Department of the Navy SBIR/STTR Transition Program

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Topic # N122-120

A Miniaturized SERS Based Sensor Technology for detecting toxic contaminants in oxygen from aircraft On-Board Oxygen Generating Systems (OBOGS)

Sporian Microsystems, Inc.

WHO

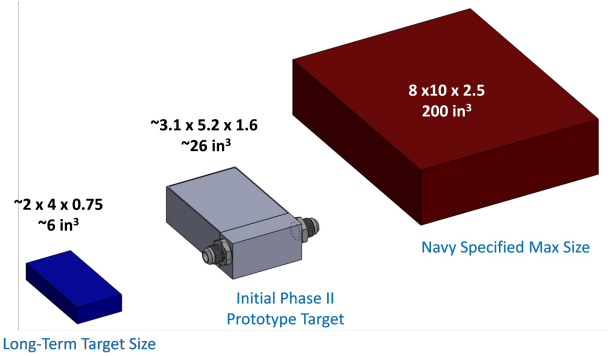
SYSCOM: NAVAIR

Sponsoring Program: PEO(T)

Transition Target: F/A-18, T-45, and F-35

TPOC:
(301)342-8419

Other transition opportunities: The OBOGS monitoring system to be constructed by Sporian can be used for other Navy and Air Force OBOGS equipped aircraft, as well as, ground based military and commercial point-of-use oxygen generating systems.



WHAT

Operational Need and Improvement: During operations, Navy aircraft are vulnerable to excessive levels of toxic byproducts that can breach the on-board oxygen generating systems (OBOGS) and enter the breathing supply. The Navy is seeking improvements in sensing capabilities, including number of components that can be sensed, response time, reliability, specificity, and robustness of sensor modules needed for military aircraft.

Specifications Required: An Ideal Monitoring System would:
- Be capable of detecting, as a minimum, PPM of contaminants
- Be compact (<2.5"x10"x8"), lightweight (<1lb), and require minimal power
- Be capable of operating in 21-100% oxygen atmosphere, oxygen system pressure range of 24-100 PSIA, and temperature ranges of -40°F -/+ 160°F
- Function as a "smart" sensor without drift over time
- Include a visual alarm indicator and output signal that can interface with an aircraft's warning system

Technology Developed: Sporian's sensor module technology utilizes surface-enhanced Raman spectroscopy (SERS) to provide real time data of various contaminants. Using SERS for detection allows for simplified components, reducing power consumption, cost, and size with highly integrated telecommunications technologies and packaging, while maintaining sensitivity and specificity. In addition, Sporian's sensor module will offer real time, accurate data of varying contaminants in a small, lightweight, and robust package.

Warfighter Value: The SERS-based detection module will detect harmful gases such as CO, CO2, NOx, and aliphatic/aromatic hydrocarbons that can be detrimental to aircrews. The real time and accurate data provided by Sporian's sensor will provide alerts by integrating in to the aircraft's system to promote safety and efficient operation.

WHEN

Contract Number: N68335-14-C-0178 **Ending on:** December 31, 2015

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Develop and prototype 1st gen system	Low	Successful demonstration of designed performance	1	November 2014
Internal lab scale testing of first generation system	Low	Demonstration of improved performance over Phase 1 concept	2	December 2014
Revise design and develop 2nd gen implementing long term form factor	Low	Proof of proposed concept	3-4	November 2015
Rigorous labscale testing of 2nd gen prototype	Low	Successful demonstration of detection performance requirements	4	December 2015

HOW

Projected Business Model: Sporian intends to sell the licensing to an On-Board Oxygen Generating System manufacturer such as Honeywell, Boeing, or Cobham.

Company Objectives: Once Sporian's SERS-based monitoring system is complete, the improvements in cost, power consumption, size, and weight over current technologies will put this OBOGS sensing module at the front of the market. With a successful detection system, Sporian hopes to not only provide a successful and efficient sensor for on-board oxygen generating systems, but also earn a reputation as an effective harsh environment sensor and packaging company.

Potential Commercial Applications: The ability of Sporian's sensor module to detect various gases at low concentration gives this technology market versatility. The SERS-based detector can be used not only in Navy aircrafts, but mobile hospitals, air generator systems, aerial refuelers, and any other gasification systems. The small size, weight, and power consumption also provide compatibility with many systems without inference.

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