Microban International, Ltd.

ACHIEVING HYGIENIC SURFACE PROTECTION WITH ANTIMICROBIAL COATINGS

PROTECTION THAT LIVES ON MICROBAN®

INTRODUCTION TO MICROBAN®

Part of Barr Brands International (BBI), a leading manufacturer of cleaning and remedial products

Global leader in antimicrobial technologies and odor control solutions since 1984

Technologies proven effective against bacteria, mold, mildew, algae, and some virus strains

300+

Partnered with more than 300 leading brands and manufacturers worldwide

Multiple operations in North America, Europe, and the Asia Pacific

AUTHORS

Glenner M. Richards, Ph.D.
Director of Microbiology & Analytical Chemistry Laboratories

Ivan W. Ong, Ph.D.
Vice President of Research & Development and Innovations

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TOPICS COVERED

1. MICROBES ON SURFACES
2. INTRODUCTION TO ANTIMICROBIAL COATING TECHNOLOGIES
3. EXPLORE MICROBAN® ANTIMICROBIAL COATING TECHNOLOGIES (ESTABLISHED & NOVEL)
4. FUTURE AND OPPORTUNITIES

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MICROBES ON SURFACES

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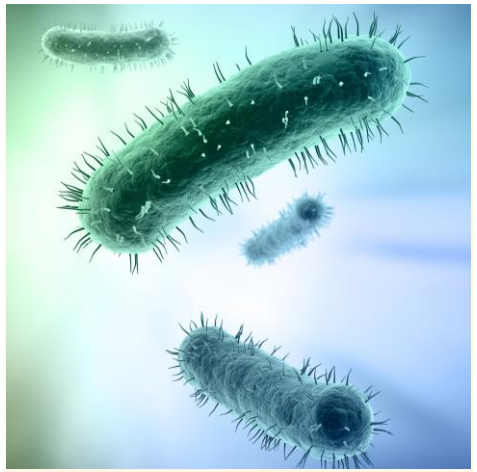
WHAT ARE THE DIFFERENT TYPES OF MICROORGANISMS?



BACTERIA

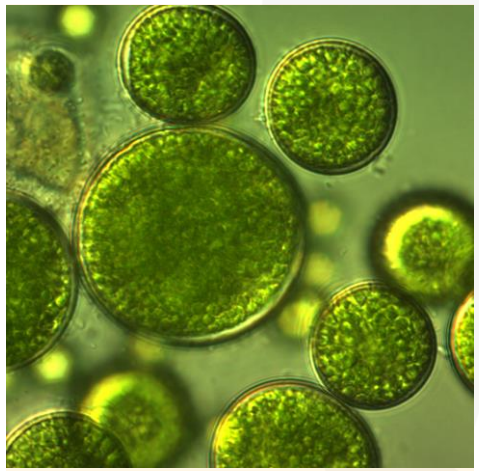
Cells are simple and can multiply easily. Populations can increase quickly on surfaces

MOLD

Produce large numbers of spores that are spread through the air and then land on surfaces

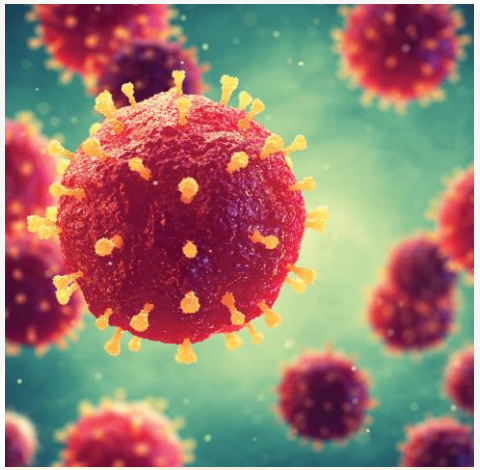
YEAST

Eukaryotic, single-celled microorganisms. Commonly found on the bodies of humans and animals



ALGAE

Commonly found on exterior surfaces where there is moisture and soil



VIRUS

Do not multiply on inanimate surfaces; but virus-contaminated surfaces contribute to disease transmission

