



Research article

Antibacterial effect of photo-activated zinc oxide nanoparticles capped with different polymers

Ola M. El-Borady^{1,2}, Ali Diab¹, Doaa M. Al-Faqih¹, Ahmed F. El-Sayed^{3*}

¹Modern Science and Arts University (MSA), October city, Egypt.

²Institute for Nanoscience and Nanotechnology, Kafrelsheikh University, Egypt.

³Microbial Genetic Department, Genetic Engineering and Biotechnology, National Research Center, Giza, Egypt.

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***Corresponding Author: Ahmed F. El-Sayed,** Microbial Genetic Department, Genetic Engineering and Biotechnology, National Research Center, Giza, Egypt.

Abstract

In this paper, three types of zinc oxide nanoparticles (ZnO NPs) were prepared by a wet chemical method (precipitation method), the first type was ZnO NPs capped with Polyethylene Glycol (ZnONPs@PEG) and other ZnO NPs were capped with Polyvinylpyrrolidone (ZnO NPs@PVP), and the last type of ZnO NPs was provided without polymer. The samples were characterized via X-ray diffraction (XRD). The average crystal size and shape of the prepared ZnO nanopowder were determined by Transmission Electron Microscope (TEM). The antibacterial activity of the three types of ZnO NPs were tested against four types of bacteria that were *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus*. All ZnO NPs were photo-activated under the exposure to UV light at 254 nm before being applied against the four types of bacteria. The antibacterial activity of ZnO NPs was determined based on the appearance of zones of inhibition and the standard deviation was calculated for all appeared inhibition zones. The results obtained from TEM imaging revealed the formation of spherical, rods and nano flowers shapes for uncapped ZnO NPs, ZnONPs@PEG and ZnO NPs@PVP respectively. Also, it was found that the *Bacillus subtilis* inhabited using ZnONPs@PEG more than using the other types of ZnO NP.