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Short Communication

Anti-bacterial Activity of Metallic Nano Particles

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INTRODUCTION

Recently, metallic nanomaterials have become the most immense and rapid emerging materials of science areas. The increased consciousness of nanomaterial fabrication, especially nanoparticles (NPs), is due to their interesting properties revealed by their size, high surface area, and extraordinary surface activity display outstanding catalytic, electrical, and optical properties. Thus, metallic NPs have taken part in extensive applications of research technique and in advance micro- and nanotechnologies.

They are proved as excellent heterogeneous catalysis, utilized in thin-film fabrication technology, in electronics, and in the production of microelectronic devices.

Wet chemical method for nanoparticle production

The second traditional method is wet chemistry mostly used to fabricate metallic NPs. this method also has the ability to produce NPs of superintended morphology, composition, and crystallinity**.**

Nucleation

The main mechanism of synthesis initiates with the summons of nucleation, in which a new phase particle called "seed" has been produced in a previous system of single phase a consistent solution of salt.

Seeding process

Throughout the reduction process of salt, the metallic atom concentration increases with the decomposition of precursor till a supersaturated state has been attained.

Nanoparticle formation

The nanoparticles are established by the restrained competition of surface energy improvement and a bulk energy diminution.

Antimicrobial tests disclosed that AgNPs had highly bactericidal outcome on the drug-resistant or multidrug-resistant P. aeruginosa with the MIC range of 1.406–5.625 μg/mL and the MBC range of 2.813–5.625 μg/ml. TEM manifested that AgNPs could set foot in the multidrug-resistant bacteria and impair their morphology and structure. The proteomics appraised that, in the AgNP treated bacteria, the levels of SOD, CAT, and POD like alkyl hydroperoxide reductase and organic hydroperoxide resistance protein, were evidently high, as well as the significant overexpression of low oxygen regulatory oxidases, including cbb3-type cytochrome c oxidase subunit P2, N2, and O2. Further results endorsed the over production of ROS. the strong antibacterial action of AgNPs on either gram-positive or gram negative bacteria.

Sondi and SalopekSondi first announced their inspection of AgNPs against Escherichia coli and revealed that formation of "pits" in bacterial cell wall and aggregation of AgNPs in the cellular membrane led to an increased permeability of the cell wall and ultimately the cell death.12 Shameli et al disclosed that AgNPs were able to kill or curb Staphylococcus aureus or Salmonella typhimurium, and their antibacterial presentation strongly relied on the dimension of the particles.

Presently, the most known mechanisms of AgNPs involve AgNPs disrupt the uprightness of the bacterial cell wall and membrane, promoting the permeability of the membrane and the escape of the cell constituents, and eventually induce cell death.

CONCLUSION

Thus, metallic NPs have taken part in extensive applications of research technique and in advance micro- and nanotechnologies. The nanoparticles are established by the restrained competition of surface energy improvement and a bulk energy diminution.

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