Marie Skłodowska-Curie Actions Postdoctoral Fellowships 2021

Supervisor Profile

1. Details of the IMDEA Supervisor

<table>
<thead>
<tr>
<th>Name of Supervisor</th>
<th>Álvaro Somoza</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td><a href="mailto:alvaro.somoza@imdea.org">alvaro.somoza@imdea.org</a></td>
</tr>
<tr>
<td>Website</td>
<td><a href="https://nanobioimdea.com/">https://nanobioimdea.com/</a></td>
</tr>
</tbody>
</table>

2. Research themes proposed

The project aims to develop **nanocarriers for nucleic acids** (e.g., siRNAs, miRNAs, mRNA), which can be used for the regulation or edition of genes through the RNAi or CRISPR process, and even for the development of vaccines. The nanocarriers will be designed to release the therapeutic molecules at the target cells. It is achieved using linkers that respond to specific stimuli inside the cells. In addition, the development of modifications for nucleic acids will be explored to modulate their interaction with the essential proteins (e.g., Ago2, Cas12a), aiming for better control of the regulation or edition process.

The primary purpose of this approach is to develop **more efficient nanomedicines against pancreatic cancer and uveal melanoma based on nucleic acids**. These diseases lack effective treatments, and the patients die after few months once the disease has metastasized. The researcher will work in the **preparation of the nanostructures and modified nucleic acids and their evaluation in cell culture**.

We are looking, preferably, for **synthetic chemists** interested in using their skills for the development of complex nanostructures and modified nucleic acids for **nanomedicine applications**. The candidates will work in the preparation of linkers to modify nanostructures with nucleic acids and drugs for the preparation of smart nanoparticles with therapeutic use. The candidates will learn various techniques involving **nucleic acid chemistry, nanoparticle preparation and characterization, and cell culture evaluation**.

Candidates with **experience** in **nanomedicine** or with a **biology/biochemistry** background could also be considered, but their activities will be mainly focused on the evaluation of the nanostructures prepared. The candidates will learn techniques and processes for the **preparation and characterization of nanomaterials**.

Furthermore, the candidates will have the opportunity to learn about the **application of quality systems in research laboratories** (e.g., ISO, GLP), since we are implementing Standard Operational Procedures (SOPs) and ISO/GLP guidelines to most of the processes of the laboratory.
3. Brief description of the Research Group

The group is composed of postdoctoral researchers and Ph.D students from different disciplines (e.g., Chemistry, Biology, Biochemistry), which expertise are combined to develop therapies and sensors for diseases, particularly, pancreatic cancer, uveal melanoma, and Duchenne muscular dystrophy. Most of the projects are carried out in collaboration with other members of the group or with national and international collaborators, but the researchers are involved in most of the activities to understand the projects better.

Besides the research activities, the members of the group have an interest in the dissemination of science to the society and have created a Youtube Channel to explain the activities of the group to a broad audience. (NanoBioTube)

4. MSCA Research Area Panels

- Chemistry (CHE)
  - Social Sciences and Humanities (SOC)
  - Economic Sciences (ECO)
  - Information Science and Engineering (ENG)
- Life Sciences (LIF)
- Environmental Sciences and Geology (ENV)
- Mathematics (MAT)
- Physics (PHY)