

H-ion Cluster

**H-ion Cluster's thunderbolt effect
creates the premier indoor air.**

Sterilization (removal of virus and bacteria)

Deodorization

Removal of harmful material (VOCs and chemicals)

Keeping freshness of food (surface sterilization and ethylene removal)

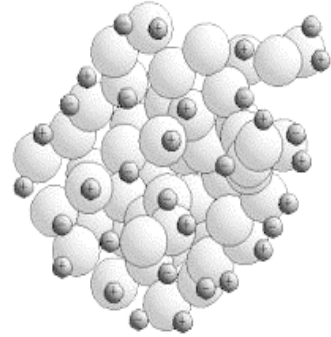


H-ion Cluster

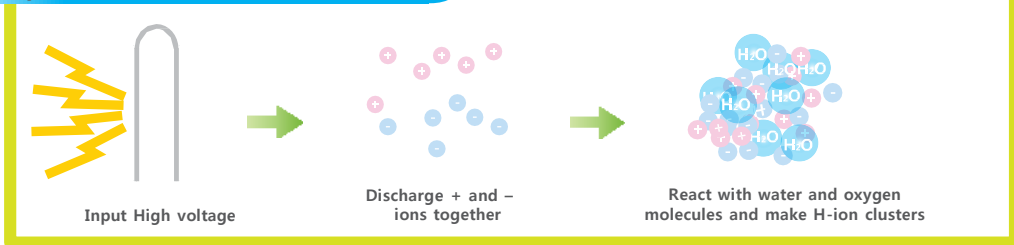
SPE H-Ion Cluster generates ions with high binding energy, which has stronger decomposition effect of toxic substances than the others.

Ion Cluster is the aggregation of 10~60 oxygen ion molecules with lots of + ions, - ions including OH radicals. After lightning has occurred, ion clusters are created in the air, and they wrap and oxidize the bad odor molecules, germs, virus, bacteria, and many pollutants.

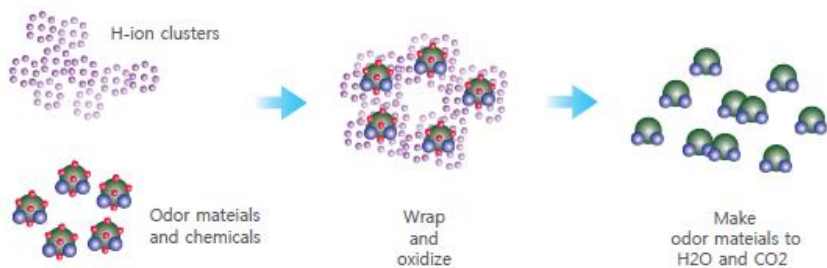
When nature makes thunderbolts, there comes ion clusters. And there are much more ions in forest and waterfall area than in city. It is natural purification process without any side effect.



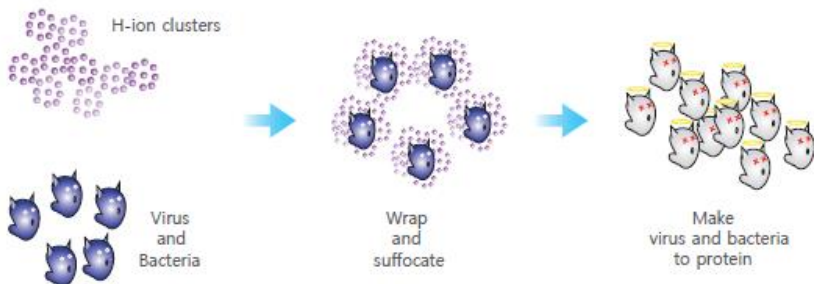
Principle of H-ion Cluster Generation



Deodorization



Sterilization



H-ion Cluster's Effect

Deodorization

Effectively decreases bad odors (Cigarette Smell, Ammonia, Trimethylamine, H₂S, Toluene) from the places such as smoking room, garbage, toilet, and etc. It can remove odors in the air as well as on the surface.

Sterilization

Effectively decreases various invisible germs and bacteria floating in the air as well as on the surface and creates a sanitary and healthy environment.

Removing Harmful Materials

Effectively decreases VOCs and harmful substances such as formaldehyde, toluene, etc., which cause sick house syndrome.

