DESCRIPTION FOR THE GENERAL PUBLIC

Silicon compounds are used in many areas of economy and technology, from the most popular in cleaners, detergents, cosmetics, additives to food products, to more spectacular in medicine, electronics, car industry and airplane industry. Organoboron compounds have numerous applications in the production of drugs, pesticides and materials with special properties. The majority of them is obtained in catalytic processes, most often in the presence of noble metal complexes. The commonly used catalysts in this process are platinum, rhodium and palladium compounds. However, high price of noble metals and impossibility of their reuse in technological processes, have prompted us to search for alternative cheaper solutions, based on other elements, but of similar effectiveness.

The scientific aim of the project is design of new effective and selective catalytic systems for the synthesis of organosilicon and organoboron compounds (via hydrosilylation and hydroboration of alkenes and alkynes) based on the complexes of more abundant transition metals (iron, cobalt, nickel, manganese) with the ligands of Schiff bases type and trialkylhydroborates of metals from group I of the periodic table ($M^{I}HBR_3$).

Currently of key importance is optimization of the catalytic reactions, that is the search for the ways of making them safe for the natural environment, highly effective and selective, capable to perform in mild conditions and tolerant to reactive functional groups. The search for new, simple in synthesis and much cheaper analogs of noble metal catalysts or active systems based on derivatives of the main groups elements has become one of the priorities in catalysis.

The outcome of the project will be proposition of selective methods of molecular and macromolecular syntheses of organosilicon and organoboron compounds of great synthetic (as reagents in organic synthesis: alkenylsilanes and alkenylboranes) or application (polycabosilanes, cross-linked silicones) significance.