



News

The fine bubble breakthrough

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Imagine your kitchen floor or bathroom tiles being cleaned by very tiny bubbles. Or imagine round-the-clock restrooms staying clean and functional. Sounds great, but how is it possible and is it too good to be true? Not anymore, a new technological era is dawning.

Washing with soap and water may soon be a thing of the past thanks to an incredible new technology that creates water containing ultra-fine bubbles (smaller than the wavelength of light) – a scientific feat heralded as the next technological breakthrough. It sounds too good to be true, but according to the [Fine Bubble Industries Association](#) (FBIA) in Japan, it's a very real solution to the wasteful (and not to mention laborious) task of cleaning. And it's not only household chores that will benefit. Fine bubbles are also expected to give plenty of advantages to other applications, from accelerating the growth of hydroponically grown plants to enhancing the power of skin creams and serums.

Bubbles contained in a liquid are classified based on size :

- **Bubbles** – volume of gas enclosed by an interface in a liquid
- **Fine bubbles** – bubble of a size typically less than 100 micrometers
- **Ultra-fine bubbles** – fine bubble of a size less than one micrometer

So what's the big deal with bubbles? Perhaps you're not aware, but there are bubbles and bubbles. They come in all shapes and sizes: bubbles, fine bubbles and ultra-fine bubbles.

Dr. Bob Carr from [NanoSight Ltd.](#), a UK-based company that measures ultra-fine bubbles, sees a very bright future for the new technology: “Fine bubbles appear to be an extremely interesting and exciting new technology and such is the rate of growing interest in a very wide range of applications that we hope to be in a position to design and develop instrumentation for use by many industries in this field.”

The bubble boom

In the last decade, the use of fine bubble technologies has skyrocketed. According to the preliminary market research conducted by the FBIA, the total amount of fine bubble business including management and operation services, facilities and related systems that are connected to core products was USD 20 million in 2010. It is expected to rise to USD 4.3 billion in 2020, and USD 8.5 billion in 2030. While interest in fine bubble technology is nothing new, what’s different about recent optimism is that this innovative technology has recently generated much attention, and its potential has become a lot clearer – especially in the last few years.

FBIA Chairman Dr. Akira Yabe points to a remarkable case at the Isahaya Bay of Nagasaki, where high water pollution levels were causing clams to die. The use of fine bubbles in the Isahaya Bay not only improved water quality, but enhanced clam survival rate. “The potential of fine bubbles in the treatment of water is enormous, particularly in developing countries suffering from water pollution and shortage. I believe the use of fine bubble technologies will spread very widely in a short amount of time.”

In Japan alone, calculating the global business scale based on the Japanese global share of the water business, the fine bubble business volume worldwide was USD 1.26 billion in 2010 and is expected to be USD 44.3 billion in 2020, and USD 126.7 billion in 2030.

Scrub-free cleaning

Fine bubble technology can be put to a multitude of cleaning uses. Its cleaning power is more effective than regular water, using less water, and less manpower. Also, fine bubbles are good for the environment, as pre-determined by the amount of water used or waste generated. It also reduces the need for toxic chemicals and other detergents. The biggest benefit is probably the cost implication of producing fine bubbles, which is far smaller than most businesses would spend on traditional cleaning solutions.

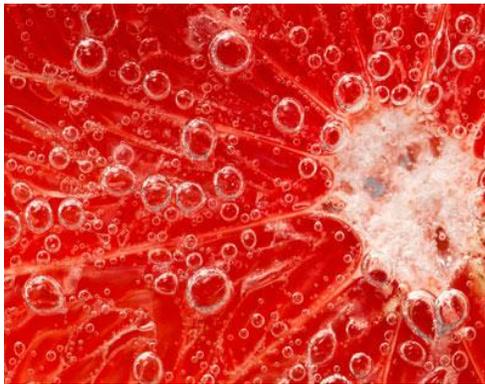
[NEXCO-West](#) (West Nippon Expressway Company Limited), the Japanese expressway company, has been using fine bubble water to clean restrooms in service and parking areas and to remove salt – in other words sodium chloride – that would otherwise damage highway bridges. It says that it has seen a number of improvements, such as:

- 90 % reduction in water use
- 30 % reduction in the number of cleaning hours
- Zero environmental impact (resulting from cleaning agents and other chemical detergents)
- Significantly lower odor levels

As Naoyuki Sumida, Executive Director and Director General of NEXCO-West, puts it: “Fine bubble technology has made effective and efficient cleaning possible. The technology will now need to be applied to a wide range of industries around the world – an indispensable condition for its future development and expansion.”

From fizzy drinks to food

There will be a broad spectrum of business potentials that will benefit from fine bubble technology in the coming years, including the food sector – and I don’t mean just carbonated drinks.



An ongoing collaborative research between MTEC and Kasetsart University (KU) in Thailand concludes that fresh vegetables washed with fine bubble water are more resistant to food-borne pathogens than vegetables washed with normal water. It also concludes that using bubble technology for vegetable growing can effectively prolong the shelf-life of the produce.

The study’s head, Dr. Wannee Chinsirikul, of National Metal and Materials Technology Center in Thailand, reports that washing fresh vegetables with fine bubble water shows great potential.

“Washing of fresh produce is an important step for removing soil and debris, improving the appearance of the commodity, lowering the produce’s temperature (pre-cooling) and limiting the development of physiological changes,” says Dr. Chinsirikul. “Washing also reduces the microbial load on the surface of incoming produce or residual pesticide which impact the product’s quality, shelf-life and safety (Reference : Xuentong Fan et al., 2009).”

What are some other food applications for fine bubble technology? Lettuces grown hydroponically, thicker and creamier mayonnaise, not to mention tastier and nicer-smelling drinks, just to name a few.

Wishful thinking?

Fine bubble technology has advanced over the past decade, with more “real serious widespread adoption” happening in the last two years. What types of applications will appear? Will fine bubble technology be widely adopted? Are there more exciting developments on the way? Where do things stand and where are they going? These are definitely exciting times.

According to Maurice Wedd, the new Chair of ISO/TC 281 for fine bubble technology, ISO’s move to create a new committee will be key to fostering consumer confidence and increasing industry uptake. “Engineering has now developed apparatus that can reliably generate fine bubbles in quantity, and we have already seen numerous applications of their use. All of these current uses and applications, together with new ones evolving over time, are likely to meet a degree of regularization with standards as they mature.”

Sounds interesting, right? Of course it does. Sounds easy? Hardly. A number of issues still need to be addressed before fine bubble technology truly gets off the ground. There is also much controversy over why fine bubbles exist in water for long periods of time, or even why they are so effective. In fact, scientists have only really been able to prove their existence quite recently.

It's going to be an exciting – if at times overwhelming – journey for fine bubbles in the next few years. Over time, the development of standards into this new and innovative technology will spur industry-wide adoption and deployment. But one thing is clear: there's no bursting this technology bubble.