

Prestige Shield

Antiviral Coating Agent

Against Indirect Transmission

Highly Water Repellent and
Anti-Novel Coronavirus (**COVID-19**)

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設 計



建 造

Specialty

- Antivirus/antibacterial technology using copper ion (Cu^{2+}).
- The copper ion (Cu^{2+}) used as a catalyst is different from ordinary photo-catalysts. Even though there is no light, its strong oxidizing ability can kill viruses and bacteria.
- Copper is safe and secure to human body, and is used as a material for coins.
- As time goes by, the effect of organic antiviral medicine will diminish. Prestige Shield is an inorganic copper compound, so the effect will last longer.
- Since Prestige Shield coating agent has high water repellency, it can reduce the adhesion of viruses or germs to objects.
- Prestige Shield coating agent can be coated on the surface of various materials because of its transparent coating.
- Prestige Shield coating agent is water-based.

Test Results (ISO 21702 Test Method)

(Coating on Aluminum Plate)

A) Inactivation of Influenza A Virus

* Alternative viruses such as novel coronavirus (COVID-19) , influenza virus, SARS virus, rubella virus, etc.
Antiviral activity for **Prestige Shield: R=4.6** Satisfactory level: **R=3.0**

Status of Aluminum Plate	Test Time (Hour)	PFU/cm ²			Log(PFU/cm ²) (Logarithm)		Antiviral Activity (Prestige Shield) R
		N=1	N=2	Average	Mark	Value	
No Coating (0h)	0	237,500	206,250	221,875	UO	5.3	—
No Coating (24h)	24	16,125	39,063	27,594	Ut24	4.4	—
Prestige Shield Coating	24	0.63	0.63	0.63	At1	-0.2	4.6

B) Inactivation of Feline Calicivirus (FCV)

* Alternative virus such as norovirus , rotavirus, poliovirus, adenovirus, etc.
Antiviral activity for **Prestige Shield: R=5.2** Satisfactory level: **R=3.0**

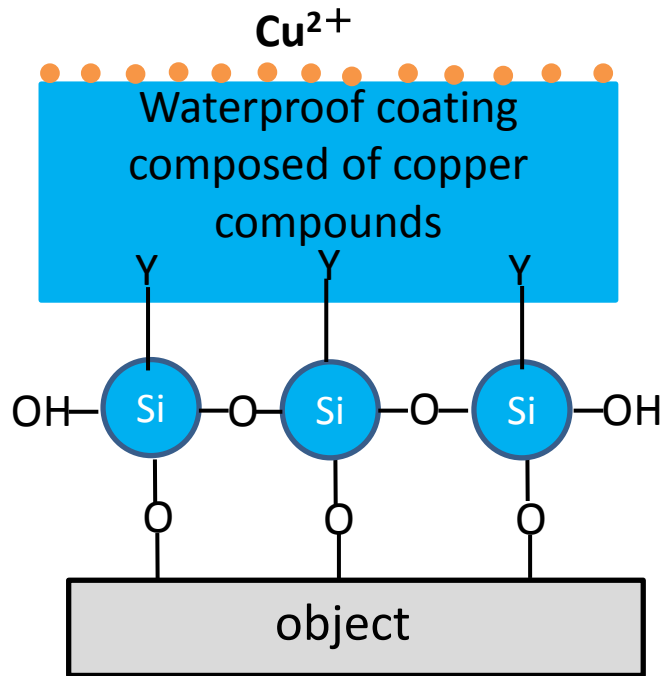
Status of Aluminum Plate	Test Time (Hour)	PFU/cm ²			Log(PFU/cm ²) (Logarithm)		Antiviral Activity (Prestige Shield) R
		N=1	N=2	Average	Mark	Value	
No Coating (0h)	0	762,500	831,250	796,875	UO	5.9	—
No Coating (24h)	24	89,063	117,500	103,281	Ut24	5.0	—
Prestige Shield Coating	24	0.63	0.63	0.63	At1	-0.2	5.2

It has very large antiviral activity against influenza A virus and Feline carisivirus (FCV).

