DAIKIN

STREAMER

Streamer Technology

TESTÉ PAR l'Institut Pasteur de Lille

Delivering the purest air
for your home or business

What is streamer technology?

The Streamer technology developed by Daikin Industries is an epoch-making air purification technology that has succeeded in stably generating˝high-speed electrons˝, which had been considered difficult up to that time.

There are various harmful proteins and harmful chemical substances around us.

These are effects in a Streamer test space & not verification results in an actual operation space.

Works on objects caught by the filter

Streamer decomposes and eliminates allergens such as pollen, mould, and mites (droppings and dead mites)*1*2

Pollen, mould, and mites (dead mites) were placed on the electrode of the Streamer Discharge unit and then photographed through an electron microscope after being irradiated with Streamer Discharge for 15 minutes.
*Joint research with Wakayama Medical University

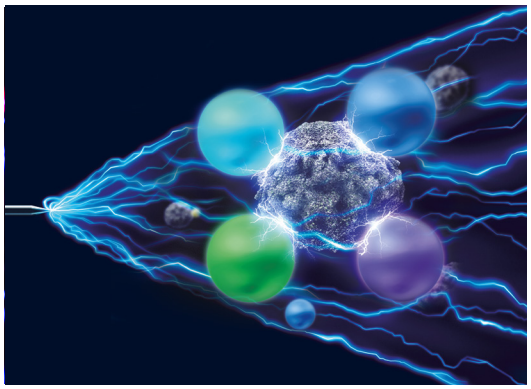
Decompose and eliminate pollen	Decompose & eliminate mould	Decompose and eliminate allergens such as mite droppings and dead mites
Eliminated more than **99.6%**[*1] in 2 hours!	Eliminated more than **99.9%**[*2] in 24 hours!	Eliminated more than **99.61%**[*1] in 24 hours!

Notes:
*1 Testing organization: Wakayama Medical University.
Test conditions: Irradiated allergens with Streamer and checked decomposition of allergen proteins by either the ELISA method, electrophoresis or electron microscopy.
Test result: 99.6% eliminated. (Works on objects caught by the lter)
*2 Measuring method: antibacterial test/mould elimination test
Testing organization: Japan Food Research Laboratories.
Test number: 204041635-001.
Test result: 99.9% eliminated. (Works on objects caught by the fillter)

About the Streamer Discharge

The Streamer discharge is a type of plasma discharge that generates "high-speed electrons", which have high oxidative decomposition power in a three-dimensional and wide range, so the oxidative decomposition power is 1,000 times or more compared to general plasma discharge (glow discharge).

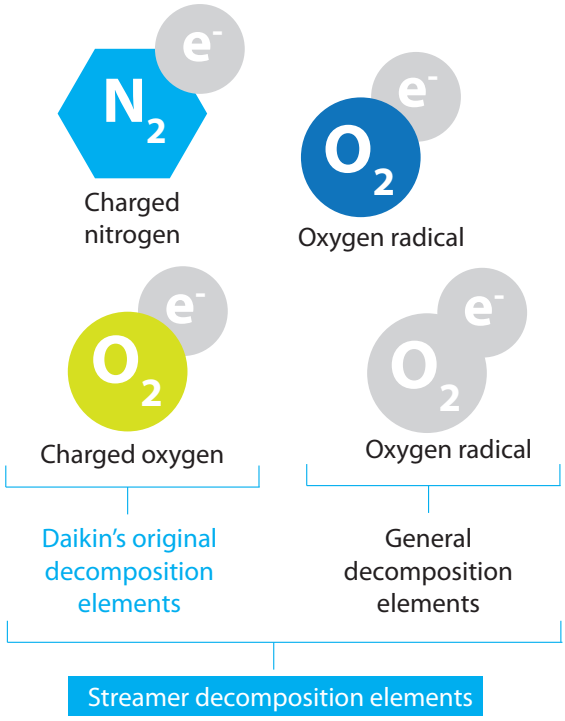
With this technology, high-speed electrons that combine with air components have a strong oxidative decomposition power, so they continuously act on odors, bacteria, and indoor pollutants such as formaldehyde. So far, we have demonstrated in collaboration with universities and public research institutes that it acts on harmful substances such as infuenza virus, norovirus, toxins and bacteria that cause food poisoning.