Keeping the Freshness of Food

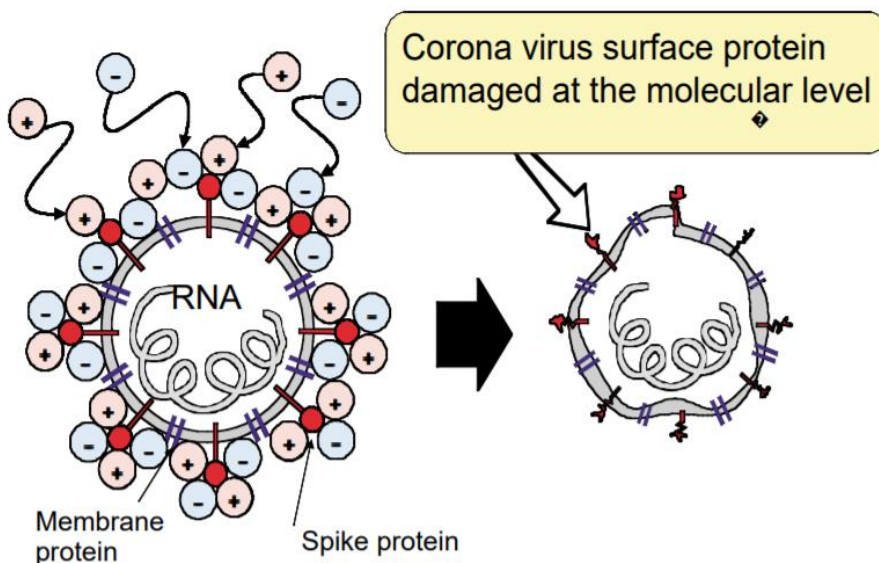
By removing fungus that can easily bruise food, we will create an environment that allows food to be kept fresh and ready for longer.

Test Report for Removal Efficiency of SPE's Ion Cluster Products

| | Contaminants | Efficiency | Test Institute |
|------------------|--------------------------|------------|----------------------------|
| Bacteria & Virus | S.Aureus Bacteria | 99% | KTR, SCLAB |
| | Influenza A Virus (H1N1) | 95% | Kitasato (Japan) |
| | MSRA Super Bacteria | 99% | KCL |
| | Salmonella | 99% | KCL |
| | E.Coli Bacteria | 99% | KTR, SCLAB |
| | Bacteria | 99% | Enviro Screening Lab (USA) |
| | Fungi | 99% | Intertek (France) |
| | Chemical & VOCs | VOC | 98% |
| Formaldehyde | | 98% | KCL |
| Ammonia | | 93% | Inha University, KTR |
| Toluene | | 92% | Inha University, KTR |
| H ₂ S | | 98% | KTR |
| Acetone | | 98% | KCL |
| Ethylene | | 100% | KCL |

What is Corona Virus and how H-ion Cluster inactivates it ?

The corona virus belongs to RNA Virus. Its shape is spherical with a diameter of from 60 to 220 nm. It has an RNA nucleus enclosed within an envelope made of protein, along with spike-like proteins on its surface. Ionclusters wrap the corona virus and damage the spike protein to be inactivated.



The structure of Corona Virus and the Action of H-Ion Cluster
(Picture source from Sharp's website)

