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# PROTECTION AGAINST CORONA:
# MATERIALS RESEARCH PROVIDES FINDINGS AT INSTITUTES OF THE ZUSE COMMUNITY

ZUSE-GEMEINSCHAFT

**As the year draws to a close, expectations are growing that protection against COVID-19 will soon be available. Until this is the case for large sections of the population, the successes achieved in research and industry to protect against the virus in 2020 offer a good starting point in the fight against corona and beyond. At institutes in the Zuse community, progress have been made not only in medical but also in materials research.**

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These successes in materials research include innovations in the coating of surfaces. "In the wake of the pandemic, the demand for antiviral and antimicrobial surfaces has risen sharply, and we have successfully intensified our research in this area," explains Dr. Sebastian Spange, Head of Surface Technology at the Jena research institute INNOVENT. He expects to see an increasing number of products with antiviral surfaces in the future. "Our tests with model organisms show that an appropriate coating of surfaces works", emphasizes Spange. The spectrum of techniques used by INNOVENT includes flame treatment, plasma coating and the so-called Sol-Gel process, in which organic and inorganic substances can be combined in one layer at relatively low temperatures. According to Spange, materials for the coatings can be antibacterial metal compounds as well as natural substances with antiviral potential.

**Nonwovens produced for mask manufacturers**

In 2020, the textile expertise of numerous institutes in the Zuse community ensured that application-oriented research could prove its worth in the practical fight against pandemics. After the shortage of mask supplies in Germany at the beginning of the pandemic, textile research institutes reacted to the shortage by jumping into the breach. The Saxon Textile Research Institute (STFI), for example, converted its research facilities to the production of nonwovens to supply German and European manufacturers of particle filtering protective masks. "From March to November 2020, we supplied nonwovens to various manufacturers in order to provide the best possible support for mask production and thus help contain the pandemic. At a critical time for industry and the population, we were able to help relieve critical production capacity - an unaccustomed role for a research institute, but one we would assume again in similar situations," explains Andreas Berthel, Managing Commercial Director of STFI.


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Testing the germ load of a mask

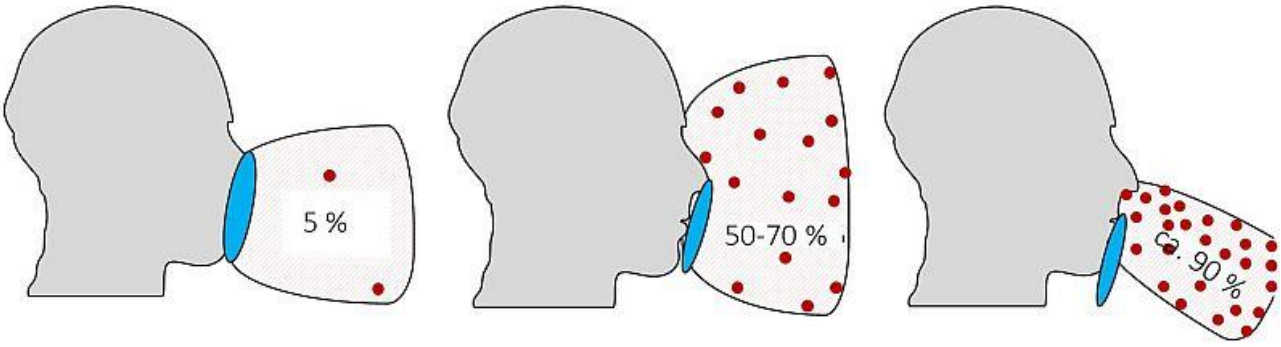
**Development of reusable medical face masks**

For the improvement of everyday as well as medical face masks the German Institutes for Textile and Fiber Research (DITF) are working on this project. In cooperation with an industrial partner, they are currently developing in Denkendorf, among other things, reusable medical face masks made of high-performance precision fabric using Jacquard weaving technology. The multiple use avoids waste and possible supply bottlenecks.

There are regulations for all types of masks, now also for everyday masks. At Hohenstein, compliance with standards for masks is checked. A new European guideline defines minimum requirements for the design, performance evaluation, labelling and packaging of everyday masks. "As a testing laboratory for medical products, we test the functionality of medical masks from microbiological-hygienic and physical aspects", explains Hohenstein's Managing Director Prof. Dr. Stefan Mecheels. In this way, Hohenstein supports manufacturers, among other things, with technical documentation to prove the effectiveness and safety. Respiratory protection masks (FFP 1, FFP 2 and FFP 3) have been tested at the Plastics Centre (SKZ) in Würzburg since the middle of this year. Among other things, inhalation and exhalation resistance and the passage of particles are tested. In addition, SKZ itself has entered into mask research. In cooperation with a medical technology specialist, SKZ is developing an innovative mask consisting of a cleanable and sterilizable mask carrier and replaceable filter elements.

**ILK tests for mouth-nose protection**

The fight against Corona is won by the contributions of humans: Of researchers in laboratories, of developers and manufacturers in the Industry as well as from the citizens on the street.

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Proportion of the remaining aerosols when wearing an MNS

Against this background, the Institute for Air and Refrigeration Technology (ILK) in Dresden has carried out investigations into the permeability of the mouth and nose protection (MNS), namely on possible impairments when breathing through the mask as well as the protective function of everyday masks. Result: Although the materials used for the mouth-nose protection are able to retain about 95 percent of the exhaled droplets, "under practical aspects and consideration of leakages" it can be assumed that about 50 percent to 70 percent of the droplets enter the room, according to the ILK. If the mask is worn below the nose only, it can even be assumed that about 90 percent of the exhaled particles will enter the room due to the large proportion of nasal breathing. This illustrates the importance of tight-fitting and correctly worn mouth and nose protection. "On the other hand, from a physical point of view there are no reasons against wearing a mask", ILK managing director Prof. Dr. Uwe Franzke emphasizes. The researchers examined the CO2 content in the air we breathe as well as the higher effort required for breathing and based this on the criterion of overcoming the pressure loss. "The investigations on pressure loss showed a small, but practically irrelevant increase," explains Franzke.

The complete ILK report "Investigations on the effect of mouth and nose protection (MNS)" is available here.

*Source: Zuse community*