

Contrats doctoraux 2026

Titre du projet de thèse : Micro-endoscopic probe for stimulated Raman histology

Directeur(s) de thèses : Alexandre Kudlinski (PhLAM)

Résumé du projet de thèse (en 20 lignes maximum) :

Endoscopic techniques are essential for the diagnosis, staging and treatment of epithelial cancers. For many cancers, they are often the only way to access the tumour site directly. However, precancerous tissues sometimes exhibit subtle changes that cannot be detected visually. Endoscopic cancer detection has two main limitations: (1) the limited sensitivity of commonly used fluorescent markers and (2) the need for biopsies and histological analyses, which delay surgery and clinical decision-making.

This PhD project aims to develop a miniature optical probe for stimulated Raman histology able to provide real-time tissue images that closely match conventional histology (H&E staining). This approach aims to enable earlier and less invasive detection of gastroenterological cancers, while also exploring its potential for detecting urological cancers and assessing tumour margins during surgery.

We propose an innovative approach combining stimulated Raman scattering (SRS) microscopy, state-of-the-art hollow-core fibres, and advanced technologies for assembling miniature fibre-optic micro-endoscopic probes. The goal is to develop an SRS endoscopic probe capable of performing stimulated Raman histology in real time. The technology will be developed for applications in gastroenterological and urological cancers, with validation on relevant biological tissues in collaboration with clinical partners.

The PhD will be carried out at the PhLAM laboratory at the University of Lille, under the supervision of Alexandre Kudlinski, in close collaboration with Hervé Rigneault (Institut Fresnel, Aix-Marseille University) and Lightcore Technologies, a company based in Lille and Marseille.

This PhD project is strongly experimental in nature, focusing on optics, optical fibres, and ultrashort-pulse lasers. Skills in instrument control, electronics, optical design (particularly using software such as Zemax) and image processing would be an advantage. The candidate should have a strong interest in experimental optics, and demonstrate independence, initiative, and good practical problem-solving skills.

Date de recrutement envisagée : 01/01/2027

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To apply: <https://emploi.cnrs.fr/Offres/Doctorant/UMR8523-ALEKUD-009/Default.aspx?lang=EN>