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Microelectromechanical Gas Sensor Based on Knudsen Thermal Force

A compact, all-electric microelectromechanical gas sensor provides superior low-pressure measurement, extracting both gas pressure and relative species concentration, making it ideal for pharmaceutical freeze-drying and high-altitude vehicles.

Temperature moderating applications, particularly in lyophilization (freeze-drying) applications, are inefficient. Current vacuum gauges used to measure gas levels are bulky, require significant power, and cannot measure composition directly.

Researchers at Purdue University have developed a novel, microelectromechanical gas sensor to measure both the heat transfer rate and displacement of a known ambient gas mixture. This device is based on Knudsen thermal force and uses technology that creates a thermal gradient between the heater and surrounding gas and structure. This technology is particularly valuable as it is compact, all electric, and comparatively superior to vacuum gauges in low pressure environments, making it attractive for pharmaceutical lyophilization and high-altitude UAV/spacecraft, among other applications.

Advantages:

-Extracts both gas pressure and relative species concentration for a gas mixture

-Lightweight and compact

-All electric

Potential Applications:

-Pharmaceutical lyophilization

-High-altitude UAV/spacecraft

TRL: 4

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Category
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Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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