Applications

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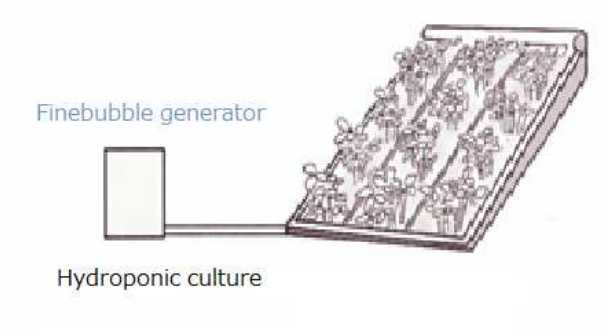
1. Agriculture

■ *Growth promotion*

- Washing / sterilization of farm products
- Purification of stock raising urination
- Increase of oxygen content of water culture
- Soil improvement
- Promotion of fermentation of fermentation food and cultivation

Effects of dissolved oxygen has on the cyclamen



Reprinted Nara Agricultural Technology Center from "agricultural technology information"

«Reports from customers»

① Strawberry farmer (Gamagori city, Japan)

Yields increased 20-30%. Leaf is lush even end of the season.

② Lettuce farmer (kashiba city, Japan)

Hydroponic culture（Kashiba City, Japan）

Grow faster. It usually needs 90 days to ship, but it shorten to 70 days.

③ Vegitable farmer(Hokkaido,Japan)

Grow faster, it is obviously effective.

④ Tomate farmar（Shirai city,Japan）

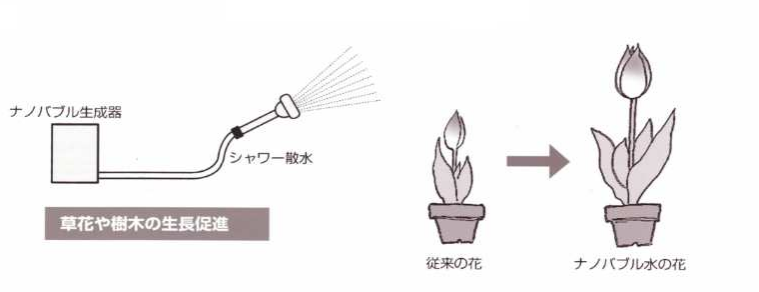
Roots thickened

(Other users)

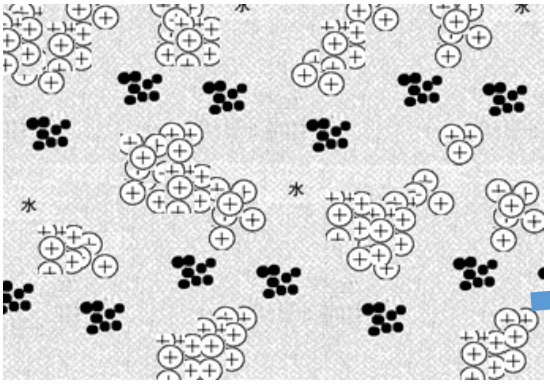
Sprout garlic, cherry tomatoes, Chinese cabbage, gerbera, plant factory (greens)

Roots grow well and lush leaves grow.

Leaves are lush and keep high yield even the end of the season in house cultivation of strawberry..

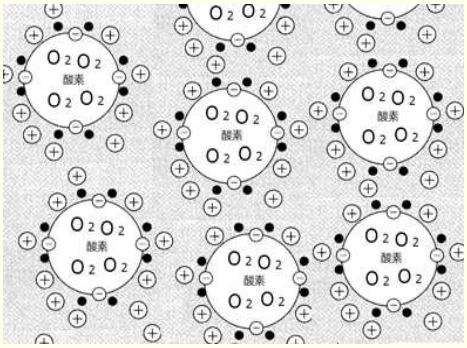


Cluster image In the liquid fertilizer

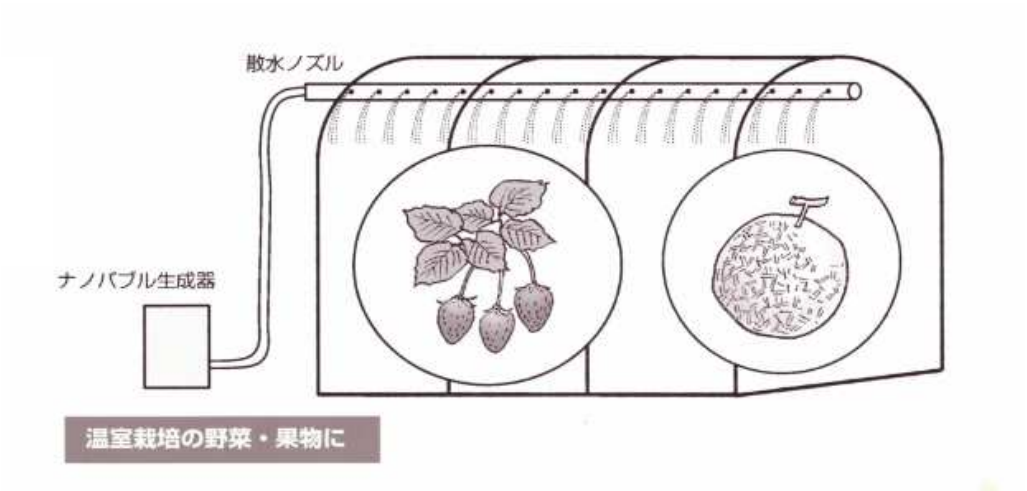


✕Fertilizer and minerals are clustered in the water, so they are hardly absorbed from the roots.

Image of nano-bubbles in liquid fertilizer



◎ Static electricity of nano-bubble catch ions of fertilizer and mineral which are charged positive. They are very stable in the water and ions never get together rather disperse in the water. That the reason why fertilizer and mineral are absorbed well.



Nikkei 10/18/2011

It tells new release of ASUPU's new product for agriculture.