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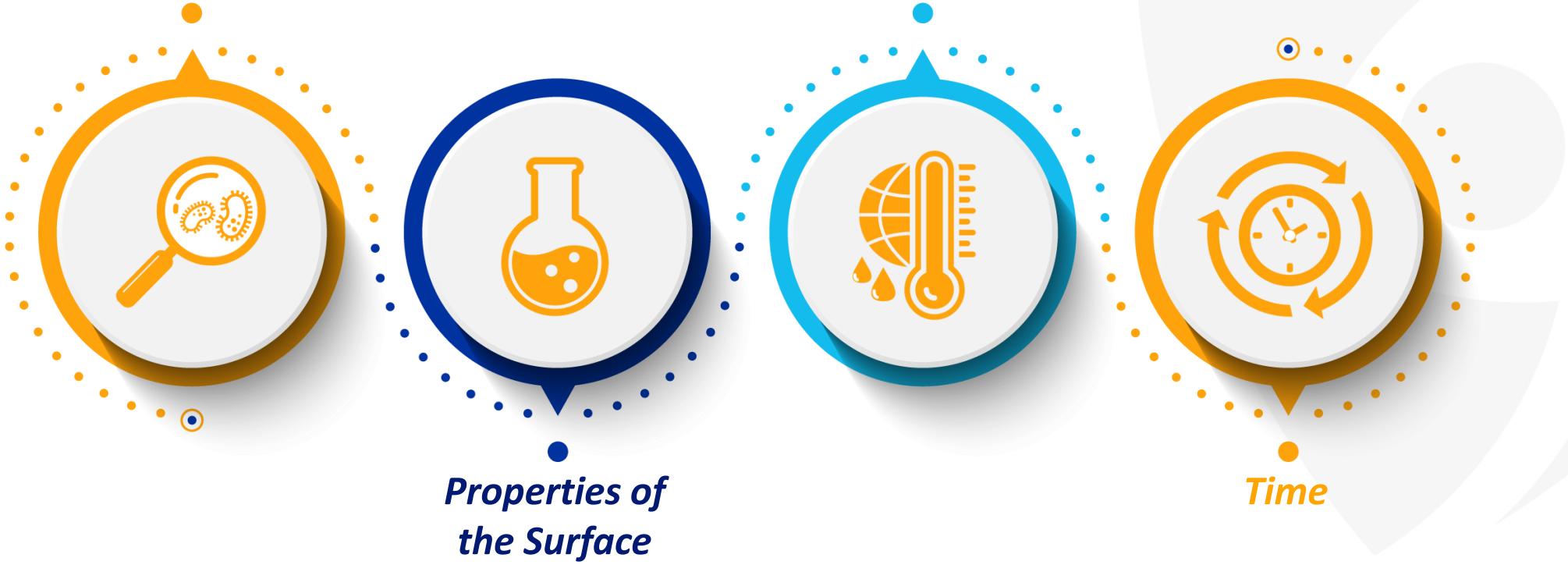
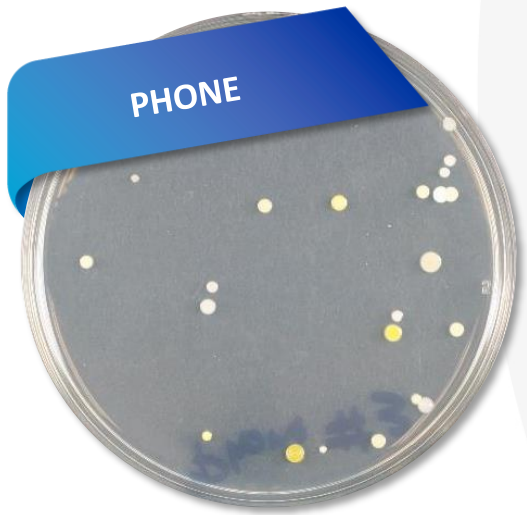
WHAT FACTORS IMPACT MICROBIAL GROWTH ON SURFACES?



WHAT SURFACES ARE SUSCEPTIBLE TO MICROBIAL GROWTH?



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HOW DO MICROORGANISMS IMPACT PRODUCTS AND SURFACES?

Prematurely degrade products

- *Microbes can break down a product*
- *Cracked, ugly products may need premature disposal and costly replacements*

Stain surfaces

- *Some bacteria, mold, and algae have pigmented (colored) cells. This causes a discoloration of the product when the microbes are growing*
- *Discolored products may become aesthetically displeasing and need to be replaced*

Cause foul odors

- *As microbes multiply, waste products can be released as gas and odors*
- *Products emitting a foul odor may need to be replaced*

