



ژنراتور نانو حباب واتوکس در فرآیند تصفیه آب و فاضلاب

مهندس عارف دادگستر

مدیرعامل شرکت نانو حباب انرژی

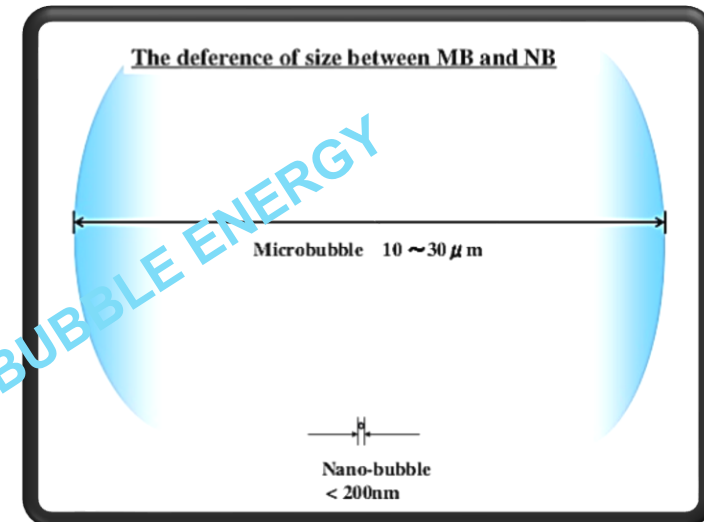
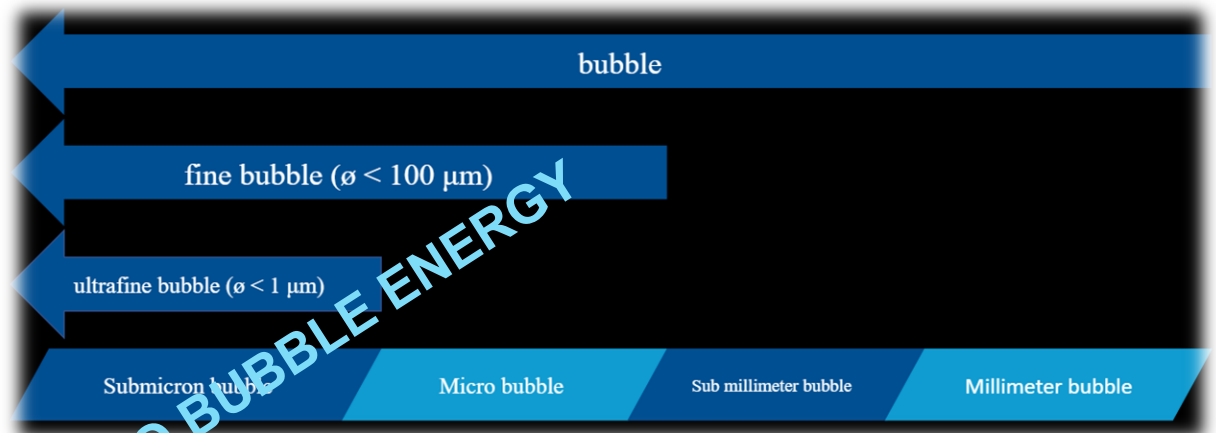
