

# Anti-Viral and Anti-Bacterial Self-Disinfecting Screen Protector and Surface Protector

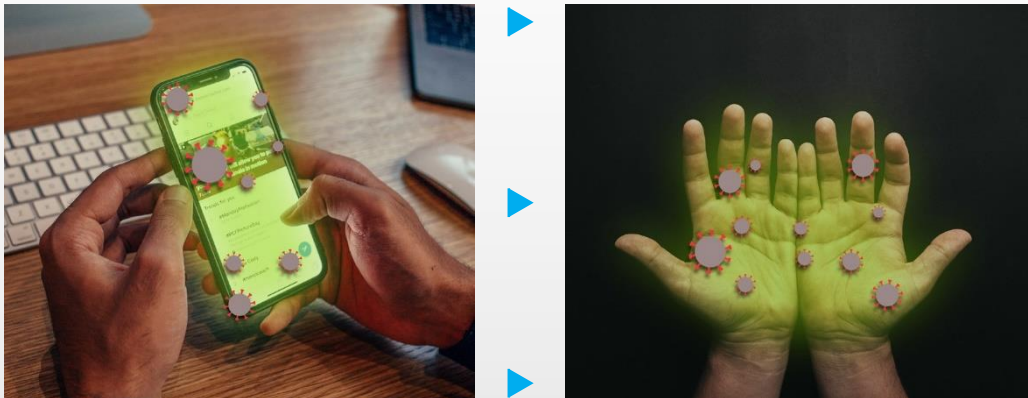
30 Jan 2021

Class 1 Medical Device





Enhancing the antiviral and antibacterial properties of **copper** through advanced **nano-technology**. Reducing self-disinfection time from 2+ hours (copper) to just minutes (Flytech-NanoShield).



Viruses and bacteria can survive on hard surfaces for long periods of time, SARS-CoV-2 – the virus responsible for COVID-19 has been studied to survive up to **3 - 5 days** on hard surfaces<sup>1</sup>. Surfaces that are frequently touched can be a vector for disease transmission. We touch elevator buttons, our phones, self-serve kiosks, vending machines and tablets daily and then touch our faces without thinking twice. If any of these surfaces have viruses attached, higher rates of infection occur.

## Retrofit frequently touched display and devices

- 🛡️ Easily installed: silicone adhesive is simple to install, leaving no messy residue behind.
- 🛡️ Cut to suit any shape and size: supplied in factory direct roll form 98cm wide.

## Benefits

- 🛡️ Immediate effect: eradicates viruses and bacteria **within minutes**.
- 🛡️ Long Lasting: Acceleration test shows it maintain its effectiveness in **12 months**
- 🛡️ Quality: Manufactured in **Japan**

<sup>1</sup> <https://www.webmd.com/lung/how-long-covid-19-lives-on-surfaces>

## Antiviral Test

Effective against coronavirus, influenza, norovirus within minutes. Verified by Independent Labs below:



USA



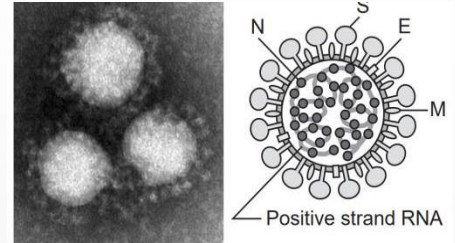
Singapore



Australia



Japan



Coronavirus (quoted by National Institute of Infectious Diseases)

