

## Research Project for Master Students

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### Sustainable Catalysis based on First-row Transition Metals

The development of sustainable, more efficient and selective organic synthesis is one of the fundamental research goals in chemistry. It is now well recognized that **organometallic compounds** have become an established synthetic tool for the functionalization of organic molecules.

During the last decades, manifold transition metal catalysts based on precious metals such as rhodium, palladium, and ruthenium have proved to be efficient catalysts in several processes. However, these metals are rare and expensive, and they can be toxic and difficult to recycle.

**The aim of this project is to develop more sustainable catalysts** by replacing precious metals with no expensive metals. The use of first row transition metals, such as **nickel, cobalt, and specially iron** is highly attractive, not only because their low price but also because these metals are typically used in enzymes for numerous transformations of natural products. Our target is to develop catalytic systems capable to efficiently perform reduction reactions such as hydrosilylation, hydrogenation, and deoxygenation.

Students will have the opportunity to synthesize organic and organometallic compounds (using Schlenk techniques), characterize new complexes by using different techniques (eg. NMR spectroscopy, infrared, elemental analysis, mass spectrometry) and perform catalytic experiments.

**Area:** Organometallic chemistry, Homogeneous catalysis

**Institution:** Instituto de Tecnologia Química e Biológica – [Homogeneous Catalysis Lab](#)