Spécialité de Master « Optique, Matière, Plasmas »

Stage de recherche (4 mois minimum, à partir de début mars 2011)

Proposition de stage pour l'année 2010-2011 (ne pas dépasser 1 page)

Date de la proposition :

Responsable du stage / *internship supervisor*:

Nom / *name*: SOCI Prénom/ *first name* : Cesare

Tél : Fax :

Courriel / *mail*: csoci@ntu.edu.sg

Nom du Laboratoire / *laboratory name*: CINTRA

Code d'identification :UMI 3288 Organisme :CNRS/Nayang Technological University /Thalès

Site Internet / *web site*: http://cintra.ntu.edu.sg

Lieu du stage / *internship place*: Singapour

Titre du stage / *internship title*: **Design and modeling of a two-dimensional photonic crystal cavity**

Two dimensional photonic crystals (2D-PhC) are artificial wavelength-scale periodic structure with high refractive index contrast in dielectric media which exhibit a band gap, i.e. a band of frequencies where light is forbidden to propagate. They have recently attracted much attention due to their ability to mold the flow of light at a wavelength scale. Their unique optical properties have allowed the development of innovative and ultra-compact optical devices such as LEDs, waveguides and filters, to name only a few, and make them a promising building block for on-chip optical communication. In particular, 2D PhC semiconductor microcavities have really interesting intrinsic features due to their small volume and high quality factor (Q) for tailoring the emission properties of emitters placed inside the cavity, which can lead to a variety of application ranging from ultralow threshold laser to efficient single photon source. Up to now, these semiconductor cavities based on a thin suspended membrane and embedding nanostructures such as quantum wells and quantum dots have been extensively studied. Other gain media such as single semiconductor nanowire or conjugated polymer hasn't been considered yet despite their great potential for the development of compact on-chip light sources and optical sensors for optofluidic or biosensing applications. However, their integration with 2D PhC cavity is still an issue that has to be addressed. The aim of this project is to carry out an electromagnetic study for the design and the optimization of an original photonic crystal cavity for out-of plane lasing operation. The coupling efficiency between the cavity modes and the gain medium (semiconductor nanowires, conjugated polymer) will be particularly studied.
The highly motivated candidate will have the opportunity to learn the fundamental physics behind photonic crystals and gain hands-on experience on commonly used electromagnetic computational methods and fabrication techniques in semiconductor industry (ebeam lithography, dry etching, etc.). He will perform a challenging work in a top academic research environment and enjoy state-of-the-art facilities at NTU (high performance computing cluster, nanofabrication center, optical characterization set-ups).

Minimum duration of internship: 5 months
Candidates are kindly advised to send by email to **dbaillargeat@ntu.edu.sg** , with mail subject "**CINTRA_2011_ Internship**" followed by the candidate's full name, the following documents (in English)
- CV (including education & professional history)
- Letter of Motivation including your possible contribution to the project

Toutes les rubriques ci-dessous doivent obligatoirement être remplies

Ce stage pourra-t-il se prolonger en thèse ? *Possibility of a PhD* **? : oui**

Si oui, financement de thèse envisagé/ *financial support for the PhD***:**

Lasers et matière	**X**	Lumière, Matière : Mesures Extrêmes	**X**
Optique de la science à la technologie	**X**	Physique des plasmas	

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