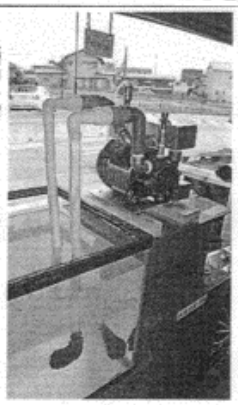
日本経済新聞　2011年（平成23年）10月18日（火曜日）

超微細気泡の発生装置

アスプ、農業向け開拓

生育を促進、栽培法指導も

大学や企業向けの実験用装置の開発・販売を手掛けるアスプ（長泉町、高橋賢社長）は自社開発した直径0・1～30㍃（㍃は100万分の1㍍）の微細な気泡「マイクロナノバブル」を発生させる装置を農業従事者向けに売り出す。これまでは電子部品の汚れを除去する応用研究を進める企業や大学が主な顧客だったが、農作物の成長を促す特長を生かして新たな販路を開拓。年間100台の販売を目指す。



水槽内に「マイクロナノバブル」を発生させる超微細気泡発生装置

同社の超微細気泡発生装置は200～1000㍑の水量に対応し、100㍗の電源に差し込むだけで使える。大きさは高さ360㍉、幅400㍉、奥行き240㍉。マイクロナノバブルは50㍍以下の気泡で、マイナスの電荷を帯び、瞬間的に超高温・超高圧状態になる。このため水質浄化や医療など幅広い分野で利用が見込まれ、大学や企業の研究機関向けに販売してきた。

今回、新たな販路として同社が開拓を目指すのは農業分野。水中で発生させた超微細気泡がプラスの電荷を帯びる土壌内の栄養分を吸着し、酸素と共に作物内に効率的に吸収されることで、農作物の成長を促進させる働きに注目した。

具体的には、装置を既存の農業用水の貯水タンク内に設置し、配水用のパイプを通して超微細気泡をふんだ水を農作物に与える。すでに昨年度に愛知県内のイチゴ農家で試験導入し、導入前と比較して、収穫量で2割増を達成している。

また来年2月に中国・北京で開催される、世界のイチゴ栽培技術や農業機械などを集めた「第7回世界苺大会in北京」で、同装置と超微細気泡を活用した栽培手法を紹介する予定だ。将来的には中国を中心に、東南アジアでの販売体制の構築も目指す。

装置の価格は40万円から。アスプでは水温や肥料の種類など、超微細気泡の特性を生かした最適な栽培方法の指導と合わせて、農業従事者に装置の売り込みを図る。

同社では年間5000万円の販売を目指す。2011年9月期の売り上げは5000万円。高橋浩司副社長は「『ナノバブル農法』として認知度を高めていきたい」としている。

2. ANIMAL HUSBANDRY

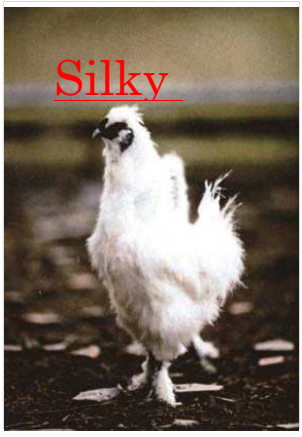
Spray in barn → Sterilization of virus and harmful microbial and deodorant.

Breeding water→ Health maintenance and biological improvement

floor cleaning, → Cleaning ,sterilization and deodorant

Conclusion:

Yolk and color of egghell have changed.
O group and H group both lay eggs of 2.5 times compared to W group.

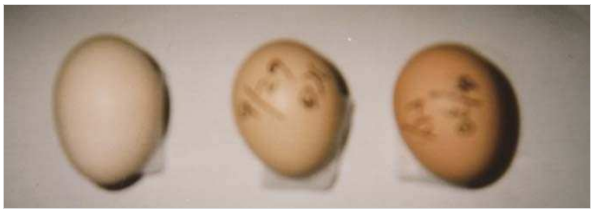


Experiment of breeding by by drinking nano-bubble water

W group･･･Feed tap water

O group･･･Feed air nano-bubble water

H group･･･Feed hydrogen nano-bubble water

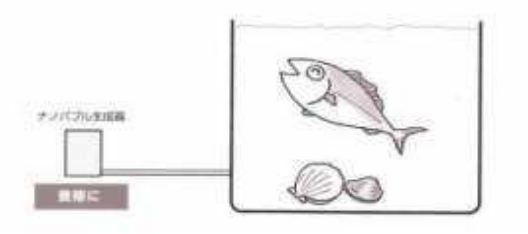


W O H

W O H

3. FISHING INDUSTRY/ FARMING

- *Grow faster*
- oxygen supply
- disease prevention
- Keep freshness



Farming of oysters

Oyster soak in water tank for a day before shipment in order to take dirts. Dirts began to removed form oysters by generating microbubbles in a water tank.

Generate microbubbles

Dirts are going up to the water surfce attaching to microbubbles.

1 WATER PURIFICATION

- Effluent, Dam , Lubricating water etc.

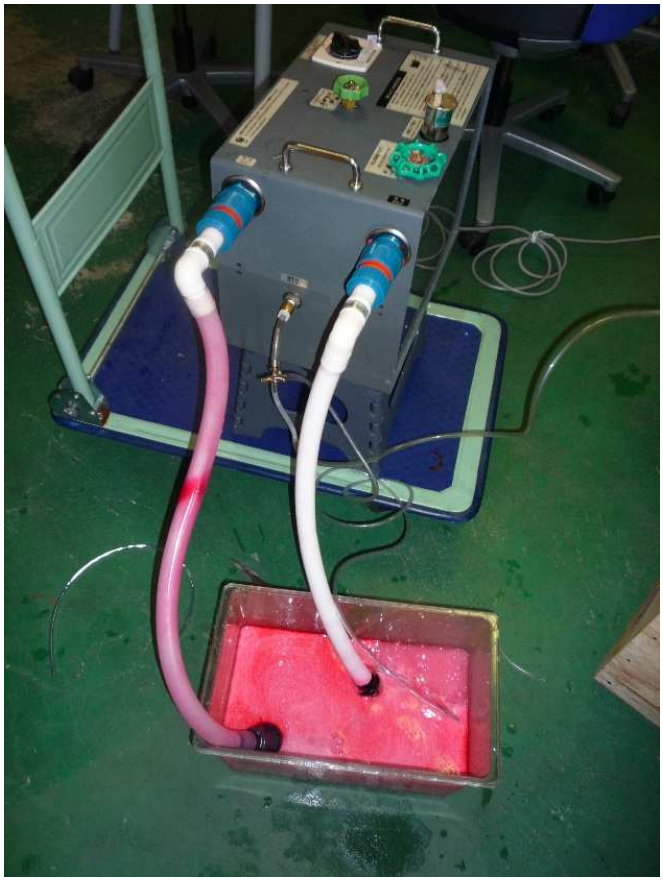
① «Purificaion of pond »

