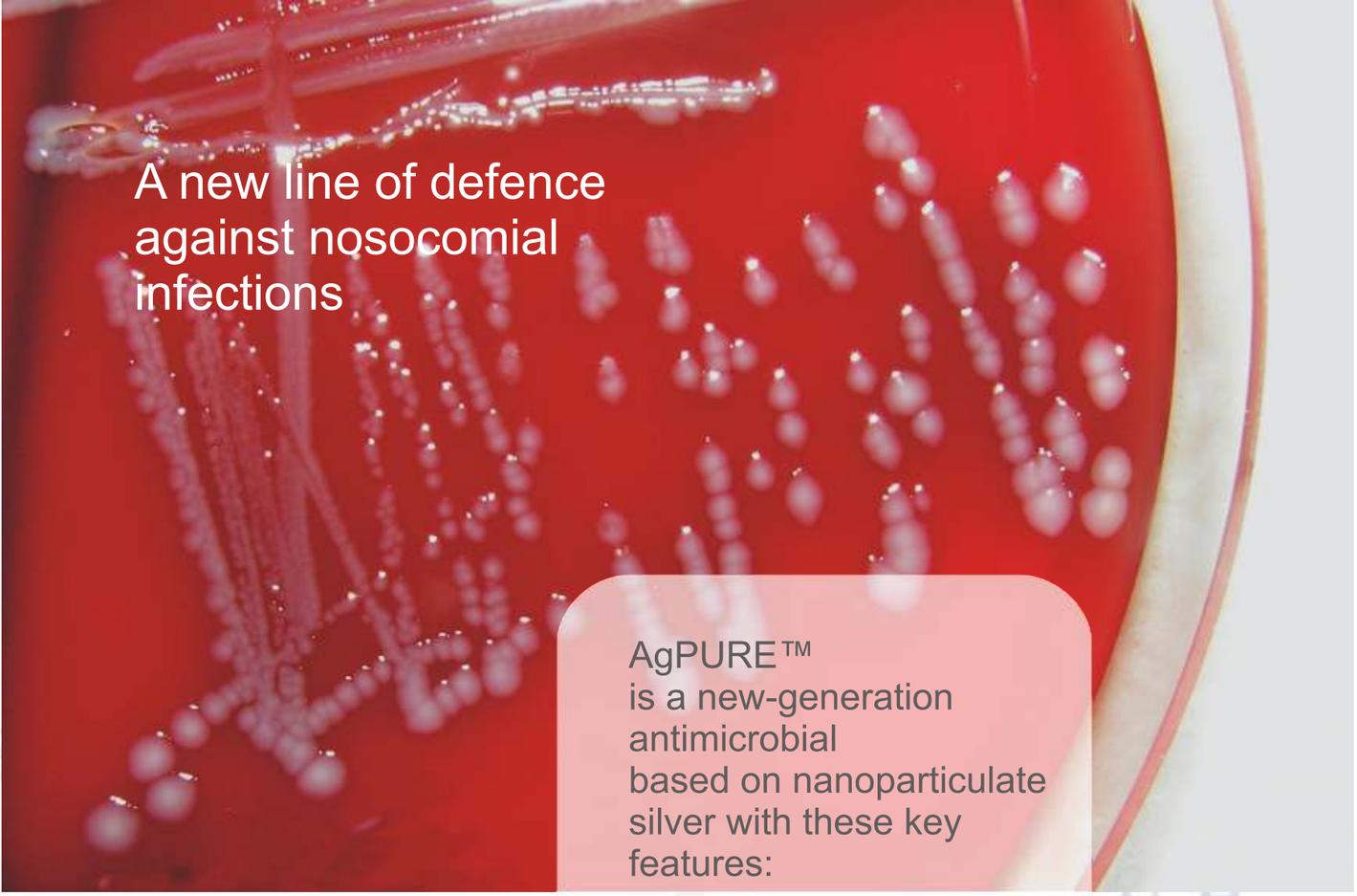
Ag PURE

silver active surface

antimicrobial
silver additive



A new line of defence against nosocomial infections

AgPURE™
is a new-generation antimicrobial
based on nanoparticulate silver with these key features:

- fast response
- permanent antimicrobial effect
- reduce the adhesion of bacteria
- efficient against drug-resistant germs
- non cytotoxic
- excellent biocompatibility
- lack of side effects and easy to use

Infections after surgeries

and infections acquired in hospitals or during medical treatments are increasing. They have become a serious health risk for patients and hospitals all over the world. The whole healthcare system is burdened with growing costs to fight these nosocomial infections (also known as hospital-acquired infections). Microorganisms (bacteria, yeast, fungi), growing in liquid or air conducting systems, on containers and all the other surfaces of medical devices are the cause of these infections. In most cases, bacteria settle on surfaces by creating a biofilm. A biofilm is an accumulation of microorganisms in which microbial cells adhere to one another and/or to a surface.

