PDF- Low-Temperature Polymer Hybrid Bonding for Next-Generation Fan-Out Packaging

Record number : OPR-1345

Overview

RESEARCH DIRECTION

Dominique Drouin, Professeur - Department of Electrical and Computer Engineering

INFORMATION

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ADMINISTRATIVE UNIT(S)

Faculté de génie
Département de génie chimique et de génie biotechnologique
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:
Advanced packaging technologies are at the core of the microelectronics revolution and play a key role in areas such as artificial intelligence, aerospace, and high performance computing. Among these technologies, Fan Out Wafer Level Packaging (FOWLP) stands out for its high interconnection density and efficient use of space, enabling more compact and powerful systems.
Hybrid bonding, combining polymer dielectrics with metallic interconnections, is a crucial enabling step. However, the use of copper presents major challenges, notably due to oxidation and the high temperatures required during processing. In this context, this postdoctoral project aims to develop innovative hybrid bonding processes by exploring low-temperature alternative metallurgies, contributing to the development of future microelectronic technologies.
You will work in a collaborative and stimulating environment within 3IT and C2MI, two centers of excellence where researchers, students, and industry partners innovate together, offering unique opportunities for professional development and global impact.

Topic:
This postdoctoral project aims to develop a reliable low‑temperature polymer‑based hybrid bonding process, which is essential for fine‑pitch (≈10 µm) die‑to‑wafer (D2W) assembly within advanced Fan Out Wafer Level Packaging (FOWLP) architectures.
The main tasks include:
• Optimizing die to wafer (D2W) bonding conditions to achieve a robust, reliable, and high performance bonding interface.
• Investigating alternative metallurgies for interconnections, ensuring compatibility with the adhesive dielectric material and low electrical resistance.
• Conducting morphological, electrical, and mechanical characterizations to evaluate adhesion quality and interface robustness.
• Collaborating with IBM‑Bromont to facilitate the integration of these processes into industrial environments and to contribute to the development of next generation assembly solutions.

By the end of the postdoctoral project, the successful candidate will have established an innovative low temperature hybrid bonding process based on alternative metallurgies, contributing to the advancement of high density interconnection technologies for next generation microelectronic systems.

Work Supervision:
This postdoctoral fellowship will be supervised by Prof. Dominique Drouin as part of the IBM/NSERC Research Chair in Heterogeneous Multi Chip Integration for High Performance Computing. The doctoral research will be conducted at the 3IT (Université de Sherbrooke) and the C2MI (Bromont), two centers of excellence offering state of the art facilities and a unique collaborative environment. This setting fosters innovation, hands on cleanroom training, and active participation in industrial research projects, while promoting diversity and inclusion. The successful candidate will have the opportunity to work with multidisciplinary teams and to develop skills that are highly valued in both industry and advanced research.

Desired Profile:
• PhD in materials science, microelectronics, mechanical engineering, or a related field.
• Experience in cleanroom environments with demonstrated expertise in microfabrication processes (lithography, deposition, etching).
• Skills in advanced characterization (structural, mechanical, and electrical analyses) and knowledge of metallurgy and polymers.
• Ability to communicate in French or English, both orally and in writing.
• Autonomy, scientific rigor, and the ability to work as part of a team in a multidisciplinary environment.
• Assets: Knowledge of advanced packaging, integration processes, and high-density interconnection technologies.

Contact: inpaqt@usherbrooke.ca
Documents to provide: Cover letter, curriculum vitae and contact information for 2 references.

Discipline(s) by sector

Sciences naturelles et génie

Génie chimique, Génie électrique et génie électronique, Génie mécanique

Funding offered

Yes

Annual 50 000$

Partner(s)

IBM Canada Ltée.

The last update was on 24 July 2026. The University reserves the right to modify its projects without notice.