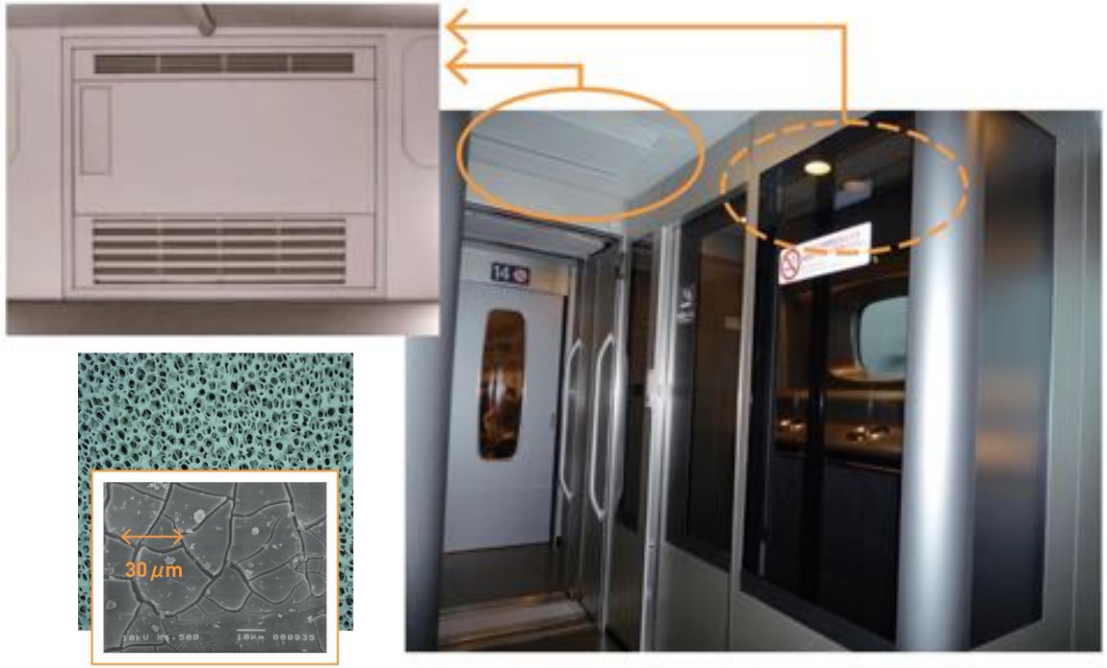
Expanding Use of

Japanese Photocatalytic Technology

Around the World

Smoking room on Shinkansen. Deodorization and air purification



Air purification unit with photocatalytic ceramic filters installed on the ceiling inside and outside the smoking room of the Tokaido and Sanyo Shinkansen N700 Series trains.

「 Odor-free smoking room 」

The photocatalytic ceramic filter jointly developed by JR Tokai and Seiwa Kankyo Engineering Co., Ltd. can decompose and purify secondhand cigarette smoke, which contains many volatile organic compounds (VOCs). It has been well received by passengers as an “odor-free smoking room.

Citation: Journal of the Japan Society for Opportunity Studies
https://www.jsme.or.jp/kaisi/1184-15/

Membrane roof coated with titanium dioxide photocatalyst

Antifouling and environmental purification

Moto-Sumiyoshi Station on the Tokyu Toyoko Line,
Nakahara-ku, Kawasaki City, Kanagawa Prefecture

「Photocatalytic Membrane Roof」

Moto-sumiyoshi Station on the Tokyu Toyoko Line in Nakahara-ku, Kawasaki City, Kanagawa Prefecture, is equipped with a photocatalytic membrane roof. The ticket gate and concourse are bright and spacious.

The roof is coated with titanium dioxide photocatalyst, which reduces the lighting load and provides a photocatalytic self-cleaning system that prevents fouling and maintains the beauty of the building.

The photocatalytic effect also decomposes environmentally harmful substances such as NOx, making the station environmentally friendly.

Citation: yukimisblog
http://yukimis.blog.fc2.com/blog-entry-28.html

The Challenge to Create Safe Drinking Water with Photocatalyst and Sunlight　Water Purification

Demonstration machine for photocatalytic water purification technology

「Photocatalytic Water Purification Technology」

Panasonic's “Photocatalytic Water Purification Technology” is a technology that uses photocatalysts and ultraviolet rays from sunlight to rapidly treat toxic substances in water to produce safe drinking water.

