

Spécialité de Master « Optique, Matière, Paris »

Stage de recherche (4 mois minimum, à partir de début mars)

Proposition de stage

Date de la proposition :

Responsable du stage / internship supervisor:	
Nom: Marris-Morini	Prénom: Delphine
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Mail: delphine.morini@u-psud.fr	
Nom du Laboratoire / laboratory name: Institut d'Electronique Fondamentale (IEF)	
Code d'identification : UMR 8622	Organisme : Université Paris Sud/CNRS
Site Internet / web site: http://silicon-photonics.ief.u-psud.fr/	
Adresse / address: bâtiment 220, centre scientifique d'Orsay	
Lieu du stage / internship place: IEF, bâtiment 220, centre scientifique d'Orsay	

Titre du stage / internship title: <u>Integrated optics for sensing applications</u>
Résumé / summary
<p>Mid-infrared (mid-IR) spectroscopy is a nearly universal way to identify chemical and biological substances, as most of the molecules have their vibrational and rotational resonances in the mid-IR wavelength range. Commercially available mid-IR systems are based on bulky and expensive equipment, while lots of efforts are now devoted to the reduction of their size down to chip-scale dimensions. The demonstration of mid-IR photonic circuits on silicon chips would benefit from reliable and high-volume fabrication to offer high performance, low cost, compact, low weight and power consumption photonic circuits, which is particularly interesting for mid-IR spectroscopic sensing systems that need to be portable and low cost.</p> <p>In this context, we develop a new route towards key advances in the development of chip-scale integrated circuits on silicon for the mid-IR wavelength range. The original idea is to use nonlinear optical properties in Ge/SiGe quantum well (QW) active devices combined with Ge-rich-SiGe waveguides. In order to be able to exploit the nonlinear effects, a specific care on the design of the waveguides is required in term of both light confinement and dispersion.</p> <p>The objective of the internship work is to participate to the characterization of photonic integrated circuits, using a new and unique optical bench dedicated to integrated optics in the mid-IR wavelength. Firstly optical waveguides, bends, ring resonators will be characterized. Structures dedicated to non-linear effect measurements will then be studied. Finally the student will try to estimate the performances of different devices (mid-IR sources, detection based on down-conversion and sensing part) based on these structures. This work will be done in strong collaboration with 2 PhD students and a post-doc researcher in the group. The work will be done in the framework of the INSPIRE project, in a strong collaboration with Giovanni Isella's group (L-Ness lab (Politecnico di Milano)).</p>
Applicant skills:
<ul style="list-style-type: none">- Basic knowledge of photonic devices.- Willingness to study and learn modelling/design/fabrication and characterization of photonics devices.

Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD ? : Yes			
Si oui, financement de thèse envisagé / financial support for the PhD: ERC european project funding			
Lumière, Matière, Interactions	<input checked="" type="checkbox"/>	Lasers, Optique, Matière	<input checked="" type="checkbox"/>

Fiche à transmettre (fichier pdf **obligatoirement**) sur le site <http://stages.master-omp.fr>