Fiber-laser driven photonic chip-based Mid-IR supercontinuum

Ecole Centrale de Lyon

NICOLAS BAUDIN
INTERNSHIPS IN FRANCE INITIATIVE

Name of the hosting institution in France	Ecole Centrale de Lyon
Name of the host laboratory / research team	Nanotechnology Institute of Lyon / Photonics
Address	Institut des Nanotechnologies de Lyon INL - UMR 5270 Ecole Centrale de Lyon - 36 av Guy de Collongue 69134 Ecully Cedex, France
Web site	https://eclausion.ec-lyon.fr/
Name of the supervisor	Christian GRILLET
Function	CNRS
Email	christian.grillet@ec-lyon.fr

Internship offer

Topic of the internship (title)	Fiber-laser driven photonic chip-based Mid-IR supercontinuum			
Proposed dates of the internship*	Start:	2020-09-01	End	2021-01-30

* The supervisors have indicated the dates proposed are flexible and are able to be postponed subject to COVID-19 border closures.

Scientific and academic objectives of the internship (detailed description of the internship content, work expected from the intern and expected outcomes):

The Mid-infrared (Mid-IR) wavelength range - from 3 to 15 µm - is currently experiencing a huge surge in interest for an enormous range of applications that affect almost every aspect of our society, from compact and highly sensitive biological and chemical sensors, to imaging, defence and astronomy. A notable feature of the Mid-IR is that most chemical and biological compounds that relate to our health, safety and environment have a strong spectral signature in the Mid-IR. The Mid-IR therefore offers unique opportunities for the development of technologies with a high societal (sensor applications, defence, industrial and environmental security, etc.) and fundamental impact (chemistry, biology, astrophysics, etc.). Our group recently demonstrated the first octave spanning supercontinuum generation in a cmos-based platform (from 3 to 8.5um) with record on-chip output power. To achieve this, we exploited a low-loss dispersion engineered SiGe waveguide pumped at 4 um by a MIROPA system, an optical parametric amplifier delivering femtosecond pulses in the mid-IR. In this work, the student's project will focus in modelling and manufacturing SiGe waveguides for broadband mid-IR supercontinuum generation, specifically designed to be pumped by a commercially available Leukos system.

Name of industrial partner	LEUKOS
Role of the industrial partner in the internship project	The student will work closely with Leukos to design photonic chip compatible with Laser-driven supercontinuum available at Leukos. Leukos will mentor and host the student and will provide guidance during the modelling work. Manufacturing of the photonic chip will be carried out in INL or CEA-LETI and characterisation of the photonic chip will be performed in INL and/or Leukos depending on the first trials.
Main contact at the French industrial partner	Guillaume Huss, CEO
Email of contact at French industrial partner	guillaume.huss@leukos-systems.com
Name of the Australian partner institution	RMIT
Name of lab/department/team involved in the collaboration at the Australian partner institution	Micro Nano Research Facility (MNRF)/Integrated Photonics and Applications Centre (InPAC)
Main contact in the Australian partner institution	Arnan Mitchell
Function	Professor, Director
Email address	arnan.mitchell@rmit.edu.au
Outside of this ongoing collaboration, will applications coming from students of other eligible Australian universities be considered by the hosting institution in France?	Yes

Expected profile of applicant

Level of study	S/he should work towards his/her Masters/honours
Discipline	Physics; Optics; Solid-state physics
Required qualities, knowledge and skills	We seek a talented and ambitious researcher with a good knowledge and a solid background in the field of solid-state physics, optics, and semiconductor devices. An experience in photonics, nonlinear optics, clean-room fabrication, material deposition or optical modelling and characterization will be strongly appreciated.

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