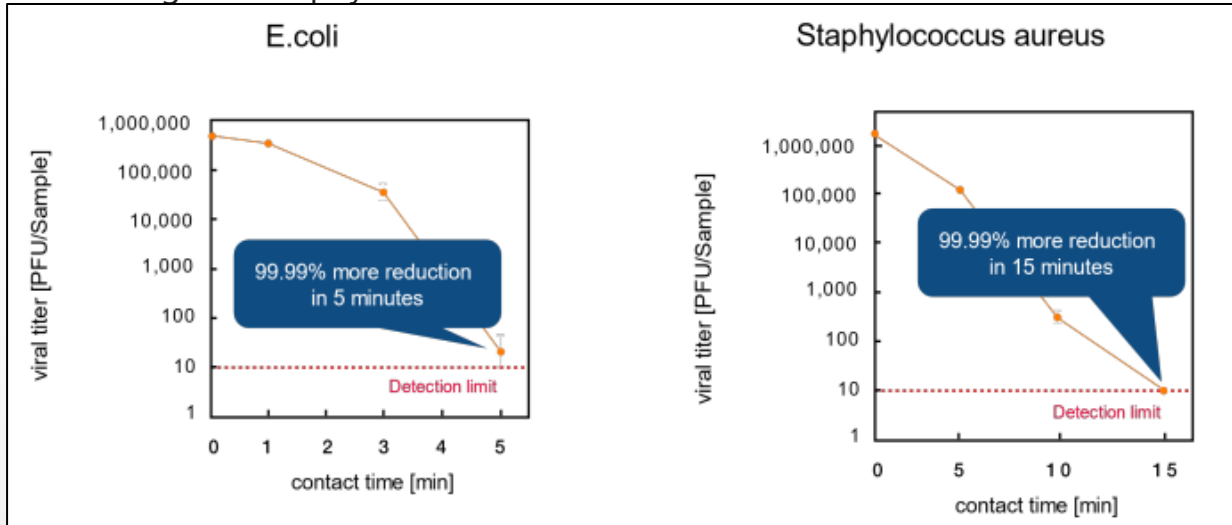
Enveloped viruses	Non-enveloped viruses																		
Lipid membrane (envelope) surrounds the capsid layer with the DNA/RNA within.	No lipid membrane, the DNA/RNA is surrounding by a protective capsid protein layer																		
Coronavirus Influenza virus	Norovirus Adenovirus																		
<p><b>Coronavirus</b></p> <table border="1"> <caption>Coronavirus Viral Titer Data</caption> <thead> <tr> <th>Contact time [min]</th> <th>Viral titer [PFU/Sample]</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1,000,000</td> </tr> <tr> <td>10</td> <td>~100,000</td> </tr> <tr> <td>30</td> <td>~10,000</td> </tr> </tbody> </table>	Contact time [min]	Viral titer [PFU/Sample]	0	1,000,000	10	~100,000	30	~10,000	<p><b>Feline calicivirus (Norovirus surrogate)</b></p> <table border="1"> <caption>Feline calicivirus Viral Titer Data</caption> <thead> <tr> <th>Contact time [min]</th> <th>Viral titer [PFU/Sample]</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1,000,000</td> </tr> <tr> <td>5</td> <td>~100</td> </tr> <tr> <td>10</td> <td>~10</td> </tr> <tr> <td>15</td> <td>~10</td> </tr> </tbody> </table>	Contact time [min]	Viral titer [PFU/Sample]	0	1,000,000	5	~100	10	~10	15	~10
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### ISO21702:2019 Test

- In **3 minutes, 99.99%** of Influenza virus (H3N2) was eradicated.
- In **5 minutes, 99.99%** of Feline Calicivirus was eradicated.
- In **10 minutes, 90%** of the mouse-based coronavirus MHV-A59 was eradicated.
- In **30 minutes, 99.99%** of human coronavirus Strain OC43 was eradicated.

## Antibacterial

Effective against Staphylococcus and E. Coli within minutes.



### JIS Z2801:2010

- In **5 minutes, 99.99%** of the E.coli Bacteria strain was eradicated.
- In **15 minutes, 99.99%** of Staphylococcus aureus Strain was eradicated.

## Durability-Simulation Test

Accelerated wear test was done to evaluate Flytech-Nanoshield Anti-viral protective film's effectiveness after simulated long term use.

### Testing Regime

In order to test the effectiveness and efficacy Nanoshield film after long term use, a wiping test was developed to simulate regular cleaning for six months

### Test Methodology

To simulate real life sanitation procedures, a rag soaked with various cleaning products was used to regularly wipe the Nanoshield film. The results below are reflective of three, six and 12 months, assuming cleaning is done three times daily. Wiping was carried out with standard force.

