

Antimicrobial activity of silver and its compounds

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little or no activity due to relatively small concentration of Ag(I) ion available.

The antimicrobial properties of silver and its compounds, even not known as such, have been utilized since the early Mediterranean cultures. In this work, the antimicrobial properties of silver and its compounds have been investigated. For this purpose, elemental silver and its oxidized forms were used.

In the case of metal, metallurgical, electrodeposited or electroless deposited silver samples were tested. As found in the present work, “nanocrystalline” or “macrocrystalline” elemental silver does not have antimicrobial activity at all. Elemental silver, either “nanocrystalline” or “macrocrystalline” may exhibit some antimicrobial activity only if oxidized silver species are present at these surfaces or within the silver metal.

In the case of silver compounds, the antimicrobial effect was investigated using randomly picked oxides, salts or oxysalts, where silver is in the state Ag(I), Ag(II) or Ag(III). Only oxidized forms of silver i.e. Ag(I), Ag (II) and/or Ag(III) had shown antimicrobial activity against gram positive and gram negative bacteria as well as against fungi. Furthermore, the antimicrobial activity of oxidized silver species was found to strongly depend on the concentration of available silver ions and the solubility product.

For the soluble compounds or those having a high solubility product in spite of their antimicrobial activity, there are different drawbacks related to cytotoxicity, staining, longevity etc. On the other hand, the compounds having relatively low solubility products (less than 10^{-18}) showed