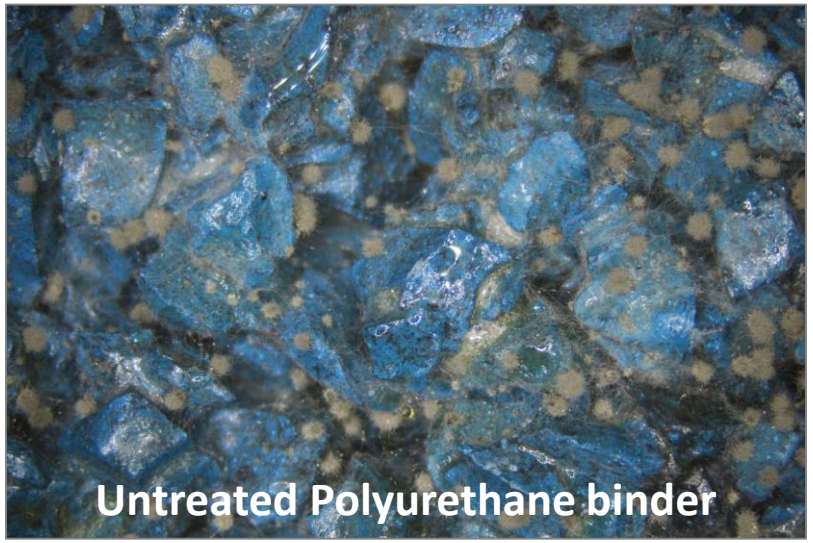
ANTIMICROBIAL COATING TECHNOLOGIES

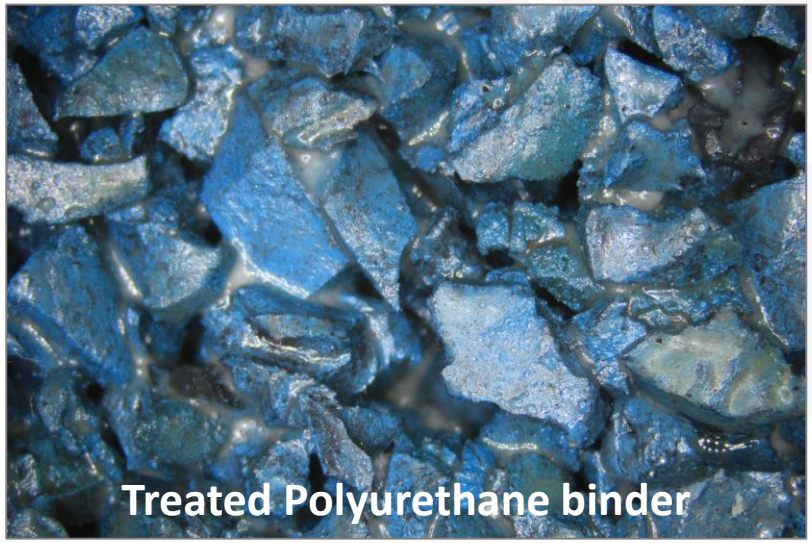
WHAT ARE ANTIMICROBIALS?

- *Chemicals that inhibit microbial activity*
- *Various mechanisms*
- *Make surfaces inhospitable to microbes*
- *Can be built into a product or applied topically*