T-1 Solution used for wiping test impregnated Solution		T-2 Acceleration period and number of wiping sessions	
Tap water		Assumed Period	Wiping frequency (round trip)
Neutral detergent diluent		3 month	270
70% ethanol		6 month	540
200ppm Aqueous Na Hypochlorous acid solution		12 month	1080

### ISO 22196

- Flytech-Nanoshield protective film still effectively kills 99.99% of the Influenza Virus after simulated 12 months usage.

## Real-life Japanese Nursing Care and Medical Facility 6-month Test

- 16 locations
- Door handles and Handrails

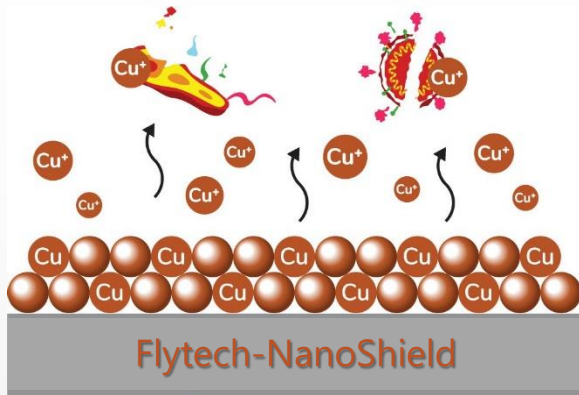
Sample	Setting		Antiviral activity value	Reduction rate	P/F
Standard value			$\geq 3$	$\geq 99.9\%$	-
Unused sample			$\geq 3.6^*$	$\geq 99.9\%$	OK
Actual sample	nursing home A	Bathroom handrail	2.6	$\geq 99.8\%$	
		Handrail	$\geq 3.6$	$\geq 99.9\%$	OK
		handrail	$\geq 3.6$	$\geq 99.9\%$	OK
		Living room door	$\geq 3.6$	$\geq 99.9\%$	OK
		Living room door	$\geq 3.6$	$\geq 99.9\%$	OK
	nursing home B	Restroom door	$\geq 3.6$	$\geq 99.9\%$	OK
		Restroom door	$\geq 3.6$	$\geq 99.9\%$	OK
		Restroom handrail	$\geq 3.6$	$\geq 99.9\%$	OK
		Clean room door	$\geq 3.6$	$\geq 99.9\%$	OK
		Clean room door	$\geq 3.6$	$\geq 99.9\%$	OK
	nursing home A	Bathroom handrail	$\geq 3.6$	$\geq 99.9\%$	OK
		NS* door	$\geq 3.6$	$\geq 99.9\%$	OK
		NS door	$\geq 3.6$	$\geq 99.9\%$	OK
		NS door	$\geq 3.6$	$\geq 99.9\%$	OK
		Indoor door	$\geq 3.6$	$\geq 99.9\%$	OK
		Indoor door	$\geq 3.6$	$\geq 99.9\%$	OK

\*NS : nurse station



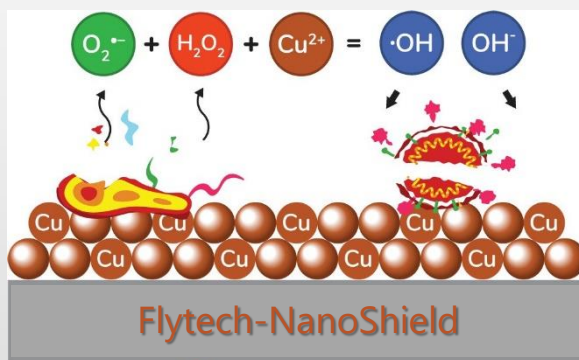


# How it works: copper nanotechnology



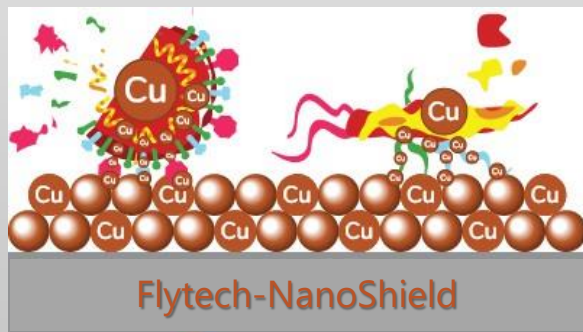
## Copper Ions

Flytech-NanoShield produces electrically charged copper ions that attach to viruses and bacteria altering their structure, inactivating them.