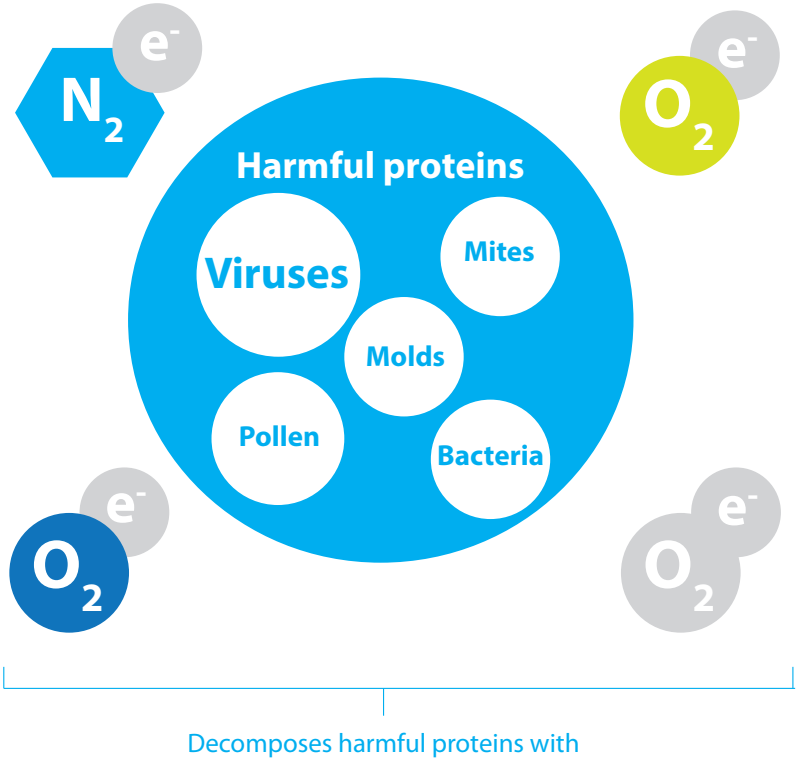


Streamer Discharge

Comparable to about 16 times the energy of the sun

*Comparison based on oxidative decomposition power. Charged nitrogen has an oxidative decomposition power of 10eV (electron Volt), and the oxidative decomposition pwer of the sun is equivalent to 0.5eV.





Streamer Technology against SARS-COV-2

Daikin in collaboration with a group of research professors from the Department of Microbiology in the Faculty of Veterinary Medicine from the Okayama University of Science, led by Professor Shigeru Morikawa, has demonstrated that the Streamer technology has inactivating effects against the novel Coronavirus (SARS-COV-2).

*This result was obtained by using a Streamer discharge device for testing in lab conditions.
The effects of products equipped with Streamer technology or results in actual use environments may differ.

Testing Organization

Professor Shigeru Morikawa's led research group at the Department of Microbiology in the Faculty of Veterinary Medicine from the Okayama University of Science

