Ain Shams University
Faculty of Engineering
Architectural Department

Impact of Nanotechnology on Building Technology

A Thesis
Submitted to the Faculty of Engineering of Ain Shams University
for the Partial Fulfillment of the Requirements for the Degree of
MASTER OF SCIENCE IN ARCHITECTURE

By
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Ain Shams University, Faculty of Engineering,
Department of Architecture,
2011.

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Statement

This thesis is submitted to Ain Shams University in Cairo, Egypt for "**The Degree of Master in Science in Architecture**".

The work included in this thesis was accomplished by the author at the department of Architecture, Faculty of Engineering, Ain Shams University, during the period from 2005 until 2011.

No part of this thesis has been submitted for a degree or a qualification at any other University of Institute.

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"These are Interesting Times we are living in..."

Dedication

I hereby dedicate this humble piece of work to all the people God assigned to shape my Spirit, Mind, and Heart.

To my forever Respected and Loved Parents, my resilient adoring Wife, and my dear Grandfather; Yousef Sabry Abu-Taleb, may we be rejoined again.

Abstract

Nanotechnology is a developing technology, and due to its nature of scale it has an impact on nearly every aspect of life.

Accordingly this research studies the impact of the applications made possible by Nanotechnology on our current building technology.

It studies first the history of building technology, and then Nanotechnology with its different fields and applications, as to be able to understand thoroughly the impact it currently has on building technology, by classifying it into the different fields where it has an effects.

Also the thesis extrapolates into the future of Architecture with its short and long term as to be able to foresee how it will be in the upcoming technological era.

Summary

The thesis is structured on the premise that Architecture and its building technology have always been influenced by the technology of its period, and sometimes respecting the available technology more than its surrounding environment.

Therefore, and where that Nanotechnology is one of the cutting edge technologies in the present and due to its nature of scale, the thesis assumes that Nanotechnology currently has an impact on building technology in the form of advanced applications.

Accordingly the thesis starts in its First Chapter to research the history and relationship between technological developments and building technology, and so to reach an understanding and deeper appreciation of the current impact of Nanotechnology on building technology and how it provided applications that other technologies failed to achieve. These developments were classified into:(Technologies responsible for the production of building materials - Technologies responsible for the production of building Systems)

Chapter Two studies the foundations of the science behind Nanotechnology through understanding its definitions, meanings, and scientific terms associated with them, and summarize its history. Also it looks at the current research ongoing in Nanotechnology, and its scientific principles. Then the chapter classifies the risks of Nanotechnology, and monitoring some methods of avoidance.

Chapter Three completes the understanding of nanotechnology, but through the study of its general application that are not related to building technology, and they are as shown in the following categories: (Leisure - Lighting Technology - Air and space exploration - Automotive - Information Technology - Food and Agriculture - paper – Environmental technology - Textiles - Energy - Health)

Chapter Three also applications for some of the important experiments and derived from nanoscience are: (Quantum Dots - Carbon Nanotube - Graphene)

In Chapter Four and in the light of what has been studied in the first three chapters, analyses many of the various applications currently offered by nanotechnology in building technology, such as self cleaning, fire proofing, air purifying treatments and others. Which were classified as follows:

(Structures construction - fire proofing - Aesthetics - Climatic Control)

Chapter Five carries out an extrapolation into the future of how the impact of nanotechnology on the near and distant future of building technology, will eventually change Architecture, and specifically in the following areas: (Environmental solutions - developed nano-materials - Structural - aesthetics - Colonization of the Earth and other planets)

In Conclusion the thesis summarizes the result of research in nanotechnology with the provision of several recommendations made on an international and national levels, together with the aspects of research that could be opened for the researcher.

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To my Wife who has been my pusher, puller, and wheel turner, every time the world took its toll on me…..

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Ramy Bakir