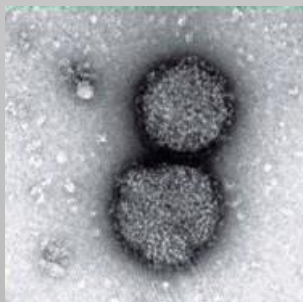
## Reactive Oxygen Species (ROS)

Flytech-NanoShield reacts with molecules that are produced by bacteria ( $\text{H}_2\text{O}_2$ ,  $\text{O}_2^{\cdot-}$ ) to form a chemical substance called Reactive Oxygen Species (ROS). ROS damages both the proteins and nucleic acids in viruses and bacteria providing an antibacterial and antiviral effect.

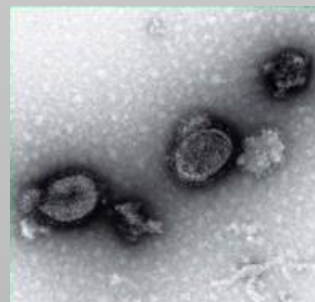


## Direct Contact

All viruses are surrounded by a protective protein layer that holds the infectious DNA/RNA inside. In order for viruses to spread, this layer needs remain intact. Flytech-NanoShield's copper particles are rapidly absorbed into this protein layer bursting their protective wall.



Influenza (before) circular shape, no damage to virus envelope



Influenza (after) damaged and destroyed virus envelope, non-infectious

# Benefits: Product Performance



## Continuous protection

Viruses and Bacteria are eliminated within minutes of being in contact with the film, reducing the risk of transmission in surfaces that are frequently touched.



## Advanced Tech. from Japan

Patented copper compound (Cu<sub>2</sub>), more effective than Copper Alloy, Nano Silver, Silver ion or Zinc in speed of elimination of viruses and bacteria



## Optically clarity for touchscreens

Only optically clear film (88% transmission) on the market using PET Polymers with silicone adhesive, making it the ONLY FILM suitable for touch screens



## Easy installation

Our films come with an adhesive backing that makes it simple to install. Just cut to size, peel and stick



## Low maintenance

High efficiency by reducing the frequency of sanitation required to touchpoints. Unlike chemical disinfectant which require intensive labour. We recommend replacement every 6 to 12 months



## Lab tested

Tested in leading laboratories in Japan, Singapore. In Australia it is entered in the ARTG, # 339939 as a **Class 1 Medical Device** to destroy microbes and viruses that come into contact with it

# Comparison to alternative products

	Flytech-NanoShield Film	Brand C	Spray Coating
Efficiency	<b>within minutes</b>	within <b>hours</b>	within <b>hours</b>
Transparency	<b>Clear</b>	Matte	Matte
Maintenance	<b>Low</b>	Low	High
Coating Visibility	✓	✓	✗
Labor	<b>Low</b>	Low	High
Bleach Resistant (Sodium Hypochloride)	✓	✓	✗
Alcohol Resistant	✓	✓	✗
Durability	<b>6-12 months</b>	6-12 months	3-6 months
Technology	<b>Cu+ Nano Ions</b>	Copper alloy	Silver Alloy
ATP reading	<b>60+</b>	2000+	200+
Test/ Lab Reports	<b>Singapore, Australia, Japan</b>	Korea	Singapore, USA
Antiviral	✓	✗	✗ (no data)
Antibacterial	✓	✓	✓
Drying-Surface Preparation	✗	✗	✓
Protective Barrier	✓	✓	✗
Electrical/Electronic Safe	✓	✓	✗
Installation	<b>Easy</b>	Easy	Difficult (requires curing time and expertise)



