

NANOHACK 2.0

Protective masks made of antibacterial materials

NANOHACK 2.0 - the antibacterial protective mask, is an innovative design developed by Copper3D and manufactured on demand by CD3D Sp. z o.o. using 3D printing technology. It is made of a revolutionary PACTIVE® material doped with copper nanoparticles, which makes it bactericidal.



NANOHACK 2.0 provides additional protection to reduce the risk of virus infection or poisoning. The mask combines two aspects: it uses the potential of Copper3D PACTIVE® antibacterial filament, and has unique and aesthetic design. Copper3D filament production technology is based on a patented and highly effective additive based on copper nanoparticles, transforming PLA thermoplastic into fully antibacterial nanocomposites.

ABOUT NANO HACK 2.0

Copper3D – a Chilean manufacturer of globally recognized, anti-bacterial 3D printing materials with copper nanoparticles, was one of the first companies that in the face of the COVID-19 pandemic, developed and made available under an open-source license a protective mask design that can be printed on 3D printers. The mask called NANO HACK 2.0 is currently one of the most popular 3D models of this type, being the recommended solution, among others by NIH – US National Institute of Health.



In April 2020 CD3D Sp. z o.o. – a leading company in the 3D printing industry in Poland, has signed a contract under which it is an authorized manufacturer of NANO HACK masks by Copper3D. The masks are made of original, anti-bacterial PLACTIVE® filaments, which are used by many renowned scientific and research institutions in the world, including NASA.

The NANO HACK 2.0 mask is an OPEN-SOURCE project

Each user of 3D printers of the FDM / FFF type can successfully 3D print a NANO HACK 2.0 mask themselves. Projects are public and can be downloaded. Copper3D and CD3D recommend 3D printing them from PACTIVE® antibacterial materials according to the manufacturer's website guidelines. Only then the mask will have properties that predispose it for use as a protective mask – 3D print of the mask from ordinary thermoplastic materials without any additional filtration makes it only an aesthetic gadget.

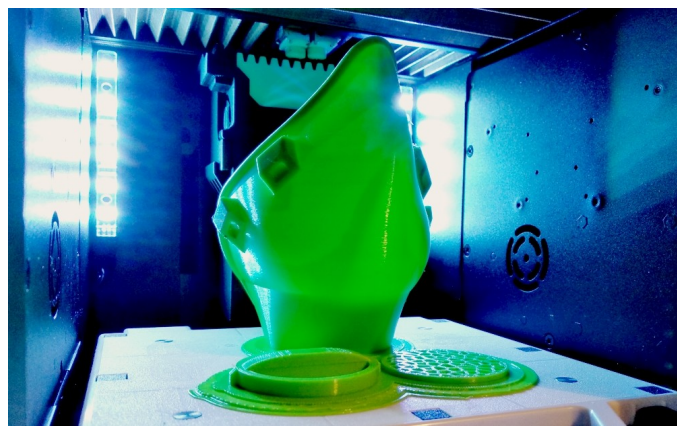
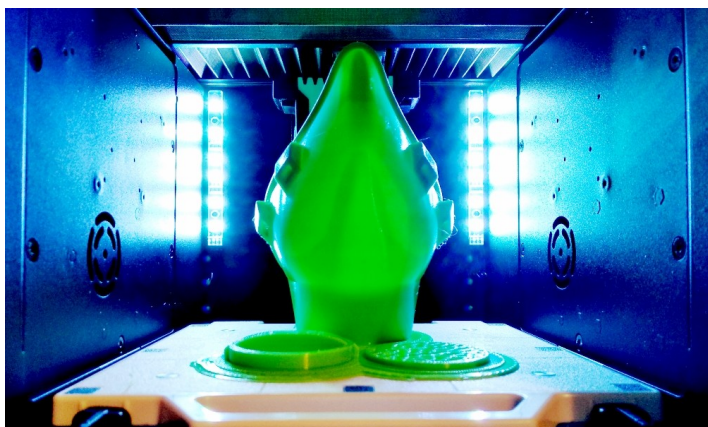
The mask cannot be 3D printed and then sold without the knowledge and consent of Copper3D – this is tantamount to breaking the provisions of the open-source license for which it is available. **CD3D from the very beginning of the NANO HACK project is its official partner and has full Copper3D authorization for the production of masks and their possible commercialization.**



THE MANUFACTURING PROCESS

NANO HACK 2.0 is not a product – when ordering a mask, you order in fact the 3D printing service to make it in a specific way from clearly specified materials. The masks are only available in three colors: green, red and blue. These are the only colors in which Copper3D's antibacterial PACTIVE® material appears. NANO HACK 2.0 masks found in other colors do not have antibacterial properties, because they cannot be 3D printed from the correct material.

NANO HACK 2.0 masks are created on 3D printers equipped with a closed working chamber separated from the printing system and built-in HEPA filters. Thanks to this, masks are manufactured in a stable and controlled environment. However, they still need to be washed and disinfected before the first (and each subsequent) use.



