



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

DIPARTIMENTO
DI CHIMICA INDUSTRIALE
"TOSO MONTANARI"

TITLE

Production of fuels from CO₂ and waste biomass.

Objectives:

The decrease in CO₂ emissions to reach the fit for 55 by 2030 and the Green Deal by 2050 is mandatory. In this context, the capture and utilization of CO₂ (CCU) and the electrification of catalytic processes are gaining increasing attention.

The research will involve the development of catalytic materials for the conversion of CO₂ into methanol and the electrochemical conversion of biomass derived compounds. To achieve these aims the following specific objectives will be investigated:

1. Synthesize copper-based catalysts for the hydrogenation of CO₂ into methanol, characterize the materials and test them in a bench scale reactor.
2. Prepare 3D electrocatalysts by electrodeposition or other suitable techniques, physico-chemical and electrochemical characterization and testing in a batch electrochemical cell.

The experimental results will allow establish structure/activity relationships to better understand how to further improve both catalysts and reaction parameters. For comparison purposes reference catalysts will be used.

Training Project

The project will focus on the training of a researcher with abilities to manage the research and the analysis of the data, in particular in the field of the CO₂ conversion and electrification of a catalytic process.

The researcher will consolidate his/her expertise in the evaluation of chemical-physical and electrochemical properties of catalytic materials such as investigation of the structure (X-Ray diffraction, XRD), specific surface area and porosity (N₂ adsorption/desorption), morphology (Scanning and Transmission Electron Microscopy), reducibility (H₂-TPR), electroactivity (Linear sweep voltammetry and Cyclic Voltammetry) and in the testing of the activity in thermocatalytic and electrochemical reactors.



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In the training project the researcher will reach autonomy in performing experimental research and in the analysis of the results obtained.

The research will be performed in the Department of Industrial Chemistry "Toso Montanari" within the CARE group where all the reactors and instruments to perform the research are located.

The research activities will be carried out under the supervision of the Prof. Patricia Benito tutor of the borsa di ricerca.