

Anti-Microbial Coatings

NPG-365

A unique and innovative Israeli development that provides a full solution, for virucidal coating which is both eco-friendly and water-based, for various surfaces in the house, hospitals, public facilities, food factories, clean labs and more, to prevent the contamination and spread of infections from contaminated surfaces carrying viruses, bacteria, molds and fungus

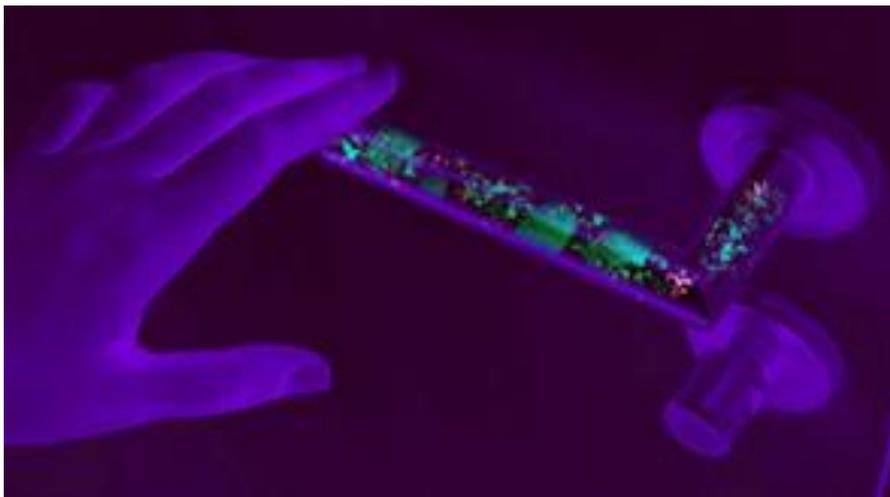
Nano Paint LTD is an Israeli company that develops unique and proven technology for manufacturing an eco-friendly, water-based paint with **proven** antibacterial, **antiviral** – and antifungal (mold) qualities- the paint contains natural materials and minerals that have shown antibacterial and antiviral activity in studies. The paint has a slow-release mechanism and keeps the antimicrobial activity for a long period. The paint is highly durable and highly adhesive even in extreme climate conditions.

The formula only contains natural materials and minerals and does not contain any poisons, solvents or pollutants; the combination of materials in the formula creates an environment impossible to sustain the development of **different kinds of viruses, molds, fungus and bacteria, including antibiotic-resistant bacteria in hospitals.**

The Coronavirus has high survivability on different surfaces (up to 4 days on stainless steel), using the antimicrobial Nano Paint's paints can prevent virus and bacteria survivability on the painted surfaces (horizontal and diagonal), and assures that the touch of a person's hand on a painted surface, such as a rail or a hallway wall in a hospital or school, will be free of viral and bacterial infections, thus greatly reducing contamination throughout the space. The company has conducted successful tests in "Milouda & Migal Laboratories" for paint durability according to the Japanese standard for fighting infections in hospitals, **standard JIS Z 2801, and ISO 22196**. The company conducted 2 durability tests in the Volcani Center, in the viral laboratories headed by Dr. Aviv Dombrovsky. On both tests, the paint completely destroyed the viruses. The paint can be applied on walls, surfaces, facilities and infrastructure of: hospitals, nursing homes, schools, educational institutes, food factories and facilities and public facilities in Israel and the world.



Preventive and Hindering Touch Contamination Coating



Some background about viruses:

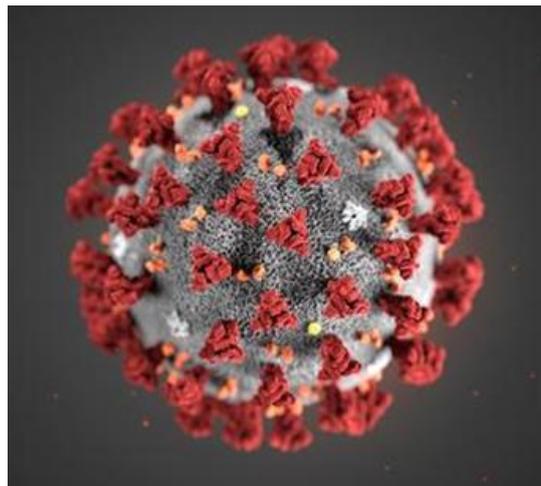
COVID-19 – (SARS-CoV-2)

The virus spreads through droplet infection: tiny droplets from an infected person (coughing or sneezing) carry the virus through the air and infiltrate the respiratory system of healthy people. The virus also spreads through touching – the infection is usually from symptomatic patients, but there is evidence of infection from non-symptomatic patients – people who carry the virus, but did not develop any symptoms of the disease.

