Postdoctoral fellowship at ENS Lyon, France

Design of New Enantiopure Receptors Family for Selective Recognition of Chiral anions in Aqueous media

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Key words: multi-steps organic synthesis, chiral resolution, enantiopure synthesis, host-guest chemistry, chiroptical properties.

The design of artificial receptors for selective anion recognition is of great importance in biochemistry, environment and medical areas.[1] However, anion complexation by synthetic receptors in water remains challenging with respect to organic solvents. Anions exhibit very high solvation in aqueous solutions, and therefore, they are more difficult to bind by molecular or macromolecular hosts than the cations displaying the same size.[2] In the last two decades, several research groups have synthesized molecular receptors able to coordinate organic and mineral anions with high efficacy and selectivity. **Among the different strategies used for anion binding, supramolecular enantioselective complexation of chiral anions, which is defined by a host property to bind selectively one guest enantiomer over the other, has been the object of intensive studies over the last years**.[3] The design and study of artificial receptor for chiral anion recognition can accomplish two different objectives: i) this can help to understand the enantioselective anion recognition occurring in complex biological systems; ii) this can also provide a potent tool for chiral anion detection and separation based on the complexation properties of the receptor.[4]

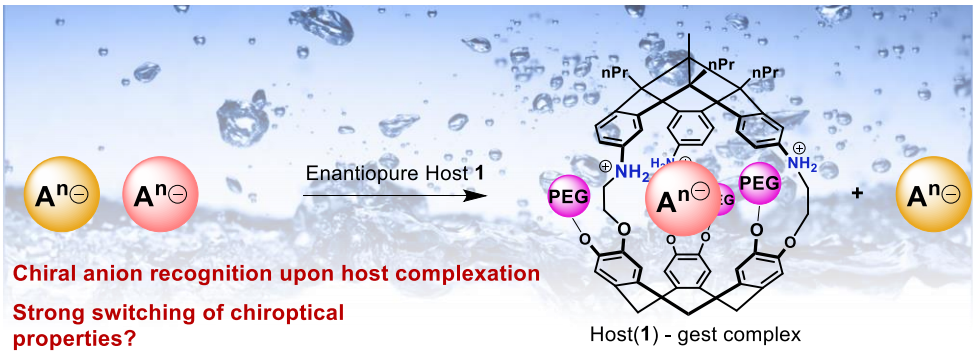

Chart 1. Design of a new family of enantiopure water-soluble receptor **1** for chiral anion sensing in organic and aqueous solutions.

Our project addresses the multi-steps synthesis of a novel family of chiral receptors in their racemic and enantiopure forms (chart 1)**. If successful, their chiral anion binding properties will be investigated in both organic and aqueous media.** These molecular hosts will be new structural analogs of cryptophane derivatives which have been widely used as efficient container shaped receptors for host-guest complexation studies. Cryptophanes are composed of two cyclotribenzylene (CTB) units connected by three bridging chains, leading to the well-known hollow structure allowing encapsulation of different neutral or charged guests.[5] However, several major breakthroughs will have to be solved considering the specificity of our project. **The development of a general strategy to synthesize our new family of molecular receptors with a perfect control of the absolute stereochemical outcome**

will be the first technical barrier to be lifted during this project. Since our family of hosts shall undergo conformational changes upon anion complexation, **significant chiroptical switch is also expected to occur in their ECD (electronic circular dichroism) spectra**. This will be a very promising tool for chiral anion sensing material if it exhibits a potent specificity in aqueous media containing complex mixtures of anionic species.

Profile: We look for **a highly motivated synthetic organic chemist** with an interest (or experience) in **supramolecular chemistry** and **chiroptical property studies**.

Duration: 1 – 2 years.

Starting date: January 2022.

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