INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Methods for Embedding Glass into Silicon Wafers

Technology Number: 4227

OVERVIEW

Novel method for fabricating vertical feedthroughs in glass with high precision

- Ensures excellent spatial resolution and repeatability without damaging substrates
- Applications include microelectronics, microfluidics, and integrated circuit designs

BACKGROUND

Vertical feedthroughs in glass are critical components in various high-precision industries, including microelectronics, microfluidics, and integrated circuits. Historically, techniques such as sand blasting, ultrasonic drilling, electrochemical etching, laser drilling, reactive ion etching (RIE), and mechanical drilling have been used to create holes in glass substrates. Despite their widespread use, these methods come with significant limitations. They often lack batch processing capabilities, offer low spatial resolution, require large minimum hole sizes, and can damage the substrate. Consequently, there is a pressing need for innovative technologies that can produce high-quality, high-resolution vertical feedthroughs in glass, without compromising the structural integrity of the material.

INNOVATION

Researchers at the University of Michigan have developed a method to create vertical feedthroughs in glass utilizing a glass reflow step. This technique allows glass to assume virtually any shape while maintaining its structural integrity. The process can incorporate silicon, metal, or both into the glass, enabling the design of whole wafers with regions of different materials. This innovative approach overcomes the limitations of existing methods, ensuring excellent spatial resolution, repeatability, and substrate integrity. The potential real-world applications include through-glass vias, antenna coupling, high-Q factor electrical passives, microfluidics, micropumps, and integrated CMOS and MEMS devices. This technology is biocompatible and boasts extremely low power consumption, making it highly versatile for various advanced materials laid into silicon molds.

ADDITIONAL INFORMATION

Technology ID

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Category

Manufacturing Process
Engineering & Physical Sciences
Semiconductor, MEMS, and Electronics

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Learn more

US8707734 “Method of embedding material in a glass substrate"