

Call reference number	(2025-11)
Call name	IKUR Neutronics SmartSPE project Pre-doctoral position
Application Deadline	2025/05/28

Introduction and main description

BCMaterials – the Basque Center on Materials, Applications and Nanostructures – is an independent research center located in Leioa, Spain, and is part of Ikerbasque (the Basque Foundation for Science) and the University of the Basque Country (UPV/EHU). Learn more about us at www.bcmaterials.net.

We invite applications for a **predoctoral researcher position in Materials Science** as part of the IKUR Neutronics SmartSPE project. This is an exciting opportunity for motivated early-stage researchers to contribute to cutting-edge developments in next-generation energy storage technologies by using advanced neutron scattering.

The project focuses on **solid-state electrolytes (SSEs)** for lithium-ion batteries, addressing the safety and performance limitations of traditional organic liquid electrolytes. Our research aims to:

- Develop SSEs with enhanced ionic conductivity and lithium transference.
- Incorporate **self-healing** and **self-sensing functionalities** to improve battery lifespan and reliability.
- Explore **reversible shutdown mechanisms** using phase-change materials and thermoresponsive polymers for safer battery systems.
- Apply advanced techniques such as **solid-state NMR**, **quasielastic neutron scattering (QENS)**, and **Small-angle neutron scattering (SANS)**, and **nanoscale simulations** to investigate lithium diffusion and interfacial dynamics.
- Establish fundamental design principles for high-performance **solid-state batteries (SSBs)** tailored for future technological applications.

This position offers not only excellent scientific training but also a robust foundation in **transferable skills**, thanks to strong collaborations with leading academic institutions and innovative startups in the nanomaterials and energy storage sectors.

The ideal starting date for the position is 01/07/2025. The project's estimated completion date is 31/12/2026.

Skills and Requirements

The candidate must have a master in Materials Science, Physics, Chemistry or related areas. A background in energy storage is desirable but not compulsory. Knowledge in advanced structural characterization techniques, is also desirable.

Proficiency in speaking and writing in English.

Self-motivated and ability to work in a team and willing to coordinate the research in a particular topic.

A high level of motivation and independent thinking abilities.

Skills and Requirements

Ability and eagerness to learn new skills outside his/her own discipline.
Presentation skills and being able to meet the deadline are also required.

Work Program / Duties / Responsibilities

Position Overview:

The selected candidate will work at the forefront of materials science, with a primary focus on the design, synthesis, and integration of novel materials for smart solid-state electrolytes. The goal is to create innovative battery systems with enhanced performance, safety, and durability.

Key Responsibilities:

- Synthesize and characterize novel materials (e.g., metal-organic frameworks, MOFs) to enhance lithium-ion conductivity through tailored pore interactions and integration with ionic liquids.
- Develop and study new cathode materials, including both conversion-type and intercalation-type systems, as well as engineered interlayers to support efficient lithium plating.
- Incorporate synthesized MOFs into advanced polymer matrices with self-healing or sensing capabilities to enable intelligent response mechanisms in the electrolyte.
- Assemble and test complete battery cells, performing full electrochemical characterization to evaluate performance, durability, and safety under operating conditions.
- Contribute to the development of novel battery architectures, enabling scalable, high-performance solid-state energy storage devices

Research Environment:

The PhD candidate will be fully embedded in a dynamic and multidisciplinary team at BCMaterials, with access to state-of-the-art facilities and equipment. The project involves active collaboration with leading international research groups in Europe and beyond, providing an excellent platform for scientific growth, networking, and career development.

Application Procedure

Apply by submitting a motivation letter and a CV (in English) using the "Contact" button at the corresponding offer, at the "Join Us" area on BCMaterials' portal (<https://www.bcmaterials.net/join-us>).
Your name and email address will be required for further contact too.

Other Relevant Information

We provide a highly stimulating environment with state-of-the-art infrastructures, and unique professional career development opportunities. We offer and promote a diverse and inclusive environment and welcomes applicants regardless of age, disability, gender, nationality, ethnicity, religion, sexual orientation or gender identity.
The candidates will need to include contact details for 2 referees.