

Call for Expressions of Interest to apply for a MSCA Postdoctoral Fellowship



One-pot assay for screening cancer nanomedicines

The role

The **“Supramolecular Chemistry” Group** is looking for a young postdoctoral researcher to work in the field of **nanomedicine**. The contract will be within the framework of the **National Project “One-pot assay for screening cancer nanomedicines: decoding bar-coded nanoparticles by DNA-PAINT microscopy (NANOCODE)”**.

Nanomedicine emerged 20 years ago with the promise of delivering drugs selectively to their target, thereby increasing their efficacy and minimising unwanted side effects. Selectivity comes from encapsulating the drug in a nanostructure, which radically alters its pharmacokinetic and biodistribution profile while increasing its solubility and protecting it from degradation. Nanostructure design features, such as size, shape or surface chemistry, have a major influence on the biodistribution and elimination of nanomedicines. In addition, nanomedicines increase circulation times in the blood, making extravasation to disease sites more likely.

Despite the promise of nanomedicine for drug delivery, very few nanomedicines have been approved for use in patients. This poor translation to the clinic is due to several factors, including poor safety and toxicity assessments, difficulties in large-scale manufacturing, and poor selectivity.

By using **DNA-PAINT microscopy**, a type of **super resolution microscopy which uses short oligonucleotide sequences**, thousands of different types of NPs can be bar-coded and assayed all at once: **a bar-code one-pot assay**. The DNA-PAINT technique allows evaluating a library of different NPs, previously formulated separately, mixed in the same container at the same time. The bar-code one-pot assay provides a detection signal (which one) and localization (where) of different individual NPs according to their barcode. **The project aims at obtaining precise information on the targeting, efficiency of delivery, penetration and biodistribution of NPs, with the potential of accelerating nanomedicines translation into clinic.**

What do we look for?

• Non-Negotiable Conditions:

- **PhD thesis defended** at the time of deadline for applications (11th September 2024).
- **Max. 8 years experience in research**, from the date of the award of their PhD degree.
- **Exception:** For **nationals or long-term residents of EU Member States or Horizon Europe Associated Countries** who wish to reintegrate to Europe, years of experience in research in third countries will not be counted.
- **Must not have resided or carried out main activity in Spain for more than 12 months between 11th September 2021 and 11th September 2024.**

• Qualifications

- **PhD in Chemistry/Nanotechnology/Biochemistry/Pharmacy or related.**

• Professional experience

- Experience in **nanoparticle formulation and characterization**.
- Previous experience in **cell culture**.
- Previous experience in the development of **lab-on-a-chip/organ-on-a-chip** devices will be considered a plus.
- Previous experience in **imaging techniques** (e.g., confocal microscopy or life imaging) will be considered a plus.

• Competences

- **Competencies and skills:** Communication, Teamwork and Collaboration, Commitment, Proactivity, Integrity, Critical and Analytical Thinking.
- **High level of English.**
- **Experience in data analysis** with specialized software (Matlab, Python or similar) **will be considered a plus.**

Working conditions

- **Contract duration: Minimum of 12 months and maximum of 24 months.**
- Estimated annual gross salary: Stipulated by the MSCA-PF call.
- Target start date: April 2025 onwards.

The group

Dr. Pujals' research group is dedicated to developing more efficient **drug delivery systems**. They employ **super-resolution microscopy in nanomedicine**, from nanomaterial characterization to tracking all the steps a nanomaterial must take to reach its target: blood circulation, extravasation, cell targeting, cell internalization, and intracellular release. Her lab also uses **correlative approaches** (super-resolution microscopy with electron microscopy) to gain insights into nanomaterial's cell internalization processes. Another research area is the **development of nanofibers** that respond to different stimuli (light, pH, enzymes, etc.) to achieve precise drug release.

More information is available in the web page:

<https://www.iqac.csic.es/research/departments/biological-chemistry/supramolecular-chemistry/#presentation>

The institute

The **Institute for Advanced Chemistry of Catalonia (IQAC)** is one of the research centers of the **Spanish National Research Council (CSIC)**. The Institute is located in Barcelona and it was created in 2007 with the mission to perform research of excellence in Chemical Sciences with the broad goal of improving the quality of life. The general strategy to achieve this mission involves the application of chemical approaches to address and solve societal challenges, mainly those related to human health, the sustainability of chemical processes and products, and the needs for novel materials for different applications. Since its establishment, IQAC has been in a permanent attitude to transfer its knowledge and technology results to the industrial sector.

The research developed at IQAC is organized around two main nodes: **Biological Chemistry** and **Nanobiotechnology** and it is facilitated by a number of Key Enabling Technologies. Considering the objectives pursued, many of the investigations carried out by the Research Groups at IQAC lie at the intersection between nodes.

In addition, our Institute holds a set of scientific and technical facilities run by highly qualified scientists and technical personnel with a solid background and long lasting expertise. These facilities are available not only to IQAC research groups, but also to potential users from both academia and private institutions. In any case, the technical services from IQAC are always wide open to attend any inquiry and to offer their best efforts to find adequate responses to specific needs.

How to apply?

Those interested may email their **CV** and **motivation letter** to **Dr. Silvia Pujals** at silvia.pujals@iqac.csic.es with CC to international@iqac.csic.es, adding "**MSCA Postdoctoral Fellowship**" to the email subject and indicating via which channel you found the expression of interest. **Letter/s of references are recommended.**

Deadline: 21st July 2024.