In India, about 70% of the population uses water other than tap water for drinking, and as many as 50 million people suffer health problems due to toxic substances such as hexavalent chromium and pesticide residues flowing into the ground. This technology is expected to solve this problem.

Citation: Panasonic
https://news.panasonic.com/jp/topics/38815

Membrane roofs for various airport facilities

Antifouling and environmental purification

Narita Airport Terminal 1 Tent Roof

Citation: Jiji Press, Ltd.
https://www.jiji.com/jc/v8?id=202211naritaairport

Kitakyushu Airport Membrane roof over walkway

Citation: CHUKOH CHEMICAL INDUSTRIES, LTD.
https://www.chukoh.co.jp/products/skytop/skytop-features/station-airport08/

「Photocatalytic Membrane Roofs at Airport Facilities」

In recent years, airports not only in Japan but also in many other countries have adopted lightweight membrane roofs in order to create higher ceilings and a sense of space and luxury through lighting.

Membrane roofs have the advantage of being lightweight, but they are also difficult to maintain and clean. However, by using a photocatalytic membrane roof, the antifouling and self-cleaning functions work effectively.

Photocatalytic Glass at Central Japan International Airport

Antifouling and environmental purification

「Self-cleaning effect of photocatalytic glass」

Photocatalytic glass coated with stain-resistant glass is used for a portion (17,000 m2) of the passenger terminal building.

When sunlight shines on the photocatalytic glass, dirt adhering to the glass is decomposed and its adhesive strength is weakened, making the glass less likely to become dirty (self-cleaning effect), thus reducing the number of cleanings and saving cleaning water.

The photocatalytic effect also decomposes environmentally harmful substances such as NOx, making the environmentally friendly.

Citation: Central Japan International Airport Co.,
https://www.centrair.jp/corporate/sustainability/environment/activity/consideration/operation/energy-saving/light.html

New Chitose Airport Photocatalytic Anti-virus border control project

Anti-virus

Photocatalytic unit and photocatalytic film installation

「Demonstration Experiment of Anti-Virus Measures Using Photocatalysts」

Since 2009, 341 ultraviolet LED air purification systems have been installed on the second floor of the domestic terminal at New Chitose Airport. In addition, 15 large air conditioners in the overall air conditioning system have built-in photocatalytic units (ultraviolet fluorescent lamp type), and long-term monitoring has been conducted to see if photocatalytic air purification is possible in the terminal.

Experimental results showed an 80% reduction in viruses, demonstrating the effectiveness of photocatalysis in large-scale facilities.

Citation: Seiwa Environmental Engineering Co,Lit.
https://seiwa-inc.com/see/virus.html

Citation: NEDO
https://www.centrair.jp/corporate/sustainability/environment/activity/consideration/operation/energy-saving/light.html

Vietnam Noi Bai Airport Photocatalytic Installation in Restrooms

Antibacterial, Anti-virus, Anti-mold, Deodorizatio

「Photocatalytic Installation in Restrooms」

The second passenger terminal building for international passengers at Noi Bai International Airport in Hanoi, the capital of Vietnam, was newly constructed. The second passenger terminal building for international passengers was newly constructed at Noi Bai International Airport in Hanoi, the capital of Vietnam, and photocatalysts were installed in the restrooms of the facility, which was completed in 2014.

The introduction of photocatalysts provides airport users with a clean and hygienic restroom environment with antibacterial, antiviral, antifouling, antifungal, antifungal, and odor-resistant effects.

The anti-mold effect of photocatalyst is also effective in Hanoi, where humidity is high.

Citation: jica
https://www2.jica.go.jp/ja/evaluation/pdf/2019_VNXVII-6_4_f.pdf

Photocatalytic Tile, Marunouchi Building, Tokyo

Antifouling and environmental purification

「Photocatalytic Tile」

Japan's first “photocatalytic tiles” were used in the Marunouchi Building (Marunouchi Building, completed in 2002) in front of the Marunouchi Exit of Tokyo Station. The main feature of photocatalytic tiles is that they have a self-cleaning effect, meaning that dirt does not adhere to the exterior walls of the building and is automatically washed away when it rains.

The self-cleaning effect keeps the building exterior clean, which means that cleaning and other maintenance work can be greatly reduced, and the amount of detergent and water used can also be reduced. In addition, the photocatalytic effect decomposes environmentally harmful substances such as NOx, making it an eco-friendly technology.

