



ionisan

## Bipolar ionization

Effectiveness tested and certified



energetica®

# Modes of viral transmission

Airborne transmission is definitely a pathway of contagion which has been deeply investigated. The results show that a good air quality in indoor environments plays a key role in the containment of viruses and other microorganisms<sup>1</sup>.

The **principal mode by which people are infected with bacteria or viruses** is through exposure to respiratory fluids. Exposure occurs in three principal ways:

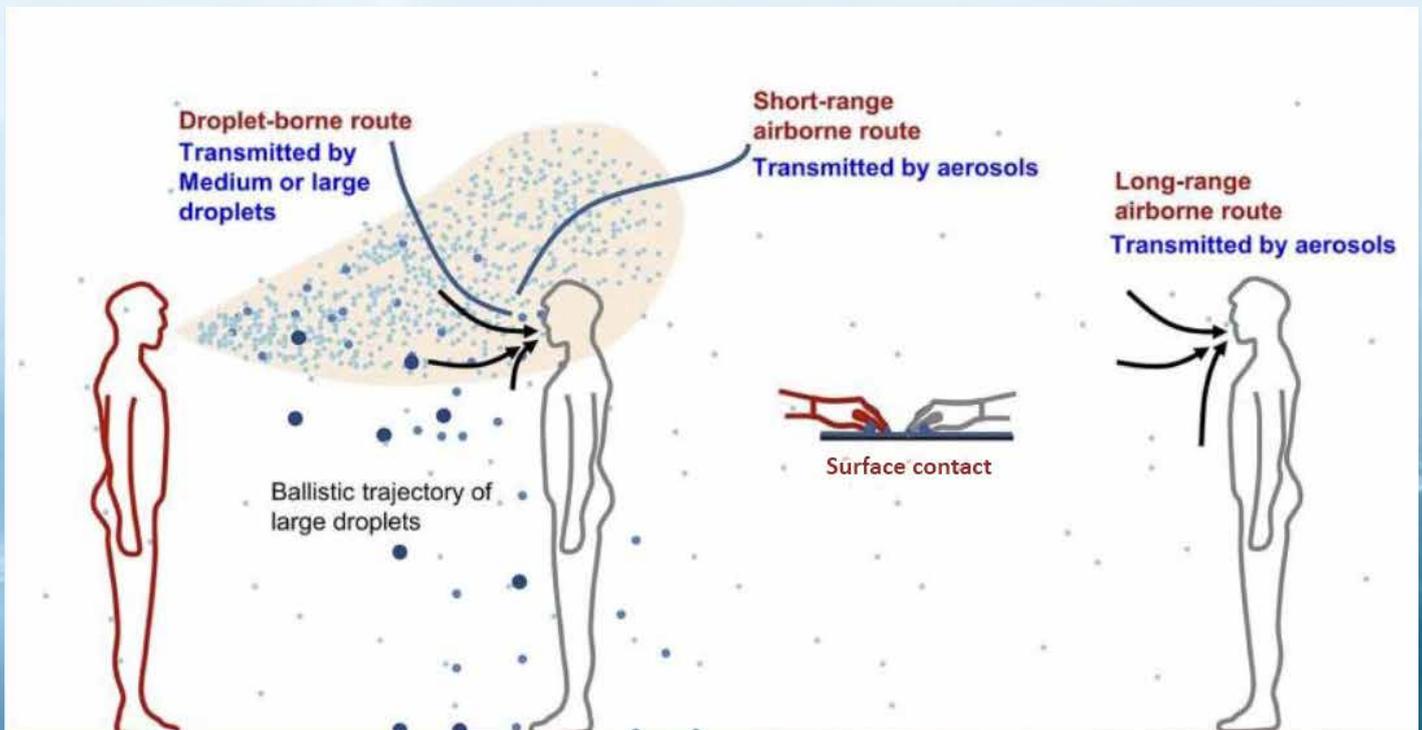
1. **inhalation** of very fine respiratory droplets and aerosol particles,
2. **deposition** of respiratory droplets and particles by direct splashes and sprays,
3. **indirectly by touching** surfaces with virus on them<sup>2</sup>.

