

## Ozone UFB water inactivates the novel coronavirus – Sanden develops Ozone UFB Water Supply System.

Sanden Holdings Corporation (Representative Director & President: Katsuya Nishi; head office: Isesaki-shi, Gunma, Japan) is steadily implementing the five reform plans that are the key strategies of its mid-term management plan SCOPE2023.

As a measure that will lead to the "Concentration of management resources to the environmental-conscious product area" - part of the reform plan of "Growth by actively promoting 'collaborative creation'" - Sanden Advanced Technology Corporation, which is engaged in the development of leading-edge technologies for Sanden Group, is currently developing an ozone UFB (Ultra-Fine Bubble) water supply system.

Since this system is a new UFB product (a hygiene-related product) and is developed in Gunma, we have been working with and receiving strong support from Industrial Economics Division of Gunma Prefecture.

The world has been taking measures against new coronavirus infection since the beginning of 2020, such as national and regional lockdowns, wearing masks, thorough hand washing etc., but the number of people infected and dying is still increasing. Vaccinations have been underway since the end of last year, but we have to be prepared for a prolonged battle against the new coronavirus. This is the reason why we started developing an ozone UFB water supply system by utilizing the technological capabilities of Sanden Group.

The oxidizing power of the ozone contained in ozone UFB water is stronger than chlorine dioxide or hypochlorous acid. It has been proven that the ozone UFB water is able to kill various bacteria and viruses. The ozone UFB water produced by our ozone UFB water supply system in large quantities can be divided and contained in spray bottles, so that it can be used as a sanitizer. The ozone contained in the ozone UFB water is decomposed back into oxygen. It is therefore so harmless, safe, and environmentally friendly that it can be used in many medical institutions to disinfect their facilities and prevent infections.

In a recent demonstration test conducted by an external testing institute, the ozone UFB water produced by this system was found to be effective in inactivating more than 99.9% of the novel coronavirus.



Ozone UFB Water Supply System (Prototype)

Inactivation test against novel coronavirus

[Testing institute] Japan Textile Products Quality Technology Center

[Target virus] NIID isolate of SARS-CoV-2 (novel coronavirus) provided by National Institute of Infectious Diseases

[Test sample] Ozone UFB water

[Test method] Plaque assay

[Test condition] Mixing ratio between virus suspension and test sample = 1:19, Action time: 10 minutes

[Test result] 99.9% or more (normal logarithmic difference from negative control: 3.7 \*3)

The report (excerpt)

[様式 1110F36]	21KB080138-2(1/4)
<b>試験結果報告書</b>	
依頼者名	サンデン・アドバンステクノロジー株式会社 殿
品名	オゾン UFB (ウルトラファインバブル) 水 1点
試験項目	抗ウイルス性試験
2021年3月10日提出の試料に対する試験結果は下記の通りです。	
2021年4月14日	
一般財団法人 日本繊維製品品質技術センター 神戸試験センター 射本	

3) 本試験

- ・試験ウイルス：SARS-CoV-2 NIID 分離株；JPN/TY/WK-521（国立感染症研究所より分与）
- ・試験ウイルス懸濁液濃度： $1.3 \times 10^7$  PFU/ml

検体	試験液 1ml 当たりの ウイルス感染価 (PFU/mL) の常用対数値			Negative control との常用対数値差
		常用対数値	常用対数値平均値	
PBS (Negative control)	混合直後	n1	5.77	/
		n2	5.77	
		n3	5.76	
	10分作用後	n1	5.70	
		n2	5.61	
		n3	5.66	
オゾン UFB (ウルトラ ファインバブル) 水	10分作用後	n1	<2.00	3.7
		n2	<2.00	
		n3	<2.00	

- The test results do NOT show a demonstration effect under the actual usage conditions. The effect may vary depending on the usage environment and method.

Vaccination is being promoted all over the world, and we believe that by spreading the use of this product, it will become possible to deliver ozone UFB water with less health risk to the people in need, such as those at medical facilities, nursing homes, etc.

We will conduct a monitoring survey for this system in the market before starting mass-production. With the help of Industrial Economics Division of Gunma Prefecture, we will conduct a monitoring evaluation of the prototypes at the prefectural medical institution and the nursing homes so that we will be able to improve customer satisfaction.

In addition, we are considering kindergartens, schools, movie theaters, gyms, and offices, which are expected to use relatively large amounts of sanitizer, as future customers because this system can easily generate the ozone UFB water on site. We are also expecting to expand our business into car rentals, cabs, and car sharing services.

We believe our mission is to ‘create comfortable spaces that enrich human lives’ taking account of the way the society should be in 2030. We will strive to contribute to the creation of a comfortable environment and realize an affluent society by promoting the use of ozone UFB water supply systems.

\*1: UFB (Ultra-Fine Bubble) is an extremely fine bubble with a diameter of less than 1 $\mu$ m, and is a registered trademark of Japan Fine Bubble Industries Association. UFBs are known to promote gas dissolution into liquids, and the ozone UFB water can be expected to show the resistance effects to bacteria and viruses. It is also known that UFBs have a surface-active effect, and can be expected to have a dirt-absorbing effect.

\*2: Inactivation is the process of killing pathogens such as microorganisms, viruses, etc., in other words, of making them lose their infectivity and virulence.

\*3: The ordinary logarithmic difference of 3.7 from the negative control means that the inactivation effect is 99.98%. ( $1 - 10^{-3.7} \approx 0.9998$ )

\*4: Partner organizations that will cooperate in our monitoring survey for prototypes

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| ▪Kotobuki-no-Sato, special nursing home  | 1976-5 Hashie-cho, Isesaki-shi, Gunma        |
| ▪Rose Hill, special nursing home         | 1126 Kitasengi-cho, Isesaki-shi, Gunma       |
| ▪Gunma Prefectural Cardiovascular Center | Ko 3-12 Kameizumi-machi, Maebashi-shi, Gunma |