

Project area: Chemistry

Supervisor: Ana Petronilho

Duration: 10 months

Number of students: 1

Project Summary

Development of Sustainable Catalytic Systems Based on DNA scaffolds

DNA-mediated catalysis is an emerging area in the field of bioinspired catalytic processes. It exploits the chirality of DNA in asymmetric synthesis using hybrid catalysts comprised of a metal complex anchored to a DNA strand. However, controlling metal coordination and defining the number of active sites remains a considerable challenge. Developing synthetic systems that allow for the incorporation of a defined number of metal sites, obtaining one modified DNA molecule able to perform multiple catalytic tasks is thus highly desirable.

In this project we will develop DNA-functionalized catalytic systems bearing transition metals coordinated *via* N-Heterocyclic carbenes to the nucleobase. Nucleobases form strong hydrogen bonds, which are responsible for DNA structure and functions. Application of these interactions in catalytic processes will be employed as catalytic strategy aiming to provide substrate recognition, proton-transfer facilitated processes, and synergetic catalytic systems. This methodology constitutes a unique approach combining a strong donating carbene ligand with the additional coordination sites that nucleobase provides, allied with high propensity of nucleobases to form strong hydrogen bonds.

When successful, this project will fabricate a DNA based compounds bearing different catalytic functionalities. This feature will enable to perform an array of catalytic processes with only one catalyst, and will constitute a great advance in the field of sustainable catalytic processes.