Institute of Microelectronics of Barcelona IMB-CNM CSIC

PhD Student
Magneto-opto-mechanical nanodevices for immunomodulation

The **IMB-CNM** is the largest institute in Spain dedicated to the research and development of Micro and Nano Technologies and Microsystems and with unique capabilities in silicon technology. It belongs to CSIC since its foundation in 1985 and is distinguished as a María de Maeztu Unit of Excellence.

IMB-CNM aims to contribute to the advancement of knowledge and to the economic and social development of society, as well as to the training of researchers and engineers and to the advice to public and private entities.

Research activities of IMB-CNM are dedicated to Micro/Nano Integrated Systems: miniaturized electronic systems which include sensing and/or actuating capabilities in addition to electronic information processing, power management and external interfaces.

The IMB-CNM is located on the Autonomous University of Barcelona (UAB) Campus and contains the largest clean room facilities in Spain with full capability to process its own CMOS technologies and laboratories.

Project:

Motivated by the systemic toxicity and delivery challenges of current immunotherapies, this PhD project seeks developing novel wirelessly controlled magneto-opto-mechanical (MOM) nanodevices to mechanically and biochemically harness macrophage plasticity for targeted treatments in cancer and inflammatory diseases.

The core objective is to achieve remote control over macrophage phenotypes, reprogramming them from pro-tumor to anti-tumor in colorectal cancer, or from pro-inflammatory to regenerative in rheumatoid arthritis.

The MOM nanodevices will combine different materials and multiple mechanical actuation modes, including opto-mechanical, photo-strictive, magnetophoretic or magneto-strictive with biochemical stimulation, to modulate macrophages phenotype. The therapeutic efficacy of the MOM nanodevices will be demonstrated in advanced 3D-bioprinted in vitro models.

Key Responsibilities:

The project will utilize the largest Clean Room in Spain and will benefit from collaborations and secondments with IBEC and/or IIB Sant Pau for the preclinical validation.

Main activities:

- Fabricate (by photolithography, colloidal lithography, etc.) MOM nanodevices
- Develop optical/magnetic actuation setups for characterizing the MOM nanodevices and for remote optical/magnetic biomedical stimulation.
- Understand the coupled mechanical and biochemical stimulation effects in the macrophage polarization, and demonstrate the therapeutic effects in 3D bio printed models of colorectal cancer and rheumatoid arthritis pannus

Carrer dels Til·lers s.n., Campus UAB | 08193, Cerdanyola del Vallès
https://www.imb-cnm.csic.es | talent@imb-cnm.csic.es
+34 93 594 7700

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Education and Experience

- ✓ MSc in Nanoscience, Physics, Chemistry or Biomedical Science.
- ✓ Experience in nanofabrication/characterization techniques or in vitro assays.
- ✓ Excellent communication and writing skills in English.
- ✓ Key Skills: Teamwork, Critical thinking and problem solving, Scientific writing and oral presentations.

What We Offer

- The opportunity to join one of Spain's leading research centres in micro- and nanotechnologies, internationally recognised for the excellence of its scientific and technological activities.
- Access to cutting-edge nanofabrication facilities and research resources.
- Collaboration with leading researchers in the nanomedical field.
- Publishing in high-impact scientific journals and presenting in international conferences.
- Enrolment at the UAB PhD program with multidisciplinary training.
- A dynamic, collaborative and multidisciplinary environment with highly qualified researchers, engineers and technical specialists.
- Expected start date: December 15th, 2026

Interested in joining us?

Complete this **form** and send your CV, Motivation Letter, Academic Records and 2 Academic References to **Talent@imb-cnm.csic.es**, with the subject: **"PhD Student - Magneto-opto-mechanical nanodevices for immunomodulation".** Incomplete or non-eligible applications will be automatically rejected.

*Applicants are kindly advised to ensure that their CVs clearly demonstrate compliance with the requirements of the position. CVs should include precise dates, relevant skills, and notable achievements that evidence the candidate's suitability and distinction in the selection process.

Deadline: September 22, 2026

Shortlisted candidates will be contacted by the first week of October, 2026 to be informed of next steps.

Check our website for more information about the IMB-CNM and our research activities

Take the next step in your research career with us!

By applying, you accept our data protection policy.

IMB-CNM (CSIC) adheres to the European Charter and Code of Conduct for Researchers, ensuring full alignment with their principles and requirements, including equal opportunity, transparency, merit and ability, caring for an open, fair, and excellence-based hiring processes.

IMB-CNM holds the HR Excellence in Research award, which acknowledges CSIC's commitment to continuous improvement in HR strategies for researchers.

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