## Alma Mater Studiorum - Università di Bologna

### **SCUOLA DI SCIENZE**

Dipartimento di Chimica Industriale "Toso Montanari"

Corso di Studio in

# **Chimica Industriale**

Classe L-27- Scienze e Tecnologie Chimiche

# Studi preliminari per la sintesi di catalizzatori della reazione di carbonatazione dello stirene ossido

CANDIDATO	RELATORE
ilippo Vacchi	Prof. Mariafrancesca Fochi
	CORRELATORE
	Dott. Paolo Dambruoso

Anno Accademico 2020-2021

Dott. Caterina Rovegno



### Abstract (ENG)

The climate change causes a wide range of phenomena that affect the global population with various intensity depending on the geographical area. It is hypothesized that the consequences of climate change will lead to new migratory routes, e.g. the melting of the Himalayan glaciers will severely affect the agricultural sector of all the surrounding area, imposing to millions of people to move away. The climate change will therefore have effects on food production and availability, on the health and wealth of people living in the most affected states and on the economy. Such global consequences (e.g. resources shortage) will possibly lead to new conflicts.

To avoid new conflicts between states, one solution (among many others) is to investigate new technologies for the climate change mitigation, with particular attention to the CO<sub>2</sub> presence, *i.e.* the most representative and fearsome among greenhouse gases. In the last years the scientific community has been very committed to the study and to the development of new technologies for the storage and use of CO<sub>2</sub>. The NATO SPS-funded TANGO project fits into this context with the aim of finding a new technology for the industrial production of cyclic carbonates from reactions between epoxides and CO<sub>2</sub>. In fact, carbon dioxide is a particularly suitable C1-building block to obtain high valuable chemicals, being easily available, cheap and non-toxic.

The TANGO project consits of various research activities, concerning the investigation, synthesis and optimization of some catalysts for the carbonation reaction, the development of a method for the immobilization of the homogeneous catalysts and the optimized construction of the reactor in which to perform the model reaction. In this scenario, the research group of Dr. Paolo Dambruoso (Institute of Organic Synthesis and Photoreactivity - Italian National Research Council, ISOF-CNR) deals with the synthesis and study of the catalysts for the carbonation reaction between epoxides and CO<sub>2</sub>. During my internship period in Dr. Dambruoso's group I performed the synthesis of a collection of catalysts precursors (Fig.1) that will be used in a model carbonation reaction.



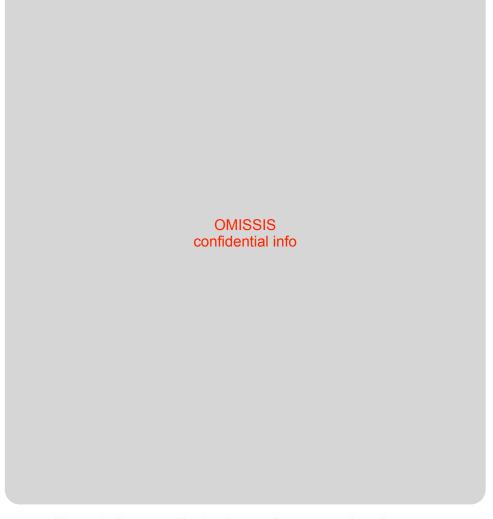


Figure 1: Retrosynthetic scheme of target catalysts' precursors.

The aim of the research carried out during my internship period was the optimization of the synthesis of various amines', imidazols' and pyridines' derivatives. These catalysts' precursors can be obtained from epoxides and nitrogen-containing molecules. The alkylation with alkyl halides of the synthesized intermediates will be the topic of further studies, which will also include the activity evaluation of the final catalysts.