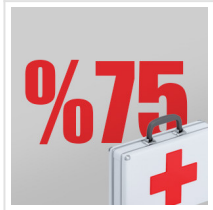


## Silver Nanoparticles in 75% of Nanoproducts in Medicine Industry



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A study on Nanotechnology Products Database (NPD) shows that silver nanoparticles have been used in 75% of products in medicine industry. The statistics imply to the great importance of silver nanoparticles in the production of nanotechnology products in medicine industry.

A number of technologies serve in the field of health and medicine because the market in these fields and the strategic importance of hygiene to the countries persuade the researchers to employ technology development in increase life quality, especially in medicine section. Therefore, nanotechnology products in the field of medicine gathered in Nanotechnology Products Database (NPD) were studied. Results show that wound dressing has the highest number of products in this section with 88 nanotechnology products. The second place belongs to sanitary napkins with 26 while antimicrobial gloves and face masks possess the next ranks by having 17 and 15 products, respectively.

Studies on the nanostructures used in these products show that silver nanoparticles are the most commonly used nanostructures with a great difference with other nanostructures. According to NPD, silver nanoparticles have been used in 238 products while only 6 products contain gold nanoparticles as the second rank.

### **Why are silver nanoparticles so important in nanotechnology products in medicine industry?**

Silver nanoparticles have antibacterial properties and they are able to destroy cellular walls of the bacteria. One of the advantages of silver nanoparticles to antibiotics is that nanoparticles affect bacteria that resist to drugs. Antibacterial properties of silver nanoparticles depend on their size and concentration. In general, higher concentration increases antibacterial properties. Studies show that when silver nanoparticles become small in size, they can destroy bacteria at very lower concentrations. Numerous studies have been

carried out on the effect of nanoparticles morphology on antibacterial properties. An article suggests that nanoplate particles have the highest antibacterial effect and activity.

Although many studies have been carried out on the mechanism of the effects of silver nanoparticles on bacteria, there are still questions in this regard. It has so far been proved that silver nanoparticles can damage cellular walls of bacteria. Changes in bacteria cellular membrane increases the diffusivity of the cells, which finally results in the death of the bacteria. Another mechanism is the creation of free radical formed by silver nanoparticles. The radicals attack the cellular wall. On the other hand, the presence of silver ion in the environment causes interaction between these ions and thiol groups in enzymes and alkaline agents of the bacteria, which results in the death of the cell. The interaction also prevents some cellular activities such as DNA proliferation.

Predictions show that silver nanoparticles will have a market of about \$3 billion in 2024, mostly because of the antibacterial and anti-fungi properties of these particles. It must be pointed out that the applications of these nanoparticles are not limited only to medicine industry, and they have applications in other industries such as textile and packaging.

There are various methods to synthesize silver nanoparticles, among which chemical vapor deposition (CVD), physical vapor deposition (PVD), and vacuum evaporation on running liquids (VERL) are very common at industrial scale. A wide share of these materials market belongs to the [United States](#) and [UK](#), while [South Korea](#) and [China](#) have a developing market in Asia.

**Top companies in the production of these products are as follows**

[NanoHorizons](#), [Emfutur Technologies](#), [Nanoshel](#), [Nanocs](#), [Cima Nanotech](#), [American Elements](#), [Applied Nanotech](#), and [Cline Scientific](#).