

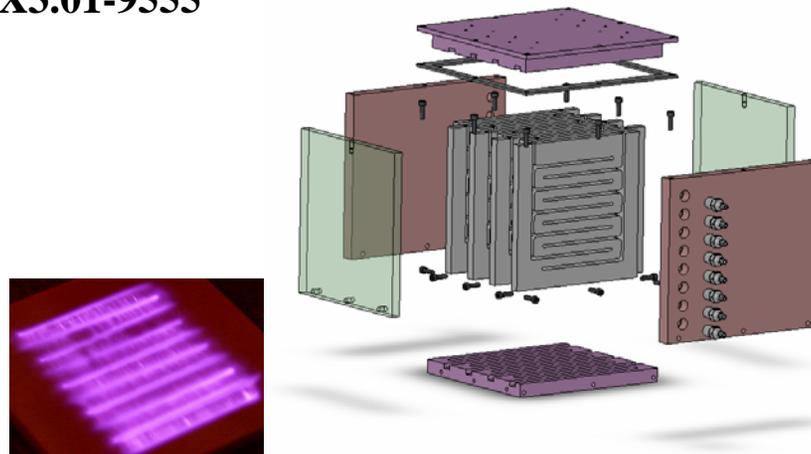
# Plasma Air Decontamination System (PADS) – Phase II

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## Identification and Significance of Innovation

- Use of plasmas at ambient temperature and pressure to generate highly reactive species to break down VOCs and ammonia.
- Novel array of low power, flat ceramic plate plasma reactors arranged with a large, flow through surface area for increased volumetric contact with the air stream.
- Low maintenance and no consumables.
- Replace high temperature catalytic reactors in TCCS and/or VPCAR.
- Eliminate or reduce size of adsorbent beds with accompanying reduction in re-supply mass.
- Ease of scaling for a variety of applications.
- Ideal for building systems common to all Advanced Life Support Systems.



## Technical Objectives

- Improve design of power supply for higher output at relatively low cost.
- Implement Phase I conceptual reactor design.
- Design and test two other alternative designs.
- Evaluate reactor efficiency on VOC and ammonia removal.
- Characterize and minimize byproducts of plasma reactions.
- Evaluate service life time and factors affecting efficiency.
- Integrate PADS into existing TCCS and/or VPCAR for air purification.

## Work Plan

- Task 1 - Refine system requirements.
- Task 2 - Improve design of power supply.
- Task 3 - Develop and test different PADS designs.
- Task 4 - Optimize selected PADS design.
- Task 5 - Evaluate factors affecting service lifetime.
- Task 6 - Byproducts analysis and remediation.
- Task 7 - Develop and test flight-like prototype.
- Task 8 - Management and Reporting.

## NASA Applications

- Replace catalytic reactors in the Trace Contaminant Control System (TCCS) and/or the Vapor Phase Catalytic Ammonia Removal (VPCAR) system
- Easily scalable system will allow use in any habitat size.
- Could be used in modular systems with common components across entire exploration life support systems.

## Non-NASA Applications

- Compact, low maintenance air purification for public areas such as homes, offices, and public transportation.
- Post processing of industrial process streams.
- Possible use in environmental remediation.

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