

# Plasma-Activated Catalytic Air Purifier Cleans Enclosed Spaces

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## Plasma technologies produce unwanted byproducts

Cold plasmas have been shown to be effective in treating and destroying volatile organic vapors, molds, spores, bacteria, viruses, and other airborne particles. However, plasma discharges produce reactive nitrogen oxides and ozone that must be removed. Current plasma technologies use filters such as activated charcoal to trap hazardous byproducts, but these filters must be exchanged, limiting their practical use as an indoor air purifier.

## Innovation deactivates pathogens and mitigates hazardous gas-phase products

This plasma-activated catalytic air purifier can be used to clean enclosed spaces such as aircraft, hospitals, and classrooms—without the need for filters to capture unwanted plasma-produced byproducts. The air purifier has a direct current or variable frequency low-temperature, non-thermal plasma discharge region that can be combined with thermal and plasma-activated catalysts. The plasma components can be dielectric barrier discharge (DBD), micro hollow cathode discharge (MHCD), or a plasma-jet array. The plasmas and catalytic regions individually or collectively deactivate and collect viruses and particles in enclosed or recirculating air spaces and systems while mitigating any hazardous gas-phase product (e.g., ozone, nitrogen oxides) formation and release.

## Summary Bullets

- This plasma-activated catalytic air purifier can be used to clean enclosed spaces, such as aircraft, hospitals, and classrooms, while mitigating hazardous gas-phase byproducts.
- The air purifier can be used synergistically with UV diode lasers and UV lamps, providing additional contaminant destruction pathways while lowering the potential for dielectric breakdown and plasma formation.
- This comprehensive technology is effective for germicide and sterilization activities as well as for hydroxyl-radical production and ozone removal in a wide variety of indoor environments.

## Solution Advantages

- **Effective air purification:** Provides treatment strategies for any enclosed space—either used directly in the space or within a circulation and/or air conditioning system
- **Synergistic approach:** Can be used with UV diode lasers and UV lamps, providing additional contaminant destruction pathways while lowering the potential for dielectric breakdown and plasma formation
- **Comprehensive use:** Effective for germicide and sterilization activities as well as for hydroxyl-radical production and ozone removal

### Potential Commercial Applications

This innovation could be useful in cleaning enclosed spaces in the following environments:

- Buildings
- Aircraft
- Hospitals
- Classrooms
- Residential homes and apartments
- Hotels and offices

### Inventors

- Dr. Thomas Orlando  
Professor - Georgia Tech School of Chemistry and Biochemistry
- Dr. Brant Jones  
Senior Researcher - Georgia Tech
- Dr. Alexander Aleksandrov  
Senior Research Scientist - Georgia Tech School of Chemistry & Biochemistry
- Richard Bedell  
Electrical Engr III - Georgia Tech School of Chemistry and Biochemistry

### IP Status

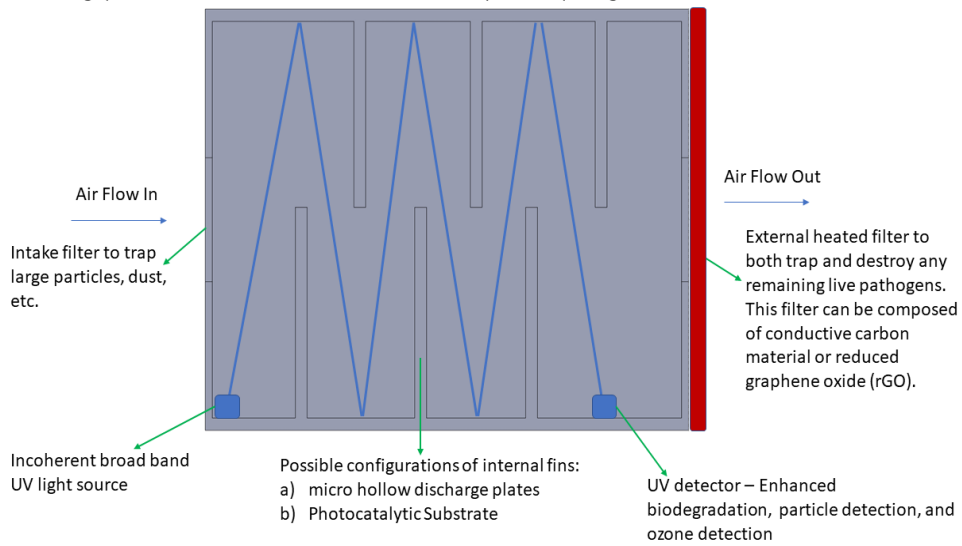
<p>Patent application has been filed</p>: US63/356697

### Publications

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### Images

Oxygenated free radicals (OFRs) are generated within the air purification system by photocatalytic oxidation or micro-hollow discharge plates. The radicals then interact with and destroy harmful pathogens.



## Air Purification System Diagram

Visit the Technology here:

[Plasma-Activated Catalytic Air Purifier Cleans Enclosed Spaces](https://s3.sandbox.research.gatech.edu/print/pdf/node/4007)

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