

## CONTRATOS PREDOCTORALES 2022 SEVERO OCHOA

### PROJECT TITLE / JOB POSITION TITLE:

**In-situ correlation of microstructure and electrical properties in organic semiconductor films under operando conditions**

### JOB POSITION RESEARCH LINE:

**RL4 - Tuneable and Low Cost Molecular Electronics**

### RESEARCH PROJECT / RESEARCH GROUP DESCRIPTION:

Organic semiconductor (OSC) thin films are of enormous interest as active components for electronic devices. Due to the fact that OSC crystalline solids are held by intermolecular van der Waals interactions, polymorphism is a common phenomenon. The identification of new or specific polymorphs is of large importance for establishing structure-property relationships, herewith, gaining an understanding of microscopic charge transport physics, as well as to understand the stability of devices. Polymorphism can also represent a benefit in the search for improved functional properties. However, prediction and control of polymorphism in organic materials is challenging where the formation of kinetically trapped polymorphs appears as a common scenario.

Grazing incidence wide angle X-ray diffraction (GIWAXS) is a widely used technique for the crystallographic characterization of thin films, which can be employed for a real-time investigation during growth or during a thermal annealing treatment. On the other hand, it is of important significance to elucidate the lateral length scale of the morphological and electronic changes. For that purpose, advanced atomic force microscopy methods offer a valuable tool to correlating morphology and functional properties at the nanoscale.

Investigating the changes occurring in operando devices during post-processing protocols is of key important for device optimization. This work is fully framed in the RL4: Tuneable and Low Cost Molecular Electronics.

#### **JOB POSITION DESCRIPTION:**

This project aims at in-situ investigating the evolution of electrical and structural properties of OSC films during annealing by means of real-time GIWAXS in operando organic field effect transistors (OFETs). One important part of this work will take place in the laboratory; exploring by advanced methodologies of atomic force microscopy to elucidate temperature-induced changes is one of the goals.

The candidate is required to have a degree in physics. The work implies acquiring a deep knowledge of advanced characterization methodologies (X-ray diffraction synchrotron at radiation facilities and atomic force microscopy) and good skills for data analysis.

The PCSI group offers a friendly atmosphere and will provide all the support for adequate training in the experimental work, in writing of publications as well as for the participation in conferences and workshops.

#### **GROUP LEADER:**

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Research project / Research Group website: <https://icmab.es/fsi/surfaces>