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AL-Azhar University
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Preparation of Silver Nanoparticles by Different Chemical Methods

A THESIS

Submitted For the Fulfillment of Master Science Degree in Physical Chemistry

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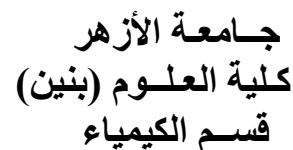
Al-Azhar University

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Chemistry Department,

Cairo/2013



مقدمه من

بكالوريوس علوم قسم كيمياء (2006)
كلية العلوم – جامعة الأزهر (فرع أسيوط)

11

قسم الكيمياء - كلية العلوم - جامعة الأزهر
للحصول على درجة الماجستير فى العلوم
(الكيمياء الفيزيائية)

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١٠٠. السيد علي عبدالعال

رئيس شعبة تكنولوجيا
مركز بحوث وتطوير الفلزات

أستاذ الكيمياء غير العضوية
كلية العلوم – جامعة الأزهر

أستاذ الكيمياء الفيزيائي
كلية العلوم – جامعة الأزهر

قسم الكيمياء – كلية العلوم – جامعة الأزهر
2013

بسم الله الرحمن الرحيم



" صدق الله العظيم "

(سورة طه : د 114)

Dedication

To My Parents

To My Wife

To My Son

To My Uncles

To My Brothers

To My All Family

Ch. Bassam KHalaf Damrany

ACKNOWLEDGEMENT

“I do thank ALLAH for all gifts He gave me”

I would, however, like to take this opportunity to acknowledge gratefully my personal debt to Prof. Dr. Ali Mustafa Ali Hassan, professor of inorganic chemistry, faculty of science, Al-Azhar University, and to Prof. Dr. El-Syed Ali Abdel-Aal, Head of Minerals processing and Technology Department, Central Metallurgical Research & Development Institute for suggesting, supervising the problem, helpful guiding and concrete discussion of this work. Their deep insight, inextinguishable, fatherly patience and wisdom on both the professional and personal levels as a constant source of inspiration.

My deepest thanks and appreciation are also due to Prof. Dr. Mostafa Farag Bakr professor of physical chemistry, faculty of science, Al-Azhar University for his guidance, valuable advice and continuous supervision.

I wish to express thanks to Dr. Youssif H.A. Ebead, May Allah mercy him, Associate professor of physical and inorganic chemistry, faculty of science at Qena, South Valley University.

This experimental work was carried out in Central Metallurgical Research & Development Institute (CMRDI), El –Tabeen, Cairo, Egypt; thanks are due to all staff and administration in the institute.

Acknowledgement

It is also my pleasure to thank my family for their tolerance, support and encouragement.

Finally, Thanks are also extended to all the staff and colleagues in the chemistry department, faculty of science, Al-Azhar University.

Aim of work

Silver nanoparticles can be produced by various methods including the chemical reduction of silver ions with or without stabilizing agents, hydrothermal methods in organic solvents, and microwave irradiation in reverse micelles. Using these methods, silver nanoparticles with spherical, octahedral, tetrahedral, hexagonal, cubic, wire, coaxial cable, triangular prism, disc, triangular, and shell shapes have been manufactured. All these advances have promoted the scientific knowledge on the nature of nanomaterials. Consequently, the aim of this thesis is to prepare silver nanoparticles using three different techniques (chemical reduction, hydrothermal and microwave irradiation). The experimental conditions such as initial concentrations of silver nitrate, pH of medium, reaction temperature, reaction time, addition of the surfactant and reducing agent are thoroughly studied. Another important objective goal of this study is to control the size, morphology, shape, and stability, color, and physiochemical properties of the produced silver nanoparticles by controlling the synthesis conditions.

List of Abbreviations

Silver Nanoparticles	SNPs
X- Ray Diffraction	XRD
Transmission Electron Microscopy	TEM
Scanning Electron Microscopy	SEM
Cetyltrimethyl Ammonium Bromide	CTAB
Cetyltrimethyl Ammonium Chloride	CTAC
Dodecyltrimethyl Ammonium Bromide	DTAB
Linear PolyethylenImine	LPEI
Sodium Dodecyl Sulphate	SDS
Hexadecyl Pyridinium Chloride	HPC
Polyethylenglycol	PEG
Isoelectric Point	IEP
Surface Plasmon Resonance	SPR

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