UNIVERSITÉ DE SHERBROOKE

(Chaire NSERC-TDSI) MEMS encapsulation by direct conductive bonding

Record number : OPR-421

Overview

RESEARCH DIRECTOR

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Information

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ADMINISTRATIVE UNIT(S)

Faculty of Engineering
Department of Mechanical Engineering
Interdisciplinary Institute for Technological Innovation

LEVEL(S)

Master's degree
Ph.D.
Postdoctoral Fellowship

LOCATION(S)

Campus principal
C2MI - Centre de Collaboration MiQro Innovation

Project Description

Research topics background : MEMS sensors generally require an individual encapsulation to provide the environment required for the device and protect it from ambient conditions. However, cutting and packaging individual chips can be costly and inefficient. An alternative approach is to protect the devices by bonding from front face a silicon wafer with cavities to isolate the different sensors in a single step. However, the bonding process must guarantee vacuum in the cavities and avoid capillary leaks and degassing of the materials. In addition, new applications will require the use of piezoelectric thin films that will modify the roughness of the bonding interface. In-situ doped polysilicon (ISDP) provides a promising bonding interface by allowing deposition on thin films and an electrical path through the bonding. The objective of this research topic is to develop a hermetic and electrically conductive bonding process at wafer level on ISDP interface. The work will consist in studying the impact of surface preparation (mechanical-chemical planarization -CMP-; cleaning,...) and bonding parameters on the hermeticity and bonding forces between wafers.

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-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

Mechanical 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.