Just after start to generate micro-bubbles

The dirt which came off an underwater dirt and wall surface surfaces to the water surface.

A dirt is removed, and water is activated enough by supply of oxygen, and water environment to

② ≪Decomposition　test of red ink≫

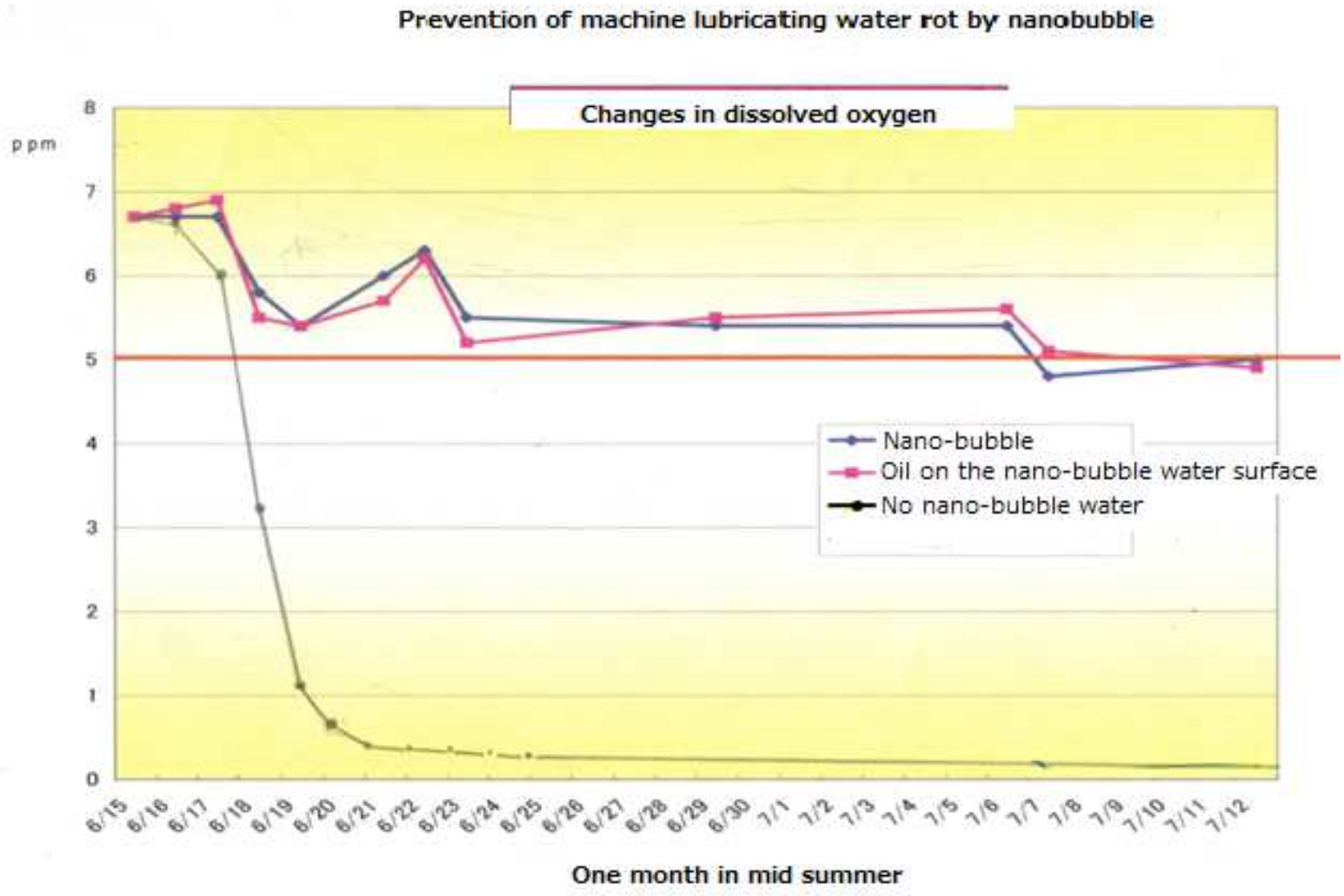


5 minutes after stopping 90 minutes operation.

【ASK3型】Recommended for use in laboratory.

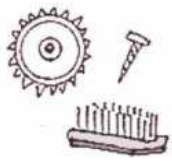
Model	ASK3
Flow　L/min.	7～10
Weight　kg	15
Power supply　V	AC100
Power consumption　W	550
Size　H×W×D　mm	360×400×240

③ ≪Purification of lubricating water≫



Nana-bubble water keeps enough amount of oxygen even one month during midsummer. Lubrication water with nanobubble do not rot.　Putrid odor does not come out in factory.

2 WASHING, CLEANING, ERADICATION AND DEODORANT



- Medical equipment, hand washing, hair washing, precision equipment, parts cleaning, food

Micro-bubble have a large surface compared to its volume.

It is very effective to wash and clean uneven skin surface.

