

AGXX – A REGULATORY COMPLIANT DISINFECTANT AND PRESERVATIVE FOR PAINTS AND COATINGS

Heraeus Precious Metals GmbH & Co. KG
December 2025



Heraeus

Precious Metals

Heraeus

fifty ONE



THE HERAEUS GROUP – A FAMILY-OWNED TECHNOLOGY COMPANY

Total Revenue in 2024

29.4 bn. €

(34.7 bn. US\$)

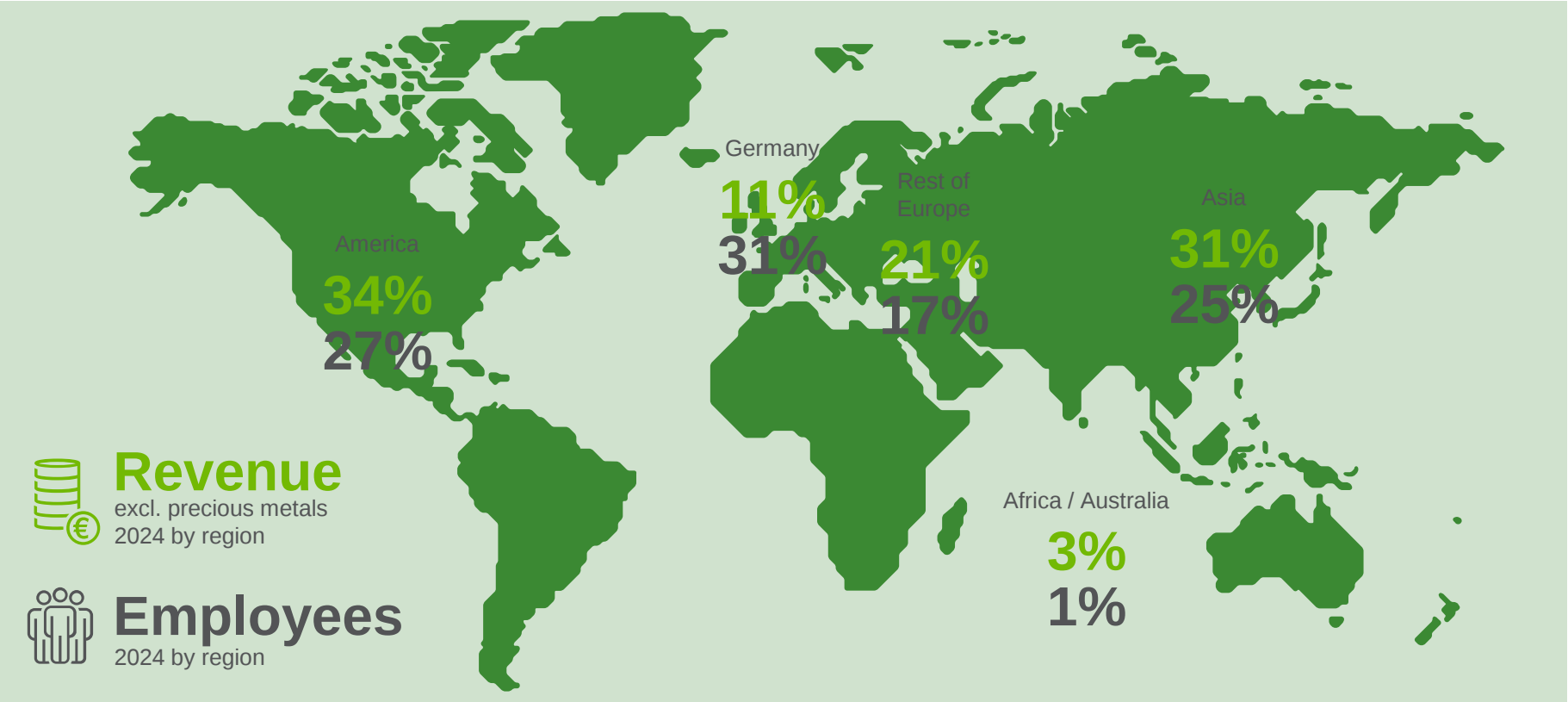
US\$ calculated with 2024 average exchange rate (1 € = 1.18 US\$)



Approx. **100** sites in **40** countries



market-oriented distribution in **15** Operating Companies



6.0%

R & D Expenditures

based on revenues
excl. precious metals



APPROX. **15,200**

employees worldwide
incl. staff leasing



TOP 10 ↑

family-owned companies
in Germany



WHY IS THERE A NEED FOR NEW ANTIMICROBIAL TECHNOLOGIES?



