

Air purification, sterilization and disinfection for bacterial and virus,
etc by Plasma



Plasma Sterilizer



Air purification



Sterilization



Disinfection
by plasma



Dawoo Korea (Headquarter / Plant)

35 Gibaero 109-beon-gil, Hwaseong-si, Gyeonggi-do
Tel : +82 31-898-5450 / Fax : + 82 31-898-5451
www.dawookorea.co.kr





Dawoo Korea promises to produce the advanced plasma steriliser that completely sterilizes air and surface where viruses and bacteria are present, through continuous and creative research and development.

“Plasma Sterilizer Created with the Best Technology and Passion ”



Air purification

- Sterilizing toxic organic matter and bacteria in the air by UV light irradiation
- Purifying air using antibacterial filter and activated carbon absorbent
- Air purification and sterilization



Sterilization

- Sterilizing viruses (bacteria, fungus, MRSA, etc.) by high density plasma
- Air purification and sterilization
- Sterilizing equipments for internal use and sterilization for secondary infection

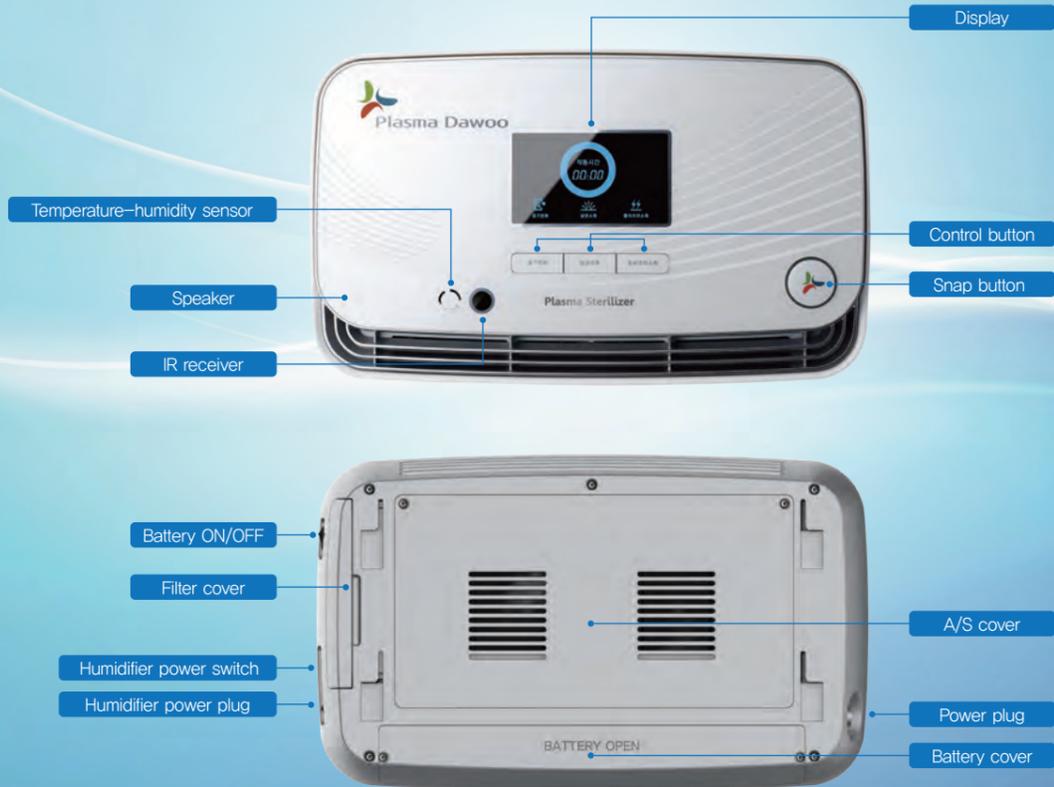


Disinfection by plasma

- Sterilizing indoor wall, flower and exposed surfaces
- Disinfection does not affect electronic circuit or loading equipment
- Air purification and surface sterilization
- Complete sterilization (more than 99.9%) and preventive disinfection

