




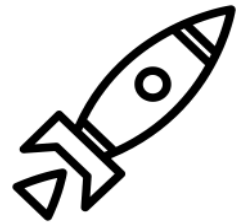


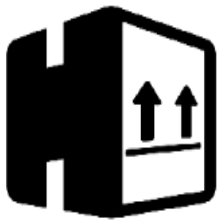


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KERONE is possessing employee strength of more than 280 experts continuously putting efforts for happy industrial engineering solutions

KERONE is possessing experience of 48+ years in engineering excellence.

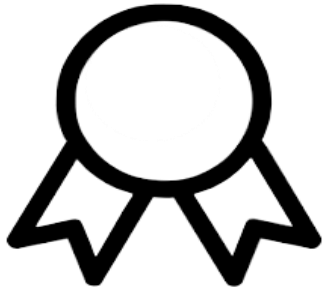
KERONE is having immense expertise in manufacturing and implementing various types of engineering solutions.

KERONE is possessing employee strength of more than 280 experts continuously putting efforts for happy industrial engineering solutions.

KERONE

48+

Years Experience



150+

Experts

5000+

Satisfied Clients

280+

Employees

Our Vision and Mission

Vision

- Turn into world leader in providing specialized, top-notch quality and ecologically sustainable industrial heating, cooling , drying and engineering solution across the globe.
- To attain global recognition as best of quality and environment friendly engineering solution company.

Mission

- To enhance the value of customer operation through our customer need centric engineering solution.
- We are committed to provide our customers, unique and best in class products in Industrial heating, drying and cooling segment, with strategic tie-up for the technical know-how with renowned leader in the industry specific segment.
- We are company that believes in strong ethics and timely commitment helps to build long term relationship.

Value Propositions

Highly
Customized Product

Sound
Infrastructure

Adherence
to
Standards

Timely
Delivery

Team of experts
Delivering Quality

Cost Effective
Solutions

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We are Certified by...

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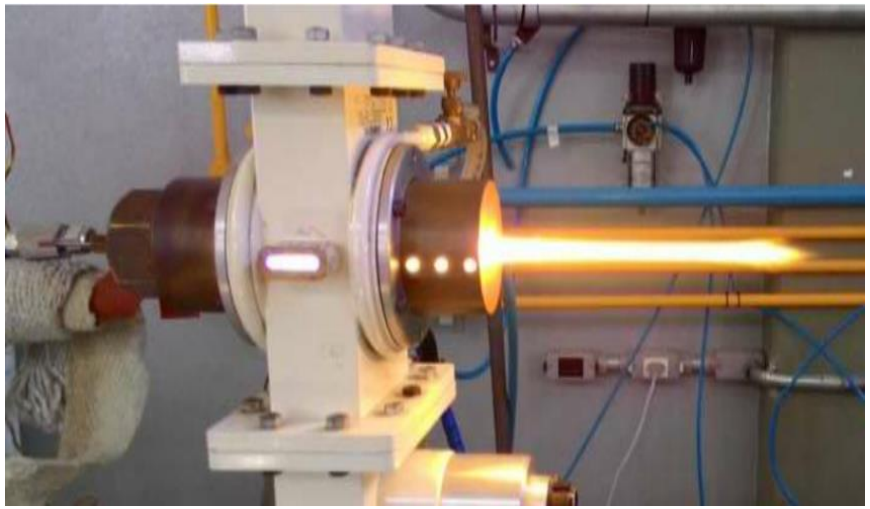
ISO 9001:2008 | ISO 9001:2015 | OHSAS 18001 | EMS 14001

Microwave Air Jet Plasma

Introduction

- Microwave Air Jet Plasma (MAJP) is a technology that utilizes microwaves to generate and sustain a high-temperature plasma discharge in air. It involves the application of intense microwave energy to ionize and excite the gas molecules present in the air, resulting in the formation of a plasma state.
- Plasma is the fourth state of matter, consisting of ionized gas that contains free electrons and positive ions. It is characterized by its high energy, as the atoms and molecules within the plasma have sufficient energy to dissociate into charged particles.
- In the case of MAJP, the microwaves are typically generated by a microwave source and then guided into a resonant cavity or waveguide. The intense microwave field within the cavity ionizes the air molecules, creating a plasma jet or discharge. The plasma jet can reach high temperatures, ranging from several thousand to tens of thousands of degrees Celsius.



Definition

A technology that utilizes microwaves to generate a high-temperature plasma in an air jet.