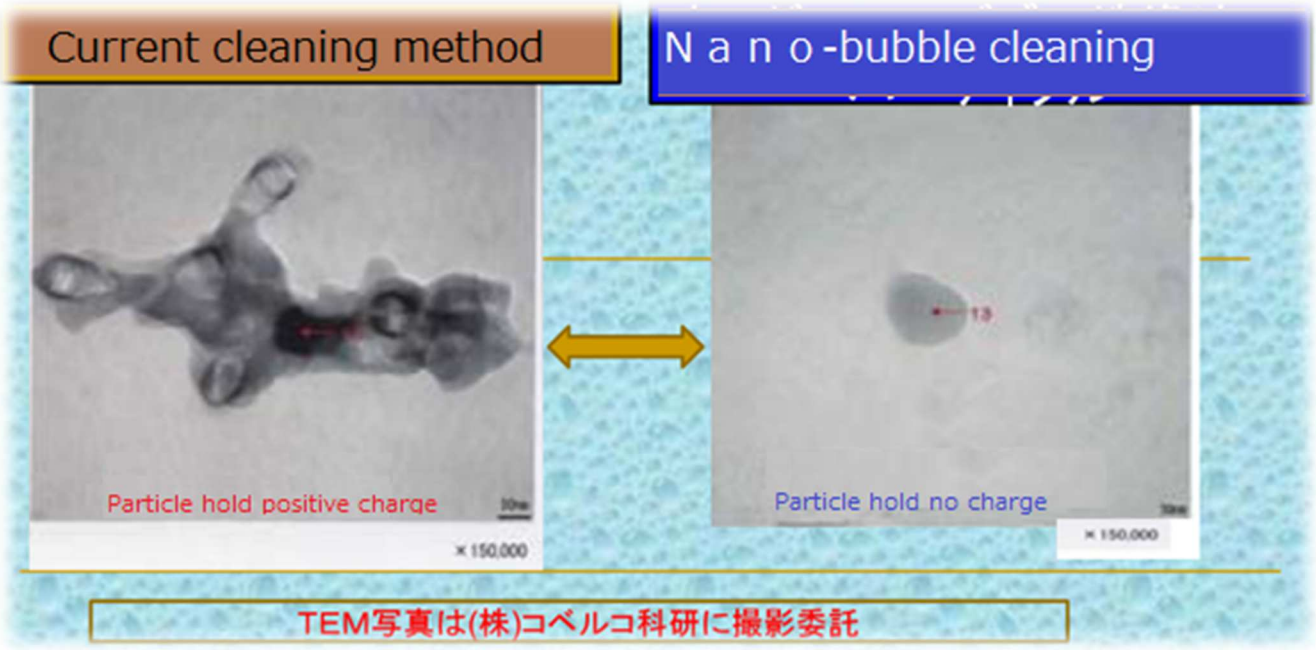
Hydrophobic substances such as sebum can be attached and removed efficiently.

Sterilization effect by the free radicals generated by break of bubble

No bubble shawer

Mico-bubble shawer

①«Semiconductor・FPD Washing»