These adherent cells are frequently embedded within a self-produced matrix of extracellular polymeric substance (EPS). A biofilm is not only created on surfaces of medical or analytical devices, but also on medical products made of plastic or metal utilised on or in the patients body. Just a few bacteria are sufficient to initiate the formation of a biofilm, whilst inside it, germs are protected from the body's immune response as well as the antibiotics applied externally.

The number of infections caused by antibiotic-resistant germs is has risen dramatically and is complicating the medication treatment of affected patients.

The consequences are dramatic:

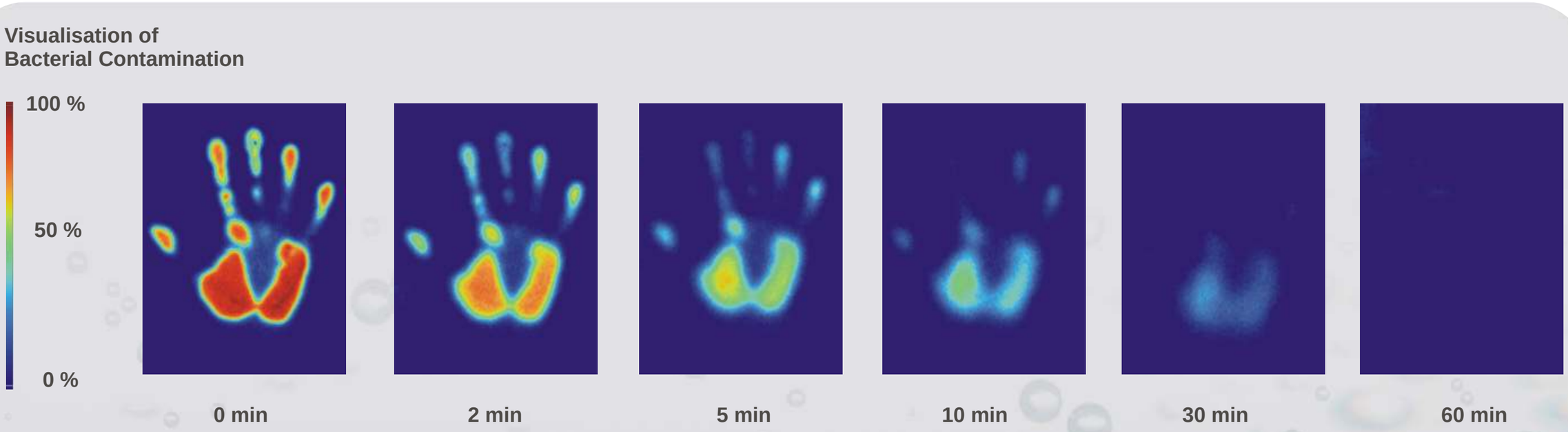
Patients are suffering from painful and delayed recovery times. Often a preventative antibiotic treatment becomes necessary. Consequently, the physical stress for patients and the economic burden for the healthcare system increases.

Thus the stated aim

is to prevent the initial adhesion of biofilm-forming microbes. Additionally the proliferation of pathogenic germs on almost every medical surface has to be avoided. To succeed, the addition of an antimicrobial agent to the material either directly during the manufacturing process, or by means of a special coating procedure, is recommended.

Antimicrobial agents will not replace the necessity for cleaning and appropriate hygiene, yet are the best choice to eliminate all remaining microbes and avoid a repeated proliferation of germs on cleaned surfaces.

AgPURE™ silver active surface
Fast response within minutes



Broad spectrum antibiotic finish with full lifetime effect.

Silver has been used for medical applications (eye solutions, wound treatment, etc.) for over a century. Silver ions strongly inhibit the growth of microorganisms like bacteria, yeast and fungi. **Silver shows a broad-spectrum antimicrobial activity even against antibiotic-resistant strains (MRSA).** These germs fail to develop a resistance to silver ions, as silver targets different sites of the microbial metabolism at one time.