People release respiratory fluids during exhalation in the form of droplets across a spectrum of sizes. These droplets carry virus and transmit infections. **The largest droplets** (diameter greater than 100  $\mu\text{m}$ ) are subject to gravity and settle out of the air rapidly, within seconds.

**The smallest very fine droplets**, and aerosol particles formed when these fine droplets rapidly dry, are small enough that they can remain suspended in the air for minutes to hours.

Therefore, an individual could be infected when they inhale aerosols produced when an infected person exhales, speaks, shouts, sings, sneezes, or coughs. **Reducing airborne transmission of virus requires measures to avoid inhalation of infectious aerosols, especially indoors**<sup>3</sup>.

This figure shows the different ways of transmission of respiratory droplets as a function of their size.

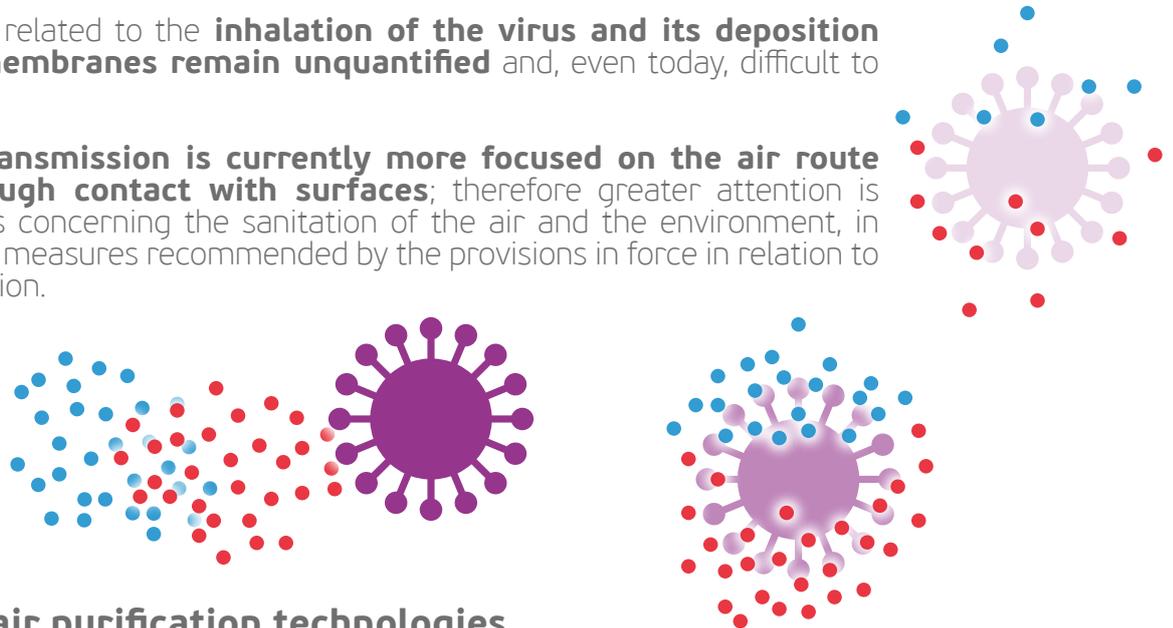


## Notes

1. Buonanno G, Stabile L, Morawska L. Estimation of airborne viral emission: Quanta emission rate of SARS-CoV-2 for infection risk assessment. Environment international. May 11 2020
2. Source: Centers for Disease Control and Prevention [www.cdc.gov](http://www.cdc.gov)
3. Ten scientific reasons in support of airborne transmission of SARS-CoV-2 Trisha Greenhalgh, Jose L Jimenez, Kimberly A Prather, Zeynep Tufekci, David Fisman, Robert Schooley