* Experiment conducted by: PROTECTEA LTD.

(an Osaka University Venture aiming for research & development, manufacturing and sales of products on infectious disease prevention and control)

Basic Composition



The copper compounds in the Prestige Shield coating is ionized by moisture and oxygen in the atmosphere. (Cu^{2+})

1. Enzyme is the source of nutrients for viruses and bacteria. Cu^{2+} can oxidize and decompose enzymes and kill viruses and bacteria.
2. Cu^{2+} destroys the surface envelope and capsid of the virus, opens pores to enter the virus, and destroys the DNA and RNA of the virus core.

Copper compounds with a contact angle of 98° or above are mixed to form a highly waterproof transparent coating on the surface of the object.

Antiviral and Antibacterial Effect About Prestige Shield

Prestige Shield. is a transparent coating agent with antiviral and antibacterial effect, composed of FCWP, our company's existing high-molecular material with high water repellency, and copper compound. We know that copper is safe for human body and has very high antiviral and antibacterial effects.

Example :

1. Escherichia coli O157 is a cause of foodborne illness , and Prestige Shield is extremely effective against it. Prestige Shield also has high antibacterial ability against Legionella, Cryptosporidiosis and E. coli.
2. Prestige Shield can eliminate Influenza A virus (an enveloped virus, one of the alternative viruses to coronavirus) and Feline Calicivirus (a non-enveloped virus, one of the alternative viruses to norovirus).
3. The vector of Dengue and Zika fever is Aedes aegypti mosquito (Aedes albopictus / Stegomyia albopicta), and it is proved that Prestige Shield can effectively suppress the transmission of viruses spread by Aedes aegypti mosquito.

*Copper, brass and bronze are capable of killing harmful, potentially deadly bacteria. , and protecting public health. (approved by the U.S. Environmental Protection Agency (EPA) in March 2008)

*After 4 years of investigation, when using copper bed fences, copper bedside tables, copper nurse call buttons, copper drip racks, etc., pathogens on copper surface and the infection rate are reduced. A result is published:

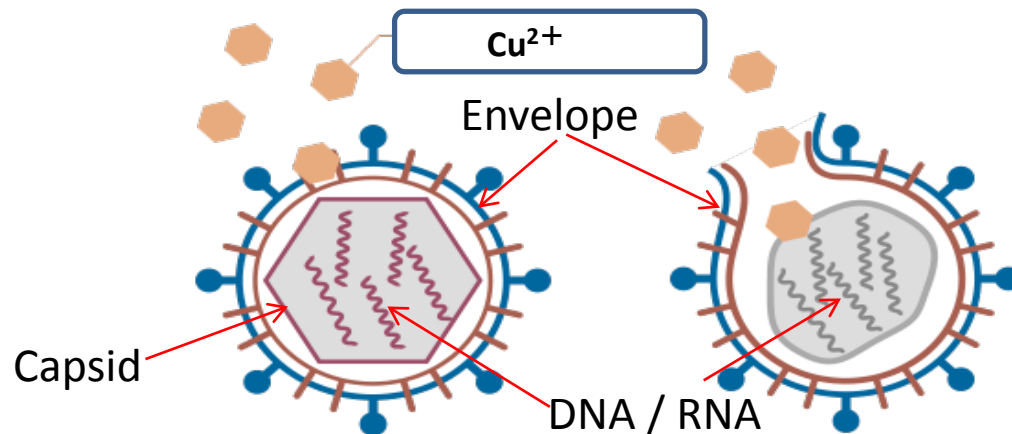
“Copper surface can reduce the risk of infection by 58%”.

