Innovative product for virus infection prevention,

SPATIAL SANITIZER, born in Japan
Removal of Airborne Viruses and Bacteria by the Force of Chlorine Dioxide Molecules
What is \textit{nanoclo}_2? 

With the power of chlorine dioxide (\textit{ClO}_2) molecules it removes and suppresses viruses, bacteria, fungi, allergens and odor substances in the air.

\begin{itemize}
\item [\textbf{ClO}_2] is amazing work for removing virus and powerful deodorization in airspace: Making Fresh Air!!
\item Removing almost of all virus in airspace
\item Effect of deodorant by \textit{ClO}_2 is faster and much works than Chlorine
\item The deodorant effect is expected to resolute for fundamental of bad odor by chemical oxidative decomposition. It has the effect of deodorizing eight major odors of \textit{ammonia} \textit{/ methyl mercaptan} \textit{/ hydrogen sulfide} \textit{/ methyl sulfide} \textit{/ trimethylamine} \textit{/ methyl disulfide} \textit{/ styrene} \textit{/acetaldehyde}]
\end{itemize}
The use scene of ClO₂ in the world

ClO₂ is used in various fields around the world for various purposes, and important applications are used for industrial use and business use.

◆ **United States** (R & D is progressing from the earliest in the world)
  Water purification plant · · · sterilization and cleaning of tap water
  Drilling of oil · · · Removal of harmful substances
  Food factory, petrochemical plant ... · sterilization · cleaning

◆ **China** (world's largest consumption)
  Cleaning and sterilizing foodstuffs, drinking water removal of livestock, water treatment of factory cooling water

◆ **Australia, South Korea**
  Infectious disease prevention of livestock

◆ **Japan**
  Cooling water ... Legionella bacterium sterilization
  Domestic animal infectious disease prevention ... There is no approval of Ministry of Agriculture, Forestry and Fisheries
  Pool water · · · sterilization
  Food additives · · · approved as bleaching of wheat flour
  Tap water · · · Approved for use at 2 ppm or less by purification at the water supply site by the water service method
  Medical equipment · · · sterile washing
What’s Chlorine Dioxide (Clo2) ?

Mechanism of sterilizing by chlorine dioxide molecules

Viruses, bacteria, fungi and allergens are made of protein

ClO₂ can easily combine with amino acid molecules, of which the protein of viruses, bacteria and mold is composed, and bring the oxidative decomposition occurrence. Viruses, bacteria and mold are disinfected, when the molecule structure is changed by the oxidative decomposition with chlorine dioxide and the molecules are inactivated.

1. Viruses, bacteria, mold and odors floating in the air
2. ClO₂ molecules aggressively attack floating materials
3. Taking out electrons from targeted materials (oxidation)
4. Function of viruses, bacteria, mold and odors falls off by the oxidization.

※It does not mean that it is 100% adsorbed to viruses, bacteria, fungi and odor floating in the air to change the structure. The spread of components varies depending on the use environment.
**Safety of ClO₂**

ClO₂ is usually used in a tooth paste and a mouse wash in the US and bleach for noodle and sanitary for foods materials.

The safety has been certified and guaranteed by FDA (United States Food and Drug Administration) and WHO (World Health Organization), which have one of the world’s most stringent evaluation standards, and it has already been injected and used in water purification and pools even in USA, Canada, Europe etc. It is. Furthermore, it is approved in Japan for used by the Ministry of Health, Labor and Welfare for treatment of tap water and disinfection of swimming pools.

<table>
<thead>
<tr>
<th>Certifying Institution</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan Ministry of Health, Labor and Welfare, Ministry of Economy, Trade and Industry</td>
<td>Permitted for drinking water treatment, treatment of wheat flour, disinfection of pools, public bathing water disinfection, general antibacterial, disinfection</td>
</tr>
<tr>
<td>WHO</td>
<td>A1 Class</td>
</tr>
<tr>
<td>The Joint FAO/WHO Expert Committee on Food Additives (JECFA)</td>
<td>ADI A1Class</td>
</tr>
<tr>
<td>FDA</td>
<td>Permission for food additives, medical disinfection, medical equipment disinfection</td>
</tr>
<tr>
<td>EPA (United States Environmental Protection Agency)</td>
<td>Approved for drinking water, factory wastewater treatment, environmental purification</td>
</tr>
<tr>
<td>USDA, FSIS (United States Department of Agriculture, Food Safety and Inspection Service)</td>
<td>Approved using for food, meat disinfection</td>
</tr>
<tr>
<td>NASA</td>
<td>Adopted for complete sterilization and foods in “space shuttle”</td>
</tr>
<tr>
<td>HACCP</td>
<td>Officially adopted for meat disinfection with high risk of food poisoning</td>
</tr>
<tr>
<td>Others</td>
<td>Many countries allow it to use for drinking water, medical use, food additives</td>
</tr>
</tbody>
</table>
Considering that end-use products of chlorine dioxide gas are being used in daily life, the Industrial Association of the Japan Society of Industrial Science and Technology has further increased tenfold of 0.1 ppm obtained by occupational health and safety or 6-month exposure test results. We decided that it is necessary to provide a safe range. The indoor concentration guideline value (voluntary standard of chlorine dioxide industry association) in this case is **0.01 ppm**.

