Master in Photonics – "PHOTONICS BCN"
Master ERASMUS Mundus "EuroPhotonics"

MASTER THESIS PROPOSAL

Dates: April 2023 – July or September 2023

Laboratory: Institute of Materials Science of Barcelona
Institution: CSIC
City, Country: Barcelona, Spain

Title of the master thesis: Building Plasmonic Crystals from Plasmonic Metamolecules

Name of the master thesis supervisor and co-supervisor: Agustín Mihi
(for external proposals a co-supervisor from the program in needed)

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Keywords: *nanophotonics, nanofabrication, optical characterization*

Summary of the subject

Photonic and plasmonic architectures hold great promise to improve the performance of many optoelectronic technologies through the ability to manipulate light at the nanoscale. However, these nanostructures are typically produced via cumbersome and costly lithographic processes. In our group, we fabricate photonic nanostructures using a scalable and low-cost *soft nanoimprinting technique* compatible with emerging optoelectronic devices. Our approach is compatible with a wide variety of materials such as biopolymers and colloids leading to a new generation of unconventional photonic architectures (*https://enlightment.icmab.es*).

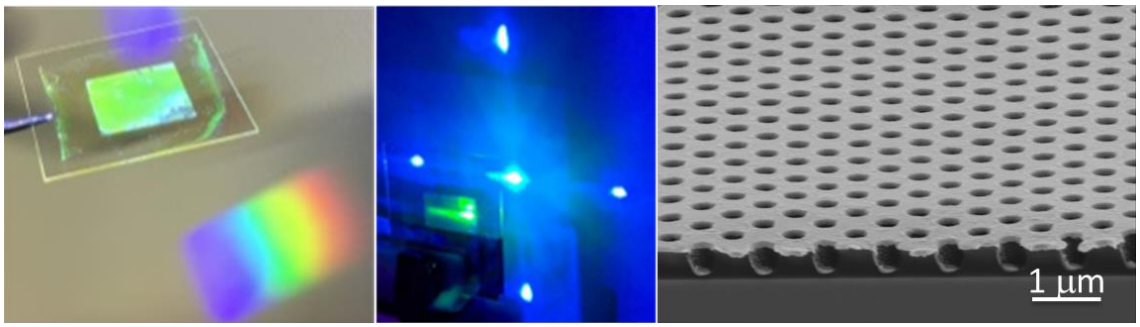

Figure 1. *Summary of photonic architectures obtained by soft lithography and unconventional materials to control light propagation.*

Objectives:

The goal of the collaboration is to control the emission properties of an emitter throught the nanostructure that we will develop.

The candidate will combine a simple soft nanoimprinting fabrication procedure to produce a series of scalable metasurfaces to control light emission. The resultant wide variety of nanostructures will be optically characterized in a home built optical set-up. Also available is a FDTD software to model and gain insight in the optical properties explored. Finally, we will try to implement the designed surfaces in an actual device to improve its performance.

Additional information (if needed):

We look for an enthusiastic researcher familiarized with the fields of photonics/ plasmonics and:
- A good level of written and spoken English.
- Optical setups know-how and optical spectroscopy background
- Nanofabrication experience, knowledge of vacuum and cleanroom work environments