination networks. The study of self-assembled heterometallic systems within the broader context has attracted great and increasing attention from the scientific community due to their numerous applications. Despite the substantial resources devoted to understanding the nature of such materials, their synthesis and control of physicochemical properties still remain a considerable challenge. As a consequence of both longstanding and newly recognized problems, the continuous development of metallosupramolecular chemistry demands constantly evolving synthetic strategies, characterizations and research on application potential.

In this project, a new generation of coordination assemblies of various topologies and unique properties will be developed with the use of a wide range of flexidentate pyridyl- β -diketonate ligands and *p*-*d*-electron metals. A range of building blocks has been precisely selected to prepare a series of novel metallosupramolecular compounds while conducting fundamental investigations on their physicochemical properties and functionality. The key research question addressed by the PI is how the diverse structure of organic units and metal coordination geometry induce different complex topologies (macrocycle, cage, polymer), *i.e.* exploring the correlation between the controllable component selection and the resulting nanostructure type (Figure 1). Due to the encoded structural properties, including the presence of metals with high catalytic activity and high local concentrations of active centres, the proposed coordination assemblies can find prospective applications in catalysis. The research will be conducted towards the use of the obtained complexes as efficient catalysts for the reactions catalysed by Pd and Pt, with particular emphasis on tandem reactions.

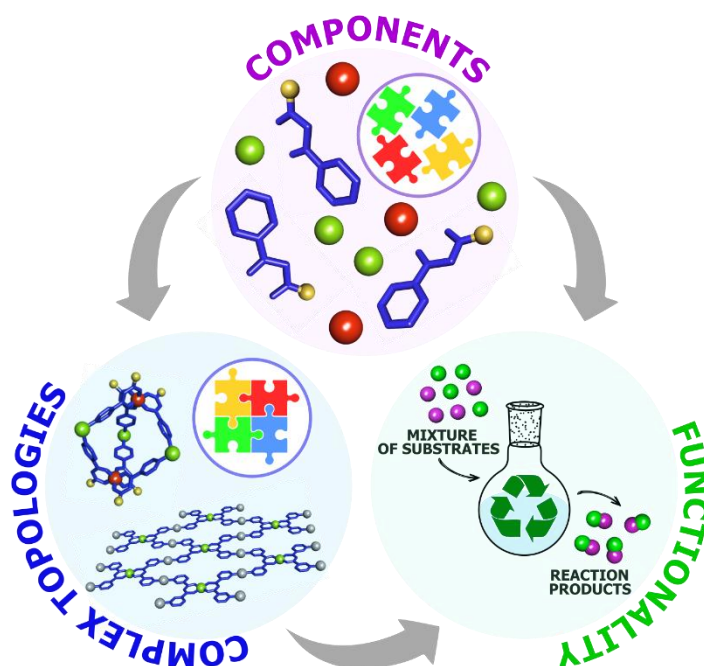


Figure 1. The correlations "ligand/metal geometry - complex topology - functionality" – research objective of the project.

This project is not only driven by the synthesis and characterization of new metallosupramolecular architectures, but also by a significant interest in mutual correlations between their structure, physicochemical properties and functionality. The proposed coordination assemblies with a wide variety of topologies should vastly expand the current knowledge of metallosupramolecular systems. Furthermore, the proposed approach should ensure easy access for investigation of relationships between complex structure and catalytic activity, as well as to carry out the necessary modifications in order to increase their application potential.