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# O3MAX Water System + MAX NANO BUBBLE

YAMAGEN MT & T (S) PTE. LTD.



## What clients require is

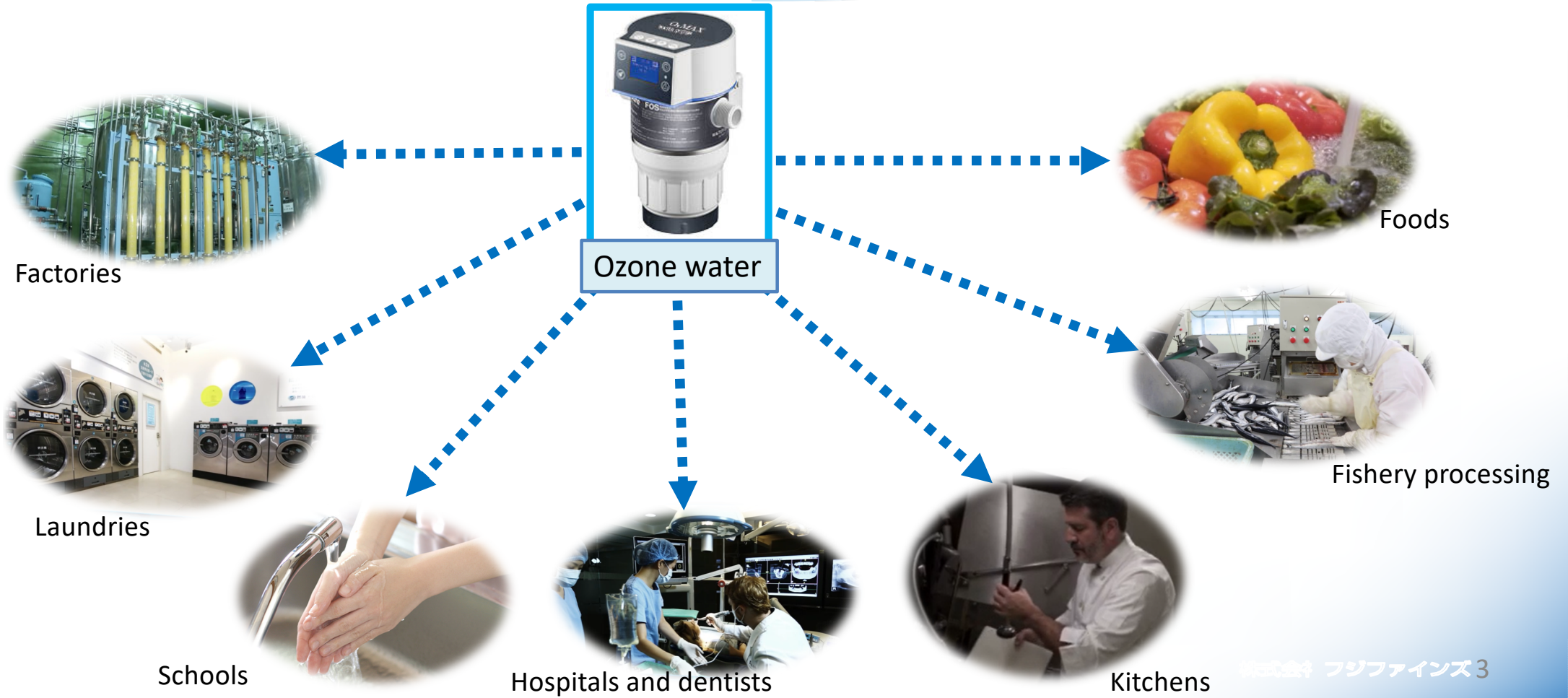
**“To Realize Sanitation, deodorization and cleaning all at once”**

1. Sanitation and deodorization process are safe
2. Harmless and environmental friendly due to chemical-free
3. Maintenance is NOT troublesome
4. Installation cost and running cost are reasonable
5. Large equipment and large-scale construction is NOT necessary
6. Sanitizing and cleaning without damaging any materials
7. High cleaning power

**Our products can meet these needs!!**



# Some usages of Ozone water



# Examples

## Factories

- Sanitation of foods' surfaces
- Sanitation of hands

Substituted sodium hypochlorite with ozone water



## Laundries

- Sanitizing and deodorizing of clothes
- Used for rinsing water



## Restaurants

- Cleaning kitchenware
- Washing vegetables
- Sanitation for staff



## Specification of O3MAX Water System

Item name	O3MAX Water System
Installation	Directly installed in water pipe
Max flow rate (at 3kg/cm <sup>2</sup> )	60~2,300LPH
Diameter of water pipe	G3/4
Concentration of ozone	1.0ppm (Normal)
Max water pressure	7kg/cm <sup>2</sup> (100psi)
Power	AC100~240V, 50/60Hz
Standard rated power	96W
Water quality	水道水
Water temperature	5~40°C
Size	W140 × D128.5 × H210.5 (mm)
Weight	1.3kg
Protection level	IP56
Consumable item	Cartridge generating ozone (every 1,000h)

Replacement of cartridge.  
The size is very small.

LPH: liter per hour

※Conditions for generating 1.0ppm of ozone  
Temperature: 25°C TDS: 200 Volume: 218LPH



## Comparisons with other ozone water generator

### Other Large machines

#### Size

Due to the size, the installation require large space and large-scaled construction.

#### Cost

About SGD10,000- 15,000

#### Maintenance

Costly and troublesome.

#### Speed

Ozone gas mixed into water must be generated first, so it takes long time and the concentration gets unstable sometimes.

#### Others

Ozone gas must be managed.



### Other small machiens

#### Size

Small but requires space for installation (Height is about 30cm)

#### Cost

SGD7,000~9,000

#### Maintenance

Some of consumable items and/or exclusive liquid are needed.  
Frequency of replacement is too many (Ex. Every 120h)

#### Water volume and others

Small but continuous generating is impossible.  
Concentration of ozone is low.  
Lack versatility.



# Features of 『O3MAX Water System』

## O3MAX WaterSystem

### Size

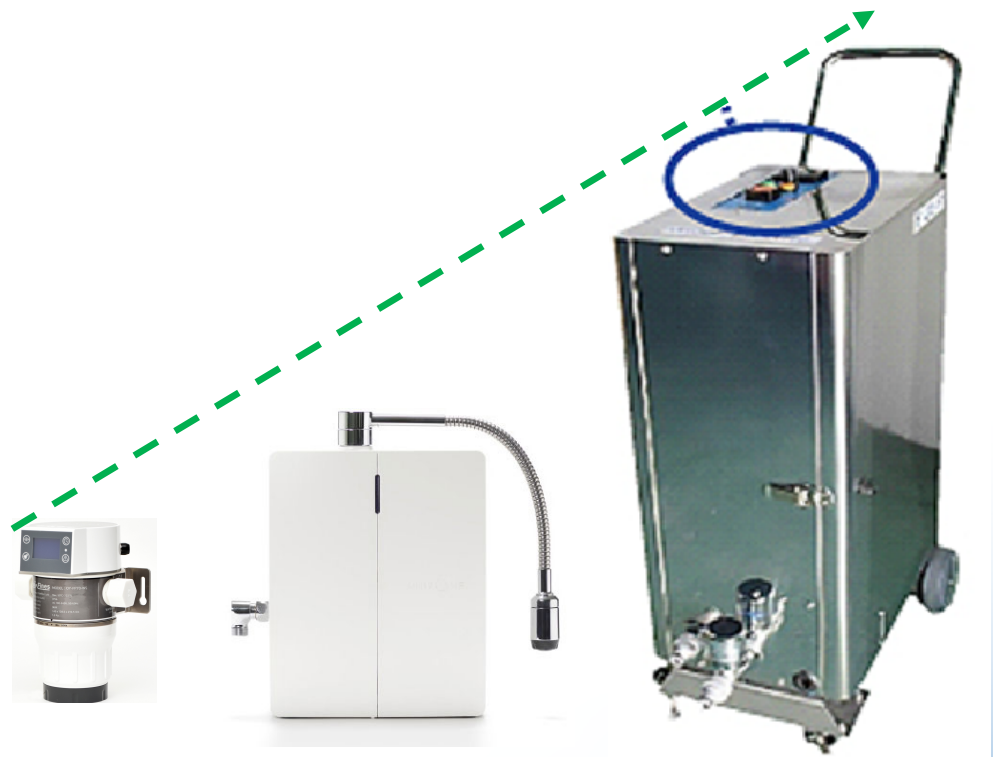
The height is almost same as 500ml plastic bottle.  
Due to the size, it can be easily installed in small spaces.