(from Professor M. Schmidt, Medical University of South Carolina, USA)

The Two Effects of Copper Ions (on Enveloped Viruses)

Copper compounds are ionized by the moisture and oxygen in the atmosphere. (Cu^{2+})

1. Cu^{2+} ions remove electrons from surface protein of the virus through oxidation, surface protein of the virus will then ionize and lose its ability to infect
2. When copper ions (Cu^{2+}) come into contact with virus, the virus's envelope and capsid will be destroyed, thereby opening the virus hole into the core, and then destroying the DNA and RNA of the virus core through intense oxidation/reduction



Novel coronavirus (COVID-19), influenza virus, SARS virus, rubella virus, etc.

The Two Effects of Copper Ions

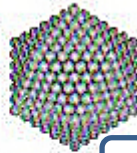
(on Naked Viruses)

Copper compounds are ionized by the moisture and oxygen in the atmosphere. (Cu^{2+})

1. Cu^{2+} ions remove electrons from surface protein of the virus through oxidation, surface protein of the virus will then ionize and lose its ability to infect
2. When copper ions (Cu^{2+}) come into contact with virus, the virus's capsid (protein) will be destroyed, thereby opening the virus hole into the core, and then destroying the DNA and RNA of the virus core through intense oxidation/reduction

エンベロープをもたないウイルス

正二十面体



Cu^{2+}

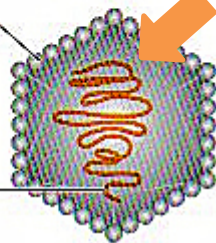
Capsid
(Protein)

カプシド
(蛋白質)

破壊

DNA / RNA

核 酸



Norovirus, Rotavirus, Poliomyelitis virus, adenovirus, etc.

Viruses without an envelope are not easily destroyed by ordinary alcohol and surfactants, but copper ions can effectively destroy the virus.

Scope of Application

Scope of Application

- Such as commercial facilities, hospitals, nursing centers for the elderly, schools, houses, etc.
Door handles, handrails,
toilets, sinks, bathrooms, floors and places where viruses and bacteria can spread.
- Viruses and bacteria may be scattered on dining table and table surface during speech and eating.
- Cars, trains, subways, airplanes and other public transportation facilities such as doors, handrails, dashboards, car body, rings and other things that people touch.
- Smart phones, TVs, computers and other things that people touch.

Applicable Surface

- Plastic surface / Painted surface
- Metal surface
- Glass/ceramic surface / various stone surface / cement surface

Precautions

- If the surface of the coated object has a water-repellent function, it may be difficult to adhere.