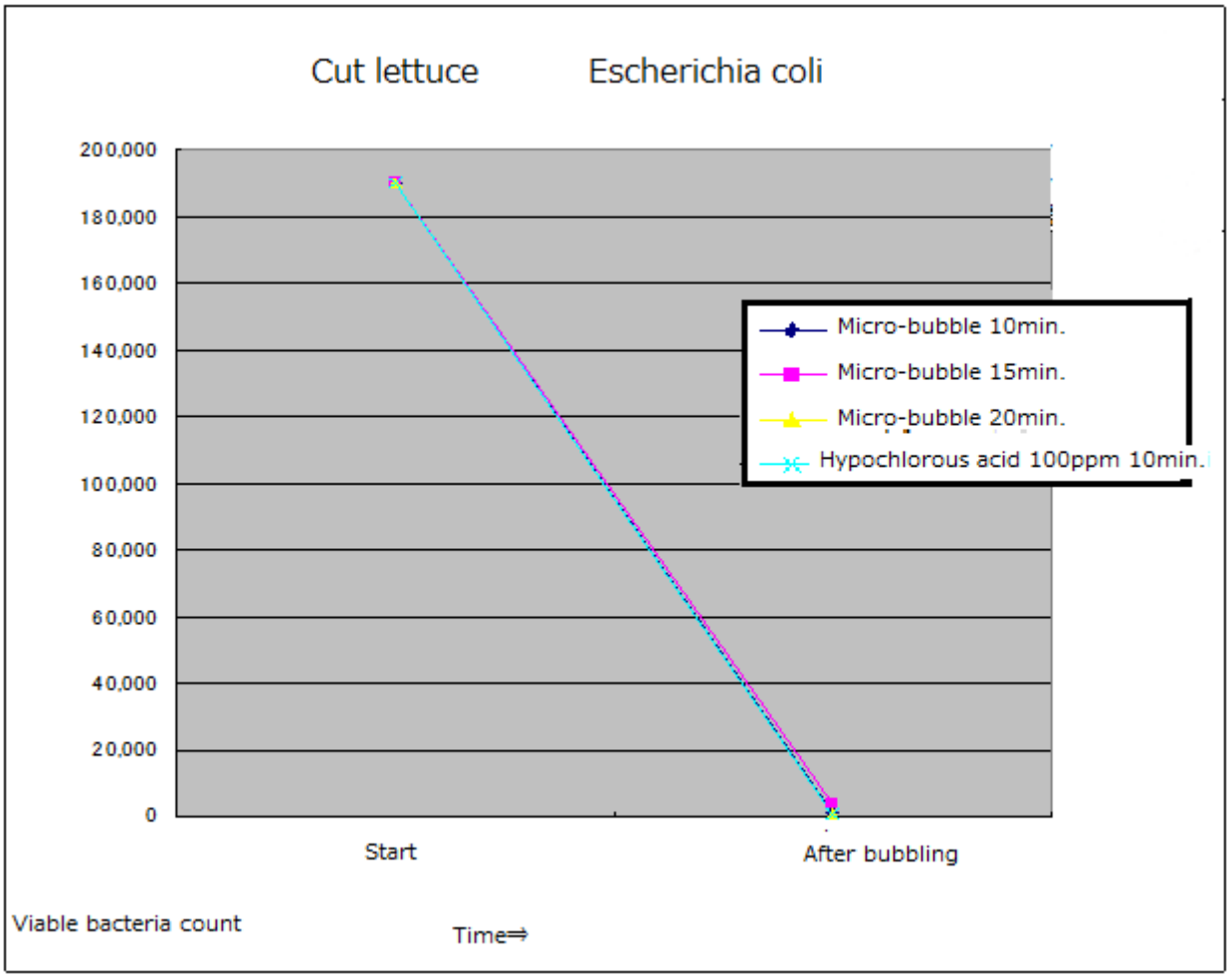


Chemical solution you use can be changed to nanobubble water. It is a technology that keeping gas of low solubility inside of bubbles for a long time other than cleaning and sterilizing.

This can be applied for food, chemical, pharmaceutical and also in drug discovery, etc.

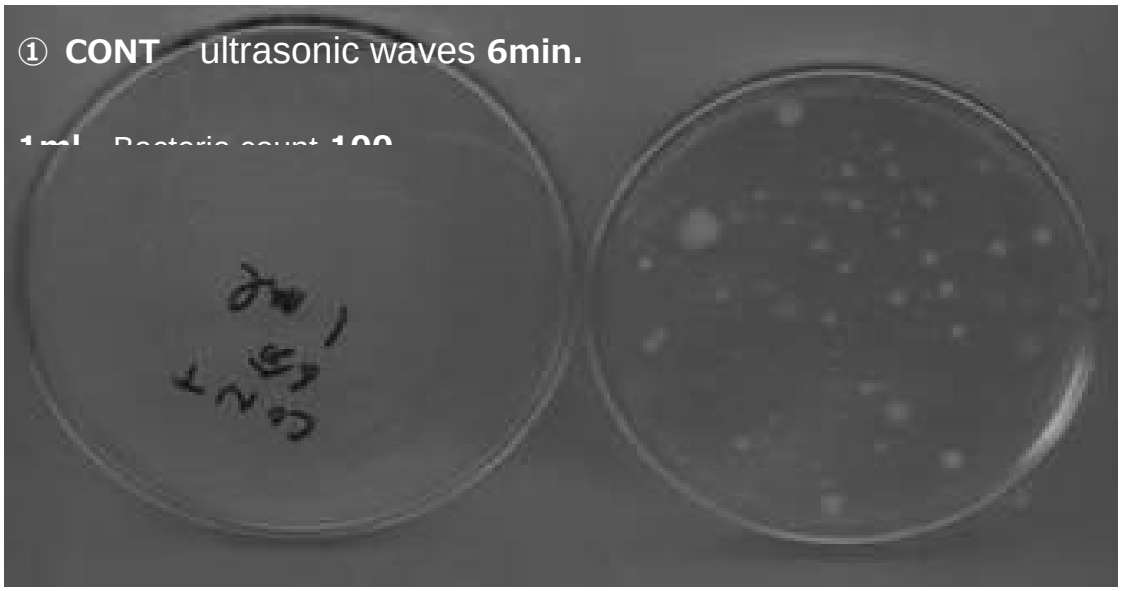
② «Cleaning sanitization of food»

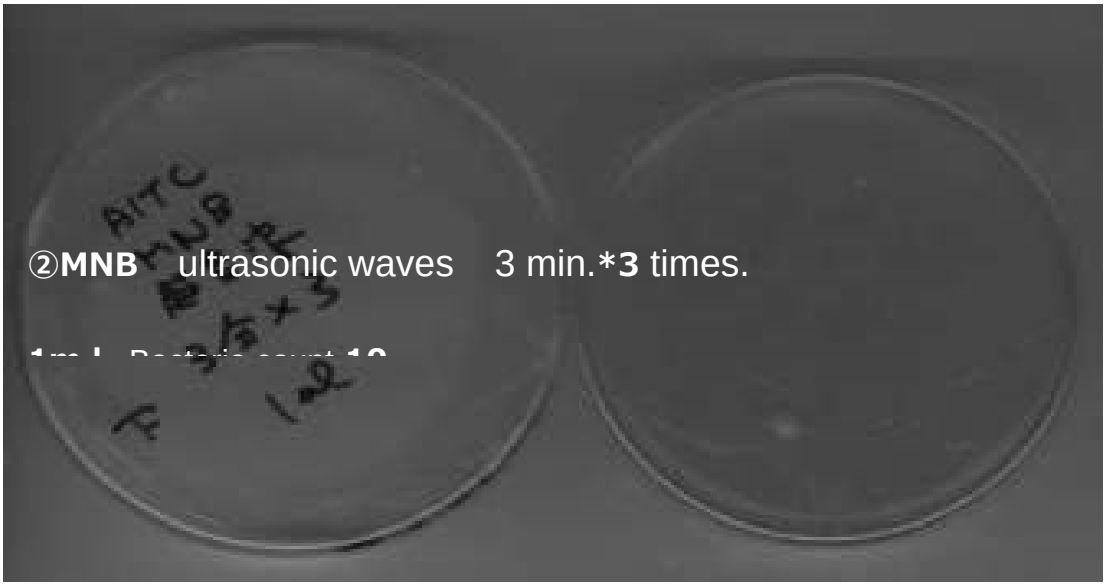
A. E. coli bacteria elimination test of cut lettuce



	Start	After bubbling
Micro-bubble 10 min.	190,000	1,100
Micro-bubble 15min.	190,000	3,600
Micro-bubble 20 min.	190,000	400
Hypochlorous acid 100ppm 10 min.	190,000	410

B. Sanitization test of chicken wings





- Generate ultrasonic waves while generating fine-bubbles to AITC solution 50ppm , piece of chicken wing in it while replace solution every 3 minutes. This procedure was pepeated 3 times.

