

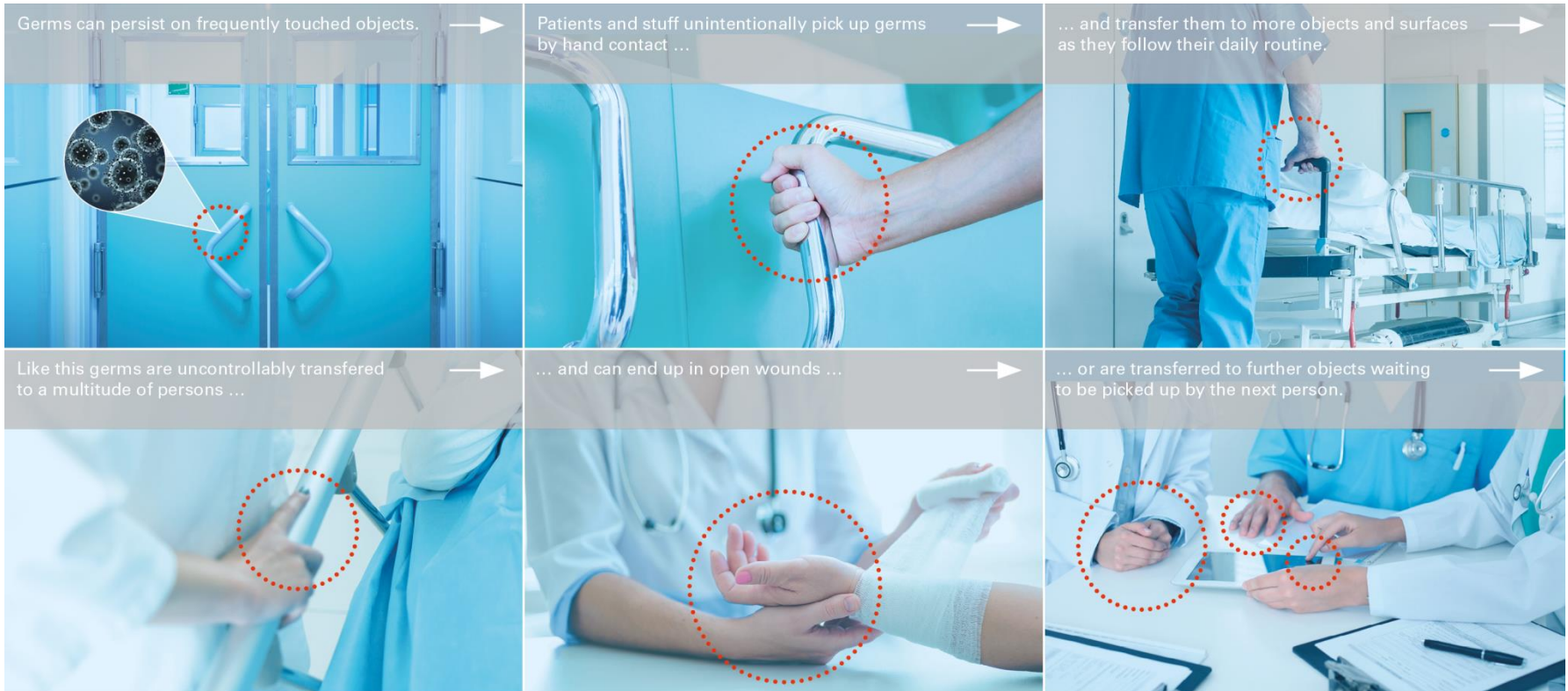


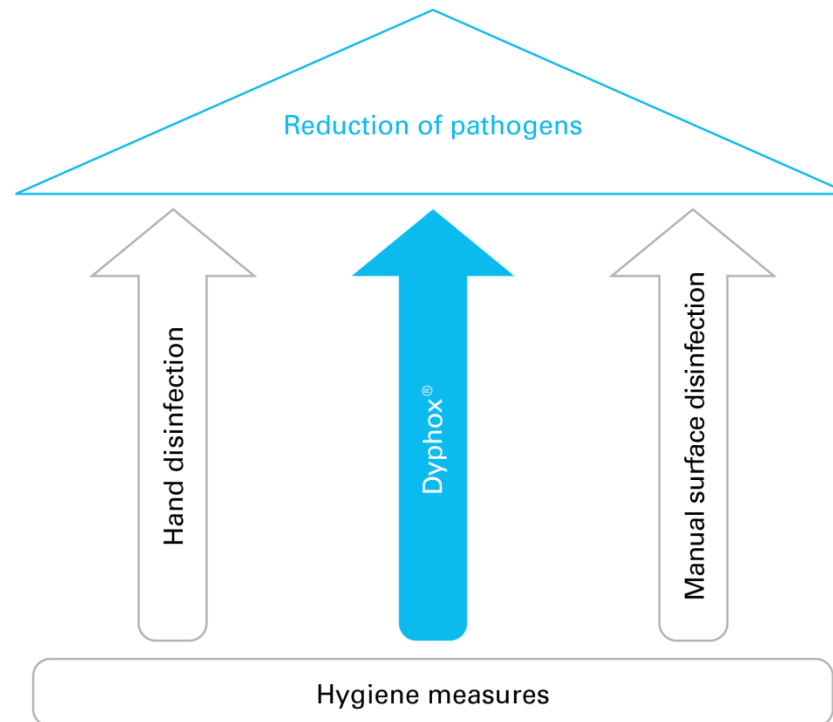
...in co-operation with DYPHOX

Antimicrobial. Safe. Uninterrupted.

DYPHOX Coating provides antimicrobial protection
treatment of frequently touched surfaces