Plasma Sterilizer

Size	360mm X 220mm X 84mm
Weight	Less than 5kg (including rechargeable battery)
Rated voltage	DC 12V (Integral power), AC 22V (Adaptor)
Battery	DC 7.2V (Automatically recharged)
Power consumption	Less than 30W, air velocity (5~15m/s), noise less than (40~60dB)



Operating method by stage

Stage 1 : Air purification

▶ Turn ON the power button and air purification button

- Sterilizes toxic organic matter and bacteria in the air by UV light irradiation
- Purifies air by using fan through antibacterial filter and activated carbon absorbent
- Air purification and sterilization

Stage 2 : Sterilization

▶ Turn ON the sterilization button

- Operate UV + level 1 plasma
- Air purification and sterilization
- Sterilizes equipments for internal use

Stage 3 : Disinfection by plasma

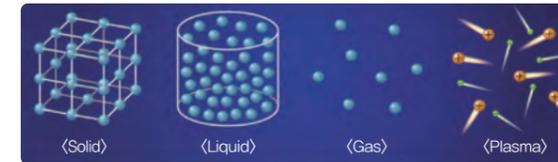
▶ Turn ON the disinfection by plasma button

- Operate UV + level 2 plasma (preventive disinfection available)
- Air purification and surface sterilization
- Complete sterilization (more than 99.9%) and preventive sterilization



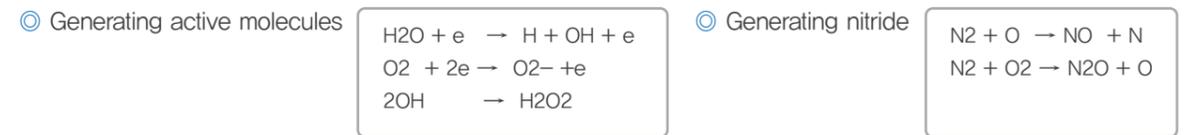
What is Plasma?

- ◎ Solid ▷ Liquid ▷ Gas ▷ 4th state of material
- ◎ Compound of ionized gas formed during gas discharge
- ◎ Occupies 99% of the universe

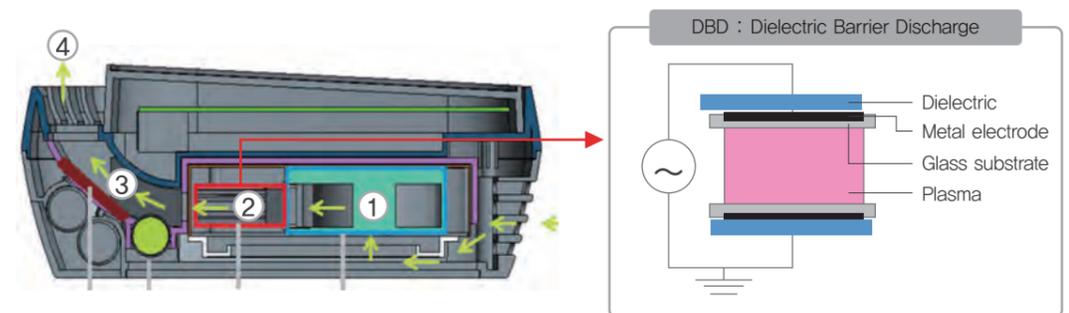
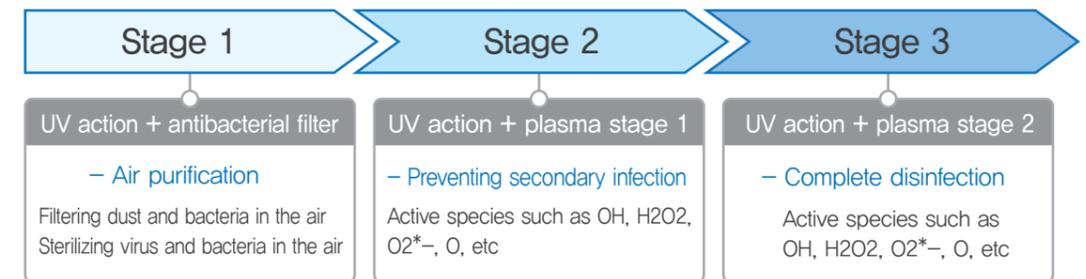


