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HÜBNER **EXPERT TALKS**

INTRINSIC ANTIVIRAL AND ANTIBACTERIAL FINISHING OF SILICONE, RUBBER AND FABRIC PRODUCTS

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INTRINSIC ANTIBACTERIAL AND ANTI VIRAL PROTECTIVE EQUIPMENT

FOR PROFILES / ELASTOMER COATED TEXTILES

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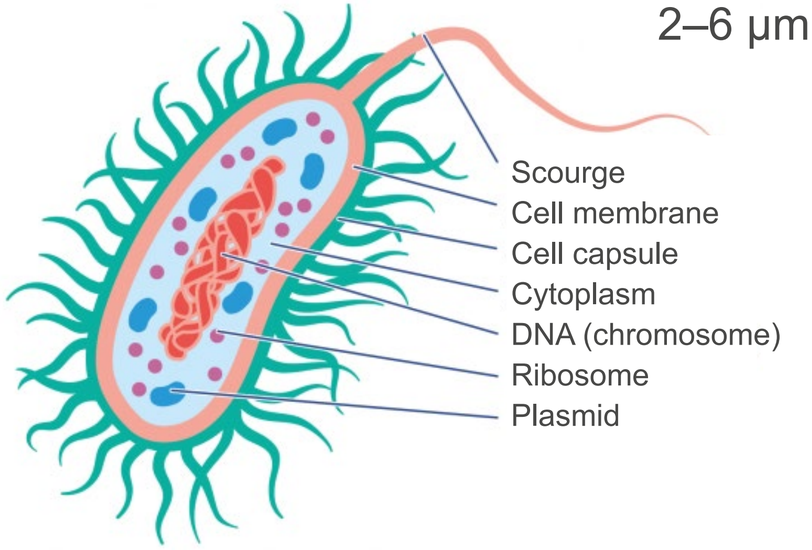
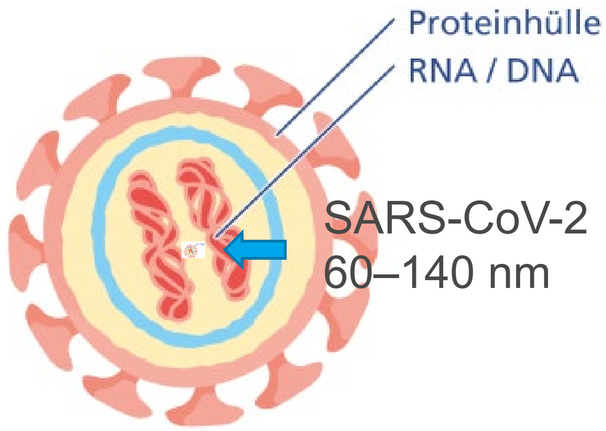
INTRINSIC ANTIBACTERIAL AND ANTI VIRAL PROTECTION

BACTERIA AND VIRUSES

E. coli
2–6 µm





Bacteria

- unicellular organisms
- own metabolism
- reproduction by cell division

Examples:

- Vibrio cholerae (Cholera),
- Yersinia pestis (Plague),
- Bacillus anthracis (Anthrax)

Viruses

- no living beings
- no metabolism of their own
- reproduction only via host cells

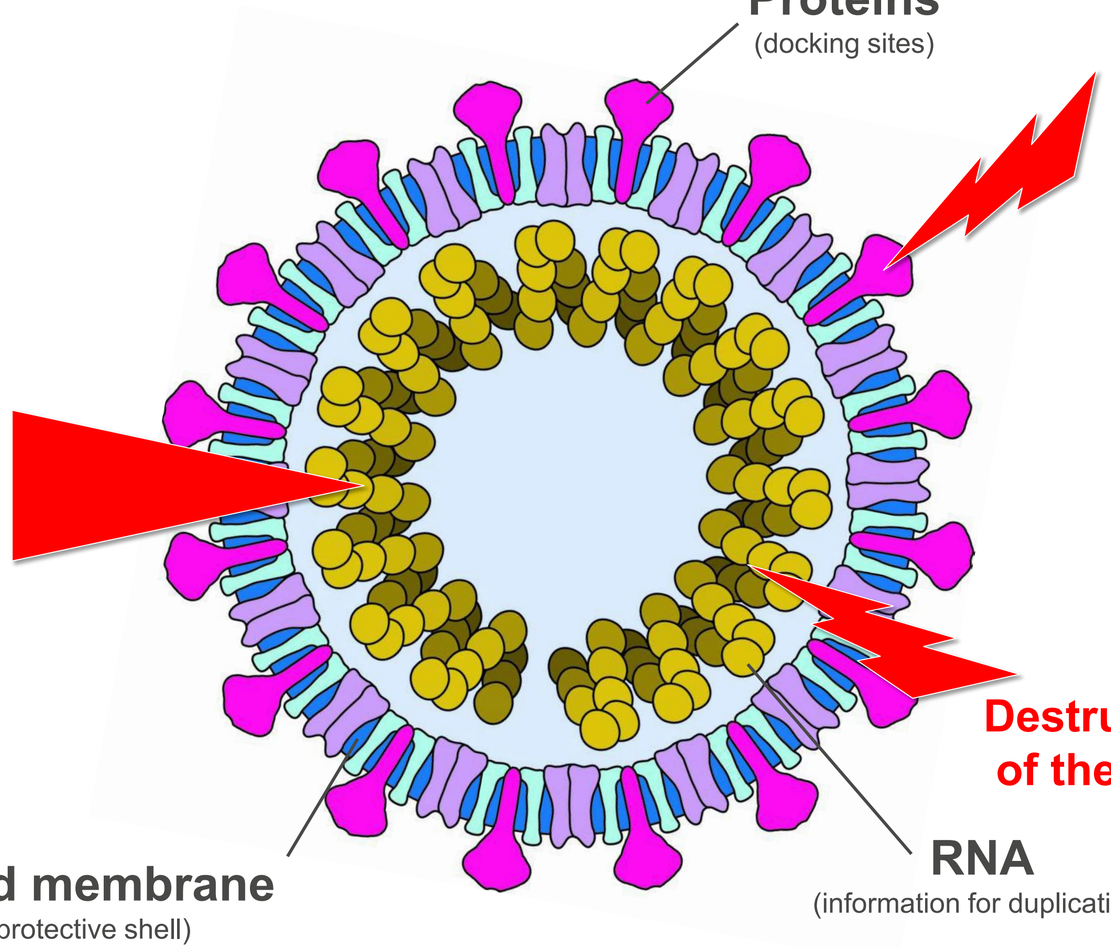
Examples:

