One of the most important areas of research in current organic chemistry is the development of efficient methods for the synthesis of complex bioactive compounds and drugs. Active substances of modern drugs are more and more structurally complex compounds, which most often have to be produced as pure enantiomers through highly efficient and effective transformations. Thus, the development of methods allowing for stereocontrolled synthesis of chemical compounds is currently the main stream of organic chemistry. After more than 40 years from the first use of transition metals for the catalytic asymmetric hydrogenation of alkenes and carbonyl compounds, the most effective catalysts for these changes are still compounds of rhodium, iridium, ruthenium or platinum. Certain disadvantage of these metals is their high cost as well as toxicity and unwanted impact to the natural environment. These negative aspects are not only a problem in the context of environmental protection, but above all a fundamental limitation in the choice of the methodology used. Interestingly, much more available and cheap zinc is not broadly used in asymmetric synthesis, although the complexes of this metal, also those containing chiral ligands, are well known. Zinc ions are components of many enzymes where they play the role of both the stabilizer of the spatial structure and the cofactor, participating in the catalysis of substrates. Although for many years asymmetric catalysis was dominated mainly by platinum complexes, we are now observing an increasing interest in zinc and iron complexes. Within the framework of this grant, we postulate searching for catalysts composed of zinc salts and chiral ligands for hydrosilylation reactions of cyclic imines and asymmetric ATH hydrogen transfer. The development of catalysts for this reaction can be considered as an interesting challenge in the field of catalyst design and green chemistry. In turn, the postulated search for catalysts for the reductive aldol reaction extends our knowledge about the use of new catalysts in this reaction and forces us to verify the view of limiting known catalysts to "coins metal hydrides." Moreover, a closer look at the mechanisms of chiral zinc complexes is important and rational a justified issue also in the context of progress in knowledge in the field of organic chemistry and biochemistry.