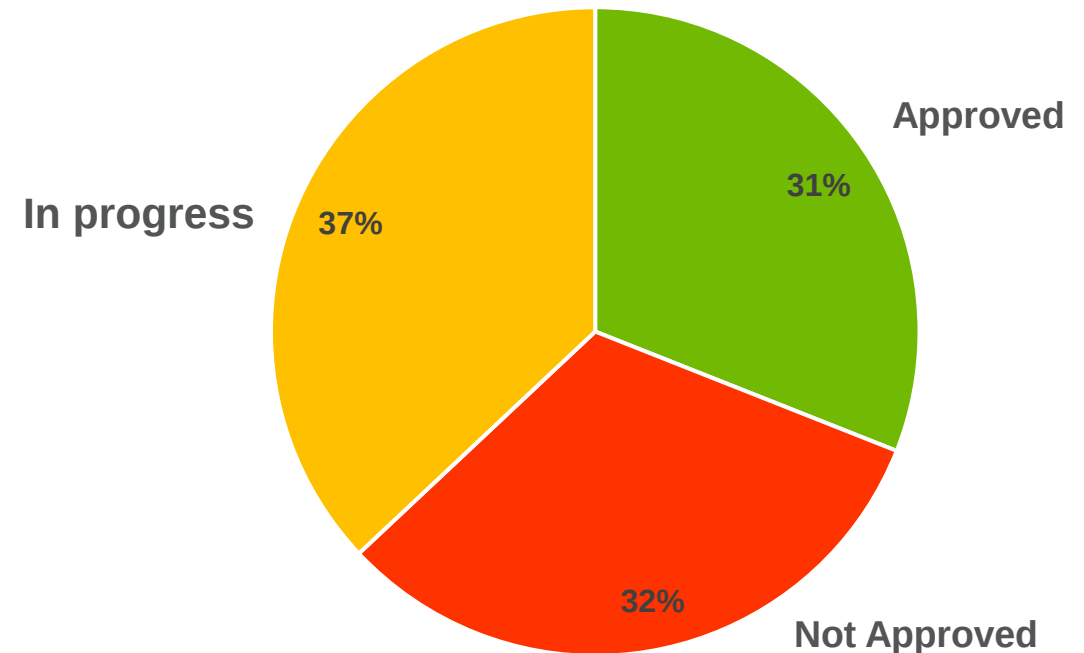
REGULATORY PRESSURE IN EUROPA – OVERVIEW

EU – Biocidal product regulation

- Biocides were brought to market in the EU until the mid-90s without a thorough approval process
- 1998: Commencement of EU Biocidal product directive (BPD)
- 2012: Commencement of EU Biocidal product regulation (BPR)

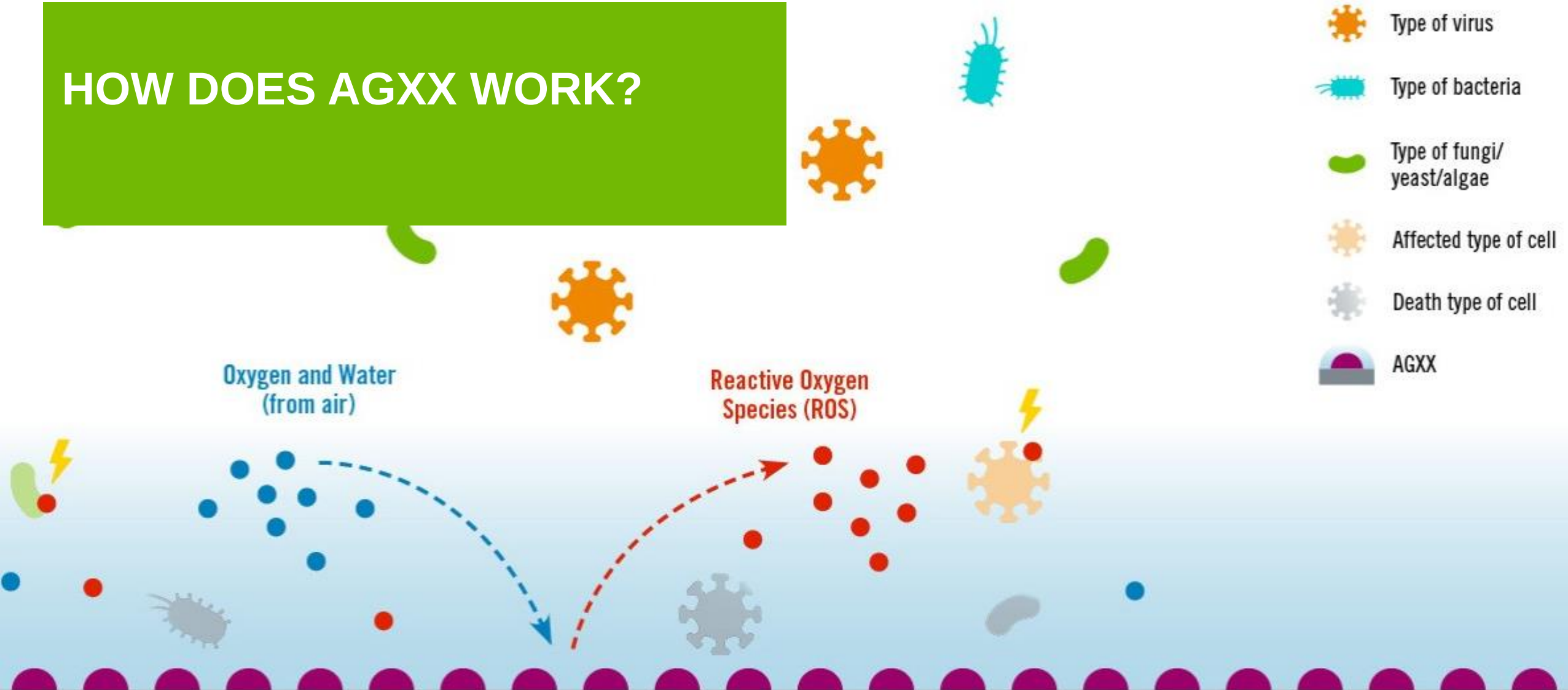
Evaluation of all biocidal substances on the market by the ECHA (Until 2030)

