ABSTRACT IN INGLESE

In the great realm of organic synthesis, phase-transfer catalysis (PTC) is a well recognized methodology which plays a key role both in industry and academia research. This process involves reactions that take place between reagents which are located in different phases, for example an inorganic water-soluble reagent and a substrate soluble in the organic phase. Considering the well-defined advantages of asymmetric phase-transfer catalysis as a powerful method for organic synthesis, the aim of this research project is to introduce novel macrocycle systems as new and efficient catalysts in this field.

First of all, considering the advantages of the easy synthetic process for the preparation of cyclopeptoids, their well-explored complexation properties and the preliminary study on the application as phase-transfer catalysts, the idea is to deeply investigate their use in PTC. The advantages of the solid phase synthesis, such as the easy purification of the intermediates and the modular nature of the products, make cyclopeptoids ideal candidates for the discovery of new catalytic systems, as it is possible to incorporate a wide variety of functionalities inside the backbone of the macrocycle in an expeditious way. As a consequence, a library of peptoid-based chiral macrocycles of different size, decorated with alternating residues of L-Proline and different aromatic side chains, will be prepared and used for enantioselective alkylation reactions.

The scope of this project extends also to the investigation of novel chiral calixarenes. However, in this case, the idea is to exploit the ability of calixarenes to form host-guest complexes with alkali cations. The study is also devoted to further explore the potential of crown ethers in new catalytic processes. The second chapter focus first on the synthesis of novel chiral cyclopeptoids and then on their application in asymmetric phase-transfer alkylations, in particular for the enantioselective synthesis of α-amino acids. Afterwards the application of new designed calixarenes for the same alkylation reaction is described. Finally the application of cyclopeptoidic systems in the enantioselective alkylation of 2-aryl-oxazoline-4 carboxylic acid esters is discussed. The third chapter describes the application of crown ethers in phase-transfer processes. For this purpose a diasteroselective methodology for the synthesis of γ-substituted butenolides by a direct vinylogous Mukayama-Michael reaction has been developed.