Citation: DIAMOND, INC.
https://diamond.jp/articles/-/152494?page=2

Nikko Toshogu‘s “ Urushi Project” Anti-mold

「 Urushi Project 」

Nikko Toshogu, a wooden structure built approximately 400 years ago, is a World Heritage Site that preserves the art of the Edo period. In Nikko, where the building is located, it snows a lot in winter and rains a lot in summer, and both the building and the sculptures are easily damaged. The surfaces of the carved buildings have been protected by the same traditional technique used in the Edo period, in which lacquer is applied over and over again and colored with natural rock paints and other materials.

When the surfaces of the lacquered buildings were examined, numerous areas of mold were found. A new field of application has begun to be pioneered: the protection of cultural assets by utilizing the anti-mold effect of photocatalysts.

Citation: DIAMOND, INC.
https://diamond.jp/articles/-/149395?page=3

PanaHome, photocatalytic house　Anti-fouling and Anti-mold

「 Kiratech 」

Thirteen years after its release, PanaHome's original high-performance photocatalytic tile “Kilatec,” developed together with TOTO, has been used in a cumulative total of 70,000 new homes.

The photocatalytic tile, which was selected for a Good Design Award in 2014, is a product with excellent design as well as functionality, as the iridescence phenomenon caused by the titanium dioxide blend changes the shade of the tile depending on the way the light hits it and the angle from which it is viewed, creating a unique texture.

Citation: DIAMOND, INC.
https://diamond.jp/articles/-/149395?page=3
Citation: Panasonic Homes Co., Ltd.
https://homes.panasonic.com/designer/works/009.html

Tokyo Station Yaesu Exit “Grand Roof” Anti-fouling

「 Grand Roof 」

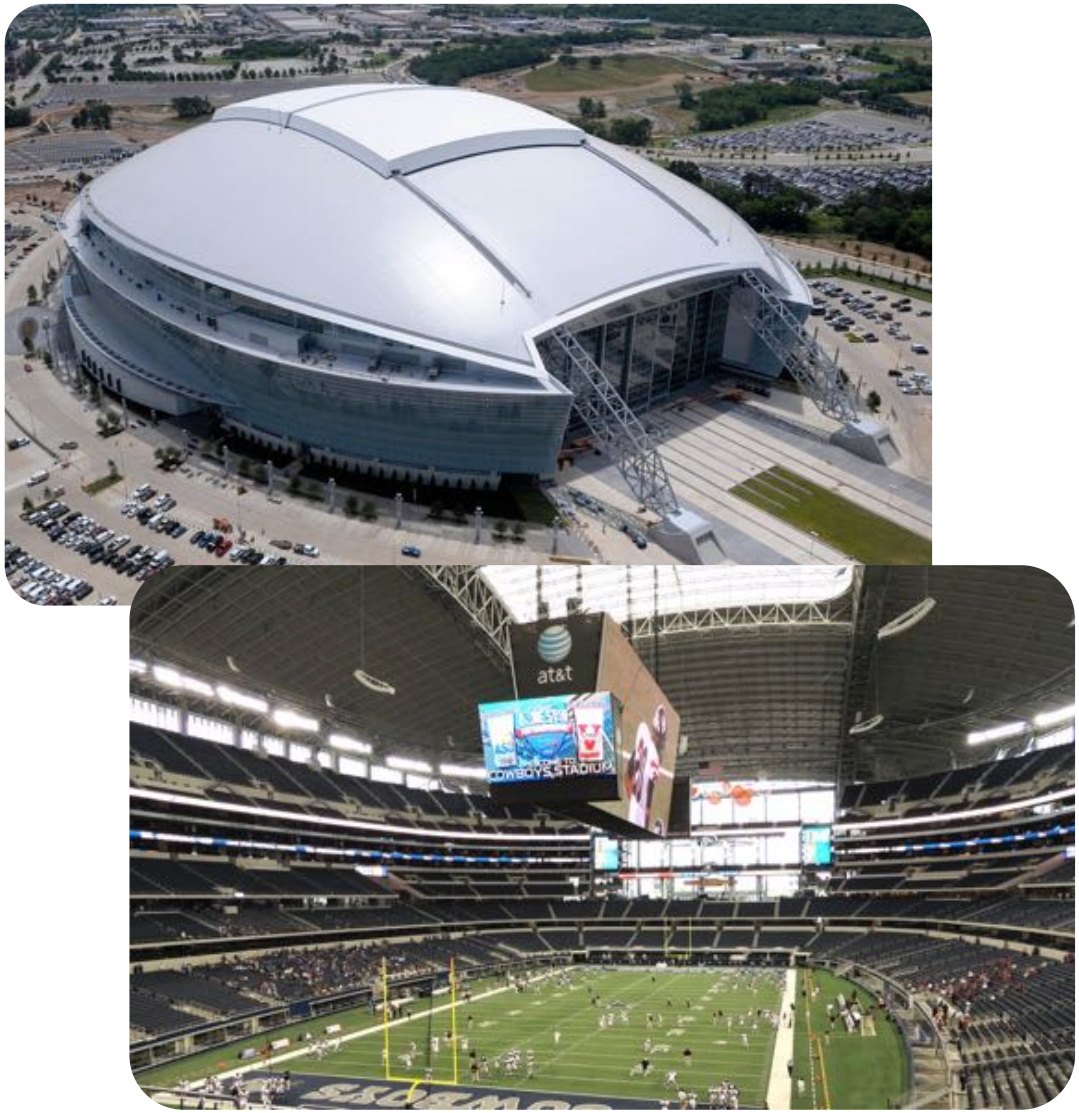
The “Grand Roof” roof at the Yaesu Exit of Tokyo Station is a special structure: a large-scale membrane roof approximately 230 m long and the maximum height of the main roof is approximately 27 m.

