“Structural modifications of *Cinchona* alkaloids. Oxidative coupling as a method for the extension of the quinoline fragment and the synthesis of derivatives functionalized in the C6’ position”

The oxidative coupling of electron-rich compounds, which is accompanied by the formation of new C-C and C-heteroatom bonds, is one of the main challenges posed by modern organic chemistry. The aromatic oxidative strategy has been widely discussed in the literature, particularly as an alternative in obtaining natural products for enzymatic processes occurring in nature.

One of the research topics was focused on the application of an oxidative coupling strategy as a variant of classical methods of synthesis of new heteroatom compounds, which are analogs, to those found in nature. The modification was based on the expansion of the aromatic quinoline fragment of *Cinchona* alkaloids.

The *Cinchona* alkaloids are classified as privileged catalysts and ligands in asymmetric synthesis. The spectacular catalytic activity of *Cinchona* alkaloids determines their unique structure e.g. 1,2-aminoalcohol, an olefinic moiety and an aromatic quinoline fragment. The diversity of *Cinchona* alkaloids structure, makes them attractive target for structural modification, which allows the design and synthesis of the catalysts intended for the specific reaction. The new *Cinchona* alkaloid analogs, expanded in the aromatic fragment with 2-aminophenoxaz-3-one system, were obtained by oxidative coupling of the corresponding amine alkaloid derivatives and 2-aminophenol derivatives. *Cinchona* alkaloids and phenoxazinone, ring-fused products, due to the their dual nature, may constitute interesting chiral organocatalysts as well as biologically active molecules.

Another research topic involves the modifications of *Cinchona* alkaloids particularly functionalization of C6’ position in quinoline fragment. Up to now, the literature, presents the synthesis of a series of derivatives of *Cinchona* alkaloids with a hydrogen bonding group situated at the C6’ position e.g. (tio)urea, sulfonamide, benzamide. The new bifunctional catalysts have been widely used in many asymmetric reactions, provide high enantiomeric excess. The objective of the second research topic is to synthesize a number of novel *Cinchona* alkaloids with a functionalized squaramide moiety at the C6’ position with the purpose of exploring their utility as organocatalysts of enantiopure compounds.