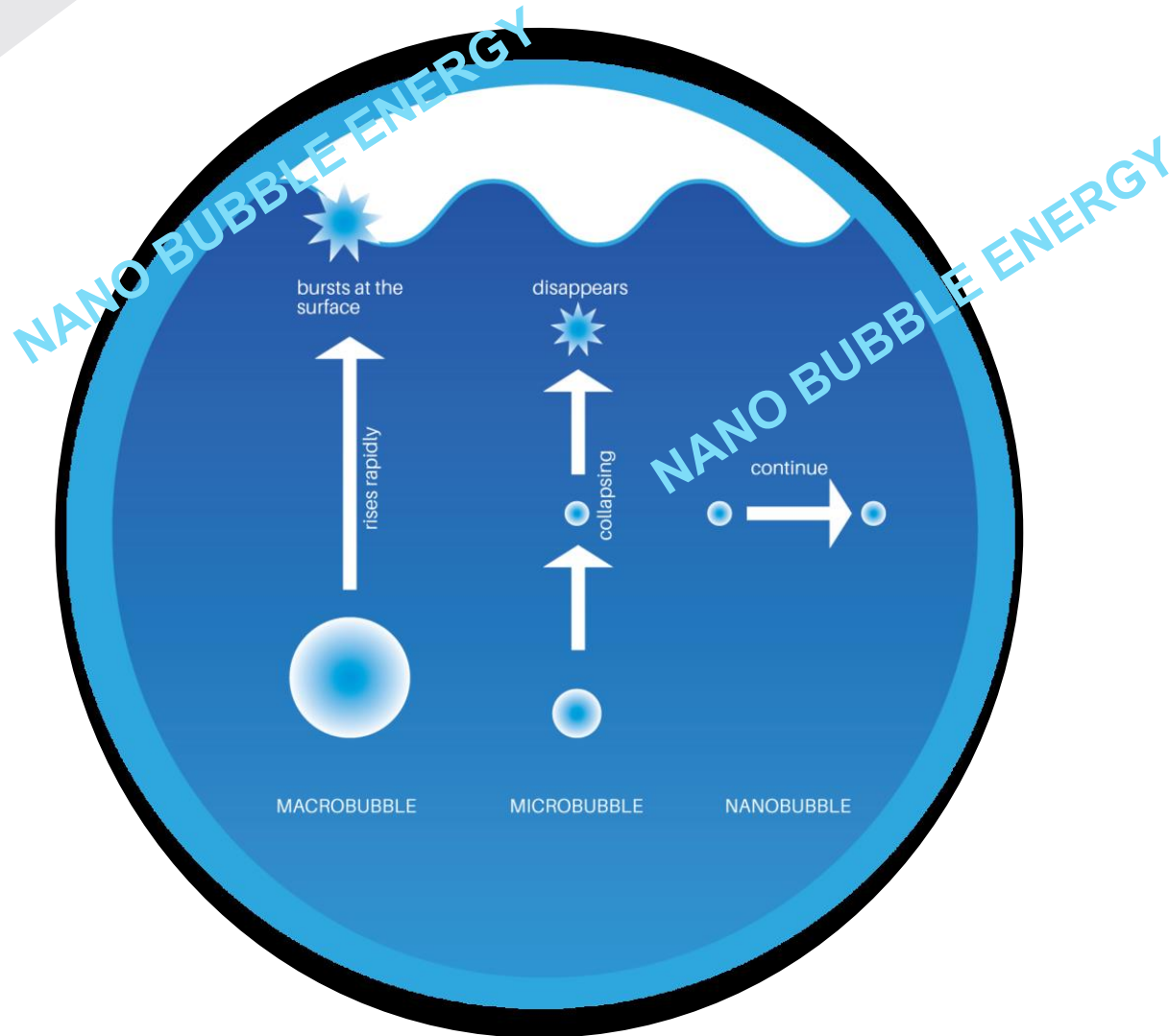
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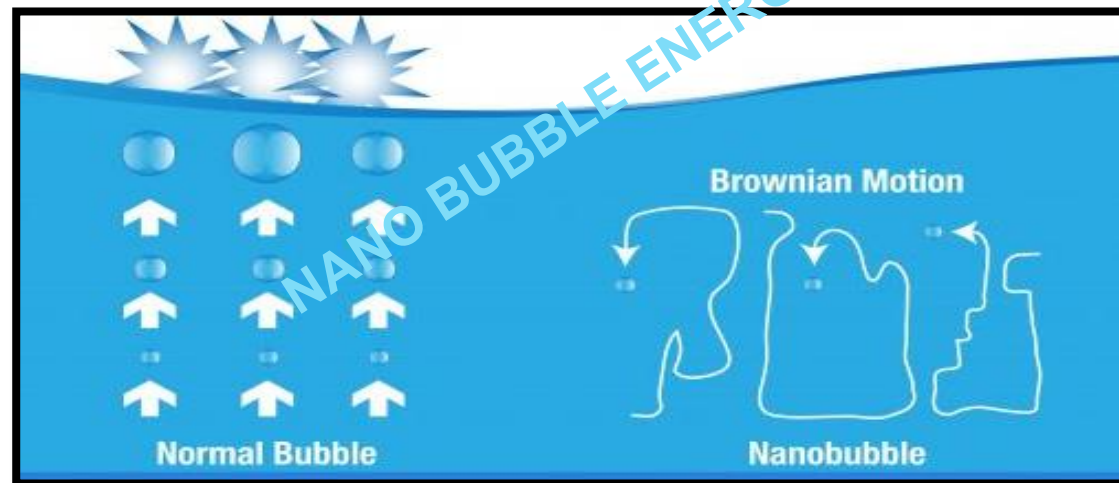
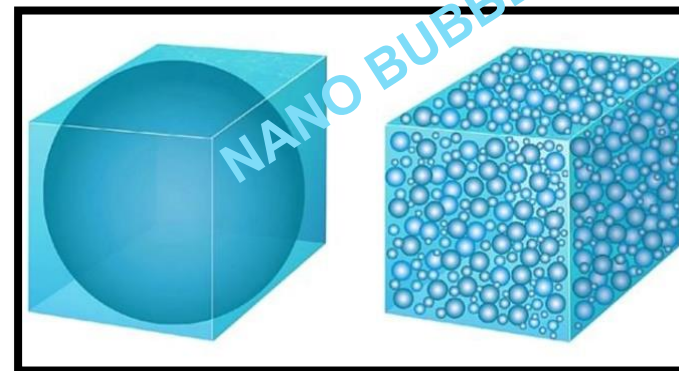


