

## NANO-BUBBLE VS. ORDINARY BUBBLE

The Nano-bubbles Generator produces an exponentially increased surface area-to-volume ratio per mass as compared to water containing normal bubbles – more than 50,000,000 nano-bubbles per 1 ml (1 cubic centimeter) of water.





# THE NANO-BUBBLE GENERATOR





The Nano-bubbles Generator flow rate is 400 - 1,584 Gallons per minute.



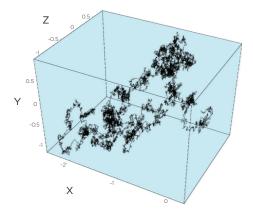
Nano-bubbles as seen with the aid of a laser.



Ordinary bubbles (>1nm diameter) quickly rise to the surface and burst but the smaller nano-bubbles (<100 nm diameter) have a lower buoyancy and will remain suspended in liquids for an extended period of time.

#### **SMALL BUT MIGHTY**

Shown here is a 3D Brownian motion path of a single nano-bubble. In general, nano-bubbles can stay in water column, however depending on chemistry of water column, the nano-bubbles can remain in the water column up to 30 days and as long as 6 months in controlled lab testing.

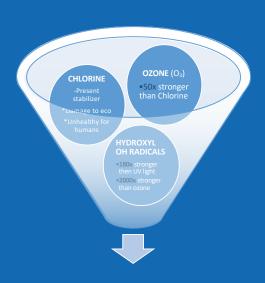




GREG CHAPAS • DIRECTOR OF SALES PHONE: (904)-422-5288 EMAIL: GCHAPAS@BLUENANOTECHNOLOGIES.COM



2019 Tested and Approved Technology\*



### **WHAT ARE NANO-BUBBLES?**

The International Standards accepted diameter of a nano-bubble is 50 microns or less.

- Impossible to detect with the human eye
- Greater than 109 bubble density per cm3
- True nano-bubbles sink, continue to shrink. implode and generate high levels of heat and pressure (OH- radicals)
- Mass transfer gas efficiencies exceeding 90% retained in water
- No off gassing or loss to atmosphere because the size of the bubbles allows them to stay in the water column



#### WHAT BLUE NANO TECHNOLOGIES DOES...

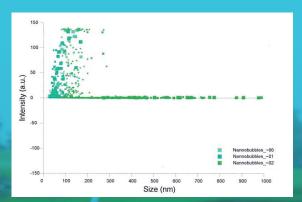
- Blue Nano Technologies, LLC eliminates harmful algae and odors, Highly concentrated nano-bubbles combine with controlled providing long term solutions without the need for chemicals
- The Anzai nano-bubbler generator is made of carbon ceramic and creates negative charges at the bubble liquid/gas interface
- Capable of injecting gas into water at low pressures
- Creates high outer surface pressure and inner surface pressure causing extremely dense bubble formation
- · Little or no maintenance required
- Scalable to higher flow rates
- Compact and easily transported in a specially designed trailer
- Controlled levels of oxygen/ozone gas are injected into the carbon ceramic
- Liquid flows over the carbon ceramic media shearing nano-bubbles off of the ceramic surface

- levels of ozone entering the water column
- · Levels of oxidation reduction potential are continuously monitored
- Upon entering the water, the nano-bubbles will sink and continue to shrink, slowly diffusing remedial gas affecting contaminants
- At end of the nano-bubble life cycle, implosion will occur creating hydroxyl radicals, which offers guicker remedial solutions of lake and pond waters
- This will begin improvement of low dissolved oxygen conditions
- As the monitored water column health improves, equipment can reduce use of ozone, eventually converting to injecting oxygen into water column
- As algae, diatoms, toxins, and bacteria are removed, water clarity improvements occur
- Ultimately, with the health of the water column improved, the habitat of aquatic life will be restored

#### **NANOSIGHT**

- Focusing on using ozone impregnated nano-bubbles for disinfection
- Ozone is a well known sterilizer
- Considered 100% natural disinfectant
  - Approximately 10x more effective than chlorine
- Technology delivers ozone directly to water through nano-bubbles with an unequaled, high gas absorption rate above 90%
- Bubbles act as a dissolved gas
- Non selective biocide and chemical degradant

\*Blue Nano Technology, LLC equipment designed and assembled by Environmental Compliance Equipment (ECE) equipment produces the greatest density of gas infused nano-bubbles per cm3



Anzai nano-bubbler produces 98% of bubbles in 10nm - 97nm size One nano-meter = one billionth of a meter