### Reference materials judged by Japan Chlorine Oxide Industry Association as safe

**Medium to long term toxicity**


**Human impact**

7) Toxicological Profile for Chlorine Dioxide and Chlorite: U.S. Department of Health and Human Services Public Health Service Agency for Toxic Substances and Disease Registry September 2004

**Evaluation at international organizations**


20) Chlorine Dioxide: ACGIH® © 2001

7) Toxicological Profile for Chlorine Dioxide and Chlorite: U.S. Department of Health and Human Services Public Health Service Agency for Toxic Substances and Disease Registry September 2004

8) Toxicological Review of Chlorine Dioxide and Chlorite: U.S. Environmental Protection Agency September 2000
In Japan, the standard concentration setting criteria for chlorine dioxide gas is set at 0.01 ppm with a further 10 times safety range than 0.1 ppm according to WHO (World Health Organization) safety confirmation report.

※ 0.01 ppm is a value judged to be not harmful to health even if consumed over the lifetime.

We are designing the product so that the emission concentration will be around 0.01 ppm of the voluntary standard value of chlorine dioxide industry association.

【Result】
After 3 hours, the emission concentration of chlorine dioxide gas is stable in the range of 0.01 ppm to 0.012 ppm

※ The test is done in a closed space by a reasonable inspection method. Because it is not an inspection under the general living environment, it differs from the test result depending on the usage environment.
Evidence of effectiveness for nanoclo2

It is taken the performance evaluation test by a official third party inspection organization in Japan.
- Virus / Bacteria 99% reduction after 24 hours
- Reduce the odor residual rate to 0 to 20% or less!

* Nanoclo2 series has obtained validity data at safe chlorine dioxide gas emission concentration to major viruses, bacteria, odor under specific conditions in third party organization for each product.

- Evaluation tests are carried out with specific viruses and bacteria, not experimental results with all viruses and bacteria.
- What is safe chlorine dioxide gas emission concentration ... Indoor concentration guideline value set as voluntary standard value by chlorine dioxide industry association (voluntary standard of chlorine dioxide industry association) 0.01 ppm

* The test is done in a closed space by a reasonable inspection method.

Because it is not an inspection under the general living environment, it differs from the test result depending on the usage environment.
nanoclo2 is an epochal as prevention of influenza infection

**Just wear, Ease, No hassle**
You do not have to go to the hospital & It's not as annoying as a mask.

**Not dependent on virus type**
The new virus has no vaccine and can not be prevented at the beginning of the epidemic. However, chlorine dioxide exerts the same effect regardless of virus type.

**No side effect**
There is no side effect because it is not intended to inject antibodies into the body like a vaccine to make antibodies.

**Economic**
Medical expenses, vaccination costs, economic compared to daily mask fee.

※Caution
It does not remove 100% of the virus floating in the air. Moreover, chlorine dioxide gas is allowed to flow into the wind outside, so we can not expect any effect.
1. Since chlorine dioxide generating case is reversible type with white on one side and black on the other side, you can put your favorite colour for clothes etc.

2. Insert a chlorine dioxide generator in a card case with a clip case and wear it.

<table>
<thead>
<tr>
<th>Product</th>
<th>nanoclo2 case in type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>2 months after open</td>
</tr>
<tr>
<td>Principal Component</td>
<td>Sodium chlorite, Calcined zeolite</td>
</tr>
<tr>
<td>Items in a box</td>
<td>Chlorine dioxide generator, Card case with clip</td>
</tr>
<tr>
<td>Product Size</td>
<td>100 × 80 × 8mm</td>
</tr>
<tr>
<td>Package Size</td>
<td>110 × 170 × 20mm</td>
</tr>
</tbody>
</table>
## Portable (dangling from neck) Type Cost Performance Comparison

