



Cairo University

# **THE ROLE OF NANOTECHNOLOGY IN SUSTAINABLE ARCHITECTURE**

## **CASE STUDY: IMPACT OF GLASS TREATED NANOTECHNOLOGY IN ENERGY EFFICIENCY FOR OFFICE BUILDINGS IN NEW CAPITAL**

By

**Shimaa Abd Elhakim Mohamed Sayed**

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  
**ARCHITECTURAL ENGINEERING**

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**Title of Thesis:**

The role of Nanotechnology in Sustainable Architecture  
Case study: Impact of Glass Treated Nanotechnology in Energy Efficiency for Office  
Buildings in New Capital

**Key Words:**

Nanotechnology; Architectural Sustainability; Nanomaterials for glass; Energy  
Efficiency; Thermal Comfort

**Summary:**

Nanomaterials are one of the most important technologies to improve the built environment. This study examines the impact of nanotechnology in future architecture, clarifying the applications of nanotechnology in glass especially. We also discuss using glass treated nanotechnology with different WWR for facades with four office building archetype models in new capital to improve energy efficiency by using Design Builder program. The results showed how the glass can comply with the requirements of the Egyptian energy code. The results also indicate that the use of glass treated nanotechnology reduce energy consumption by 17% and 12% if used with the highest energy consumption façade but if used in all facades except the north, the ratio is 31% and 24% compared to single glass 6mm and double glass 6mm-12Air respectively.

# **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: Shimaa Abd Elhakim Mohamed

Date:

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## **Dedication**

To the most loving and caring parents,

**Abd Elhakim M. Sayed and Aml Al Syafi**

To my beloved husband,

**Mahmoud Amer Mahmoud**

Thank you all for giving me the tools to be successful in my life  
and the motivation to use them.

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