Research engineer in photophysics for in vivo imaging at ENS Paris

A 2-year research engineer position is available at the Chemistry Department of ENS Paris to participate in methodological innovations in the field of fluorescence imaging. Start date: from January 1, 2026 (negotiable). Salary: €2,880–€3,265 gross, depending on experience. Desired level of education: PhD.

Project

The engineer will participate in the IMARISC ANR project which aims to develop a new method for reducing phototoxicity and fluorophore photobleaching in fluorescence imaging, relying on 2-color illuminations.

Phototoxicity and photobleaching are mediated by so-called "triplet" states of fluorophores and endogenous photosensitizers, that form upon fluorophore excitation. These triplet states then interact with oxygen, leading to singlet oxygen and other reactive species that oxidize fluorophores and cell components and trigger unwanted biological responses. We have recently shown that it is possible to exploit a photophysical process called reverse intersystem crossing (RISC) to depopulate triplet states by co-illumination at a 2nd wavelength and reduce the photobleaching of green and yellow fluorescent proteins (Ludvikova et al., Nat. Biotechnol. 2024, 42, 872). The engineer will be responsible for expanding this approach to other fluorophores by designing illumination schemes adapted to each fluorophore, characterizing the effect of co-illumination on phototoxicity and photobleaching, and, finally, implementing one or more biological applications.

Activities

Planned activities include:

1) Sample preparation. Fluorophores will be studied both in vitro (production of recombinant fluorescent proteins) and in vivo in bacteria and mammalian cells (cell culture). In vitro experiments will also involve the design and use of microfluidic devices to confine fluorophore solutions during illumination.

2) Use, alignment and modification of optical set-ups. Two wide-field, dual-illumination microscopes will be used during the project: an "in-house" microscope dedicated to photophysical characterizations, and a Nikon microscope dedicated to in vivo experiments. Micro-millisecond time-resolved spectroscopy setups will in addition be used to characterize the triplet states of fluorophores. These different setups will have to be adapted for the study of each fluorophore (change of illumination sources, filters, etc.).

3) Use, adaptation and development of codes for data analysis. The project will generate spectroscopy data (spectra and kinetics) as well as microscopy images, which will need to be analyzed. We will also seek to build photophysical models to account for experimentally observed effects.

Skills

We are looking for a PhD in biophysics or in physical chemistry at the interface with biology, with a solid background in fluorescence microscopy (sample preparation, experiment design,

data acquisition, image analysis) and programming. Additional skills in one or more of the following areas will be appreciated: microfluidics (soft lithography), photophysics, spectroscopy, optics, instrumentation, microbiology, cell biology (cell culture), biochemistry/molecular biology (recombinant protein production). The candidate should also have a good level of scientific English.

Work context

The engineer will be based at the Chemistry Department of the Ecole Normale Supérieure in Paris, where he/she will be part of the AIV team (Analysis and Engineering of Living Systems - 8 permanent staff and around 10 PhD students/post-doctoral fellows). He/she will have access to the team's microscopes and spectroscopy equipment, the department's biology facilities and the microfluidics facilities at the Institut Pierre-Gilles de Gennes (3 min walk from ENS). The project involves close collaboration with the MUSE team (Mutagenesis in Single-Cells and Evolution) at INRAE Jouy-en-Josas (Institut Micalis), where some of the experiments may also take place.

Contact and application

Applicants should send their CV, list of publications, cover letter and contact information for at least two referees to Agathe Espagne (agathe.espagne@ens.psl.eu) and Lydia Robert (lydia.robert@inrae.fr). Please also feel free to contact us for any further information.