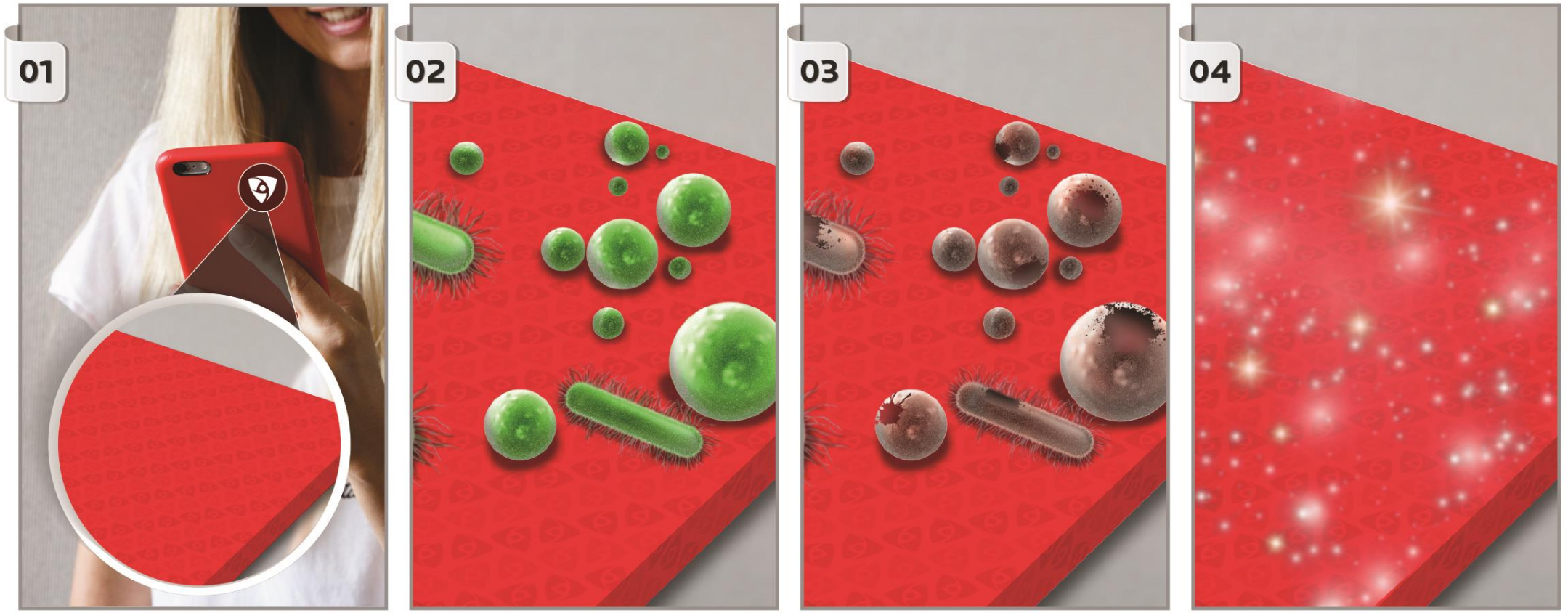
WHAT ARE ANTIMICROBIAL COATING TECHNOLOGIES?

- *Surface treatments that contain antimicrobial chemical agents*
- *Specifically designed to add protective and hygienic value to products*
- *Inhibit attachment, survival, and growth of microbes on surfaces*





HOW DO ANTIMICROBIAL COATINGS WORK?



*Coating is **applied** to the surface*

*Surface becomes **contaminated***

*Technology **attacks** microbes*

*Surface **stays cleaner** and fresher*

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CHOOSING AN ANTIMICROBIAL COATING TECHNOLOGY

Antimicrobial Coatings: *Permanent vs. Supplementary*

Permanent AM Coatings

Fully integrated as part of article during manufacturing: *e.g. co-injection, ceramic glaze treatment, silicone*

Applied onto article as a coating post forming: *e.g. powder coating, cross-linked systems (epoxies, urethanes, lacquers)*

Textiles treatments: *e.g. air filters, PPE masks, textiles*

Supplementary AM Coatings

Spray-on liquids: *e.g. Microban 24, Sani-24, Aegis*

Removable films: *e.g. stick-on surface protectants, surgical incise films*

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MICROBAN® PERMANENT ANTIMICROBIAL COATING TECHNOLOGIES

GLOBAL LEADERS IN ANTIMICROBIAL AND ODOR CONTROL TECHNOLOGY

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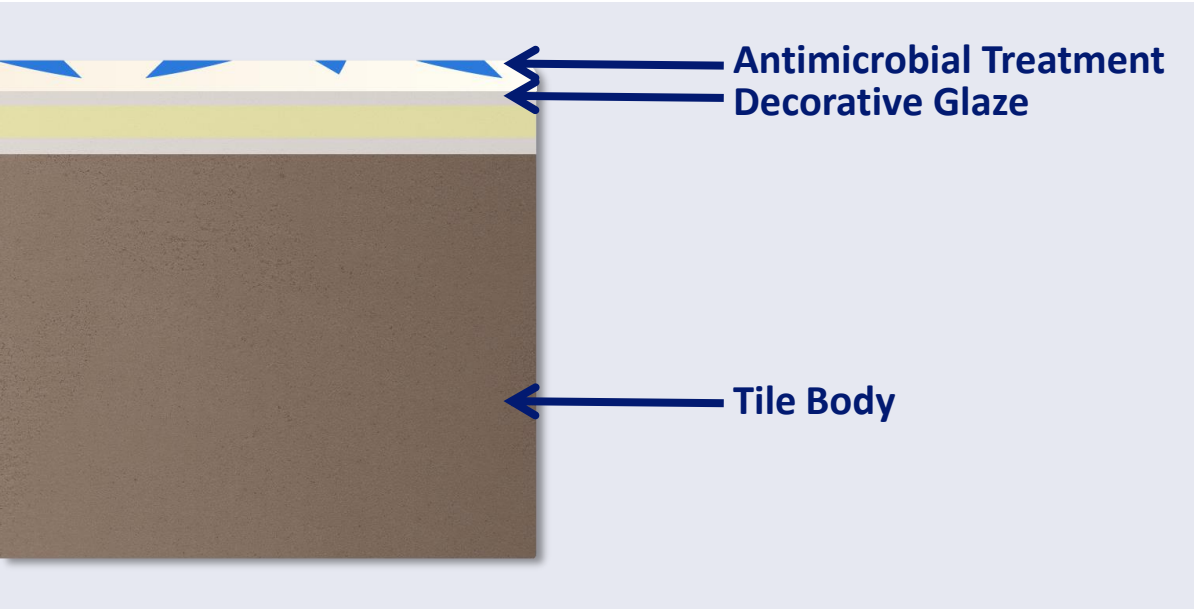
WHAT ARE PERMANENT ANTIMICROBIAL COATING TECHNOLOGIES?

