

Predocctoral Open Position

ADVANCED COATED CONDUCTORS FOR SUPERCONDUCTING ELECTRICAL POWER DEVICES ENABLING THE SPREAD OF CLEAN ENERGIES

Joffre Gutiérrez (ICMAB, CSIC)

Position offered

We offer a position for a predoctoral researcher in the framework of the project “Advanced coated conductors for superconducting electrical power devices enabling the spread of clean energies” funded by the Ministerio de Ciencia e Innovación as part of the Ecological and Digital Transformation Programme.

Main Tasks and Responsibilities

The project aims to engage talent young students for a Materials Science doctorate in the field of High Temperature Superconducting (HTS) Materials by investigating the integration of HTS coated conductors (CC) in clean energy applications by customizing them and adapting them to the specific technical requirements under real working conditions of the devices (temperature, magnetic field and injected current).

Two specific customization objectives will be pursued: 1/ To increase the robustness of the conductors by an improved electro-thermal stabilization using the current flow diverted (CFD) strategy; and 2/ To enhance the engineering total current of CC to create a new generation of more compact high field magnets using substrate-less conductors.

The PhD project is addressed towards the physical analysis of the material with special emphasis in electrical transport characterization at cryogenic temperatures under high-magnetic fields (up to 16 T), and the mechanical-thermal properties of the tapes which will be evaluated both experimentally and using finite element simulations.

Requirements

- Degree in Materials Science, Nanoscience, or Physics
- High motivation to experimental research
- Working aptitudes in a collaborative group
- High level in written/spoken English
- Academic grades and research experience will be considered in the evaluation
- Experience and knowledge on superconductivity, superconducting materials and electron microscopy characterization techniques will be valuable

Conditions

- The contract will be full time.
- Duration of 4 years.
- The starting date will be from December 2022.

How to apply

The selection process will be continuous until a good candidate is found, but strong effort will be done to finish it before end of December 2022.

Interested persons should send an email to Joffre Gutiérrez (jgutierrez@icmab.es) attaching:

- CV
- Academic grades certificate
- Letter of motivation
- Contact details of a reference person.

ICMAB is an equal opportunity employer committed to diversity and inclusion of people with disabilities.

About the Superconducting and Large Scale Nanostructures

Group

The candidate will be integrated in a large group with different background expertise in the field of HTS materials developing cutting-edge research in the physical understanding of these materials. The research group is very international and interdisciplinary, with more than 25 years' experience in HTS superconductivity.

Superconductivity is a macroscopic quantum phenomenon based on the formation of a condensate at the energy ground state by electron-pairing (Cooper pairs), with outstanding properties and impact in many applications. Since high temperature superconducting cuprate materials were discovered 30 years ago, many additional applications were envisaged since large currents without losses could be expected at liquid nitrogen temperatures and under high-magnetic fields. Nowadays, the international community is able to fabricate HTS tapes for high current energy efficient applications (high power cables, wind generators, electrical aviation) and large scale infrastructures (fusion, circular colliders, NMR beyond 1 GHz). Nevertheless, the integration of CCs into devices usually require further customization of the tapes to fulfil specific electromagnetic, thermal or mechanical requirements. The study of how to adapt CCs to each specific functionality is an essential step to develop competitive devices. The ICMAB-SUMAN group has always been very actively investigating these goals through collaborative projects with industry or engineering teams. This strategy will be further followed in this research, centred in the very relevant and specific areas of a demanding electrical power device, such as the Fault Current Limiter (FCL), but with special emphasis in applications requiring CC coils (such as generators, motors, compact fusion or SMES). The objective is to adapt CCs to the specific technical demands under the working conditions of these devices (temperature, magnetic field, injected current), generate the electromagnetic-thermal-mechanical data, and analyse the challenges to scale-up the customization processes.

About ICMAB

ICMAB is one of the world's leading Institutes in Materials Science research, located at Campus UAB, very close to Barcelona. The ICMAB's main strategic objectives and missions are to make an impact in the field of new materials for applications in energy, electronics and health through its research and training and empowering the next generation of scientists.

ICMAB provides facilities, state-of-the-art equipment and most importantly, excellent scientists and professionals, to assure you a rewarding environment. In the last years, we have grown up to build up a team devoted to project managing, technology transfer, innovation, communication, maintenance, technical services and administration, to team up with the researchers for the advancement of science.

The diversity of our people and the interdisciplinary research fields related to Materials Science ensures an enriching and inspiring working environment. If you are an enthusiastic and highly motivated person and would like to work in a multidisciplinary and multicultural environment, join us!