

# Enhanced Plasma Sterilized Filtration™ System: Improving Indoor Air Quality

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## Environmental Problem

Indoor air quality (IAQ) is defined as the physical, chemical, and biological characteristics of indoor air. IAQ is influenced by a myriad of factors including the number of air exchanges between the indoor and outdoor environments, contamination arising from within the building or from the environment, and microbial contamination. Because it is estimated that people spend approximately 90% of their time indoors, both the public and private sectors are becoming increasingly aware of issues associated with poor IAQ. Furthermore, people who are the most susceptible to the effects of poor indoor air often are the same people who spent the greatest amount of time indoors. Examples include the very young, the elderly, and those suffering from chronic illnesses. EPA has ranked IAQ among the top five risks to public health.

## SBIR Technology Solution

With support from EPA's SBIR Program, Atmospheric Glow Technologies, Inc. (AGT), developed and is actively commercializing its Enhanced Plasma

System (EPS) for IAQ. The EPS-IAQ, covered by four patents, is a multi-stage system that eliminates airborne microorganisms and certain chemicals using One Atmosphere Uniform Glow Discharge Plasma (OAUGDP®). The EPS-IAQ consists of an OAUGDP generator, a particulate filter for microorganism capture, a volatile organic compound (VOC) filter, and an ozone catalytic filter. Ancillary systems include the power supply and control system.

Air containing VOCs and microorganisms enters the system, where the contaminants are trapped and destroyed. The trap operates continuously and is designed to have a holding capacity that exceeds the expected loading between plasma treatments. The particulate filter uses off-the-shelf technology for high-efficiency capture. The plasma generator is energized periodically and creates reactive chemical species from the air. These species destroy trapped microorganisms as well as VOCs.

The fully automated EPS-IAQ is designed with flexibility and scalability in mind. It employs a simple modular design with a plasma generator at its core that is adaptable to room-sized or larger in-duct applications. EPS systems can be installed during new construction or easily retrofitted into existing facilities. By taking a modular design approach, AGT easily can reconfigure the EPS-IAQ to provide systems with or without ducted connections or direct, in-flight systems for fly-through destruction of organisms or chemicals.

## Commercialization Information

The EPS-IAQ is in pre-production. AGT is completing engineering designs to meet specifications for a Tier 1 manufacturer. Initially, the targeted market will be the residential sector, providing a cost-effective means to remove and destroy microorganisms and reduce irritating VOCs from the indoor air while meeting the most rigid quality standards. AGT continues to advance the core plasma technology and is pursuing application areas in such diverse arenas as biotechnology, military and agricultural decontamination, aerodynamics, and materials processing for industry.



Diagram of AGT's Enhanced Plasma System for Indoor Air Quality, which destroys all types of captured microorganisms while reducing concentrations of airborne VOCs.

## Company History and Awards

AGT is a science and engineering company that was founded in 2000. AGT became a publicly traded company in February 2004. The company's early research and development work was supported largely by the SBIR Program. To date, AGT has been awarded 15 SBIR projects totaling more than \$6 million. This funding has been used to further the development of AGT's atmospheric plasma technology. Located in Knoxville, Tennessee, AGT is housed in a 12,000 ft<sup>2</sup> facility with state-of-the-art chemistry, microbiology, physics, and plasma laboratories; a prototype development shop; and prototype manufacturing areas.



AGT has been internationally recognized with an *R&D Magazine* Top 100 Award, the University of Tennessee-Battelle Oak Ridge National Laboratories Subcontractor of the Year Award, the U.S. Small Business Administration Roland Tibbetts Award recognizing excellence in government contracting, and the Dawnbreaker Outstanding Commercial Achievement Award. AGT has just recently received its second R&D 100 Award for its first product in the biotechnology arena. The company and its products have been featured in periodical publications such as *Popular Science* and *R&D Magazine*.

## SBIR Impact

- The U.S. Environmental Protection Agency has ranked indoor air quality (IAQ) among the top five risks to public health.
- Atmospheric Glow Technologies, Inc. (AGT), developed a cost-effective means of improving IAQ using atmospheric plasma—the Enhanced Plasma System for IAQ (EPS-IAQ).
- AGT's EPS-IAQ destroys trapped microorganisms and volatile organic compounds, and is engineered to meet the most rigid standards for indoor air quality.
- AGT is completing engineering designs to meet specifications for a Tier 1 manufacturer.