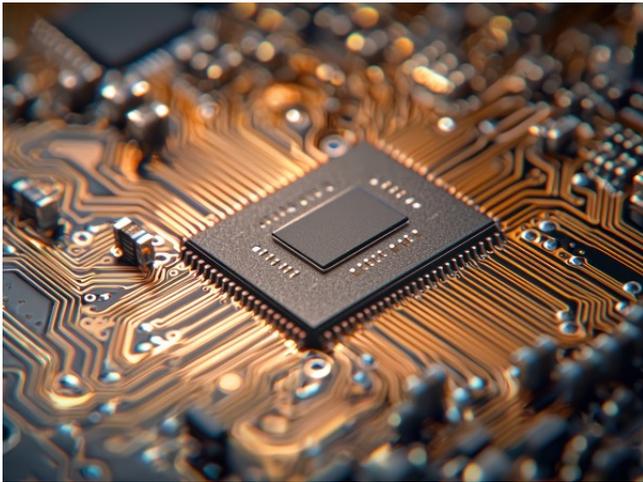




Fused Silica Microsensors, Microactuators, Packaging, and Microsystems

TECHNOLOGY NUMBER: 5196



OVERVIEW

Integrated MEMS IMUs using fused silica for improved performance and manufacturability

- Combines sensors, actuators, and packaging in a single fused silica chip
- Applications include navigation, optical sensors, and piezoelectric devices

BACKGROUND

MEMS inertial measurement units (IMUs) are crucial in many industries for tracking orientation and motion. Traditionally, IMUs are produced using hybrid integration at the system level, which often leads to several issues. Attempts at co-fabricating components for IMUs have historically fallen short, primarily due to the large size of the components, inadequate performance, device coupling issues, and conflicting process and packaging requirements for different types of devices like accelerometers, gyroscopes, and timing units. These shortcomings necessitate an innovative approach to the manufacturing process to create more efficient, reliable, and compact IMUs. The existing technologies fail to address the need for a unified and adaptable manufacturing process, thereby hampering the performance and integration of MEMS IMUs in real-world applications.

INNOVATION

Technology ID

5196

Category

Hardware

Engineering & Physical Sciences

Semiconductors, MEMS, and

Electronics

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Researchers at the University of Michigan have developed an advanced manufacturing technology called Package of Silica for Timing and Inertial Measurement (PASTIME). This innovation leverages the excellent properties of fused silica to create a unified, single-chip solution that integrates sensors, actuators, and packaging components. Technical advances of the PASTIME approach include the ability to fabricate multiple navigation-grade sensors and actuators on every layer as well as support for heterogeneous materials. This integrated system is optimized for different pressure levels and sensor performance, using varied layer thicknesses to meet specific needs. Real-world applications of PASTIME include MEMS inertial measurement units, optical sensors, and piezoelectric devices, offering robust solutions for navigation, imaging, and sensing technologies. The improved method offers ease of manufacturing, modular packaging, and enhanced performance, making it a significant advancement in the field.

ADDITIONAL INFORMATION

INTELLECTUAL PROPERTY

[US9778039](#) "Microsystem device and methods for fabricating the same"