### Maintenance

Cartridge can last 1,000hours.  
Skilled staff is not required for the replacement.

### Speed

Ozone water is immediately generated just after opening a tap.  
Concentration of ozone is stable.





# O3MAX Water System The test result of Skin disinfection

Tested by Doctor of dentistry of MEIKAI University, Prof. Yokose

This test confirmed that disinfection effect of washing only with O3MAX Water System is same or higher than washing only with soap.

## Test process

The test compared No.1&2 with PALM-CHECK (PL6201R010: general bacterial (SCD) ager medium from NIKKEN SEIBUTSU Co.,Ltd) pressed for 10secs with the right hand being washed with soap for 60secs and being wiped with a towel contaminated for 1mins.

1. After washing the right hand with soap and tap water for 30secs each (total 1min) and completely wiping off moisture on the hand with 3pcs of paper towels, pressed the hand on PALM-CHECK for 10secs.

2. After washing the right hand with ozone water for 1min and completely wiping off moisture on the hand with 3pcs of paper towels, pressed the hand on PALM-CHECK for 10secs.

After these, cultured each PARM\_CHECK for 24hours in 37°C and compared.



O3MAX System



Soap

株式会社 フジファインズ 8

# O3MAX Water System (Test result of Lettuce's Browning)

## TEST PROCESS

1. Cut 2pcs of lettuce (A and B) into quarters
2. Respectively dip A and B into tap water and ozone water for 30secs
3. Drain both lettuces and wrap in plastic wrap
4. Keep them in a fridge and monitor a few days

Test period: 22<sup>nd</sup> – 24<sup>th</sup> Sep 2021

22/9 Tap water A



24/9 tap water A



22/9 tap water B



22/9 Tap Water B



22/9 Ozone water A



24/9 Ozone water A



22/9 Ozone water B



24/9 Ozone water B



# O3MAX Water System Track records

O3MAX Water System is installed in several types of clients like factories and restaurants.



A factory of food wrap film (Dai Nippon Printing Co., Ltd.)

Purpose: Replace from chemical & improve hygiene management

Use: Sanitize hands



A sushi restaurant (Jun)

Purpose: Hygiene management of a new branch but don't prefer to use a machine which doesn't fit with the restaurant's design.

Use: Washing kitchenware and food, Hygiene management of employee

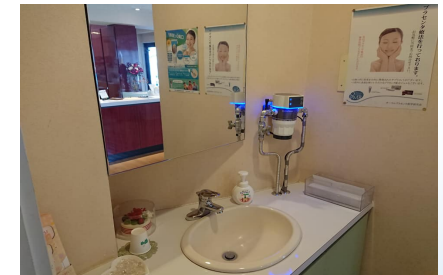


Food processing (Yamasho Co.,Ltd)

Purpose: Replace from chemical

(Safe and healthy workplace for employee • Abolish chemical management)

Use: Sanitize meat' surface and replace from sodium hypochlorite



Hashimoto dentist and Hirota Dentist

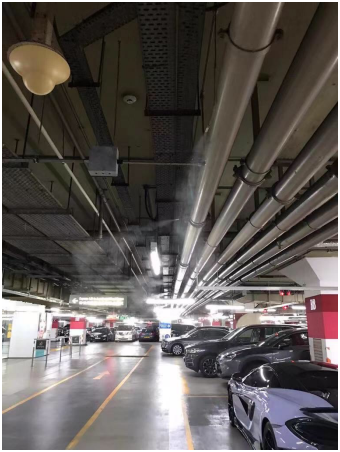
Purpose: Infectious disease countermeasures without chemical

use: Patients' and staffs' hand wash



# O3MAX Water System Track record (Outside Japan)

O3MAX Water System is used in super markets and 5stars hotels group even outside Japan!!



A super market (Use an atomizer)  
▪ Hygiene measures for customers



A Restaurant  
▪ Washing kitchenware and food



A coin laundry  
▪ Washing, deodorizing and sanitizing of clothes



# Just water → Sanitizing · Deodorizing · Cleaning all at once

Ozone power Sanitation · Deodorization



MAX NANO BUBBLE (Ultra Fine Bubble)



Minimize water bubble



Dissolve ozone into water



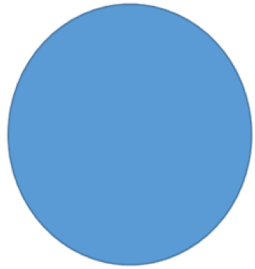
Efficiently realize gas dissolved.  
Extend the lifespan of ozone with MAX NANO  
BUBBLE

Chemical is free and ozone doesn't last, thus, it is very SAFE

# MAX NANO BUBBLE can minimize water bubble

The Nano bubble is invisible, non-floatable, non-breakable and change water's nature around the bubble.

Water bubble's floating speed  
(The time to float 1m)



Normal bubble  
(Diameter 0.5mm or more)  
About 8sec

Micro bubble  
 $1 \mu\text{m} =$   
 $1/1,000\text{mm}$



Micro bubble  
(Diameter 10-100 $\mu\text{m}$ )  
About 12min

Ultra fine bubble  
 $1\text{nm} =$   
 $1/1,000,000\text{mm}$



Ultra fine bubble  
(Diameter 50-500nm)  
About 2years



**Non-floatable**

## Ultra-fine seepage water is

Huge amount of tiny bubbles are generated, water gets to enable bacteria and creatures to take oxygen efficiently.