Current situation (July 30th, 2025)



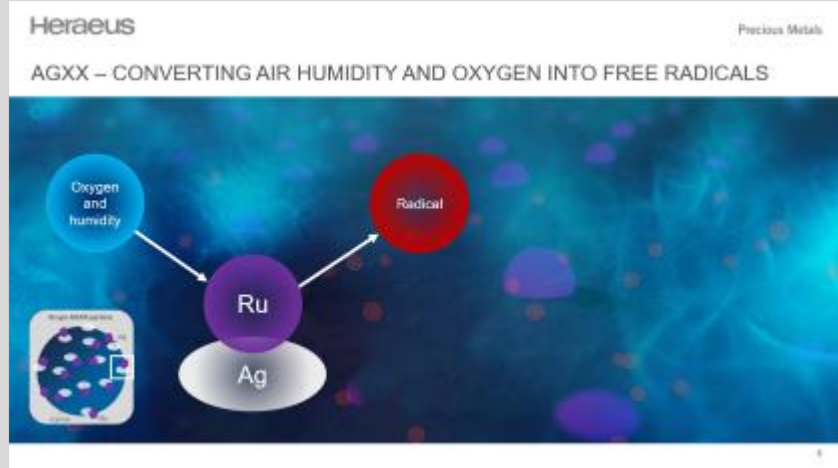
MANY OF TODAY'S AVAILABLE ANTIMICROBIAL TECHNOLOGIES WILL BE BANNED FROM THE MARKET

HOW DOES AGXX WORK?

