

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2020-828

Topic # N182-118

System for Onboard Engine and Bleed Air Monitoring and Filtering  
Precision Combustion, Inc.

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** TBD

**Transition Target:** (i) An improved breathing air filtration system for Personal Protection Equipment (PPE); and (ii) catalytic scrubber in the hot zone of the engine bleed air prior to the heat exchanger to destroy and filtrate contaminants resulting in clean air to OBOGS

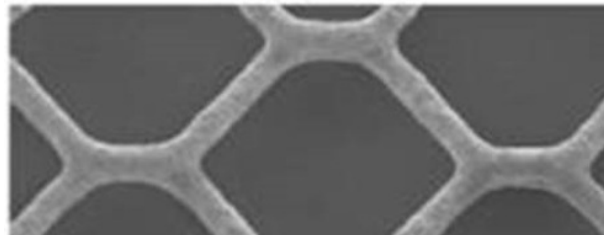
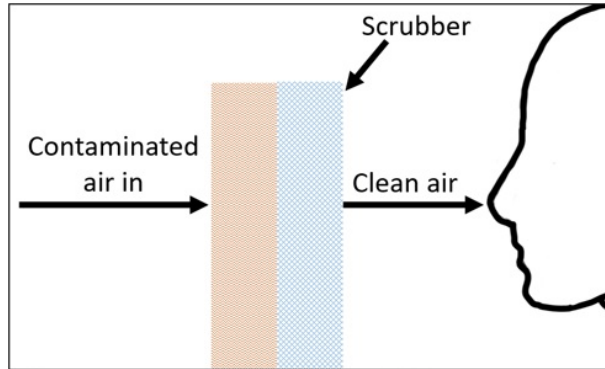
**TPOC:**

(301)342-3728

**Other transition opportunities:**

Given this is a platform technology, other breathing air filtration applications are envisioned, both for personal protection, as well as for general indoor air filtration.

**Notes:** Re-VID (TM) : Reusable Virus Impairment Device platform technology approach



Images Courtesy of Precision Combustion, Inc.

## WHAT

**Operational Need and Improvement:** This catalytic scrubber technology promotes destruction/inerting of contaminants in air and provides improved prevention of respiratory contamination. The risk of respiratory infection without respirator use is 63%. Surgical and cotton masks seem to be ineffective in preventing the dissemination of SARS-CoV-2 from aerosol transport from patients with COVID-19 to the environment and external mask surface. With N95 filtering facepiece respiratory infection risk is 9.5%. Using OBOGS Pre-filter Technology as a mask's coronavirus filter should reduce infection risk to 0.1%. OBOGS Pre-filter Technology uses a Microlith®-based catalytic scrubber for real-time filter and destruction of organics, organophosphates, Volatile Organic Compounds (VOCs), and other bleed air contaminants from the pilot air supply line in addition to killing viruses when this Microlith®-based catalytic scrubber is used in masks.

**Specifications Required:** Respiratory infection rate of 0.1% against enveloped and non-enveloped viruses whose virus particle size range between ~10 nm and 6 µm.

**Technology Developed:** High surface area nanofiber catalytic scrubber and destructive filter. The final report will show characteristic data on virus and Microlith®-based catalytic scrubber filtration system interaction.

**Warfighter Value:** A mask using this technology will:

- Provide outward and inward protective effectiveness
- Seal completely, without any bypass of particles, ensuring the actual efficiency of the mask is achieved
- Be available in N-95 / N-99 / P-100 NIOSH ratings
- Be comfortable to wear in humidity
- Be one Size Fits All
- Destroys pathogens
- Be able to talk without distortion
- Filter will be able to be regenerated
- Comfortable to wear (e.g. eliminate fogging of glasses)

## WHEN

**Contract Number:** N68335-20-C-0288 **Ending on:** January 13, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Finalize catalytic scrubber materials and filter KPP's w. NAVAIR	Low	KPP list	4	July 2020
Determine materials and testing methods	Low	Material list and testing method selection	4	October 2020
Experimentally examine performance of selected solutions	Low	Confirm materials and methods for testing and validation	5	April 2021
Design and fabricate Engineering Prototype (EP) Filter	Med	Confirm filter requirements to finalize design	5	July 2021
Test EP filter for performance validation	Med	Prototype demonstration and Final Report with test data	6	January 2022

## HOW

**Projected Business Model:** Our goal is to maintain technical oversight of development of the technology platform and transition this technology to the fleet in an initial application working with a commercial manufacturer and Navy personnel to improve safety and productivity for Sailors and Marines.

**Company Objectives:** Commercialize the technology within the Navy, and more broadly within all of DoD. PCI plans a staged applications development and commercialization schedule aligning with the SBIR program, seeking spin-offs into various applications funded either by BAA's or other development programs.

The primary markets for this integrated high-efficiency photocatalytic oxidation and sorbent system will be for military and commercial aircraft OBOGS systems. The technology is initially targeted for application in the Navy for OBOGS equipped aircraft such as the F/A-18 Hornet/Super Hornet. Other Navy and Air Force OBOGS equipped aircraft will be addressed once the technology is proven for the initial Navy aircraft. There is also the promising potential for a spin-out into personnel protection equipment applications for contaminants and viruses.

Seek commercial applications for license to appropriate PPE and filtration companies.

**Potential Commercial Applications:** Breathing air filtration masks, vehicle and building air filtration. To date, PCI has designed, developed, and delivered several regenerable adsorber units to AFRL and NASA. These units have been tested for removal of water, of Toxic Industrial Chemical (TIC) simulants and of CO<sub>2</sub>/trace contaminants, and the performance results indicated good sorption capacity with efficient regeneration.

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