### Monthly cost comparison of portable types

<table>
<thead>
<tr>
<th>Shape</th>
<th>Nanoclo2 Case-in type</th>
<th>Nanoclo2 Replacement Pack</th>
<th>T Company</th>
<th>O Company</th>
<th>G Company</th>
<th>K Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>ClO₂ generating agent</td>
<td>Granule type</td>
<td>Granule type</td>
<td>Gel type</td>
<td>Granule type</td>
<td>Granule type</td>
<td>Granule type</td>
</tr>
<tr>
<td>Retail Price suggested by manufacturer in JAPAN</td>
<td>$8.33 €7.42</td>
<td>$5.26 €4.69</td>
<td>$8.77 €7.81</td>
<td>$10.53 €9.38</td>
<td>$10.53 €9.38</td>
<td>$6.58 €5.86</td>
</tr>
<tr>
<td>Effective usage term</td>
<td>2months</td>
<td>2months</td>
<td>1month</td>
<td>2months</td>
<td>2months</td>
<td>1month</td>
</tr>
<tr>
<td>Monthly cost</td>
<td>$4.17 €3.71</td>
<td>$2.63 €2.34</td>
<td>$8.77 €7.81</td>
<td>$5.26 €4.69</td>
<td>$5.26 €4.69</td>
<td>$6.58 €5.86</td>
</tr>
</tbody>
</table>

※Calculate at exchange rate 1 US dollar = 114 yen, 1 euro = 128 yen
※As of September 2018
**Product introduction**

**nanoclo2 Place type 3WAY ECO-Friendly**

<table>
<thead>
<tr>
<th>Product</th>
<th>nanoclo2 eco-type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>2 months after open</td>
</tr>
<tr>
<td>Principal Component</td>
<td>Sodium chlorite</td>
</tr>
<tr>
<td></td>
<td>Calcined zeolite</td>
</tr>
<tr>
<td>Items in a box</td>
<td>Chlorine dioxide generator</td>
</tr>
<tr>
<td></td>
<td>nanoclo2 3WAY ecotype</td>
</tr>
<tr>
<td>Product Size</td>
<td>114 × 95 × 15mm</td>
</tr>
<tr>
<td>Package Size</td>
<td>110 × 170 × 20mm</td>
</tr>
</tbody>
</table>

**Adopt environmentally friendly eco material**

We use earth-friendly non-wood “Palm Palas Caspa pulp”.  
* Palm palm Casa pulp replaces wood pulp paper raw material. Effective utilization of non-timber can save forest resources.

- Effective for about 3 mths
- Effective range: 12.96 m² from 9.72 m²
### Placed type cost performance comparison

#### Monthly cost comparison of placed type

<table>
<thead>
<tr>
<th>Chlorine dioxide type</th>
<th>Nanoclo2 Place type</th>
<th>T Company</th>
<th>K Company</th>
<th>G Company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Granulation type</td>
<td>Gel type</td>
<td>Gel type</td>
<td>Granulation type</td>
</tr>
<tr>
<td>How to use</td>
<td>3WAY</td>
<td>Place vertically</td>
<td>Place vertically</td>
<td>Place vertically</td>
</tr>
<tr>
<td>Effective space</td>
<td>20<del>26㎡ (6</del>8 tatami)</td>
<td>26<del>40㎡ (8</del>12 tatami)</td>
<td>20<del>26㎡ (6</del>8 tatami)</td>
<td>20<del>33㎡ (6</del>10 tatami)</td>
</tr>
<tr>
<td>Retail Price</td>
<td>$11.40 €10.16</td>
<td>$17.54 €15.63</td>
<td>$8.77 €7.81</td>
<td>$16.67 €14.84</td>
</tr>
<tr>
<td>Effective usage period</td>
<td>3months</td>
<td>2months</td>
<td>1month</td>
<td>3months</td>
</tr>
<tr>
<td>Cost per month (tax-excluded)</td>
<td>$3.80 €3.38</td>
<td>$8.77 €7.81</td>
<td>$8.77 €7.81</td>
<td>$5.55 €4.95</td>
</tr>
</tbody>
</table>

※Calculate at exchange rate 1 US dollar = 114 yen, 1 euro = 128 yen
※As of September 2018
Effective in places susceptible to virus infection!

It provides a safe and comfortable living space that is not affected by viruses and bacteria.

hospital
Kindergarten, A nursery school
nursing home
office
elementary school
Middle school
Hospitality store
Commuting Train
Supermarket, store
『nanoclo2』 are used throughout Japan
It is used for doctors, medical staff, pharmacists.

Medical institution, pharmacy
Total delivered number exceeded
1 million.

※Total results from the fall of 2014 until December 2017

Sales volume

◆ Total medical staff
620,000 people

◆ Number of sales pharmacies
12,000 stores nationwide
Four reasons why nanoclo2 is chosen

1. Excellent safety and sustainability
   We have manufacturing know-how on top of domestic chlorine dioxide preparations. Established a technology that is safe without health hazards and releases low concentration effective for long term release effective for eradication of airborne bacteria. Performance that is compatible with safety and effectiveness is the industry's top class.

