Synthesis and characterization of new 2D materials for MEMs applications CIRCUITS FOR AI-DRIVEN SPIN QUBIT CONTROL

Record number : OPR-1065

Overview

RESEARCH DIRECTION

Mathieu Massicotte, Professeur - Department of Electrical and Computer Engineering

INFORMATION

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RESEARCH CO-DIRECTION

Nadi Braidy, Professeur - Department of Chemical and Biotechnological Engineering

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ADMINISTRATIVE UNIT(S)

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

LEVEL(S)

Stage postdoctoral

LOCATION(S)

3IT - Institut interdisciplinaire d'innovation technologique

Project Description

Context: Teledyne DALSA (TD) is collaborating with the Université de Sherbrooke to push back the frontiers of infrared camera performance by designing a new generation of thin films,and devising processes to implement them. AThese materials need to demonstrate a high sensitivity of their electrical resistance to temperature, while being stable and manufacturable on a large scale.

Research project: The aim of this project is to synthesize and characterize a new class of two-dimensional materials (MSi_2N_4, where M is a metal such as Mo and W), with very promising properties for MEMs applications. This will involve the growth process development of MSi_2N_4 films, the transfer of these films to appropriate substrates and then, the characterization of their physical properties using different techniques (transmission electron microscopy, electronic transport, mechanical tests, infrared spectroscopy, etc.). To synthesize MSi_2N_4 films, two methods will be investigated, namely chemical vapor deposition (CVD) and cathode sputtering (PVD).
The successful candidate will have to set up the system(s) necessary for the synthesis of MSi_2N_4, to develop the growth and transfer processes for these thin films and characterize their electrical, thermal and mechanical properties. Ultimately, the aim will be to optimize the physical properties of these new 2D materials and demonstrate their growth at wafer scale for future MEMs applications.

Supervision & work environment: This postdoctoral internship will be supervised by UdeS experts in nanomaterials and microelectromechanical systems (MEMS), Profs Nadi Braidy, Mathieu Massicotte and Luc Fréchette. The work will be carried out at UdeS's Institute for Interdisciplinary Innovation in Technology (3IT), at the Centre de Collaboration MiQro Innovation (C2MI) and at TD's Bromont plant.

The 3IT is a unique institute in Canada, specializing in R&D related to energy, environment and health issues. C2MI is an international center for collaboration and innovation in MEMS and advanced encapsulation. Finally, Teledyne DALSA, one of the world's largest pure-play MEMS

foundries, has been operating for over 30 years in Bromont, with 3,800 m2 of cleanroom space. The trainees will thus benefit from an exceptional research environment and a multidisciplinary academic and industrial team working hand in hand to develop the technologies of the future.

Profile required:
• Ph.D. degree in engineering or science in the field of physics, chemistry or materials.
• Experience in deposition /growth and characterization of thin film.
• Experience in CVD, PVD techniques, 2D materials and clean room is an asset.
• Ability to communicate orally and in writing in English or French.
• Strong capacity for adaptation, autonomy, teamwork and problem-solving.
• Strong interest in materials physics, 2D materials, microscopy and interdisciplinary R&D.

Contact: emplois-materiaux@usherbrooke.ca
Documents to be supplied: CV, statement of interest and 2 references

This project can accommodate one or more students in the following programs: -
- Postdoctoral fellowship

Discipline(s) by sector

Sciences naturelles et génie

Génie électrique et génie électronique,
Génie mécanique

Funding offered

To be discussed

Partner(s)

Teledyne DALSA, C2MI