The NANO HACK 2.0 mask by Copper3D is not a medical device

Copper3D and CD3D highlight the following:

- the NANO HACK 2.0 mask model is not a N95 mask, only an original interpretation of the protective mask designed by Copper3D
- the mask should not be used as personal protective equipment in high-risk stations, but only as a tool to reduce the risk of virus infection or poisoning
- the mask should be used for a maximum of 8 hours a day, then discard the used filter
- it is necessary to systematically and properly care for the cleanliness of the mask by washing it in clean soapy water; in the case of Copper3D antibacterial materials, they must be decontaminated chemically (e.g. with high-grade alcohol).





Technical information on the use of masks

The NANO HACK 2.0 mask is not a medical product or a personal protection product. Like popular face protective shields, it provides additional and partial protection against harmful particles in the air and prevents the spread of liquid that pollutes the respiratory tract. Regardless of the mask elements printed on the 3D printer from Copper3D PLACTIVE® materials, an additional filter should be used (e.g. polypropylene nonwoven – the same material as used in surgical masks).

According to the US Food and Drug Administration (FDA), the design of surgical masks does not provide full protection against germs and other contaminants due to their loose fit. In addition, surgical masks are disposable devices that should be disposed of safely. The Center for Disease Control and Prevention (CDC) recommends placing these types of items in a plastic bag and placing them in a basket, and then washing your hands after removing the used mask. Previously published studies have shown that high viral load remaining in surgical masks and respirators can be a source

of transmission of the virus to both the person wearing the mask or using the respirator and to others. This can happen when healthcare professionals touch the mask and then do not wash their hands properly or discard the mask without taking appropriate precautions. In addition, pathogens discharged from surgical ventilators onto patients in the operating room increase the risk of nosocomial infections. The NANO HACK 2.0 mask uses a biocompatible polymer containing copper nanocomposite, which has antimicrobial properties.

Copper and copper nanoparticles inhibit the replication and multiplication capacity of SARS-CoV4, influenza5 and other respiratory viruses with high antimicrobial potential (antiviral and antibacterial). Copper can inactivate viruses as SARS-like and SARS-Cov4, influenza virus 5, H1N1 and eliminate dangerous bacteria such as Staphylococcus aureus, Escherichia coli, Listeria and others. Copper3D's 3D PLACTIVE® and Mdflex® printing materials can be an effective and inexpensive solution to help reduce the transmission of selected infectious diseases.

Cleaning the NANO HACK 2.0 mask:

Washing: the NANO HACK 2.0 mask should be washed with soap and clean water. The water temperature should not exceed 60°C, as this may deform the mask. The mask cannot be washed in a dishwasher or immersed in boiling water as this will lead to permanent deformation and destruction.

Rinsing: the NANO HACK 2.0 mask should be completely rinsed with clean water.

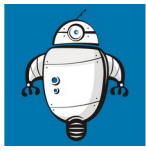
Disinfection: the NANO HACK 2.0 mask should be disinfected to deactivate other pathogens. As with mask cleaning, the use of chemical disinfection must not exceed 60°C.

Drying: the NANO HACK 2.0 mask must not be dried with a hair dryer using warm air, as this may lead to deformation.

Storage: NANO HACK 2.0 mask can be stored in home / office conditions in a dry place, protected from dust and dust.

The most popular methods of chemical disinfection:

Method 1: Alcohol is effective against influenza virus. Ethyl alcohol (70%) has a broad spectrum of activity as a bactericide and is generally considered better than isopropyl



alcohol. Because alcohol is flammable, limit its use as a disinfectant to small areas and use it only in well ventilated rooms. Prolonged and repeated use of alcohol as a disinfectant can also cause discoloration, swelling, hardening and cracking of some plastics.

Method 2: Most household bleach solutions contain 5% sodium hypochlorite (50,000 parts per million available chlorine). Recommended dilution: it is usually recommended to dilute 1: 100 with 5% sodium hypochlorite:

- use a 1-part bleach to 99 parts cold tap water (1: 100 dilution) to disinfect surfaces
- adjust the ratio of bleach to water accordingly to achieve the appropriate concentration of sodium hypochlorite; e.g. bleach containing 2.5% sodium hypochlorite, use twice as much bleach (i.e. 2 parts bleach in 98 parts water).



The prices and lead times:

- 1 - 99 masks = 23 EUR for 1 mask
- 100 and more masks = 20 EUR for 1 mask

The lead time depends on the current workload of our machine park. We do not produce masks for the warehouse – we make them only on individual customer order, specifying the color, size (can be adjusted) and additional accessories (rubber bands, copper mesh filters, non-woven filters).

To receive the price offer and precise delivery time, please contact us:

CD3D Sp. z o.o.

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You can also visit our websites: www.3dprintingcenter.net/nanohack
or www.centrumdruku3d.pl/maski3d