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

Job Title: PhD student - Inorganic Nanoparticles Group

Research area or group: Inorganic Nanoparticles Group

Description of Group/Project:

The Inorganic Nanoparticles Group at ICN2, led by Dr. Neus G. Bastús, focuses on the design and synthesis of advanced inorganic nanomaterials through wet-chemistry routes, with precise control over size, morphology, composition, and structural complexity. The group integrates Safe and Sustainable by Design (SSbD) and green chemistry principles from early development stages to guide responsible innovation across materials' life cycles.

Within the framework of the TRANSCERIA-MAT project ("Oxygen Vacancies in CeO_2 Nanoparticles: Controlling ROS Modulation through Precision Synthetic Engineering"), the group investigates defect engineering in cerium oxide nanoparticles to optimize their redox activity and catalytic properties. This involves aqueous, room-temperature synthesis methods, advanced spectroscopic characterization, and integration of machine learning to correlate synthesis conditions with functional performance. The goal is to establish predictive synthesis strategies for oxygen vacancy control, with potential applications in catalysis and health-related fields.

The group offers an interdisciplinary and dynamic research environment, combining strong expertise in materials chemistry, nanotoxicology, and nanobiomedicine. Researcher will have access to state-of-the-art facilities and collaborate with internal and external experts.

Main Tasks and responsibilities:

The researcher will be actively involved in all stages of the design, synthesis, and characterization of cerium oxide–based nanomaterials, with a focus on controlling oxygen vacancy concentrations for applications in catalysis and redox modulation. Key responsibilities include:

- Developing and optimizing aqueous, room-temperature synthetic protocols for CeO_2 nanoparticles with tailored defect structures and dopant incorporation.
- Characterizing physicochemical properties using advanced techniques such as UV-Vis, XRD, XPS, and electron microscopy, with support from specialized core facilities.
- Correlating synthesis parameters with functional properties (e.g., redox activity, oxygen storage capacity), in collaboration with machine learning experts to build predictive models.

- Producing well-characterized nanoparticle batches for external testing and catalytic benchmarking by consortium partners. Coordination with collaborators will be essential to ensure reproducibility, sample traceability, and timely delivery.
- Documenting experimental procedures and results in a structured, FAIR-compliant format; contributing to data curation for ML model training.
- Preparing scientific manuscripts, reports, and presentations; contributing to dissemination and project meetings.
- Participating in regular internal group discussions and transversal ICN2 seminars to foster knowledge exchange and scientific development.

Requirements:

- **Education:** Master's degree in nanoscience, materials chemistry, or a related discipline.
- **Professional Experience:**
  Solid background in inorganic chemistry and colloidal synthesis.
  Familiarity with redox-active nanomaterials and defect chemistry is highly valued.
  Knowledge of spectroscopic and structural characterization techniques (e.g., XPS, TEM) will be a plus.
  Prior experience in the synthesis and characterization of inorganic nanoparticles—particularly metal oxides—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).
  Fluent in English (spoken and written).

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

How to apply:

All applications must be made via the ICN2 website https://jobs.icn2.cat/job-openings/744/phd-student-inorganic-nanoparticles-group 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:
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.