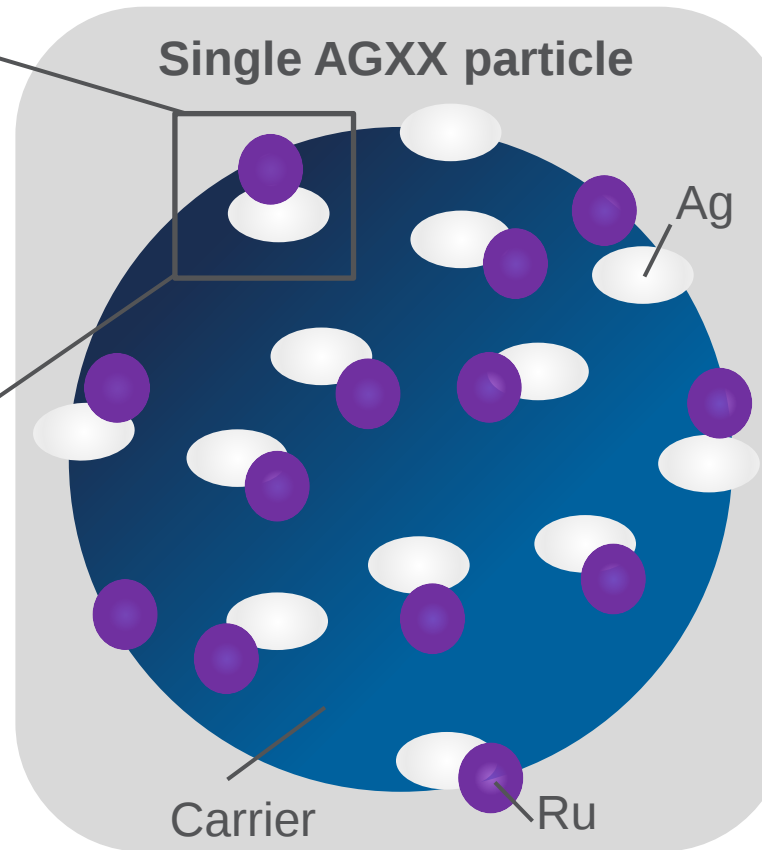


AGXX CONSISTS OF TWO PRECIOUS METALS ON A CARRIER

AGXX active cell



Single AGXX particle

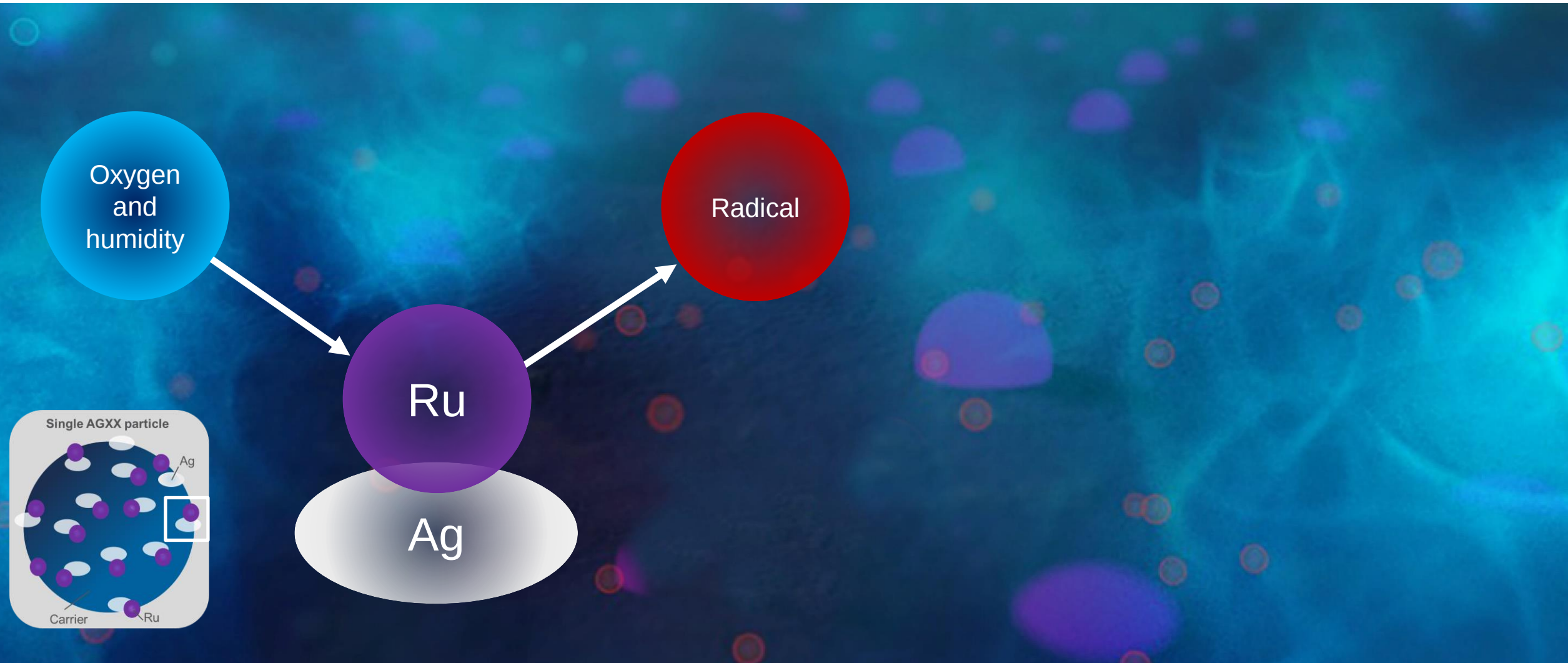