③ Bacteria control·····MRSA

Source : Antibacterial and Antiviral Actions of Micro-bubble Generated by Ultrasonic Machine Having a High Performance on Opportunistic and Pathogenic Microorganisms and its usefulness

Muneo MOTOMURA, kukatsu SUZUKI Department of clinical Nutrition, Faculty of Health Science, Suzuka University of Medical Science

Changes in the bacteria count of Staphylococcus aureus (MRSA)

MRSA is resistant to meticillin antibiotics and couse outbreals in nursing homes and schools.

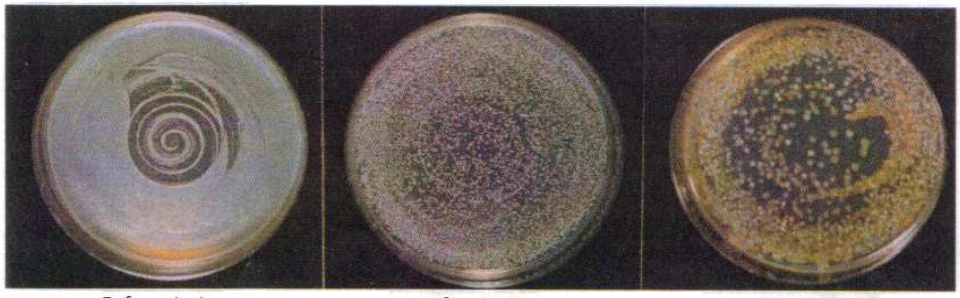
Its fatality rete is high.

One minute after MB treatment, 33 million became 5.6 million. 83.00% of MRSA was killed.

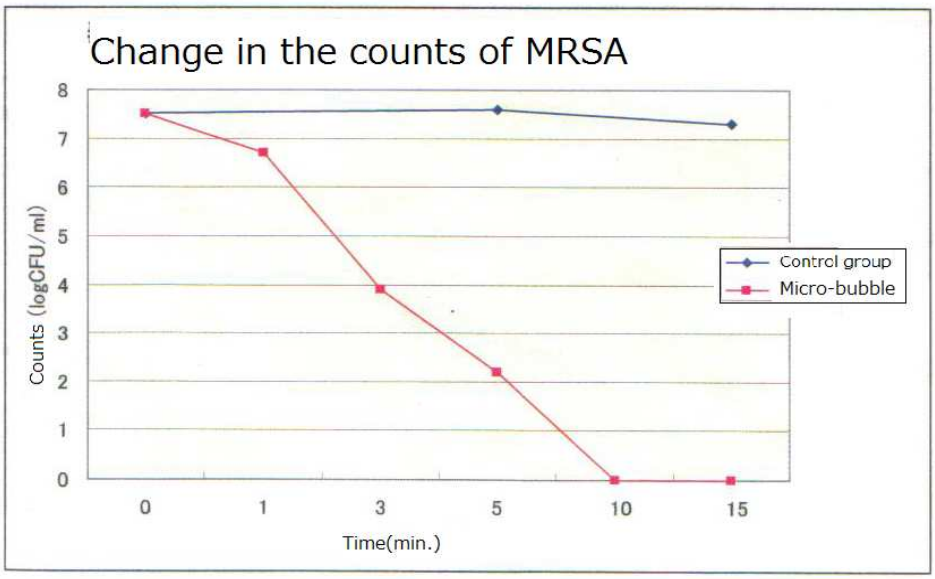
7600 remained after 3 minutes, kill rate reached 99.98%.Completely extinguished after 10 minutes.

Control group	$(3.3\pm0.3)\times10^7$ (7.5 ± 0.1)	ND	ND	$(3.8\pm0.6)\times10^7$ (7.6 ± 0.7)	ND	$(2.2\pm0.4)\times10^7$ (7.3 ± 0.4)
Micro-bubble	$(3.3\pm0.3)\times10^7$ (7.5 ± 0.1)	$(5.6\pm0.5)\times10^6$ (6.7 ± 0.2) [83.00%]	$(7.6\pm0.7)\times10^3$ (3.9 ± 0.1) [99.98&]	$(2.4\pm0.3)\times10^2$ (2.2 ± 0.1)	0 (0)	0 (0)

( ):logCFU/ml、[ ]:Killing rate

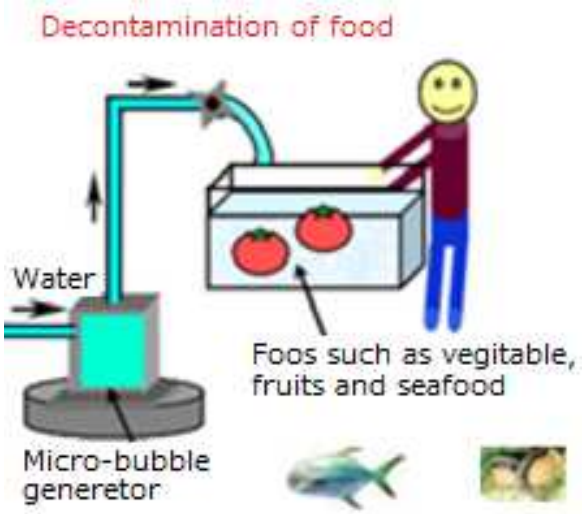


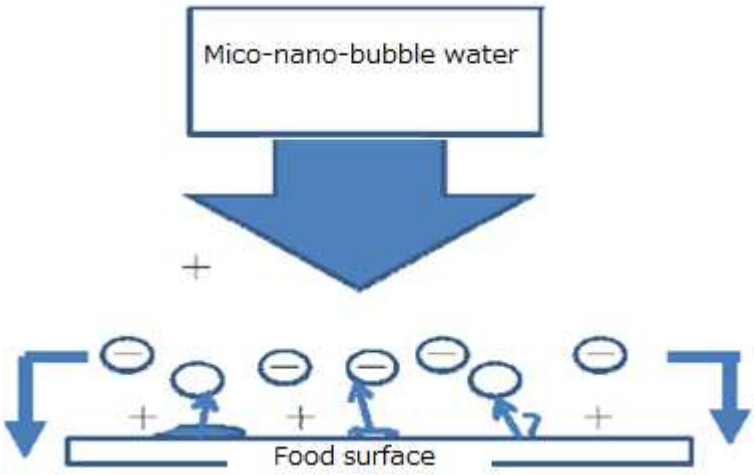
Before start　After 1 min.　After 3 min.