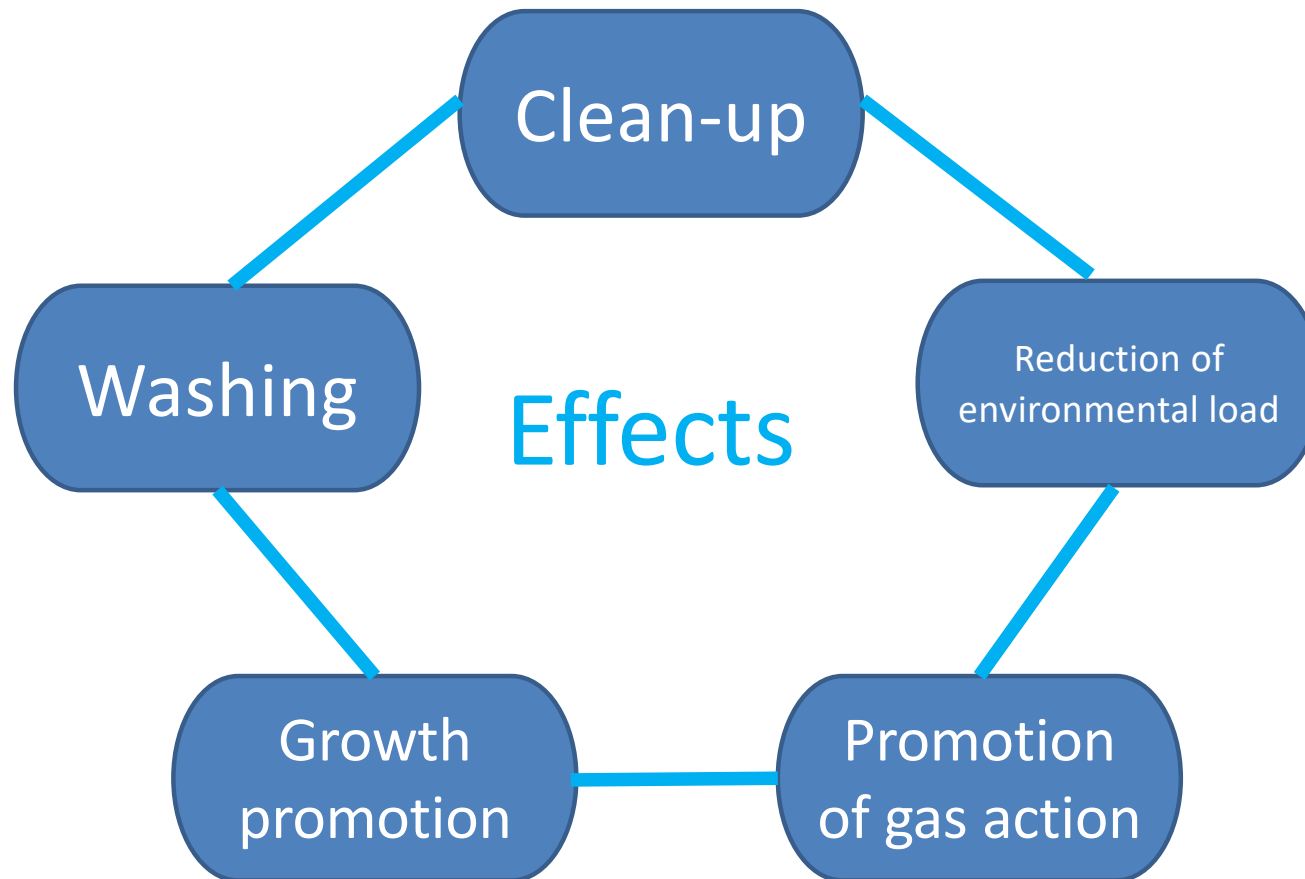
The effect does not change even if bubbles cannot be observed over time.

## Ultra fine bubble enhances water's functions






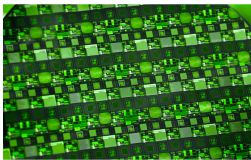


### 『Dissolve + Penetrate + Peel + Flow』

Electrical effect	Bubbles' surface is negative. Most of dirt are positive, thus, bubbles absorb them.
Impact pressure effect	The smaller the bubble size, the higher the internal pressure and the larger the shock wave associated with the bubble collapse.
Surfactant effect	It is more permeable and allows liquids and air bubbles to spread to every corner.
Sustainable effect	Nano-sized bubbles are stable and stay in the liquid for a long period of time, so that the effect of the gas lasts.

## Uses of Ultra fine bubble



# Uses of Ultra fine bubble examples

Environment	Agriculture	Foods	Fisheries
 <ul style="list-style-type: none"> <li>- Soil purification</li> <li>- Ground water purification</li> <li>- Waste water treatment</li> <li>- Sludge volume reduction</li> <li>- Decomposition of harmful substances</li> <li>- Algae removal</li> </ul>	 <ul style="list-style-type: none"> <li>- Agricultural products' <ul style="list-style-type: none"> <li>✓ Promotion of growth</li> <li>✓ Increase of yield</li> <li>✓ Improvement of quality</li> </ul> </li> <li>- Preservation of freshness</li> <li>- Liquid fertilizer</li> </ul>	 <ul style="list-style-type: none"> <li>- Improvement of quality</li> <li>- Prevention of oxidation</li> <li>- Adding flavor</li> <li>- Adding texture</li> <li>- Adding fragrance</li> </ul>	 <ul style="list-style-type: none"> <li>- Marine products' <ul style="list-style-type: none"> <li>✓ Promotion of growth</li> <li>✓ Increase of yield</li> <li>✓ Improvement of quality</li> </ul> </li> <li>- Improvement of aquaculture environment</li> <li>- Preservation of freshness</li> </ul>
Clean-up	Industrial area	Beauty	Others
 <ul style="list-style-type: none"> <li>- Cleaning toilet</li> <li>- Cleaning production lines</li> <li>- Salt damages' measures</li> <li>- Piping dirt removal</li> <li>- Washing machine</li> <li>- Vegetable and fruits</li> </ul>	 <ul style="list-style-type: none"> <li>- Precision peeling</li> <li>- Thin film separation of Silicon wafer</li> </ul>	 <ul style="list-style-type: none"> <li>- Spa</li> <li>- Face and head washing</li> <li>- Nano-technology cosmetics</li> <li>- Showerheads</li> </ul>	 <ul style="list-style-type: none"> <li>- Medical care</li> <li>- Pharmaceuticals</li> <li>- Ships</li> <li>- Papermaking</li> <li>- Daily necessities</li> <li>- Energy</li> <li>- Aquarium</li> </ul>

Ultra fine bubble is environmentally friendly and can clean and wash without using chemicals.



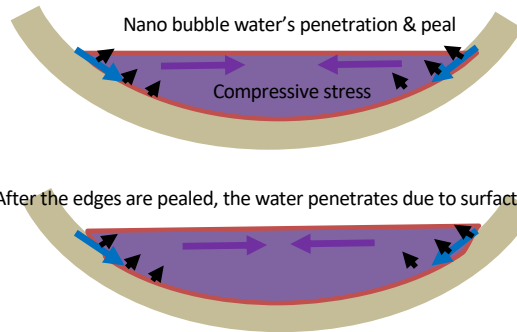
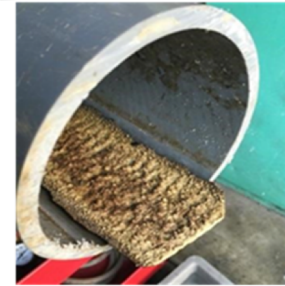
# Unity calculus removal test with MAX NANO BUBBLE



Run water overall



Fully peeled



After the edges are peeled, the water penetrates due to surfactant effect.

After ultrafine bubble water flow on the surface, unity calculus collapses slowly.

Normal water can't break unity calculus.