Supervisor
Professor

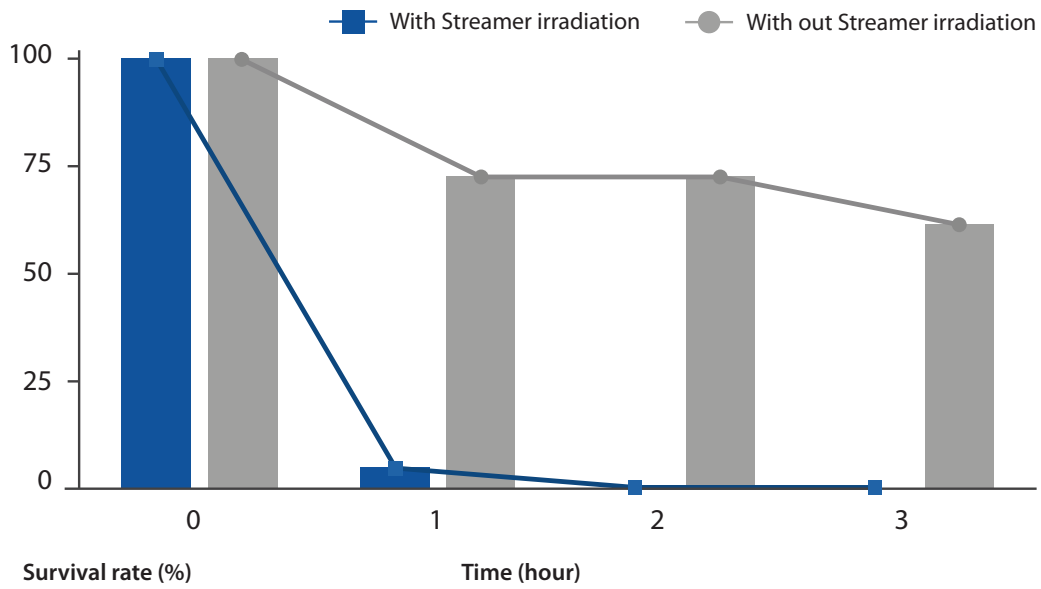
Shigeru Morikawa

Department of Microbiology, Faculty of Veterrinary Medicine, Okayama University of Science.
Former Director of SARS Countermeasures office, National Institute of Infectious (NIID)

Test Method

Two acrylic boxes of about 31L were mounted inside a safety cabinet. One box was equipped with a Streamer discharge device and the other box was not. A see-saw rocking motion shaker was placed in each box, and a six-well plate was placed on top of the motion shaker. Virus solution measuring 0.5 ml was put into each well of the plates, and Streamer irradiation was performed while agitating the solution using the motion shaker (approximately 12 times per minute). Virus solution was collected from two wells every hour for three hours, and viral load was measured. The viral load of SARS-CoV-2 was quantied by the TCID50 method using Vero E6 / TMPRSS2 cells.

Experimental Result



Streamer Irradiation Time	1 hour	2 hour	3 hour
Novel coronavirus (SARS-CoV-2) inactivation	93.6%	99.7%	99.9%

Source: "Study report on the inactivation eect of plasma ion generator (Daikin Streamer) on SARS-CoV-2" written by Shigeru Morikawa, Department of Veterinary Medicine, Microbiology Course, Okayama University of Science.

*This result was obtained by using a Streamer discharge device for testing in lab conditions.
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As a result of the test, SARS-CoV-2 was inactivated by 93.7% after 1 hour of Streamer irradiation. After 2 hours, it was inactivated by more than 99.8%, reaching more than 99.9% after 3 hours of Streamer irradiation.

Institut de Lille Certification

Institute Pasteur de Lille evaluated the effectiveness of Daikin's air purifiers, equipped with Streamer technology, against respiratory viruses. It concluded from its tests that Daikin's range of air purifiers eliminates more than 99.98% of the human coronavirus HCoV-229E in 2.5 minutes.*

- According to tests performed in the laboratories of the Institut Pasteur de Lille, Daikin's air purifiers eliminate more than 99.98% of the human coronavirus HCoV-229E in 2.5 minutes. This virus is of the same family as SARS-CoV-2, the coronavirus causing the COVID-19 pandemic.

  The units have also been evaluated as 99.93% effective against the H1N1 virus in 2.5 minutes. H1N1 is the virus causing common flu.

- This means Daikin's air purifiers are an additional measure in the fight against respiratory diseases. The compact plug-and-play purifier can strongly contribute to reducing the risk of respiratory virus transmission.

  This recognition is a milestone in the plan of Daikin to become a major player in the air purification business in Europe, Middle East and Africa.

*Detailed test results per type of Daikin air purifier:

'Daikin device MCK55WVM (commercial name MCK55W), tested by Institut Pasteur de Lille, removes 99.996 % of Human Coronavirus HCoV-229E in 2.5 minutes running time at 'turbo' speed in laboratory conditions (air-tight chamber with inner volume 0.47 m^3, no air renewal). Human Coronavirus HCoV-229E is different from the virus responsible for COVID-19, SARS-CoV-2, but belongs to the same family of coronaviruses.'

'Daikin device MC55WVM (commercial names MC55W/VB), tested by Institut Pasteur de Lille, removes 99.98 % of Human Coronavirus HCoV-229E in 2.5 minutes running time at 'turbo' speed in laboratory conditions (air-tight chamber with inner volume 1.4 m^3, no air renewal). Human Coronavirus HCoV-229E is different from the virus responsible for COVID-19, SARS-CoV-2, but belongs to the same family of coronaviruses.'