## Screen Protector (PET) Sizes:

Screen Sizes	Display Area (Straight Corners)
15" (4:3)	305 x 229mm
21.5" (16:9)	476 x 268mm
32" (16:9)	697 x 392mm
43" (16:9)	941 x 549mm



## Custom Size:

- 98cm width x various lengths in Roll
- Special Shapes possible
- 100 microns

## Surface Protector (PVC) Sizes:

Uses	Size
Glass Door Handles	300 x 145mm
Countertop (Small)	600 x 500mm
Countertop (Big)	1320 x 500mm
Long Bench	2000 x 500mm



## Custom Size:

- 132cm width x various lengths in Roll
- Special Shapes possible
- 80 microns



# **Applications**

*For Screen – PET Material*

*For Other Surfaces – PVC Material*



**Door Handles**



**Door Push Plate**



**Hand Rail**



**Elevator Button**



**Electronic Door Buttons**



**Self-serve Kiosk**



**Inflight/Onboard Entertainment**



**ATM**



**Tablet**



**Smart Phone**



**Small Devices**



**Educational Table/Desk**



**Kitchen Bench Tops**



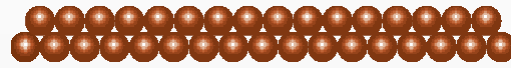
**Fitness Equipment**



**Safety Screen**

## ◆ Film composition

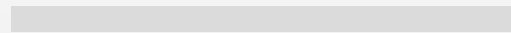
- ▶ Flytech-NanoShield is customizable depending on what the customers needs are. Film compositions can vary in antiviral efficiency, hardness, scratch resistance and thickness.
- ▶ We uses a special silicone adhesive that makes installation easy, leaving no excess residue.



**Antiviral Coating**



**100µm PET /  
80µm PVC**



**PET - Silicone /  
PVC - Acrylic**



**PET liner / Paper liner**

\* The above is a configuration example and can be customized.

## ◆ Physical property values

Properties	PET Screen Protector	PVC Indoor Surface Protector
<b>Adhesive Force</b>	80-100mN/25mm	19N/25mm
<b>Total Light Transmittance</b>	>88%	>88%
<b>Haze</b>	<8%	<15%
<b>Antiviral Function</b>	Excellent	Excellent
<b>Antibacterial Function</b>	Excellent	Excellent

\* Above values are measured values and not guaranteed values.

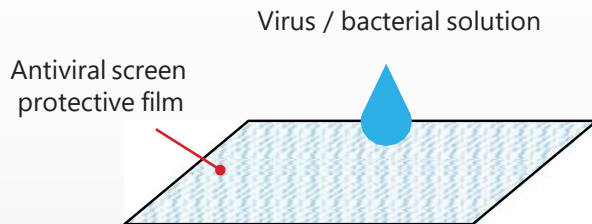
## ◆ Safety

The below tests have been performed to demonstrate it is safe to touch.

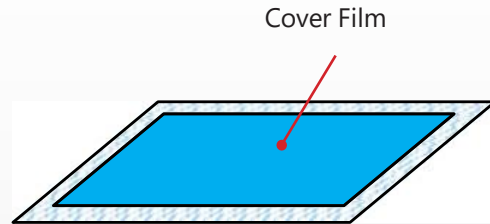
Test items	Test results	Testing institution
Acute oral toxicity test	Minimum lethal dose (LD50 value) > 2,000 mg/kg	Food and Drug Safety Center Hatano Research Institute
Ocular irritation test	No irritation of eye tissue (cornea, iris, conjunctiva)	Food and Drug Safety Center Hatano Research Institute
Primary skin irritation test	No irritation reaction was found.	Food and Drug Safety Center Hatano Research Institute
Skin sensitization test	Skin sensitization: Negative	Food and Drug Safety Center Hatano Research Institute
Mutagenicity test	Genotoxicity: Negative	Food and Drug Safety Center Hatano Research Institute
Cytotoxicity test	Score: 2 (positive = 3 or higher) using a non-woven fabric with Copper Ions	Nelson Laboratories, LCC

