

What are Nanobubbles?

Nanobubbles are 2000 times smaller than a grain of salt, invisible to the naked eye, but with the power to transform the way gasses are delivered to where they are needed most. Nanobubbles are the most energy-efficient method of transferring gasses into a liquid. This technology is being used across all industries to deliver oxygen, ozone, carbon dioxide, and other gasses in an efficient and economical way.

Unlike conventional bubbles, Nanobubbles do not float, they are not buoyant. Instead, nanobubbles migrate throughout the liquid they are in, gradually releasing their gas for weeks after initial injection. The bubbles also repel one another, so they do not coalesce into larger bubbles. When the bubbles finally release their gas, they implode with a brief, intense energy that creates a beneficial reaction.

Nanobubbles lower aeration costs by up to 75%, reducing capital expenditures and driving down operating expense.



Flotation Boost

Improved recovery of suspended ultrafine and sometimes coarse particles.



Oxidation Boost

Long lasting oxygenation disperses bubbles throughout an entire water body.



Environmental Impacts

Natural processes minimize or eliminate the need for added chemicals.

Mining

Water Treatment

Irrigation

Pool and Spa

Oil and Gas

Pharmaceutical/
Biotech

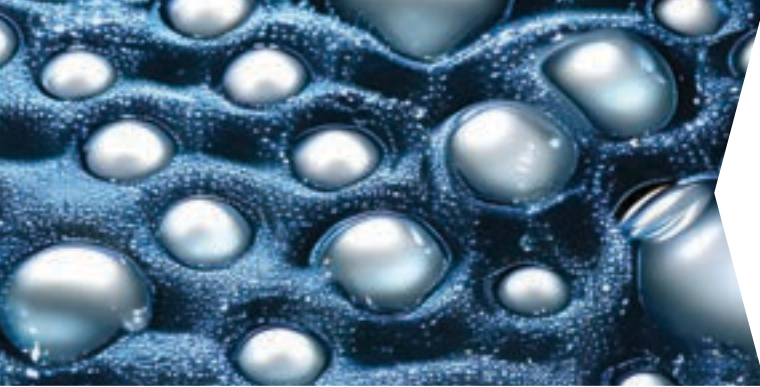
Food and Beverage

Aquaculture

Land and Pond
Restoration

Nanobubbles Improve Mining Operations

Adding a nanobubble generator to insert oxygen or ozone into tailings basins reduces the need for added chemicals like hydrogen peroxide, providing oxygen directly where it is needed most. The use of nanobubble assisted flotation will significantly increase mineral recovery rates with less energy used when compared to traditional methods of solids separation.

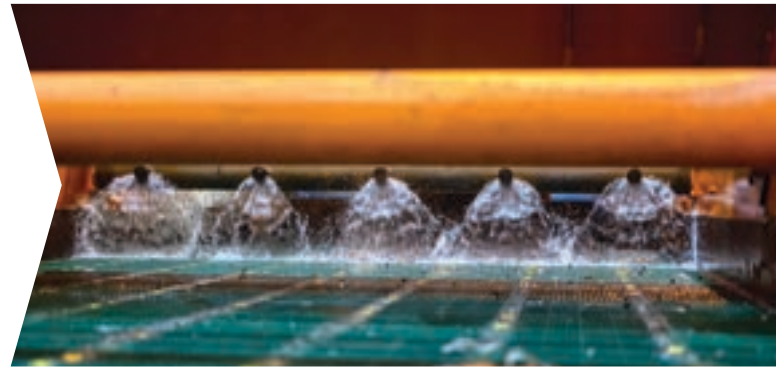


Nanobubble-Assisted Flotation Separation

Froth flotation utilizing nanobubbles will allow for ore flotation by density, not hydrophobicity. In one study of the impact of nanobubble injection on Pb-Cu-Zn sulfide ore, nanobubbles increased fine particles' buoyancy and catch rate, which allowed finer material to be separated and recovered than standard techniques.

More Gold Recovered + Lower Processing Costs

Using nanobubble technology in a gold mining operation has generated a 26% conversion increase in gold recovery by maximizing material recovery efforts. Nanobubble flotation combined with microbubbles and conventional bubbles enabled more gold to be collected prior to discharge into the tailings basin. There are many applications where nanobubble oxidation can reduce or eliminate chemical usage in mining operations.



Nanobubbles Increase Recovery of Precious Metals

Capture copper, gold and other precious metals previously lost to tailings. The use of nanobubble technology can improve flotation rates and aid in the recovery of fine particles, allowing more copper to be recovered from tailings.