- ***Microban® legacy***
- *Not wiped or rubbed off*
- *Products with incorporated coatings are commonly called 'treated articles'*
  - *Reduce the bioburden on a surface within hours after a contamination event*
  - *Protect the product and confer hygienic value*

COMMON APPLICATIONS

Ceramics

- *Unique "fired-in" antimicrobial technology*
- *Antimicrobial compound permanently incorporated as part of the ceramic glaze during the firing process, offering outstanding permanence*

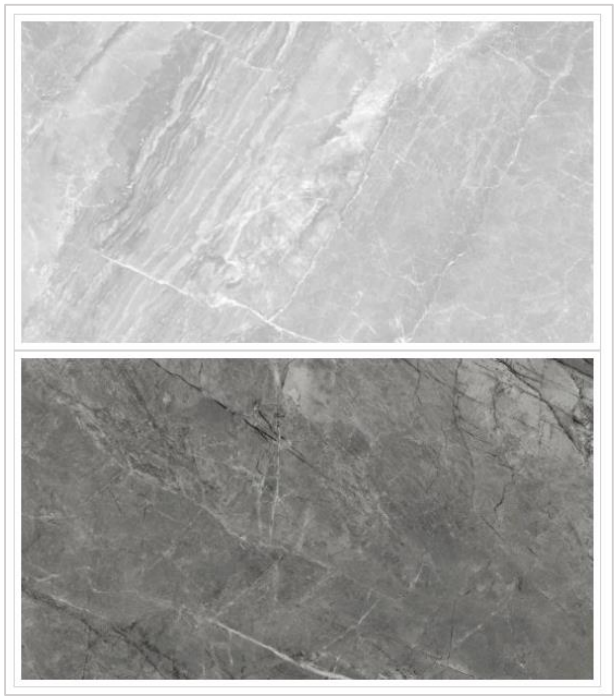


- *Silver-based formulation (works 24-7)*
- *Antimicrobial efficacy measured by ASTM E3031 test method*