Transmission of germs via surfaces







Survival of bacteria, viruses, fungi and spores on inanimate surfaces


Bacteria


 *Escherichia coli*
up to 16 month


 *Pseudomonas aeruginosa*
up to 16 month

 *Staphylococcus aureus*
up to 7 month


Viruses


 Coronaviruses
up to 9 days


 Norovirus
up to 7 days

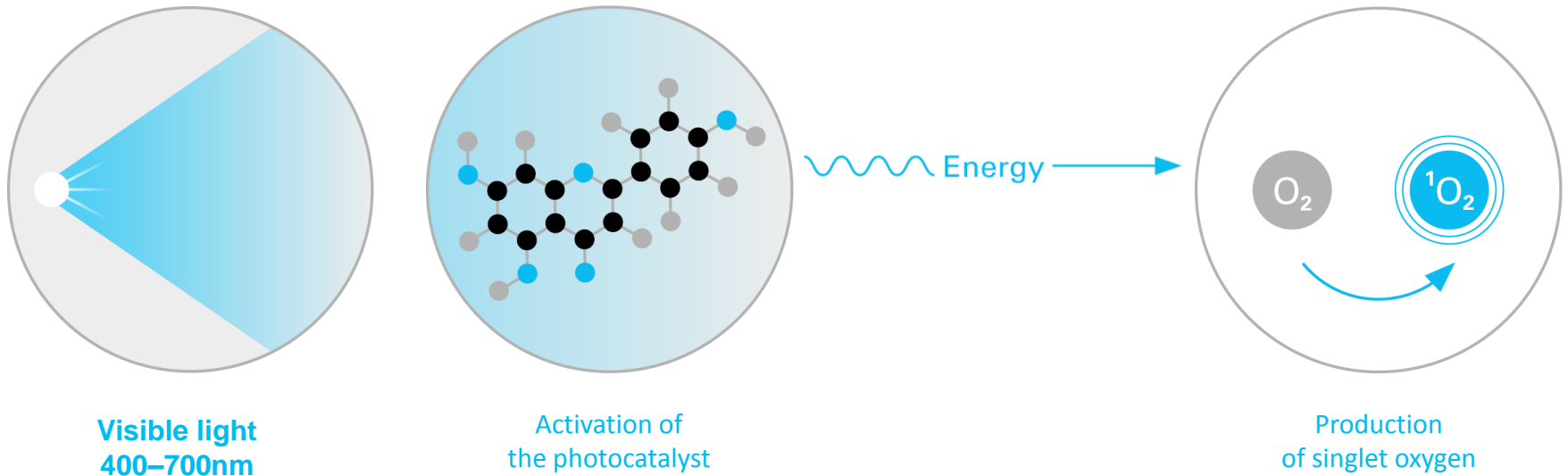
 Influenza virus
up to 2 days

Fungi/spores

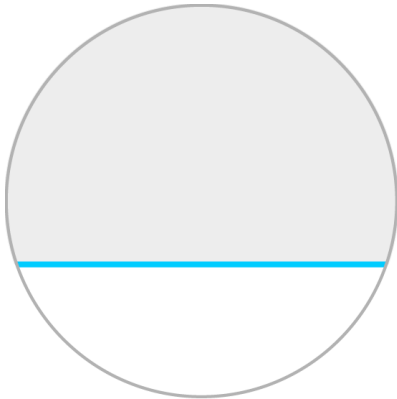
 *Candida albicans*
more than 30 days

 *Aspergillus niger*
more than 30 days

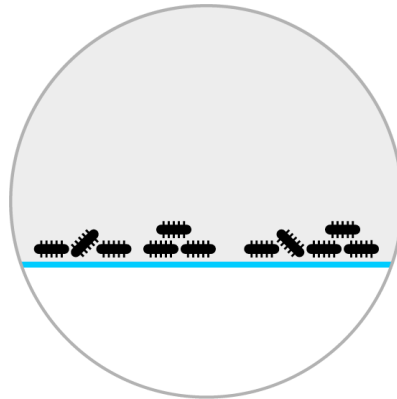
 *Mucor sp.*
more than 30 days



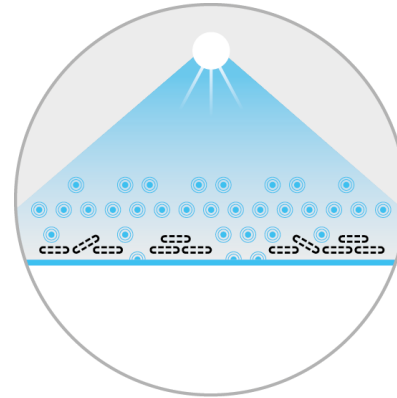
Photodynamics relies on the excitation of a photocatalyst by light of the visible spectrum. By transferring the absorbed energy to ambient oxygen, singlet oxygen is generated.



Surface is coated with Dyphox®, wiped, brushed or sprayed depending on surface



Contamination with bacteria, viruses, fungi and spores by contact.



Activation of the antimicrobial effect by visible light and oxygen.



Fast and effective inactivation of microorganisms – hygiene gaps are permanently closed.

Antimicrobial efficacy

- **photocatalyst: derivative from chemical plant components**
- **biocidal agent: generated from our DYPHOX photocatalyst when hit by visible light (*in-situ*)**
- **Evidence of efficacy:**
 - ✓ kills more than 99.99% of bacteria (tested after a modified version of ISO 22196)
 - ✓ kills more than 99.98% of envelopped viruses (tested after a modified version of ISO 21702)
- **tolerable temperature: - 20 to 80°C**
- **tolerable humidity: 0 to 100%**
- **durability: scratch test successful until 30 N; resistant to common cleaning and disinfecting agents**



Characteristics of the coating

- **type of product:** liquid coating solution based on sol-gel