# Antiviral and antibacterial lab test methodology

Test Methodology: JIS L1902 / ISO22196

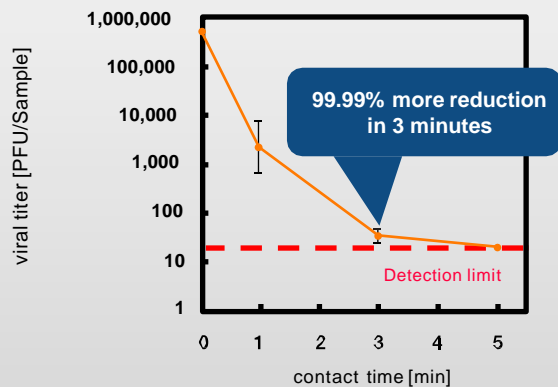


Virus solution (bacterial solution) is dropped on the Antiviral screen protective film piece.

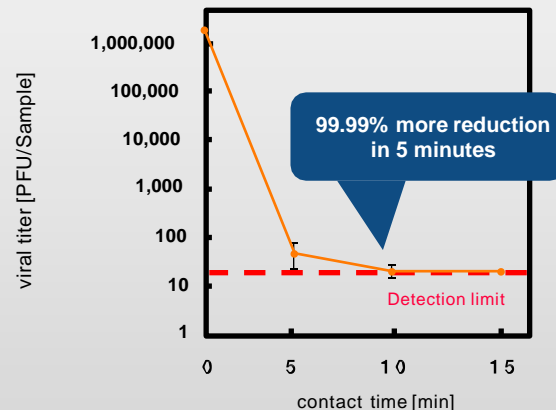


Cover the cover film with the virus solution (bacterial solution) and adhere to the Antiviral screen protective film for evaluation.

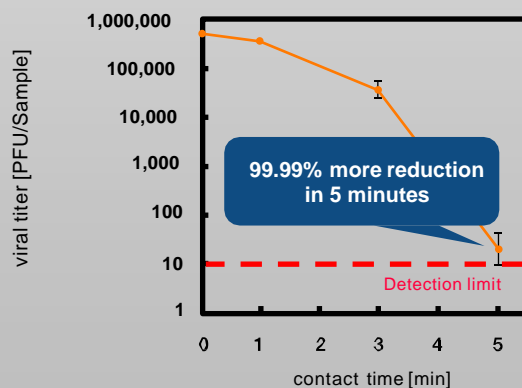
## Influenza



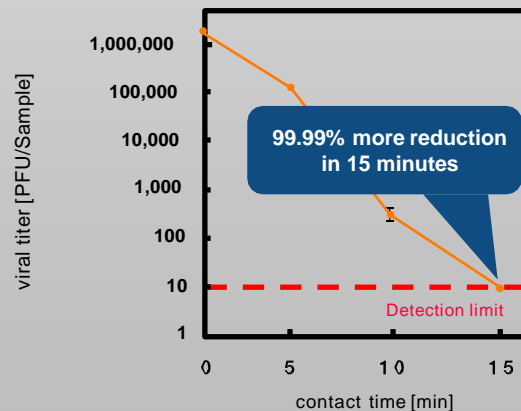
## Feline calicivirus (Norovirus surrogate)



## E.coli



## Staphylococcus aureus



**Flytech-NanoShield transparent protective film has been shown to reduce viruses and bacteria by more than 99.9% in minutes**





BIO SCIENCE  
LABORATORIES INC

## BIO SCIENCE LABORATORIES, INC EXECUTIVE SUMMARY FOR THE STUDY # 2003154-450

**STUDY TITLE:** EVALUATION OF THE VIRUCIDAL PROPERTIES OF A TREATED NON-POROUS MATERIAL VERSUS CORONAVIRUS USING ISO 21702