- Corona virus (including SARS-CoV-2),
- Influenza virus (including H1N1),
- Ebola virus,
- Measles virus

source: https://www.stiftung-gesundheitswissen.de/

INTRINSIC ANTIBACTERIAL AND ANTI VIRAL PROTECTION

VIRUCIDAL SUBSTANCES



Chemical disinfectants:

- Alcohols (conditionally)
- Oxidizing agents (e.g. chlorine, ozone, hydrogen peroxide)
- Metal (salt) nanoparticles (e.g. silver)

Physical disinfection:

- (moist) heat
- Filtration
- Radiation (UV)
- Plasma
- Mechanical lysis

https://de.wikipedia.org/wiki/Desinfektion*

ANTIBACTERIAL ≠ ANTIVIRAL

source: https://www.chemie.uni-konstanz.de/

INTRINSIC ANTIBACTERIAL AND ANTI VIRAL PROTECTION

- We have succeeded in giving our highly flame-resistant silicones and EPDM compounds intrinsic antibacterial and antiviral properties.
- Intrinsic means that the active material is in the compound and not on the surface.
- As a result, there is very long-lasting effectiveness. With surface protection, the active ingredient rubs off over time.
- In contrast to other companies, not only antibacterial tests (bacteria, microorganisms, e.g. fungi) were carried out, but also antiviral tests (antimicrobial) and showed very good results.

INTRINSIC ANTIBACTERIAL AND ANTI VIRAL PROTECTION

The integration of the intrinsic antibacterial an anti viral protection not result in any changes in the fire properties, rheology or physical properties of the elastomer compounds. No influence on the color, it can be used in black and white compounds.

Following tests were done:

- Color fastness DIN EN 20105-A02 (72h)
- Xenon DIN EN ISO 105-B02 (72h)
- Artificial aging DIN 53508 (70°C / 168h)
- Ozone DIN ISO 1431 (72h; 50 pphm; 23°C; 50% rel. humidity)
- Kata plasma test DIN EN ISO 9142-E2 (168h / RT & 50°C 100% rel. humidity)
- Cross cut EN ISO 2409
- Water absorption DIN EN ISO 62 (7d / RT & 50°C)
- Resistance to cleaning agents DB TL 918300 (24h; 23°C)
- Fire test according to EN45545-2/2020 according table R1, R10 and R22

No change in any properties were found.

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Tests have been performed according to the following bacteria and virus:

Effect / Property	Testing standard	Test parameter
Quantitative antibacterial test on plastics	ISO 22196:2011	Bacterium: Staphylococcus aureus (ATCC 6538P)
Quantitative antibacterial test on plastics	ISO 22196:2011	Bacterium: Escherichia coli (ATCC 8739)
Quantitative antiviral test on non-porous materials	ISO 21702:2019	Influenza A [H3N2] (ATCC VR-1679)
Quantitative antiviral test on non-porous materials	ISO 21702:2019	Human coronavirus 229E (ATCC VR-740)

Effectiveness tests results:

Material	Bacterium: Staphylococcus aureus	Bacterium: Escherichia coli	Virus: Influenza A [H3N2]	Virus: Human coronavirus 229E
EPDM	99.999	99.999	99.917	99.838
Silicone	99.999	99.999	99.713	99.971

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INTRINSIC ANTIBACTERIAL AND ANTI VIRAL PROTECTION

- The system found in this way can be used for various polymers in the hardness ranges of 40-90 Shore A.
- The main applications are elastomer components that come into contact with the human body.
- In public, highly frequented and hygienically sensitive areas, these would include seals, fascia boards, handles, railings, bellows materials.
- Antimicrobial technologies prevent bacteria, mold, fungi and even a number of viral strains. Compared to antibacterial agents, antimicrobials provide a higher level of protection.

Thank you for your kind attention!

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