



Faculty of Science
Chemistry Department



Green synthesis of silver nanoparticles and its biological applications

Thesis
Submitted for Partial Fulfilment of Master Degree in
Inorganic chemistry

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(B.Sc. Biochemistry/Chemistry, 2005)

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For the degree of M.Sc of science in
Inorganic chemistry

To

Department of Chemistry
Faculty of Science
Ain Shams University
2013



Faculty of Science
Chemistry Department

Approval sheet

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2013



I do appreciate my God for giving me wonderfully parents who are enlightening and always supporting me in all my Life.

I also thank my brothers and friends for listening and for always being there through everything.

I also many thanks to my Prof. Dr. Mostafa Khalil and Khaled Zakaria for continuous encouragement and help.

Doaa mohamed



*First I do thank **Allah** the most merciful for his indefinite blessings who give me the power to go forward in a way illuminated with his merciful guidance.*

*I would like to express my thanks to **Prof. Dr. Mostafa M. H. Khalil**, Professor of Inorganic and Analytical, Faculty of Science, Ain Shams University, for giving me the chance to be one of his students and for his generous advices, valuable discussions, which helped me greatly, and the good proof reading of this thesis. He did not only guide this work and find time to discuss with me but also gave me the confidence to express my ideas freely. I will always remember how his ideas and suggestions always work and how he could simply pick the small mistakes. Actually he was more than a supervisor, he was a teacher who inspired me and pushed me forward.*

*Special thanks to Dr. **Khaled Z. El-Baghdady**, Lecturer of Microbiology, Microbiology Department, Faculty of Science, Ain Shams University for his warm encouragements, supervising the practical work, continuous assistance, guidance, valuable advice during this research work and without which fulfillment of this work would be impossible, for helping and revising the whole manuscript.*

*Many thanks to **Dr. Eman H. Esmail**, Assistant Professor of Inorganic and Analytical, Faculty of Science, Ain Shams University, for her help and supervising the practical work and for her guidance and support in writing the thesis.*

I would also like to thank my Colleagues in the Chemistry Department, Faculty of Science, Ain Shams University for their help.

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Abstract

A facile bottom-up “green” synthetic route using olive leaves, pomegranate peel extracts as reducing and stabilizing agent produced silver nanoparticles in aqueous solution at ambient conditions. This is a simple, cost-effective, stable for long time and reproducible aqueous room temperature synthesis method to obtain a self-assembly of AgNPs. The size and shape of Ag nanoparticles are modulated by varying the ratio of metal salt and extract in the reaction medium. Only one hour were required for conversion to silver nanoparticles at room temperature and suggesting reaction rate higher or comparable to those of nanoparticles synthesis by chemical methods. Variation of pH of the reaction medium gives AgNPs with different sizes. The nanoparticles obtained are characterized by UV-vis, transmission electron microscopy (TEM), x-ray diffraction (XRD), FTIR spectroscopy and thermogravimetric analysis (TGA).

The antimicrobial effects of silver (Ag) ion or salts are well known, but the effects of Ag nanoparticles on microorganisms and antimicrobial mechanism have not been revealed clearly

The antimicrobial activity of Ag nanoparticles was investigated against multi-drug resistant bacteria like *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. In these tests, Muller Hinton agar plates were used and Ag nanoparticles of various concentrations were supplemented in liquid systems. As results *Staphylococcus aureus* were inhibited at the low concentration of Ag nanoparticles, *E. coli* was less sensitive to Ag Nps compared with *S. aureus*.

These results suggest that Ag nanoparticles can be used as effective growth inhibitors in various microorganisms, making them applicable to diverse medical devices and antimicrobial control systems.

Keywords

Green synthesis, Silver nanoparticles AgNPs, olive leaves, pomegranate peel extract.