- Work performed under a more stable condition than gas
- Eco-friendly technology capable of self chemical reaction
- The core of industrial technology (applied to sterilizer, semiconductor, LCD, etc.)

Sterilizing with active molecules and nitride by plasma



Plasma Sterilizer – What is Disinfection by Plasma?



- 01 As the external air flows in, the air passes through the antibacterial filter to be purified primarily
- 02 A large amount of plasma is generated from the plasma source
- 03 Plasma discharged through the fan
- 04 Removes contaminants using UV lamps and active carbon

Plasma Sterilizer Created with the Best Technology and Passion



99.9% effective in sterilizing bacteria and virus
Plasma Bio Sterilizer



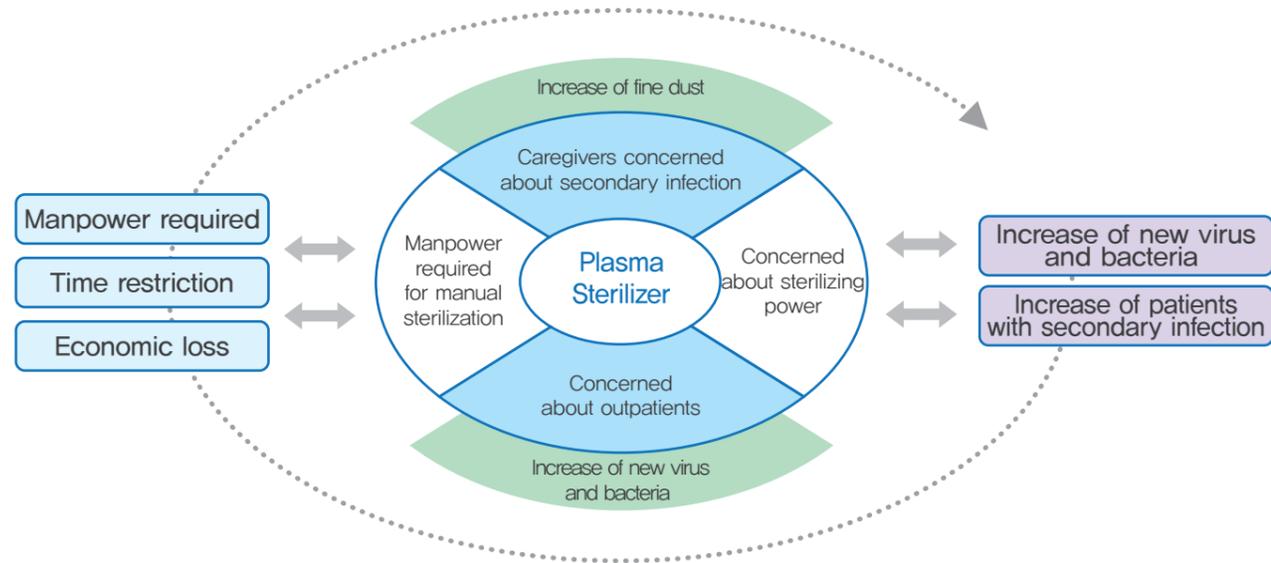
Plasma Sterilizer – Purpose

We aim to create a fresh and refreshing environment by installing the sterilizer in a place which requires sterilization such as hospital ward, operation room, silver town, elderly hospital, ambulance, food storage room, kindergarten and daycare center, and to sterilize floating bacteria and viruses in the air.

We worked with the industry–university cooperation team of KwangWoon University to develop Plasma Sterilizer to create a healthy and safe indoor environment by eliminating factors inhibiting health and improving living conditions.

