

Prototyping of Quantum Optoelectronic Devices

Record number : OPR-943

Overview

RESEARCH DIRECTION

Dominique Drouin, Professeur -
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Engineering

INFORMATION

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RESEARCH CO-DIRECTION

Dominic Lepage, Responsable de
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INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté de génie
Département de génie électrique et de
génie informatique
Département de génie mécanique
Institut quantique

LEVEL(S)

2e cycle

LOCATION(S)

3IT - Institut interdisciplinaire d'innovation
technologique
Institut Quantique Sherbrooke

Project Description

Context:

The goal of this project is the realization of integrated nanophotonic circuits enabling the addressing of qubits for industrial quantum sensors. Such systems are to be employed as room temperature ultra-sensitive magnetometers in the fields of geological exploration, defense, navigation, medical imaging and for the development of quantum computers. This embodies a pioneering quantum technology to be brought early to the market and adopted on a large scale.

This funded graduate project is part of the Canadian National Quantum Strategy and the Quebec Quantum Innovation Zone. Our team at the Interdisciplinary Institute for Technological Innovation (3IT) is developing impactful and practical solutions in close collaboration with SB Quantum, the National Research Council of Canada, the MiQro Innovation Collaborative Centre, the Quantum Institute and the National Institute for Optics.

Topic:

This graduate undertaking aims at prototyping optically detected magnetic resonance magnetometers (ODMR) and advance the technology readiness level of the platform to enable large-scale mass production. The selected individual will have the important responsibility of manufacturing and testing various iterations of nanodevices to provide industrial partners with a series of minimum viable products for commercialization. The student will have the opportunity to thrive in the cleanroom environment of 3IT to develop various industrial microfabrication processes, including:

- Preparation of thin films samples: Metals, Diamond, Al₂O₃, Si₃N₄, SiO₂.
- Resin coating, electro and photo lithography, plasma deposition and etching.
- Wet bench manipulations.
- Thin film metrology using ellipsometry, profilometry, electron and atomic force microscopy.

Work Supervision:

The project will be conducted under the co-supervision of Dr Dominic Lepage and Pr Dominique Drouin. The selected individual will interact regularly with all collaborators but will conduct most of the work at the 3IT. The candidate will benefit from an exceptional research environment where students, professionals, teachers, and industry experts closely collaborate for the advancement of future technologies.

Desired Profile:
The sought-after candidate should have a high-quality academic record, skills in applied physics or engineering, hands-on laboratory experience, creativity, strong adaptability and an interest in research and development in optics/photonics/quantum sciences. Familiarity with cleanroom environments or micromanipulation will be an asset.
“Because the research project involves sensitive technology, the applicant should not be affiliated with any of the countries where Canada is imposing sanctions.
Proficiencies in French communication is a plus.
Contact : dominic.lepage@usherbrooke.ca
Documents to provide: Cover letter, curriculum vitae and the contact information of two individuals familiar with your work.

Discipline(s) by sector	Funding offered	Partner(s)
Sciences naturelles et génie	To be discussed	SBQuantum
Génie électrique et génie électronique, Génie mécanique		

The last update was on 23 April 2024. The University reserves the right to modify its projects without notice.