



Ain Shams University  
Faculty of Science  
Chemistry Department

# **Development of Chitosan Films Capable of Sustained-Release of Heparin and Their Applications in Biocompatible Sensors**

**A Thesis**

**"Submitted for the degree of master of science as a partial fulfillment for requirements of the master of science"**

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2017



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*Thesis Submitted by*

**Amira Salim Hassaan Afify**

For the Degree of M.Sc. of Science in  
(Analytical Chemistry)

To

Department of Chemistry

Faculty of Science

Ain Shams University

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# *Dedication*

To my first tutor ever, to my beloved father,  
may Allah bless his soul

To my mother for her endless love, guidance,  
support & encouragement, without her I would  
not have been able to finish this work

To my husband for his support and  
encouragement

To my beloved son and my sisters

To my colleagues for their continuous support,  
encouragement, help and inspiration Mohamed,  
Raghda, Heba and Marwa.

## ACKNOWLEDGEMENT

*First and foremost, I would like to thank **Allah** for giving me the opportunity and well-power to accomplish this work*

*I would like to express my sincere gratitude and indebt to **Prof. Dr. Ibrahim H. A. Badr**, Prof. of Analytical Chemistry, Chemistry Department, Faculty of Science, Ain Shams University. my ideal, who has the inspiration for the whole thesis. He is always kind enough to suggest the topics of research and to follow up the progress of the work with keen interest, guidance and whose efforts made this humble work possible. Thanks for bearing up with me all those years.*

*Also, I wish to express my sincere gratitude **Dr. Mohamed Gouda Abd Elhalim**, Prof. of Textile Chemistry and Technology, National Research Center. He always follows up the progress of the work; he was always dedicated to pushing me further, and offering help and advice, thanks for your support.*

*Furthermore, I wish to express my sincere gratitude to **Dr. Abd Elnaby M. Salem**, Lecturer. of inorganic Chemistry, Chemistry Department, Faculty of Science, Ain Shams University, for his efforts during this research work.*

**Amira Salim Hassaan Afify**

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## **List of abbreviations**

<b>IUPAC</b>	International Union of Pure and Applied Chemistry
<b>ISEs</b>	Ion selective electrodes
<b>EMF</b>	Electromotive force
<b><math>K_{ij}^{pot}</math></b>	Selectivity coefficient
<b>CH</b>	Chitosan membrane
<b>THF</b>	Tetrahydrofuran
<b>CPDA-1</b>	Citrate phosphate dextrose adenine
<b>PVC</b>	Polyvinyl chloride
<b>CuONPs</b>	Copper oxide nanoparticles
<b>CH-CuO</b>	Chitosan-CuO nanoparticles membrane
<b>CH-CuO-H</b>	Chitosan-CuO heparin
<b>KTCIPB</b>	Potassium tetrakis(chlorophenyl)borate
<b>TDMAC</b>	Tridodecyl methyl ammonium chloride
<b>DOS</b>	Diethyl sebacate

<b>Tris</b>	Tris (hydroxymethyl) aminomethane
<b>NA</b>	Not applicable.
<b>SD</b>	Standard deviation
<b>SEM</b>	Scanning electron microscopy
<b>TEM</b>	Transmission electron microscopy
<b>PRP</b>	Platelet-rich plasma
<b>PBS</b>	Phosphate-buffered saline
<b>NPOE</b>	o-nitrophenyl octyl ether
<b>CTA</b>	Cellulose triacetate