INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Monolithic System for Gas Sampling and Analysis with Integrated Gas Pumps

TECHNOLOGY NUMBER: 2024-396

OVERVIEW

Integrated microchip system for efficient gas sampling and analysis

- Eliminates external flow controls for micro gas chromatography
- Environmental monitoring, industrial process control, personal exposure assessments

BACKGROUND

Gas sampling and analysis are crucial across various domains including environmental monitoring and industrial process control. Traditionally, gas chromatography instruments have been large, cumbersome, and expensive, making them unsuitable for real-time, on-site applications. They often rely on hybrid systems that entail manual fluidic connections, increasing the risk of errors, and production costs. Existing portable alternatives still face challenges, such as the need for external flow valves and controls, increasing system complexity and potentially impacting precision and reliability. The demand for a compact, integrated system that can autonomously handle these conditions necessitates innovation. A streamlined, monolithic system could significantly enhance portability, reduce costs, and improve manufacturability, offering a scalable and miniaturized solution for gas analysis.

INNOVATION

Researchers at the University of Michigan have developed, monoGSA (monolithic gas sampling and analysis) system, a microfabricated chip integrating Knudsen pumps, a preconcentrator, separation column, and detector for efficient gas analysis. By incorporating Knudsen pumps, this system regulates gas flows without external valves, reducing size and cost. It streamlines manufacturing through a single fabrication process, minimizing the need for separate assembly steps. High-performance thermally conductive components reduce thermal crosstalk, enhancing operational precision. The monoGSA's compact nature and integrated design make it suitable for diverse applications requiring continuous, precise gas analysis in various environmental settings.

ADDITIONAL INFORMATION

INTELLECTUAL PROPERTY

Pending

Technology ID

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Category

Hardware
Engineering & Physical Sciences
Semiconductor, MEMS, and Electronics

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