Introduction to Photocatalytic Oxidation (PCO) Technology

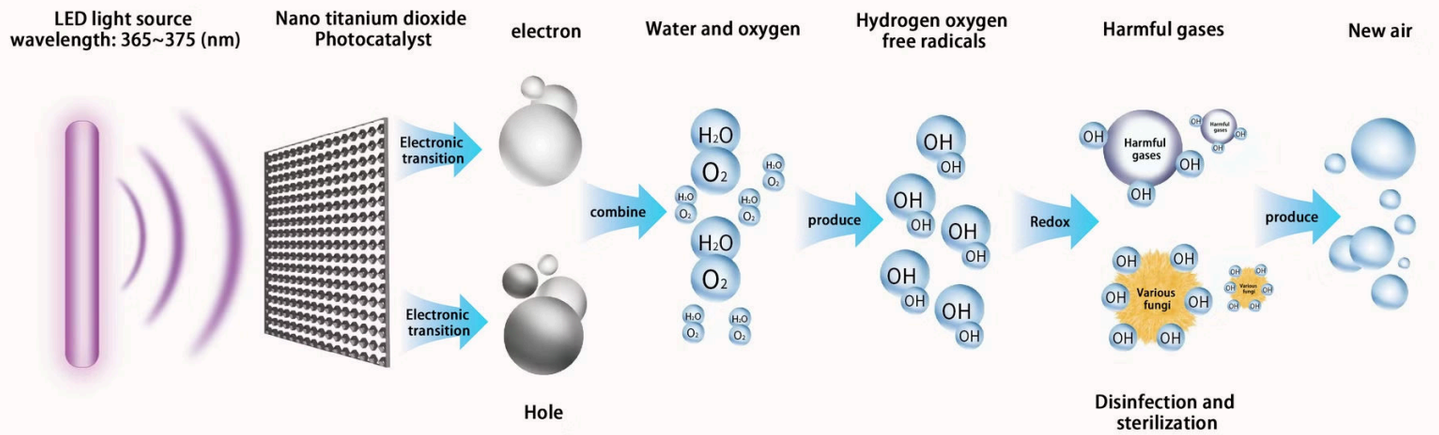
Photocatalytic Oxidation (PCO) is an innovative technology that harnesses the power of light to clean and sanitize the air and surfaces. This revolutionary process utilizes a photocatalyst, titanium dioxide (TiO2), that reacts with UV light to generate highly reactive oxygen species that can effectively neutralize airborne and surface-bound pollutants, including particulate matter (PM), bacteria, and other harmful contaminants. By seamlessly integrating this technology into a HEPA filtration system, it offers a comprehensive "capture and kill" solution for maintaining a clean, healthy, and sanitized indoor environment.

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How PCO Works to Reduce PM, Mold, and Bacteria

The PCO process begins when the photocatalyst, such as TiO2, is activated by UV or visible light. This activation triggers a series of chemical reactions that generate highly reactive oxygen species, including hydroxyl radicals and superoxide ions. These powerful oxidants then break down organic compounds, such as volatile organic compounds (VOCs), into harmless byproducts like carbon dioxide and water.

In addition to eliminating airborne pollutants, the PCO technology is also effective at destroying mold, bacteria, and viruses. The oxidative process disrupts the cell membranes and DNA of these microorganisms, rendering them inactive and preventing them from spreading. This makes PCO an excellent choice for sanitizing and purifying indoor agricultural areas.



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The Benefits of PCO Technology

1

Particulate Matter Reduction

PCO technology effectively removes a wide range of particulate matter, including dust, pollen, and other airborne pollutants, improving indoor air quality and reducing the risk of respiratory issues.

2

Mold and Bacteria Elimination

The powerful oxidative process of PCO disrupts the cell structure of mold and bacteria, eliminating these harmful microorganisms and maintaining a clean, hygienic environment.

3

Air and Surface Sanitization

PCO technology not only purifies the air but also sanitizes exposed surfaces, providing a comprehensive solution for maintaining a clean and healthy indoor space.

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Benefits of PCO for Indoor Agriculture

1 Improved Crop Yields

By purifying the air and eliminating airborne contaminants, PCO helps create an optimal growing environment for plants, leading to increased crop yields and healthier produce.

2 Reduced Pathogen Exposure

The PCO process effectively kills harmful bacteria, viruses, and mold, protecting plants and workers from exposure to these dangerous microorganisms.

3 Enhanced Nutrient Absorption

By removing airborne pollutants and particles, PCO technology allows plants to more efficiently absorb the necessary nutrients, further boosting their growth and productivity.

4 Longer Shelf Life

The sanitizing effects of PCO can extend the shelf life of harvested produce, reducing waste and increasing the quality and freshness of the final products.

