

## Company Description

BCMaterials, Basque Center on Materials, Applications and Nanostructures, is an autonomous research center launched in June 2012 by Ikerbasque, the Basque Foundation for Science and the University of the Basque Country (UPV/EHU) as a research center for Materials, Applications and Nanostructures. The Center is included in the BERC's (Basque Excellence Research Centers) Network, and its mission is to generate knowledge on the new generation of materials, turning this knowledge into (multi)functional solutions and devices for the benefit of society.

## Information

 Deadline: 2022-09-25  
 Category: Academia  
 Province: Bizkaia  
 Country: Basque Country  
 City: Leioa

## Company

BCMaterials



## Main functions, requisites & benefits

### Main functions

The development of efficient, safe and environmentally friendly energy storage systems is considered as one of the key aspects to move towards a more sustainable society, in environmental terms. Among the different energy storage systems currently available, rechargeable batteries in general, and lithium-ion secondary batteries (LIBs) in particular, are of particular relevance. However, there are a wide variety of critical aspects related to the use of this type of batteries, such as the scarcity of lithium and other raw materials used (cobalt, natural graphite...), their high cost of extraction combined with geopolitical conflicts, and the safety issues inherent to this technology (the risk of explosion). It is therefore essential to work on the search for alternative battery systems that use environmentally sustainable materials and are safer, without losing storage capacity. In this context, sodium-ion batteries (NIB) and zinc-ion batteries (ZIB) have aroused great interest in energy storage applications due to the natural abundance of sodium and zinc, their lower cost and their adequate redox potential, which allows obtaining batteries with acceptable levels of energy density. However, the technology of NIBs and ZIBs still needs to be further developed to obtain batteries that are competitive with LIBs. Therefore, this project aims to develop a new generation of electrolytes in gel form based on renewable polymers such as cellulose, chitin, agarose or carrageenans. Similar to conventional systems, these biopolymers can ensure good electrical insulation between the cathode and the anode but at the same time allow an efficient ion exchange between them. For this purpose, the biopolymers will be processed to make them suitable for 2D printing techniques. In addition, additive manufacturing by 2D printing offers low production costs, the ability for complex designs and applicability on flexible substrates, thus also enabling the development of mechanically flexible batteries, which are increasingly in demand in areas such as wearable electronics or point-of-care diagnostics. Such gels will also provide greater battery safety by preventing leakage of the liquid electrolyte. Once the electrolytes have been optimized, they will be implemented in Na and Zn cells to evaluate their possible application in real energy storage systems. The pre-doctoral position is framed within the research areas of Active and smart materials of the BCMaterials. Work Program / Duties / Responsibilities Design of novel battery electrolyte systems based on renewable materials. The candidate will work with polymers from natural origin such as cellulose, chitin, chitosan or agarose. After synthesis and surface modification of batter separators, electrolytes and cathode materials, their microstructure, mechanical properties, and chemistry, would be characterized. Developed materials will be tested into a final battery device.

### Requisites

The candidate must have Master's degree or equivalent in Materials Science, Chemistry, Chemical Engineering or related areas. Proficiency in speaking and writing in English. Capacity for teamwork in an interdisciplinary and international environment. Self-motivation and willingness to perform excellence research. Creativity in problem solving. Ability and eagerness to learn new skills outside own discipline. Presentation skills and ability to meet the deadline are also required. Internships related with materials chemistry and/or energy storage are an asset.