Composition and Physical/chemical Properties of Coating

Ingredient

● Thinner dry type

Copper compounds

Zircon compound

Silicone compounds

Ceramic compound

Isopropanol

Water

Physical/chemical properties

Appearance: light green milky white

Liquidity: water-soluble

PH: 4.2 ~ 5.1

Reactivity: stable

Viscosity: No data

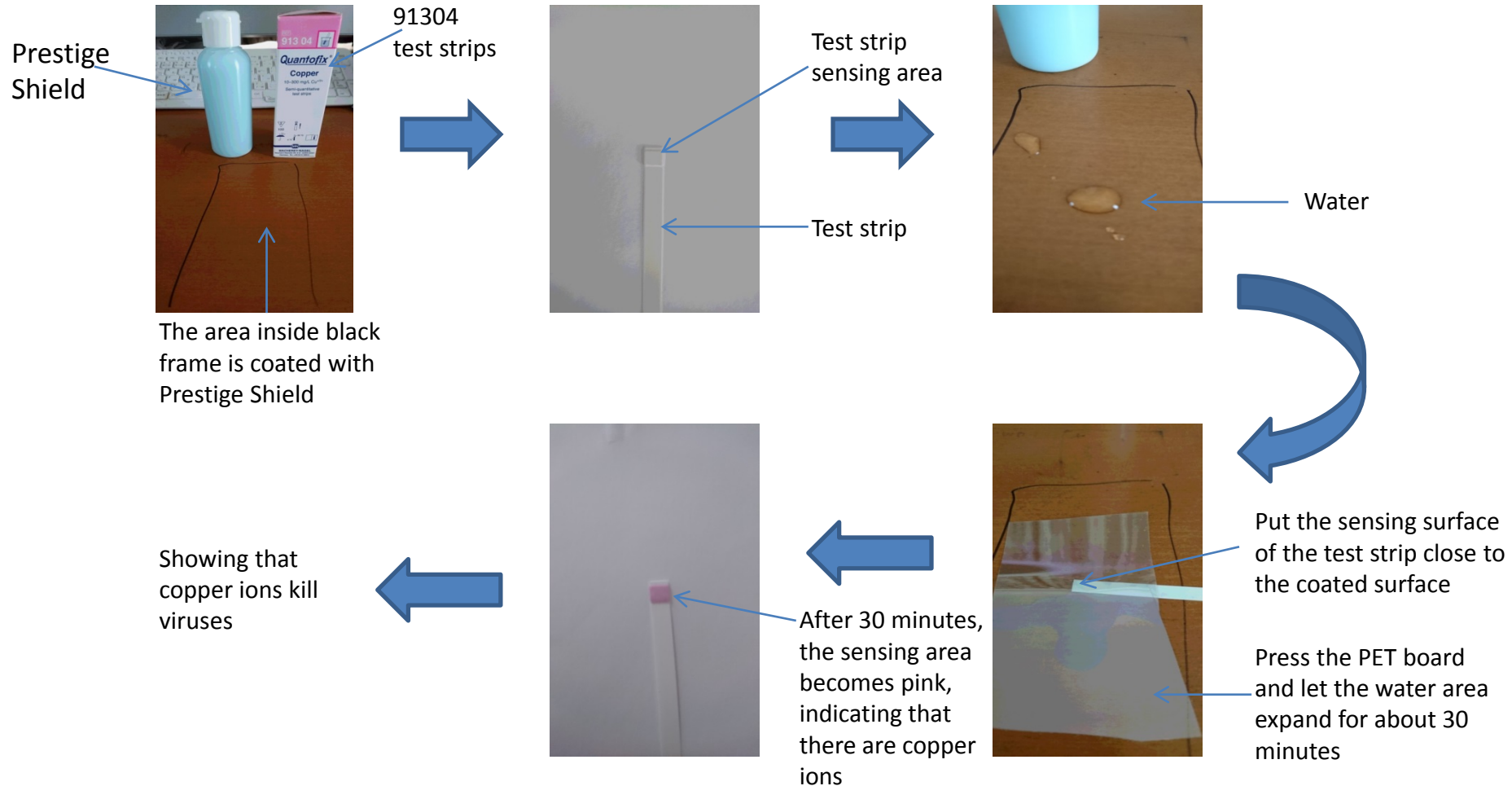
Boiling point: about 100°C

Specific gravity: about 1 (25°C)

Coating Method

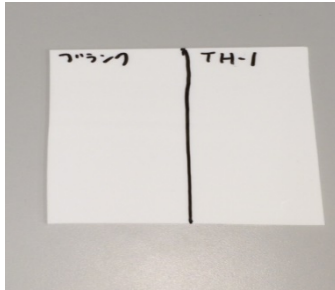
Engineering	Method
1. Removal of oil and dirt on the surface of the substrate	After removing the dirt with alcohol or a brush, rinse the surface with water, and wait until the surface is dry
2. Coating operation after drying	Coating method: spraying or brushing * Material with smooth surface (Plastic, metal, tile, glass, etc.) wipe and dry the surface after coating (using brushing method)
3. Suitable coating amount	1m ² area Material with smooth surface Wet: 30g~40g Material with rough surface Wet: 60g~70g

Simple Method of Antiviral Test

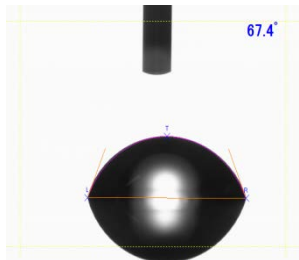


Water Repellency Test

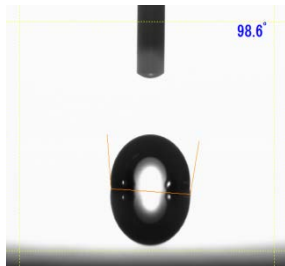
Acrylic panel
(common product sold in market)