EXAMPLES OF TREATED CERAMIC PRODUCTS

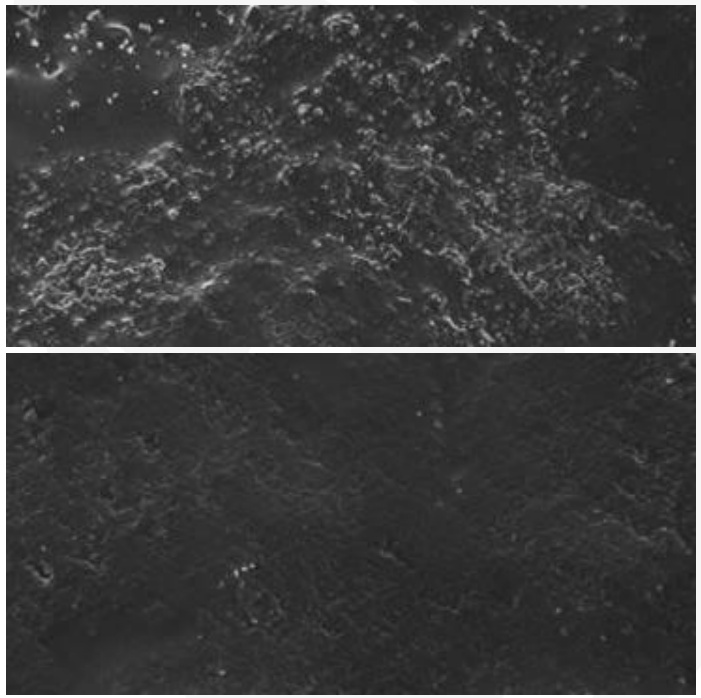
LIBBEY

Porcelain glaze dinnerware
with Microban®



东鹏 DONG PENG

Ceramic floor tiles
with Microban®



PANARIAgroup

Ceramic coverings
with Microban®

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COMMON APPLICATIONS

Polymers

- *Antimicrobial incorporated during manufacturing*
- *Plastics – mostly polyolefins*
- *Better UV stability*
- *Antimicrobial efficacy measured by ISO 22196, JIS Z2801*

Example:

METRO®

***Polymeric shelving unit** with Microban®*

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COMMON APPLICATIONS

Post Forming

- *Applied onto article as a coating post forming*
- *Numerous coating approaches*
- *Typically cross-linked coatings are the most superior*
  - *Powder coatings*
  - *Epoxies, Lacquers*
  - *Urethanes*
  - *Melamine-Formaldehyde, Urea-Formaldehyde*
  - *Ceramic Coatings*
- *Considerations for this application include properties such as hardness and wear resilience, UV stability, exposure to cleaning solvents, and aesthetics*

EXAMPLES OF PRODUCTS TREATED POST-FORMING

RESINWERKS™ FLOOR COATING SYSTEMS

Water-based epoxy coatings

EVERBRITE™

Solvent-based coatings

QHF

Urethane coatings

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EXAMPLES OF PRODUCTS TREATED POST-FORMING

speck

Phone cases
with antimicrobial clear coating

cellularline

Screen protector
with transparent antimicrobial coating

Kwikset

Door hardware
with hard-wearing antimicrobial coating

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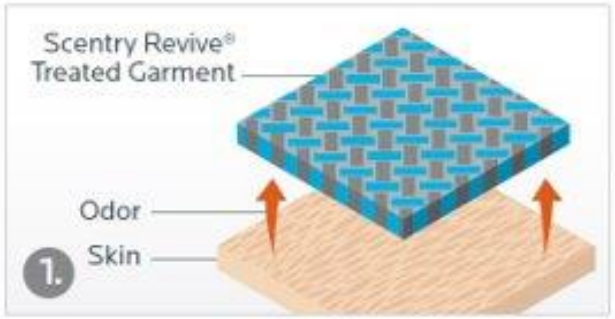
COMMON APPLICATIONS

Textiles

- *Clothes with body odor are washed multiple times or discarded prematurely*
- *Excessive washing frays fibers and discharges microfibers into the water stream*
- *Antimicrobial coating of textiles can:*
  - *Contribute to sustainability by keeping garments fresher*
  - *Reduce laundering*
  - *Prevent premature disposal of garments*

EXAMPLE OF TEXTILE TREATMENT



THE SCENTRY REVIVE® TECHNOLOGY PERMEATES THE GARMENT TO FORM A PROTECTIVE BARRIER.

AS ODOR COMES IN CONTACT WITH THE SCENTRY REVIVE® BARRIER, IT NEUTRALIZES AND DISSIPATES.

ODOR IS ELIMINATED AS CONTACT IS MADE WITH THE SCENTRY REVIVE® BARRIER WEAR AFTER WEAR.

EVEN WITHOUT WASHING AFTER EACH USE, THE SCENTRY REVIVE® BARRIER PREVENTS ODOR AND ODOR BUILD-UP

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MICROBAN® SUPPLEMENTARY ANTIMICROBIAL COATING TECHNOLOGIES

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WHAT ARE SUPPLEMENTARY ANTIMICROBIAL COATING TECHNOLOGIES?

Support permanent coating technologies

- *Topically applied onto products and surfaces*
- *Not part of the article to which they are applied*
- *Highly relevant on high-touch surfaces, textiles, and in the healthcare industry*
- *Applied via:*
  - *Removable films as surface protectants*
  - *Sprays onto hard non-porous surfaces*

