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 values are Commitment, Collaboration and Transformation.

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 20 Research Groups, 7 Technical Development and Support Units and Facilities, and 2 Research Platforms, covering different areas of nanoscience and nanotechnology.

Job title: Doctoral Student

Research area or group: Inorganic Nanoparticles

Description of Group/Project:
The Inorganic Nanoparticles Group at ICN2, led by Dr. Neus G. Bastús, focuses on the rational design and synthesis of advanced inorganic nanomaterials through wet-chemistry colloidal routes, enabling precise control over size, morphology, composition, and structural complexity. The group systematically integrates Safe-and-Sustainable-by-Design (SSbD) and green chemistry principles from the earliest stages of materials development, ensuring responsible innovation across the entire materials life cycle.

Within the framework of the MAIAMI project (Multimodal Artificial Intelligence Platform for Accelerated Materials Innovation), the PhD researcher will work on the controlled wet-chemistry synthesis of advanced inorganic nanoparticles, with a particular focus on high-entropy alloy (HEA) and multimetallic systems for energy-related applications. The work will combine scalable and environmentally benign synthetic routes with advanced structural and compositional characterisation to establish clear links between synthesis parameters, nanostructure, and functional performance.

A key aspect of the PhD will be the systematic documentation and curation of experimental data in a FAIR-compliant materials database, including synthesis protocols, characterisation results, and SSbD indicators. These high-quality datasets will directly feed AI-driven optimisation workflows, enabling predictive, reproducible, and sustainable materials discovery within MAIAMI's closed-loop experimental platform.

The position offers a highly interdisciplinary and dynamic research environment, with strong experimental training in nanomaterials synthesis and characterisation, exposure to data-driven and AI-assisted research methodologies, and access to state-of-the-art facilities at ICN2. The PhD researcher will collaborate closely with internal and external experts in materials chemistry, data science, and energy applications, benefiting from an international and collaborative research ecosystem.

Main Tasks and responsibilities:

The PhD student will carry out experimental research on the wet-chemistry synthesis of HEA and multimetallic nanoparticles within the MAIAMI project. The position is strongly laboratory-focused, while offering exposure to AI-driven and data-centric materials research. The main activities of the PhD will include:

- Developing and optimising wet-chemistry synthesis protocols to produce nanoparticles with controlled composition, size, morphology, and structural complexity.
- Performing structural, compositional, and surface characterisation using UV–Vis spectroscopy, XRD, XPS, and electron microscopy, with training and support from ICN2 core facilities.
- Analysing how synthetic parameters affect material properties and functional performance, and interacting with machine-learning and modelling teams to translate experimental results into predictive datasets.
- Preparing reproducible nanoparticle libraries for functional testing by MAIAMI partners, ensuring sample traceability, consistency, and quality control.
- Recording synthesis procedures and characterisation results in a FAIR-compliant materials database for AI-assisted optimisation workflows.
- Participating in the preparation of scientific publications, reports, and conference presentations, project meetings and dissemination activities.
- Engaging in regular group meetings, training activities, and interdisciplinary seminars at ICN2 as part of the PhD training programme.

Requirements:

- **Education:** Master's degree in Materials Science, Chemistry, Nanoscience, or a closely related discipline.
- **Knowledge:** Solid background in inorganic chemistry and colloidal synthesis. Knowledge of spectroscopic and structural characterization techniques (e.g., XPS, TEM) will be a plus.
- **Professional Experience:** Prior experience in the synthesis and characterization of inorganic nanoparticles—particularly metals—is desirable. Experience with aqueous-phase synthesis, surface functionalization, or integration of experimental data with machine learning models will be considered advantageous.
- **Personal Competences:** Strong scientific motivation, attention to detail, and ability to work independently. Demonstrated capacity to meet deadlines and contribute effectively within a multidisciplinary, collaborative research environment. Ability to communicate and coordinate efficiently with partners from complementary fields (e.g., catalysis, spectroscopy, data science).

Summary of conditions:

- Full time work (37,5h/week)
- Contract Length: Temporary
- Location: Bellaterra (Barcelona)
- Salary will depend on qualifications and demonstrated experience.
- Support to the relocation issues.
- Life Insurance.
- Work-Life Balance and Flexibility with flexible work schedules
- 28 holidays per year

- Flexible compensation plan: tax advantages contracting some products (health insurance, childcare, training, among others.)
- Training activities: languages, mentoring programme, wellbeing programme.
- International environment

Estimated Incorporation date: as soon as possible

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How to apply:
All applications must be made via the ICN2 website https://jobs.icn2.cat/job-openings/809/doctoral-student-inorganic-nanoparticles and include the following:

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

Applications will be reviewed continuously.

Equal opportunities:
At ICN2 we foster an inclusive and safe work environment, free from any form of discrimination—whether based on gender, sexual orientation, gender identity, age, origin, culture, religion, disability, or any other personal or social condition. We are committed to ensuring equal treatment and opportunities in all our processes, especially in recruitment, which is based solely on talent, experience, and ability. We implement proactive policies for inclusion and harassment prevention that reinforce our commitment to respect and fairness. If you share these values and are looking to grow in an open and diverse environment, ICN2 is ready to welcome you.