

**TOPIC:** The increased use of conventional energy sources such as gas, petrol, and carbon has led to an alarming **increase in global temperature**, subsequently leading to **climate change**. In recent decades, considerable efforts have been made to develop **new and more efficient alternative energies**. **The project** will explore the **development of an innovative thermoelectric device** to generate electricity. **GainTherm** proposes the powering of Internet of Things (IoT) devices in smart cities.

We are looking for a highly motivated candidate with a degree in physics, chemistry, material science, or engineering with master's degree who are interested in completing a PhD thesis in our group. The research will be focused on the development of an efficient thermoelectric generator based on thin films by electrodeposition. The project has been recently awarded by JAEPRE from CSIC. It is crucial to have good English abilities and personal skills. Additional requirements are previous expertise on material nanostructuration, characterization techniques, and/or electrodeposition.

The PhD student will develop the doctoral thesis in the Functional Nanoscale Devices for Energy (FINDER) group. The FINDER group (<https://finder.imn-cnm.csic.es/>) is at the forefront of the scientific research lines that will be merged in this project, and the PhD student will, therefore, be formed in a highly competitive research field preparing her/him for a future career in academia or industry. The student should be admitted in a Doctoral School of the one University of Madrid as such as Universidad Autónoma de Madrid from the campus de Excelencia UAM+CSIC ([https://www.uam.es/EscuelaDoctorado/Home.htm?language=en\\_GB](https://www.uam.es/EscuelaDoctorado/Home.htm?language=en_GB)) with a regulated process of training and acquisition of knowledge and skills, which is also adapted to the PhD student and agreed with the supervisor (Dra. C. V. Manzano).

Each year, an external academic committee assesses the work of each student to ensure academic achievements. The formation includes foundational courses with specialized classes in the discipline of study, and cross-disciplinary training (oral and written scientific communication, knowledge transfers issues, how to write papers, projects, perform presentations, etc...) for doctoral students in all areas of science, creating an avenue for interdisciplinary interactions.

### **Specialized training**

Firstly, the PhD student will be formed how to look for bibliography and how to use different software's about bibliography (as Endnote), about data analysis (Origin, XnView, ImagenJ, etc.). The PhD student will be trained about how to growth materials by anodization and electrodeposition, and how to use a glove box. The PhD student will learn how to measure the structural, compositional and morphological characterization, and the thermoelectric properties (electrical and thermal conductivities and Seebeck coefficient) to be independent in the group when all these tasks will be controlled by the student. In addition, the PhD student will receive knowledge about how to plot and analyze the scientific data and how to write scientific papers in order to finish the PhD thesis manuscript. Moreover, the PhD student can apply and perform different courses that are interested for his/her thesis. This formation will revert to a competitive interdisciplinary background for her/his future, with a solid formation interesting for a career in academia or the technological industry. The PhD student will participate in the FINDER group meetings every Monday. These meetings are focused on the scientific advances in the group. Each Monday, one person of the group performs an oral presentation to the rest of the group about his/her scientific topic. The purpose of these presentation is the preparation for the future to assist to international conferences and learn how to do it. In addition, every Friday the PhD student will have a meeting with Dra. C.V. Manzano to plan experiments and discuss about the thesis development, dissemination activities (manuscript writing, divulgation activities,). The PhD student can do short stays in different international groups.

For further information, please see: <https://finder.imn-cnm.csic.es/>. Interested applicants should send a full CV, a motivation letter, and the Degree's marks to [crisrina.vicente@csic.es](mailto:crisrina.vicente@csic.es).