EXAMPLE OF SUPPLEMENTARY COATING TECHNOLOGIES

MacDermid Enthone
INDUSTRIAL SOLUTIONS

***Impregnated Stick-on Films** With Microban®*

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EXAMPLES OF SUPPLEMENTARY COATING TECHNOLOGIES

Consumer – P&G

Disinfectant offering 24-hour residual sanitization performance

Commercial – P&G

Disinfectant offering 24-hour residual sanitization performance

Healthcare - PDI

Disinfectant offering 24-hour residual disinfection performance

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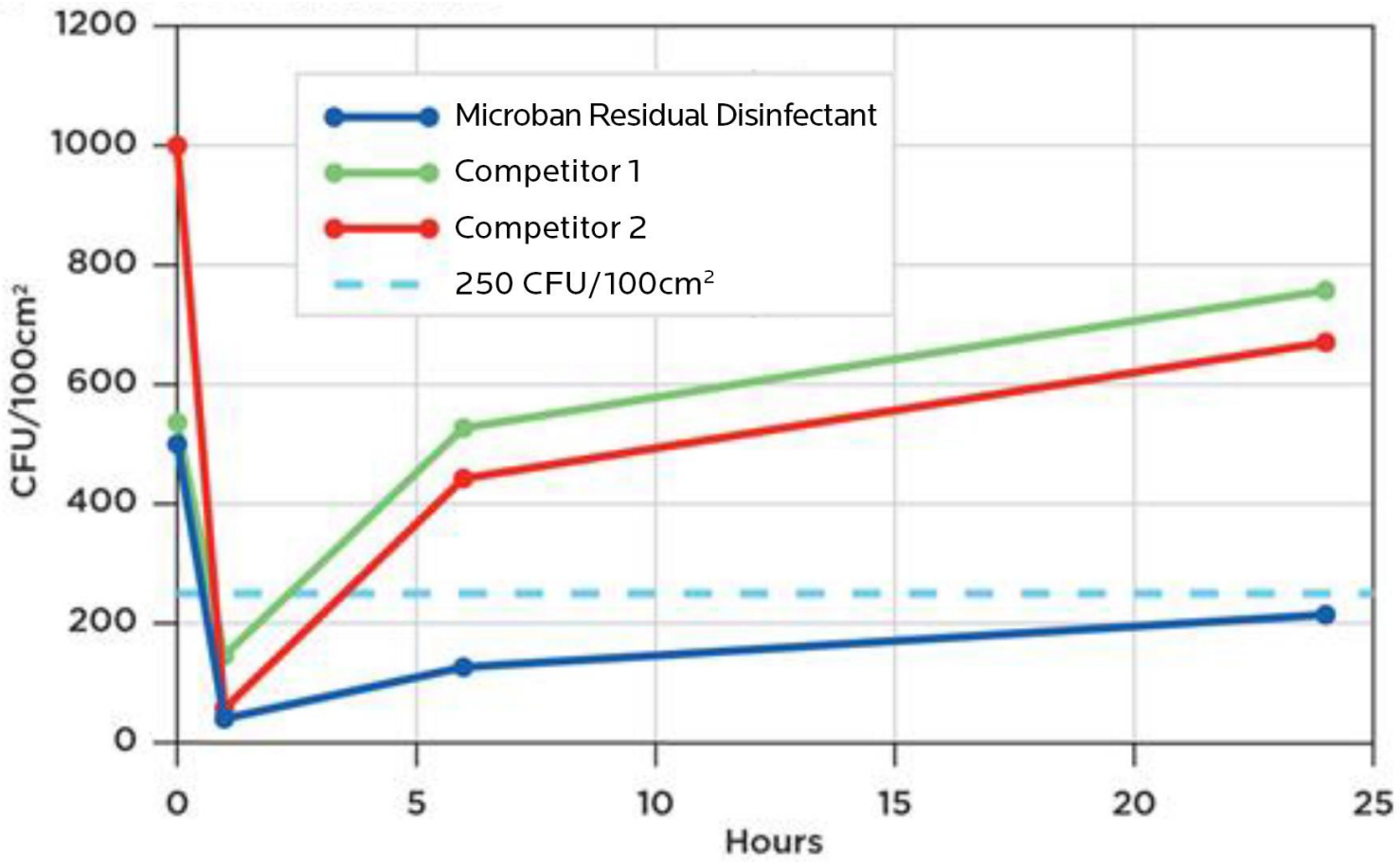
EXAMPLE: SPRAY-ON LIQUIDS

ICU trial with total bacterial counts from bed rails.



3-month trial conducted in ICU room with Microban's residual disinfectant shows effective suppression of bacteria over the course of a day

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REGULATORY CONSIDERATIONS

HOW ARE ANTIMICROBIAL COATINGS REGULATED?