In some conditions, the virus can survive a relatively long period of time on surfaces. It appears that an infection is possible through contact with a contaminated surface followed with a nose, mouth or eye contact, through which the virus enters the body.

A medical literature survey, checking other viruses of the Corona family (Published in the medical magazine The Journal of Hospital Infection, and conducted by Virology researchers from Ruhr-Bochum University in Germany) causing the SARS and MERS diseases, reveals the virus is very durable and can survive outside the body much longer than estimated. The researchers analyzed several essays published in the past regarding human Coronaviruses, and found that they can remain active up to 9 days on surfaces. For comparison, the influenza virus only survives 48 hours outside the human body and HIV only survives 4 minutes.

Studies have also shown that the virus survives temperatures of up to 30 degrees Celsius. In another study, researchers from Hong-Kong University checked how the type of surface, environmental conditions and disinfectants affect the virus survivability through time. First, the researchers tested the ability of the viruses to survive on various surfaces. On some, like toilet-paper or regular paper, no active units of the virus were found within 30 minutes. On other surfaces, like wood, steel, fabric and plastic, a high concentration of active viruses was found even after 1-4 days from the start of the test.



(Above, a CDC simulation of the Coronavirus.
Photography credit: EPA / CENTERS FOR DISEASE CONTROL)

The structure of the virus – the Coronavirus is made up out of three main components: RNA, proteins and lipids. The viral envelope, like most viruses, is made out of a double layer of lipids. This envelope is embedded with structures of transmembrane proteins which have a crucial role in infiltrating the target cells (identifying and binding to receptors on the target cells). Additional proteins assist in the process of duplicating the virus – and act as the building blocks of its structure.

The lipids create the viral envelope – their role is to protect the virus and allow it to bind with the target cells membrane.

The nucleic acid that allows the production of the coded proteins, those unique to the virus, and replicating virions is RNA.

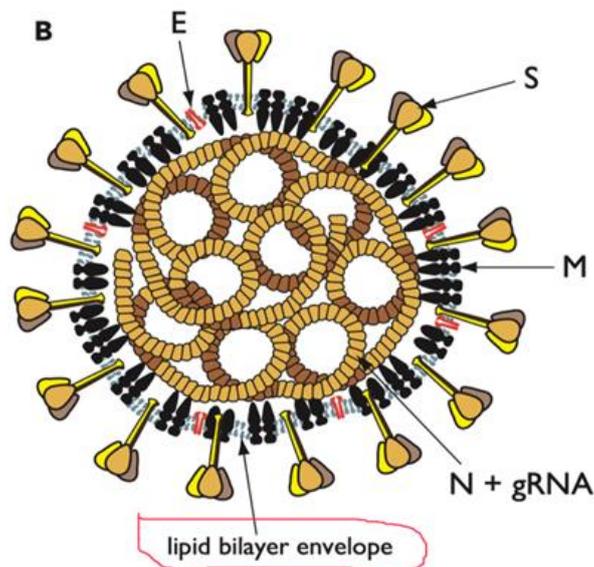
The three components go through the self-assemble process to create the virus. There are no strong covalent bonds, quite the opposite: the viral self-assembly is based on interactions and Hydrogen bonds (which are weaker) between the three components: lipids, proteins and RNA.

When a virus attacks a cell – it takes over the cell's system and forces the cell to create a huge amount of RNA copies, proteins and the viral envelope components, which self-assemble to create copies of the virus. The full cell eventually explodes and the viruses inside spread to attack other cells to repeat the process.

Infection prevention – Since the Coronavirus has an oily casing – the recommendation for the public is to disinfect their hands using soap-like substances. These substances are effective since they have hydrophilic and hydrophobic ends – the hydrophobic end dissolves the oily viral envelope and destroys it, and the other bonds that "stick" the virus structure, leading to inactivating the virus.

The differences between virus survivability on different surfaces – Viruses, including the Coronavirus, are nano-particles, whose size range between 50-200 nanometers. Nano-particles have complex interactions on the surfaces they are on- skin, fabrics, metals and paints. The structure of the virus is created with **hydrogen bonds** – and with hydrophilic bonds (fat-like). Wooden surfaces, for instance, create hydrogen bonds with the virus. The virus stays attached to them – but does not remain active for long. Materials like metals, Teflon and such do not create a hydrogen bond with the virus. On one hand, the virus does not attach to the surface, but on the other hand- it stays very stable on them.

<https://virologydownunder.com/why-does-soap-work-so-well-on-sars-cov-2>



The existing problem – Public buildings are exposed to infections from various threats. The transmission of bacteria, viruses and fungus through air and through direct contact of multiple people in one space (Israel alone has 6,000 deaths a year as a result of hospital infection only. The situation worldwide is worse in relation to relative size). Moist and hot conditions are optimal for the development of bacteria and also viruses, and organic food that carries through touch from place to place.

