



# **Synthesis and Characterization of some Novel Bio-nanocomposites by Gamma Irradiation and their Potential Applications**

*A Thesis Submitted By*

**Amr Mohamed Said Emara**

*M. Sc. of Science (Chemistry), 2015*

*Assistant Lecturer at Nuclear Chemistry Department*

*Hot Laboratories Center*

*Atomic Energy Authority*

**For the Degree of Doctor of Philosophy of Science  
(Chemistry)**

**To  
Chemistry Department  
Faculty of Science  
Ain Shams University**

**2019**





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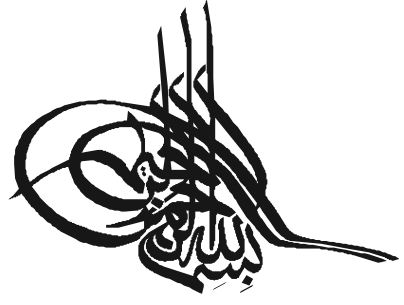
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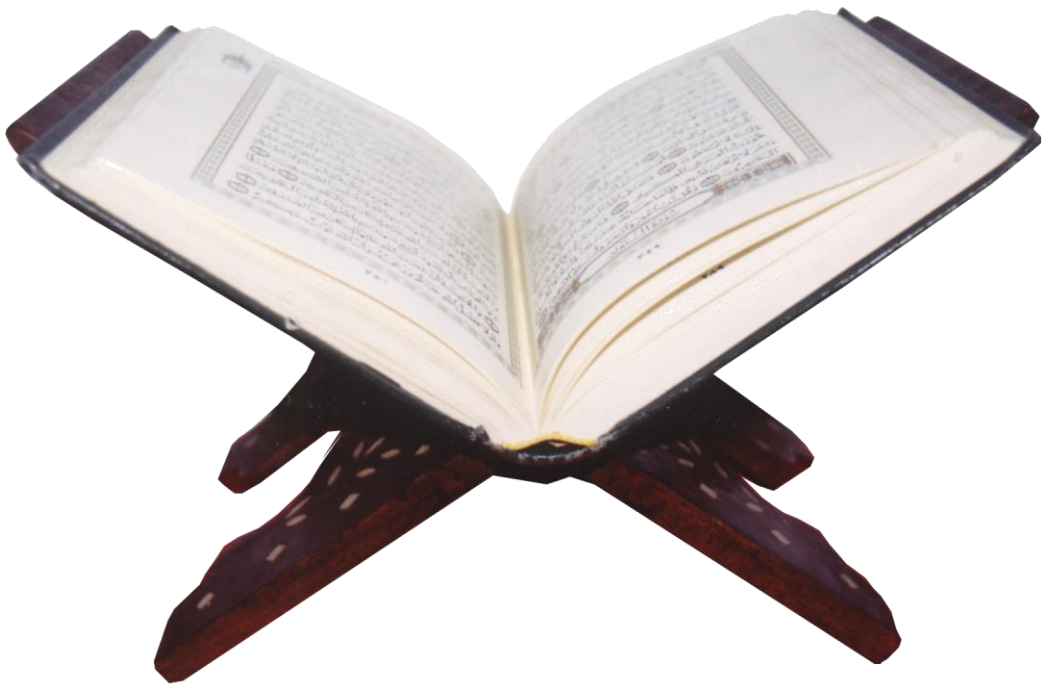




وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ

وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا ﴿١١٣﴾

سورة النساء





**Approval Sheet for Submission of Ph. D. Thesis**  
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*Amr Emara*





# Dedicated to

*My father's angelic spirit,  
My fabulous mother,*

*My better half "my wife",  
My daughters (Rand & Roaa)*

*My brother, my sisters,*

*And, the rest of my family*



# **List of Abbreviations**