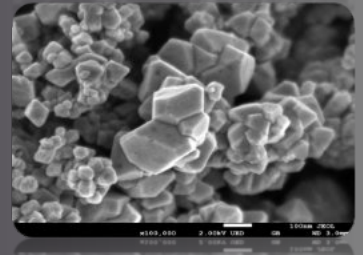
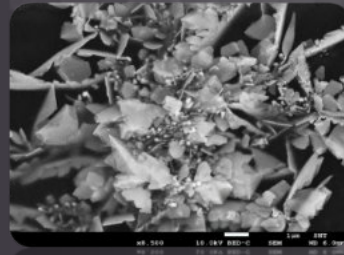
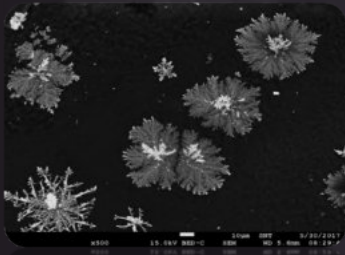
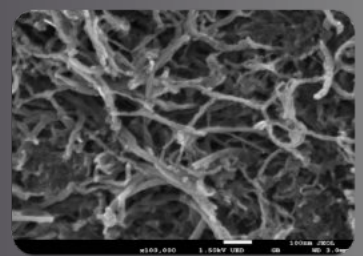
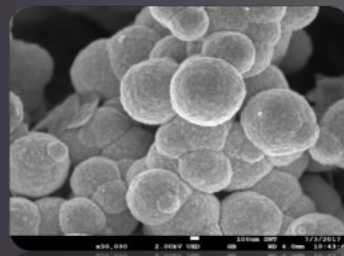
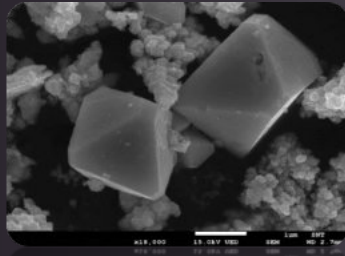
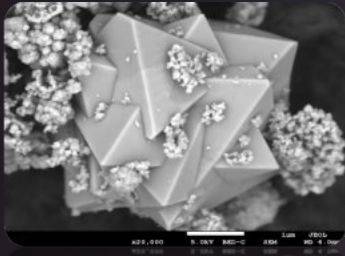


AGUSCIO

*new standard in ceramics*

*Create an innovative future with us*



Smart Nanotechnologies focuses on the research and manufacture of specialist chemical products with unique properties. We are inspired by nanotechnology, which enables us to produce specific structures of nanometric sizes, offering enormous potential for many industries.

Our main goal is to manufacture high-quality products that enable using nanomaterials in many industries.

The small size of the particles, and thus the highly developed specific surface area, results in materials with unique properties that are different from those of the same substances at the micro- and macro-scale, e.g.

- better mechanical properties,
- better optical properties,
- increased chemical activity,
- increased antibacterial activity,
- reduced environmental burden.

# Pathogens vs nanoparticles

## Current problems and threats

- rapid migration of microorganisms ,
- development of drug resistance ,
- dynamic mutation of microorganisms ,
- limited natural resources .

## Silver nanoparticles:

- have strong biocidal properties,
- are highly stable,
- are safe for humans and the environment,
- are easy to apply in industrial processes,
- bacteria and fungi have not developed resistance to them,
- their use is cost-effective.



## *Why silver nanoparticles?*

Silver nanoparticles eliminate microorganisms in several ways:

- they act as a catalyst, causing the oxidation of many chemical compounds essential to bacterial life, resulting in their inactivation. The bacterium loses its ability to breathe, and its genetic material is destroyed
- by touching the cell wall of the microorganism, they block the energy flow and its respiratory channels.
- by denaturing proteins, they destroy their structures, which results in the loss of their biological activity that is irreversible and fatal.
- by combining with chemical compounds which form DNA chains, they destroy their bonds. The microorganism loses its ability to replicate (multiply), so no further generations are formed, and no information about threats is transmitted.

## PROBLEM

The increasing frequency of hospital-acquired infections and the limited options for their control have contributed to the increase in antibiotic-resistant pathogenic microorganisms. Modern medicine focuses on post-factum action in an attempt to combat the effects of diseases caused by pathogens.

## CHALLENGE

The challenge is prevention, leading to a reduction in the number and inhibition of migration of pathogenic microorganisms, thus limiting the impact of infections.

## SOLUTION

The solution is to use technologies that provide self-disinfecting surfaces not only in medical and public settings but also in our homes.

One of our products is the **AGuscio** technology, which combines the production and adaptation technology of a bioactive additive for ceramic coverings (tiles, fine stoneware tiles, sanitaryware, etc.).

The application of **AGuscio** technology facilitates manufacturing tiles and ceramic articles with new unprecedented characteristics. As a result, the construction industry will gain a new standard of safety and protection against the development of pathogens.

The innovative nanosilver application technology for ceramics, developed and tested by **Smart Nanotechnologies**, allows manufacturers to create any collection of self-disinfecting polymer and ceramic products such as ceramic and fine stoneware tiles.