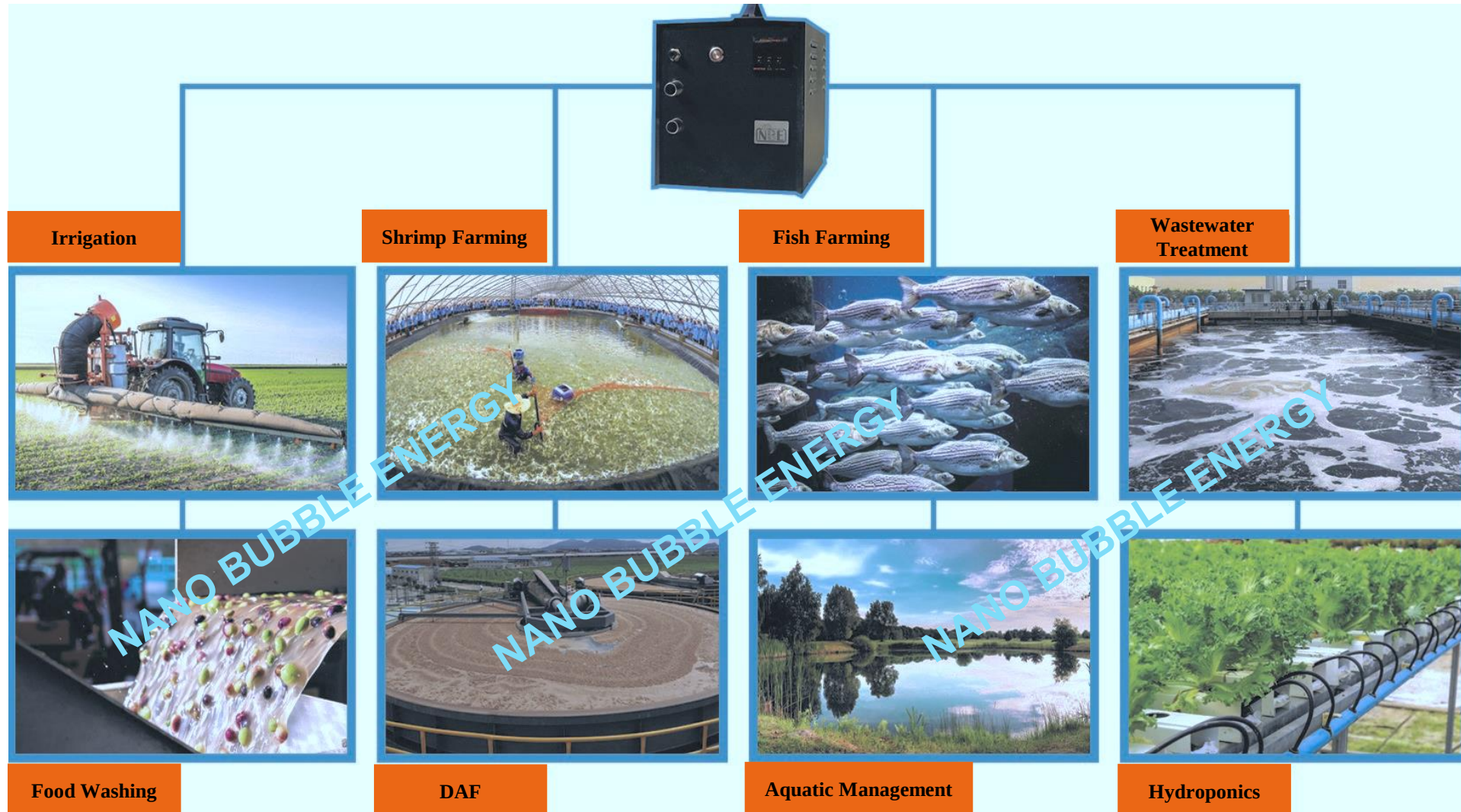
Outline

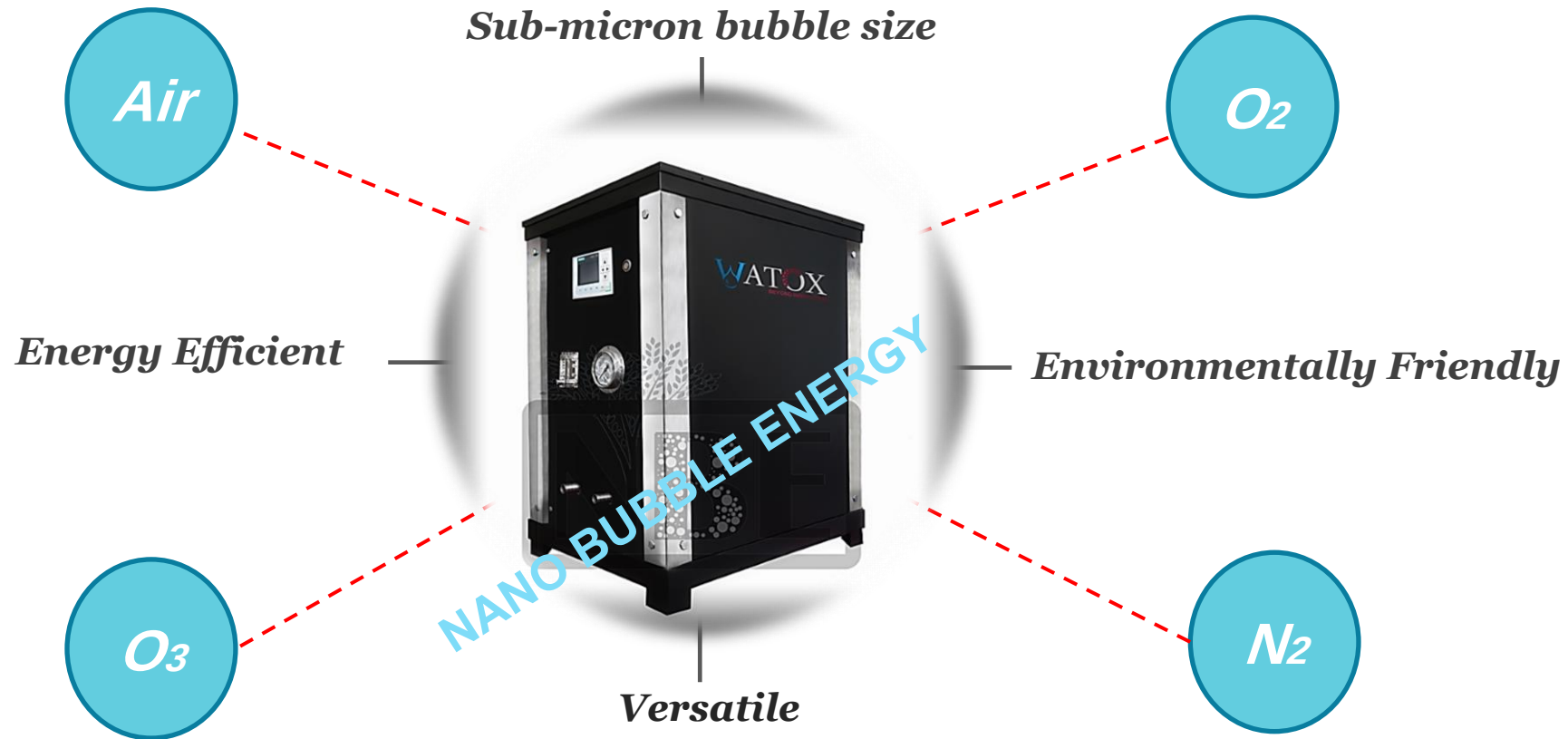
- ✓ **Introduction**
- ✓ **Nanobubbles & Attributes**
- ✓ **Applications**
- ✓ **NBE's nanobubble generators**
- ✓ **Measurements**
- ✓ **WATOX**
- ✓ **WATOX in water & wastewater treatment**



