



Ain Shams University
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Cairo- Egypt

***Nanomaterials – based impedimetric sensor for
biological and environmental applications***

Thesis Submitted in Partial Fulfillment of The Requirements of
The Degree of Philosophy Doctor of Sciences in Chemistry

(Inorganic and Analytical Chemistry)

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Aim of the Work

An impedimetric sensor based on nanomaterials modification for biological, environmental and industrial applications. A new electrochemical impedance spectroscopy technique used due to its very high sensitivity and wide applications in the recent decades due to the capacity to elucidate the electronic and physical properties of the electrochemical system such as charge transfer resistances, capacitances, diffusion coefficients, pore sizes and diffusion coefficient .

SUMMERY

The thesis deals with a new technique method which named electrochemical impedance spectroscopy. Fabrication of impedimetric sensor based on nanomaterials modification. The investigation of their characteristic performance and evaluation of their biological, industrial and environmental matrices applications have been extensively considered. The thesis contains five chapters.

Chapter (I)

Deals with an introduction that is performing a precise literature survey focusing on the electro-chemical detection technique especially electrochemical impedance technique, preparation of nanomaterials (such as gold nanoparticles and graphene nanosheets) and self assembled monolayer method covering the last two decades. The characterization of impedimetric sensor and their application in biological, pharmaceutical, industrial and environmental matrices have been thoroughly surveyed.

Chapter (II)

Sensitive and selective impedimetric sensor for Cr (III) based on newly synthesized ionophore (N', N'''E, N', N'''E)- N', N''' – (((ethane- 1, 2 – diylbis (oxy)) bis (2,1 – phenylene)) bis (methanylylidene)) bis (3-methylbenzofuran- 2 – carbohydrazide) in AuNPs/graphene oxide(GO)/graphite (Gt) paste electrode has been developed. Physical and chemical characterization of the paste electrode using UV-Vis, FTIR, TEM,