



# NANOSHIELD Antiviral & Antibacterial Transparent Protective Film

Made in Japan

Enhancing the antiviral and antibacterial properties of copper through advanced nanotechnology. Reducing self-disinfection time from 2+ hours (copper) to just minutes (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 days on plastic and stainless steel. 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 surfaces and devices

- ▶ Easily installed: silicon adhesive is simple to install, leaving no messy residue behind
- ▶ Cut to suit any shape and size: supplied in factory direct roll form 50cm or 100cm wide.

## ◆ Benefits

- ▶ Immediate effect: eradicates viruses and bacteria within minutes
- ▶ Self-cleansing: long lasting effect without reapplication
- ▶ Quality: Manufactured in Japan



NANOSHIELD [www.nanoshield.co](http://www.nanoshield.co)

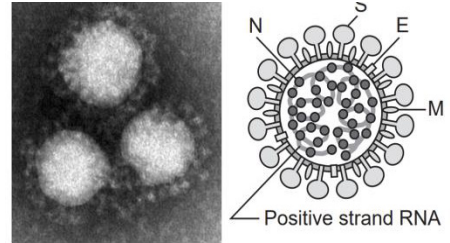


[www.hitek-ltd.co.uk](http://www.hitek-ltd.co.uk)



# Antiviral & Antibacterial

Effective against coronavirus, influenza, norovirus, staphylococcus and e.coli within minutes.  
Independent lab verified

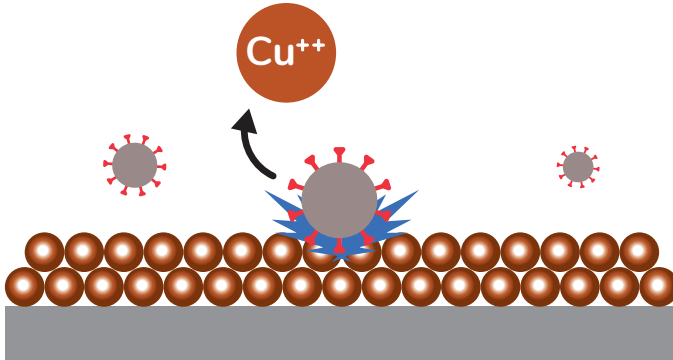


Coronavirus (quoted by National Institute of Infectious Diseases)

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 style="text-align: center;"><b>Influenza</b></p> <table border="1"> <caption>Influenza Viral Titer Reduction 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>1</td> <td>~100,000</td> </tr> <tr> <td>3</td> <td>~100</td> </tr> <tr> <td>5</td> <td>~20 (Detection limit)</td> </tr> </tbody> </table>	Contact time [min]	Viral titer [PFU/sample]	0	1,000,000	1	~100,000	3	~100	5	~20 (Detection limit)	<p style="text-align: center;"><b>Feline calicivirus (Norovirus surrogate)</b></p> <table border="1"> <caption>Feline calicivirus (Norovirus surrogate) Viral Titer Reduction 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>~20 (Detection limit)</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	~20 (Detection limit)	15	~10
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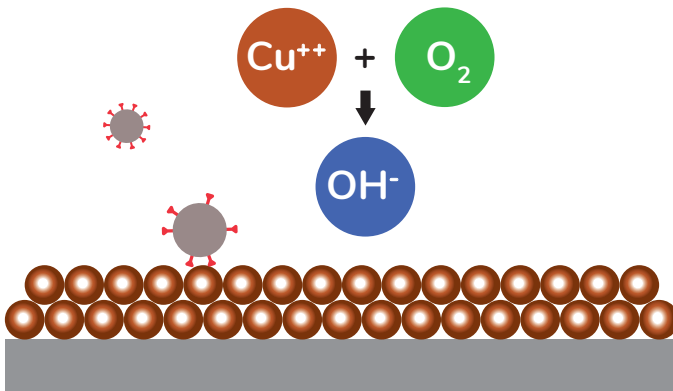
# How it works: copper nanotechnology

1



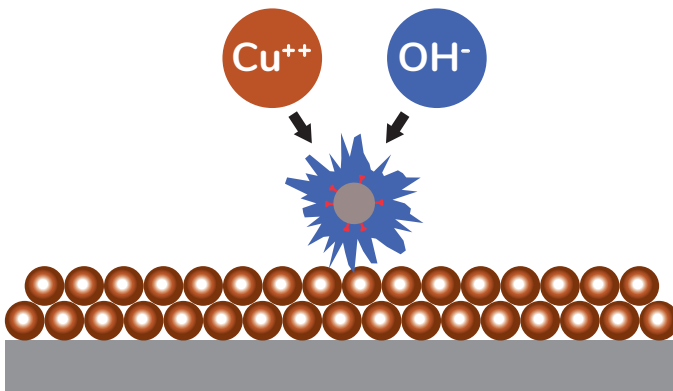
All viruses have a protective layer that attempts to preserve the infectious DNA/ RNA within, lipid envelope (enveloped virus), capsid protein layer (non-enveloped virus). Nanosized copper particles produce copper ions ( $\text{Cu}^{++}$ ) that damage these protective layers leaving the DNA/ RNA exposed.