- Microwave Air Jet Plasma (MAJP) refers to a specific plasma generation technique that utilizes microwaves to create and sustain a high-temperature plasma discharge in air. It involves the application of intense microwave energy to ionize and excite the gas molecules present in the air, leading to the formation of a plasma state.
- Plasma is the fourth state of matter, consisting of ionized gas that contains free electrons and positive ions. It is characterized by its high energy and reactivity. In the context of MAJP, microwaves are employed to provide the energy required to ionize the air molecules, creating a plasma jet or discharge.
- The resulting plasma jet can exhibit high temperatures, typically ranging from several thousand to tens of thousands of degrees Celsius. This plasma jet can be directed towards a specific target or utilized for various applications such as surface treatment, sterilization, waste treatment, material synthesis, or plasma-assisted combustion.

Working Principle

- **Microwave Generation**

  The process begins with the generation of microwaves using a microwave source or generator. Microwaves are a form of electromagnetic radiation with wavelengths typically ranging from about one meter to one millimeter.

- **Microwave Energy Transfer**

  The generated microwaves are then guided and directed into a resonant cavity or waveguide system. This system helps to contain and transfer the microwave energy efficiently.

- **Microwave Interaction with Air**

  Within the resonant cavity or waveguide, the intense microwave energy interacts with the air or gas mixture present. The microwaves exert an electric field on the gas molecules, causing them to oscillate rapidly.

Working Principle

- **Ionization and Excitation**

  The oscillating electric field of the microwaves transfers energy to the air molecules. This energy transfer leads to the ionization and excitation of the gas molecules, resulting in the formation of a plasma state. The high-energy microwaves break apart the gas molecules, creating positive ions and free electrons.

- **Plasma Jet Formation**

  The ionized gas molecules, consisting of positive ions and free electrons, form a plasma. This plasma is in the form of a jet or discharge that emerges from the resonant cavity or waveguide. The plasma jet can exhibit high temperatures due to the intense energy input from the microwaves.

- **Plasma Applications**

  The plasma jet generated by MAJP can be directed towards specific targets or used for various applications. Depending on the intended purpose, the plasma jet can be utilized for surface treatment, sterilization, waste treatment, material synthesis, plasma-assisted combustion, or other relevant applications.

Applications

- ## Surface Treatment

  The high-energy plasma jet produced by MAJP can be utilized for surface treatment processes. It can effectively clean surfaces by removing contaminants, oxides, or organic residues. The plasma jet can also modify the surface properties of materials, such as enhancing adhesion or creating functional coatings.

- ## Sterilization and Decontamination

  The high temperatures and reactive species present in the MAJP plasma jet make it suitable for sterilization and decontamination purposes. It can be used in medical settings to sterilize equipment, instruments, and surfaces. It is also useful in the food industry for decontaminating food products and packaging.

- ## Waste Treatment

  MAJP technology can be employed for the treatment and disposal of hazardous waste materials. The high temperatures of the plasma jet can effectively break down complex organic compounds, reducing them to simpler and less harmful substances. This makes it valuable for waste management and environmental remediation.

Applications

- **Material Synthesis**

  The controlled environment of MAJP allows for the synthesis of nanoparticles, nanomaterials, and thin films. The plasma jet can facilitate the formation of unique material structures, offering precise control over composition, size, and morphology. This application has implications in fields like nanotechnology, electronics, and advanced materials.

- **Plasma-assisted Combustion**

  MAJP can be utilized in combustion processes to improve fuel efficiency and reduce emissions. The plasma jet can enhance the combustion of fuels by promoting their decomposition or activating specific chemical reactions. This has potential applications in industries such as energy, transportation, and power generation.

- **Environmental Remediation**

  The reactive species and high temperatures of MAJP plasma can be harnessed for environmental remediation. It can assist in the removal of pollutants, such as volatile organic compounds (VOCs) or hazardous air pollutants (HAPs). MAJP can also aid in the destruction of harmful substances, contributing to air purification and pollution control.

Surface Modification and Cleaning

- ## Surface Cleaning

  The intense plasma jet produced by MAJP is capable of removing contaminants, oxides, and organic residues from various surfaces. The reactive species, such as ions and radicals, present in the plasma interact with the contaminants, breaking them down and facilitating their removal. MAJP-based surface cleaning is used in industries like electronics, semiconductor manufacturing, and precision cleaning.

- ## Surface Activation

  MAJP can be used to activate surfaces, enhancing their adhesion properties for subsequent processes like bonding, coating, or printing. The plasma jet can create microstructures, increase surface roughness, and introduce functional groups on the surface, promoting better adhesion between materials. This application finds use in industries such as automotive, aerospace, and biomedical devices.

- ## Surface Functionalization

  MAJP can modify the surface chemistry of materials by introducing specific functional groups or coatings. The plasma jet can activate precursor gases or introduce reactive species that chemically bond to the surface, creating functionalized layers. This is useful for tailoring the surface properties of materials, such as hydrophobicity, biocompatibility, or corrosion resistance.

