

## CONTRATOS PREDOCTORALES 2021 SEVERO OCHOA

### PROJECT TITLE / JOB POSITION TITLE:

Towards full-oxide electronic memory devices

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

There is an increasing demand of materials able to be integrated in the new era of devices in the age of the Internet of Things. These have further requirements of reliability and robustness. Ferroelectric materials show switchable by electric field spontaneous surface charge. This switchable charge can be used to modulate the conductivity of a so-called channel in a field effect transistor architecture device or of the tunneling current in ferroelectric tunnel junctions. As ferroelectricity stems from electronic processes, it is intrinsically robust and reliable, in addition of being energy efficient. The recent discovery of ferroelectricity in doped hafnium oxide,  $\text{HfO}_2$ , which is a material compatible with industrial processes, makes this material ideal candidate to be implemented in full oxide electronic devices.

ICMAB has the capability to growth such ferroelectric material ( $\text{HfO}_2$ ) with state-of-the-art crystalline quality. Thus, the framework of the present project is the development of full oxide devices based on highest quality ferroelectric oxide materials. During the project, the student will work on the development of materials involving extensive structural (high resolution x-ray diffraction, synchrotron techniques, etc.). Most importantly, electric characterization (resistance measurements, ferroelectric characterization, etc.) will be the core of the project. Electric characterization dynamics at the nanoscale will be performed using atomic force microscopy. Optical lithography at clean room facilities will be a final necessary step for device fabrication.

The PhD will integrate a group with students and researchers with diverse expertise and aims. The project will also be integrated in in-going collaborations with MIT (USA), University of Cambridge (UK), and others. The thesis will be supervised by Ignasi Fina ([shorturl.at/gqHM5](http://shorturl.at/gqHM5)) with an intensive production and several on-going projects regarding the topic during the last years.

**JOB POSITION DESCRIPTION:**

**(2.000 characters – including spaces)**

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

The candidate should have recently obtained a master's degree (in physics, chemistry, nanoscience, material science or related) with outstanding grades.

An enthusiastic student is required with interest in the realization of experimental tasks and in seeking ultimate mechanisms triggering observed results.

**GROUP LEADER:**

Dr. Ignasi Fina  
[ifina@icmab.es](mailto:ifina@icmab.es)

**RELATED LINKS TO THE POSITION**

URL: <https://mulfox.icmab.es/>  
<https://sites.google.com/view/ifinawebsite>