



*Call for Expression of Interest:*

### Marie Curie Individual Fellowship for post-docs

The **Radiation Detector Group (RDG)** invites researchers holding a PhD to express their interest in applying to a Marie Curie Postdoctoral (PF) Fellowship together with the topic below.

We are experts on developing radiation detectors for medical physics, high-energy physics, accelerators, industrial, and radiation harsh environments.

**Research topic that we are supporting for new applications:**

### Hybrid sensors for personalized treatments in hadron therapy

***Motivation:*** A key parameter to optimize hadron therapy treatments is the relative biological effectiveness (RBE) of the radiation quality, which depends on the amount of energy that the ionizing particle deposits per unit length (linear energy transfer, LET) and on the type of cells irradiated. It is necessary to understand in depth the effect of *tuning* LET over DNA damage for patient profit, i.e., understanding the relations between the physical cause (LET) and the related biology effects. For this reason, the precise quantification of the LET is fundamental, being only possible with advanced microdosimeter arrays as the ones developed by our group. Likewise, the utilization of these microdosimetry data in clinics requires understanding the radiobiology underlying the treatments; this would be done by developing and embedding advanced *Organs-on-Chips* into our microdosimeter arrays. The so-integrated *hybrid sensor* will provide a direct measure of the physics and radiobiology parameters.

***Proposition:*** We aim to create the first Organ-on-Chip to characterize the parameters above for the first time. It would allow us to optimize the RBE-weighted doses in the patients. Making hybrid sensors at these scales implies developing a new technology based on microfabrication at the CNM, as well as building a specific experimental set-up in which to evaluate these sensors.

***Innovations:***

- (1) Develop the first *hybrid* radiation sensors.
- (2) Measure for the first time microdosimetry & radiobiology parameters correlated at the same time.

This project will use three key unique infrastructures:

- An advanced micro and nano manufacturing facility (**CNM clean room**) where the devices will be manufactured, and
- A particle accelerator facility where sensors can be irradiated under the relevant conditions. Secondments will be performed in the **National Center for Accelerators**.
- A proton therapy centre where the final tests will be performed.

Successful candidate will have access to the RDG lab and the 1500 m<sup>2</sup> CNM clean room for micro and nanofabrication (find a list of currently available equipment at <https://www.imb-cnm.csic.es/en/micro-and-nanofabrication-clean-room/technology-offer>) and associated labs (electronic circuits assembly, electronic characterization, packaging, rapid prototyping). She/he will be trained in the use of these laboratories and equipment as needed for the development of the proposed research, e.g. in radiation detector design, fabrication, and characterization as well as in the basic principles of medical physics.

### Candidate Profile:

We are looking for a motivated researcher with:

- PhD in Micro and Nano technology, Physics, Electronics, or related field.
- Previous experience in Organs-on-Chips and micro-nanofabrication will be positively valued.

Interested candidates, please send a short CV (max. 5 pages) and a letter of motivation (max 1 page) to [consuelo.guardiola@imb-cnm.csic.es](mailto:consuelo.guardiola@imb-cnm.csic.es)

**The deadline for receiving your expression of interest is 15<sup>th</sup> June 2023.** Please visit the MSCA Postdoctoral Fellowship webpage for more details on what the funding covers and who can apply:

<https://marie-sklodowska-curie-actions.ec.europa.eu/actions/postdoctoral-fellowships>

More details of the call can be found on: <https://www.imb-cnm.csic.es/en/about-center/careers/open-positions>.