According to the Israeli Ministry of Health reports, public facilities are crowded with people carrying bacteria and viruses can spread from one person to another or the surroundings. Surfaces such as walls, ceilings, or barriers, are prone to develop bacteria, some of it dangerous, that can cause infections and diseases. Infections that are common in public facilities such as schools, hospitals, nursing homes, public buildings, libraries, kitchens, bathrooms and showers, where there are ideal conditions for bacteria to spread.

The Solution for contact contamination:

Antimicrobial paints and casings.

Common products today – drawbacks

The market has many coatings and paints with anti-microbial qualities, we haven't found in the market products with proven antiviral activity.

The anti-microbial paints that can be found in the market today are considered harmful to the environment and contain materials that are bad for the health of both the person painting and the people in the room days after the paint job, such as heavy metals, Triclosan, silver ions, copper, quaternary ammonium compounds and more. The materials being used are highly toxic both to bacteria and fungus, but also create an indirect health hazard to people and the environment, these materials are with limited durability. In an article recently published – and a declaration by the American Food and Drug Administration – it is highly doubtful that these materials are effective in dealing with bacterial and fungal infections common in hospitals (see quote). There is a worldwide trend to replace the "synthetic toxins" with natural materials to reduce environmental pollutants.

<https://www.paintsquare.com/news/?fuseaction=view&id=16324>

Our proven solution – **NPG-365** Nano Paint's formula, as opposed to the aforementioned, is a water-based paint coating containing only minerals and natural materials, without any organic solvents and pollutants, and therefore is not dangerous, not to the painter and not to the person staying in the drying room, and since it is fast-drying, you can apply it on those surfaces and use them safely the same day, which make it distinctively more efficient to operate the use of painted spaces. Due to the qualities of their compounds, the unique ingredients of our paints are both anti-microbial and virucidal according to the conducted test.

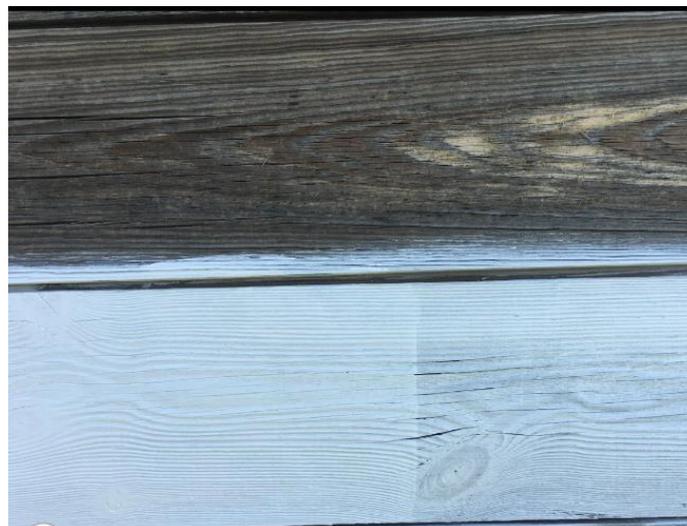
The exceptionally user-and-environment-friendly formula – in addition to allowing the desired application of paint over outdoor and indoor surfaces, allows to apply a thin coat (and transparent as well) especially in crowded public places, over commonly used surfaces, such as faucet handles and pushing buttons, as found in schools or hospitals.

Such application, whose virucidal activity lasts between days and weeks (and not minutes), is capable, with suitable adjustment and application, of providing an alternative solution for the constant use of the alcohol-based disinfectant, which is the current answer for preventing the distribution of contact and surfaces infection.

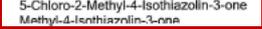
Results of the testing at **Beheshti** facilities for direct application over a wall that is infested with molds and fungus.



Painting over a wooden bus-stop structure, the painting was done directly over mold infected wood, approximately 3 years ago.



*The attached comparative document, antifung.pdf, presents a comparison between our product and popular leading paints - apparent here, is the composition of toxins contained within competitor products, as well as the limitation of their efficacy.

	Zinsser https://www.rustoleum.com/product-catalog/consumer-brands/zinsser/primer-sealers/mold-killing-primer 	Sherween Williams https://www.sherwin-williams.com/homeowners/products/paint-shield-microbicidal-interior-latex-paint 	Nano Paint 
Activity	Antifungal	Antibacterial	Antibacterial + Antifungal +Antiviral
Primer required	+ The paint itself is only used as a primer, and thereafter it is recommended to use an interim and a top coat.	+	Not required
Contains organic solvents	+	+	Does not contain
Toxic antibacterial material	Contains ethan Glicol and other toxic materials: 	+ Quaternary Ammonium compounds Includes a warning – might cause fetal damage	Toxins free – contains materials that are permitted for use in food
Can be used in hospital, the food industry, children bedrooms	Toxic	Toxic	Safe for use

*E&OE