2



A chemical reaction occurs between the  $\text{Cu}^{++}$  and surrounding oxygen ( $\text{O}_2$ ), generating reactive oxygen species (ROS): superoxide and hydroxyl radical ( $\text{OH}^-$ ).  $\text{OH}^-$  is like nature's silver bullet, this highly destructive unstable radical seeks equilibrium by stealing atoms from neighbouring atoms, causing rapid damage to viral proteins and their DNA/RNA.

3



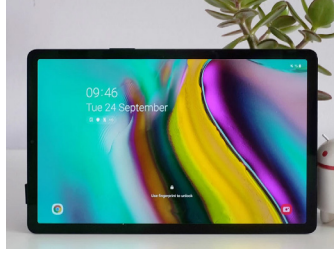
Copper has the ability to accept and donate electrons as it cycles between  $\text{Cu}^+$  and  $\text{Cu}^{++}$  oxidation states. This redox property ensures the long-term production of  $\text{Cu}^{++}$  and  $\text{OH}^-$ , continually eradicating viruses and bacteria without the need for wipes or reapplication.

# Suggestion Applications

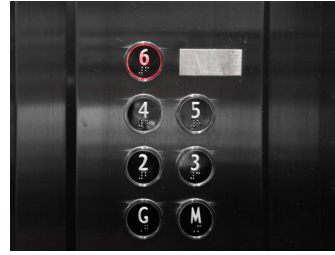
## NANOSHIELD 50



Small Devices



Personal Computers



Elevator Button



In Flight Entertainment



Smart Phones

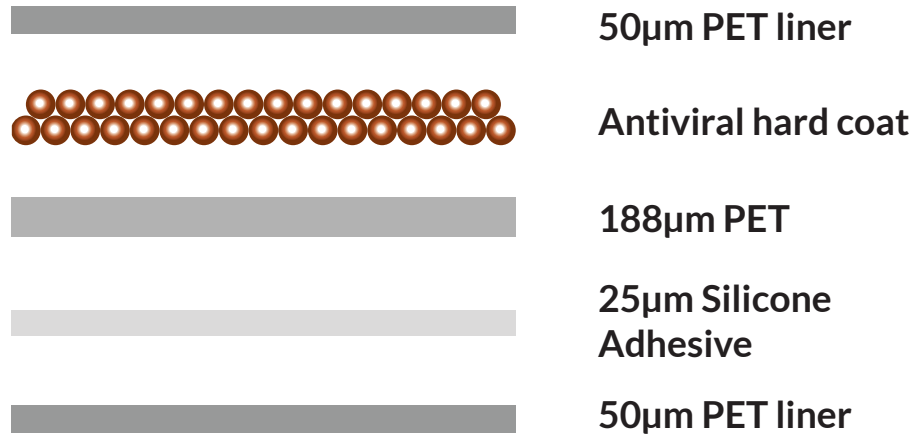


Self Service

Antiviral Efficiency	★	★	★	★	★
Scratch Resistance	★	★	★	★	★
Chemical Resistance	★	★	★	★	★
Cleanability	★	★	★	★	★
Installation Simplicity	★	★	★	★	★
Screen size	★	★	★	★	★

## ◆ Film composition

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



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

## ◆ Physical property values

Product name	Anti-virus screen protective film
Adhesive force	80-100mN/25mm
Pencil hardness	H
Total light transmittance	88.5%
Haze	6.3%
Antiviral function	Excellent
Antibacterial function	Excellent

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

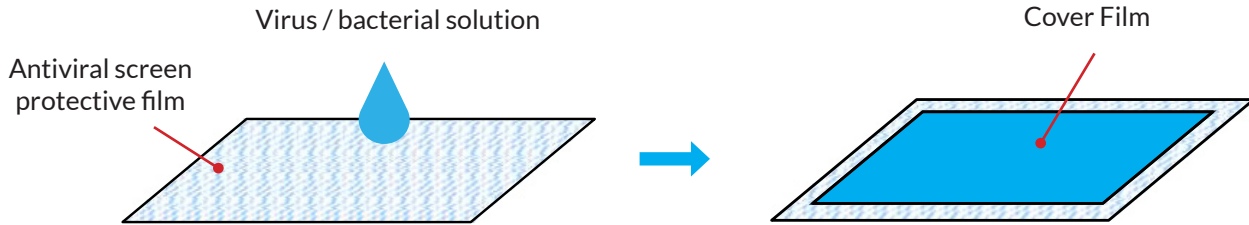
## ◆ Safety

The below tests have been performed to demonstrate Nanoshield 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