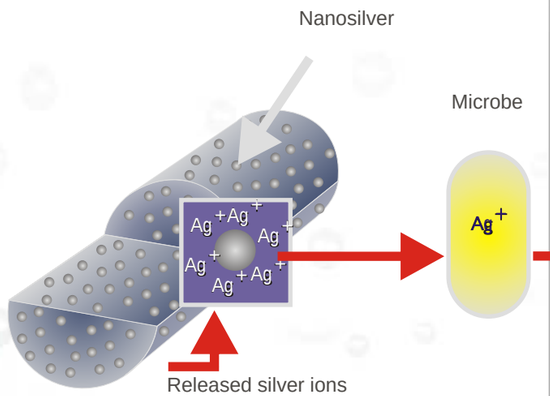
AgPURE™ nanosilver combines the antibiotic characteristics of silver with the unequalled low dosage of active silver nanoparticles.

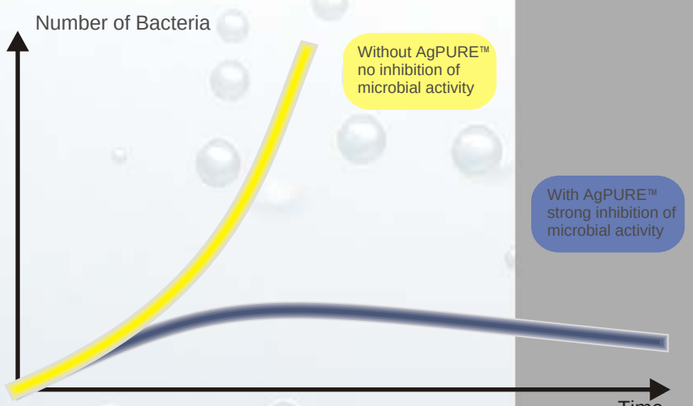
A surface or material treatment with nanosilver results in a very high antmicrobial efficacy with very small potential side effects.

AgPURE™ nanosilver features a very high surface to volume ratio enabling the controlled release of silverions at very low dosages. **This is the real power of nanotechnology**.

Depending on the dosage, silver ions released from AgPURE™ nanosilver, eliminate 99.9% of all bacteria on a surface within one hour.

AgPURE™ generates an effective steady state of silver ions on the implanted surface.

