NASA SBIR/STTR Technologies

Contract # NNM08AA08C, Plasma Air Decontamination System (PADS) II
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Identification and Significance of Innovation

Uses non-thermal plasma that operates at ambient temperature & pressure to generate highly reactive species for destruction of air contaminants.

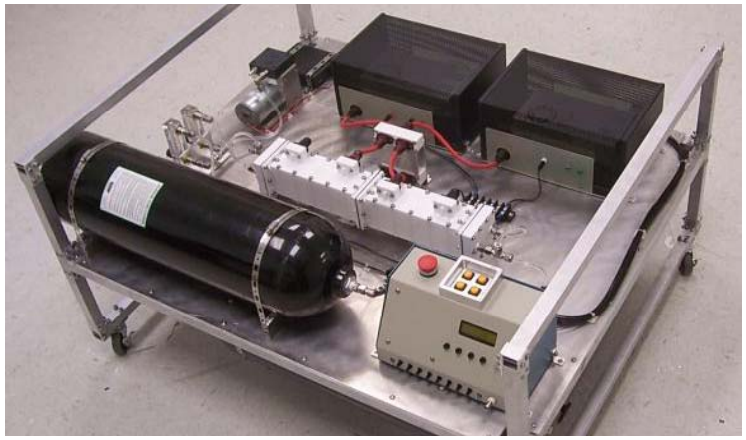
Capable of removing both ammonia and volatile organic carbons (VOCs), and both low and high molecular weight VOCs. No need for separate systems.

Converts VOCs into mostly CO_2 and H_2O. No other organic byproducts detected at levels to be concerned.

Ozone, the dominant reaction byproducts, may be exploited for onboard disinfection applications of water, food, and/or food-contact surfaces.

Highly scalable, no moving parts, no consumables, and low maintenance, suitable for long-duration flight missions.

Expected TRL Range at the end of Contract (1-9): 4-5



Technical Objectives and Work Plan

Design, build, and test two different PADS candidate prototypes based on dielectric barrier discharges (DBDs).

Design, build, and test a third PADS candidate prototype based on atmospheric pressure glow discharges (APGDs).

Conduct thorough review of the different designs and test results, and select the best as basis for the final PADS prototype.

Optimize the selected design for higher processing capacity and higher efficiency in contaminant removal.

Design and build the final PADS prototype reactors.

Design necessary subsystems to complement PADS reactors and to address potential reaction byproducts issue.

Test completed PADS prototype for single-pass removal efficiency using acetone, ammonia, dichloromethane, methane, and toluene.

Validate system performance with more realistic closed-loop, SMAC level tests.

Analyze plasma reaction byproducts.

NASA and Non-NASA Applications

Provide an alternative to existing trace contaminant control in a spacecraft and/or habitat.

Its ease to scale allows it to be used in a variety of applications, such as crew exploration vehicle and lunar habitat, increasing system commonality.

Ozone may be used for onboard disinfection applications.

Potential for hydrogen recovery from methane, product of Sabatier reaction.

Portable air decontamination system for emergency or homeland security applications. Or a compact system for buildings, airplanes, trains, etc.

Firm Contacts

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NON-PROPRIETARY DATA