**SPONSOR:** NANOVEU PTE LTD  
Blk 81 Ayer Rajah Crescent, 03-43,  
Singapore 139967

**TEST MATERIAL:** Treated Film  
(EPA Registration Number: Not Provided)  
Active Ingredient: Monovalent Copper

**TEST STRAIN:** Coronavirus strain OC43 (Betacoronavirus, #0810024CF)  
Source: ZeptoMetrix Corporation

**STUDY PURPOSE:** The purpose of this study was to determine the virucidal activity of an antimicrobial coated surface when challenged with Coronavirus. Testing was based upon method described in ISO 21702:2019 "Measurement of antiviral activity on plastics and other non-porous surfaces". Two batches of the treated test material were evaluated as specified in U.S. Environmental Protection Agency, Office of Chemical Safety and Pollution Prevention, OCSPP 810.2200: Disinfectants for Use on Environmental Surfaces (February 2018).

Table presents the summary of testing results for the Test Material, Treated Film.

**TABLE**  
Summary of Results for Treated Film versus Coronavirus OC43

Test Material: Treated Film	Test Conditions		Relative Humidity	Coronavirus % Reduction	Coronavirus log <sub>10</sub> Reduction	EPA Requirement for Virucidal log <sub>10</sub> Reduction for Hard Surface Disinfectants
	Exposure Time	Exposure Temperature				
Batch #1, Lot # March 2020	30 minutes	25 °C ± 1 °C	≥90%	99.97	3.58	≥3.00
Batch #2, Lot # April 2020				99.99	3.92	

**STUDY CONCLUSION:** Under the conditions of this evaluation, Batch #1 (Lot # March 2020) of the Test Material, Treated Film (Monovalent Copper), reduced the virus infectivity by an average of 3.58 log<sub>10</sub> (SE=0.528) on three test carriers, following a 30-minute exposure. Batch #2 (Lot # April 2020) of the Test Material, Treated Film (Monovalent Copper), reduced the virus infectivity by an average of 3.92 log<sub>10</sub> (SE=0.688) on three test carriers, following a 30-minute exposure. The Test material, Treated Film (Monovalent Copper) Batch #1 (Lot # March 2020) and Batch #2 (Lot # April 2020) demonstrated > 3 log<sub>10</sub> reduction of Coronavirus strain OC43 on each test surface.

Study Director, Volha Teagle, Ph.D. 05-21-2020  
Date

Mailing Address • P.O. Box 190 • Bozeman, MT 59711 • 0190  
Shipping Address • 1755 South 19th Avenue • Bozeman, MT 59718 Business Address • 1765 South 19th Avenue • Bozeman, MT 59718  
Phone 406-587-5735 • FAX 406-586-7930 • Web Site: www.biosciencelabs.com • E-mail: experts@biosciencelabs.com

## EVALUATION OF THE VIRUCIDAL PROPERTIES OF A TREATED NON-POROUS MATERIAL VERSUS CORONAVIRUS

Prepared for SPONSOR:  
**NANOVEU PTE LTD**  
Block 81, Ayer Rajah Crescent, 03-43,  
Singapore 139967

Prepared by TESTING FACILITY:  
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Department of Microbiology & Immunology,  
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Singapore 117545

24 April 2020

Vincent T. K. Chow, MD, FRCPATH, MBBS, MSc, FISAC

A/Professor of Microbiology & Education Director for Microbiology

Principal Investigator, Host And Pathogen Interactivity Laboratory

Department of Microbiology & Immunology, Yong Loo Lin School of Medicine, National University of Singapore

MD4, Level 3, Kent Ridge, Singapore 117545

Email: micctk@nus.edu.sg

## Anti-viral and anti-bacterial performance test of anti-viral film

### [Purpose and Overview]

To evaluate the anti-viral and anti-bacterial performance of anti-viral film.

### [Method]

#### Anti-viral test

The evaluation of antiviral performance was carried out with reference to ISO 18184.

