Laser fabrication on technical substart

Record number : OPR-1449

Overview

RESEARCH DIRECTION

Marie-Josée Gour, Professeure - Department of Electrical and Computer Engineering

INFORMATION

marie-josee.gour@usherbrooke.ca

ADMINISTRATIVE UNIT(S)

Faculté de génie
Département de génie électrique et de génie informatique
Institut interdisciplinaire d'innovation technologique (3IT)

LEVEL(S)

3e cycle

LOCATION(S)

3IT - Institut interdisciplinaire d'innovation technologique
Campus de Sherbrooke

Project Description

Laser diodes are essential components across a wide array of industries, including medicine, industry, telecommunications, transportation, environment, and defense. However, their efficacy is often hampered by limitations inherent in traditional substrate materials and fabrication methods. To address these challenges, a collaborative effort has been proposed, leveraging the innovative PEELER technique developed by the Université de Sherbrooke. This groundbreaking approach enables the fabrication of high-performance laser diodes using reusable parent substrates, promising enhanced yield and reduced manufacturing costs. The overarching goals of this collaboration are multifaceted. Firstly, developing a novel semiconductor device manufacturing process aims to alleviate Canada's reliance on fluctuating global wafer supply chains, thereby bolstering the domestic semiconductor industry. Secondly, by creating key process building blocks for low-cost, high-performance laser diodes, the partnership seeks to establish a new industry standard, positioning Canada and Quebec as a leader in laser diode technology. Furthermore, advancements in the PEELER process are expected to enhance its efficiency and versatility, facilitating easy integration of laser diodes into Silicon. Finally, the initiative also aims to mitigate the environmental footprint of semiconductor manufacturing by reducing dependency on rare materials and minimizing waste by re-using them multiple times.

This project is a collaboration with a leading Canadian industrial partner in the manufacturing and development of laser devices. Its goal is to investigate innovative solutions for beam extraction for laser devices fabricated on technical substrates. A comprehensive literature review will be the first step to explore the various possibilities for beam extraction. The most promising solutions will then be tested through simulation to verify their feasibility and ultimately lead to laser fabrication using the most promising approach.

This project will be carried out under the supervision of Professor Marie-Josée Gour, in close collaboration with professors and experts in nanofabrication, assembly, and the design of optoelectronic devices. The 3IT, the Interdisciplinary Institute for Technological Innovation, is a unique institute in Canada dedicated to research and development of innovative technologies in the fields of energy, electronics, optoelectonics, robotics, and health. The 3IT possesses expertise in many cutting-edge areas of micro-nanoelectronics and optoelectronics. Furthermore, the 3IT hosts an international joint research unit of the CNRS, the Laboratoire Nanotechnologies et Nanosystèmes (LN2), in partnership with numerous CNRS laboratories in France. The 750 m² cleanroom includes a wide range of advanced micro- and nanoelectronic equipment necessary for the complete fabrication of III-V devices, including semiconductor lasers. In addition to its fabrication capabilities, the 3IT has simulation tools for optoelectronic devices and integrated optics.

The successful candidate will benefit from an annual scholarship of 30 000$ as well as an exceptional international research environment where students, engineers, professors, and industry professionals work hand in hand to develop the technologies of the future. Research will be conducted in multidisciplinary settings, where the skills acquired will range from nanofabrication and advanced assembly and characterization methods to optoelectronics, biomedical sensing, and quantum applications, all supported by highly qualified personnel.

Desired profile:
• Engineering or Master's degree in micro-nanotechnologies in physics, materials science, nanotechnology, or other relevant fields.
• Desire to work in the field of microelectronics and optoelectronics.
• Leadership, curiosity, autonomy, sense of responsibility and teamwork.
• Assets: Knowledge in design of integrated circuits and semiconductor devices.

Important information:
• Starting date: as soon as possible,
• Send CV, references and transcripts of the last 2 years to: marie-josee.gour@usherbrooke.ca.

Discipline(s) by sector

Sciences naturelles et génie

Génie électrique et génie électronique

Funding offered

Yes

$ 30 000 annual

The last update was on 8 October 2026. The University reserves the right to modify its projects without notice.