

Antimicrobial Effect of Chitosan and Multi-walled Carbon Nanotubes

Thesis

Submitted in Partial Fulfillment of the Requirements for the Degree of Master in Science (M. Sc.) in "Microbiology"

By

Nahla Eltohamy Ahmed Ali Khalil B.Sc of Science (Microbiology & Chemistry Department) Ain Shams University (2009)

Under the supervision of

Prof. Saadia Mohamed Easa
Associate Professor of
Microbiology, Faculty of Science,
Ain Shams University

Prof. Magdy Attia Mohamed Professor of Microbiology, National Research Centre

Prof. Wael Sabry Mohamed Associate Professor Polymers Dept., National Research Centre

Department of Microbiology Faculty of Science Ain Shams University 2018



Faculty of Science



Antimicrobial Effect of Chitosan and Multi-walled Carbon Nanotubes

Thesis

Submitted in Partial Fulfillment of the Requirements for the Degree of Master in Science (M. Sc.) in "Microbiology"

By

Nahla Eltohamy Ahmed Ali Khalil B.Sc of Science (Microbiology & Chemistry Department) Ain Shams University (2009)

Department of Microbiology
Faculty of Science
Ain Shams University



Faculty of Science



Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master in Science (M. Sc.) in "Microbiology"

Bv

Nahla Eltohamy Ahmed Ali Khalil

Title: Antimicrobial Effect of Chitosan and Multi-walled Carbon Nanotubes

Supervisors: Approval

(1) Prof. Saadia Mohamed Easa

Associate Professor of Microbiology-Faculty of Science- Ain Shams University

(2) Prof. MagdyAttia Mohamed

Professor of Microbiology - National Research Centre

(3) Prof. Wael Sabry Mohamed

Associate Professor of Polymers - National Research Centre

Examination Committee:

(1) Prof. Ashraf Sabry Abdel Fatah Elsayed

Professor of Microbiology- Botany Department- Faculty of Science- Zakazik University

(2) Prof. Khaled Ibrahim Mostafa Elnagar

Technical Director of the National Institute of Measurement and Calibration and Head of Chemical Measurements Division of the Institute

(3) Prof. Saadia Mohamed Easa

Professor of Microbiology- faculty of Science - Ain Shams University

(4) Prof. Magdy Attia Mohamed

Professor of Microbiology - National Research Centre





Declaration

This thesis has not previously submitted for any other universities.

Nahla Estohamy Ahmed Asi Khasis

Acknowledgments

Acknowledgement

First of all and before anything, my deep thanks for **Allah** for supporting, kindness and success in all fields in my life.

Grateful thanks to **Prof. Saadia Mohamed Easa,** Professor of Microbiology, Microbiology Department, Faculty of Science, Ain Shams University, for her help, Kindness, careful guidance as well as willing cooperation throughout this work.

My great appreciation to **Prof. Magdy Attia Mohamed**, Professor of Microbiology, Agricultural Microbiology Department, National Research Centre for direct supervision, great help for all work, continuous guidance throughout the experimental part, valuable interpretation and discussion of the results obtained, and sponsoring this work.

My deepest thanks to **Prof. Wael Sabry Mohamed,** Associate Professor of Polymers, National Research Centre, for suggesting the research project, teaching and plentiful activates for me to bring this work to its present shape.

My grateful gratitude to **Prof. Hanaa Elsayed Nasr,** Professor of Polymers, National Research Centre, for supporting, sponsoring this work, Kindness as well as her direct and indirect help to perform this work in the perfect manner as could as possible.