- ☐ Sub-micron diameter
- ☐ Large interfacial surface area
- ☐ Neutral buoyancy
- ☐ High internal gas pressure
- ☐ Negatively charged surface







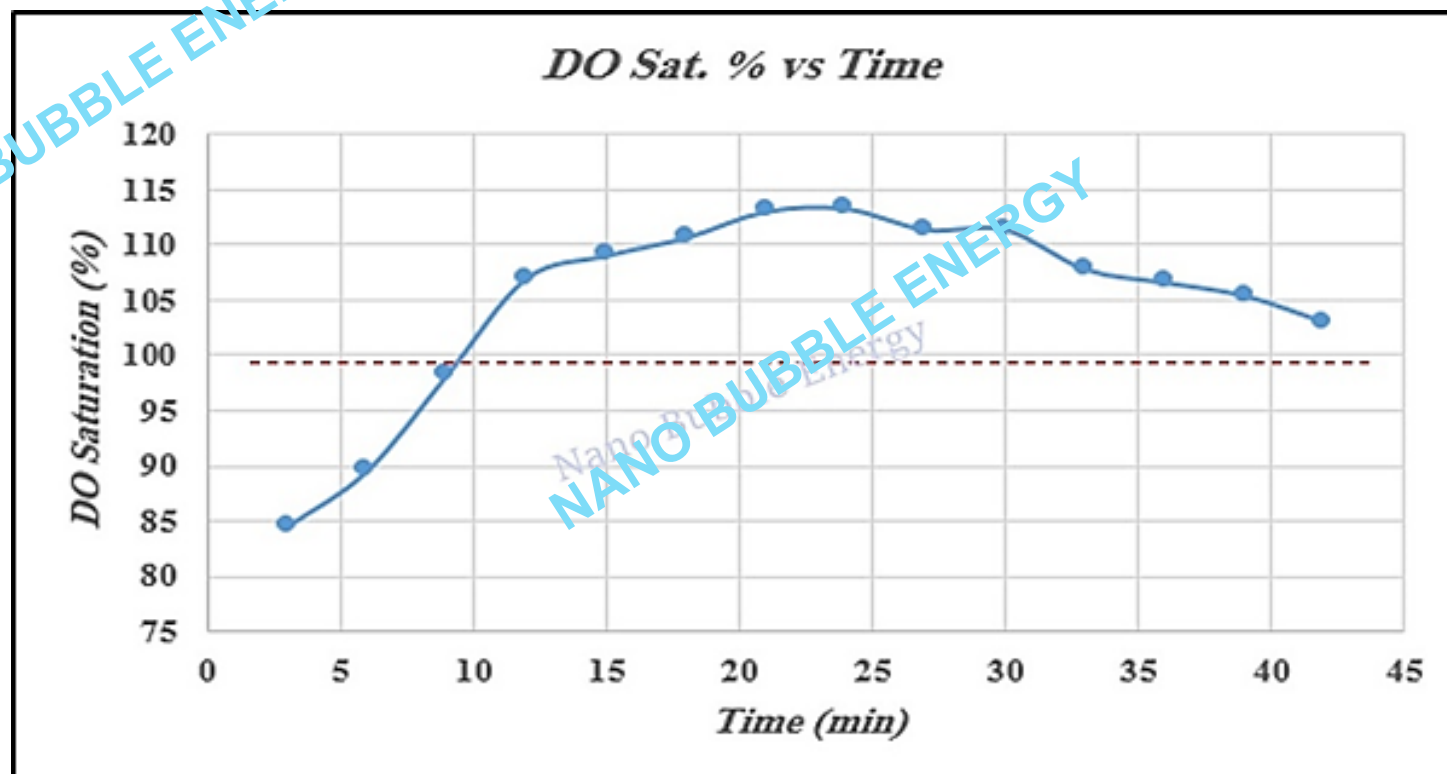


NBE's nanobubble generators

5



1. DO Measurement (Air Nanobubbles)





Measurement

7

2. Size Quality Report



Size Quality Report

