

# Antibacterial and Antifungal Effect of Cotton Bandaging Material Modified with Gold Nanoparticles

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The metal vapor synthesis (MVS) has proven its efficiency towards the preparation of mono- and bimetallic organosols and their derived composite materials [1]. Herewith, a series of medical bandaging materials have been prepared via the modification of traditional cotton gauze with gold nanoparticles synthesized by the MVS. The structure of the resultant Au-containing composite materials was elucidated using X-ray and synchrotron techniques, viz., XPS, XRD, EXAFS and SAXS. The presence of gold nanoparticles within the composite materials is unambiguously supported by EXAFS/XANES, XRD (see **Figure 1**) and XPS (the Au 4f<sub>7/2</sub> binding energy is 85.2 eV, which is only by 1.2 eV higher than that of bulk Au due to size effects). According to SAXS, the gold nanoparticles are essentially spherical and characterized by the predominant size of 6 nm, although the size distribution is asymmetric due to a fraction of larger particles with sizes of up to 30 nm.

**Table 1.** Selected results of antimicrobial tests for the Au-modified cotton gauze

Microbial strain	CFU decrease, %
Candida spp. (fungus)	95
Pseudomonas aeruginosa	69
Staphylococcus haemolyticus	67
Moraxella species	58
Escherichia coli	49
Acinetobacter baumannii	45
Klebsiella pneumonia	44
Staphylococcus aureus	29
Proteus mirabilis	25
Salmonella enteritidis	15

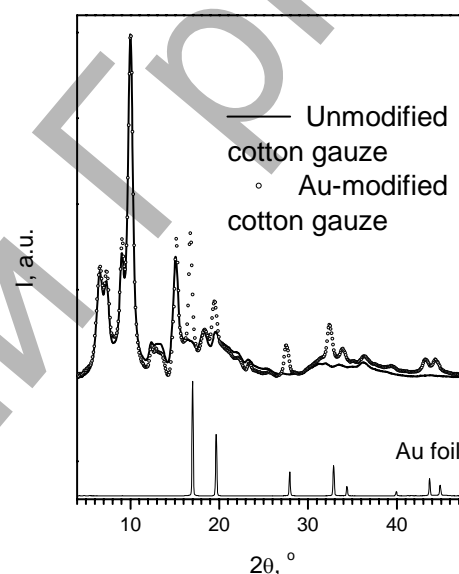
selected results of the tests are summarized in **Table 1** in the form of percent decrease in colony-forming units (CFU) on the Au-modified cotton gauze relative to control counts. The results demonstrate a high potential of the Au-containing composite materials for medical practice [2].

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## References

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[2] Patent BY 6307 U 2010.06.30; patent BY 6950 U 2011.02.28



**Figure 1.** XRD pattern of the composite

The antimicrobial (including both antibacterial and antifungal) activity of the Au-modified cotton gauze composite materials were tested against such pathogens as Salmonella enteritidis, Proteus mirabilis, Pseudomonas aeruginosa, Klebsiella pneumonia, Escherichia coli, Acinetobacter baumannii, Moraxella species, Staphylococcus aureus, Staphylococcus haemolyticus, and fungi genus Candida (Candida spp.). Some