As reported by international organizations:

- Current scientific evidence suggests that **transmission through contaminated surfaces does not predominantly contribute to new infections** <sup>(4)</sup>.
- The contributions related to the **inhalation of the virus and its deposition on the mucous membranes remain unquantified** and, even today, difficult to establish.
- **The mode of transmission is currently more focused on the air route rather than through contact with surfaces**; therefore greater attention is required on aspects concerning the sanitation of the air and the environment, in association with the measures recommended by the provisions in force in relation to the pandemic situation.



## Comparison of air purification technologies

There are different solutions to improve the cleanness and safety of indoor environments. The following sheet shows the main technologies available and their peculiarities compared.

	Ionization (cold plasma)	Ozone	UV-C Radiation	Electrostatic Filters (HEPA)	Nebulized Disinfectant
Easy to use	✓	✗	✓	✓	✗
Work in presence of people	✓	✗	✓	✓	✗
Sanitizes air	✓	✓	✓	✗	✗
Sanitizes surfaces	✓	✓	✗	✗	✓
Virus, pollutants, pollens (VOC) and odor elimination	✓	✓	✓	✗	✗
NO Risk of chemical contamination	✓	✓	✓	✓	✗
Natural and ecological system	✓	✗	✓	✗	✗
NO need of maintenance	✓	✗	✗	✗	✗
Bacteria	✓	✓	✓	✓	✗
Ranking <sup>5</sup>	9	5	7	4	1

### Notes

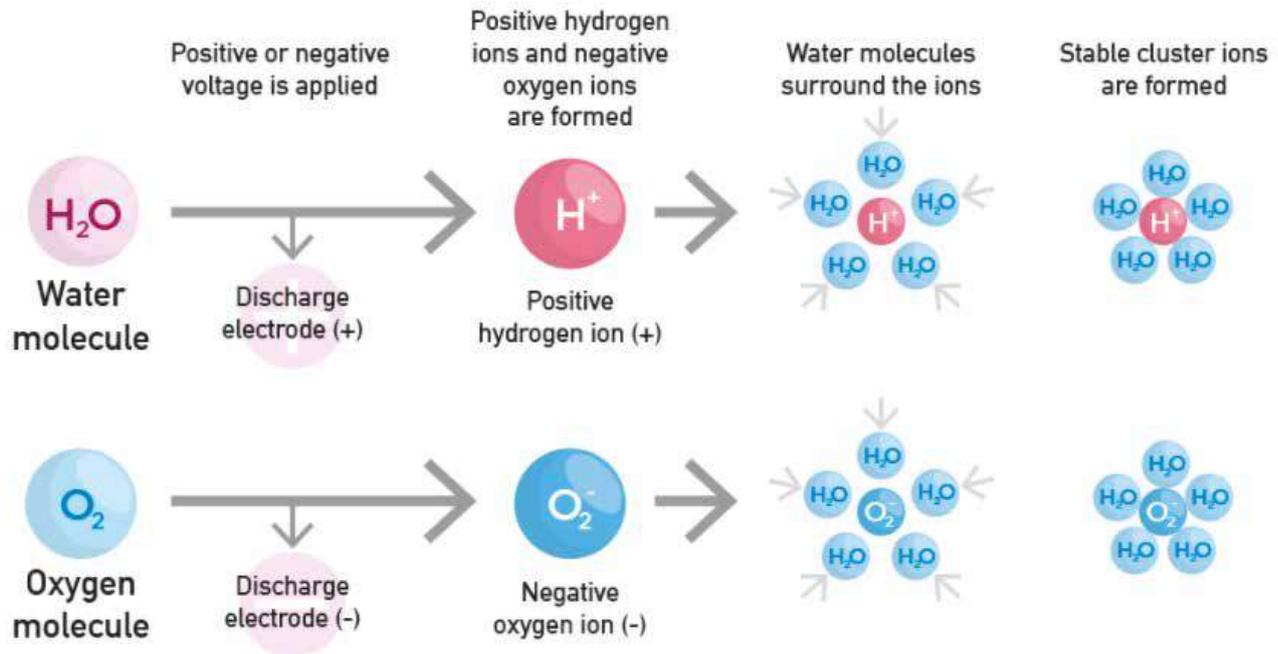
4. CDC.Science Brief: SARS-CoV-2 and Surface (Fomite) Transmission for Indoor Community Environments. Updated Apr. 5, 2021. Atlanta, GA: Centers for Disease Control and Prevention; 2021. <https://www.cdc.gov/coronavirus/2019-ncov/more/science-and-research/surface-transmission>  
 5. Overall performance from 1 to 10 (1 is the lowest result, 10 the best)