Virus used for evaluation: Influenza virus (H3N2) A/Kitakyusyu/159/93  
Feline calicivirus (F9 strain)

- 1) Anti-viral film was cut into 5 x 5 cm pieces.
- 2) 100 µL of the virus suspension was dripped onto the sample film and covered with a 4 x 4 cm cover film.
- 3) At 25° C, influenza was incubated for 1, 3, or 5 minutes, and feline calicivirus was incubated for 5, 10, or 15 minutes.
- 4) The surface of the specimen was washed with medium containing surfactant.
- 5) The virus titer (virus count) in the above washing solution was measured by plaque test.

The effect of the monovalent copper compounds on the concentration was examined.

#### Anti-bacterial test

The evaluation of antiviral performance was carried out with reference to JIS Z 2801.

Bacteria used in the evaluation: E. coli

Staphylococcus aureus

- 1) Anti-viral film was cut into 5 x 5 cm pieces.
- 2) 100 µL of the bacillus was dripped onto the sample film and covered with a 4 x 4 cm cover film.
- 3) At 35° C, E. coli was incubated for 1, 3, and 5 minutes, and Staphylococcus aureus was incubated for 5, 10, and 15 minutes.
- 4) The surface of the specimen was washed with medium containing surfactant.
- 5) The number of live bacteria in the above washout solution was measured by the blending culture method.

### [Result]

#### Anti-viral test

The antiviral film reduced influenza virus (H3N2) by more than 99.99% in 3 min (Fig. 1).

Against feline calicivirus, it was reduced by more than 99.99% in 5 min (Fig. 2).

The viral titers per contact time and the rate of decrease from the initial values obtained for each

**FOOD AND DRUG SAFETY CENTER**  
Hatano Research Institute



Australian Government  
Department of Health  
Therapeutic Goods Administration

### Public Summary

Summary for ARTG Entry: 339939 Nanoveu Limited - Antibacterial screen protector

ARTG entry for Medical Device Included Class 1

Sponsor Nanoveu Limited

Postal Address PO Box 1491, West Perth, WA, 6872

Australia

ARTG Start Date 22/07/2020

Product Category Medical Device Class 1

Status Active

Approval Area Medical Devices

#### Conditions

- The inclusion of the kind of device in the ARTG is subject to compliance with all conditions placed or imposed on the ARTG entry. Refer Part 4-5, Division 2 (Conditions) of the Therapeutic Goods Act 1989 and Part 5, Division 5.2 (Conditions) of the Therapeutic Goods (Medical Devices) Regulations 2002 for relevant information.
- Breaching conditions of the inclusion related to the device of the kind may lead to suspension or cancellation of the ARTG entry; may be a criminal offence; and civil penalties may apply.

#### Manufacturers

Name

Address

[Redacted]

[Redacted]

Japan

#### Products

1. Antibacterial screen protector

Product Type Single Device Product

Effective Date 22/07/2020

GMDN 62504 Antibacterial screen protector

Intended Purpose It is intended to be applied to hard surfaces including display screens to protect against wear and tear and to destroy microbes and viruses that come into contact with it, helping reduce the risk of virus and bacteria spread.

#### Specific Conditions

No Specific Conditions included on Record

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Page 1 of 1 Produced at 30.09.2020 at 04:20:40 AEST

This is not an ARTG Certificate document.

The onus is on the reader to verify the current accuracy of the information on the document subsequent to the date shown.

Visit [www.tga.gov.au](http://www.tga.gov.au) for contact information

Public Summary

## CAVEAT

**Antimicrobial film is not a substitute for proper cleaning. It's **one more tool to enhance safety** for your customers. (Just help when your staff cannot disinfect the area in a continuous manner.)**

**Dirt and scratch on the Protector Film will affect the Disinfection efficiency.**

**It is suggested to replace new the Screen Protector according to your usage conditions (say, with visible scratches) and **no more than 12 months** to ensure the maximum protection.**



## Contact Information

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[sales@flytech.com.hk](mailto:sales@flytech.com.hk)      35255838

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