

CONTRATOS PREDOCTORALES – MATRANS24 (CEX2023-001263-S)

RESEARCH CHALLENGE:

Organic heterostructures for photodetection

PROJECT TITLE / JOB POSITION TITLE:

Novel materials and interfaces for the development of organic devices for NIR detection.

RESEARCH PROJECT / RESEARCH GROUP DESCRIPTION: (Max. 2.000 characters – including spaces)

The use of organic electronic devices and, in particular, organic field-effect transistors (OFETs), as photodetectors offers the possibility of detection wavelength tuneability, low-cost manufacturing, and compatibility with flexible substrates. Hence, these type of devices are raising a high interest for a wide range of applications. In particular, there is a rising necessity of developing NIR detectors for various scientific and industrial applications such as health monitoring, artificial vision for robotics and autonomous cars, optical communication networks, advanced night vision, ultrahigh resolution spectroscopy and biomedical imaging.

To achieve NIR organic absorbers, materials showing a low HOMO-LUMO band gap are required. In particular, charge transfer materials composed of a donor (D) and acceptor (A) units are highly appealing for this purpose, although they have mainly been explored as single crystals.

This thesis will focus on the fabrication of OFETs based on thin films of charge transfer organic semiconducting materials and we will explore for their potential applications as NIR detectors. The research will encompass all aspects of device fabrication and characterization, including an in-depth investigation at both the macroscale and nanoscale using scanning probe microscopy techniques.

This project will be realised working in collaboration between two complementary ICMAB groups. The e-MolMat group has a wide experience in the fabrication of thin films of organic materials for their implementation in OFET devices, while the PCSI group is recognized by its expertise in performing nanoscale characterization in devices using a broad range of techniques. Both groups have already been collaborating for a few years.



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JOB POSITION DESCRIPTION:

(Max. 2.000 characters – including spaces)

Include all the relevant information about the position, role, responsibilities and skills required within the project/group

The candidate will join two pioneer, dynamic, and active groups composed of chemists, physicists, and engineers who work in close collaboration to achieve the innovative goals of this project, and in a friendly and international environment.

The candidate will be enrolled in the Materials PhD program at UAB. The student will be co-supervised, and regular meetings will allow proper mentoring and guidance by the supervisors and the whole group. In addition, the successful candidate might travel to other European countries to develop the project in the framework of scientific collaborations or to present the results of his/her research at conferences and schools.

This PhD work will cover the preparation of thin films of organic semiconductors and their morphological and structural characterization, the fabrication and electrical characterisation of organic field-effect transistors (OFETs) and the use of scanning probe microscopy techniques such as AFM or KPFM.

The PhD will present his/her results in group seminars and will have the chance to attend scientific seminars organised on the Campus of UAB and at ICMAB, as well as follow technical courses or acquire soft skills such as presentations, writing scientific articles and outreach dissemination.

The candidate should hold a Bachelor degree in Physics, Chemistry, Materials Science, Nanoscience or related discipline, and a Master's degree, which should have been evaluated with high marks.

The candidate should be greatly motivated toward highly interdisciplinary projects and willing to interact with European labs and scientists from different disciplines.

PhD CO-DIRECTORS:

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