# JOB DESCRIPTION - PHD

## « Plasmonic enhanced fluorescence based optofluidic fiber probe for next generation of clinical diagnostic tools »

| DESCRIPTION OF THE POSITION | |
|---|---|
| **Duration** | 12 to 24 months, starting September 2026 (flexible) |
| **Location** | XLIM Research Institute, University of Limoges, France |
| **Supervisors** | Dr. Georges HUMBERT and Assoc Prof. Dinish U.S |
| **Deadline** | Mid-May 2026 |
| **Salary** | ~2300 € brut from Limoges University (social security included) ~3000 $SG net from A*STAR Graduate School + Medical insurance + some housing subsidy. |

Liquid biopsy refers to the molecular analysis of cell free nucleic acids, subcellular structures like exosomes or circulating tumor cells in biological fluids like blood, urine, saliva, ascites fluids, pleural effusions, etc for disease diagnosis. Compared to tissue biopsy, liquid biopsy is a non-invasive or minimally-invasive sensitive detection of biomarkers to develop personalized and precise diagnostics. It has the potential for becoming an indispensable method for early detection of diseases and to monitor patients' responses to therapeutic interventions in clinical settings. However, the challenges to develop an effective liquid biopsy of biomarkers with minimal preparation of the body-fluid samples are immense. Specifically, the main challenge for achieving effective liquid biopsy at the bed-side is equivalent to "finding a needle in a haystack" (i.e. detecting biomarkers in low concentration) with high efficiency, reliability, and, minimal manipulations, time and costs. Our objective is to address this challenge by developing a novel biosensing platform based on the association of specially fabricated optofluidic fiber with nano-plasmonic technologies and novel biosensing strategies for achieving unprecedented sensitivity and reliability, and with excellent compatibility to effective transfers at the bedside.

Optofluidic fibers are a novel class of optical fiber composed of micro-fluidic channels running along the fibre core yielding tremendously long light–analyte interaction length, high measurement repeatability and reproducibility, excellent compatibility with microfluidic systems and industry standards.

We aim to capitalize on the properties offered by the specially designed optofluidic fibers associated with nano-plasmonic structures for enhancing the sensing performances of fluorescence spectroscopy methods (i.e. plasmonic enhanced fluorescence – PEF). In particular, we aim to (i) investigate PEF in optofluidic fiber, (ii) realize a novel optofluidic fiber for enhancing PEF and (iii) develop novel detection protocols of biomarkers. Furthermore, we aim to exploit the performances of this novel fiber based biosensing platform for detecting new relevant biomarkers from patient's fluids in strong collaborations with Singaporeans and French clinicians and our industrial partner.

## Profile :

The proposed PhD subject requires to collaborate with experts in different scientific domains (fiber photonics, plasmonic nanomaterials, spectroscopy, biosensing), in different laboratories and countries. The candidate must hold a Master's degree or have a university degree equivalent to a European Master's (5-year duration), with a strong background in preferably photonics, bio-photonics, bioengineering, fluorescence, plasmonic nanomaterials. Basic AI/Machine Learning skills for data analysis, programming are appreciated.

The candidate should have the following skills for conducting this PhD subject:

- High degree of autonomy and good ability to organize, plan her/his works
- Fluent in English (reading, writing, speaking)
- Highly motivated to realized and develop experiments
- Strong motivation and curiosity
- Ability to work with several disciplines and different types of actors is recommended

## Eligibility :

A Bachelor and a Master degree in Physics / Optical Engineering / Electrical engineering / Bioengineering / Materials science or related field with at least a 2nd Upper Class Honours.

## Environment :

The thesis will be realized within the strong collaboration between the Translational Biophotonic Laboratory (TBL) and XLIM Research Institute, in the framework of an International Research Program of the CNRS (IRP “FiberMed”). TBL is part of A*STAR Skin Research Lab, one of the research institutes of the Biomedical Research Council under the Agency for Science, Technology and Research (A*STAR) in Singapore. XLIM is a joint research institute held by the University of Limoges and the French CNRS. Both partners have very strong complementarities. In XLIM, the thesis will be realized within the “Fiber Photonics” team, who has world-class expertise in fabricating specialty optical fibers. TBL is one of the world leaders in developing bio-sensing platforms for various biochemicals and clinical samples for immediate on-field applications. This long collaborative works has led to numerous results providing strong foundations for the realization of this thesis subject.

Additional information :

- TBL: https://www.a-star.edu.sg/asrl
- XLIM: https://www.xlim.fr/

The PhD student will belong to the PhD school of the University of Limoges for the diploma. She / He will work at XLIM during the first 12 months and the last 6 months, and at A*STAR SRL - TBL during 18 months through the A*STAR Research Attachment Programof A*STAR’s Graduate Academic.

The PhD student will be supervised by:

- Dr. Georges HUMBERT (CNRS director of researcher at XLIM)
- Assoc Prof. Dinish U.S (Senior Principal Investigator at A*STAR SRL - TBL)

## Application :

Applicants will have to send their application before mid-May 2026 to :

- Dr. Dinish U.S (Dinish@a-star.edu.sg)
- Dr. Georges HUMBERT (georges.humbert@xlim.fr)

Their application should include :

- Their CV,
- An application letter in English,
- Transcripts of their last years of studies in English
- Master Manuscript if available
- Letters of recommendation are welcome.

As the post may require access to information classified as national defence secrets, the successful candidate will be subject to a security clearance procedure, in accordance with the provisions of Articles R.2311-1 et seq. of the Defence Code and IGI No. 1300 of 9 August 2021.