# How bipolar ionization works?

The IONISAN ion generator produces positively charged hydrogen ions from water molecules floating in the air, and negatively charged oxygen ions from atmospheric oxygen.

As a result, various types of superoxide ions are formed. These trigger chemical reactions similar to those that occur naturally in the environment, thus **purifying the indoor air in the premises where we live and work**. Some of the oxidizing ions **destroy the protein structure of the bacteria, viruses, and molds rendering them completely harmless**.

While other ions oxidize the volatile organic components (VOC) floating the air, making them harmless as well. Thanks to this combined ion effect, it is possible to **control the quantity and harmful effects of microbes/pathogens**, and VOC in the treated area using Nature's own methods.



The ion generators contained in the ionisan products are of the needle point type, which deliver a very high number of positive and negative ions per second (from  $10^{11}$  to  $10^{12}$  ion/sec), without producing even the smallest amount of ozone<sup>6</sup>.

Ozone is very harmful for the health of humans and pets (may irritate lungs with concentrations as low as 0,05 part per million). In fact, the norms in most EU countries set a limit for the regular exposure to Ozone at 0,1 part per million (0,3 ppm for max 15 min).

For that reason the ionisan technology is much safer and does not require any minimum size of the room, or additional ventilation where the products are operated.

Another important advantage is that the ionisan products do not depend upon any scheduled replacement of important and expensive parts like it happens for example with ion generators based on condensers (which have to be replaced every 12 ÷ 18 months latest to maintain the same performances).

## Notes

6. The ion generators on which the ionisan products are based guarantee a virtually ozone free operation. The maximum level is below 0,01 parts per million, corresponding to 10 parts per billion (< 10 ppb).



## Ionisan strenghts

Ionisan with its cold plasma bipolar ionization technology, is able to perform with all the characteristics mentioned above:

Elimination of the bacterial load

Reduction of virucidal load

Allergens inactivation

Removal of fine dust

Elimination of odors (from the kitchen, smoke, fuels,...)

Do not produce ozone

Do not require any maintenance

Tested against bacteria and SARS-COV2



# Ionisan Test and Results

The effectiveness of the Ionisan Products has been proven by accredited Laboratories certified by ISO 17025.

## Tested against bacteria



The bactericidal efficacy of Ionisan has been tested by the **SGS INSTITUT FRESENIUS GmbH** using the species *Enterococcus faecium*. **The reduction rate** after 30 minutes **is greater than 99,999%** showing a very good capacity of inactivating bacteria within a very short time.

This value exceeds by far the best products on the market and allows to extend the efficacy of the product also to most of other bacteria and viruses. Nevertheless, a specific test against SARS2-COVID19 has been carried out.

Most producer of air purifier tested their products against viruses according to the EN17272 or to the EN16777 standards. This is because a standard test procedure for air purifiers aiming to evaluate the capability of inactivating microorganisms in the air (aerosol) is not yet available.

Still the EN17272 is a test method to determine the disinfectant activity using automated processes for distributing chemicals by air diffusion, which is not exactly the real process of an air purifier based on cold plasma, and more over this standard covers the disinfection of surfaces but not that of the air.