Sample Name:

SOP Name: Size-clear cell zeta.sop

File Name: DTS.dts

Record Number: 1376

Measurement Date and Time: Wednesday, August 26, 2015 9:00:48 AM

RESULT MEETS QUALITY CRITERIA

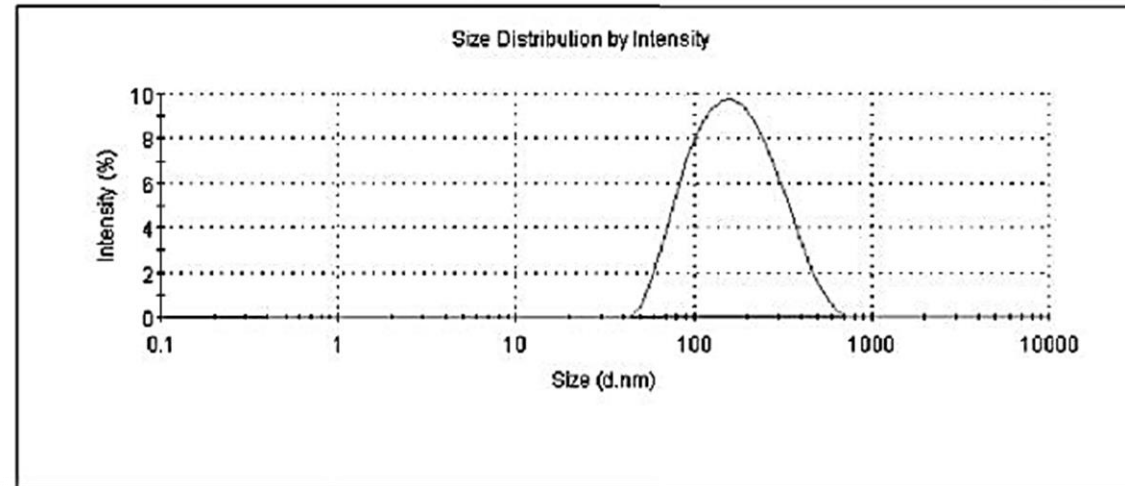
Micro-Nanobubbles Fundamentals and Applications-2-3-5 Measurement of size and zeta potential of nanobubbles