- **applicable to:** plastics, glass, aluminium, stainless steel
- **type of application:** can be wiped or sprayed
- **service:** introduction to application by our service-crew
- **curing of the coating:** complete curing at room temperature within 48h, can be used after 10 minutes
- **maintenance:** contract for maintenance is available



Comparison of technologies

| | Dyphox® | Ag/Cu/Zn | TiO ₂ | UV-C | Biocides |
|---|---------|----------|------------------|------|----------|
| Effective under dry conditions | ✓ | × | × | ✓ | × |
| Effective under wet conditions | ✓ | ✓ | ✓ | ✓ | ✓ |
| No development of resistances | ✓ | × | ✓ | ✓ | × |
| Activated by visible light | ✓ | – | × | × | – |
| Activated by UV light | ✓ | – | ✓ | ✓ | – |
| No leaching of nanoparticles or chemicals | ✓ | × | × | ✓ | [×] |
| Harmless to humans | ✓ | × | × | × | × |
| Eco-friendly | ✓ | × | × | – | × |
| No accelerated aging of plastics | ✓ | ✓ | × | × | ✓ |

Key:

Ag: silver

Cu: copper

Zn: zinc

TiO₂: titanium dioxide

UV-C: ultraviolet light (often λ=254nm)

Biocides: e.g. triclosan, benzalkonium chloride, isothiazolinone or chlorhexidine

II. DYPHOX Universal – Comparison of technologies

Advantages of **DYPHOX** Universal at a glance



effective against
bacteria, viruses, fungi and spores



successfully tested
in a field study



Uninterrupted effect



increase safety



reduce costs



Application on board
during service



effective on
dry surfaces



harmless



sustainable technology



no formation
of resistances
of germs, bacteria etc.

Keep surfaces hygienic. Easy and effortless - with the power of light and oxygen.

The new generation of antimicrobial coatings – clinically tested.



Freese

Marine Floorings

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