Our plasma sterilizer has three different functions including air purification, air sterilization, disinfection by plasma, which enables you to choose a desired function to sterilize contaminated air and create a pleasant and refreshing environment.

Plasma Sterilizer – Background



Plasma Sterilizer – Effect

As the severity of the public health caused by air pollution has become a task for the nation to work on, various policies have been established to respond to this matter, however a solution has not been found yet.

Sterilization is necessary in places where there is a high risk of infection, such as hospital and ambulance, however no effective sterilizer is present.

It is necessary to prevent secondary infection such as staphylococcus aureus, which causes food poisoning, MERS coronavirus, foot-and-mouth disease avian influenza and Zika virus, however preventive measures are still inadequate

Powerful sterilization
Economically convenient

Creates safe and pleasant indoor environment
and prevents secondary infection

Comparison of features of technologies for improving harmful environment

Category	1st Generation (using filter)	2st Generation (using UV light / photocatalysis)	3st Generation (using plasma)
Sterilization effect	None	Insufficient	High sterilization effect using high density plasma
Odor removal effect	Slightly effective when applying a carbon filter	Minimal effect when UV lamp performance deteriorates	Very good with 3-level deodorizing system
VOCs removal effect	A separate filter required	Insufficient effect of removing HCHO as the energy level is low	Very good with 3-level deodorizing system
Installation / operation convenience	Requires a space for installation depending on the structure of filter and regular maintenance and replacement costs required	Installation structure is different according to catalyst system and cost for regular replacement of lamp generated	Can be installed in various places. 3 separate functions allow choice of the desired function

Expected effect of applying plasma technology

Perspective of internal and external consumer

1. Improved work efficiently by creating a pleasant indoor environment
2. Improved healthy by purified and sterilized indoor air

Economic aspect

1. Saves manpower and resource required for internal sterilization, by applying plasma technology differentiated from existing sterilizer
2. Prevents secondary infection by improving indoor air quality
3. Increased income due to increased number of outpatients as a result of safe indoor environment

SYSTEM
(Air sterilization and purification)

Technical aspect

1. Applies the technology of discharging atmospheric pressure plasma to large area at room temperature
2. Generates a large amount of plasma to sterilize floating viruses, bacteria and attached bacteria

Marketing aspect

1. Safe hospital with no secondary infection by deodorizing and sterilizing bacteria using new technology
2. Establishes a positive and pleasant image of the hospital by improving health through air purification
3. Pleasant image of the hospital through air deodorization

