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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Under the Supervision of

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FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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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; Nanomatrials 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:

Signature:

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.

ACKNOWLEDGEMENTS

This research project would not have been possible without the support of many people. I wish to submit this research to my supervisor, Prof. Dr. Hesham Sameh Hussein Professor of architecture, Faculty of Engineering, Cairo University, for his incessant encouragement, valuable advice, continuing supervision and endless support throughout his work.

Grateful acknowledgment and sincerest thanks and gratitude are due to Dr. Wael Salah Eldin Bahlol Associate Professor, Faculty of Engineering, Misr University for Science & Technology, for his sincere support, valuable guidance, fruitful positive discussions, and comments throughout the course of this study.

Finally, special appreciation and sincere deep gratitude are due to my beloved son, our brothers, sisters, relatives, and mentor who shared their encouragement to finish this study. The author can't forget the support and encouragement he received from my friends and colleagues.

Table of Contents

CHAPTER 2 : SUSTAINABILITY AND GREEN ARCHITECTURE

CHAPTER 3 : NANOTECHNOLOGY AND GLASS IN ARCHITECTURE

CHAPTER 4 : IMPACT OF GLASS TREATED NANOTECHNOLOGY IN ENERGY EFFICIENCY FOR FACADES OF FOUR OFFICE BUILDING ARCHETYPE MODELS

CHAPTER 5 : CONCLUSIONS AND RECOMMENDATIONS

List of Tables

List of Figures