



Introduction to ultrafine bubbles and its applications



Tiny Bubbles Make A Difference!
BL Dynamics Inc.

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<http://www.bldynamics.com>



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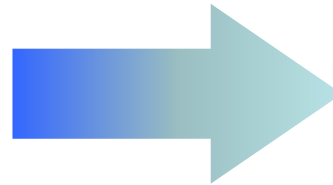
Ultrafine bubbles



BL Dynamis Inc. offers various lines of products producing ultrafine bubbles. Bubbles smaller than $50\ \mu\text{m}$ in diameter have unique properties which are different from larger bubbles.



Euglena (approx. $50\ \mu\text{m}$)



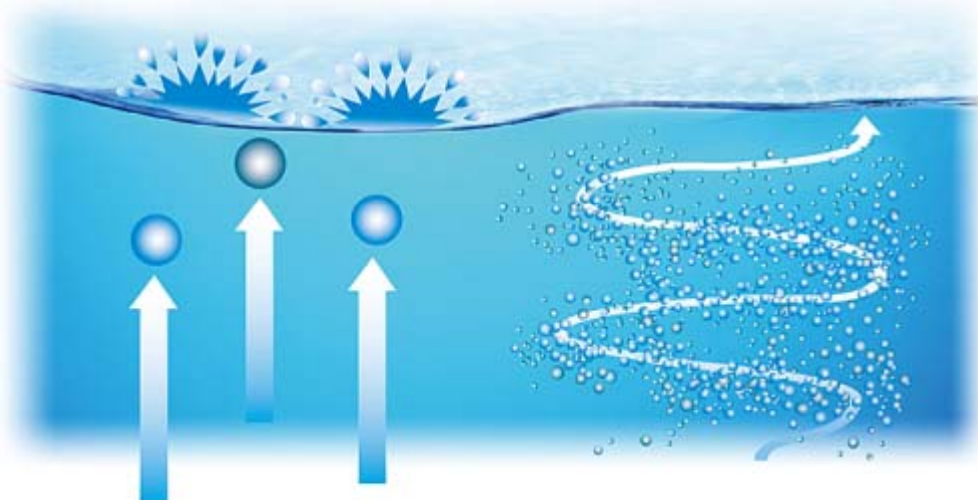
**Ultrafine
Bubbles**



What makes a difference?



1. Longer Retention

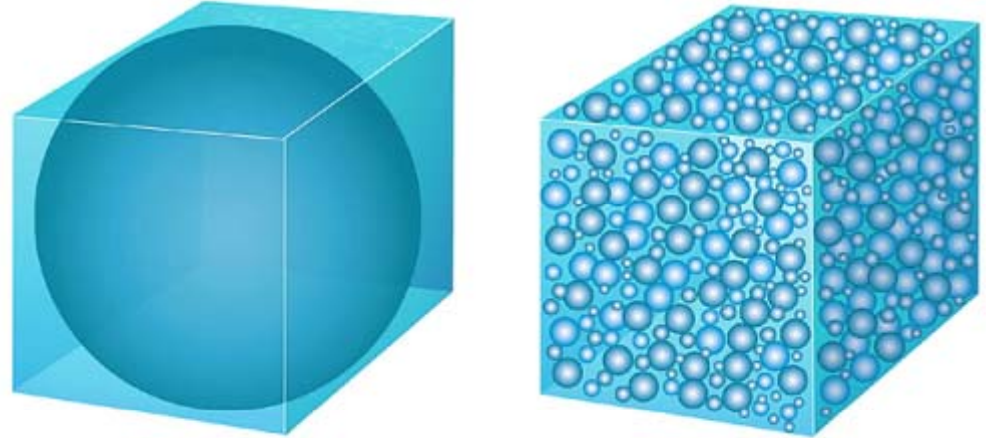


Large Bubbles

Ultrafine Bubbles

Tiny bubbles have smaller buoyancy, and able to survive underwater longer Than larger bubbles.

2. Better Reactivity



In a same volume of water, the contact area between water and bubbles in water filled with tiny bubbles are much larger than in water filled with bigger bubbles.