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Enhancing Indoor Air Quality in All Grow Spaces

Flower Rooms

The PCO technology effectively eliminates airborne pollutants, mold, and bacteria, ensuring a pristine environment for delicate flowers to thrive.

Veg Rooms

By maintaining a clean and sanitized atmosphere, the PCO-based purifier supports robust vegetative growth and overall plant health.

Drying Rooms

The "capture and kill" approach safeguards the quality of the final product by eradicating potential contaminants during the critical drying phase.

Trimming Areas

The PCO technology ensures a hygienic workspace, protecting the integrity of the harvested material and promoting a safe, clean environment for workers.

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Versatility in Indoor Agriculture Applications

1 Flower Rooms

In flower rooms, our PCO-based air purification system helps maintain a clean and contaminant-free environment, promoting the healthy growth and development of delicate blooms while eliminating airborne pathogens and odors.

2 Veg Rooms

For vegetative growth areas, the PCO technology ensures a consistent, sanitized atmosphere, supporting the robust and vigorous development of plants by removing airborne particulates and microorganisms.

3 Drying and Trimming Areas

In the critical drying and trimming stages, our PCO-enabled air purifier helps maintain optimal conditions, safeguarding the quality and integrity of the harvested product by eradicating mold, bacteria, and other potential contaminants.

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NASA's Development of PCO Technology

The concept of photocatalytic oxidation was initially explored and developed by NASA researchers, who recognized its potential for air purification and sanitation in closed environments, such as space habitats. Through extensive research and testing, NASA's scientists pioneered the use of TiO2 and UV light to address indoor air quality challenges, paving the way for the widespread adoption and commercialization of PCO technology.

NASA's advancements in PCO have proven invaluable for maintaining a clean and healthy atmosphere in confined spaces, and this knowledge has now been applied to various indoor agriculture settings, where air quality and sanitation are equally critical for successful plant cultivation.



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Relevant Studies and Research

Numerous studies and research papers have been published, highlighting the effectiveness of PCO technology in improving indoor air quality and sanitation. For example, a study conducted by the University of Michigan found that PCO systems were able to significantly reduce airborne concentrations of bacteria, mold, and particulate matter in a controlled indoor environment.

Additionally, a review article published in the Journal of Photochemistry and Photobiology B: Biology summarized the various applications of PCO, including its potential for odor control, volatile organic compound (VOC) degradation, and disinfection of water and air.

These and other relevant studies demonstrate the scientific evidence supporting the use of PCO technology in indoor agriculture settings, where maintaining a clean and healthy environment is paramount for plant growth and worker well-being.

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Introducing Our New Device: Capture and Kill

Capture

Our new "Capture and Kill" device combines the power of HEPA filtration with the advanced oxidation capabilities of PCO technology. The HEPA filter traps and removes airborne particulates, while the PCO system actively destroys harmful microorganisms and breaks down organic pollutants.

Kill

The PCO component of the "Capture and Kill" device generates highly reactive oxygen species that eliminate bacteria, viruses, mold, and other microbes, both in the air and on surfaces. This dual-action approach ensures a comprehensive sanitization of the indoor environment.

Purify

By integrating these two powerful technologies, the "Capture and Kill" device provides unparalleled air purification and surface sanitation, creating a cleaner, healthier, and more hygienic indoor space for homes, businesses, and agricultural facilities.

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HEPA Filtration Combined with PCO Technology

1

Capture

The HEPA filter in the "Capture and Kill" device traps and removes a wide range of airborne particulates, including dust, pollen, and other allergens.

2

Oxidize

The PCO system then activates to break down organic pollutants and eliminate harmful microorganisms, including bacteria, viruses, and mold spores.

3

Purify

The combined power of HEPA filtration and PCO technology ensures a comprehensive purification of the indoor air, creating a cleaner and healthier environment.

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Improving Indoor Air Quality and Hygiene



Cleaner Air

The "Capture and Kill" device effectively removes airborne pollutants, improving the overall indoor air quality and creating a healthier environment for occupants.



Sanitized Surfaces

The PCO system's ability to eliminate harmful microorganisms on surfaces helps maintain a high level of hygiene and reduce the risk of infectious diseases.



Healthier Plants

For indoor agricultural applications, the "Capture and Kill" device enhances plant growth and productivity by providing a clean, pathogen-free environment.



Improved Wellbeing

By improving air quality and sanitizing surfaces, the "Capture and Kill" device helps create a safer and more comfortable indoor environment for occupants.

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A Comprehensive Solution for Indoor Agriculture

By integrating HEPA filtration and PCO technology, our innovative air purification system offers a comprehensive solution for maintaining optimal indoor air quality in a wide range of agricultural environments. From flower rooms and vegetative growth areas to drying rooms and trimming spaces, this advanced system effectively captures and neutralizes a diverse array of airborne pollutants, microorganisms, and odors, ensuring a clean, healthy, and productive indoor growing ecosystem.



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