Surface Modification and Cleaning

- ## Thin Film Deposition

  MAJP can be utilized for the deposition of thin films onto surfaces. The plasma jet can activate precursor gases, causing them to decompose and deposit as a thin film on the substrate. This technique enables the deposition of uniform and conformal coatings on complex-shaped objects and finds applications in areas such as electronics, optics, and protective coatings.

- ## Surface Etching

  The controlled energy and reactivity of MAJP plasma allow for precise surface etching. The plasma jet can selectively remove material from the surface, creating etched patterns or structures. This application is commonly used in microelectronics, micro fabrication, and the production of microfluidic devices.

Sterilization and Disinfection

- **Enhanced Microbial Inactivation**

  MAJP generates a high-temperature plasma jet that contains a variety of reactive species, including ions, radicals, and UV photons. These reactive species have strong antimicrobial properties and can effectively inactivate a wide range of microorganisms, including bacteria, viruses, fungi, and spores.

- **Rapid and Efficient Sterilization**

  MAJP enables rapid sterilization and disinfection processes. The high temperatures and reactive species in the plasma jet result in a quick and thorough eradication of microorganisms from surfaces or objects. This can lead to increased productivity and reduced downtime in healthcare facilities, laboratories, food processing, and other critical environments.

- **Non-contact and Non-chemical**

  MAJP is a non-contact sterilization method, meaning there is no direct physical contact between the plasma and the items being sterilized. This eliminates the risk of cross-contamination and minimizes the potential for damage to sensitive or delicate equipment. Additionally, MAJP does not require the use of chemical agents, reducing the need for potentially harmful disinfectants.

Sterilization and Disinfection

- **Broad Spectrum Activity**

  MAJP exhibits a broad spectrum of antimicrobial activity, making it effective against a wide range of pathogens, including drug-resistant strains. This versatility makes it suitable for various applications, such as sterilizing medical instruments, disinfecting surfaces in healthcare settings, or ensuring food safety in the food industry.

- **Environmentally Friendly**

  MAJP offers an environmentally friendly approach to sterilization and disinfection. It does not produce chemical residues or harmful byproducts that can impact the environment. Additionally, it reduces the reliance on chemical disinfectants, contributing to sustainability efforts.

- **Scalability**

  MAJP technology can be scaled up or down to accommodate different sizes and volumes of sterilization requirements. It can be applied to small, handheld devices, as well as larger-scale applications such as sterilizing medical equipment, food processing machinery, or industrial surfaces.

Materials Processing

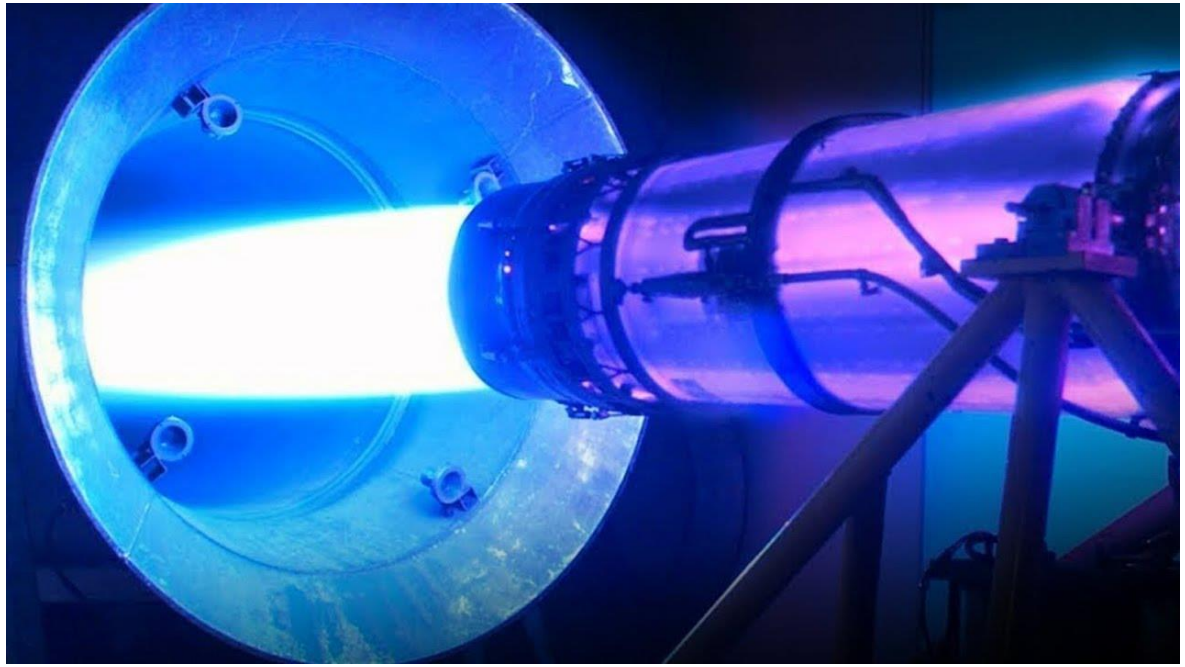
- MAJP can be used to modify the surface properties of materials. The intense plasma jet generated by MAJP can etch, clean, activate, or functionalize the surface of different materials, including metals, polymers, ceramics, and composites. It enables precise control over surface roughness, wettability, adhesion, and other surface characteristics, allowing for tailored material properties.
- MAJP can be employed for the deposition of thin films onto substrates. The plasma jet activates precursor gases, causing them to decompose and deposit as thin films on the surface. This technique enables the fabrication of uniform and conformal coatings, such as protective coatings, functional films, or barrier layers, onto various materials.
- MAJP offers a platform for the synthesis and processing of nanomaterials. The high-energy plasma jet can facilitate the growth of nanoparticles, nanowires, or nanostructured materials. It provides control over size, morphology, and composition, making it valuable for applications in nanotechnology, catalysis, electronics, and energy storage.