Membrane roofs are lightweight and have excellent design features, but they are time-consuming and costly to clean.

Therefore, by using a photocatalytic membrane roof, beautification maintenance is achieved through the self-cleaning function of photocatalyst, which prevents the adhesion of dirt on the surface, breaks it down, and when it rains, it flows off with the rainwater.

Citation: Tokyo Station City Management Council
https://www.tokyostationcity.com/learning/granroof/pdf/Granroof.pdf

AT&T Stadium Roof Anti-fouling



「 AT&T Stadium Roof 」

AT&T Stadium is a large multi-purpose stadium in Texas, USA, with a maximum capacity of approximately 100,000 people.

Currently, the use of tent and membrane roofs for such large facilities is becoming more common. The reason is that they are both lightweight and flexible in design.

On the other hand, they are difficult to clean and maintain. Therefore, it is becoming more common to use a photocatalytic coating to maintain the beauty of the roof with a self-cleaning function.

Citation: NationStates
https://www.nationstates.net/page=dispatch/id=2002647

Pompidou Center Mes Roof Anti-fouling

「 Pompidou Center Mes 」

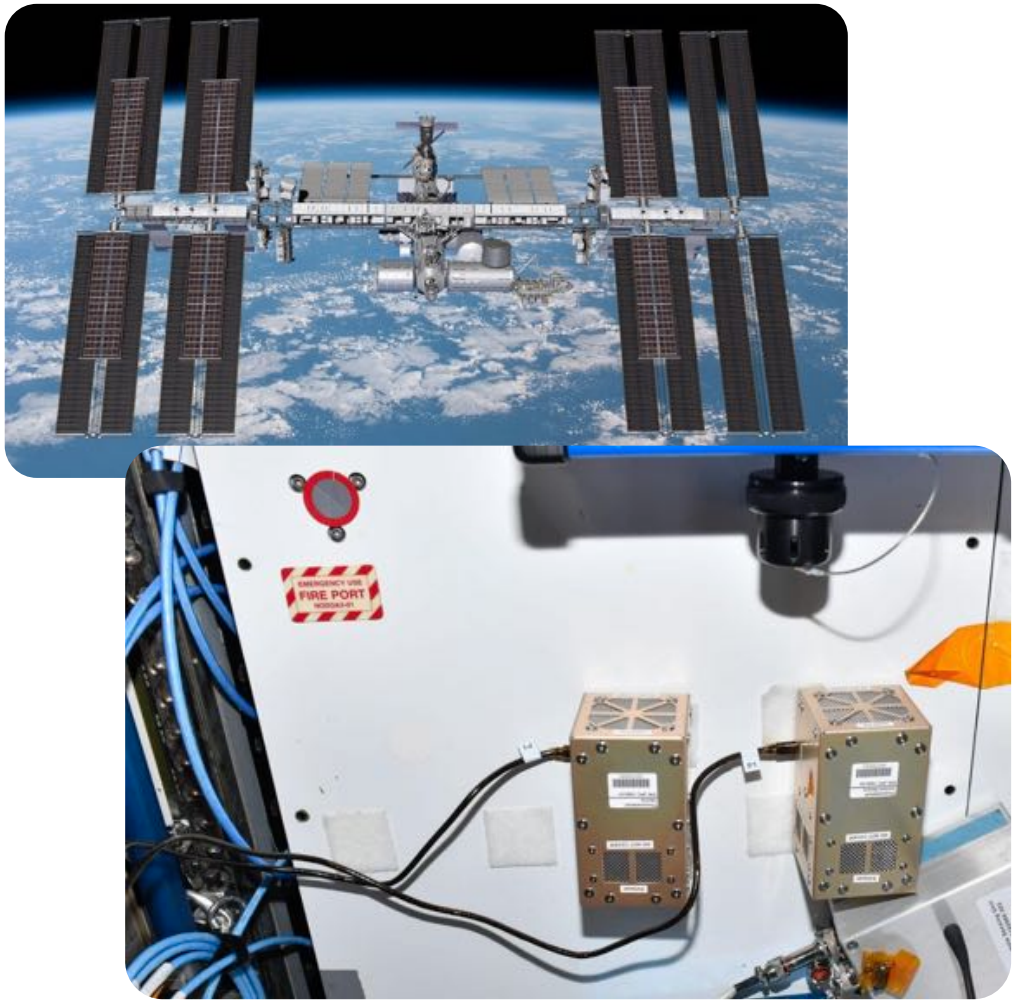
Completed in 2010, the Pompidou Center Mes, Europe's first large-scale membrane structure facility using photocatalytic tents, was designed by Japanese architect Shigeru Ban, and has a softly curved roof shape that utilizes the characteristics of membrane materials along with its functionality, covering a surface area of approximately 8,000 square meters.

Again, the roof is coated with photocatalyst to maintain its beauty through a self-cleaning function.

Citation: aasarchitecture
https://aasarchitecture.com/2013/05/centre-pompidou-metz-by-shigeru-ban-architects/