AGXX particles

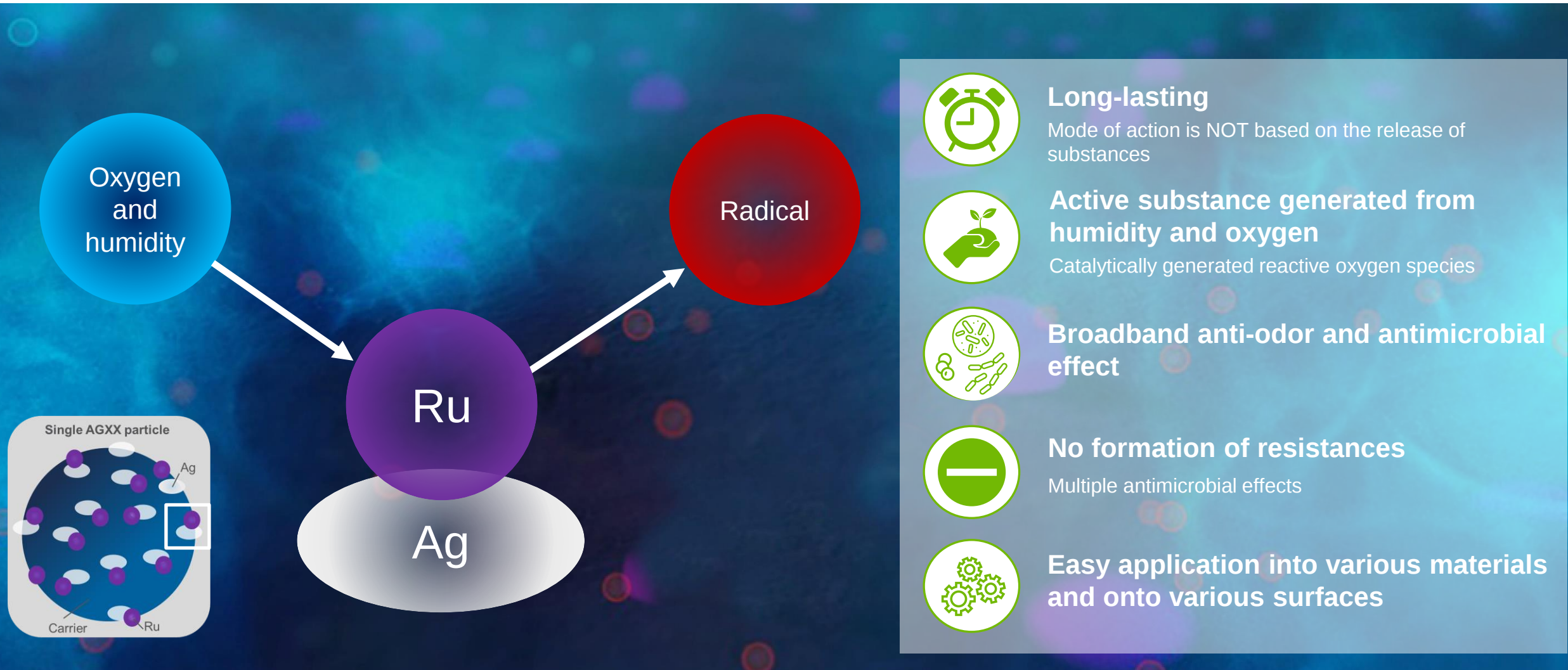


AGXX particles consist of carriers coated with firmly attached silver & ruthenium „islands“ forming discrete particles

