

Antiviral and antibacterial screen protector

In addition to the hygiene measures with which we are all familiar, the reduction of contact transmission of pathogens, including the SARS-CoV-2 virus, represents an essential aspect of efficient hygiene protection. Germs, pathogens, viruses and bacteria accumulate on surfaces, especially touch surfaces. After just a few hours and days, highly visible concentrations of pathogens form (Figure 1). Extremely visible is the germ formation on mouth-nose coverings („masks“), which are of course repeatedly put on and taken off and thus viruses, bacteria, fungi get from the mouth-nose area onto surfaces (Figure 2). A recent study by US scientists^[1] shows that even the novel SARS-CoV-2 virus can survive on surfaces for several days. Another study by London Metropolitan University^[2] already concluded in 2018 that fecal bacteria carried by visitors were found on touchscreens of a well-known fast-food restaurant.

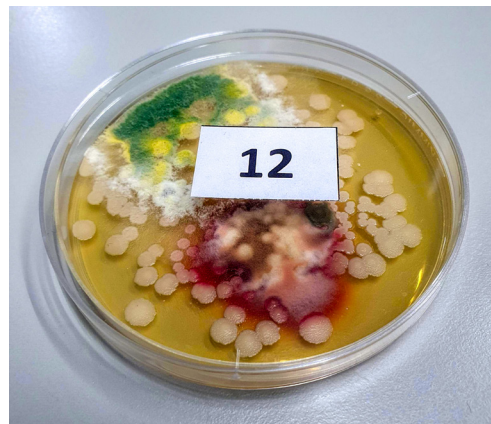
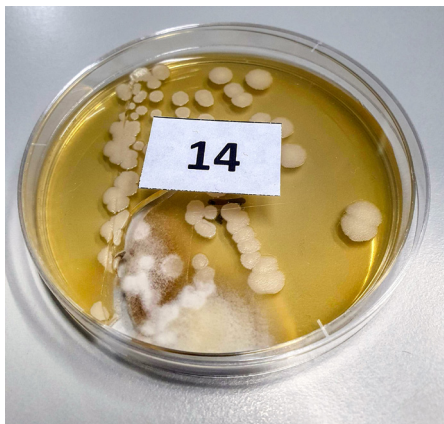
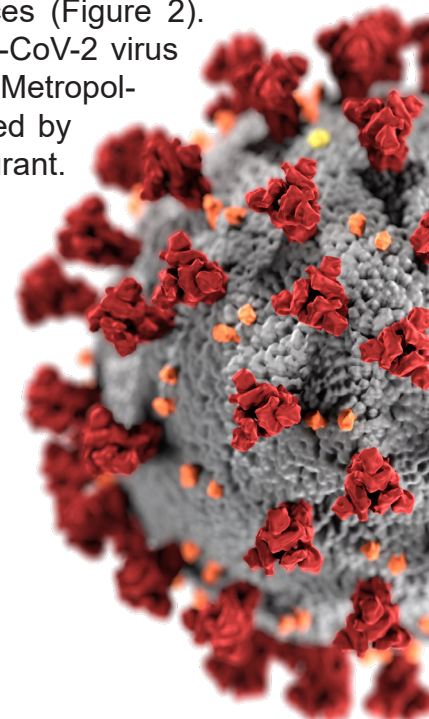
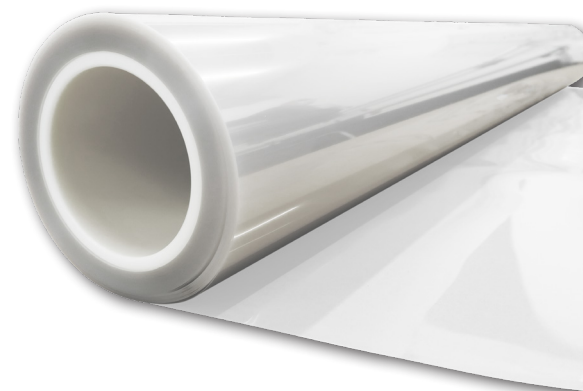
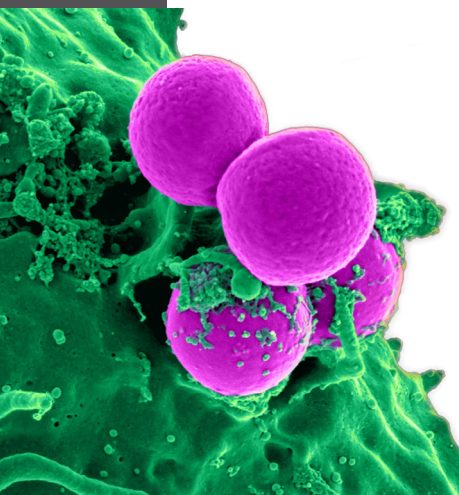


Fig. 1: Cell phone surface: fungal agar, germ growth after only 5 days (no cleaning or disinfection).