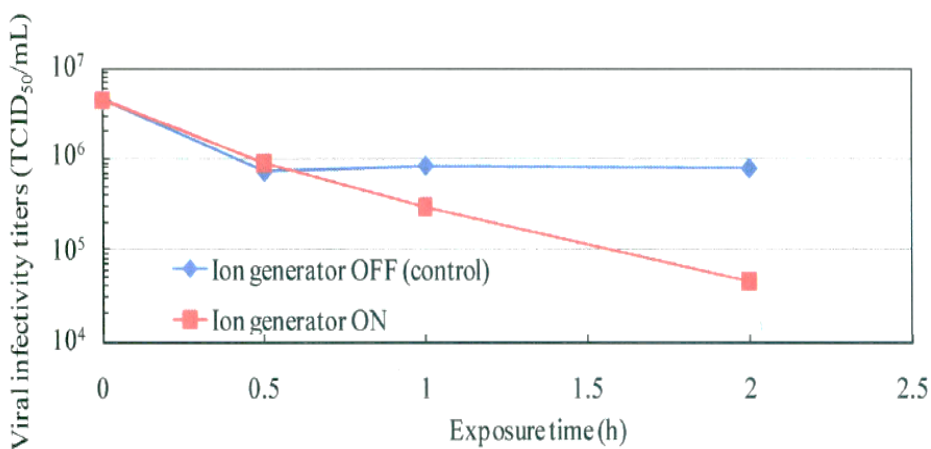


Figure 1: Antiviral efficacy of ion generator

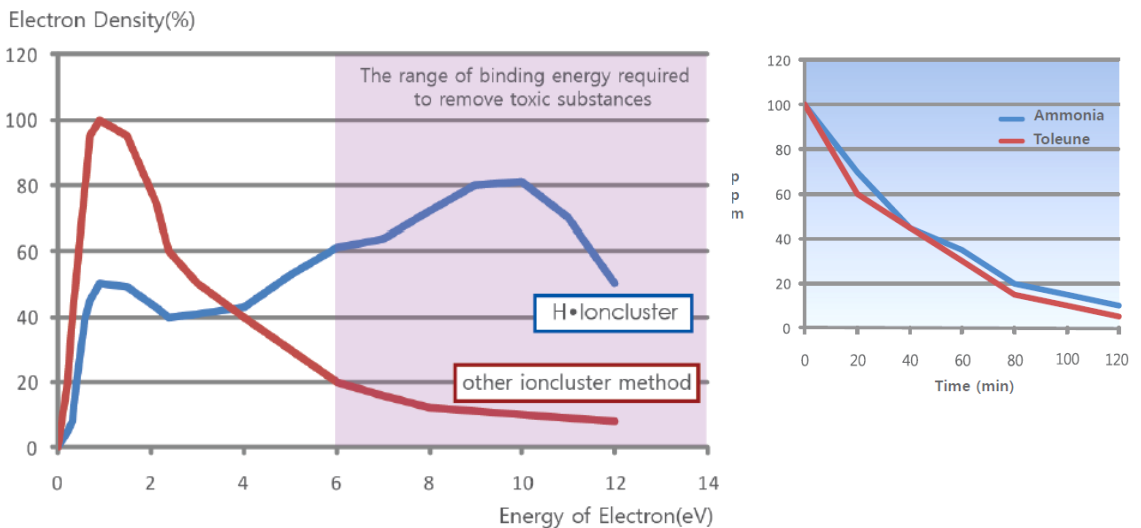
H-ion cluster showed its efficiency of 95% removal of RNA virus (H1N1) within 2 hours through Kitasato Lab.

Why H-ion Cluster decrease chemical materials better than others ?

Most chemical substances (VOC, Formaldehyde, etc.) have binding energy over 6eV, so higher energy level is required to remove them.

| Chemical Materials | Family | Formula | CAS # | IE.eV |
|--------------------|-----------|-------------------------------|-----------|-------|
| Ammonia | Inorganic | NH ₃ | 7664-41-7 | 10.07 |
| Benzene | Aromatic | C ₆ H ₆ | 71-43-2 | 9.24 |
| Ethylene | Alkene | C ₂ H ₄ | 74-85-1 | 10.51 |
| Formaldehyde | Aldehyde | CH ₂ O | 50-00-0 | 10.88 |
| Hydragen Sulfide | Sulfide | H ₂ S | 7783-06-4 | 10.46 |
| Toluene | Aromatic | C ₇ H ₈ | 108-88-3 | 8.83 |

SPE's H-Ion Cluster products utilize Dielectric Barrier Discharges (DBD) technology to make ion clusters with high energy (more than 6eV), resulting in excellent decrease of odors and chemicals that need type or brush type ionizer can not decrease. That's why we are called H-ion cluster. (High-Energy Ion Cluster)



| Chemical Materials | Chemical Formula | Decomposition Formula |
|--------------------|-------------------------------|---|
| Ammonia | NH ₃ | 4NH ₃ + 3O ₂ → 2N ₂ + 6H ₂ O |
| Toluene | C ₇ H ₈ | C ₇ H ₈ + 9O ₂ → 7CO ₂ + 4H ₂ O |
| Benzene | C ₆ H ₆ | 2C ₆ H ₆ + 15O ₂ → 12CO ₂ + 6H ₂ O |
| Ethylene | C ₂ H ₄ | C ₂ H ₄ + 3O ₂ → 2CO ₂ + 2H ₂ O |
| Formaldehyde | CH ₂ O | CH ₂ O + O ₂ → CO ₂ + H ₂ O |