④Decontamination of radioactive species

Radionuclides such as radioactive cesium are electrically charged + are attached to the food surface. Micronano-bubble may contact and remove them as micronano bubble carry negative electric charge

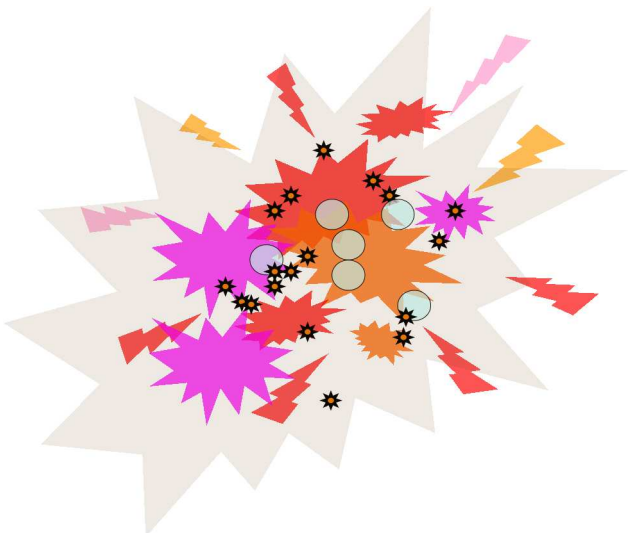


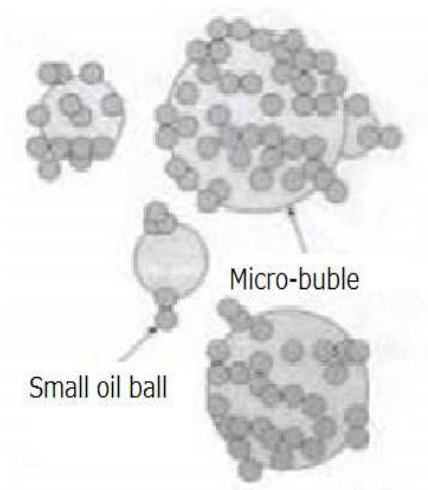


3 EMULSION

- Energy-saving combustion of fuel oil
  Emission reduction such as Nitrogen oxide (NOx) ,sulfur oxides (SO)
- Fod emulsification

Combustion efficiency can be improved as oil that has been broken up into small oil ball stick to bubble which
which is very stabilized.





4 FLOW VISUALIZATION

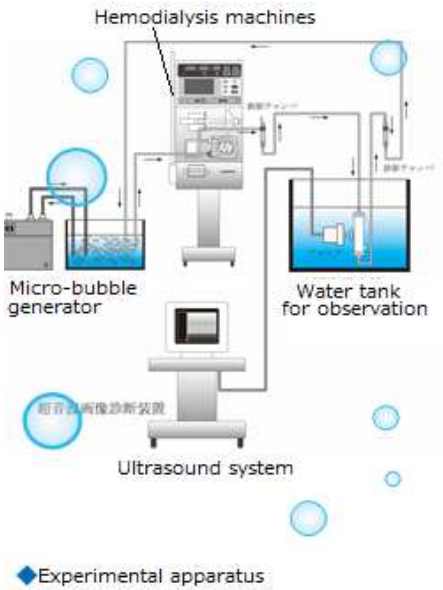
Hori Lab. Department of Applied Physics, Okayama University of Science

http://www.dap.ous.ac.jp/~hori/index.html

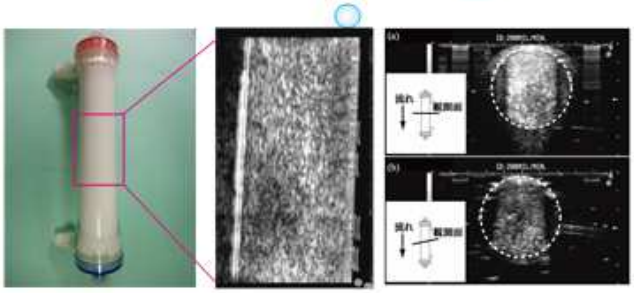
Micro-bubble has a large Acoustic impedance, so it reflects ultrasonic. Therefore, it can be used as a tracer by combining the ultrasound system.

Dialyzer is a medical device that got approximately from 10000 to 20000 membranes with straw-like fine holes. It is needed to visualize the flow of the dialysis fluid is useful t o develop the dialysis device with high performance.

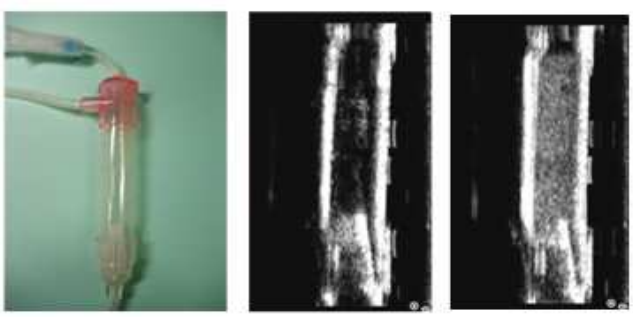
The study was published in **The Japanese journal of medical instrumentation** Vol.80, No.3



