Tohoku University / AIST
Technology introduction

Hollow nano and micro bumps

Low-Temperature and Low-Pressure Bonding Technology

Overview

Bonding between components is a critical step in semiconductor packaging, especially as devices become more complex and sensitive. Traditional bump structures like pyramids or cones rely on stress concentration to achieve strong joints. However, **this often results in damage to the device or substrate**. Our **novel hollow bump technology** addresses this issue by **allowing the bump to deform plastically under low loads**. This exposes **fresh metal surfaces, low-temperature bonding with minimal stress**. This approach reduces the risk of mechanical damage while maintaining strong interconnect performance, offering a promising solution for semiconductor assembly.

Product application

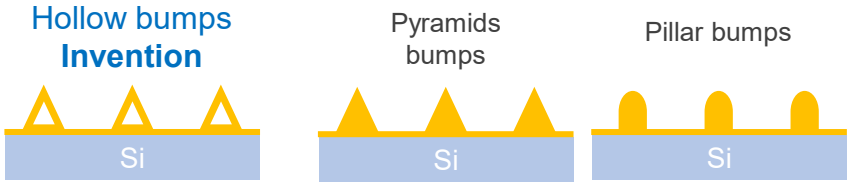
- Semiconductor and component mounting
- Module and component bonding

IP Data

IP No. : Not published
Inventors : HIGURASHI Eiji, TAKEUCHI Kai, GOTO Shintaro
Admin No. : T24-094

Features・Outstandings

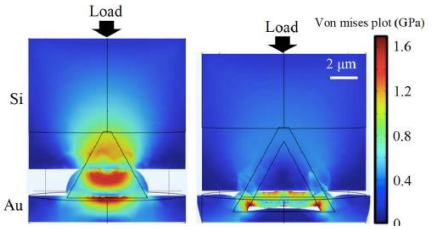
Comparison with the conventional method



✓ Low load
Low temp. bonding

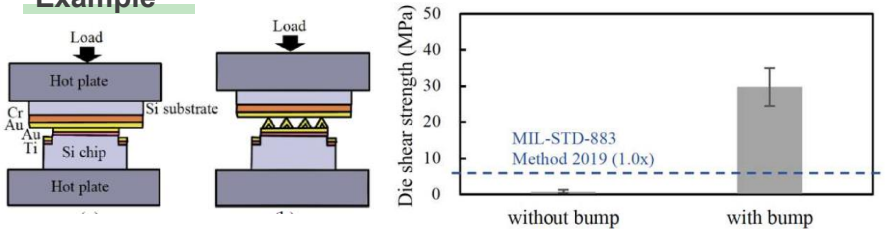
✗ Stress concentration
Damage during bonding

Simulation results *



Hollow bumps do not concentrate stress

Example *



Bonding test with and without hollow bumps
⇒ **High die shear strength with hollow bumps**

* S. Goto et al., "Formation of Au Hollow Micro-Bump Arrays for Low Temperature Au-Au Bonding," 2024 IEEE CPMT Symposium Japan (ICSJ), Kyoto, Japan, 2024, pp. 150-151, doi: 10.1109/ICSJ62869.2024.10804723.

Contact

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