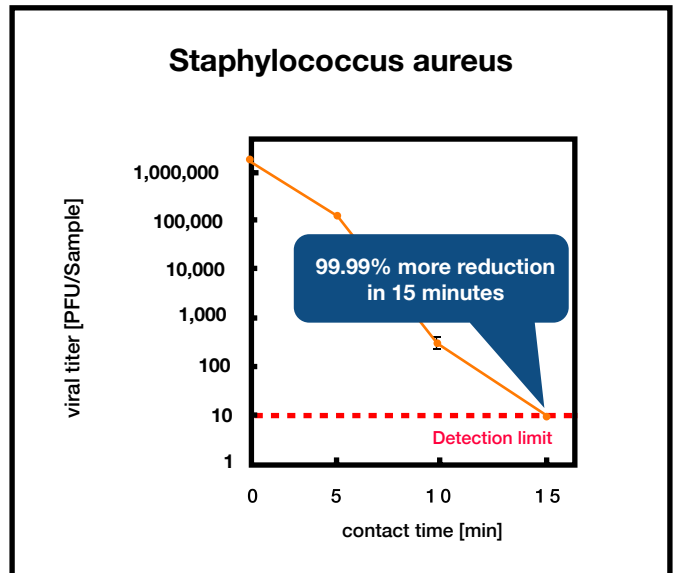
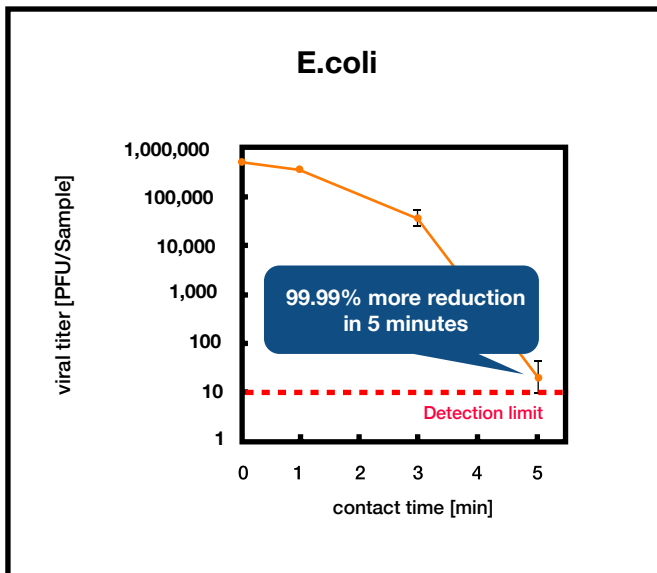
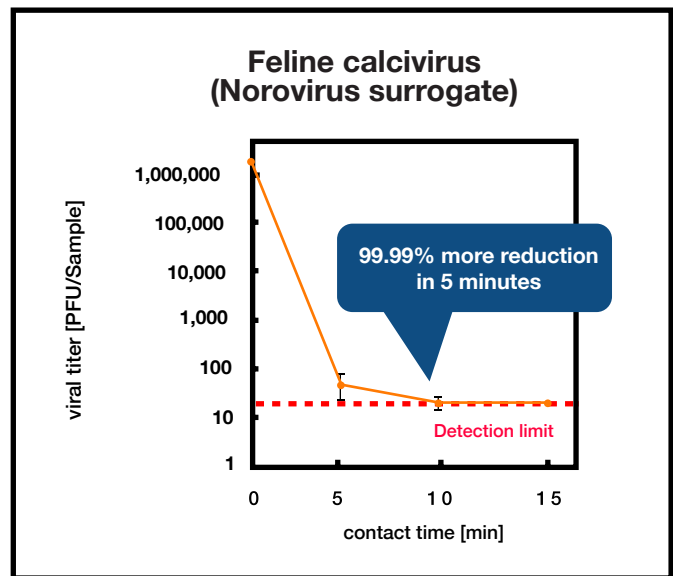
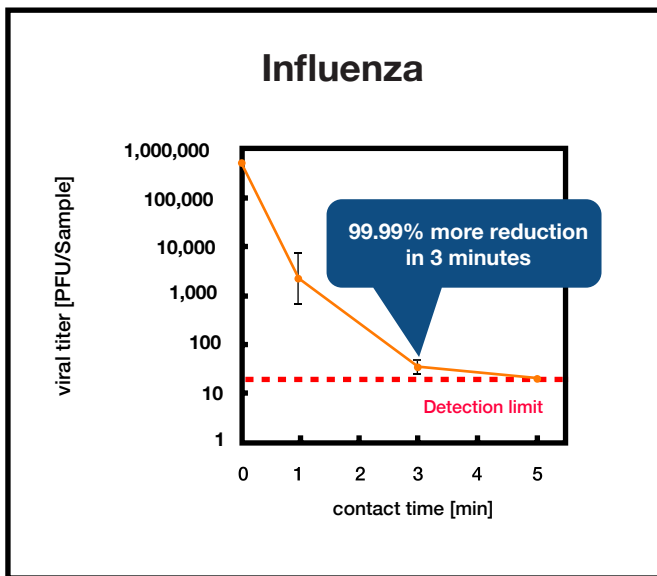
# Antiviral and antibacterial lab test methodology

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 (bacterialsolution) and adhere to the Antiviral screen protective film for evaluation.



Nanoshield transparent protective film has been shown to reduce viruses and bacteria by more than 99.99% in less than 15 minutes