# ANSEROS INDUSTRIAL OZONE SOLUTIONS

SEMICONDUCTOR

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Recycling the life

## SOLUTIONS FOR SEMICONDUCTORS INDUSTRY

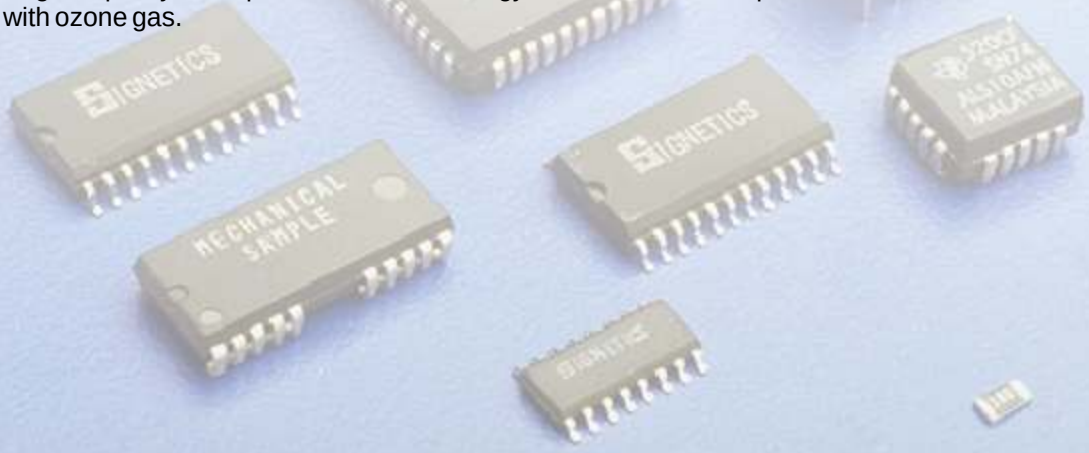


### INTRODUCTION

When most people think of ozone, they picture a thin layer of gas high above the earth's outermost atmosphere that protects us from the sun's ultraviolet rays. But this bluish gas, which sometimes is described as that "fresh smell" after a thunderstorm, has a variety of down-to earth uses. Ozone is a gas. And it's made of just one thing "oxygen".

Ozone can be visualized as a regular O2 molecule with a very nervous, active, reactive, excitable, energetic, and lively O1 atom as a side kick. This monatomic O1 atom does not like to be alone, and near the earth's surface, it refuses to stay with the stable O2 double bond. It is active and reactive, with energy needing to be channeled in some useful direction. It will combine with virtually anything on contact, or at least will try. This active O1 will not stabilize until it can break away from the O2 and form a stable molecule with something else, virtually any other molecule that is available. If no other molecule is available, it will eventually unite with another O1 atom in the same situation, and restabilize as O2."Ozone is simply a gas composed of three oxygen atoms. It's an extraordinary sanitizing agent that's economically produced and remarkably effective in applications such as food processing and equipment cleaning/sanitizing.Today, ozone technology is steadily replacing conventional sanitation techniques such as chlorine, steam or hot water.

Growing consumer awareness and increasingly stringent regulatory demands have resulted in renewed emphasis on the quality of water used for the production of semiconductors, pharmaceuticals, water for human consumption and many more.To achieve these new standards of quality, improved technology must be utilized to provide water free from all bacteria and organics and to maintain water systems free from bacteria and biofilms without risk of disinfection products affecting the quality of the product. The technology to achieve these requirements is ozonation, the treatment of water and air with ozone gas.

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## OZONE TECHNOLOGY

Ozone is a very strong disinfectant and oxidizer. Any pathogen or contaminant that can be disinfected, altered or removed via an oxidation process will be affected by ozone. It is the strongest of all molecules available for disinfection in water treatment, and is second only to elemental fluorine in oxidizing power. Compared to chlorine, the most common water disinfection chemical, ozone is a more than 50% stronger oxidizer and acts over 3,000 times faster. Both chlorine and fluorine are highly toxic chemicals.

Ozone gas produced electrically in an ozone generator from oxygen in ambient air is readily dissolved in water to provide a highly reactive oxidizing disinfectant. Ozone as triatonic allotrope of oxygen, is a highly reactive oxidizing agent and readily breaks down most organic molecules. It is the most effective oxidizing disinfectant commercially available being significantly more powerful than chlorine, chlorine dioxide and peracetic acid.