AGXX – CONVERTING AIR HUMIDITY AND OXYGEN INTO FREE RADICALS

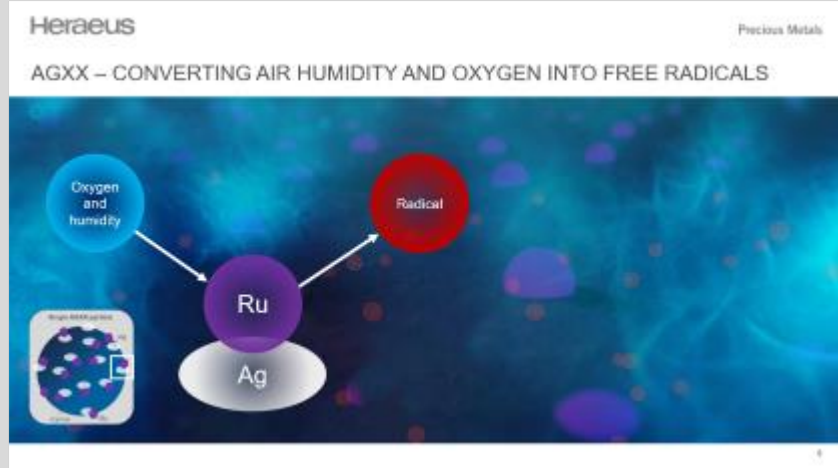


AGXX – CONVERTING AIR HUMIDITY AND OXYGEN INTO FREE RADICALS

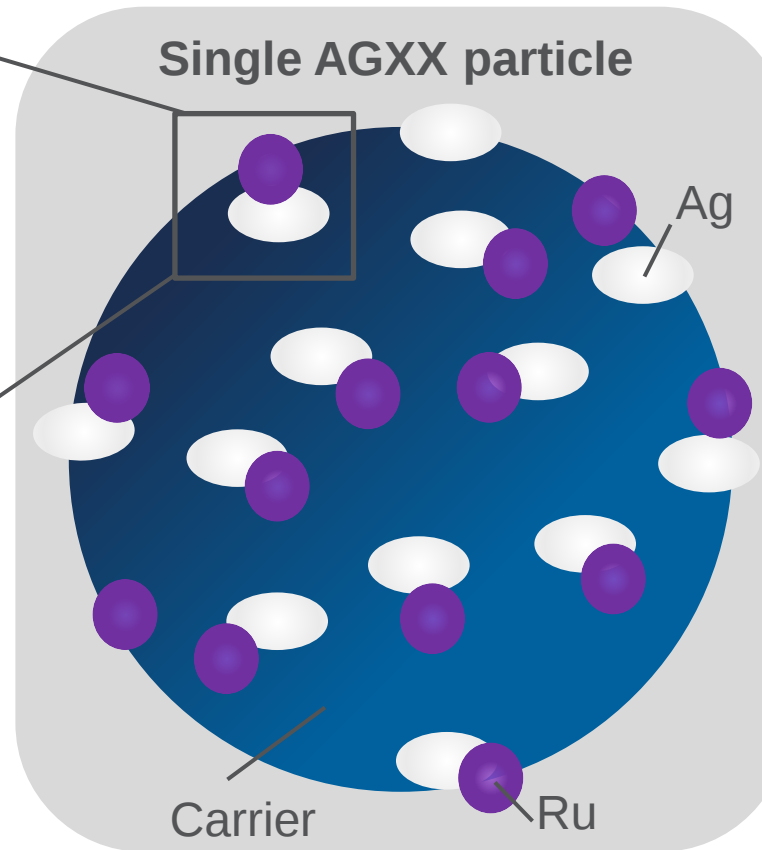


AGXX CONSISTS OF TWO PRECIOUS METALS ON A CARRIER

AGXX active cell



Single AGXX particle



AGXX particles



AGXX particles consist of carriers coated with firmly attached silver & ruthenium „islands“ forming discrete particles

AGXX-PARTICLE VARIANTS

Powder

AGXX-Hybrid-Aa

- › Carrier: AlO(OH)
- › D₅₀: 0.3 µm

AGXX-Carbon

- › Carrier: activated carbon (granules and pellets)
- › D₅₀: 50 µm – 0.18 mm

Suspension

AGXX-Hybrid-As

- › Carrier: AlO(OH)
- › D₅₀: 0.3 µm

AGXX-Hybrid-Ds

- › Carrier: SiO₂
- › D₅₀: ≤ 0.5 µm

AGXX – APPLICATION OVERVIEW



Paints and Coatings



Textiles



Polymers



Filtration

AGXX-PARTICLE VARIANTS



Recommended for paints & coatings

Powder

AGXX-Hybrid-Aa

- › Carrier: $\text{AlO}(\text{OH})$
- › D_{50} : $0.3\ \mu\text{m}$

AGXX-Carbon

- › Carrier: activated carbon (granules and pellets)
- › D_{50} : $50\ \mu\text{m} - 0.18\ \text{mm}$

Suspension

AGXX-Hybrid-As

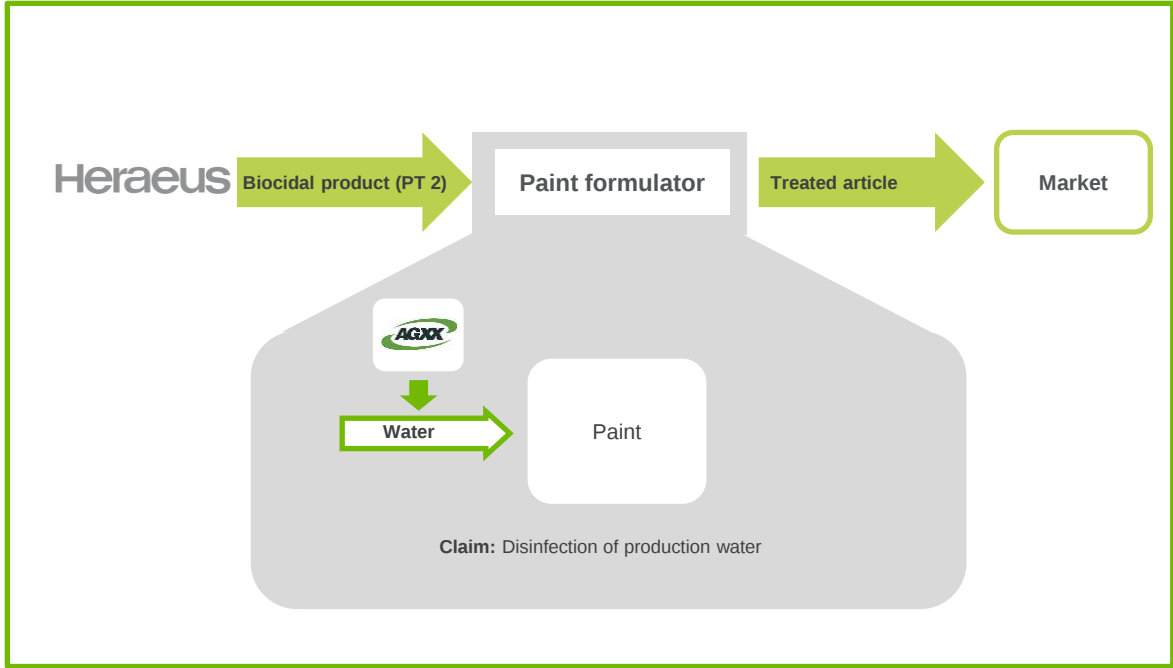
- › Carrier: $\text{AlO}(\text{OH})$
- › D_{50} : $0.3\ \mu\text{m}$

