

Institute of Microelectronics of Barcelona IMB-CNM CSIC

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.

The 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 Type: TFM

Project Title: Post-processing and characterization of multi-sensor chips fabricated using microelectronic technology

Research Group: Chemical Transducers Group

Project Description:

- ❖ This Master's thesis project focuses on the study and optimization of post-fabrication processes for chips—produced using microelectronic technology—that incorporate multiple sensors (ISFETs) and integrated circuitry for signal readout and processing. These post-processing steps involve packaging (to protect electronic components) and membrane deposition (to render the response selective). These processes demand high precision and complexity due to the chip's small size (on the order of millimetres).
- ❖ Photocurable polymers and photolithographic technologies will be used for both processes. This approach enables the definition of high-resolution patterns on the chips while ensuring process compatibility with semiconductor technologies. These operations are carried out in the IMB-CNM Clean Room and in the institute's sensor and printed technology laboratories.
- ❖ In this project, the student will collaborate with the current team to establish the encapsulation and membrane deposition processes and to characterize the sensor chips in order to verify the feasibility of the developed processes.
- ❖ This research line is funded by several ongoing projects: BIOSENSEI (HORIZON-CL6-2023-ZEROPOLLUTION, ref. 101135241), FERTISENS (Ref: ACC_2023_EXP_SIA002_40_0002236), and FLOWSAFE (HORIZON-CL6-2025-01, ref. 101291038).

Project Methodology:

- **Training:** The student will receive training through seminars or talks regularly held at the IMB-CNM, as well as through reading articles, reports, etc., covering all aspects related to sensor chips, ion-selective membranes, microelectronic technology, and water quality and aquaculture measurements.
- **Access:** The student will need to request access permissions to carry out project tasks—specifically for the CNM Clean Room (SB) and the Transducer and Printing laboratories—which require a validation process.

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Experimental work will consist of several phases:

- Encapsulation techniques using photocurable polymers. Various processes for encapsulating sensor chips onto PCB strips will be studied. Initially, existing methods based on Ebecryl-type polymers will be used.
- Membrane deposition on multisensor chips. Methods for depositing multiple membranes onto a single chip will be investigated. To this end, an initial seed layer of encapsulating polymer will be defined to establish the distinct windows for the ISFETs. Membranes designed to detect various ions (e.g., Na⁺, K⁺, NH₄⁺, Cl⁻) will be deposited on the same chip.
- Characterization of multisensor chips featuring various types of ion-selective membranes. Parameters such as sensitivity, limit of detection, interferences, and accuracy will be evaluated for these multisensors.
- Reporting of obtained results and conclusions.

Candidate desired studies:

- ✓ MSc Nanoscience and Nanotechnology
- ✓ MSc Semiconductor Engineering and Microelectronic Design

Application Process:

Before applying, please **check with your TFG/TFM program supervisor**, as he/she may already be coordinating with us to assign the project.

If there is no such coordination, **complete this [form](#) and send your CV and a motivation letter to Talent@imb-cnm.csic.es, with the subject: "TFG/TFM at IMB-CNM"**

Your CV will be forwarded to the Researcher leading the project who will contact you directly if interested.

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

<https://www.imb-cnm.csic.es/en>

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.