◆Experimental apparatus



Visualization of the flow in dyalyzer inside



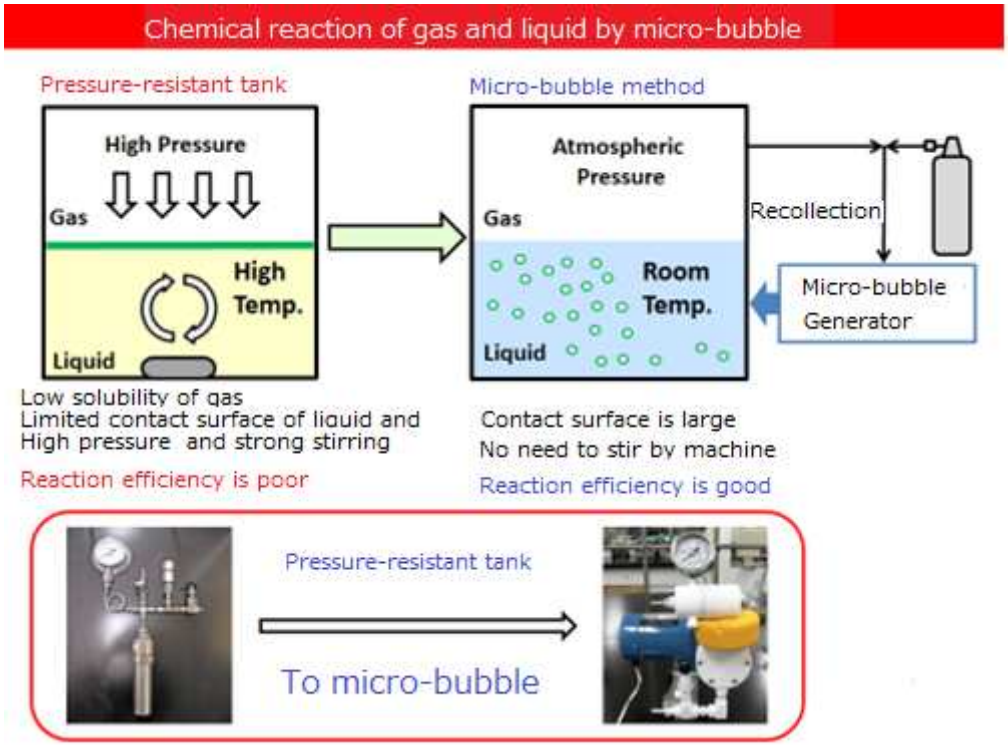
Visualization of drip chamber that catch clot

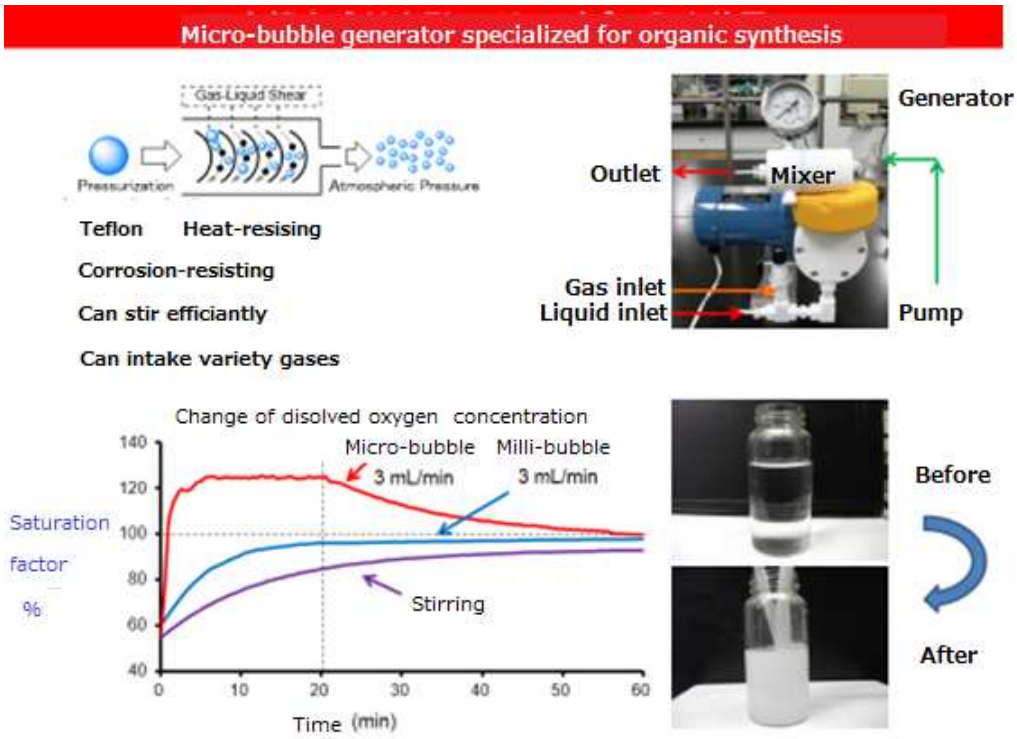
5 ORGANIC SYNTHESIS BY MICRO-BUBBLE

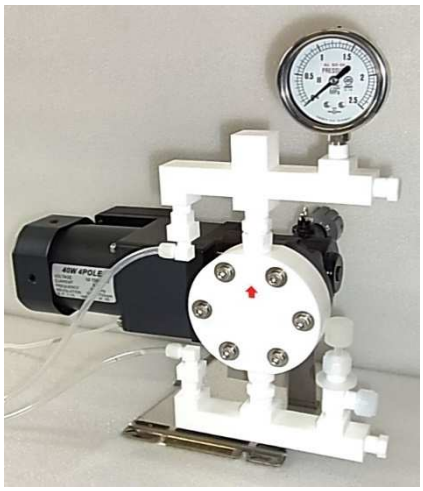
Mase laboratory, Department of Applied Chemistry and Biochemical Engineering

Course of Chemical and Bioengineering, Shizuoka University

http://www.ipc.shizuoka.ac.jp/~tnmase/mase_lab_E/mase_lab_E.htm







Model	MA3FS
Flow ml/min.	120-150
Weight kg	7
Power supply	AC100Ⅴ
Frequency	50/60Hz
Size H×W×D ㎜	380×360×210

ASUPU CO., LTD

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