Ozone has a short half-life (10-20 minutes in water) and breaks down to natural oxygen. The use of ozone will not result in the formation of chlorinated hydrocarbons or other residual by-products as with the use of chlorine or chlorinated compounds. Ozone is readily degraded to oxygen using UV light or catalyst allowing ozonated water to be instantly deozonated ready for use.

With the use of ozone, water can be treated to a degree of purity and freshness unachievable by any other means. Using ozone, the complete water system including all distribution pipework, filters, storage tanks etc. can be routinely disinfected and cleaned to remove biofilm without the need for draining down or extended shutdown.Once installed, ozone systems are simple and economic to operate requiring only electricity and air as consumables.

## OZONE APPLICATION

In Semiconductor industry there is no compromise on highly purified cleaning. Ozone treatment is a only solution which can meet these standards. Ozone gas can be used for wafer dry and wet cleaning maintaining the aspects of total metal free mechanism.

Anseros system “PAP” is a research based technology for total metal free wet cleaning, dry cleaning,TEOS, CVD and Hydrophobics.

## SYSTEM LAYOUT

HFCD - High Frequency Corona Discharge - the most challenging and the most rewarding ozone producing process currently known and commercially used. The development of our HFCD systems was allowed by advancements in the production of semiconductors, leaving classic ozone generating processes - Low Frequency (50 and 60Hz) Corona Discharge and Cold Plasma systems far behind. Ozone gas is produced by high voltage discharge harnessed inside a specially designed electrode. Variable frequency of the discharge (GE ozone generators operate in range of 0-10kHz) allows production of highly concentrated ozone gas while maintaining precision of the ozone production.HFCD offers an excellent ozone output : size / weight ratio allowing the production of smaller & lighter ozone generators with higher & more precise ozone output and lower power consumption.

ANSEROS system PAP (Metal free) and CAT(metal free) will be incorporated with existing system for high output of wet cleaning, dry cleaning, TEOS, CVD and hydrophobics.

Note: Please ask for details about ANSEROS PAP and ANSEROS CAT systems or either see ANSEROS APPLICATION NOTES

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## PERFORMANCE

Ozone is the most powerful broad spectrum microbiological and contamination control agent available.
Ozone ELIMINATES the use of hot water and conventional sanitizer.
Ozone virtually eliminates all chemical usage.
Ozone is chemical-free; it produces NO toxic by-products.
Ozone is clean and environment-friendly; its only by-product is oxygen.
Ozone is extremely effective as a disinfectant at relatively low concentrations.
Ozone is generated on site eliminating the transporting, storing and handling of hazardous materials.
Ozone is very inexpensive to produce and has an unlimited supply.
Ozone is much safer for employees than any conventional chemicals.
Ozone permits recycling of wastewater.
Ozone reduces Biological Oxygen Demand (BOD)

## HEALTH & SAFETY

The use of ozone in industrial processes has increased significantly in recent years. Ozone is an extremely powerful oxidant, yet it does not harm the environment or leave behind toxic by-products. Ozone has a short half-life (10-20 minutes in water) and breaks down to natural oxygen so it easily be discharged into the environment without any risk. Process ozone levels must be accurately monitored in order to ensure reliable and efficient process control. In addition, since ozone is toxic above certain concentration levels, worker exposure to ambient ozone must be carefully monitored in order to meet OSHA/TLV requirements.

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| **TLV-TWA**<br>Threshold Limit Value-Time Weighted Average | 0.1 $ppm_v$ | The maximum continuous ozone concentration to which an individual can be exposed during a normal 8 hour day / 40 hour work week without adverse effects. |
| **TLV-STEL**<br>Threshold Limit Value-Short-Term Exposure Limit | 0.3 $ppm_v$ | The maximum intermittent ozone concentration to which an individual can be exposed (provided that TLV-TWA is not exceeded) for no longer than 15 minutes and no more than 4 times per day (with at least 1 hour between exposures.) |

## ANSEROS CAPABILITY

As a major concern in ozone oxidation technologies we can provide the whole solutions for air and water purification. We can develop a whole range of system for semiconductors industry. As specialists in the field of ozone technology, Anseros have a wide experience in the research, design and installation of ozonation systems to suit client's specific requirements. If you have some specific or case sensitive requirement then feel free to contact our R&D department or either see ANSEROS APPLICATION NOTES.

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