AGXX-Hybrid-Ds

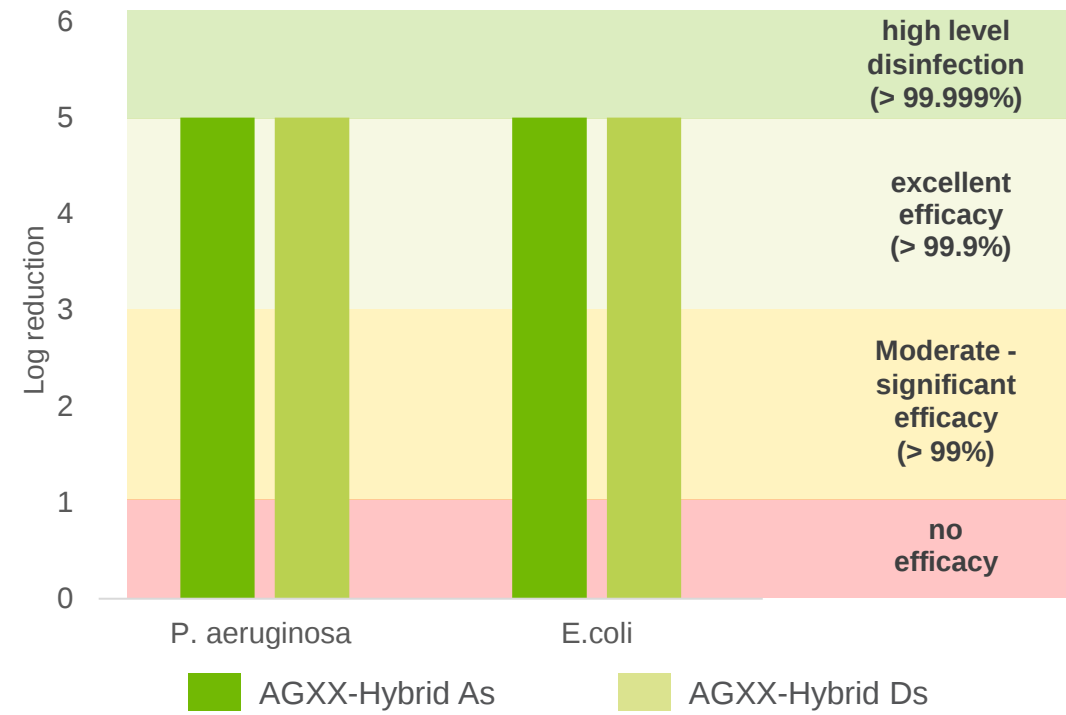
- › Carrier: SiO_2
- › D_{50} : $\leq 0.5\ \mu\text{m}$