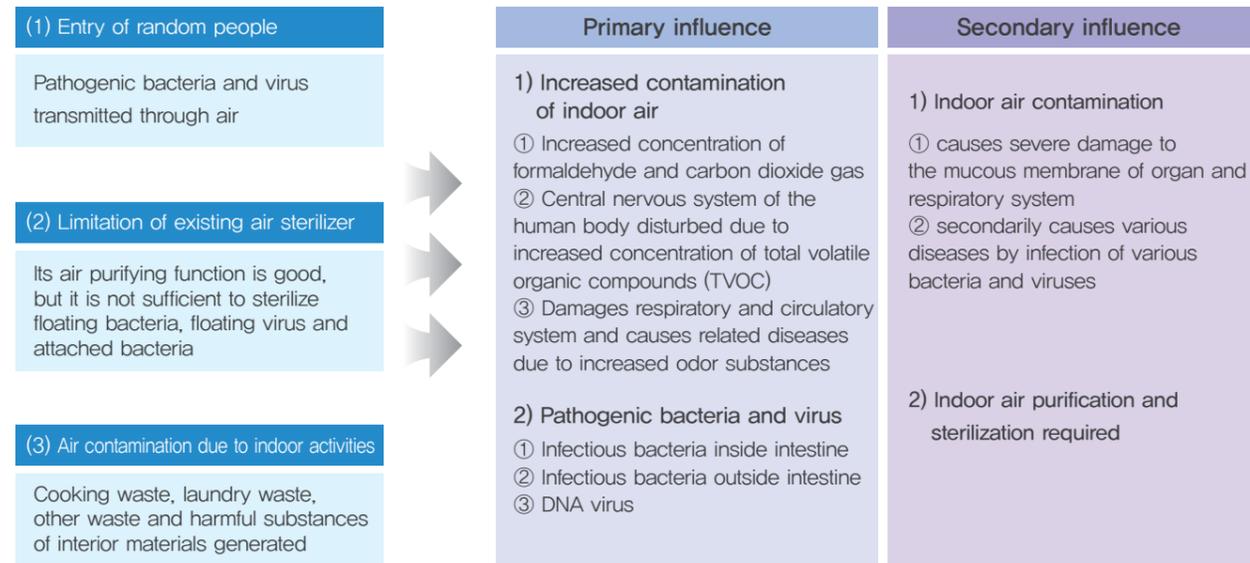
JBroadcast on JTBC Special Documentary

(Our product was broadcast on JTBC Special Documentary "Light of Human Future, Plasma" on July 6, 2017)





❑ Harmful environmental condition of hospital



❑ Harmful environmental condition of hospital – Need for preventive measures

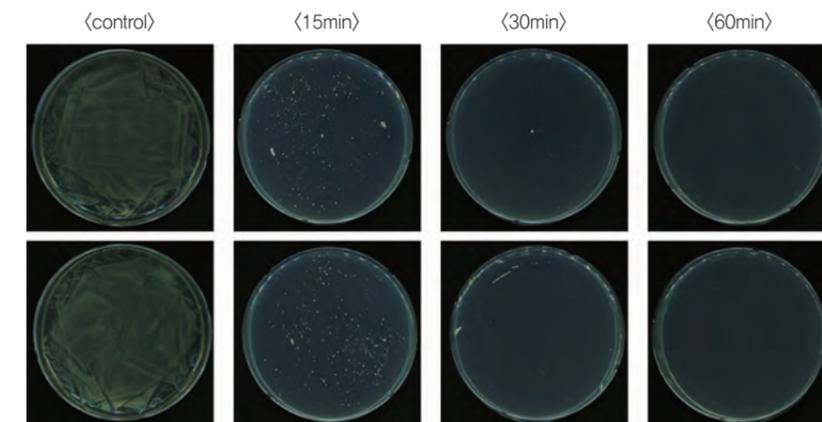
It is necessary to block the path of transmitting bacteria, which is caused by the entry of random people and inflow of contaminated air, and to overcome the limitations of existing air conditioning technology. An air purification system for sterilizing pathogenic bacteria is required to prevent diseases caused by a decreased level of immunity of elderly people and to create a clean and quiet living environment.



❑ Strengths of Plasma Sterilizer

- Sterilization of air and surface by high-density and high-performance plasma
- Sterilizes air with UV light
- Air purification function enhanced with antibacterial filter
- Enhanced function of indoor sterilization
- Uses high-density plasma source, UV lamp and antibacterial filter
- Patented disinfection by new technology, plasma

❑ Performance of plasma sterilizer_Test for sterilization power (*Provided by KwangWoon University)



<Sterilization of staphylococcus aureus by atmospheric pressure plasma source to large area>

Plasma Sterilizer Created with the Best Technology and Passion



Dawoo Korea Plasma Sterilizer



TEST 1 : Surface sterilization (Escherichia coli, staphylococcus aureus)



Test items		Test result			Test method	Test environment
		Initial concentration (CFU/mL)	Concentration after 30 min (CFU/mL)	Rate of bacterial reduction (%)		
Antibacterial test for escherichia coli	BLANK	1.8 x 10 ⁴	1.8 x 10 ⁴	-	Suggested by client	(37.0±0.1)°C (31.1±0.2) % R.H.
	Sterilizer for prevention	1.8 x 10 ⁴	< 10	99.9		
Antibacterial test for staphylococcus aureus	BLANK	1.3 x 10 ⁴	1.3 x 10 ⁴	-		
	Sterilizer for prevention	1.3 x 10 ⁴	< 10	99.9		