Before coating

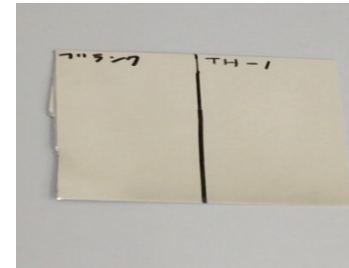


After coating

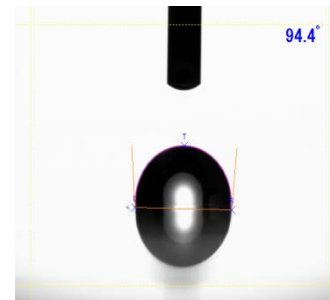


	Before coating	After coating
Contact angle (water repellency)	67.4°	98.6
Gloss	81.1	82.1

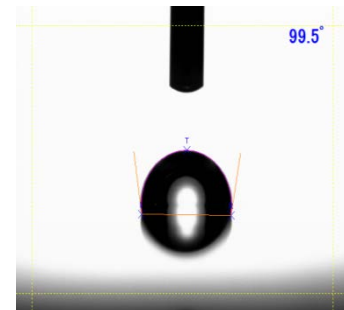
Aluminum plate
(common product sold in market)



Before coating



After coating



	Before coating	After coating
Contact angle (water repellency)	94.4°	99.5°
Gloss	350.2	1030.6

Surface Characteristics of Prestige Shield Coating-1

Characteristics of Water Repellency

Contact angle	Before coating	After coating
Tile (placed outdoor for 1 year)	55.6°	101.3°
Acrylic board (new product)	67.4	98.6
Glass plate (new product)	51.3	99.1
Aluminum plate (with untreated surface)	94.4	99.5

【Measurement of Contact Angle】

JIS R 3265 measurement method

Analysis method: drop method, $\theta/2$ method liquid volume unit : 2 μ L waiting time : 1000ms

Kyowa Interface Science Co., Ltd. Instrument name: Automatic contact angle meter Model: :DM—501

Gloss

	Before coating	After coating	New products
Common tile sold in market (placed outdoor for 1 year)	76.7	89.5	89.9
Tile (new products)	89.9	92.4	
Acrylic board	81.1	82.1	
Aluminum plate (with untreated surface)	350.2	1030.6	

【Gloss measurement】

Nippon Denshoku Industry Co., Ltd. Model: VG7000

JIS Z 8741 20° angle measurement method

- * In the JIS standard, the glass surface with a refractive index of 1.567, at an incident angle of 60°, the reflectivity is 10% and the gloss is 100% (%), and the incident angle is 20° in the case of 5% reflectance, the gloss is 100% (%).
- * The surface condition of ceramic tiles is relatively stable, so it is widely used as a reference plate (secondary standard plate) in the medium gloss area.

Surface Characteristics of Prestige Shield Coating-2

Physical/chemical Properties

Appearance	Colorless and transparent
Surface hardness (pencil hardness)	6H (When the substrate is glass)
Film thickness	2.0~3.0μm
Initial adhesion (Gear test)	Peeling number 0
Non-combustibility Yes/No	Non-combustibility

Coating: Solvent Test

Dipping for 24h	Appearance (deformation, cracking, peeling)	Adherence
IPA	No change	No change
Ethyl acetate	No change	No change
Toluene	No change	No change

Coating Film: Weather Resistance Test

	Water penetration	Exterior	Water repellency
3% H ₂ O ₂ : 288h Impregnation		No change	No change
Water: 30 days	0.00g	No change	No change

* Immersed in 3% H₂O₂ solution for 24h is equivalent to outdoor exposure for 1 year (coating test)