Fig. 2: Mouth-nose coverage: fungal-agar, germ growth after only 5 days (no cleaning or disinfection).



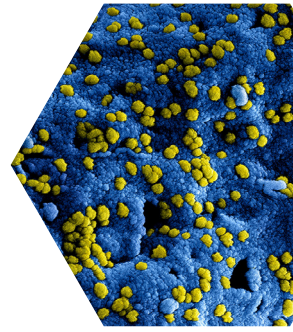
Customized up to 1000 mm x 3000 mm, special shapes, dimensions, all necessary cut-outs by high-precision laser, surface engraving possible

[1] <https://www.medrxiv.org/content/10.1101/2020.03.09.20033217v1.full.pdf>

[2] <https://www.londonmet.ac.uk/news/articles/tests-find-traces-of-faeces-on-popular-restaurant-touchscreens/>

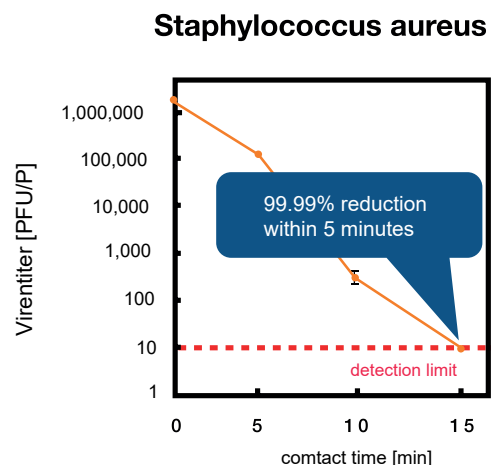
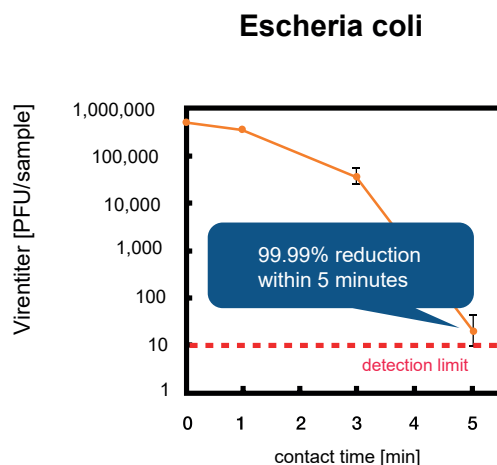
Antiviral and antibacterial screen protector

Effectively effective against, among others, Corona Viruses, Influenza viruses, Noro Viruses, Staphylococcus and E. Coli. Effective within a few minutes.



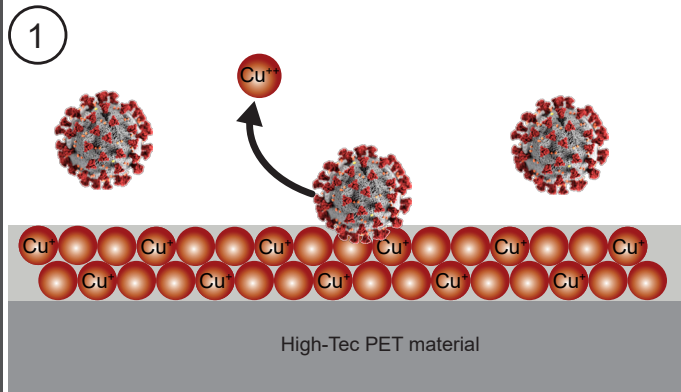
Viruses with envelope	Viruses without envelope
A membrane encloses the capsid, which contains the DNA/RNA of the viruses.	No protective membrane envelope exists for non-enveloped viruses
<p>Corona Virus Influenza Virus</p>	<p>Norovirus Adenovirus</p>
<p>Coronavirus</p> <p>Virentiter [PFU/sample]</p> <p>contact time [min]</p> <p>PFU= Plaque Forming Units</p>	<p>Feline Calcivirus (Norovirus Surrogate)</p> <p>Virentiter [PFU/sample]</p> <p>contact time [min]</p> <p>PFU= Plaque Forming Units</p>

