

ULTRA-SENSITIVE GAS SENSOR AND SYSTEM FOR IMPROVING GAS LIMIT DETECTION

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Value Proposition: *A compact microresonator sensor that can enhance light-matter interaction to enable highly sensitive detection of trace amounts of gas for safety, environmental, and diagnostic applications.*

Technology Description

Researchers at Washington University in St. Louis have developed a resonator-enhanced ultra-sensitive gas sensor that can detect frequency shifts indicating changes in the refractive index, as well as changes in resonance linewidth and baseline intensity to reveal optical absorption characteristics. This multi-parameter optical readout enables sensitive and information-rich gas characterization. Gas sensing plays a critical role in numerous applications, from environmental monitoring to medical diagnosis and ensuring safety in workplace and food industries.

This microresonator gas sensor can confine light in small volumes with ultra-low loss, and intensify light-matter interactions, enabling high sensitivity and resolution. Their compactness, coupled with real-time functionality across varied environments, empowers them to discern even trace gas amounts, providing detailed insights into the chemical composition of gases through advanced measurement techniques.

Stage of Research

Proof of concept

Applications

- Industrial safety and leak detection
- Environmental monitoring
- Medical breath analysis and diagnostics
- Food processing and storage monitoring
- Chemical process control

Key Advantages

- High sensitivity to trace gas concentrations through resonator-enhanced interaction
- Multi-parameter optical sensing (frequency, linewidth, intensity) for improved selectivity
- Compact photonic platform suitable for integration
- Real-time measurement capability
- Adaptable to different environments

Patents

Patent application filed

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