

## TECHNOLOGY SOLUTION

### Sensors



# Advanced Hydrogen and Hydrocarbon Gas Sensors

[For in situ leak detection and emissions monitoring](#)

Innovators at NASA's Glenn Research Center have developed advanced hydrogen and hydrocarbon gas sensors capable of detecting leaks, monitoring emissions, and providing in situ measurements of gas composition and pressure. These compact, rugged sensors can be used to optimize combustion and lower emissions and are designed to withstand harsh, high temperature environments. Some of the sensors, based on silicon carbide, can operate at 600°C. NASA Glenn is actively seeking industrial partners to develop and apply these cutting-edge sensors cooperatively in new applications.

#### BENEFITS

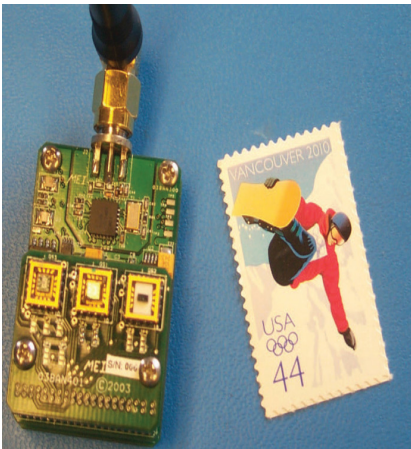
- Rugged - sensors function in environments where conventional sensor systems are inoperable
- Low cost - emissions sensors can replace more expensive gas measurement systems
- Versatile - sensors can be used in a wide range of configurations, including wireless sensor systems
- Compact - leak detection system can be applied wherever safety information is needed



## THE TECHNOLOGY

In conjunction with academia and industry, NASA's Glenn Research Center has developed a range of microelectromechanical systems (MEMS)-based and Silicon Carbide (SiC)-based microsensor technologies that are well-suited for many applications. The suite of technologies includes hydrogen and hydrocarbon leak detection sensors; emissions sensor arrays; and high-temperature contact pads for wire bond connections.

Currently used to protect astronauts on the International Space Station, the hydrogen and leak detection sensors have many Earth-based applications as well. They can function as a single-sensor unit or as part of a complete smart sensor system that includes multiple sensors, signal conditioning, power, and telemetry. The system can comprise sensors for hydrogen, hydrocarbons, oxygen, temperature, and pressure. The emissions sensor array features a gas-sensing structure that detects various combustion emission species (carbon monoxide, carbon dioxide, oxygen, hydrocarbons, and nitrogen oxides) over a wide range of concentrations. In addition, the emissions sensor array remains highly sensitive and stable while providing gas detection at temperatures ranging from 450 to 600°C. These new sensors provide a combination of responsiveness and durability that offers great value for a wide range of applications and industries.



Leak detection system the size of a postage stamp provides self-calibration and installation



The Glenn emissions sensor array detects various combustion emission species

## APPLICATIONS

The technology has several potential applications:

- Environmental monitoring (fire detection, emissions, leak detection, ventilation)
- Health monitoring
- Automotive
- Remote sensing
- Commercial space
- Chemical manufacturing

## PUBLICATIONS

Patent No: 8,001,828; 8,877,636; 9,970,914; 10,732,161

[technology.nasa.gov](http://technology.nasa.gov)

**More Information**

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