Stand / Wall Mount Type

- ✔ Suitable for living room, hospital, veterinary clinic, etc.
- ✔ Air outlet on front side
- ✔ 1 unit of ion discharge tube (AIOII)
- ✔ 1 unit of super carbon block
- ✔ No filter, no filter maintenance costs



| Section | Wall Type Series |
|----------------------|--------------------------|
| Model Name | WM-200L |
| Size (mm) | 420(W) X 210(H) X 120(D) |
| Weight(kg) | 3 |
| Recommended Use Area | 20~30m ² |
| Air Flow Rate (CMH) | Max. 150±10% |
| Input Power | DC 12V |



Stand / Wall Mount Type

- ✔ Suitable for hospital, veterinary clinic, child care center, smoking rooms, etc.
- ✔ Air outlet on top side
- ✔ 3 steps control for ion and fan speed
- ✔ 2 units of ion discharge tube (AIOII)
- ✔ 1 unit of super carbon block
- ✔ No filter maintenance cost









| Section | Stand Series |
|----------------------|--------------------------|
| Model Name | IS-150W |
| Size (mm) | 210(W) X 300(H) X 121(D) |
| Weight(kg) | 3.5 |
| Recommended Use Area | 30~40m ² |
| Air Flow Rate (CMH) | Max. 150±10% |
| Input Power | DC 12V |



Stand Type









-  Suitable for hospital, veterinary clinic, child care center, smoking rooms, etc.
-  Air outlet on top side
-  3 steps control for ion and fan speed
-  2 units of ion discharge tube (AIOII)
-  2 units of super carbon block
-  No filter maintenance cost

| Section | Stand Series |
|----------------------|--------------------------|
| Model Name | IS-250W |
| Size (mm) | 400(W) X 720(H) X 252(D) |
| Weight(kg) | 14.5 |
| Recommended Use Area | 100m ² |
| Air Flow Rate (CMH) | Max. 250±10% |
| Input Power | DC 12V |



Stand Type

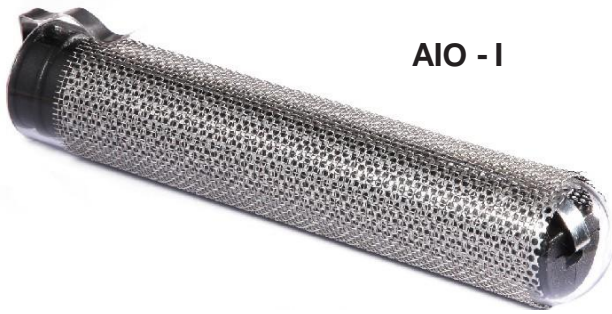


-  Suitable for large hospital lobby, hotel lobby, sanatorium, large fitness center, veterinary clinic, and residents' convenient facilities, such as screen golf place
-  Air outlet on top side
-  Dial type control for fan speed
-  2 units of large sized ion discharge tube (DI)
-  2 units of super carbon block
-  No filter maintenance cost

| Section | Stand Series |
|----------------------|--|
| Model Name | Corridor |
| Size (mm) | 600(W) X 550(H) X 300(D) |
| Weight(kg) | 20 |
| Recommended Use Area | 300~400m ² |
| Air Flow Rate (CMH) | Max. 700±10% |
| Input Power | AC 100V/220~240V, 50/60Hz (Set on country specification) |



Ion-Cluster Modules



AIO - I



AIO - II



DC Converter



AC Converter

- Designed to have all circuits inside discharge tube
- Compact size, Easy to install
- Applied to various products (FCU, Air conditioner, Air purifier, Air Curtain, and etc.)
- Used as an air sterilizer and deodorizer
- Very low electric energy consumption

| Module Series | AII IN ONE Series | |
|--------------------------|------------------------------------|------------------------------------|
| Model Name | AIO-I | AIO-II |
| Size (mm) | Ø 28 X 150 | Ø 27 X 90 |
| Weight (g) | 150 | 60 |
| Recommended Use Area | 10m ² ~20m ² | 10m ² ~20m ² |
| Power Consumption (W) | 1 | 1.5 |
| Input Power | AC 100V/240V, 50/60Hz | DC 12V |
| Min. Air Flow Rate (CMH) | 60~100 | 60~100 |

