

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

Filippo Vacchi

RELATORE

Prof. Mariafrancesca Fochi

CORRELATORE

Dott. Paolo Dambruoso

Dott. Caterina Rovegno

Anno Accademico 2020-2021



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 CO₂ 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 CO₂. 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 CO₂. 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 consists 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 Dambrosio (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 CO₂. During my internship period in Dr. Dambrosio's group I performed the synthesis of a collection of catalysts precursors (Fig.1) that will be used in a model carbonation reaction.





OMISSIS
confidential info

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.



*This publication
is supported by:*

The NATO Science for Peace
and Security Programme