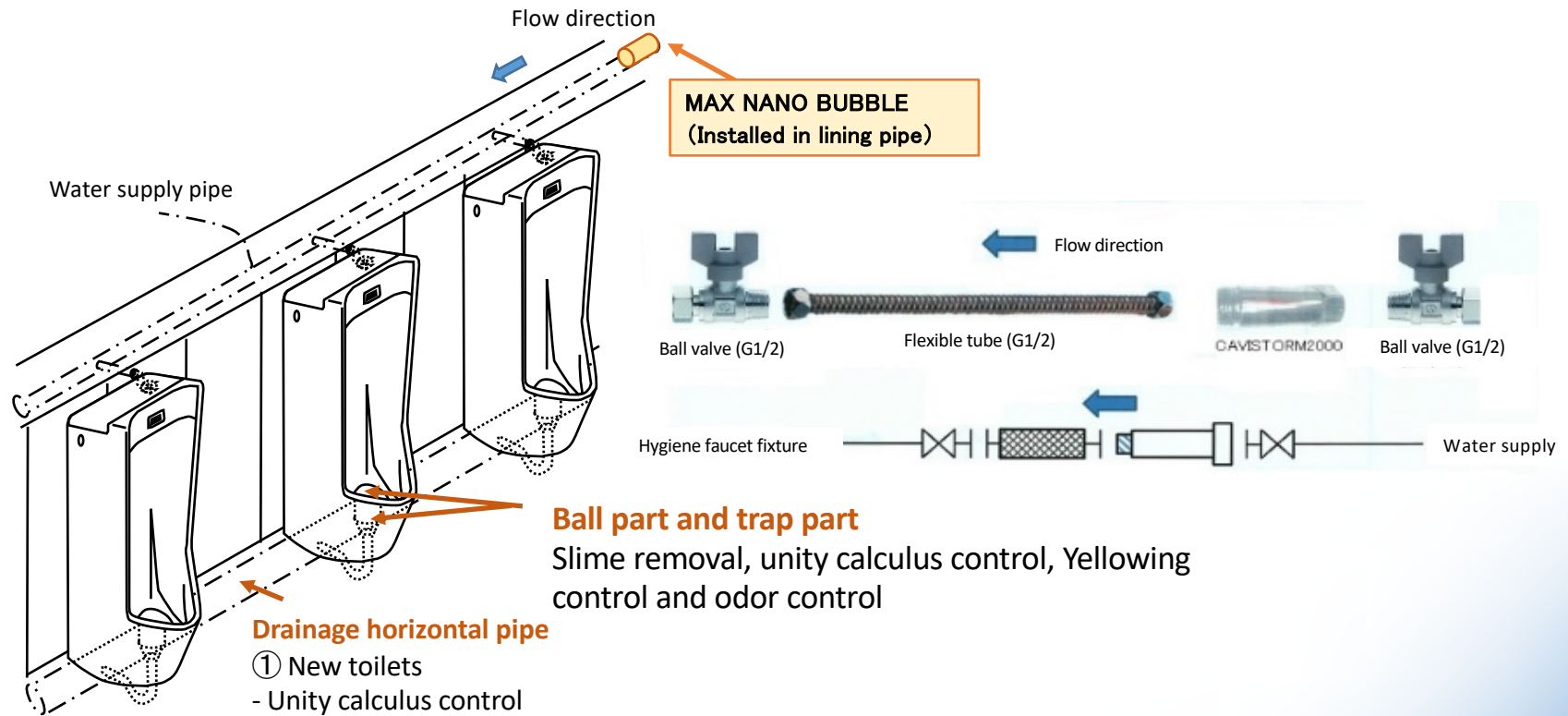
**6L/min of water flow for 100hours peeled the layer of unity calculus from PVC piping.**

\* Even the piled layer of unity calculus is peeled, it doesn't choke drain pipes because the slope of horizontal pipe is small.

\* The growth of unity calculus is caused by bacteria staying on the surface. The source of odor is also caused from the surface.

⇒ **MAX NANO BUBBLE** can prevent odor and growth of unity calculus by removing the surface.

# Toilet cleaning's effect with MAX NANO BUBBLE WATER (JR EAST)



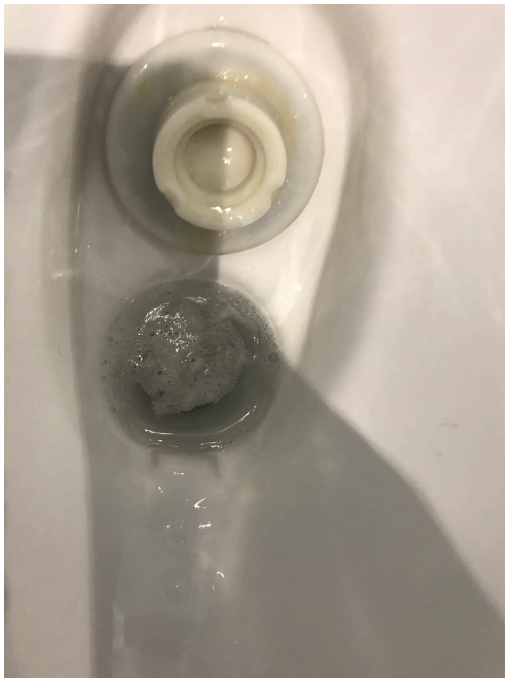
① New toilets  
- Unity calculus control

② Existing toilets  
 • Peel and removal of piled unity calculus  
 • Slime on the surface of unity calculus → Odor control



## Result of toilets in Kawasaki station of JR EAST

Without Nano bubble



After 18 months with Nano bubble  
(Photo taken in May 2019)



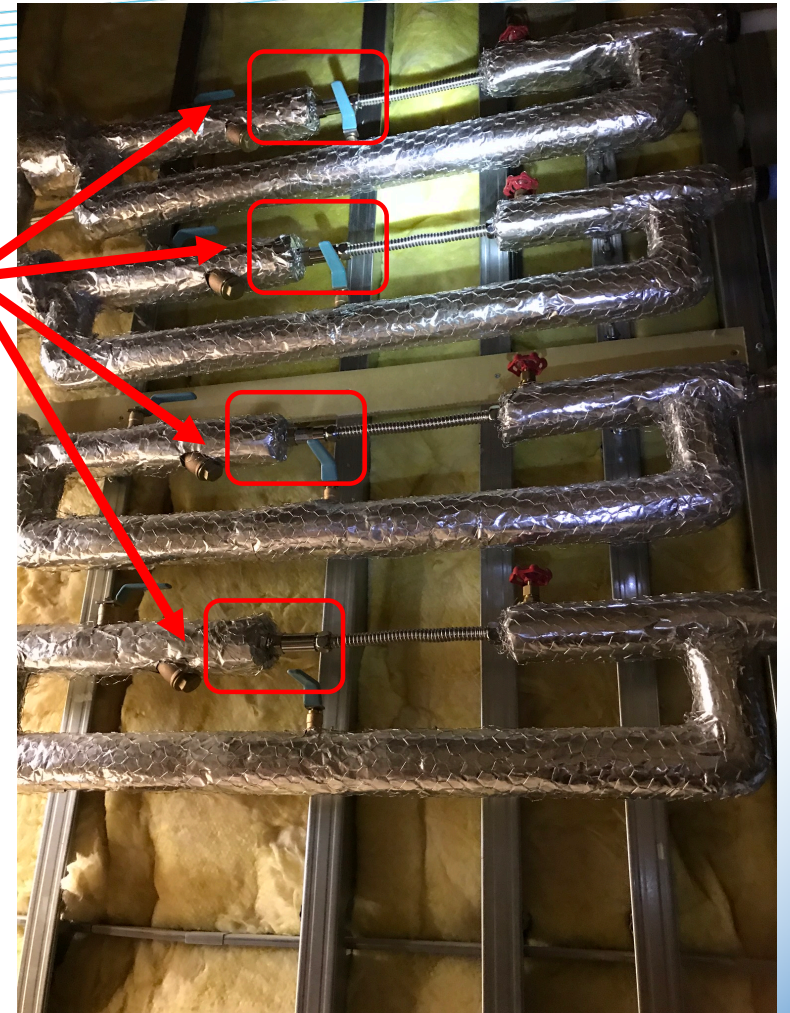
MAX NANO BUBBLE was installed in Nov 2017

Checked the condition in May 2019  
**No dirt, No yellowing**

# JR EAST MAX NANO BUBBLE



Nano bubble nozzle



MAX NANO BUBBLE was installed in new toilet of Kawasaki station in Nov 2017

- 1pc for 1 closet bowl
- 1pc for 5 urinals (→water flow is low)



# Improvement with MAX NANO BUBBLE



Shikinaen in Okinawa



# Improvement with MAX NANO BUBBLE

Pond condition changed about 1.5 months after nanobubble operation

On-site investigation  
in June 2019

Oxygen concentration : 2PPM

Black beard algae  
destroyed the scenery



Shikinaen in Okinawa

Nov 2019 – Feb 2020  
No black beard algae



# Improvement with MAX NANO BUBBLE

Installed in a farm for improvement of dissolved oxygen amount and measures against sterilization.

Before and after of MAX NANO BUBBLE installation : Seawater pool (Volume: 50t, 5m\*10m, Depth 1m)

Before installation



The water is muddy.

After installation (1week)



After MAX NANO BUBBLE installation, the water transparency improved.

