



Centre Interdisciplinaire de
Nanoscience de Marseille



Open PhD position in plasmonics and photophysics

Spatially programmed hot-electron generation in plasmonic metasurfaces.

Host institution: CINaM Laboratory, Aix Marseille University, Marseille

Contract period: 3 years

Application deadline: 16 March 2026

Supervisor: Dr. Artur Movsesyan

Co-supervisor: Dr. Beniamino Sciacca

PhD project description.

We are looking for a curious and motivated PhD student to join our plasmonics and photophysics team and work at the interface of nanophotonics and energy-related applications. Key challenges in solar energy harvesting and photocatalysis stem from limited control of electronic excitations at the nanoscale. Hot electrons in metal nanostructures enable photochemical and optoelectronic processes beyond conventional semiconductors, but practical use is hindered by the lack of spatial control over their generation.

This PhD project will address this by engineering metasurfaces with programmable, spatially localized hot-electron activity. Plasmonic and hybrid nanoantennas arranged in dichroic geometries will be fabricated using scalable lithographic approaches to tailor absorption and hot-electron generation landscapes. Under polarization-controlled illumination, hot-electron activity will be probed via site-selective photocatalysis, photodetection, and localized photopolymerization. In collaboration with material scientists in the group at the CINaM, self-assembled metasurfaces will be studied using the same probing strategies to provide a direct comparison between lithographically fabricated and colloidal metasurfaces. This combined approach will define the limits and opportunities of spatial hot-electron engineering across top-down and bottom-up methods. Moreover, the plasmon-assisted photopolymerization and photocurrent measurements will be performed in collaboration with IM2NP (Institut Matériaux

Microélectronique Nanosciences de Provence, Marseille) and ICR (Institut de Chimie Radicalaire, Marseille) institutes.

We offer:

A fully funded PhD contract for 3 years. The recruited PhD candidate will work in an interdisciplinary and international research environment at the interface of nanophotonics, materials science, and energy-related applications. The project offers access to state-of-the-art nanofabrication, advanced optical characterization facilities, and computational resources, as well as close interaction with experimental and theoretical researchers. The candidate will benefit from strong international collaborations, opportunities for short research stays, training in scientific communication and publishing, and the opportunity to present their work at two international and two national scientific conferences, providing excellent preparation for an academic or industrial research career.

Applicant profile:

We are looking for a candidate with a Master's degree (or equivalent) in physics, applied physics, materials science, nanotechnology, or electrical engineering, and a strong background in optics, nano-optics, or plasmonics. The candidate should have hands-on experience in experimental laboratory work and be familiar with nanofabrication/microfabrication techniques, including cleanroom processes or optical microscopy and spectroscopy. Scientific writing and communication skills in English are required. Additional skills that will be appreciated include experience with electrical measurements, including photocurrent, and device characterization, is a plus. Familiarity with photopolymerization or surface functionalization techniques, along with computational approaches such as FDTD or FEM, will also be appreciated.

How to apply:

Interested candidates are invited to contact Artur Movsesyan (movsesyan@gmail.com).

The formal application must include:

- a CV,
- transcripts for both Bachelor (Licence) and Master studies,
- a short summary of previous research experience (internships or research projects)
- two letters of recommendation: one from the internship or research project supervisor and one from the Master program coordinator or responsible faculty member.

The recommendation letters must be sent directly by the referees.