Planar Encapsulation of Wirebonded CMOS Microsystems

Technology #m11-124

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Microfluidic CMOS Lab-On-Chip Systems Challenged by Limited Durability Current microfluidic CMOS lab-on-chip systems often struggle with issues of limited durability. Physical damage and electrical shorting are frequent due to the fragile nature of the exposed active area used for reagent analysis. In addition, the wirebonds connecting the microchip and the IC package often break, dramatically reducing the life of these microsystems and making them expensive to operate and replace.

Encapsulation Chip Improves Durability of Integrated CMOS Lab-On-Chip Devices The new encapsulation method improves the durability and ruggedness of integrated CMOS lab-on-chip devices. The method protects the wirebonded electrical connections from physical damage while leaving the active microfluidic analysis region in the center fully exposed.

A custom gasket is first created to protect the active area of the microfluidic device. The gasket is then vacuum-fitted on top of the active area of the microchip, and another coating is then applied to fully secure the gasket and chip. The encapsulated chip is then cured and the entire structure is coated again with an additional layer for added stability, waterproofing, and resistance.

Applications:
– Precise laboratory testing of solvents, reagents, and electrolytes
– Biomedical applications including protein sensing, DNA sequencing, and cell sorting
– Biotechnology applications including cell research, molecular diagnostics, point-of-care testing, and fluid drug delivery
– Electro-optic applications including robust LCD displays and power-efficient reflective devices

Advantages:
– The technology enhances lab-on-a-chip (LOC) devices which integrate single or multiple laboratory functions on a single chip
– The new method provides increased planarity, full bondwire coverage, increased shock resistance, and improved water resistance
– Enhanced CMOS device can be used in analysis and diagnostic testing of extremely small volumes of fluids
– The inexpensive process offers sensitivity and precision of state-of-the-art laboratory instruments
– Devices can be reprogrammed as needed to perform different types of diagnostics

Patent Status: Patent pending

Licensing Status: Available for Licensing and Sponsored Research Support
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