

Master in Photonics – “PHOTONICS BCN” Master ERASMUS Mundus “EuroPhotonics”

MASTER THESIS PROPOSAL

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Laboratory: CO2MAP, ICFO

EMERGING APPROACHES FOR CO₂ CAPTURE AND CONVERSION

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Keywords: Nanomaterials, Nanotechnology, CO₂ capture, CO₂ conversion

Summary of the subject (maximum 1 page):

CO₂ capture and conversion using renewable energy stands out as one promising strategy to revert global warming. CO₂ electroreduction (CO₂R), in particular, enables the transformation of CO₂ into widely used chemicals that could be readily used in our society as fuels and chemicals.

CO₂R requires high product selectivity (among the different oxo-hydrocarbons that could be produced), high productivity or local density, high energy efficiency, and high stability. This is pursued by the design of catalysts that, from the atomic level, interact with CO₂, water, ions and electrons in ways that promote a given reaction pathway.

The prospective student will:

- Dive into the field of CO₂ capture and conversion;
- Design and fabricate CO₂R catalysts tailored to a specific reaction;
- Characterize the materials and the reactions using a combination of different advanced operando spectroscopies;
- Implement the resulting catalysts into electrolyzer reactors and characterize their performance.

Suggested literature:

[10.1126/science.aav3506](https://doi.org/10.1126/science.aav3506)



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