Also the EN16777 has been developed to test Chemical disinfectants on surfaces and does not represent an good testing procedure to evaluate the capability of an air purifier in inactivating viruses in the air.

Defining a quantitative test procedure for target microorganisms suspended in air (aerosol) which gives repeatable results is very difficult. A second accredited laboratory has been involved to developed a custom testing procedure to **demonstrate the efficacy of the product against virus spread in the air as aerosol.**

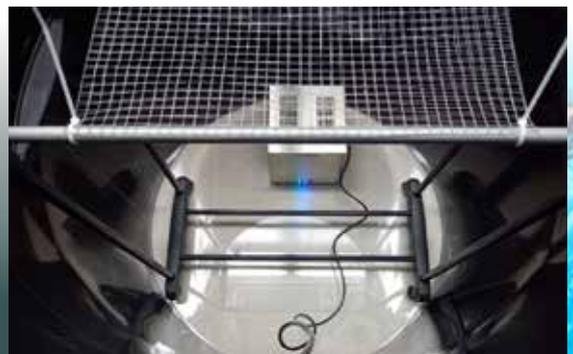
## Result of the test at SGS Institut Fresenius

Detection of the anti-bacterial effectivity of the device "Ionisan Plus, based on Ion-Generator Awions AW-D6" against Bacteria: strain *Enterococcus faecium*.

### Summary of results

The testing of performed with gram.positive bacteria, strain *Enterococcus faecium* showed after 30 minutes of exposure under dry conditions a Log- Reducion-Factor of 5,81 under the conditions of this test

Test Species	Reduction rate %	Log Reduction
<b>Enterococcus faecium</b>	> 99,999	> 5,81 (30 min)



TEST SET UP



## Tested against covid-19



LifeAnalytics developed a custom testing procedure to demonstrate the efficacy of the Awions ion generator (on which the ionisan products are based) in inactivating the Sars-Cov2 virus spread in in the air as aerosol and validate the capability of improving the safety of indoor environments. The test was performed as follows:

**TEST 1)** was carried out in a closed room where a portable nebuliser distributed the Sars-Cov2 inoculum inside the room for 5 min. At the end of the dispersion the ion generator was switched on for 10 minutes. After 10 minutes an air swab from the filtering membrane of a portable aspirator was retrieved.

**TEST 2)** was identical to nr. 1) except that the ion generator was not switched on.



## Result of the test at Life Analytics

The result of the TEST 2) is that the virus was still present (i.e. greater than the Limit Of Detection 3 c/l), while the TEST 1) did not report any presence of the virus (extract of the report below).

### TEST 2)

Test denomination	Value	Analytics Method
Detection 2019-nCov (LOD=3 c/l)	absent	MI 995 rev 00 (2020)

### TEST 1)

Test denomination	Value	Analytics Method
Detection 2019-nCov (LOD=3 c/l)	present	MI 995 rev 00 (2020)