International Space Station (ISS) Photocatalytic Air Purification System

Deodorization



Two photocatalytic air purifiers installed on board the International Space Station (ISS) (Credit: NASA/Axiom)

「 International Space Station (ISS) 」

In 2022, a photocatalytic air purification system developed by Manned Space Systems Corporation, Tokyo University of Science, and Tokyo University of Agriculture and Technology was installed on the International Space Station (ISS) on a trial basis.

The purpose is to improve quality of life (QOL) by purifying air through photocatalytic deodorization.

Citation: sorae
https://sorae.info/space/20220416-jamss-photocatalyst.html

JALCARGO Photocatalytic Container

Anti-bacterial, Anti-mold, Food freshness maintenan

Photocatalytic Container

「JALCARGO Photocatalytic Container」

Photocatalytic containers with excellent air-cleaning functions decompose and remove ethylene gas, which is generated from perishable cargo and promotes spoilage, and airborne bacteria in the container, thereby preventing product deterioration. In an experiment on the removal effect, approximately 60% of the ethylene gas inside the container was removed after 210 minutes, and nearly 90% of the suspended bacteria was removed after 240 minutes.

Currently, its use is expanding in domestic air transportation, and its use in air transportation overseas, especially to Asia, is progressing for high-end Japanese fruits and other products.

Citation: Japan Airlines
https://www.jal.co.jp/jalcargo/

Pyramid at the entrance of the Louvre

Anti-fouling and Environmental Purification

「Pyramid at the entrance of the Louvre」

Photocatalyst was installed in the glass of the pyramid-shaped entrance of the Louvre Museum in Paris.

