



PhD position in Marie Skłodowska-Curie Doctoral Network (DN) Monalisa: Motorized Nanomachines: Fundamentals, Innovations, Applications

Technical University Munich (TUM) is offering a PhD position on the topic "Controlling enzymatic reactions with externally driven DNA machines"

The project is funded by the MARIE SKŁODOWSKA CURIE Doctoral Network "MonaLisa", within the Horizon Europe Programme of the European Commission. The project aims to structure a training network for doctoral students in the field of Artificial Molecular Machines for a period of 48 months. Monalisa is a consortium of 20 partners composed of high-profile universities, research institutions and companies located in 5 European countries, and will train 15 Doctoral Candidates.

This particular PhD will be based at the Department of Bioscience of the TUM School of Natural Sciences in Garching, Germany.

# **ELIGIBILITY CRITERIA:**

In order to be eligible, each applicant must fulfill the following criteria:

*Nationality:* Candidates may be of any nationality.

<u>Mobility</u>: At the date of recruitment, the applicant must **NOT** have resided or carried out his/her main activity (work, studies etc.) in Germany for more than 12 months in the last 3 years immediately prior to his/her recruitment. Compulsory national service and/or short stays such as holidays are not considered.

<u>*Qualifications and research experiences:*</u> the applicant must fulfill the requirements defined for Doctoral Candidates (DCs): DCs are researchers who at the date of recruitment have NOT yet been awarded the doctoral degree and are in the first 4 years (full time equivalent) of his/her research career.

Full-time research experience is measured from the date when a researcher obtained the degree which formally entitled him or her to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the researcher is recruited or seconded, irrespective of whether or not a doctorate is or was ever envisaged.

#### **PROJECT DESCRIPTION:**

The doctoral researcher will explore the potential use of switchable DNA origami-based molecular devices as controllers of biochemical (enzymatic) reactions. Based on a recently established experimental platform, we aim to use electric fields to controllably move a DNA-based transport arm (with a length on the order of 400 nm) between different "docking sites" which are associated with different chemical functions. For instance, the docking of the arm on one site can be associated with the parts of the two halves of a split enzyme or ribozyme, or it can lead to the exposure or sequestration of a binding site for an enzyme, or also mechanically straining substrates/enzymes to alter their activity. The doctoral researcher will focus on the control of enzyme function as the enzyme's action intrinsically leads to the amplification of the signal. The researcher will be involved in the design and operation of electrically switchable DNA origami devices, the selection of appropriate enzyme systems, chemical functionalisation and characterisation of the enzymes, and the performance of electrically controlled enzyme reactions. Integration into macroscopic materials will be explored with the collaboration partners in the consortium.

Principal supervisor is Prof. Friedrich C. SIMMEL Enquiries about this position can be made at the following address: <u>simmel@tum.de</u>





# **DC KEY RESPONSIBILITIES:**

The position is available for 36 months and the key tasks as a PhD student are:

- To manage and carry out research projects
- To attend and participate in research and training activities within the MonaLisa network and local courses
- To write articles for peer reviewed scientific journals
- To write a PhD thesis
- To teach and disseminate research in the scientific community (international conferences) and non-scientific community, by outreach and public engagement
- To be involved in departmental and group activities

### FORMAL REQUIREMENTS:

Applicants should hold MSc degree (or equivalent) with good grades and good English skills. As criteria for the assessment of your qualifications, emphasis will also be laid on relevant work experience and previous publications (if any).

### BACKGROUND OF SUCCESSFUL CANDIDATE:

The projects will involve DNA origami design, chemical modification of DNA, biochemical chacterization, single-molecule fluorescence and other biophysical experiments. Successful candidates ideally have a physics/biophysics or chemistry/biochemistry background who are exceptionally strong in (bio)physical and biochemical experimentation and data analysis, and who are capable of working in a wet lab.

Candidates will be integrated in an international multi- disciplinary environment and will have to integrate in other laboratories of the network for training periods. The candidate must therefore have excellent personal skills and be able to work in a team.

Women are especially encouraged to apply.

#### **TERMS OF EMPLOYMENT:**

The successful candidates will receive an attractive salary in accordance with the MSCA regulations for doctoral candidates (approximate total gross monthly remuneration  $\notin$ 3500). The generous financial package includes a living allowance, a mobility allowance as well as a family allowance (if eligible). The guaranteed PhD funding is for 36 months.

A career development plan will be prepared for each fellow of the network in accordance with his/her supervisor and will include training, planned secondments and outreach activities in partner institutions of the network. The DC fellows are supposed to complete their PhD thesis by the end of the 3rd year of their employment.

More information can be found on the CORDIS page: https://cordis.europa.eu/project/id/101169136