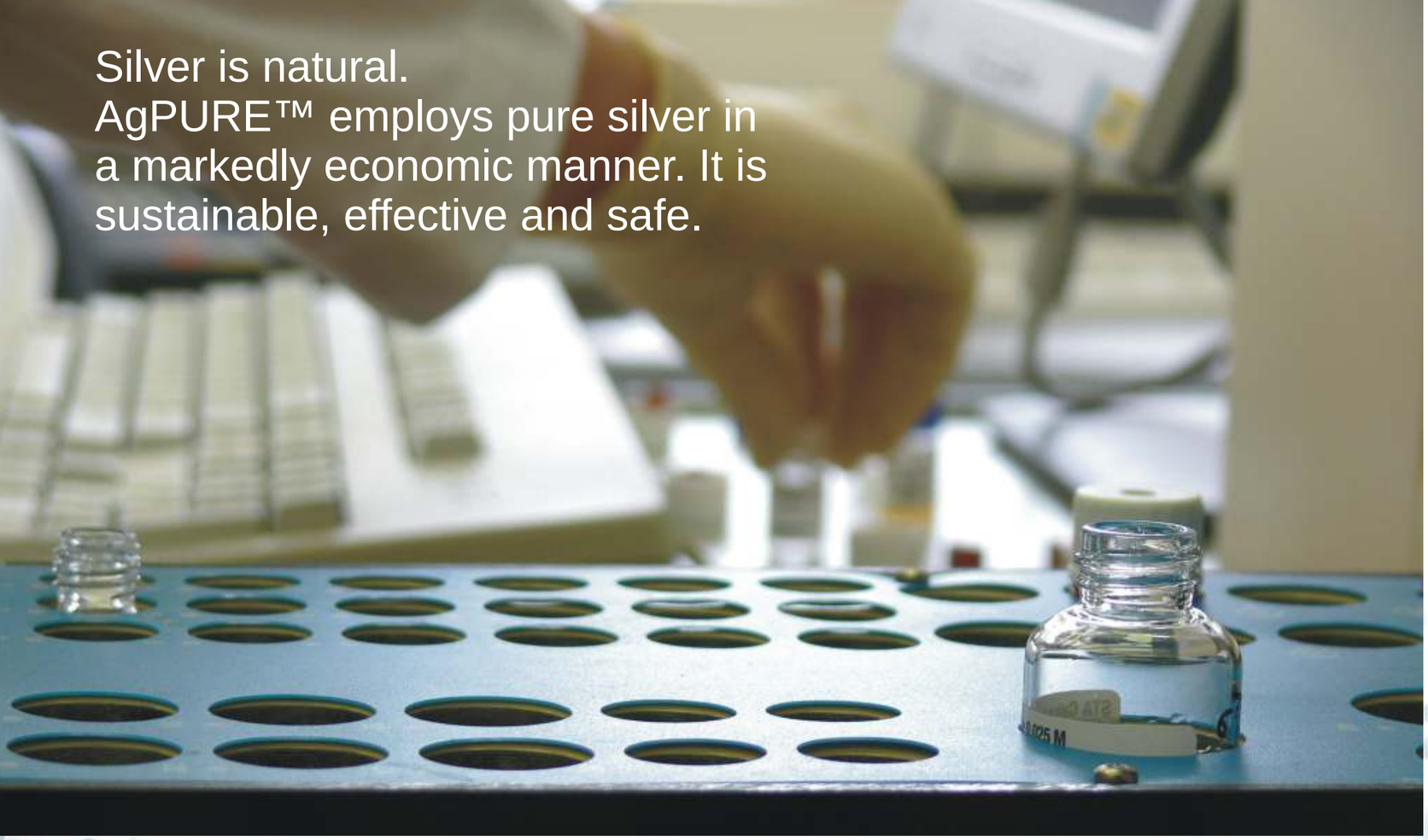




Controlled release - permanent antimicrobial effect

Silver continuously releases Ag-ions. Bodyfluids always contain high electrolyte concentrations. AgPURE™ establishes a steady state of Ag-ion concentration, that remains constant for a long time without a decrease in antimicrobial activity.

AgPURE™ is incorporated into the substrate material (e.g., polymer or coating) and is therefore irreversibly immobilised. **The antimicrobial effect does not decrease over time** even when the treated product is exposed to UV-light or subjected to harsh cleaning procedures.



Silver is natural.
AgPURE™ employs pure silver in a markedly economic manner. It is sustainable, effective and safe.

Scientifically proven

Continuous research has been undertaken since the antimicrobial effect of silver was discovered. **Therefore, silver is the most studied antimicrobial additive known to mankind**. Its functions and potency have been optimised through a variety of different processes making it suitable for many specific applications.

Easy to use

AgPURE™ products are free of any fillers. Silver nanoparticles can be integrated homogenously into all substrates as easily as usual dye pigments. AgPURE™ is processable at high temperatures as the stability of the nanoparticles is excellent even at temperatures above 300°C.

Sustainable

Nanotechnology contributes to the better management of essential material resources. In fact, the continuous usage of functionalised nanomaterials helps to save more than 95% of valuable compounds.

In most medical applications **active nanosilver concentrations** lie within the range of **0.01 wt% to 0.2 wt%.**

Add more value to your product and preserve our environment whilst not straining your budget.

AgPURE™ *antimicrobial* is the International Standard Reference Material for Nanosilver.

The OECD sponsorship program

AgPURE™ nanosilver has been selected as the official reference- and testing material for the sponsorship program of the “Organisation of Economic Cooperation and Development” (OECD). The objective of this program is toscientifically discover possible threats to health and the environment. Within the OECD's testing program, the member nations oblige themselves to address 14 representative nanomaterials to over 50 endpoints. That is, by the end of the year 2010, extensive reports including exact descriptions of the respective nanomaterial, the physical and chemical attributes, its environmental impact as well as the toxicological and eco-toxicological risks, will have been compiled.

Antimicrobial testing - proven efficacy

The antimicrobial effectivity of the AgPURE™ products can be verified by means of in-house microbiological tests and certified according to international standards.

Our laboratories provide you with industry-relevant standard procedures to determine the antimicrobial effectivity:

JIS Z 2801:2000, ISO 22196:2007

JIS L 1902:2002, DIN EN ISO 20743:2007-10

SN 195921, ASTM G 21 96, JIS Z 2911:1992

Silver leaching ISO 10993:2002-17

Safe to human tissue

No abrasion of nanosilver particles is detectable from polymer materials.

None of the tested subjects, even those suffering from atopic eczema, showed irritations of the skin when treated with a microfiber cloth containing AgPURE™ nanosilver.

Cytotoxicity

AgPURE™ nanosilver shows no cytotoxic effects in various human cell lines. (ISO 10993)

AgPURE™ nanosilver shows no skin sensitisation according to Local Lymph Node Assay (LLNA) in animal testing.

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ras**materials** focuses on the production and distribution of advanced nanomaterials.

The future of our planet needs clever concepts and technologies to overcome the challenge of the next decades. It is our inventiveness and creativity that helps us to generate sustained technological improvements that will solve some of our most pressing problems.

This new world of nanoparticulate additives and formulations is our contribution to enhanced sustainability.

We have succeeded to develop well defined **silver products that meet highest demands** in the market of modern antimicrobials**.**