A great progress achieved worldwide during the recent decades in the quality and longitude of life can largely be ascribed to the discoveries and developments in medicine and agriculture, closely followed by those of the pharma-, agro- and food-industries. But to preclude harmful, even dangerous effects of many bioactive compounds of chiral character on the living species, only the selected enantiomerically pure/enriched forms are given the legal permission for application. However, since the most conventional chemical syntheses afford only their racemic (50/50) mixture, the separation of which into specific enantiomeric compounds is quite expensive, the societies are confronted with a serious techno-economic problem. Even more so that the much advocated method of kinetic resolution (KR), which makes use of the enzymes (mainly lipases) as enantiselective biocatalysts, offers only a theoretical product yield of 50%.

Far more effective appears to be the method of dynamic kinetic resolution (DKR) in which the kinetic resolution and the conversion of an undesired chiral compound into the desired one run concurrently. In effect, such approach enables to achieve theoretical yield of even 100%, yet it necessitates two enantioselective catalysts: one to boost the KR reaction (lipases) and the other one to racemize the system (ability featured by the selected metal complexes or nanoparticles). Nowadays the bulk of research in this area centers on the selection of suitable catalysts for both of the reactions and also synchronization of activities in the batch (periodic) operations. Reports on reuse and recycling of the catalysts, as well as on the continuous-flow mode of DKRs are very scarce, although those modification could greatly improve its technological efficacy and an overall economy. **The proposed project aims to focus on the studies and development of the continuous-flow mode of the DKR process for secondary alcohols and primary amines (considered as exemplary chemicals) with the use of novel microreactors: i) continuous-flow monolithic reactor, and ii) annular rotating basket reactor of SpinChem type.** Reactive cores of which will be made of the cylindrical monoliths or smaller particles possessing very open 3D hierarchical pore structure, which is expected to have a very pronounced positive effect on their performance.

Siliceous monoliths possessing hierarchical pore structure: large flow-through macropores of micrometric sizes and large mesopores (of nanometric sizes), large specific surface area, good thermal/chemical/biological resistance and mechanical strength, can be obtained using the sol-gel method combined with phase separation and fabricated in different forms and sizes. The continuous-flow reactor will be made of a cylindrical rod (10 x 80 mm), whereas the SpinChem packing of the smaller conical pallets. Their surface will be functionalized with different entities to attach the enzyme and the metal complexes (Ru) or nanoparticles (Pd). The potentials of thus obtained (micro)reactors will be investigated in the DKR of racemic mixtures of amines and alcohols.

The latter chemicals are synthetic building blocks for many important medicaments and plant protecting compounds. However, besides laying a solid foundation for the effective solution of an important technological and hence societal problem (*vide supra*), the project is expected to further our knowledge and indicate the rational technical means and pathways for the continuous synthesis of complex chemicals in the cascade reactions, i.e. in the way they occur in nature. We believe that the importance of such knowledge can hardly be overestimated.