PLASMA AIR PURIFICATION

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INTRODUCTION

Recent studies have shown that Non-thermal Plasma (Fourth State of Matter - an ionized gas) can efficiently inactivate microbial pathogens such as bacteria, fungi, and viruses in addition to degrading toxins. Moreover, this technology is effective at inactivating pathogens on the surface of medical and dental devices, as well as agricultural products. The current practical applications of plasma technology range from sterilizing therapeutic medical devices to improving crop yields, as well as the area of food preservation. Recently accumulated knowledge has led to improvements in the efficiency of the disinfection and sterilization using plasma technology and a growing awareness of its potential utility.

Non-thermal plasma (Non-equilibrium plasma) can be generated by deploying technologies like Glow discharge, Corona discharge, atmospheric pressure plasma jet (APPJ), dielectric barrier discharge (DBD), micro-hollow cathode discharge (MHCD), Plasma needle, Low-pressure plasma etc. and has been used in various applications like Ozonizer, Plasma Medicine, Volatile Organic Compound (VOC) Treatment, Plasma Agriculture, Surface Modifications (coating, etching, activation, cleaning, nitration, etc.), Illumination (plasma screen, fluorescent lamps, etc.).

Several studies have investigated the effect of Plasma on the inactivation of both enveloped and non-enveloped viruses. Representative studies showed that plasma inactivated enveloped viruses, such as the influenza virus and respiratory syncytial virus, as well as non-enveloped viruses, such as the adenovirus. A 1-minute treatment with the Plasma can result in a greater than two-log reduction of virus titre.

Much like sunlight does in the atmosphere, Plasma produces a natural bio-climate rich in positive and negative oxygen ions. The negative ions contain an extra electron while the positive ions are missing an electron resulting in an unstable condition. In an effort to re-stabilise, these bipolar ions seek out atoms and molecules in the air to trade electrons with, effectively neutralizing particulate matter, bacteria and virus cells, odorous gases and aerosols, and VOCs.

Needlepoint Bipolar Ionization (NPBI) technology, which has been certified by UL 867 and UL 2998 as an ozone free technology, has been successfully used in hospitals, offices, airports, schools, arenas, airplanes, veterinary offices and vivarium.

The potential of Plasma technology in medical and dental disinfection/sterilization applications is already being exploited. It can be used by Air Sterilisation to sanitise the Beds, Walls, Ceilings, Floors and Desks

To maximise the disinfection efficiency, it is required that Plasma Generating Methods, Plasma Generating Conditions, use of different gas mixtures and careful control of the relative humidity, be analysed in more details, to be applied universally in a cost-effective manner.

It is now proposed to use this Plasma technology for Air Sterilisation to Protect the Healthcare Providers in times of the COVID-19 pandemic.

It requires validation and verification of all available technologies for acquisition cost comparisons.

DATA REVIEWED

1 Disinfection and Sterilization Using Plasma Technology: Fundamentals and Future Perspectives for Biological Applications; Akikazu Sakudo, Yoshihito Yagyu and Takashi Onodera; International Journal of Molecular Sciences; Published: 21 October 2019

2 Hagbom, Marie et al. “Ionizing air affects influenza virus infectivity and prevents airborne-transmission.” *Scientific reports* vol. 5 11431. 23 Jun. 2015, doi:10.1038/srep11431

3 Plasma Air Purification Technology has been used in reducing harmful bioaerosols like Norovirus and other illness-causing entities.

Université Laval conducted a study in 8 hospitals and long-term care facilities and found norovirus particles in the air in 6 of them. Viruses were detected in 54% of the rooms housing patients with gastroenteritis, 38% of the hallways leading to their rooms, and 50% of nursing stations. Virus concentrations ranged from 13 to 2,350 particles per cubic meter. It is reported (Not verified by NOUS) that deployment of Plasma Air Purification Technology was effective in reducing harmful bioaerosols like norovirus and other illness-causing entities. Results showed a 99.87% reduction of Staphylococcus epidermis (a bacteria), 99.99% reduction of MS2 (a virus used as a proxy for norovirus), and a 98.85% reduction in Aspergillus niger (a mold).

Study is available at:

(https://www.sciencedaily.com/releases/2015/04/150430113531.htm)

(Plasma Air is part of WellAir, an Irish company on a mission to create productive, healthy, energy-efficient indoor spaces free of pollutants that cause infection, allergies, asthma, and irritation. WellAir Solutions is an ecosystem model that combines Novaerus medical-grade portable air disinfection units, Plasma Air HVAC air purification devices, IAQ sensors and monitoring software.)

Enclosed:

Data provided by Plasma Air by E Mail

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