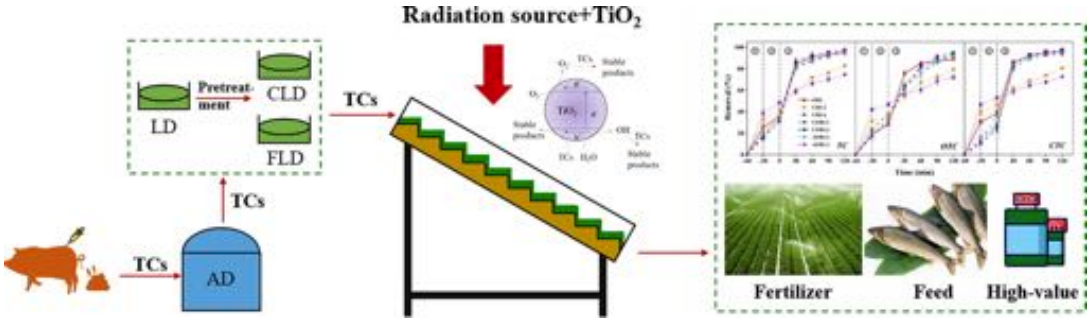
By covering the entire building with photocatalyst, cleaning costs can be kept low, and the cost-effectiveness of building management is said to be well worth it.

The photocatalytic effect is also expected to help purify the environment in Paris by decomposing environmentally harmful substances such as NOx.

Citation: DIAMOND, INC
https://diamond.jp/articles/-/149604

Photocatalytic decomposition of antibiotics in livestock manure

Sustainable



Photocatalytic decomposition of antibiotics in livestock manure

「Sustenable Livestock Production」

Livestock manure contains high concentrations of antibiotics, making it unsuitable for use as fertilizer in agricultural fields.

In this study, a system was designed to degrade antibiotics and a photocatalytic process was applied to degrade tetracycline in livestock manure. The effects of various operating variables (e.g., radiation source, TiO2 concentration, photocatalytic time, temperature, and depth of liquid digestion solution) on the removal of tetracyclines were analyzed to obtain optimal operating conditions.

Citation: Elsevier B.V.,
https://www.sciencedirect.com/science/article/abs/pii/S1385894720344399

Example of nanoAce construction：Ambulance

Anti-bacterial, Anti-virus, Anti-fouling, Deodorization

Chikugo Regional Fire Department Ambulance
(11 ambulances)

nanoAce

「 Ambulance 」

Since the corona outbreak, cleaning the inside of ambulances has become more labor intensive and time consuming. Each time a patient is transported, the interior of the vehicle must be cleaned, including sterilization, each time.

By coating the inside of the vehicle with nanoAce photocatalyst, the cleaning work can be reduced and the safety of both the patients being transported and the ambulance crews can be ensured, thanks to its anti-bacterial, anti-virus, anti-fouling, and deodorizing effects.

Example of nanoAce construction：Kashima Jingu Shrine

Anti-fouling and Anti-mold

Kashima Jingu Shrine

nanoAce

「Kashima Jingu Shrine」

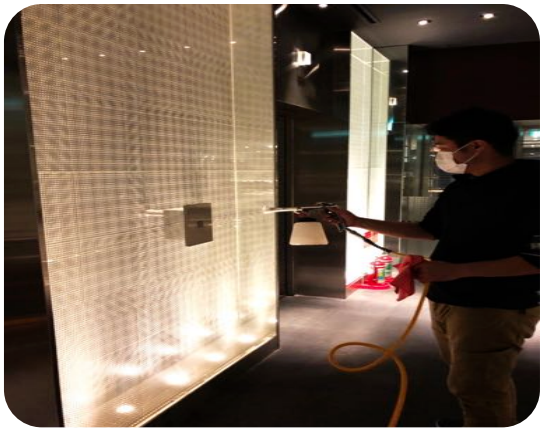
Kashima Jingu Shrine is an important cultural property in Japan, located in Miyanaka, Kashima City, Ibaraki Prefecture. It is said to have been built around 500 B.C., during the reign of Emperor Jinmu.

For a long time, it has been protected by traditional Japanese technology.

However, due to severe climate change in recent years, there was a demand for protection by new technology, and among photocatalysts, the nanoAce photocatalyst technology was adopted, which does not use glue and does not affect the objects to be protected.

nanoAce Example：Shinjuku Washington Hotel

Anti-bacterial, Anti-virus, Anti-fouling, Anti-mold, Deodorization



nanoAce

「 Shinjuku Washington Hotel 」

The Shinjuku Washington Hotel, located in Shinjuku, is used by a variety of customers from all over the world and is always paying attention to hygiene management, including measures against infectious diseases.

Since nanoAce's photocatalyst can prevent quarantine in advance, the hotel requested us to install it.

To enhance the sanitary environment in the hotel, nanoAce photocatalytic coating was applied mainly to the reception counter, doorknobs, inside and outside of elevators, and check-in machines.