



Cairo University

# **NICKEL AND COBALT POROUS ACTIVE FILMS FOR HYDROGEN PRODUCTION**

By

**Aliaa Abdel-Fatah Mohamed Mohamed**

A Thesis Submitted to the  
Faculty of Engineering at Cairo University  
in Partial Fulfillment of the  
Requirements for the Degree of  
**DOCTOR OF PHILOSOPHY**  
in  
**Metallurgical Engineering**

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

NICKEL AND COBALT POROUS ACTIVE FILMS FOR  
HYDROGEN PRODUCTION

**Key Words:**

Electrodeposition, Metal foams, Dynamic hydrogen template (DHT), Ni-Co coatings, water splitting, Hydrogen evolution overpotential HER.

**Summary:**

Electrocatalytic porous films were developed by electrodeposition of Ni and Ni-Co alloy on a 301 stainless steel foil. Material characterization by EDX confirmed deposition of Ni, Ni-Co alloy on the steel substrate. The deposited layer presents a foam-like morphology with circular pores, whose walls present an open dendritic structure. Electrode within small pore size (1.7  $\mu\text{m}$ ), manifests the highest electrocatalytic activity for HER.



## 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.

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