



Open PhD position in plasmonics and photophysics

Hot-carrier generation and heat dissipation 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 seeking a motivated PhD student to join our plasmonics and photophysics team and work at the interface of nanophotonics, heat transport, and energy applications. Light-to-energy conversion in photovoltaics, photodetection, and photochemistry is limited by how optical energy dissipates at the nanoscale. In plasmonic nanostructures, excitation produces both energetic charge carriers and significant heat, often degrading device performance. Understanding and controlling how energy is partitioned between hot-carrier generation and heat dissipation remains a central challenge in nanophotonics.

This PhD project will address this challenge using two-dimensional plasmonic metasurfaces. The goal is to disentangle hot-carrier and thermal contributions and optimize metasurface designs for site-selective hot-carrier generation with minimal heating. The work will explore both purely plasmonic and hybrid metal–semiconductor architectures to tailor electronic and thermal properties.

The project combines numerical modeling and experimental nanophotonics, including metasurface design, nanofabrication, optical characterization, and photothermal microscopy. It involves close collaboration with CINaM, IM2NP, and Institut Fresnel, providing expertise in nanofabrication, thermal imaging, and device integration. Steady-state photothermal measurements and spatially resolved thermal mapping will be used to probe local temperature profiles, alongside

electromagnetic and thermal modeling to describe energy dissipation pathways and guide metasurface design.

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 photothermal physics. The project offers access to state-of-the-art nanofabrication facilities, advanced optical characterization tools, and high-performance computational resources (Centre de Calcul Intensif d'Aix-Marseille). The candidate will benefit from strong national and international collaborations, opportunities for short research stays, training in scientific communication and publishing, and the opportunity to present their work at national and international 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 a related field. A strong background in optics, photonics, electromagnetism, or solid-state physics is expected, along with motivation to work at the interface of experiment and modeling and an interest in nanoscale energy dissipation, heat transport, and nano-optics.

Hands-on laboratory experience is required. Experience with nanofabrication/microfabrication and optical characterization techniques (e.g., spectroscopy or microscopy) is highly desirable. Additional valued skills include numerical simulations (e.g., FEM or FDTD). Excellent written and oral communication skills in English are required.

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.