USE AS A DISINFECTANT IN PAINT MANUFACTURING

BPR-compliant use in paints and coatings

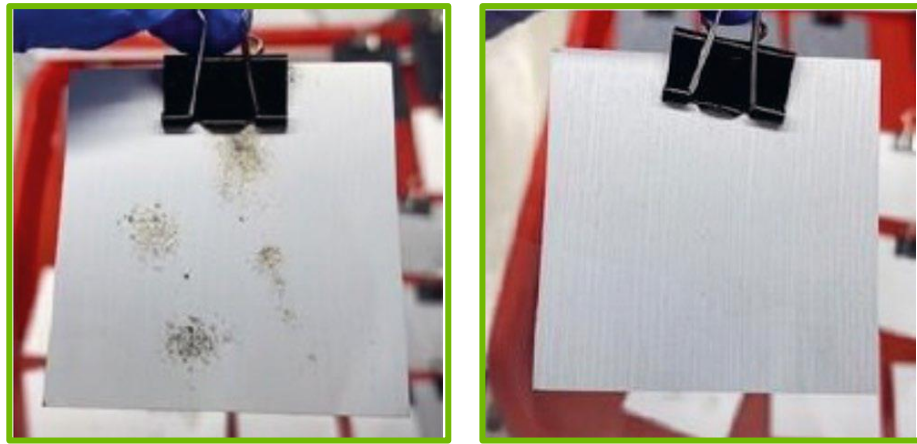


Disinfection tests were conducted in alignment with ISO 1276



FILM PRESERVATION / ANTIMICROBIAL SURFACES

AGXX prevents from microbial growth

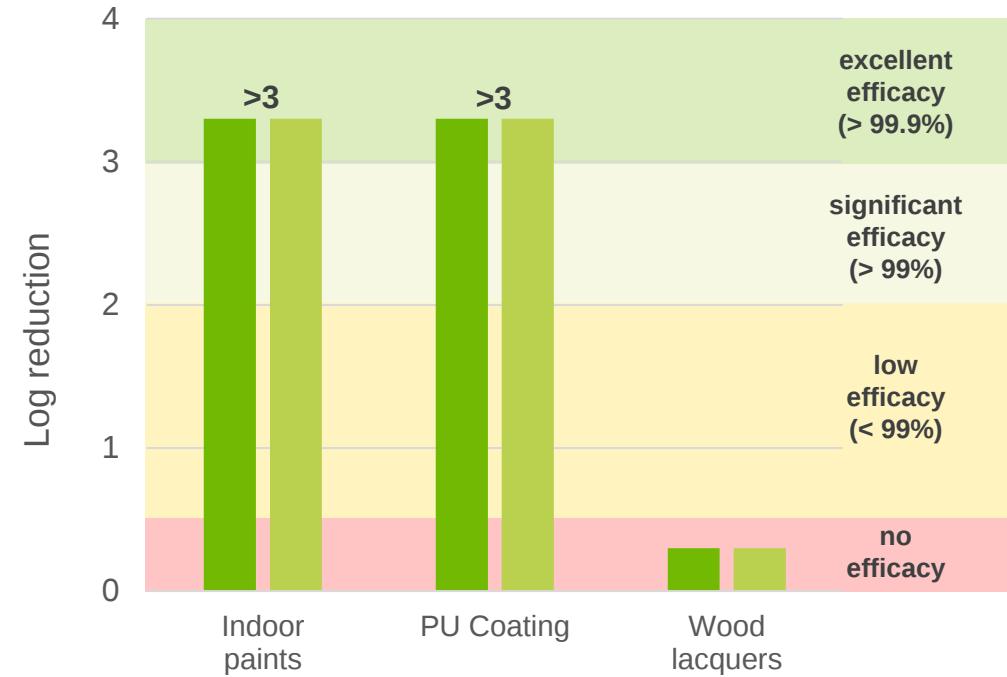


w/o AGXX

AGXX

Antifungal testing in accordance with BS 3900

AGXX is effective in water-absorbing matrixes



Antimicrobial testing in accordance with ISO 22196 in various paint matrixes

IN-CAN PRESERVATION¹

AGXX demonstrates exceptional antimicrobial efficacy according to IBRG P16 mod. (Wet State Paint Method) as a single additive or in combination with DBNPA (2-2 dibromo-3-nitrilopropionamide)

	No preservation		100 ppm AGXX-Hybrid-Aa3		50 ppm AGXX-Hybrid-Aa3		50 ppm AGXX-Hybrid-Aa3 + DBNPA < 100 ppm	
Type of microbes	B	F/Y	B	F/Y	B	F/Y	B	F/Y
Week 1	0	0	0	0	0	0	0	0
Week 2	3	3	0	0	0	0	0	0
Week 3	3	3	0	0	0	1	0	0
Week 4	3	3	0	0	0	1	0	0

Contamination in an aqueous wall paint with and without preservative

AGXX-Hybrid-As3 and AGXX-Hybrid-Ds3 require a 10x higher concentration (suspension/dispersion contains 10% solids)

B Bacteria: *E. coli* DSM 682, *P. aeruginosa* DSM 939, *S. aureus* DSM 799; 10⁵ CFU/ml

F/Y Fungi/Yeast: *C. albicans* DSM 1386, *A. brasiliensis* DSM 1988; 10⁵ CFU/ml

Evaluation: 0 = no contamination (germ reduction >99.9 %) ... 3 = high contamination >10⁵ CFU/ml

1: R&D results. PT 6 approval (BPR) in progress

LONG-TERM IN-CAN PRESERVATION TESTS¹

AGXX demonstrates exceptional long-term efficacy even after 13 inoculations

Phase I: Germ load according to IBRG P16												Phase II: Higher germ load		
Samples	Pot	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13
0% (Reference)	A	No growth	No growth	Growth visible	Growth visible	No growth	No growth	No growth	No growth	No growth	No growth	Growth visible	Growth visible	No growth
	B	No growth	No growth	Growth visible	Growth visible	No growth	No growth	No growth	No growth	No growth	No growth	Growth visible	Growth visible	No growth
Standard preservative	A	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	Growth visible	Growth visible	No growth
	B	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	Growth visible	Growth visible	No growth
AGXX 100 ppm	A	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth
	B	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth	No growth

No growth

Single colonies

Growth visible

Test results
W12

Standard preservative

Bacteria

Fungi

AGXX

Bacteria

Fungi

1: R&D results. PT 6 approval (BPR) in progress

HOW WE CAN HELP: OUR VALUE PROPOSITION



Compliance without compromise

- ✓ Fully **compliant** with current and future **BPR regulations**.



No labeling required

- ✓ **No need for CLP classifications** as the technology is not based on release of toxic substances.



Continuous protection

- ✓ Ensure **long-term antimicrobial efficacy** with our innovative catalytically regenerated technology, securing a competitive advantage.