

The mission of the Catalan Institute of Nanoscience and Nanotechnology (ICN2) is to achieve the highest level of scientific and technological excellence in Nanoscience and Nanotechnology. Its research lines focus on the newly-discovered physical and chemical properties that arise from the behavior of matter at the nanoscale. ICN2 has been awarded with the Severo Ochoa Centre of Excellence distinction for two consecutive periods (2014-2018 and 2018-2022). ICN2 comprises 19 research groups, 7 technical development and support units and facilities, and 2 research platforms, covering different areas of nanoscience and nanotechnology.

Please note that this is not a job offer. This is a call for expressions of interest from excellent postdoctoral researchers to apply for a Marie-Skłodowska-Curie Postdoctoral Fellowship with ICN2 as host institution. The process involves developing a joint application between candidate and host institution. Specifically, we are inviting expressions of interest for the following research group and project.

DESCRIPTION OF HOST RESEARCH GROUP

Host group: Atomic Manipulation and Spectroscopy

Group Leader: Aitor Mugarza

Fellowship supervisor: Jose Ramón Durán

The research interests of the AMS group focus on the atomic-scale engineering of the quantum properties of novel nanomaterials. At the nanoscale, the properties of materials are dominated by quantum effects and interfacial phenomena, which impose strong limitations on the control and reproducibility of device performances, but also open up avenues for engineering new physical properties. The aim of our group is to understand and control quantum phenomena with atomic precision by chemical and structural manipulation, nanostructuring and interfacing materials that are identified as strategic in the roadmap for new technologies (hybrid metal-organic heterostructures, graphene-based 2D materials, topological insulators...).

<https://ams.icn2.cat/>

DESCRIPTION OF RESEARCH PROJECT / TOPIC

Research area: Physics (PHY), Chemistry (CHE)

Project topic: Graphene Nanoribbon based Field Effect Transistors

Postdoctoral fellows are invited to apply for a research position in nanofabrication and characterization of nanoelectronic devices to study the intrinsic properties of both individual and networks of atomically-precise graphene nanoribbons (GNR) grown by on-surface synthesis technique ([Science 360 \(2018\)](#) and [Adv. Mater. 34 \(2022\)](#)). Although GNR have promised theoretically high performance field effect transistors (FETs) due to their semiconducting properties, in 10 years only a couple of reports have achieved decent ON/OFF ratios of 4 order of magnitude. One reason behind such discrepancy is that the commonly wet method used to transfer the GNR onto functional substrates is not effective in preserving their atomic structure, leading to poor performance FETs. Therefore, a deterministic dry transfer

method is essential for preserving their atomically-precise structure, and for that one needs to decouple GNRs from the underlying catalytic substrate.

As first approach, conventional techniques to transfer 2D materials will be adopted to build 2D heterostructures that preserve the intrinsic properties. However, more sophisticated methods such as the intercalation of self-assembled monolayers will be also considered to test their effectiveness.

The fellow will synthesize GNR-based nanomaterials, develop a dry method to transfer them onto target substrates, and measure the FET properties. The devices will be characterized not only electrically but also optically in a Raman and UV-Visible spectroscopy systems.

CONTACT

Candidates may contact aitor.mugarza@icn2.cat and joseramon.duran@icn2.cat if interested in this opportunity.

Please send the following documents / information:

- CV (max. 4 pages)
- Letter of motivation
- Two referees

Please note that this is not a job offer. The process involves developing a joint application between candidate and host institution. Note also the following basic eligibility requirements established for these fellowships by the European Commission:

- Candidates must be in possession of their PhD at call deadline
- Candidates should have no more than 8 years' research experience after their PhD
- Candidates must comply with the **mobility rule**, i.e. they must not have resided or carried out their main activity (work, studies, etc.) in Spain for more than 12 months in the 36 months immediately before the call deadline.

For full details on eligibility, please see Annex 2 of [Horizon Europe Work Programme 2021-2022](#).