# Test against SARS-CoV-2 in aerosol

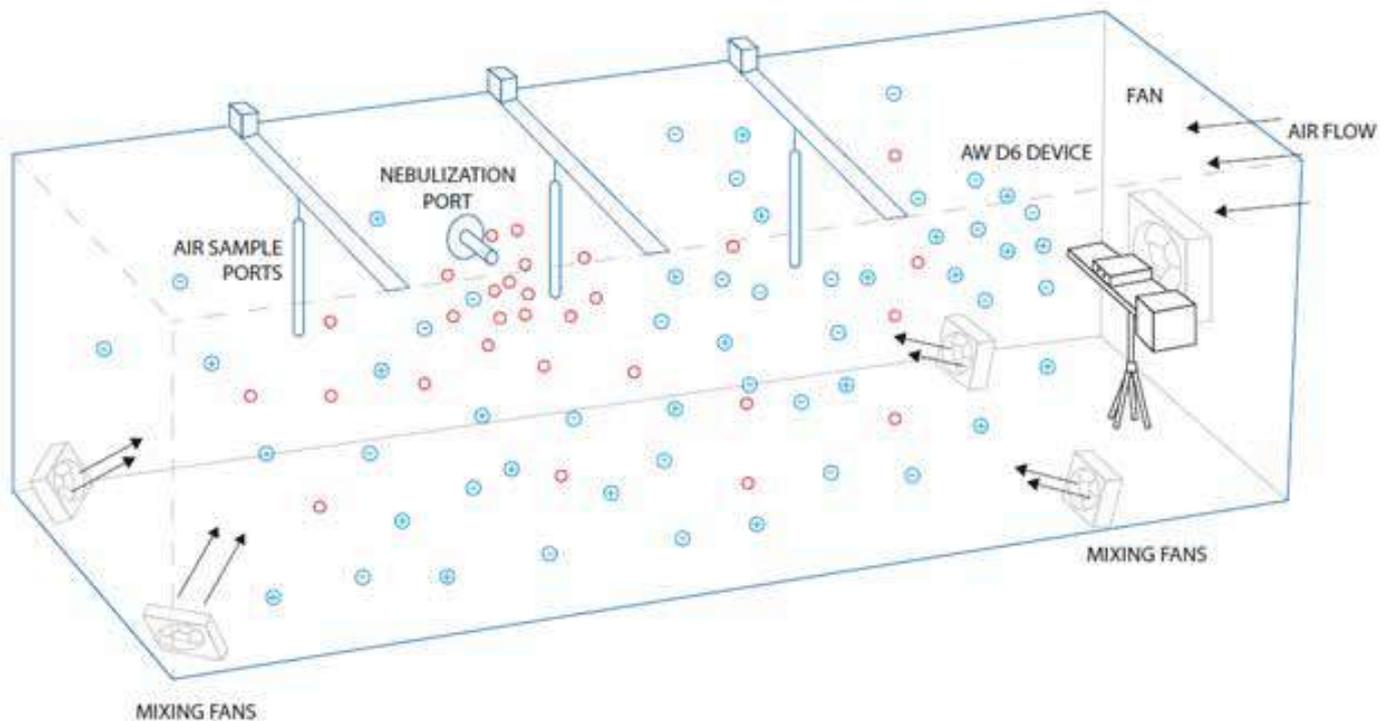
Innovative Biolabs defined a testing procedure to demonstrate the efficacy of the Awions ion generator (on which the ionisan products are based) in inactivating the Sars-Cov2 virus spread in in the air as aerosol.



## Testing conditions

Testing was conducted in a sealed chamber with a total volume of approx. 36 m<sup>2</sup>. The temperature during testing was 23 ±1,7°C, with a relative humidity of 57%. A 5.26 x 10<sup>6</sup> TCID<sub>50</sub>/mL of SARS-CoV-2 in viral media was nebulized into the room, and air samples were collected after 0, 30, and 60 minutes of device operation.

The ion generator device was placed on one side of the test chamber with a variable speed fan positioned behind the device to simulate an airflow rate of approximately 5,9 m/sec, which is comparable to the airflow in the ionisan Smile and Plus.



## Test results

The ion generator AWD6 Series demonstrated the ability to reduce aerosolized SARS-CoV-2 at all time points compared to the natural loss rate observed in the controlled setting. The device displayed a 59.578% reduction after 30 minutes and increased to a 99.954% reduction after 60 minutes.

Test species	Time	Reduction rate %
Detection 2019-nCov (LOD=3 c/l)	30 min	59,578%
	60 min	99,954%

**The complete test reports are available upon request.**



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**Eneretica Spa**

Via C. Maffei, 3 - 38089 Darzo (TN)

T +39 0465 684701 - info@eneretica.com

[eneretica.com](http://eneretica.com)