

As a flagship research center in nanoscience and nanotechnology, our mission is to open and explore new frontiers of knowledge at the nanoscale, and bring value to society in the form of new understanding, capabilities and innovation, while inspiring and providing broad training to the next generations of researchers.

Our research lines focus on the newly-discovered physical and chemical properties that arise from the behaviour of matter at the nanoscale. ICN2 has been awarded with the Severo Ochoa Center of Excellence distinction for three consecutive periods (2014-2018 and 2018-2022 and 2023-2026). ICN2 comprises 19 Research Groups, 7 Technical Development and Support Units and Facilities, and 2 Research Platforms, covering different areas of nanoscience and nanotechnology.

### **Job Title: Senior Researcher**

### **Research area or group: Advanced Electron Nanoscopy**

#### **Description of Group/Project:**

The Catalan Institute of Nanoscience and Nanotechnology (ICN2) is currently seeking a highly motivated Senior Researcher to join Prof. Jordi Arbiol's group. The focus of this position will be on atomic scale scanning transmission electron microscopy (STEM) characterization of quantum materials and devices. The PostDoc will engage in focused ion beam (FIB) sample preparation and utilize related analytical techniques such as energy-dispersive x-ray spectroscopy (EDS) and electron energy loss spectroscopy (EELS). The research will involve advanced STEM-related (e.g.: 4D STEM) atomic scale characterization of state-of-the-art semiconductor and hybrid (semiconductor/superconductor) devices for quantum applications (Qubits for quantum computing). In-situ cooling experiments and data analysis automation will be integral to the project, with a particular emphasis on low-loss EELS and valence EELS (VEELS) bandgap mapping in hybrid semi-super heterostructures.

Join our dynamic group, leader in the atomic-scale characterization of semiconductor devices. As part of our team, you'll have the opportunity to collaborate with a large network of quantum physics researchers worldwide and participate in the e-DREAM European microscopy network, which provides access to cutting-edge EM equipment and will allow you to participate in some of the largest EU projects related to STEM methodological development.

#### **Main Tasks and responsibilities:**

The focus of this position will be on atomic scale scanning transmission electron microscopy (STEM) characterization of quantum materials and devices. The PostDoc will engage in focused ion beam (FIB) sample preparation and utilize related analytical techniques such as energy-dispersive x-ray spectroscopy (EDS) and electron energy loss spectroscopy (EELS). The research will involve state-of-the-art semiconductor and hybrid (semiconductor/superconductor) devices for quantum applications (Qubits for quantum computing). In-situ cooling experiments and data analysis automation will be integral to the project, with a particular emphasis on low-loss EELS and valence EELS (VEELS) bandgap mapping in hybrid semi-super heterostructures. The candidate will help on MSc and PhD students supervision and training.

#### **AVAILABLE INSTRUMENTS**

- Thermo Fisher Spectra 300 (60-300 keV), double corrected and monochromated, Gatan Continuum EELS with K3 direct electron detector, segmented and pixelated detectors, Super-X EDS system.
- Thermo Fisher Spectra ULTRA (30-300 keV), double corrected and monochromated, HR EELS, segmented and pixelated detectors, ULTRA-X EDS system.
- Cooling, heating and biasing DENSsolutions ARCTIC sample holder
- Liquid, biasing DENSsolutions STREAM sample holder
- Gas/Vapour, heating/biasing DENSsolutions CLIMATE sample holder

- FEI F20 200 KeV STEM, EELS + EDX
- Fully Automated FIB Helios 5UX
- FEI SEM Quanta and SEM Magellan

#### Requirements:

- **Education:**  
Ph.D. degree on physical sciences, materials science, nanotechnology or related fields.
- **Knowledge and Professional Experience:**  
Hands-on experience in the following areas: Operation of transmission electron microscopes, including detailed knowledge of main physical principles, concepts, and applications of electron microscopy.  
Advanced sample preparation (FIB) and data analysis skills.
- **Personal competences:**  
Excellent interpersonal skills in order to interact with co-workers promptly and professionally, management and support the wide user community of students, post-doctoral researchers and faculty, promoting the growth of the EM core.  
Excellent oral and written communication skills. Previous experience in delivering oral technical presentations to scientific audiences.
- **Preferred qualifications:**  
Experience with operation of advanced transmission/scanning electron microscopes using aberration-corrected optics and direct electron detection systems.  
Experience with 4D-STEM analysis.  
Experience with data collection and interpretation of electron energy loss spectroscopy (EELS).  
Experience with cooling/heating in-situ S/TEM analysis, temperature holders.  
e-tomography  
Basic knowledge on semiconductor and superconductor Physics  
Experience on Semiconductor heterostructures analyses, 2D structures, nanowires.

#### Summary of conditions:

- Full time work (37,5h/week)
- Contract Length: Temporary (2 years with possibilities of extension.)
- Location: Bellaterra (Barcelona)
- Salary will depend on qualifications and demonstrated experience.
- Support to the relocation issues.
- Life Insurance.

Estimated Incorporation date: April 2025

#### How to apply:

All applications must be made via the ICN2 website and include the following:

1. A cover letter.
2. A full CV including contact details.
3. 2 Reference letters or referee contacts.

Deadline for applications: 22/11/2024

**Equal opportunities:**

ICN2 is an equal opportunity employer committed to diversity and inclusion of people with disabilities. ICN2 is following the procedure for contract of people with disabilities according with article 59 of the Royal Decree 1/2015, of 30 of October.