



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكرو فيلم

# بسم الله الرحمن الرحيم



**HANAA ALY**



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التوثيق الإلكتروني والميكروفيلم



# شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



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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**



# **CHARACTERIZATION OF ALUMINUM NICKEL COMPOSITE REINFORCED BY GRAPHENE AND SILICON CARBIDE**

**By  
Aya Ahmed Ibrahim Mohamed**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**MASTER OF SCIENCE**  
in  
**Mechanical Design and Production Engineering**

FACULTY OF ENGINEERING, CAIRO UNIVERSITY  
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**Title of Thesis:**

Characterization of Aluminum Nickel Composite reinforced by Graphene and Silicon Carbide

**Key Words:**

Al/Ni/SiC/GNPs, powder metallurgy, Hardness, Wear, compression.

**Summary**

This study presents Al-Ni composite reinforced by GNPs and SiC with different volume fraction by powder metallurgy technique. Besides, the obtained composites were investigated with different tests such as microstructure, relative density, hardness, wear, compression, and coefficient of thermal expansion tests. The results showed that by addition of SiC and increasing its percentage, the physical and mechanical properties are increased by increasing SiC up to 15 wt% then deceased. Also XRD showed the formation of new phases formed  $\text{Al}_3\text{Ni}$ ,  $\text{Ni}_3\text{C}$ .

## **Disclaimer**

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Aya Ahmed Ibrahim

Date: .. /.. / 2020

Signature:

## DEDICATION

THIS THESIS IS DEDICATED  
WITH LOVE AND AFFECTION  
TO MY PARENTS AND MY HUSBAND

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Aya Ahmed Ibrahim

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