

Biocidal additives with **silver nanoparticles** for thermoplastic and chemically cured polymers

POLYDEF Ag+

TECHNICAL DATA SHEET

POLYDEF Ag+ is a specially developed solution based on silver nanoparticles that provide antibacterial and antifungal properties. The presence of nanosilver in the protected polymer provides a biocidal effect by disrupting the normal functioning of the cell, which in turn leads to the death of microorganisms, contributing to the elimination of sources of unpleasant odors and extending the life of the material. The additive is environmentally friendly, does not change the physical properties of polymers and does not cause degradation of the protected material. The component provides long-term microbiological protection and increases the safety and attractiveness of the product. In addition, the nanoadditive is characterized by higher stability at high temperatures and high humidity in relation to traditionally used biocides.

Recommended dosage

To obtain microbiological protection, it is recommended to dose at the level of 0.1-0.3% by weight relative to the weight of the finished polymer composite.

Storage

Please note that silver-containing materials may be sensitive to light and electromagnetic fields. Insufficiently mixed product may cause some discoloration in the finished product, therefore it is the responsibility of the final component manufacturer to fully evaluate these under normal conditions of use.

Before use

As with all chemicals, read the MSDS before use. Please make sure you have the latest information before using this product. For more information, please contact us at kontakt@smartnanotech.com.pl

Silver is an element valued for its catalytic properties, thermal and electrical conductivity, but above all also for its killing effect against pathogens - bacteria, viruses, fungi. The high antimicrobial activity of this element has been used since ancient times. At that time, the mechanisms responsible for the high antimicrobial effectiveness of silver were unknown. Today, their multitude and principles of operation explain not only the effectiveness, but also the inability of pathogenic cells to develop resistance to silver. The latter feature is particularly important in the current era of increasing antibiotic resistance of many bacterial strains.

The development of technology has made it possible to use silver particles on a nanometer scale. Such significant fragmentation of this material affects its distribution, thus enabling the achievement of very high antimicrobial effectiveness even at very low concentrations. Moreover, silver has a relatively low toxicity to humans and animals. All these features make silver currently considered one of the most attractive alternatives, both for many drugs and biocides.

Basic properties of the POLYDEF Ag+

Physical state: solid, powder < 500 µm

Colour: grey

Silver particle shape: spherical

Silver content: 10.0%

Silver particle size: < 100 nm

Biocidal properties: yes

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Structural analysis

In order to study the morphology of the **POLYDEF Ag+** additive based on silver particles, a scanning electron microscope (SEM) study was carried out.

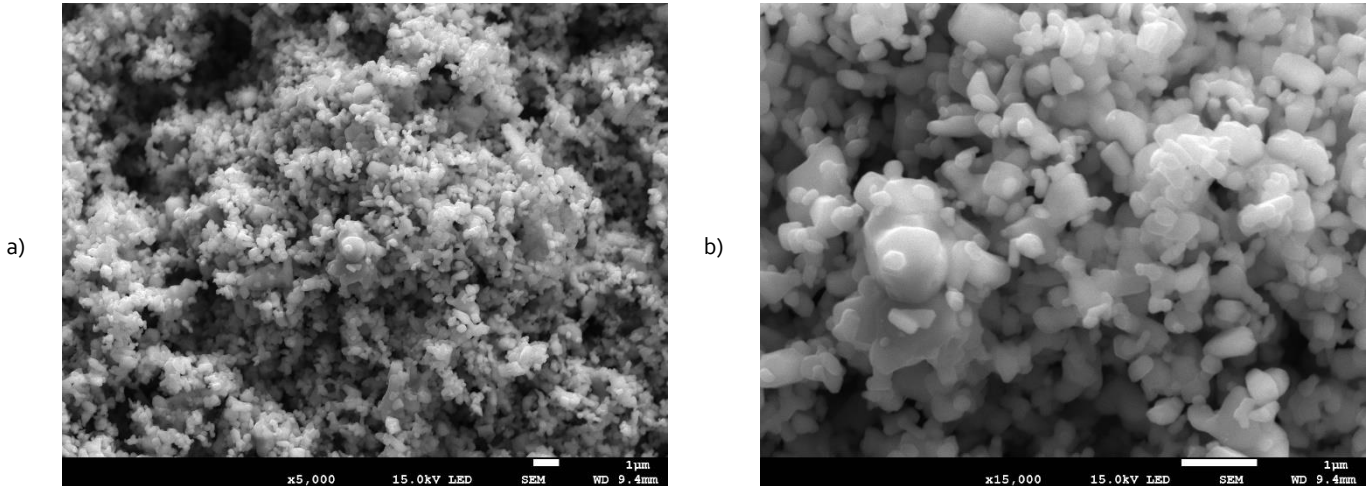


Fig. 1. Scanning electron microscope photos of the **POLYDEF Ag+** additive a) 5,000 times magnification, b) 15,000 times magnification

Microbiological testing

The biocidal properties of the **POLYDEF Ag+** additive were analyzed to assess the activity of the obtained additives against bacteria and fungi. The microbiological activity of the developed powders was analyzed against *E. Coli* (ATCC 8739) and *S. Aureus* (ATCC 6538) bacteria representing strains of gram-negative and gram-positive bacteria, and against *C. Albicans* (ATCC 10231) as a representation of fungi. The analyzes were performed according to the suspension method, dedicated to the testing of powder additives. .

