

Postdoctoral position in molecular biology and droplet-based microfluidic in Strasbourg (M/F)

Project

The overuse of antibiotics in the medical and agricultural fields has put a tremendous selection pressure that led to the rapid emergence of antimicrobial resistance (AMR) associated with an increased burden for healthcare systems and prolonged illness worldwide. New strategies are needed to optimize antibiotics treatments and counteract the development of AMR. Antimicrobial peptides (AMP) are the first line of defense against bacterial infection in most organisms, mostly by disrupting pathogens' membranes causing cell death. AMP represent an interesting target for drug development because interactions with membranes do not entail specific molecular interactions, hence reducing the risks of resistance development. In this context, the ANR funded bioAMP project proposes to setup new microfluidic-based ultrahigh throughput screening pipelines to discover new antimicrobial peptides active on bacterial pathogens.

Keywords :antimicrobial peptides • cell free protein synthesis • droplet microfluidic •

Activity

The main task of the postdoctoral researcher will be to express large libraries (10^6) of AMP variants in picoliter water-in-oil droplets containing cell-free protein synthesis systems, and to directly assess the effects of the expression of each AMP variant on bacterial viability, by ultra-high-throughput analysis and sorting of droplets containing live or dead cells.

Identification of AMP candidates with an inhibitory effect will be achieved by high-throughput sequencing (Illumina platform) of DNA templates coding for the enriched AMP, after recovery from droplets selected at the end of the pipeline. Validation of the most promising AMP will involve cell imaging and microbiological work to confirm their toxicity on the model pathogen in the laboratory. The successful candidate will be involved in optimizing the design of microfluidic chips and, if possible, the preparation of cell extracts compatible with droplet-based microfluidic screening.

Context

The postdoctoral scientist will join to the research group "Digital biology of RNA" which takes a multidisciplinary approach that combines cell and molecular biology, chemical biology, physics and droplet-based microfluidics to develop new RNAs and proteins (light-up, biosensors, enzymes) by *in vitro* evolution and study the effects of RNA modifications on their structure/function.

The position is placed under the supervision of Cédric Romilly (Associate Professor and bioAMP project coordinator) in the research group of Professor Michael Ryckelynck. The laboratory is located is affiliated with the CNRS (Centre National de la Recherche Scientifique) and located at the institute of molecular and cellular biology (IBMC, CNRS UR9002) in Strasbourg, France. More info on our website: <https://ibmc.cnrs.fr/en/laboratoire/arn-en/equipes/biologie-digitale-de-larn/>

Qualifications

A PhD in Molecular Biology or relevant area is demanded for the position.

Experience with RNA and protein biochemistry (with an emphasis on messenger RNA transcription and translation), *in vitro* directed evolution and selection of biomolecules and cell free protein synthesis systems handling is essential.

Experience with droplet-based microfluidics (PDMS chips design, fabrication and utilization), deep sequencing techniques (library preparation for Illumina or nanopore), handling of micro-organisms (pathogen included) is an advantage.

Skills in deep-sequencing data analysis (Python, R) is desirable.

The successful candidate must be able to work independently and take her/his own initiatives, and be able to integrate the host team multidisciplinary and technologic thematic. A particular emphasis will be placed on personal suitability.

The applicant must have good communication skills (written and oral) in English, due to the international work environment.

About the employment

The employment is 100% post-doctoral research fellow (< 4 year(s) research experience) and temporary position (up to 2 years), and is funded by the ANR agency (Agence National de la Recherche). Starting date: from November 2023, negotiable.

How to apply

The application should be written in English and submit via the CNRS application portal (<https://emploi.cnrs.fr/Offres/CDD/UPR9002-CEDROM-001/Default.aspx>)