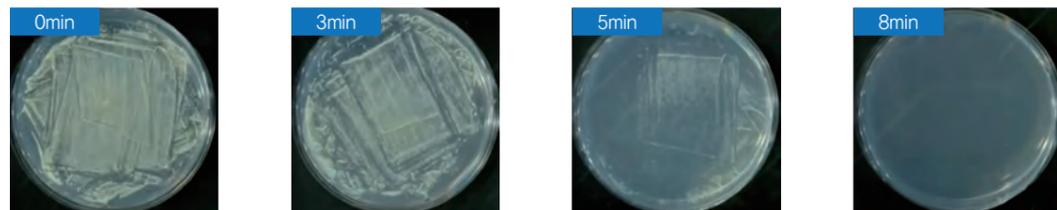
TEST 2 : Test for reduction of floating bacteria (Skin staphylococcus)



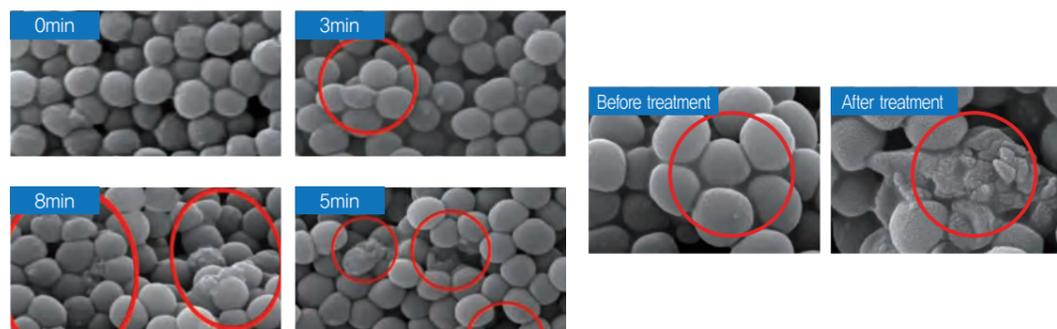
Test condition	Floating bacteria	Temperature	Humidity	Test chamber	Test time
Test method	S.epidermidis (ATCC 12228)	(23±2)°C	(70±10) % R.H.	60m ³	60 minutes
Standard and result	Standard	Reduction rate of floating bacteria			
Product name	Air sterilizer	More than 80%	99.1%		

Test for sterilizing staphylococcus aureus by plasma

※ Time for examining plasma in staphylococcus aureus



Cell wall of staphylococcus aureus destroyed by plasma



Recommended place for installing plasma sterilizer



Examples of installing plasma sterilizer



Plasma Bio Sterilizer

Plasma Bio Sterilizer

Sterilizes bacteria and virus by circulating air with plasma active species.

Sterilization effect of more than 99.9% for bacteria and virus.



99.9% effective in sterilizing bacteria and virus
Plasma Bio Sterilizer

Plasma Bio Sterilizer (DWK-DP300)



Model name	DWK-DP300
Specification	1960(H) X 1100(W) X 750(D)
Energy consumption	600W
Working temperature	Working temperature Less than 50°C
Power	220V, 60Hz
Show operating status	LCD

Plasma Bio Sterilizer (DWK-DP400)



Model name	DWK-DP400
Specification	1960(H) X 680(W) X 750(D)
Energy consumption	400W
Working temperature	Working temperature Less than 50°C
Power	220V, 60Hz
Show operating status	LCD



- Sterilizes bacteria and virus by circulating air with plasma active species
 - Eliminates, deodorizes and dries remaining ozone by using antibacterial filter, activated carbon filter and heater
 - Sterilization effect of more than 99.9% for bacteria and virus
 - Can select the function of sterilization, deodorization and drying. Continuous operation if necessary
 - Reservation function, temperature control, overheat prevention, hot air distribution system
- ※ Can change internal structure and be made to order



