

Compact, Robust, Low Power High Sensitivity Gas Sensor, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

Miniaturized gas sensors with high sensitivity that are compact, low power and low weight are needed to support for NASA's airborne science missions, particularly those utilizing the Global Hawk, SIERRA-class, Dragon Eye or other unmanned aircraft. These UAV gas sensors are intended as calibration/validation systems for space-based measurements and/or to provide local measurements not available from space-based instruments. In this SBIR program, Amethyst Research will develop a non-dispersive infrared (NDIR) gas sensor that is capable of measuring multiple gases with absorption in the Mid to far infrared spectra with high accuracy. The envisioned system will be compact, light weight and operate at low power with detection discrimination in the ppb range. The system's performance is made possible by Amethyst's recently developed high sensitivity narrow band infrared detector that can be tuned to detect only light in the absorption band of the individual gas. This unique detector enables a low cost / low power infrared source to be used to measure individual gas concentrations at high accuracy by measurement of the absorption of the gas's unique absorption band in this spectral region. Multiple detectors, each tuned to detect a certain gas, can be packaged together to construct a multi-gas sensor.

ANTICIPATED BENEFITS

To NASA funded missions:

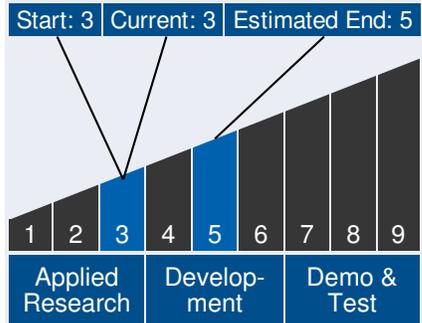
Potential NASA Commercial Applications: The robust, low weight, non-dispersive infrared multi-gas sensor that will be developed in this program will allow NASA to continuously monitor the quantity of various gases using UAVs. This information can be used for calibration and validation of satellite measurements. Hardened versions of this gas sensor could be used to monitor various trace gases on manned missions. These systems could also be used for ground based monitoring.



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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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To the commercial space industry:

Potential Non-NASA Commercial Applications: The gas monitoring system being developed in this program can be easily translated to other gases. Monitoring of industrial emissions will be a growing application of these types of systems. Other applications include spectroscopy, gas detection, chemical analysis, industrial monitoring of pollutants, and medical monitoring of exhaled gases. The improved performance of the infrared photodetector as compared to current mercury cadmium telluride (MCT) detectors makes dual government-industrial/commercial use practical. Amethyst will be able to produce detectors and sensor systems based on these detectors with high sensitivity at a lower price point than current ultra high performance infrared detectors that are based on MCT photodiodes.

Management Team (cont.)

Principal Investigator:

- Keith Jamison

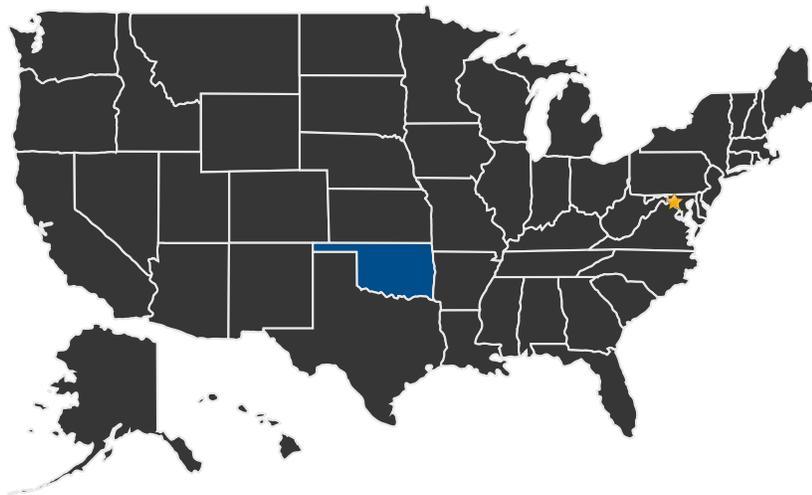
Technology Areas

Primary Technology Area:

Science Instruments,
Observatories, and Sensor
Systems (TA 8)

- └ In-Situ Instruments and
Sensors (TA 8.3)
 - └ In-Situ (other) (TA 8.3.3)

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ Lead Center:
Goddard Space Flight Center

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Other Organizations Performing Work:

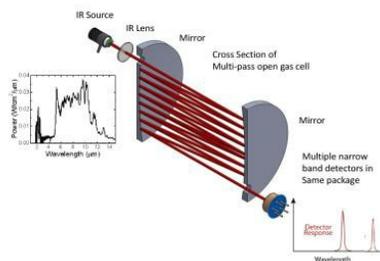
- Amethyst Research, Inc. (Ardmore, OK)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23520>)

IMAGE GALLERY



*Compact, Robust, Low Power High
Sensitivity Gas Sensor, Phase I*

DETAILS FOR TECHNOLOGY 1

Technology Title

Compact, Robust, Low Power High Sensitivity Gas Sensor, Phase I

Potential Applications

The robust, low weight, non-dispersive infrared multi-gas sensor that will be developed in this program will allow NASA to continuously monitor the quantity of various gases using UAVs. This information can be used for calibration and validation of satellite measurements. Hardened versions of this gas sensor could be used to monitor various trace gases on manned missions. These systems could also be used for ground based monitoring.