

Call for Expressions of Interest: Marie Skłodowska-Curie Actions (MSCA) Individual Fellowships 2019

Biofisika Institute (IBF) is inviting Expressions of Interest from potential international postdoctoral researchers who are interested in applying for a Marie Skłodowska-Curie Actions (MSCA) Individual Fellowship. These fellowships offer researchers the opportunity to enhance their career development and prospects through advanced training, international and intersectoral mobility. If successful, the fellowship will provide a competitive salary and an allocation for research and training costs.

The Biofisika Institute (<http://biofisika.org/>) is a joint venture between the Spanish Council of Research (CSIC) and the University of the Basque Country (UPV/EHU), it is linked to Fundación Biofisika Bizkaia (FBB) awarded with the “Basque Excellence Research Centre” (BERC) credential by the Basque Government in recognition to its research quality. Since 2016 this centre is located in a new 9.000 m² building in the UPV/EHU Scientific Park of Leioa that provides cutting-edge facilities. It host 29 faculty members developing research lines related to protein and membrane biophysics, 16 postdocs, more than 10 technicians, providing training opportunities to about 25 PhD students and a number of masters and grade students. More than 500 scientific high impact original papers have been published since 2009, and more than 30 active competitively funded research projects are being carried out currently. IBF is at the forefront in the field of biophysics, providing a multidisciplinary environment where several areas of expertise (physics, biology, chemistry) meet, creating a unique and internationally-recognized research center.

For this call, we welcome expressions of interest (Eols) particularly in the following groups:

- Cellular excitability regulation- Group leader: Alvaro Villarroel (AV)

Description of the research group:

We are interested on the molecular details of transmission of intracellular calcium signals to the voltage sensor and the gate of ion channels. We follow molecular movements of signalling domains by FRET, NMR and other techniques, both in vivo and in vitro. Folding within the ribosome is monitored by an in house iteration of

state of the art SecM assays (based on translational arrest at the ribosome that serves as a force sensor), which report folding events while the nascent peptide chain is still attached to the ribosome.

Project description: *Molecular dynamics, signal transduction and co-translational folding of calcium sensor domains of ion channels*

Protein folding to the native state is particularly relevant in human diseases where inherited mutations lead to misfolding, aggregation and degradation. The ribosome adds amino acids to the carboxyl-terminus of the nascent chain to synthesize proteins, such that they emerge from the ribosomal tunnel in a vectorial fashion, starting at the amino-terminus. In general, folding is much faster than elongation, and can proceed co-translationally. In addition to the challenge of folding within the crowded cellular environment, most proteins must form oligomeric assemblies. The influence of the vectorial nature of protein synthesis on folding and assembly remains poorly understood.

We have found that some pathological (epilepsy, mental retardation or autism) mutations at the calcium sensor disrupt domain assembly and signalling, whereas others impede co-translational but not in vitro folding, apparently defying Anfinsen's dogma that protein sequence determines a unique structure (see https://en.wikipedia.org/wiki/Anfinsen%27s_dogma).

We also aim at understanding the atomic essence of the movements within the sensor during signalling using spectral measurements (in vitro and in cellulo), and in silico molecular dynamic simulations. See Bernardo-Seisdedos et al. (2018) PNAS 115:2395.

We are searching to enthusiastic candidates interested on understanding co-translational folding and assembly at molecular level with a good background in molecular and cellular biology. The candidate should be a motivated person with a strong interest in understanding the molecular mechanisms of protein signaling.

- FluoroNanoTools Lab – Group leader: Mónica Carril (MC)

Description of the research group and potential project:

The research of the FluoroNanoTools Lab is focused on the use of fluorinated nanostructures as enabling tools to learn about dynamic biological processes, combining several areas of science from (bio)chemistry, through physics and biology. In the last years, we have generated synthetic tools to prepare a family of novel fluorinated ligands and fluorinated building blocks, which can be used to produce fluorinated NPs (F-NPs) and overcome intrinsic solubility issues associated to polyfluorinated structures. We use our fluorinated NPs as a toolbox

with different biomedical and fundamental applications in the fields of nanomedicine and nanotoxicity. On the one hand, we use fluorine as a label that can be tuned for the design of OFF/ON or smart contrast agents for diagnosis by magnetic resonance image based on Fluorine 19 (^{19}F MRI) or as a reporter for the study of protein corona in complex environments via fluorine based magnetic resonance. On the other hand, we also look for theragnostic probes that, in addition to allowing diagnosis, act simultaneously as vehicles for drugs for the treatment of different pathologies. In the field of nanotoxicity, the fluorinated nanoparticles that are prepared in the laboratory of FluoroNanoTools serve to study the biodistribution and fate of each of the components of the nanoparticles (metal core and organic coating) in vivo, in addition to their interaction with the proteins present in the blood. Further applications are envisaged and could be explored within the frame of the MSCA programme.

The FluoroNanoTools lab is looking for a highly-motivated experienced researcher of any nationality interested in applying for the Marie Skłodowska-Curie Actions Individual Fellowship call (H2020-MSCA-IF-2019), who wishes to work in the field of nanotechnology applied to solve and study biological problems.

- Structural biology of neurodegenerative disorders – Group Leader: Iban Ubarretxena-Belandia (IUB)

Description of the research group:

Our research has a strong translational relevance and centers around unraveling the structure and function of proteins linked to hereditary forms of Alzheimer's disease (AD) and Parkinson's disease (PD). In the case of AD our focus is on the membrane protein Presenilin and in PD our research revolves around Leucine-Rich Repeat Kinase 2. These enzymes constitute definable targets for studying the molecular bases of these diseases and the development of new therapeutic strategies. We mainly employ cryo-electron microscopy (cryo-EM) for protein structure determination in combination with biophysical and functional studies to obtain mechanistic insight. The United States National Institutes of Health (NIH), National Science Foundation (NSF), and the Michael J. Fox Foundation for Parkinson's Research fund our research. The laboratory was awarded a prestigious NSF CAREER award and has experience in attracting successful Marie Skłodowska-Curie postdoctoral fellows.

The laboratory is fully equipped for all aspects of molecular biology, biochemistry, biophysics and structural biology. In addition, through our membership of the New York Structural Biology Center (NYSBC, www.mysbc.org) we have direct access to high-end cryo-EM instrumentation.

Requirements for candidates:

Candidates must have a Ph.D. in Molecular Biology, Biochemistry, Biophysics,

Structural Biology or an appropriately related field. Strong research experience in structural biology is a requisite. The candidate must be able to think independently and work cooperatively.

Potential applicants

Applicants must be Experienced Researchers (ER), at time of submission (**11 September 2019**); be in possession of a PhD; or have at least 4 years of full-time equivalent research experience (please read call guidelines). Researchers cannot have resided or carried out their main activity (work, studies, etc.) in Spain for more than 12 months in the 3 years immediately before the call deadline. There are no restrictions on age or nationality. Grant is awarded to the host organization.

Submitting EoIs for MSCA-IF at IBF:

Applicants must have ensured that they meet the eligibility requirements of the call. The EoIs must include:

- CV –max 5 pages.
- Motivation letter – describing academic achievements and research expertise, focusing on those aspects relevant in the context of the corresponding project. Max 1 page.
- Contact information of two referees.

Candidates must send the required documentation before July 14th through the Biofisika website contact page (<http://biofisika.org/contact/>), adding the following subject (including Lab acronym): [Job Application MCSA-IF 2019: LAB/AV or LAB/MC or LAB/IUB]