2. Made In Japan
   Technologies and parts related to core quality such as safety, effectiveness, sustainability are all made in Japan.

3. Price
   Our wish is to be used by many people who need infection prevention. For that reason, we are committed to price, realize industry's top class cost performance.

4. Convenience & Design
   Considering the use according to the user's taste and use, such as neck and pocket attachment with a simple design.
Customer's voice is nothing but a doctor's personal opinion to the last, it does not promise the effect. Hospital name, doctor name and real names such as name, we will use images, images are using.

**Doctor of pediatrics at N University Hospital, Nagoya City, Aichi prefecture**
In the hospital, various viruses and bacteria are floating all year round. Especially in the winter, influenza and norovirus are also prevalent in the hospital and the staff may be infected and resting.
I started using it three years ago. Since then the staff did not get infected in the hospital and the staff did not take a break, so I am very saved.

**Minato-ku, Tokyo A clinic physician**
Everyone other than me who was on the spot a few days ago when there was a gathering a few years ago had been infected with influenza. Only I who happened to be wearing nanoclo2 did not infect, so I realized this surely thanks to nanoclo2.
Even in hospitals I will be examining influenza patients, so I purchase and use the influenza season every year.

**Department of Internal Medicine, Memorial Hospital, Minokamo City, Gifu Prefecture**
At first I did not think that it was really effective but I tried it because it was advised. Since the infected person was zero at the internal department staff of that year, I also tried the second year. Then, since there were no infected people in the hospital in the second year, it realized that this is effective. It is the third year of this year, but at the moment I am relieved because there are no staff who are infected and resting.

**Director of N Dental Clinic, Matsudo City, Chiba Prefecture**
Because it examines directly in the mouth, it is more easily infected than usual hospital, so I am careful. Because the mobile type gets in the way during treatment, I used the placement type for 2 years, but I did not mind even if influenza and norovirus are prevalent.
As a doctor, you can concentrate on examination with confidence by just having such a sterilizing product.
Research results by university hospitals

Grant-in-Aid for Scientific Research Project Research Result Report
May 19, 2012
Organization number : 32622
Research item : Fundamental research (C)
Issue number : 21591299

Representative researcher: Kouichirou Yoshida
Associate Professor, Showa University School of Medicine
Researcher number : 50248217

Research subject: A study of antibacterial effect of low-concentration chlorine dioxide gas against airborne causative bacteria of nosocomial infection.

We assessed the antimicrobial effect of low-concentration chlorine dioxide (ClO$_2$) gas against air bone bacteria in an indoor environment (a medical office of Showa university (66.5 m$^2$, live space)).

Firstly, we calculated the number of air bone bacteria using air sampler in a medical office (control) (temperature and humidity was not controlled.).

And then, safe low-concentration ClO$_2$ gas was generated in the medical office. Coming in and out at the door were not restricted. The concentration of ClO$_2$ gas was stable at 0.01 ppm – 0.02 ppm approximately. When low-concentration ClO$_2$ gas was generated in a room, indoor air bone bacteria were reduced compared with the control level.

This antimicrobial effect of low concentration ClO$_2$ gas was continued during the period that ClO$_2$ gas was generated.

Low concentration ClO$_2$ gas is effective for reducing the number of air bone bacteria in a live space.
Visualization test of sterilizing

Effect by chlorine dioxide (Mildew-proof test results)

Put a piece of bread in a transparent acrylic case, measure fungi easier to set up the environment and measure.

Setting conditions:
indoor temperature 25 degrees,
humidity 90% to 100%

① without protective agents
② nanoclo₂ installed
Effect by chlorine dioxide (Mildew-proof test results)

◆ Experiment period: February 25 to March 7, 2016

Natural state

Day1
Day5
Day9
Day12

2.25
2.29
3.4
3.7

Day1
Day5
Day9
Day12

Black mold begins to grow on the surface
Black mold expands at multiple locations
Blue mold occurs in plaque
White fungal spores are scattered

nanoclo2 use
Visualization test of sterilizing

1. The slice of bread without protective agents

1\textsuperscript{st} day of research

5\textsuperscript{th} day of research

9\textsuperscript{th} day of research

13\textsuperscript{th} day of research

5\textsuperscript{th} day of the experiment: Black mold appears inside the bread slice
9\textsuperscript{th} day of the experiment: Blue and white spores appear on all sides of the bread slice
From the 13\textsuperscript{th} day of the experiment: All of the bread slice is covered in mold
After 13 days of the experiment, there was no visible mold on the top or sides of the bread slice. But after the 5th day mold began to appear on the bottom of the slice, where the chlorine dioxide could not reach. This confirms that chlorine dioxide (Nanoclo2) generated from sodium chlorine (3g) over catalysts —protects against mold.