IIT MADRAS
Indian Institute of Technology Madras

Technology Transfer Office
TTO - IPM Cell

Industrial Consultancy & Sponsored Research (IC&SR)

AN INTEGRATED OPTO-MICROFLUIDIC PLATFORM FOR REAL-TIME DETECTION OF GASES IN BIOSAMPLES AND LIQUIDS

IITM Technology Available for Licensing

Problem Statement

- Traditional **gas detection methods in bio samples** are **complex and time-consuming, lacking efficiency.**
- There is a **demand for streamlined gas detection** with integrated **opto-microfluidic platforms**, addressing issues of sensitivity, real-time monitoring, and simplicity.

Technology Category/ Market

Category – Biomedical Devices, Analytical Instruments
Applications – Environmental Engineering, Biomedical engineering, Other Technologies
Industry – Healthcare And Medical diagnostic, Food and beverages, Water
Market - Medical Devices Market size was valued at USD 62.6 billion in 2021 and is poised to grow from USD 63.4 billion in 2022 to USD 134.56 billion by 2030, growing at a **CAGR of 11.35%** in the forecast period (2023-2030)

Key Features / Value Proposition

Technical Perspective:
The integration of **microfluidics, fluorescence, and optical fibers** enhances sensitivity, simplifies detection, and enables efficient sample preparation, addressing **technical challenges in gas detection.**

User Perspective:
Users benefit from a **user-friendly platform** enabling **real-time gas monitoring in biosamples, enhancing diagnostic capabilities and safety assessments**.

TRL (Technology Readiness Level)

TRL - 4, Technology validated in lab.

Research Lab

Prof. Ashis Kumar Sen
Dept. of Mechanical Engineering

Intellectual Property

- **IITM IDF Ref. 1688**
- **IN 414357 (PATENT GRANTED)**
- **PCT/IN2018/050641**

Technology

Integrated Opto-Microfluidic Platform:
A technology merging microfluidic and fluorescence-based detection for real-time gas monitoring in bio samples, ensuring continuous detection.

Sensitive Chemical Probes:
Utilization of selective probes, like rhodamine and palladium chloride, emitting fluorescence upon reacting with specific gases, enhancing sensitivity in gas detection.

Microfluidic Particle Separation Module:
Integration of a microfluidic module separating particle-free samples for efficient sample preparation, crucial for subsequent gas detection.

Optical Fiber-Based Detection System:
Implementation of an optical fiber-based detection system guiding laser light for highly sensitive and rapid detection of gas concentrations.

Application in Multiple Fields:
Versatile platform applicable in diverse fields, from healthcare diagnostics to industrial quality monitoring, providing a comprehensive solution for gas detection challenges.

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Images

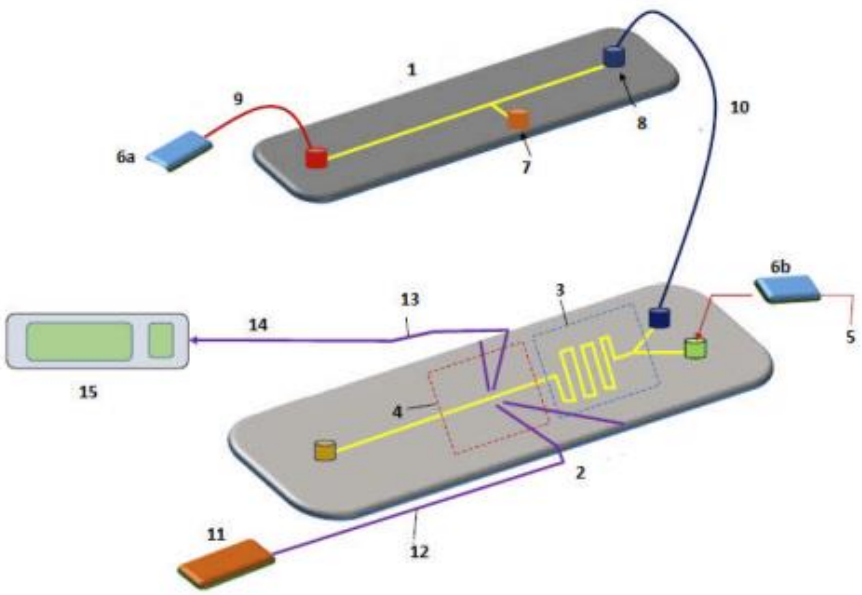

Figure 1 The integrated opto-microfluidic device features a particle separation module, optical detection module, mixing and detection zones, chemical probe, pump, and laser for real-time gas detection in biosamples.

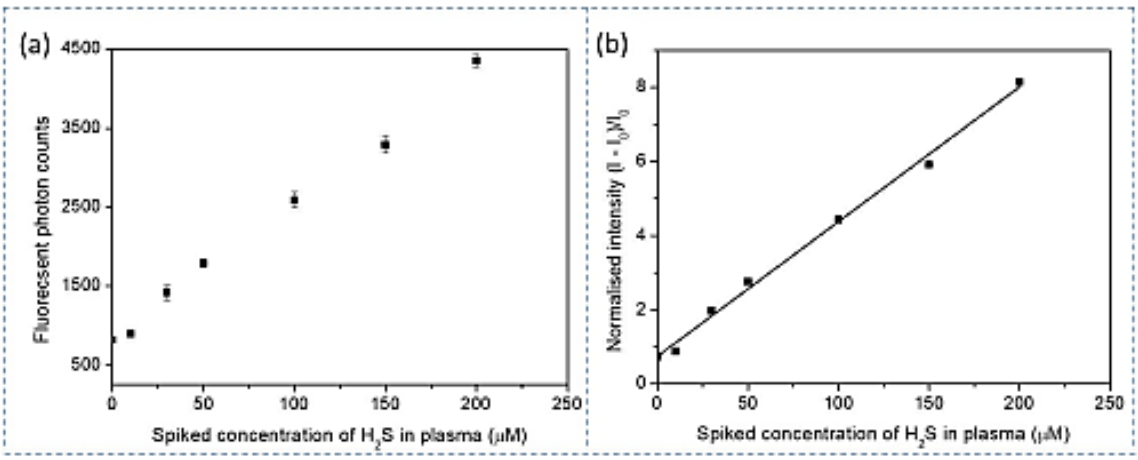

Figure 2 demonstrates the device's performance, showing a linear relationship (R^2 = 0.99) between fluorescent photon counts and spiked H2S concentration in blood-plasma, validating its potential for precise gas monitoring.

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