Effectiveness against bacteria



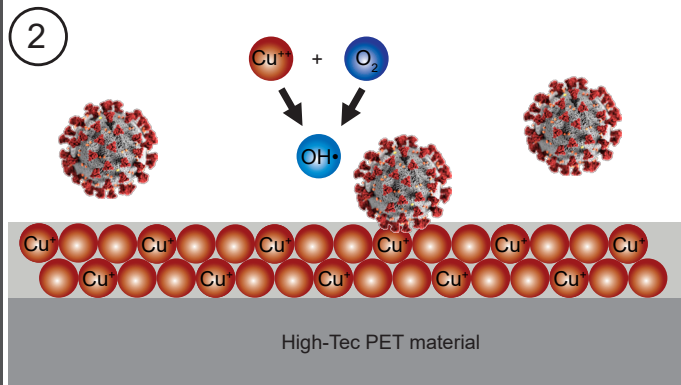
Mode of action

Mechanism of action Neoxum antiviral and antibacterial screen protector film



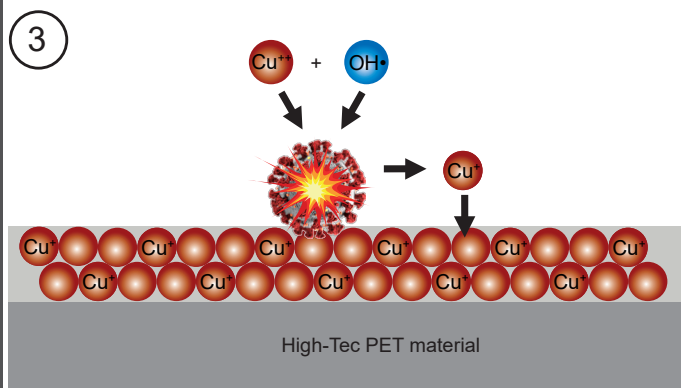
Viruses have a protective layer containing the infectious virus DNA/RNA within a lipid envelope or capsid protein layer (non-enveloped virus).

Nanoscale copper particles generate copper ions (Cu^{++}) that damage these protective layers, exposing the infectious DNA/RNA.

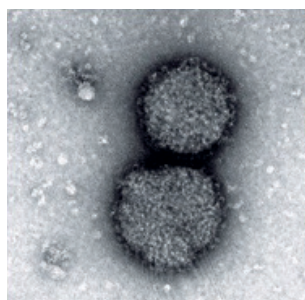


A chemical reaction now takes place between the Cu^{++} species and atmospheric oxygen (O_2). Reactive oxygen compound, superoxide (O_2^-) and hydroxyl radical (OH^\bullet) are generated intermediately.

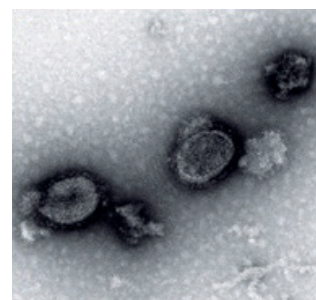
The OH^\bullet radical behaves like a rifle bullet, causing enormous damage to the virus proteins (DNA/RNA) and in the virus by pulling electrons away from surrounding species.



Copper has the ability to donate and accept electrons by alternately assuming the Cu^{++} and Cu^+ states. This so-called redox behavior ensures the long-lasting active efficacy against viruses, bacteria and pathogens without the use of disinfectants.



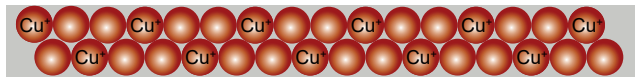
Influenza viruses BEFORE contact (active)



Influenza viruses AFTER contact (inactive)

Technical datasheet

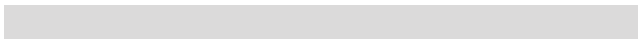
Layers



Antiviral | antibacterial
hard-coat



100 µm PET material
(Polyethylenterephthalate)



40-50 µm silicone adhesive



19 µm PET carrier film

Technical data

Parameter	value
Adhesive strength	80 -100 mN/2 mm
Transmission of light	88,5 %
Haze	6,3 %
Anti-viral activity	superior
Anti-microbotic activity	superior
Efficiency anti-viral & anti-microbotic activity	within minutes
Transparency	clear
chemical resistance in general	●
Resistant against hypochloric agent	●
Alcohol (EtOH, ISO, Bu-OH...) resistant	●
Resistant against common detergents	●
Resistant against alcohol-based disinfectant	●
Long-term stability surface activity	up to 12 months
Adhesive effect	silicone
Removable without residue	●

Application examples