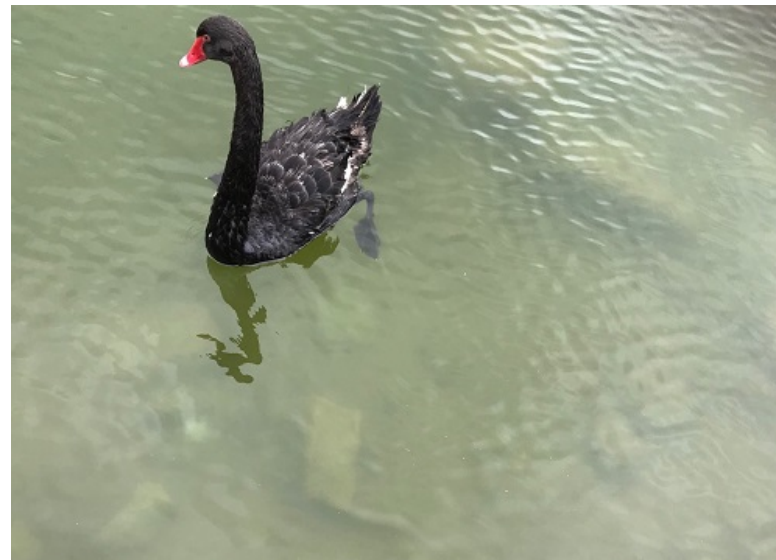
# Improvement with MAX NANO BUBBLE

Installed in Okinawa Kodomonokuni

Before and after of MAX NANO BUBBLE installation in a pond (Volume: about 73,000m<sup>3</sup>)



On-site investigation  
Oxygen concentration : 3.8PPM

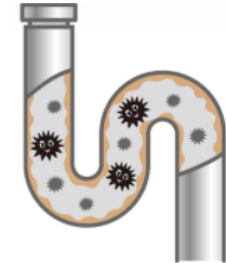


After MAX NANO BUBBLE installation, water condition improved in about 2months.  
Transparency improved so that the bottom of the pond got visible.  
Oxygen concentration : 8.2PPM

# Ozone water & Ultra fine bubble collaboration

## 1. Prevention of biofilm adhesion in piping

> By flowing ozone water inside piping, adhesion of rust and bacteria can be controlled.



## 2. Reduce of industrial waste (sludge)

> Nano bubble water is so effective that sludge volume can be reduced.

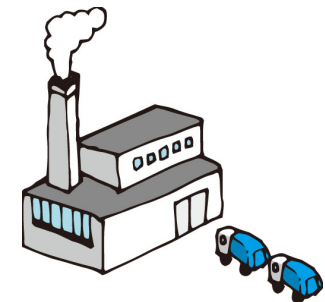
EX) Mayonnaise manufacturing plant

Sludge volume before and after installation of Nano bubble system

Before : 1200kg

After : 900kg

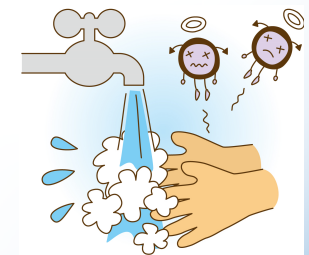
\* Reduction of industrial waste disposal costs (JPY20/kg)



## 3. Hygiene measures

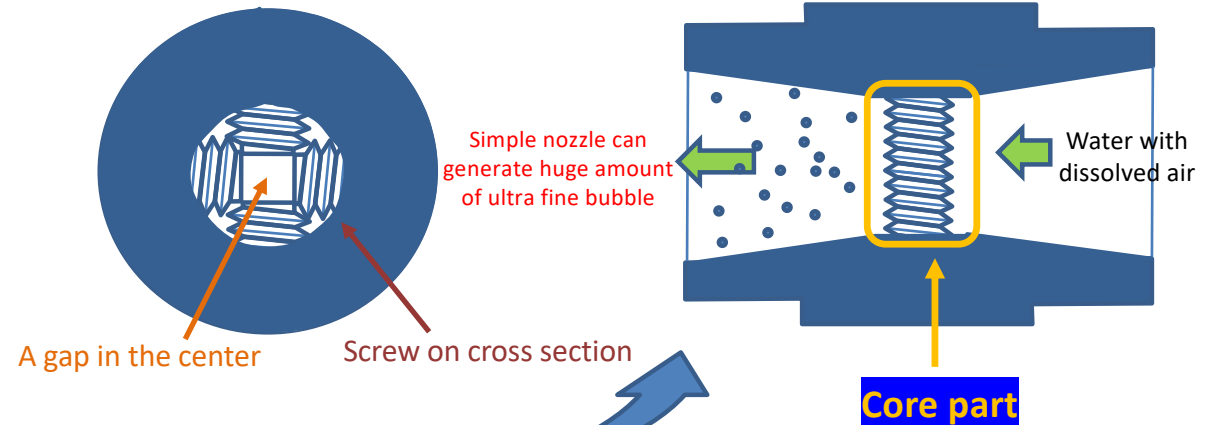
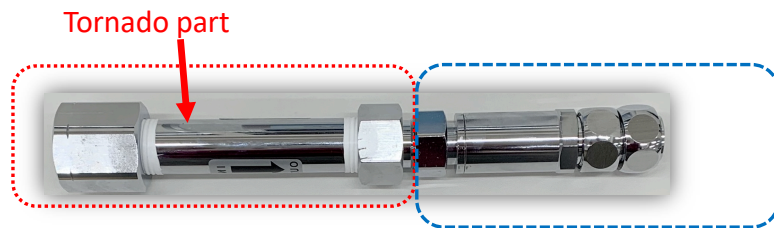
> Hand wash with ozone water prevents rough hands.

Water and sanitizer cost is reduced (Alcohol sanitizer is not necessary).



# MAX NANO BUBBLE is the smallest ultra fine bubble

The special nozzle generates huge amount of ultra fine bubbles.



Built-in high quality core

Generating smaller bubble in tap water and adding speed to push into the pipe.

The inside of the nozzle is simply configured.

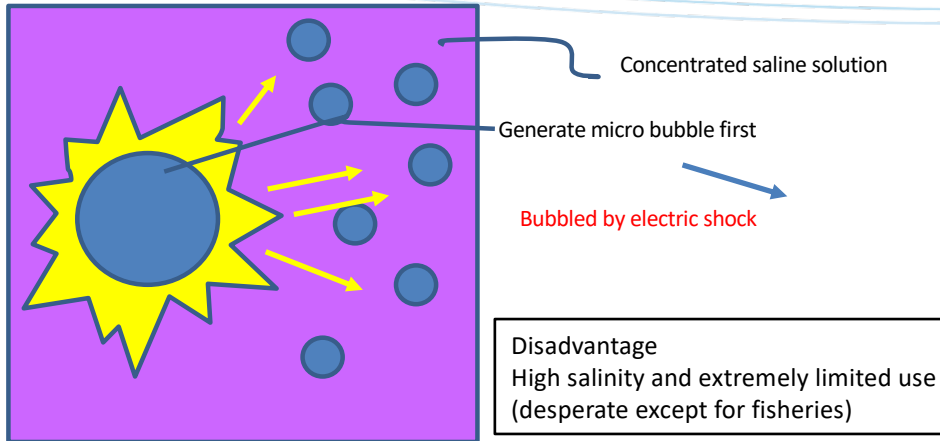
The mechanism is such that water flows smoothly. (Hard to get stuck).