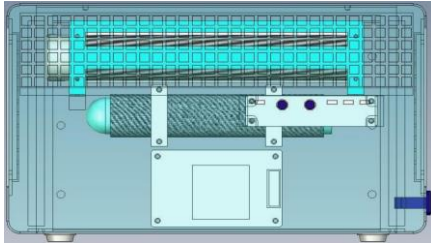
Module for Fan Coil Unit



| Model Name | AIOII -2 | AIOII-4 |
|--------------------------|----------------------------|----------------------------|
| Structure | AIOII 2 units + Base | AIOII 4 units + base |
| Size (mm) | 200(W) × 130(H) × 117.2(D) | 200(W) × 130(H) × 117.2(D) |
| Weight (g) | 460g | 500g |
| Recommended Area | 20~40m ² | 40-80m ² |
| Power Consumption (W) | 3 Watt / 400mA | 6 Watt / 800mA |
| Input Power | DC 12V | |
| Min. Air Flow Rate (CMH) | 120 CMH | 240 CMH |



Application



For hospital air purifier, Japan



For fruit cold storage purifier, Europe



For In-duct air purifier, USA



For high-end air purifier, Europe



For high-end Island kitchen hood, Europe



For hotel FCU air purifier, Hongkong



Duct-In Series



- All electronic parts are inside the discharge tube (international patents)
- Discharge tubes are installed and removed discharge tubes one by one, and can be cleaned without stopping the AHU (740g per discharge tube)
- Designed to be installed inside the duct or inside the AHU for purifying whole air in building, casino, and etc.
- Low maintenance cost due to a long lifespan.
- It can send on / off / fault signal to BMS through Dry Contact.
- Indoor Air Quality monitoring control (Optional)

| Duct-In Series | AIO-DI Series | | | | |
|--|--|---|---|---|--|
| Model | AIO-DI-1 | AIO-DI-2 | AIO-DI-4 | AIO-DI-6 | AIO-DI-8 |
| Tube Size (mm) (Diameter / Length) x Q'ty | Tube : Φ38, 410 (L) Grip : Φ60, 110 (L) X 1 tube | Tube : Φ38, 410 (L) Grip : Φ60, 110 (L) X 2 tubes | Tube : Φ38, 410 (L) Grip : Φ60, 110 (L) X 4 tubes | Tube : Φ38, 410 (L) Grip : Φ60, 110 (L) X 6 tubes | Tube : Φ38, 410 (L) Grip : Φ60, 110 (L) X 8 tube |
| Weight (kg) | Tube 740g Frame : 1kg | Tube 740g x 2 Frame : 1kg | Tube 740g x 4 Frame : 2kgs | Tube 740g x 6 Frame : 3kgs | Tube 740g x 8 Frame : 4kgs |
| Tube Size (mm) [Ø X L X Q'ty] | 38 X 430 X 1 | 38 X 430 X 2 | 38 X 430 X 4 | 38 X 430 X 6 | 38 X 430 X 8 |
| Input Voltage | AC 100V/240V, 50/60Hz (Set on country specification) | | | | |
| Power Consumption | 5 | 10 | 20 | 30 | 40 |



Application

- Casino
- Laboratory
- Library
- School,
- Hospital
- Building
- Hotel
- Factory
- Restaurant
- Waste / Wastewater disposal Facility
- etc.



Major Reference



About SUDO Premium Engineering Co., Ltd.

SPE offers a wide range of engineering products and solutions for the individual and industrial use. We offer semiconductor clean room monitoring, automobile environment test chamber, air purifiers, and anti-freezing protection products, and so on. Based on its know-how for over 30 years, SPE has developed software and various state-of-art technologies and obtained dozens of patents and utility model rights. As the total engineering company, we have a proven technology and have performances with domestic and overseas leading companies. We also have been designated as venture business and obtained certificate of affiliated R&D institute. To practice customer satisfaction to the maximum, Sudo Premium Engineering Co., Ltd. Will help customer to have new competitive power by providing products and solutions which aggressively reflects customers' requirements and needs. We will devote to create new value by constantly advancing toward new technologies in the future.

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