'Daikin device MCK55WVM (commercial name MCK55W), tested by Institut Pasteur de Lille, removes 99.986 % of Influenza A virus subtype H1N1 in 2.5 minutes running time at 'turbo' speed in laboratory conditions (air-tight chamber with inner volume 0.47 m^3, no air renewal).

'Daikin device MC55WVM (commercial names MC55W/VB), tested by Institut Pasteur de Lille, removes 99.93 % of Influenza A virus subtype H1N1 in 2.5 minutes running time at 'turbo' speed in laboratory conditions (air-tight chamber with inner volume 0.47 m^3, no air renewal).'

For more information, please visit Institut Pasteur de Lille website: www.pasteur-lille.fr.

Demonstration Experiments List

Experiment results of the Streamer technology that have been verified so far

Viruses

Target of experiment	Testing organaization	Test Method	Report date
Norovirus	Kobe University Graduate School	ELISA method	12-Jan-2007
New strain of influenza virus (Type A-H1N1)	Vietnam National Institute of Hygiene and Epidemiology	Dilution method	14-Sep-2009
Highly pathogenic avian influenza virus (Type A-H5N1)			16-Apr-2009
Influenza virus (Type A-H1N1)	Kitasato Research Center for Environmental Science	CPE and TCID50	31-Jul-2009
Influenza virus (Type A-H3N2)	Shanghai City Center for Disease Control and Prevention, etc.		8-Feb-2010
RS virus	Wakayama Medical University	CPE and TCID50	13-Apr-2012
Adenovirus	Kitasato Research Center for Environmental Science		23-Jun-2017
Coxsackievirus			
Enterovirus			
Echovirus			
Meals			
Mouse Norovirus	The University of Tokyo Graduate School		11-Oct-2018
Mouse Hepatitis Virus A59 (MHV-A59)		Plaque method	28-Apr-2020
Novel Coronavirus (SARS-CoV2-)	Okayama University of Science	CPE and TCID50	8-Jul-2020

Bacteria

Target of experiment	Testing organaization	Test Method	Report date
Bacteria (Escherichia coli/O157-)	Japan Food Research Laboratories	Pour plate culture method	8-Apr-2004
Bacteria (Staphylococcus aureus)			25-Aug-2004
Toxin (enterotoxin)		ELISA method	8-Mar-2010
Tubercle bacilli (ECG mutant)	Kitasato Research Center for Environmental Science	Plaque method	8-Mar-2010
Bacteria (tubercle bacilli/clinical strain)	The Jikei University School of Medicine	PCR method	15-Feb-2010
Bacteria (vancomycin-resistant enterococci/VRE)	Japan Food Research Laboratories	Pour plate culture method	19-Feb-2010
Bacteria (methicillin-resistant Staphylococcus aureus/MRSA)			
Pseudomonas aeruginosa			12-Apr-2010
Bacillus, Serratia, and Arthrobacter			29-Sep-2010
Bacteria (Escherichia coli/ATCC)			10-Sep-2018
Moraxella bacteria			10-Jun-2019

Molds

Target of experiment	Testing organaization	Test Method	Report date
Mold (Black mold)	Japan Food Research Laboratories	Pour plate culture method	28-Sep-2004

Hazardous gases

Target of experiment	Testing organaization	Test Method	Report date
Adjuvant suppression effect (DEP)	Wakayama Medical University National Institute for Environmental Studies	ELISA method	1-Nov-2005
Adjuvant suppression effect (DEP)	Tohoku Bunka Gakuen University	Attenuation method	8-Dec-2006

Allergens

Target of experiment	Testing organaization	Test Method	Report date
Molds and mites (feces and carcasses)	Wakayama Medical University	Pour plate culture method	8-Apr-2004
Pollen + exhaust gas + PM2.5	Yamagata University under the supervision of Professor Shirasawa, Tohoku Bunka Gakuen University	IgE antibody test	25-Aug-2004
Mites (feces and carcasses) + cedar pollen		ELISA method	8-Mar-2010
Pollen(16 kinds)	L.S.L. Asaka Research Laboratory under the supervision of Project Professor Kusakabe, graduate school of the University of Tokyo	ELISA method	23-Jan-2020

*This result was obtained by using a Streamer discharge device for testing in lab conditions.
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Indoor
Air Quality

We are committed to creating revolutionary technologies to give you the purest air.

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