

2 PhD Positions on Organic Energy Materials at ICMAB

We are offering two PhD positions on organic energy materials to be carried out primarily at the Materials Science Institute of Barcelona.

Position 1 focuses on **thermal transport in semiconducting polymers**, and is funded through the Severo Ochoa Program awarded to our institution (Institute of Materials Science of Barcelona, ICMAB). This initiative promotes collaboration among researchers from diverse scientific backgrounds. The current project specifically addresses the investigation of the thermal conductivity tensor in organic thin films. The main objective of this proposal is to study the thermal properties of polymer used for optoelectronic and energy applications, such as for thermoelectrics. The candidate will perform systematic studies on the chemical structure, molecular weight, sidechains etc., in order to develop a general understanding of what governs the thermal properties of these systems. The measurement of the effect of heating in operando will also be studied for several devices. Furthermore, it aims to develop the Doctoral Candidate's scientific expertise to produce excellent research, and interdisciplinary collaboration with scientists from different fields ranging from Physics, Chemistry, Materials Science and Data Science.

Position 2 focuses on **organic solar cells**, and it is framed within the CSIC-funded bilateral project DOMMINO, which partners up ICMAB-CSIC and Imperial College London (UK), and targets the basic science of electronic materials that can help accelerate the energy transition through three main ideas: improved thermoelectric harvesting of waste heat, improved energy efficiency of low power electronic devices, and improved utilisation of solar radiation for photovoltaic conversion. This project grants a JAE-Chair to Prof. Jenny Nelson, who will be the co-supervisor of the student. The PhD project will contribute to the development of specific types of solar cell, such as semitransparent and multijunction rainbow solar cells, through fundamental investigations of the impact of material structure and processing on device behaviour, taking advantage of the expertise provided by other members of the consortium. The relationship between properties of multicomponent materials systems and their performance in devices will be an important part of the Candidate's project. Several research secondments are planned for the student at Imperial College London.

Roles and Responsibilities

The main part of your work will be carried out at Institute of Materials Science of Barcelona (ICMAB-CSIC) in Barcelona, Spain, in the group of Prof. Mariano Campoy Quiles co-supervised by Dr. Sebastian Reparaz (Position 1) and Prof. Jenny Nelson (Position 2). The project will fund the PhD salary for three years (typically length of a PhD in Spain) and would start as soon as possible after 1st of September 2025. The PhD degree will be awarded by Universitat Autònoma de Barcelona (UAB) on the basis of successful completion of the research work and PhD studies. The candidate will also be required to participate in the training activities and workshops throughout the project.

Position 1 Topic: Thermal Properties of Organic Materials

This PhD research will focus on:

- i) Developing thermal high-throughput screening methods for organic thin films systems to study cross-plane and in-plane thermal transport.
- ii) Correlation of thermal properties with structure and morphology.
- iii) Study of large datasets that will be employed to feed statistical tools and artificial intelligence models to identify correlations between structural and thermal properties.
- iv) Use advanced IR imaging to visualize heat maps in in-operando optoelectronic devices.

Position 2 Topic: Improved utilisation of solar radiation using organic solar cells

This PhD research will focus on:

- i) High throughput screening of wide bandgap molecular materials for PV.
- ii) Reducing losses in narrow bandgap, semi-transparent molecular PVs
- iii) Thermodynamic analysis of losses in molecular PV in operation.
- iv) Thermodynamic and optoelectronic properties of multicomponent mixtures for improved PV stability.

The ideal candidate

- The applicant should have completed at least four- or five-years education with a Master's degree or Diploma from a recognized university in Chemistry, Physics, Materials Science or in a related field and should be eligible as graduate student at Universitat Autònoma de Barcelona (UAB, see <https://www.uab.cat/en/phds/materials-science#seccio-inici> for further info).
- The applicant should show interest in conducting a research project independently and should enjoy working in an international, interdisciplinary environment.
- The applicant should demonstrate an excellent command of the English language at a proficient level (spoken and written).
- Experience in solution processed organic semiconductors and their applications will be valuable. In addition to the experimental skills, experience on device simulation would be also favorably reviewed. International experience during Master's or research stage/visits will also be positively considered.

The Institute of Materials Science of Barcelona (ICMAB-CSIC) aims to increase the proportion of women and therefore qualified female applicants are explicitly encouraged to apply. ICMAB-CSIC actively promotes diversity and equal opportunities. Applicants are not to be discriminated against in personnel selection procedures on the grounds of gender, ethnicity, religion or ideology, age, sexual orientation (anti-discrimination). People with disabilities and who have the relevant qualifications are expressly invited to apply.

Application Procedure

To apply for the positions, kindly provide: (i) a letter of motivation including a 1-page statement of your research interests, relevant skills and experience; (ii) a CV including publication list, and copies of relevant certificates and (iii) names and contact details of three referees willing to write confidential letters of recommendation. All materials should be attached as a single PDF file (max. size 5MB).

For interested applicants, please submit your application via email to the following address: jobs.nanopto@icmab.es with the subject "2NanoptoPhDs", and stating which position/s you are interested on.

Deadline:

The closing date for all applications is 31st of July. However, in the interest of gender equality, this may be extended until the ratio between female and male applicants is reasonable. Shortlisted candidates will be interviewed and asked to introduce their profile at the CSIC bolsa de trabajo (https://www.bolsatrabajo.csic.es/bolsa_trabajo/).

Enquiries:

For further information about the project the applicant should contact, Prof. Mariano Campoy Quiles at mcampoy@icmab.es, and/or Dr. Sebastian Reparaz at jsreparaz@icmab.es