◆ Easy installation    ◆ Compact and high performance    ◆ Reasonable

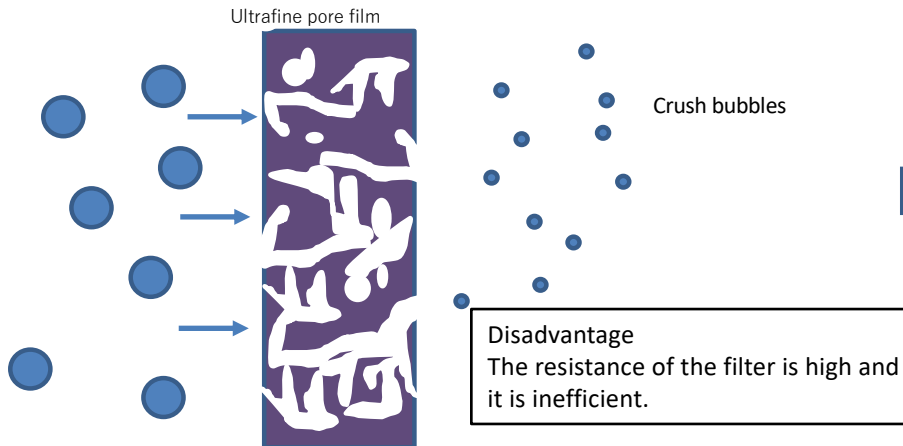


# Other company's products

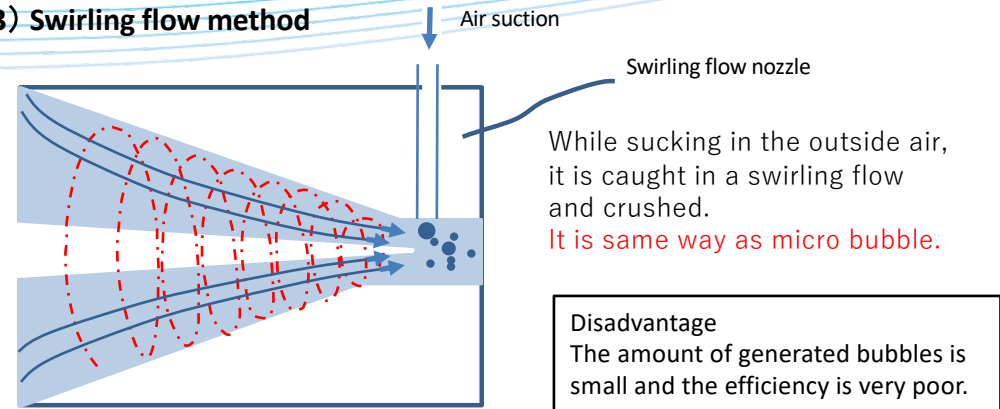
## (1) Micro bubble crushing method



## (2) Micropore crushing method



## (3) Swirling flow method

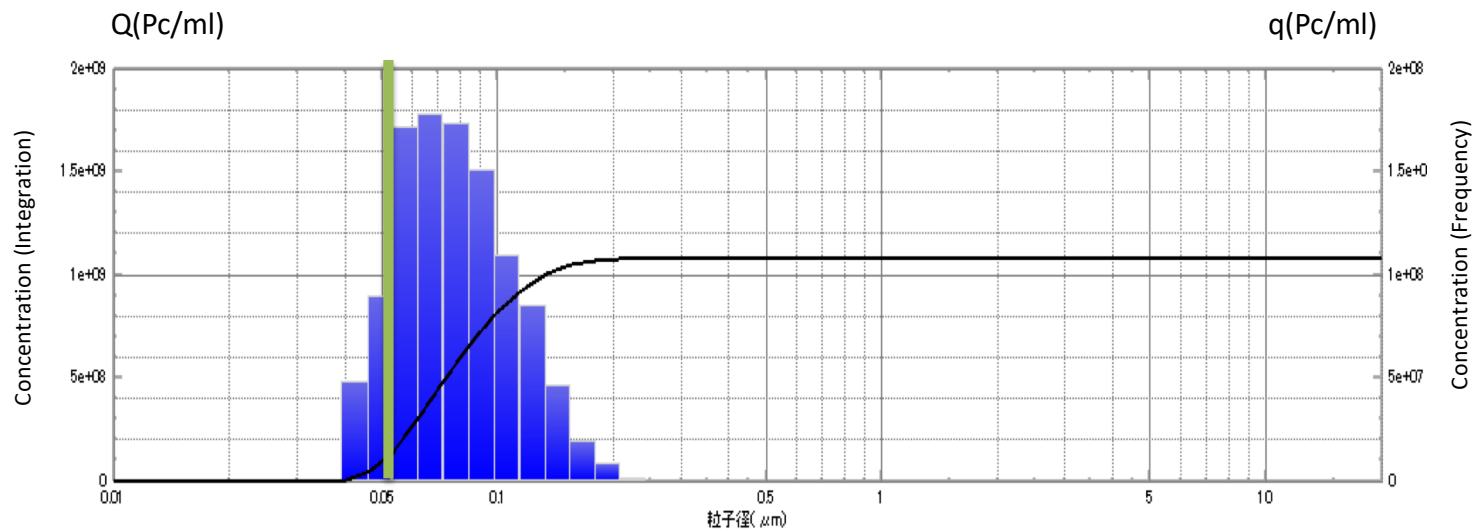


These machines are very expensive.

It is hard to provide water containing huge amount of ultrafine bubbles at low cost.

# Measurement result of bubble size of MAX NANO BUBBLE No.1

Current measuring instruments cannot measure bubbles smaller than nano size.



	Particle size X (μm)	Integration Q (pc/ml)	Frequency q(pc/ml)		Particle size X (μm)	Integration Q (pc/ml)	Frequency q(pc/ml)		Particle size X (μm)	Integration Q (pc/ml)	Frequency q(pc/ml)		Particle size X (μm)	Integration Q (pc/ml)	Frequency q(pc/ml)
1	20.000	1084226895	0	14	2.772	1084226895	0	27	0.384	1084226834	257	40	0.053	139806649	89978267
2	17.179	1084226895	0	15	2.381	1084226895	0	28	0.330	1084226577	46754	41	0.046	49828382	48576906
3	14.757	1084226895	0	16	2.045	1084226895	0	29	0.283	1084179823	374289	42	0.039	1251477	772781
4	12.676	1084226895	0	17	1.757	1084226895	0	30	0.243	1083805534	1474162	43	0.034	478695	408258
5	10.888	1084226895	0	18	1.509	1084226895	0	31	0.209	1082331371	8970996	44	0.029	70438	0
6	9.352	1084226895	0	19	1.296	1084226895	0	32	0.180	1073360376	19548793	45	0.025	70438	0
7	8.034	1084226895	0	20	1.113	1084226895	0	33	0.154	1053811583	46037460	46	0.021	70438	0
8	6.901	1084226895	0	21	0.956	1084226895	0	34	0.133	1007774123	84830383	47	0.018	70438	0
9	5.927	1084226895	0	22	0.821	1084226895	0	35	0.114	922943740	109065358	48	0.016	70438	0
10	5.091	1084226895	0	23	0.706	1084226895	0	36	0.098	813878382	151264426	49	0.014	70438	0
11	4.373	1084226895	0	24	0.606	1084226895	0	37	0.084	662613956	173040409	50	0.012	70438	0
12	3.757	1084226895	0	25	0.521	1084226895	0	38	0.072	489573548	177988722	51	0.010	70438	70438
13	3.227	1084226895	0	26	0.447	1084226895	61	39	0.062	311584825	171778176				

Niigata Prefectural Industrial Technology Research Institute from Shimadzu Corporation  
Fine bubble diameter measurement system "SALD-7500"



Measurement condition  
Water pressure : 0.1Mpa  
Water type: Ultrapure water  
Oxygen concentration : 5mg/l