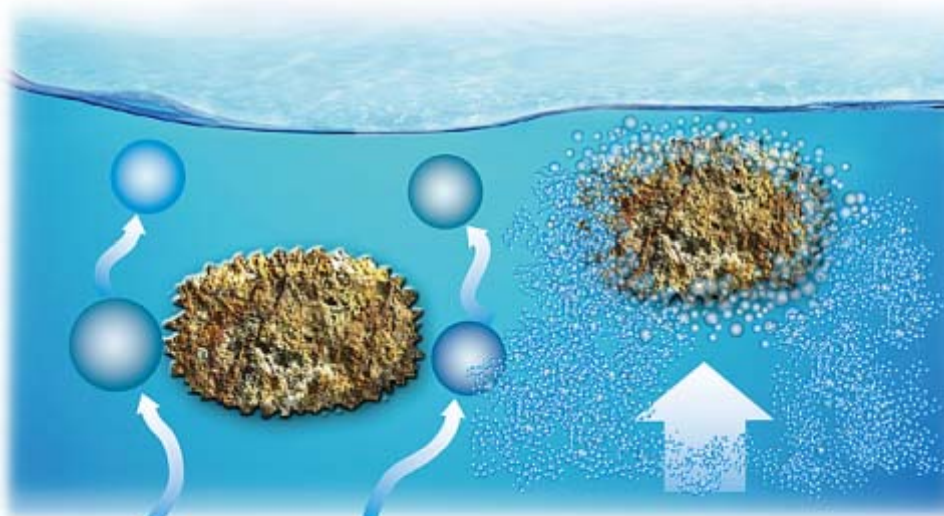
The increase in the contact are dramatically enhances aerobic bacteria activities in the liquid and the efficiency of chemical reaction between the supplied gas and liquid ingredients.



What makes a difference?



3. Air Flotation Efficiency

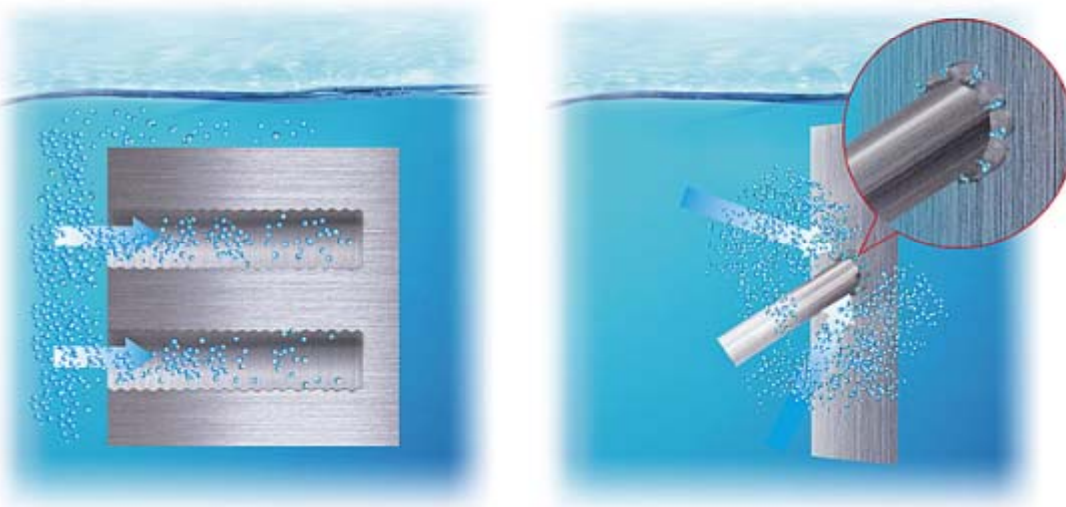


Large Bubbles

Ultrafine Bubbles

Since suspended solids are not uniform in size and shape, larger bubbles often fail to catch and bring them up to the surface. By contrast, tiny bubbles can penetrate into small dents of a contaminant and enclose it entirely in a ball of tiny bubbles, making it buoyant.

4. Better Detergency



The surface tension of liquid is proportional to the density of the liquid. Introducing tiny bubbles into liquid lowers the apparent density of the liquid, resulting in **better soaking and detergency**.

Nano BL takes in air from outside and turn it into ultra fine bubbles with an incorporated special rotary mechanism generating turbulent flows and an agitation and shearing mechanism, all working on a single power source. Being a self-contained portable system, it requires no external air supply equipment such as a compressor. It can be used even in highly contaminated waste fluids almost free from worries about clogging.



All working on a single power source

No external air supply required

Almost free from worries about clogging

Compact, portable system, easy installation



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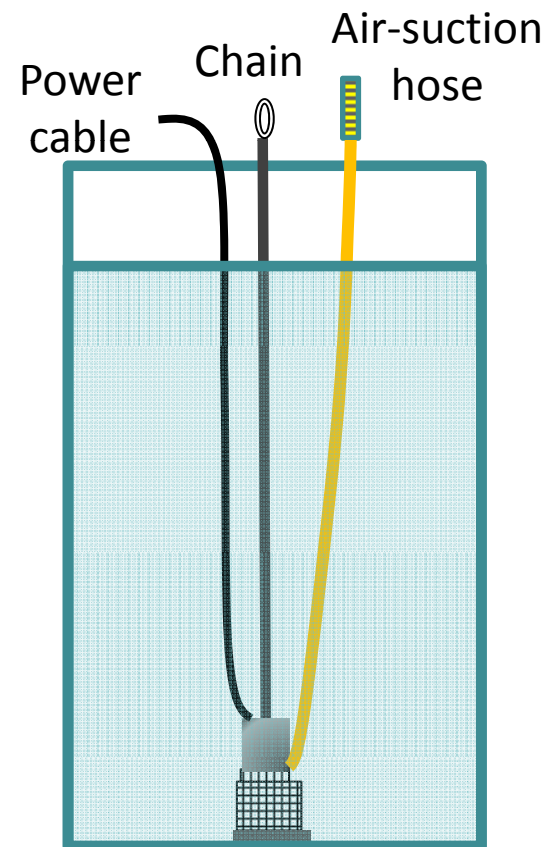
Products: Nano BL (BL-3 / BL-5)