<Certificate for Business Registration>



<Certificate of a Patent>



<Certificate of Design Registration>



<GODD DESIGN>



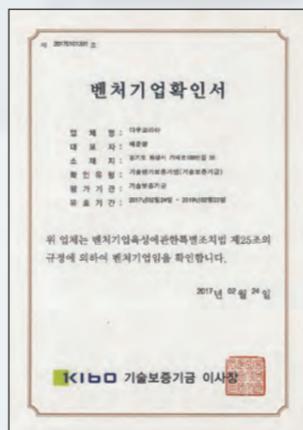
<Certificate : ISO 9001>



<Certificate : ISO 14001>



<Certificate : Research and Development Department>



<Certificate of Venture Company>



<Certificate of Excellent Product>

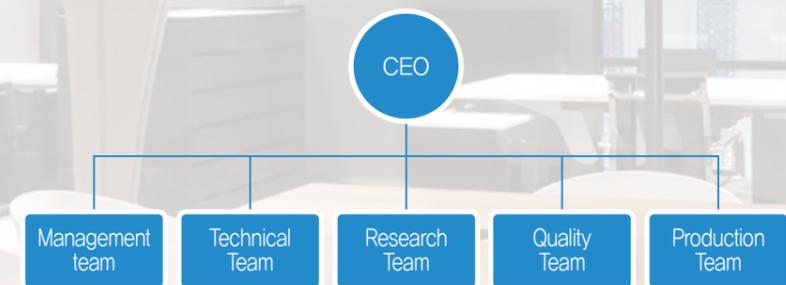
About Dawoo Korea

DAWOO KOREA specializes in producing sterilizing disinfectants and sanitary products to prevent viruses and bacteria. The MERSC (Middle East respiratory syndrome coronavirus) outbreak in 2015 and recent deaths of newborns due to secondary infections at EWha WOMANS UNIVERSITY MOKDONG HOSPITAL have caused great turmoil in the domestic economy and society. Therefore, there is an urgent need for appropriate sanitizers to sterilize viruses and bacteria in hospitals.

In response to these demands, we developed a plasma sterilizer that utilizes high-density plasma technology. Our plasma sterilizer, a nano-bio fusion technology product, has been developed jointly with Kwangwoon University Plasma Bioscience Research Center. It has been released in the domestic market and is receiving global attention.

DAWOO KOREA will supply places such as ambulances, hospitals, food factories, food service facilities and kitchens with plasma sterilizers equipped with specific, individualized features that fulfill the distinct needs of the respective spaces, thereby preventing airborne secondary infections through stringent viral and bacterial sterilization.

- **Headquarter location** : 35 Gibae-ro 109-beon-gil, Hwaseong-si, Gyeonggi-do
- **Date of establishment** : March 02, 2010
- **Major business area** : Plasma Air Sterilizer
- **Holding patent** : 1 Patent / 3 Domestic patent applied / 1 Chinese patent applied / 1 Design / 2016 Excellent design



History of Dawoo Korea

2017	Broadcast on JTBC Documentary "Light of Human Future, Plasma" Certified for electromagnetic compatibility, supplier conformity and CE certification K mark certified (Korea Testing Laboratory)
2016	First installation in ambulance Selected as excellent design Design registered Patent registered (Vehicle using plasma or indoor sterilizer)
2015	Established research and development department
2014	J2014 JIS09001, ISO14001 certified
2010	2010 Established Dawoo Korea

Development history of plasma sterilizer

2017	2017. 11 : Selected as excellent product by Public Procurement Service Started development of Plasma Bio Sterilizer Participated in demonstration of national firefighting headquarters
2016	Sold 71 Plasma Sterilizers in 2016 Selected as excellent product by Public Procurement Service Participated in demonstration of Chungnam firefighting headquarters
2015	Released the testing Plasma Sterilizer Started industrial-university research and development with KwangWoon University