## Measurement result of bubble size of MAX NANO BUBBLE No.2

	Particle size X (μm)	Integration Q (pc/ml)	Frequency q(pc/ml)		Particle size X (μm)	Integration Q (pc/ml)	Frequency q(pc/ml)		Particle size X (μm)	Integration Q (pc/ml)	Frequency q(pc/ml)		Particle size X (μm)	Integration Q (pc/ml)	Frequency q(pc/ml)
1	20.000	1084226895	0	14	2.772	1084226895	0	27	0.384	1084226834	257	40	0.053	139806649	89978267
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4	12.676	1084226895	0	17	1.757	1084226895	0	30	0.243	1083805534	1474162	43	0.034	478695	408258
5	10.888	1084226895	0	18	1.509	1084226895	0	31	0.209	1082331371	8970996	44	0.029	70438	0
6	9.352	1084226895	0	19	1.296	1084226895	0	32	0.180	1073360376	19548793	45	0.025	70438	0
7	8.034	1084226895	0	20	1.113	1084226895	0	33	0.154	1053811583	46037460	46	0.021	70438	0
8	6.901	1084226895	0	21	0.956	1084226895	0	34	0.133	1007774123	84830383	47	0.018	70438	0
9	5.927	1084226895	0	22	0.821	1084226895	0	35	0.114	922943740	109065358	48	0.016	70438	0
10	5.091	1084226895	0	23	0.706	1084226895	0	36	0.098	813878382	151264426	49	0.014	70438	0
11	4.373	1084226895	0	24	0.606	1084226895	0	37	0.084	662613956	173040409	50	0.012	70438	0
12	3.757	1084226895	0	25	0.521	1084226895	0	38	0.072	489573548	177988722	51	0.010	70438	70438
13	3.227	1084226895	0	26	0.447	1084226895	61	39	0.062	311584825	171778176				

The chart shows that lots of bubbles are smaller than 100nano.

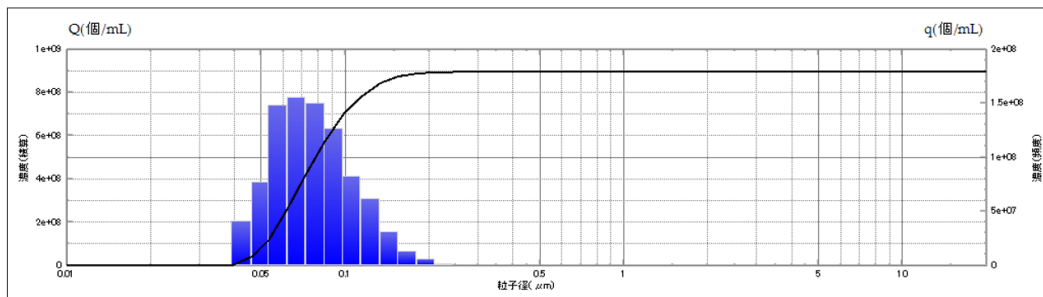
(Number of the small bubbles is about 800million)

**(Number of measurable nano-sized bubble is about 1billion pcs/cc)**

According to the achievement that unity calculus is peeled from PVC piping, we expect that pico-sized bubble which can't be measured work for this effect.

# Measurement result of bubble size of MAX NANO BUBBLE No.2 (1week later)

Even 1week later, huge amount of ultra fine bubbles can be measured.



\*Niigata Prefectural Industrial Technology Research Institute left MAX NANO BUBBLE water for 1week and measured.  
Date : 22<sup>nd</sup> Dec 2021

Particle size X (μm)	Integration Q (pc/ml)	Frequency q (pc/ml)	Particle size X (μm)	Integration Q (pc/ml)	Frequency q (pc/ml)	Particle size X (μm)	Integration Q (pc/ml)	Frequency q (pc/ml)	Particle size X (μm)	Integration Q (pc/ml)	Frequency q (pc/ml)
1	20.000	897200026	0	14	2.772	897200026	0	27	0.384	897058131	346
2	17.179	897200026	0	15	2.381	897200026	0	28	0.330	897055785	81003
3	14.757	897200026	0	16	2.045	897200026	1	29	0.283	896994782	357375
4	12.676	897200026	0	17	1.757	897200025	65	30	0.243	896637407	1327761
5	10.888	897200026	0	18	1.509	897199960	200	31	0.209	895309647	6141164
6	9.352	897200026	0	19	1.296	897199760	4071	32	0.180	889168483	13156519
7	8.034	897200026	0	20	1.113	897195689	13334	33	0.154	876011963	30981728
8	6.901	897200026	0	21	0.956	897182355	33255	34	0.133	845030235	61768443
9	5.927	897200026	0	22	0.821	897149100	40286	35	0.114	783261793	82866090
10	5.091	897200026	0	23	0.706	897108814	35160	36	0.098	700395703	126887945
11	4.373	897200026	0	24	0.606	897073654	13802	37	0.084	573507757	149630057
12	3.757	897200026	0	25	0.521	897060052	3663	38	0.072	423877700	155785360
13	3.227	897200026	0	26	0.447	897056389	258	39	0.062	268092339	148269842

In addition, the chart shows the number of ultra fine bubble increased from just after measurement

Why ultra fine bubble increased in 1week is ...

We expect that there are lots of minimum sized bubbles which can't be digitalized even with high-performance measurement system in MAX NANO BUBBLE and the measurable bubbles increase due to these bubbles' combination.

After water bubble is minimized

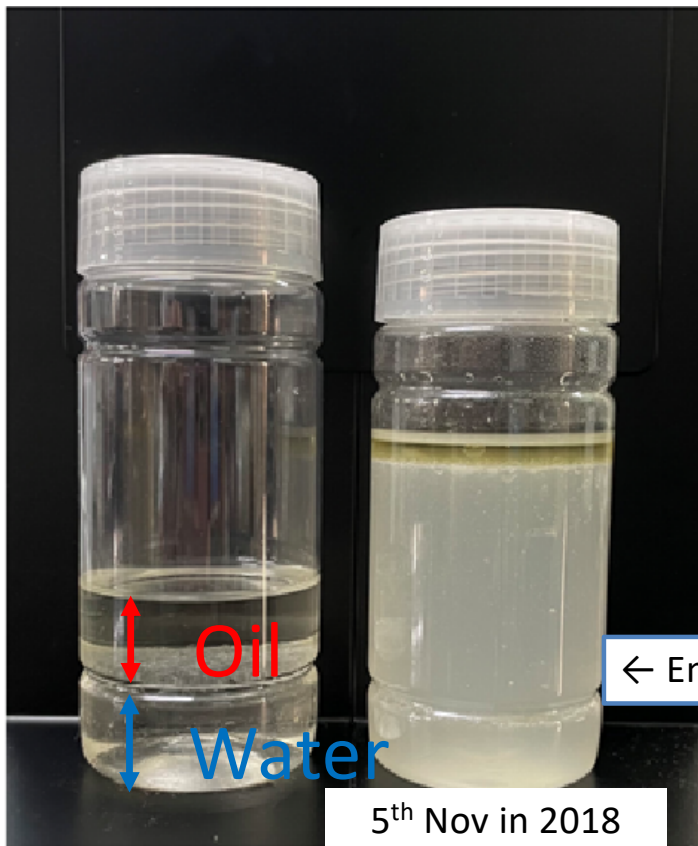
Excellent characteristic of our MAX NANO BUBBLE

Only Minimized  
bubble can do

Generally, water and oil is separated quickly without surfactant and emulsifier.

However, in case of mixing MAX NANO BUBBLE water and oil, it is emulsified for long time.

(5<sup>th</sup> Nov in 2018)



# Specification of MAX NANO BUBBLE

\*We suggest proper type according to uses and environments

Dissolved air of tap water becomes cavitation. Cleaning effect improves without chemical.

