Ultrafast graphene photodetectors for integrated photonic circuits

Record number : OPR-900

Overview

RESEARCH DIRECTION

Mathieu Massicotte, Professeur - Department of Electrical and Computer Engineering

INFORMATION

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ADMINISTRATIVE UNIT(S)

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

LEVEL(S)

2e cycle
3e cycle
Stage postdoctoral

LOCATION(S)

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

Project Description

Context - Integrated photonics is a promising technology that can revolutionize digital applications such as artificial intelligence and quantum sciences. Optoelectronic devices are the foundation of photonic integrated circuits and convert electrical signals into light signals and vice versa at a very fast rate. One of the major goals in the field of telecommunications is to design optoelectronic devices that can accelerate this rate. However, conventional materials like silicon are no longer sufficient, and new materials with improved optoelectronic properties are needed. Graphene, a single layer of carbon atoms, is a potential material with excellent optical and electronic properties. It can convert light signals into electrical signals within a few picoseconds [1], which makes them very promising for ultrafast photodetection.

Research project - We are looking for a well-qualified and motivated student to help us develop a chip-integrated, ultrafast photodetector based on graphene. The PhD project will focus on the design, fabrication and characterization of these photodetectors using state-of-the-art nanofabrication and optoelectronic measurement equipment. These tasks will be performed in close collaboration with several industrial partners in the context of a new Research Chair on nanomaterials for integrated photonics.

Research environment - The PhD student will be supervised by Prof. Mathieu Massicotte from the Department of Electrical and Computer Engineering of Université de Sherbrooke, and principal investigator of the Nano-Opto-Electro group (www.optonanoelectro.com).The work will be done mainly at the Interdisciplinary Institute for Technological Innovation (3IT) attached to the Université de Sherbrooke. 3IT is a unique institute in Canada, specializing in the research and development of innovative technologies for energy, electronics, robotics and health. It holds a state-of-the art cleanroom with a complete micro-nanofabrication infrastructure. The PhD student will thus benefit from a highly interdisciplinary research environment that combines students, technicians and professors working together to develop the technologies of the future.

Candidate profile

• Bachelor’s or Master’s degree in Engineering or Physics
• Experience and skills in laboratory work
• Background knowledge in semiconductor physics, photonics, and/or microfabrication
• Excellent adaptability, autonomy, teamwork and problem solving skills.
• Assets: knowledge or experience in cleanroom environment, CAD modeling
(ex.: Lumerical), (opto)electronic measurement, and integrated photonics.

To apply please send the following documents to mathieu.massicotte@usherbrooke.ca
• Curriculum Vitae
• Transcript (Bachelor's and/or Master's degree)
• Cover letter emphasizing the relevance of your experience with the proposed subject
• Letters of recommendation and/or contact details of 2 references
Start date: The position is available immediately.
Applications will be reviewed until the position is filled.

Référence
[1] Massicotte, M., Soavi, G., Principi, A. & Tielrooij, K. J. Hot carriers in graphene-fundamentals and applications. Nanoscale 13, 8376–8411 (2021).

This project can accommodate one or more students in the following programs:
- Postdoctoral fellowship
- Doctoral thesis
- Research-type master's thesis

Discipline(s) by sector

Sciences naturelles et génie

Génie électrique et génie électronique

Funding offered

To be discussed

The last update was on 12 March 2024. The University reserves the right to modify its projects without notice.