

Ain Shams University
Faculty of Science
Chemistry Department



Preparation, Characterization and Applications of Activated Carbon Adsorbents obtained from Different Agricultural Waste Materials

A Thesis

Submitted to Chemistry Department – Faculty of Science –
Ain Shams University in Partial Fulfillment for Requirements
of the Master Degree of Science (M.Sc) in Chemistry

By

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B.Sc. in Applied Chemistry, Faculty of Science
Ain Shams University
2008

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2012



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Granting Year:

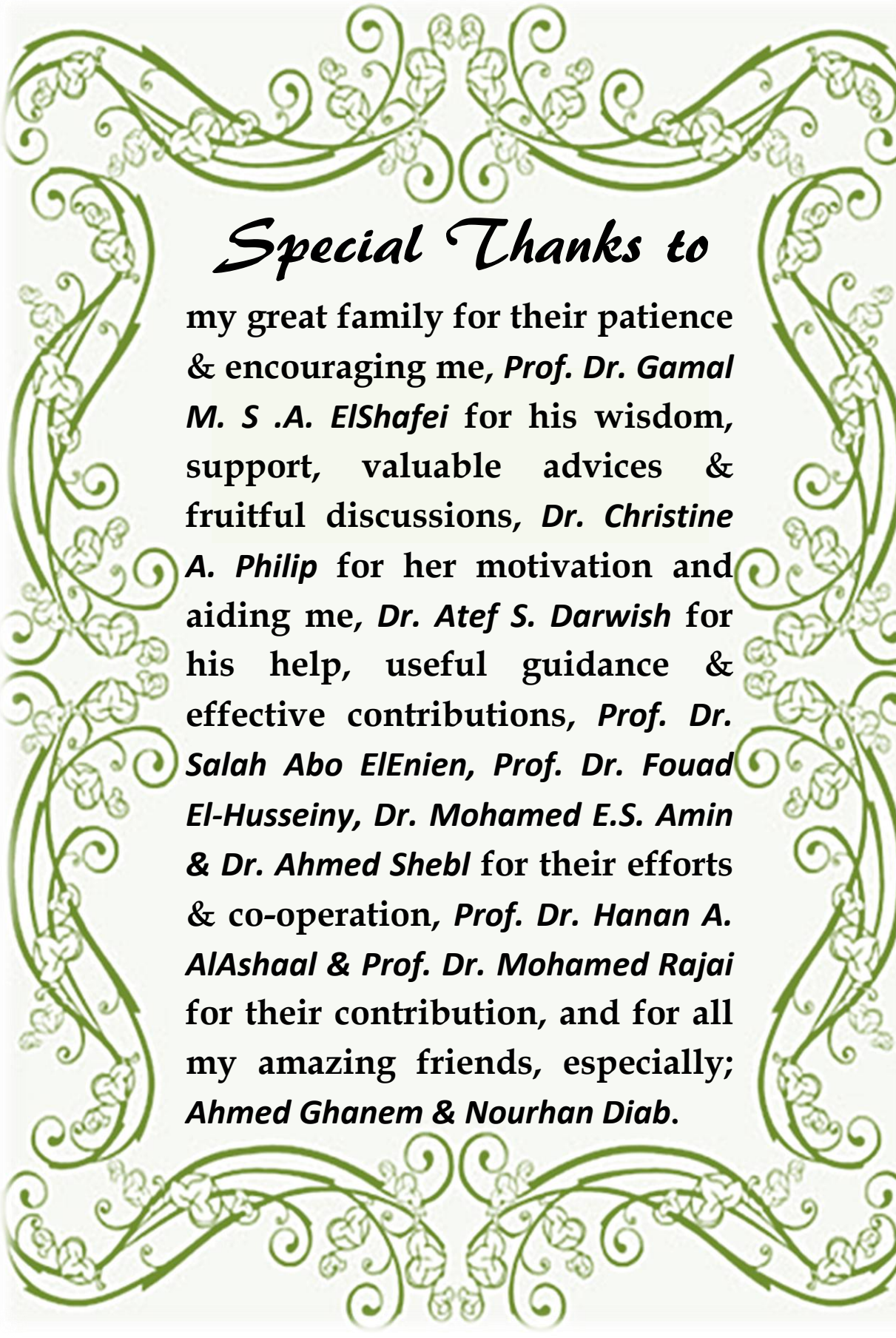
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة – الآية (٣٢)



Special Thanks to

my great family for their patience & encouraging me, *Prof. Dr. Gamal M. S .A. ElShafei* for his wisdom, support, valuable advices & fruitful discussions, *Dr. Christine A. Philip* for her motivation and aiding me, *Dr. Atef S. Darwish* for his help, useful guidance & effective contributions, *Prof. Dr. Salah Abo ElEnien*, *Prof. Dr. Fouad El-Husseiny*, *Dr. Mohamed E.S. Amin* & *Dr. Ahmed Shebl* for their efforts & co-operation, *Prof. Dr. Hanan A. AlAshaal* & *Prof. Dr. Mohamed Rajai* for their contribution, and for all my amazing friends, especially; *Ahmed Ghanem & Nourhan Diab.*

Abstract

In the present study, new activated carbon (AC) materials were prepared from *Egyptian-type* agricultural waste materials; artichoke and *Vicia faba* peels, plus silkworm feces, via pure chemical activation method. In addition to the regular dehydrating agents (KOH, ZnCl₂, H₃PO₄), new activating agents were tested for the first time ever through the preparation method; including KCl, CrCl₃, and TiCl₄. The prepared AC materials were subjected to a complete characterization scheme in order to investigate the chemical structural, textural and morphological characteristics; using FT-IR, Boehm titrations, Point of zero charge, XRD, N₂ physisorption, Iodine number, and HR-SEM. Moreover, the results were compared and correlated with the previously proposed activation mechanisms. Then, AC materials were examined towards different applications; adsorption of methylene blue, lead, and cadmium from their aqueous solutions, hydrogen storage, and antimicrobial activity of silver supported ACs against *Staphylococcus aureus*, *Escherichia Coli* and *Pseudomonas aeruginosa*. Furthermore, the results of selected adsorption systems were correlated with different adsorption isotherm and kinetic models to study the mechanism of the adsorption process, and thermodynamic parameters were also computed.

Keywords:

Activated carbon, Artichoke, *Vicia faba*, Silkworm feces, Adsorption, and Hydrogen storage

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