BL-3



Installation diagram



NanoBL



Industrial Applications #1



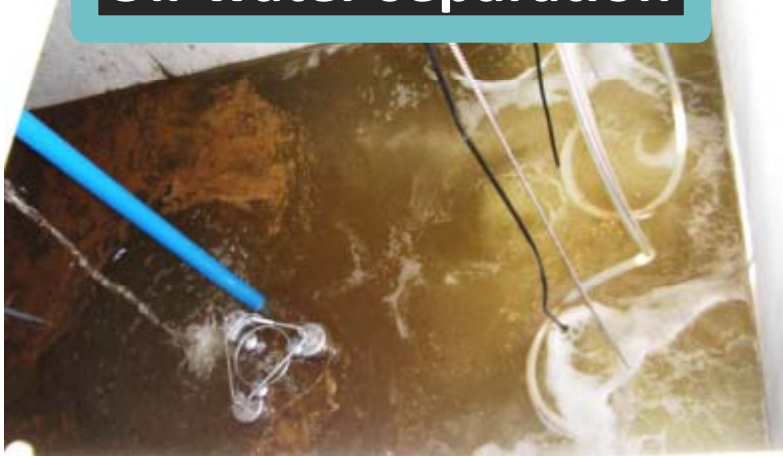
Oil-water separation



Solid-water separation



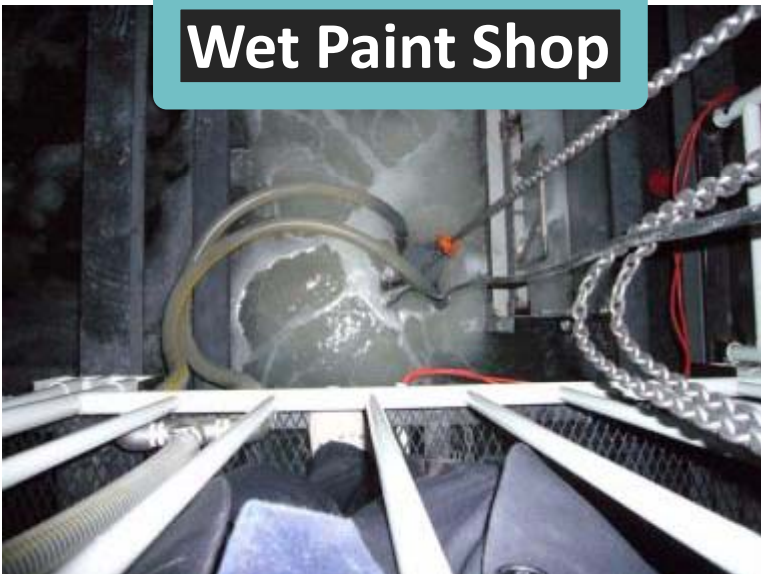
Oil-water separation



- Accelerate oil-water separation
- Accelerate solid-water separation
- Control odor and preventing fouling



Industrial Applications #2



- Better aeration with lower electricity consumption
More than 50% reduction!

	Electricity Consumption	Annual Electricity Consumption	Annual CO2 Emission
Legacy aeration	5.5 kWh	47,520 kWh	18,058 kg
Nano-BL (BL-3 x 3)	2.25 kWh	19,440 kWh	7,378 kg

- Lower maintenance & cleaning cost
- Lower chemical cost
- Prevent unwanted odor



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In Natural Environment

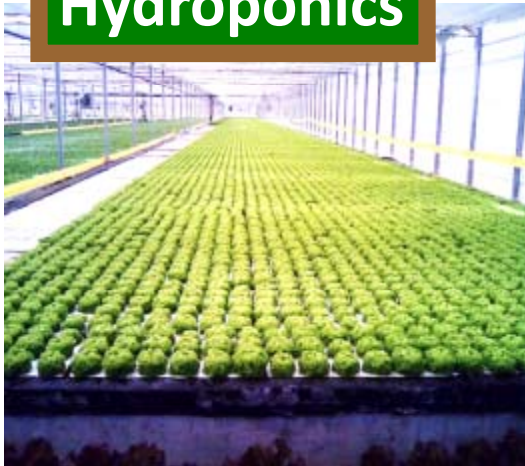


Nano BL

Fish Farm / Aqua Culture



Hydroponics



Lake, Pond, and other natural water area





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Closing



Nano BL

Thank you for your kind attention.

For more details and questions, please contact us below.

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