



Latest Trends in Low-Temperature Bonding Technology for Heterogeneous Integration and Advances in Sensors and Electronic Devices

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Abstract:

In addition to the pursuit of miniaturization (More Moore) in accordance with the scaling law (Moore's law), semiconductor devices are now pursuing a new axis of development (More than Moore) that evolves in the direction of device multifunctionality and integration of different functions. Future semiconductor devices are moving toward high value-added systems that combine "More Moore" and "More than Moore" like two wheels on a car. Heterogeneous integration technology, which integrates heterogeneous materials and functions, is attracting attention as a key to the continued growth of the semiconductor industry in the future. In recent years, there has been a rapid acceleration in the use of advanced packaging for the evolution of high-performance semiconductor devices with superior characteristics such as small size, low power consumption, high heat dissipation, and high output power, and bonding technologies such as hybrid bonding are expected to play an important role and are attracting attention. In this presentation, I will focus on room-temperature and low-temperature bonding technologies, which are characterized by reduced residual stress and thermal damage, for heterogeneous integration. I will discuss what kinds of new functions and excellent properties can be realized in optical and electronic devices using these technologies, using specific devices as examples.

Speaker's Biography:

Eiji Higurashi received the M.E. and Ph.D. degrees from Tohoku University, Sendai, Japan, in 1991 and 1999, respectively. He was a researcher at Nippon Telegraph and Telephone Corporation (NTT) from 1991 to 2003, an Associate Professor with The University of Tokyo from 2003 to 2019, and a team or group leader at the National Institute of Advanced Industrial Science and Technology (AIST) from 2017 to 2022. He has been a Professor with Tohoku University since 2022.

He is an active member of the Japan Institute of Electronics Packaging (JIEP) and the IEEE EPS

Japan Chapter and has served as the IEEE EPS Japan Chapter Chair from 2021 to 2022. He has served as the General Chair of the International Conference on Electronics Packaging (ICEP) from 2020 to 2021 and the General Chair of ICSJ (IEEE CPMT Symposium Japan) in 2024. He has authored or co-authored more than 350 journal and conference papers. His current research interests include heterogeneous integration based on low-temperature bonding and its applications in future electronic devices.