Fonctions Optiques pour les Technologies de l'informatiON
http://foton.cnrs.fr
Enssat
6, rue de Kerampont
CS 80518
22305 Lannion cedex
T. 02 96 46 91 41
F. 02 96 37 01 99
UMR 6082

Master research Internship:

Near-UV Photonic Integrated Circuits (PIC)

Starting date: between 1 January 2022 and 1 April 2022
Duration: minimum of 4 months
Supervisor: Loïc Bodiou, Stéphane Trebaol, Joël Charrier
Research team: Photonic Systems at ENSSAT- Lannion - France

Context

NUV (near ultraviolet) photonic devices, like coherent sources and optical functions, may address in a near future large domains of applications as for the next generation of biomedical diagnosis tools in particular through Raman spectroscopy as a noninvasive chemical and biological analysis technique of pollutants, medicine, cells... They can also address new paradigm in optical frequency metrology, optical functions and sensors in this uncovered wavelength domain. Coherent sources like narrow lasers and optical frequency combs are important tools in fundamental and applied physics. Short wavelength coherent sources are of great interest when interferences are involved. The need for coherent sources in the NUV is also driven by the rich variety of molecular and atomic spectral features to probe. Their study through compact sources may open up applications in sensing for medical, environment, and security applications.

SP Photonic team aims to lay the foundation toward chip-scale integration of photonic circuitry in the near ultraviolet range.

Objectives

This master research internship project concerns the design, fabrication and characterization of building blocks like GaN laser diode (LD) and associated integrated optical functions using UV-transparent materials platforms. It takes part at the early stage of a new trend in photonics to transpose integrated functions and components, first demonstrated at telecom wavelengths, to the blue and ultraviolet domains.

Following the hybrid approach developed at 1.55 µm consisting in the heterogeneous integration of III-V optical active functions on Si waveguides, III-Nitride lasers might be reported on Si-like platforms by molecular bonding offering a playground to design innovative devices. This work, combining integrated optical functions simulation, fabrication and experimental optical characterizations will be performed at Foton Institute in Lannion (France).

Research program

The master research internship project will be decomposed in work packages:

- Building a library of various passive optical functions (waveguide, (de)multiplexer, ring, etc.) and chip based single mode GaN laser diodes
- Processing of optical functions in clean room environment on various material platforms
- Characterizing optically the fabricated structures in the blue/near-UV wavelength range

The internship will begin during the first semester of 2022 and will last for a minimum of 4 months. The internship gratuity is around 550 euros per month. **This internship subject may be extended by a PhD in September 2022.**

Qualifications

Candidates should have good knowledge in the areas of integrated optics and laser physics. The ideal profile would combine interest for experimental work and for modelling and simulation works. Good interpersonal and communication skills in English are required.

About the Institut FOTON (CNRS, UMR6082)

The Institut FOTON is a research unit of the French National Centre for Scientific Research (CNRS) associated to University of Rennes 1 and the National Institute for Applied Sciences (INSA) of Rennes. FOTON is composed of three research teams: the "Optoelectronics, Heteroepitaxy and Materials" team, the "laser Dynamics, microwave photonics, Polarimetry, terahertz, imaging" team located in Rennes, and the "Photonic Systems" team located in Lannion. The two cities are located approximatively 170 km apart, in the province of Brittany, Western France. Photonic Systems team (~50 people) is involved in research on laser physics, and in particular on the experimental demonstration of new functionalities that could potentially contribute to overcoming the challenges related to sensors sensitivity, telecom capacity and guided optics (fibers and integrated photonics) in particular for sensing and nonlinear applications. The group has an established reputation in the area of laser physics and mid-IR integrated photonics. All the simulation and experimental (processing and optical characterizations) tools required for the project completion are available within the Photonic Systems Team in Lannion.

The successful candidate will carry out research in Lannion (France).

More information about FOTON can be found at: http://foton.cnrs.fr.

Further information-Contact

Further information may be obtained from:

stephane.trebaol@enssat.fr
loic.bodiou@univ-rennes1.fr
joel.charrier@univ-rennes1.fr

Institut Foton CNRS, ENSSAT, 6 rue de Kerampont, CS 80518, 22305 Lannion Cedex

Application procedure

Please submit your application at your earliest convenience by e-mail to:
stephane.trebaol@enssat.fr
loic.bodiou@univ-rennes1.fr
joel.charrier@univ-rennes1.fr

Your application should include:

- Cover letter
- Detailed CV
- Name and contact details of two potential referees
- Recommandation letters, if applicable
- Grade transcripts
- List of publications, if applicable