United States

Governed by the U.S. ***Environmental Protection Agency (EPA)***

- *Under Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)*
- *(40 CFR Parts 150-189)*
  - *Option 1: Treated article exemption – making aesthetic and odor claims*
  - *Option 2: End-use articles registered as pesticide device to make kill claims*

Europe

Governed by ***European Chemicals Agency (ECHA)***

- *Under Biocidal Products Regulation (BPR) for appropriate PT Type*
  - *Dependent on the use application*

KEY BENEFITS OF ANTIMICROBIAL COATINGS

HOW CAN ANTIMICROBIAL COATINGS BENEFIT PRODUCTS AND SURFACES?

Invisible protection, visible cleanliness

Product cleanliness is visibly improved without affecting its appearance, functionality or durability

Reduce surface staining and odors

Bacteria can cause staining and noxious odors. Reduced numbers of bacteria = a fresher product

Help to extend product lifetime

Inhibiting the growth of degrading microbes means the expected lifetime of a product is extended

Can be permanent or temporary

Can be integrated during the manufacturing process or topically applied to products and surfaces

Proven by science, trusted by manufacturers

Backed by a wealth of scientific data across a multitude of material types and product applications

Support regular cleaning

Treated surfaces maintain a consistently lower microbial bioburden in-between regular cleaning

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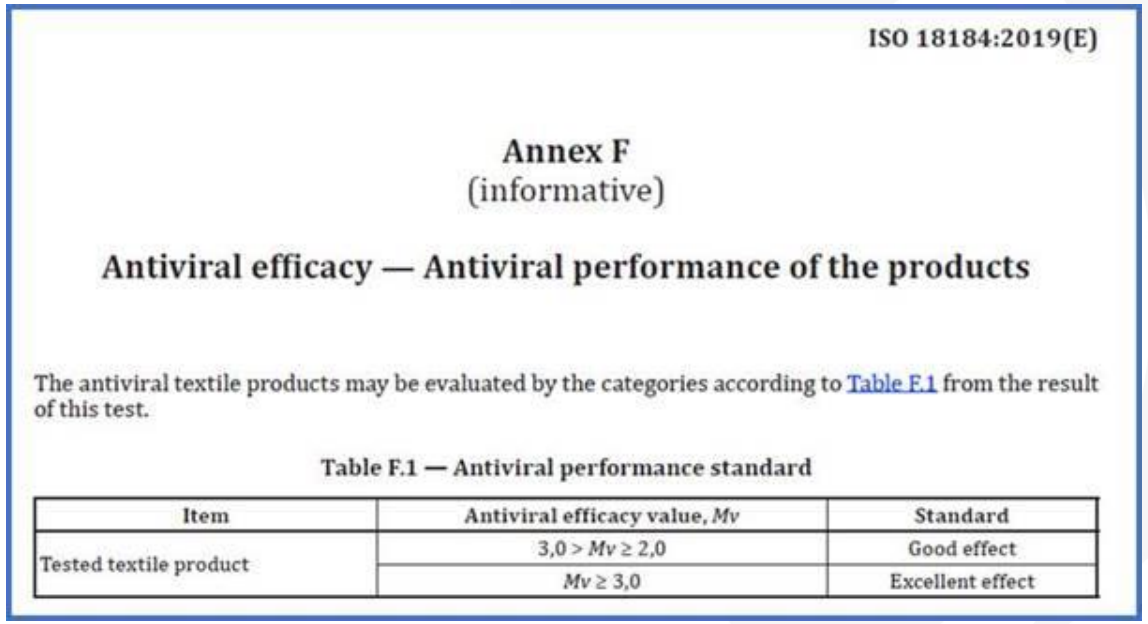
FUTURE & OPPORTUNITIES

EMERGING ANTIMICROBIAL COATING TECHNOLOGIES

Covid-19: Emerging Global Challenge

- *Polymers and textiles designed with antiviral technologies*
- *Tailored to the need of articles*
  - *Face mask – requirement is different from a film*
  - *Air filters*



ISO 18184:2019(E)

Annex F
(informative)

Antiviral efficacy — Antiviral performance of the products

The antiviral textile products may be evaluated by the categories according to Table F.1 from the result of this test.

Table F.1 — Antiviral performance standard

Item	Antiviral efficacy value, *Mv*	Standard
Tested textile product	$3,0 > Mv \geq 2,0$	Good effect
	$Mv \geq 3,0$	Excellent effect

THANK YOU

QUESTIONS ARE WELCOME

www.microban.com

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