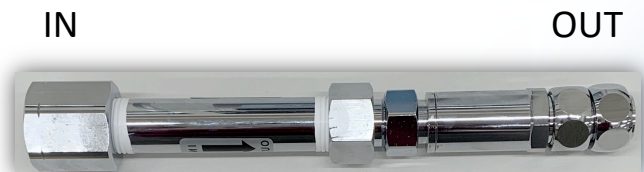
Item name	MAX NANO BUBBLE
Installation	Connecting with water piping
Water pressure	More than 0.1MPa
Water flow	6~25L/min
Temperature	0~40°C
Material	Brass POM SUS304
Connection diameter	Parallel screw for pipe
Size	Length: 22.7 cm
Weight	521g
Inspection	Passed leachability test
Lifespan	About 7years with tap water and once 2years maintenance * In case of about 23.1m <sup>2</sup> /month. * It is changed depending on environments and conditions.

Main type is 13mm•20mm

Any sized pipe is connectable with an adapter.

## Characteristics

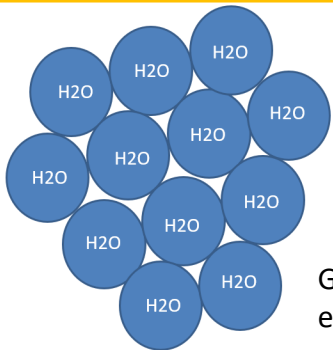
- Simple structure and reasonable (Core part is just 1pc of nozzle)
- Outside air is NOT required for generating ultra fine bubble.
- With normal water pressure can generate 1,000 to 10,000 times as the density of the conventional method of ultra fine bubble.
- Just one nozzle can treat up to 100L/min of water.



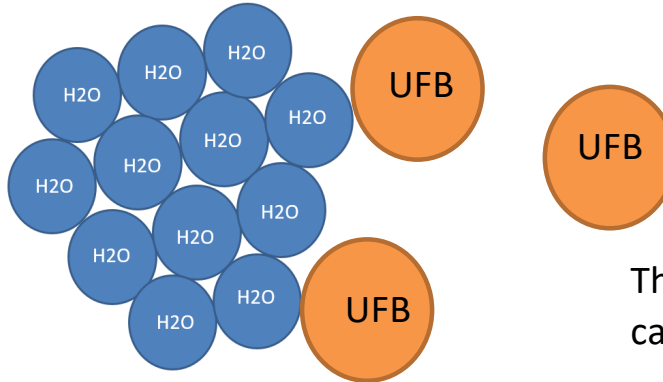


# Difference between MAX NANO BUBBLE and other products

## Other ultra fine bubble

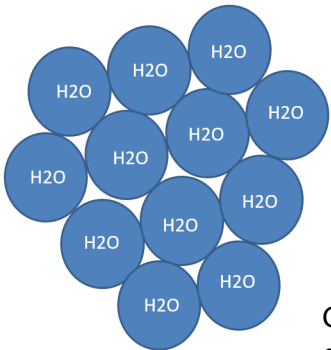


Generally, water is attached to each other.



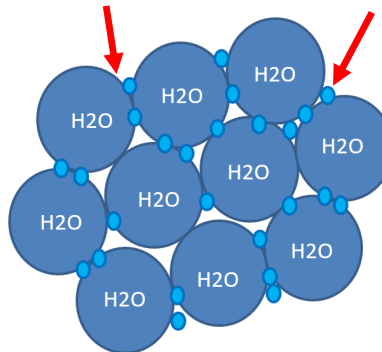
The size of normal ultra fine bubble can't get in between water molecules.

## MAX NANO BUBBLE

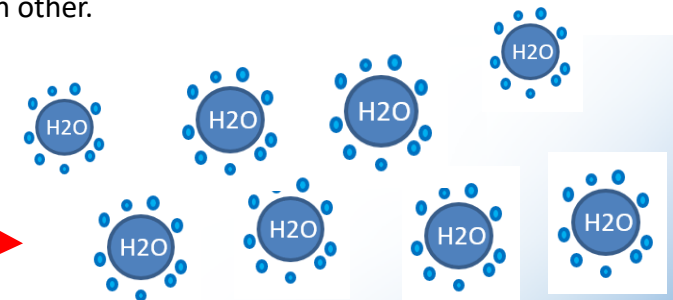


Generally, water is attached to each other.

Bubbles of MAX NANO BUBBLE is very small so they can get in between water molecules.



Bubbles of MAX NANO BUBBLE adhere around water molecules to prevent water molecules from sticking to each other.

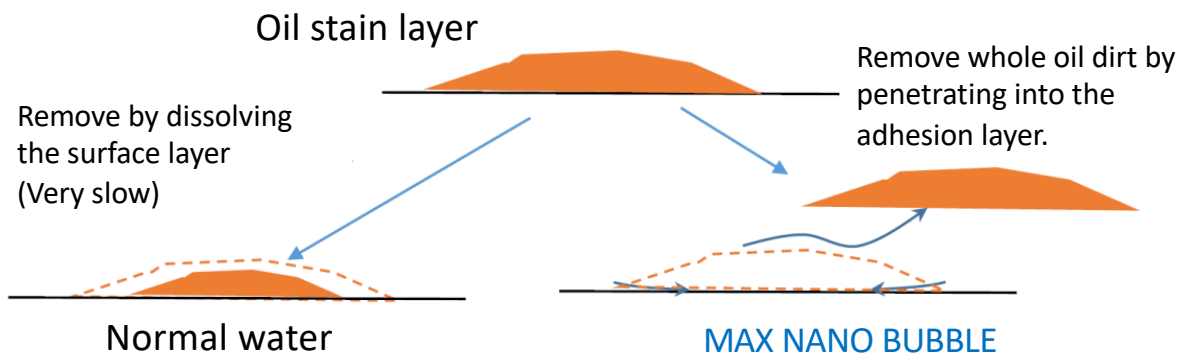


## Only MAX NANO BUBBLE can settle some problems

MAX NANO BUBBLE can generate the smallest ultra fine bubble.

Bubble itself is tiny, thus, adhere around water molecules to prevent water molecules from sticking to each other.

That's why, it can not only clean surface of unity calculus but also completely remove whole unity calculus by penetrate in the adhering surface.



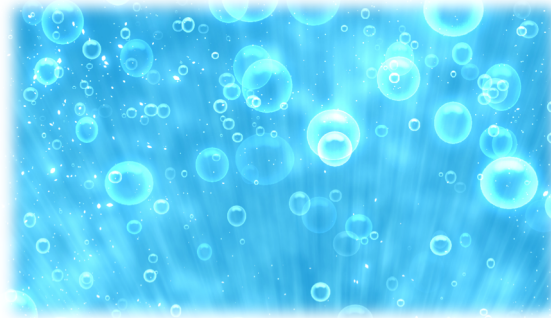


# 3 effects with Ozone water & MAX NANO BUBBLE

Ozone water = Sanitizing & Deodorizing



MAX NANO BUBBLE = Cleaning



Sanitizing + Deodorizing + Cleaning  
without chemical



# Sanitizing + Deodorizing + Cleaning for households with easy installation



## A shower

The ultra fine bubble penetration into the hair and pores enhances the moisturizing effect and detergency.



## A bathroom

Mold on a ceiling and walls and biofilms inside pipes are controlled well.



## Pets

By washing not just hair but also inside pores, odor can be controlled.



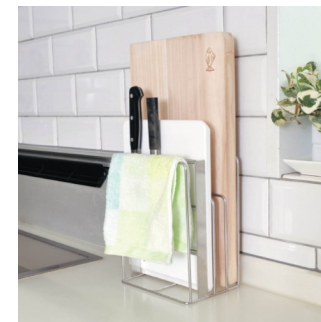
## Car washing

It foams well and can control dirt just by rinsing with Nano water for finish.



## Laundry

Dirt adhesion inside washing machine is prevented. Laundry's dirt in drainage port and drainage ditch can be removed easily.



## A kitchen

Easy to wash out dirt of kitchenware and remove and control biofilms inside drainage port and drainage.



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