UNIVERSITÉ DE SHERBROOKE

(Chaire NSERC-TDSI) Plasmonic micro-antennae for infrared imaging

Record number : OPR-424

Overview

RESEARCH DIRECTOR

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Information
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ADMINISTRATIVE UNIT(S)

Faculty of Engineering
Department of Electrical and Computer Engineering
Interdisciplinary Institute for Technological Innovation

LEVEL(S)

Master's degree
Ph.D.

LOCATION(S)

Campus principal
C2MI - Centre de Collaboration MiQro Innovation

Project Description

Research topics background : The performance of infrared imaging systems based on microbolometers is limited by a fundamental compromise between the dimensions of the pixel surface and its thermal mass. Thus, for fast and sensitive devices, it is necessary to increase the pixel surface area while decreasing its thermal mass, which is not possible with conventional geometries. This compromise can be improved by using plasmonic micro-antennae placed on each pixel, which maintain the efficiency of capturing electromagnetic radiation while reducing the mass of the bolometer membrane. The objective of this project is to design, produce and characterize plasmonic micro-antennae on microbolometer membranes in order to quantify the performance improvements in terms of response time and pixel spectral sensitivity. The work will include the development of a multiphysics model of bolometers to link electrical performance to infrared radiation absorption, design, simulate and characterize different plasmonic micro-antennae, and integrate the most efficient candidates on infrared imagers manufactured by our industrial partner.

Research environment: As part of a research project with industrial partners, several PhD thesis topics are available in the areas of manufacturing processes development, encapsulation and characterization of new materials for the micro-electromechanical systems (MEMS) next generation. For this, an outstanding research environment is available. First, the Interdisciplinary Institute for Technological Innovation (3IT), located on Université de Sherbrooke’s campus (Quebec), houses 1600 m2 of space laboratories and 430 m2 of class 100 clean rooms. Second the MiQro Innovation Collaborative Center (C2MI) located in Bromont, whose founding members are the Université de Sherbrooke, IBM Canada and Teledyne DALSA and which is the biggest microelectronics research center in Canada. Finally, Teledyne DALSA, a semiconductor foundry specialized in MEMS, CMOS and CCD technologies. In this context, the activities of the industrial research program provide a unique training environment, given the C2MI industrial micro/nano facilities, its collaborative context, and 3IT topics and multidisciplinary environment.

Candidate profil : Candidates must have a Master's degree in Physics of Materials and Nanotechnologies (nano-optics, nano-manufacturing, nano-materials ...) or a recognized engineering degree, ideally in Nanotechnologies. Candidates should be autonomous, flexible, proactive and able to work in team within industrial research environment.

Discipline(s) by sector

Natural Sciences and Engineering

Electrical Engineering and Electronic Engineering

Funding offered

Yes

Partner(s)

Teledyne DALSA Semiconductor Inc., 3IT , C2MI

The last update was on 26 November 2020. The University reserves the right to modify its projects without notice.