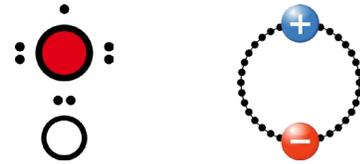


Germicidal UVC Compared to ROS & Bipolar Ionizer Disinfection Technologies

Decades of research, hundreds of peer reviewed studies and thousands of researchers & scientists have validated UVC disinfection technologies is effective in neutralizing airborne and surface microorganisms. Below are a number of organizations and experts who have provided their opinion on the use of UVC disinfection and ROS / Bipolar disinfection technologies. Below are excerpts from those documents.



UVC



ROS & Bipolar Ionizers

Source: [Johns Hopkins Bloomberg School of Public Health](#)
[Improve Indoor Ventilation in K-12 Schools to Help Reduce COVID-19 Transmission](#)

Use only proven technologies for improving indoor air quality: appropriate ventilation, filtration, or **ultraviolet germicidal irradiation**.

NOT USE unproven technologies such as **ozone** generators, **ionization**, **plasma**, and air disinfection with chemical foggers and sprays.

Source: [The Lancet COVID-19 Commission Task Force on Safe Work, Safe School, and Safe Travel](#)

...science-based technologies should be considered, such as in-duct germicidal UV lights.... UV technology has been well-studied and utilized for decades to control transmission of airborne infectious diseases, and the Centers for Disease Control and Prevention (CDC) have provided guidelines for effective design and operation of such systems. This approach can be particularly cost effective in larger spaces, or spaces that are not ventilated.

...strategies that have recently been implemented or considered in many schools (such as bipolar ionization, plasma systems, portable air cleaning units with ionizers or UV, dry hydrogen peroxide, photocatalytic oxidation) are generally considered less scientifically defensible due to their often **unproven efficacies** and due to their potential for **degrading the quality of the air** through the generation of **harmful secondary pollutants**.

Source: [The Centers for Disease Control: Ventilation in Buildings \(March 2021\) *](#)
[The CDC: Ventilation in Schools and Childcare Programs \(Feb. 2021\) **](#)

Consider using **ultraviolet germicidal irradiation (UVGI) as a supplemental treatment to inactivate SARS-CoV-2**, especially if options for increasing room ventilation and filtration are limited. Upper-room UVGI systems can be used to provide air cleaning within occupied spaces, and **in-duct UVGI systems can help enhance air cleaning inside central ventilation systems**.*

Consider using ultraviolet germicidal irradiation (UVGI) in schools and non-home-based childcare programs as a supplemental treatment to inactivate the virus that causes COVID-19, especially if options for increasing ventilation and filtration are limited. Consult a qualified professional to help design and install any UVGI system. **

There are numerous technologies being heavily marketed to provide air cleaning during the ongoing COVID-19 pandemic. Common among these are ionization, dry hydrogen peroxide, and chemical fogging disinfection. Some products on the market include combinations of these technologies. **These products generate ions, reactive oxidative species (ROS**, which are marketed using many names), or chemicals into the air as part of the air cleaning process. **People in spaces treated by these products are also exposed to these ions, ROS, or chemicals**. While variations of these technologies have been around for decades, relative to other air cleaning or disinfection methods, they have a **less-documented track record** when it comes to cleaning/disinfecting large and fast volumes of moving air within heating, ventilation, and **air conditioning (HVAC) systems or even inside individual rooms**.*

Germicidal UVC Compared to ROS & Bipolar Ionizers

Continued

UVC

Source: [ASHRAE COVID-19 Strategies](#)

Ultraviolet energy inactivates viral, bacterial, and fungal organisms so they are unable to replicate and potentially cause disease. Requires high UV doses to inactivate microorganisms on-the-fly as they pass through the irradiated zone due to limited exposure time.

ROS & Bipolar Ionizers

Technologies utilize various **methods to create reactive ions in air** that react with airborne contaminants, including viruses. The design of the systems can be modified to create mixtures of reactive oxygen species (ROS), ozone, hydroxyl radicals and superoxide anions.

Convincing scientifically-rigorous, peer-reviewed studies do not currently exist on this emerging technology; manufacturer data should be carefully considered.

Source: [Evaluating a commercially available in-duct bipolar ionization device for pollutant removal and potential by-product formation \(Feb. 2021\) Illinois Tech, Portland State University, and Colorado State University](#)
[www.physics.org: Study uncovers safety concerns with ionic air purifiers](#)

Both chamber and field tests found that an **ionizing device** led to a decrease in some volatile organic compounds (VOCs) including xylenes, **but an increase in others, most prominently oxygenated VOCs** (e.g., acetone, ethanol) **and toluene, substances commonly found in paints, paint strippers, aerosol sprays and pesticides.**

Source: [Open Letter to address the use of Electronic Air Cleaning Equipment in Buildings \(April 2021\)](#)

The proven measures that should be taken to address airborne transmission risk include properly sized and maintained ventilation (mechanical and natural), mechanical filtration (including portable HEPA filter units), and germicidal ultraviolet light systems.

One recent independent test (ref:2) of **needlepoint bipolar ionization (NPBI)** technology found that the strength of the ions produced appears **insufficient to effectively clean the air**, and the device also produced VOCs. Another study (ref: 4), conducted by **The Bureau of Toxic Substance Assessment (BTSA), monitored indoor air quality (IAQ) in a high school classroom** and characterized changes in IAQ resulting from a bipolar ionization (BPI) unit operating in the air handling unit serving the classroom. Higher levels of ozone and ultra-fine particles were measured, indicating that **IAQ worsened with the ionization device in operation. Both of these studies also raise serious concerns about the unintended byproducts produced** from these electronic cleaning devices, which are typically neither studied nor reported by the device manufacturers.



The Indoor Air Quality Expert