Materials Processing

- MAJP clean material surfaces by removing contaminants, oxides, or organic residues. The plasma jet's reactive species interact with the surface, breaking down and removing unwanted layers. This is particularly useful in industries where cleanliness and surface quality are critical, such as semiconductor manufacturing or precision optics.
- MAJP can be utilized for material degradation and recycling processes. The high temperatures and reactivity of the plasma jet can break down complex organic compounds, allowing for the decomposition of waste materials or the recovery of valuable components from discarded products.
- MAJP activate material surfaces, improving their adhesion properties for bonding and joining processes. The plasma jet modifies the surface chemistry, enhancing the bonding strength and compatibility between different materials. This is valuable in industries such as automotive, aerospace, and electronics assembly.

Advantages

- Non-thermal plasma generation
- High energy efficiency
- Versatile and scalable technology
- Environmentally friendly

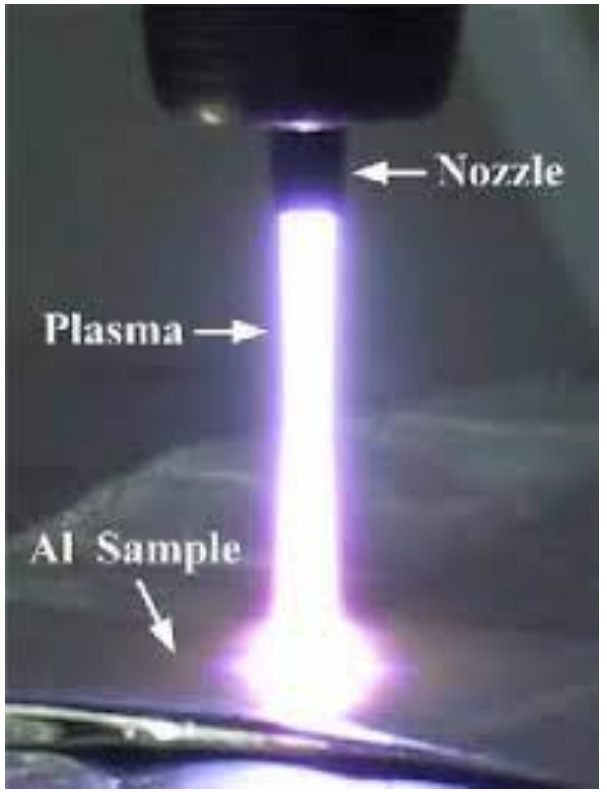


Future Perspectives

- Potential advancements and future developments in the field of Microwave Air Jet Plasma
- Emerging applications and research areas

Conclusion

- Microwave Air Jet Plasma (MAJP) technology offers a range of applications and benefits in surface modification, cleaning, sterilization, and materials processing. Its ability to generate a high-temperature plasma jet using microwaves enables efficient and precise treatment of various materials.
- The versatility of MAJP extends to surface activation, functionalization, thin film deposition, nanomaterial synthesis, and material recycling. It allows for tailored surface characteristics, improved adhesion, and the synthesis of advanced materials with controlled properties.
- MAJP technology holds promise for advancing surface treatment, sterilization, and materials processing, offering innovative solutions for diverse sectors such as healthcare, manufacturing, electronics, and environmental remediation.



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