شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

SYNTHESIS OF GRAPHEME-HYDROXYAPATITE NANOCOMPOSITE FOR THE REMOVAL OF HEAVY METALS FROM WASTEWATERS

Submitted By

Osama Hassan Radwan Abdelbar

B.Sc. of Science (Chemistry/Zoology),Faculty of Science,

El-Menofia University, 2004

A Thesis Submitted in Partial Fulfillment
Of
The Requirement for the Master Degree
In
Environmental Sciences

Department of Environmental Basic Sciences
Institute of Environmental Studies and Research
Ain Shams University

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APPROVAL SHEET

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2021

بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا إلا ما علمتنا إنك أنت العليم الحكيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

ACKNOWLEDGMENTS

All gratitude is *due to ALLAH for His continuous support all over our life.*

Then, I would like to express my great appreciation and dedicated this work to ***Prof. D. Ashraf Abdel-Aaty Mohamed*** *for his kind supervision and advice to accomplish this work.*

I would like to express my deepest sense of gratitude to my supervisor

Prof. Dr Mohamed Abdel-Hay Ahmed*, who has readily guided and helped me in planning.*

I do highly appreciate the help of all the members of the institute of environmental studies and research and all my teachers for their kindness, great help and technical support.

I am very grateful and I can't express my deep gratitude to all of my family especially my wife for their encouragement and help throughought this work.

Cairo, Egypt2021

ABSTRACT

Heavy metal pollution is a serious environmental problem that can be cured by different adsorbents. Herein, a new hydroxyapatite / graphene oxide nanocomposite (HAp/GO) material was synthesized from waste eggshell as a green and eco-friendly adsorbent for the effective removal of heavy metals (e.g., Cd, Pb, Cr, Ni, Co) from wastewaters. Nano-structured HAp was synthesized by calcination of waste eggshell followed by hydrothermal treatment in the presence of phosphate solution. However, GO was synthesized using the Hummar's method. The HAp/GO nanocomposite was synthesized from the HAp and GO precursors by ultrasonic treatment. The morphology, composition, crystal structure, functionality and stability of the synthesized sorbent were evaluated using Fourier transform infrared spectrophotometry (FTIR), Raman spectrometry, high resolution transmission electron microscopy (HR-TEM), scanning electron microscopy (SEM), energy dispersive X-ray (EDX), X-ray diffraction (XRD) and N_2-BET (Barrett–Emmett–Teller) surface area measurement techniques. Inductively Coupled Plasma Mass Spectroscopy (ICP-MS) was used to monitor the equilibrium concentrations of the investigated metal ions. The effects of the initial concentration of heavy metals, the dosage of HAp/GO adsorbent, working temperature, and the solution pH on the adsorption capacity was investigated. The synthesized HAp/GO was adopted to achieve superior simultaneous removal efficiencies (≥ 90 %) for (Cd, Pb, Cr, Ni, Co) metal ions in a given polluted sample

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