3. Bubble Size Measurement (Air Nanobubbles)

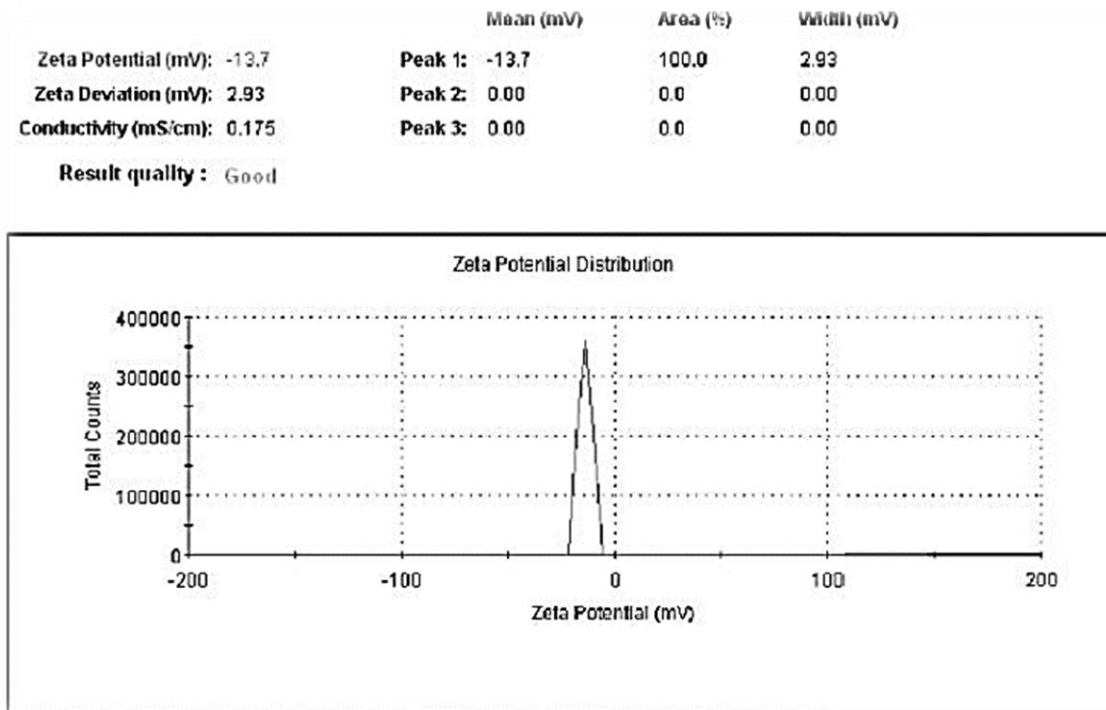
Bubble Size Diagram vs Intensity

Z-Average (d.nm): 168.0
Pdl: 0.398
Intercept: 0.728
Result quality : Good

	Diam. (nm)	% Intensity	Width (nm)
Peak 1:	190.1	100.0	105.0
Peak 2:	0.000	0.0	0.000
Peak 3:	0.000	0.0	0.000



4. Zeta Potential (Air Nanobubbles)





Applications

- **Aeration ponds**
- **Activated Sludge Tanks**
- **Aerobic Basins**
- **Aerobic Digesters**
- **Stabilization Ponds**
- **Lagoons**
- **Dissolved Air Flotation**
- **Membrane Bioreactors**
- **Clarifiers**

Benefits

- **Significant increase in DO**
- **Aerate any depth**
- **Reduced treatment time**
- **Boost treatment capacity**
- **No off-gassing**
- **Reduced sludge volumes**
- **Reduced odors**

Aeration

Energy Consumption

50-70 %

Operating Costs

> 30 %

Appropriate Aeration Method

NANO BUBBLE ENERGY

NANO BUBBLE ENERGY

NANO BUBBLE ENERGY



Loads of Thanks