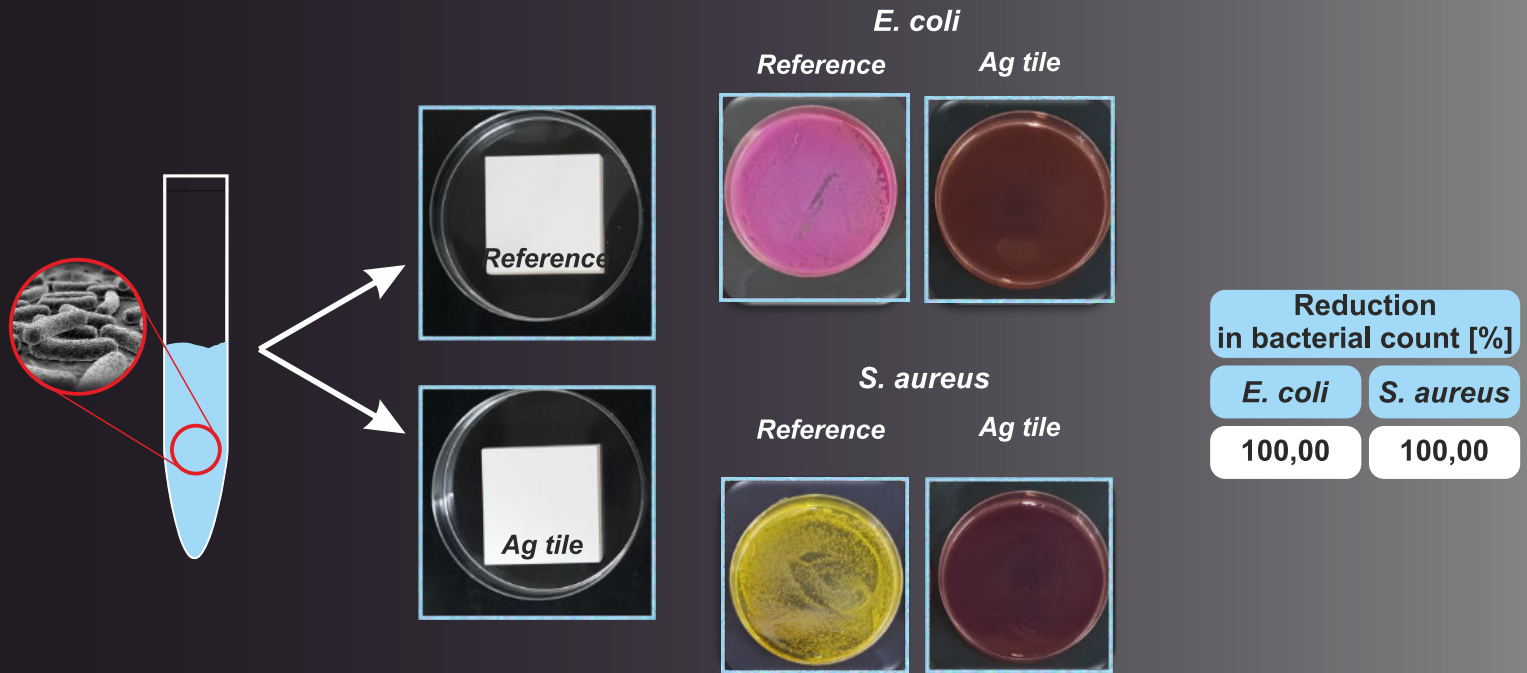
Such products can permanently protect the user against bacteria and mould, with an effect across the entire mass of the ceramic and in perpetuity, and not only superficially (as was previously the case with various non-permanent coatings). We have thus set **a new global standard in safety, comfort and hygiene.**





## Biocidal ceramic tiles

- the developed solution ensures over 90% reduction in bacteria according to ISO 22196
- the developed component shows antibacterial effectiveness on all types of ceramic tiles
- the nanoadditive is permanently bound to the protected surface and has high thermal stability
- the application is carried out using existing lines, standard equipment used in the production of ceramic components
- the component does not affect the appearance of the final product
- low cost of securing of a running metre
- patent-protected technology



The experiment was performed according to ISO 22196



## Virucidal efficacy

The virucidal properties of ceramic tiles were evaluated against Ad-36 using the method described in **ISO 21702:2019**: "*Measurement of the antiviral activity on plastics and other non-porous surfaces*".

The exposure time was 24 hours. After this time, the reduction of the titre was determined.



The results showed a titre reduction  $> 4 \log_{10}$  (virucidal efficacy 99.99%).

## *New benefits while maintaining existing advantages*

### **elimination of microbiological hazards**

An innovative and specialist product with new properties allows targeting customers who value safety and hygiene. The number of such customers is constantly increasing, while at the same time, the level of public awareness of microbiological protection is rising.

### **a hallmark for the brand and its customers**

Advanced products, capable of ensuring the comfort and safety of the user, become symbols of a brand around which it is possible to create a community of consumers, who are its greatest asset. Every customer who consciously makes a purchase will appreciate the opportunity to stand out and define their lifestyle.

### **saving money and protecting the environment**

Maintenance of self-disinfecting surfaces significantly reduces the amount of disinfectants used, which saves everyone money and is good for the environment by reducing chemical waste.

### **lifetime effectiveness**

The lifetime of sanitary products and ceramic tiles does not reduce their biocidal properties, as these remain constant throughout the product's life cycle. This is achieved through a patented technology that ensures that each successive layer contains silver nanoparticles permanently bonded to the enamel structure.

*Universal application*





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