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A Modern Model for Sustainable Architecture with uses Nanotechnology

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Abstract
The 21st century Nanotechnology has the potential to make a huge impact on sustainability; but to achieve this potential, Nanotechnology is all about getting more function on less space. In other hand, Nanotechnology is one of the most extremely important components in sustainable development. It has the potential to reduce the environmental impact and energy intensity of structures, as well as improve safety and decrease costs associated with civil infrastructure. So, nanotechnology it can one of the most extremely important component for sustainable architecture. In this research we would like to answer below questions: Can nanotechnology be developed in a sustainable manner? How nanotechnology be developed in a sustainable manner? In this Paper, first we brief describe about sustainable architecture and nanotechnology, then we shows nanotechnology it can achieving the goals of sustainable architecture. We propose a new strategy of nanotechnology to achieve sustainable development. Finally, we present a new model for nanotechnology to achieve sustainable development. This work, presents the theory of analytical methods and the analytical approach has explanatory.

Key Words: *Architecture, Nanotechnology, Sustainable Architecture,Environmental Health, Renewable Energy.*

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1.Introduction

Nanoarchitecture as the new contemporary architectural style of the 21st century that will revolutionize the architecture world in every way either the way architects think or how they inspire their ideas, the used materials in building, finishing materials, or the way we demonstrate to the world and building users. "Nanotechnology is one of the most prominent emerging technologies. It is heralded as a key technology for the 21st century that will contribute to economic prosperity and sustainable development by a broad alliance of policy-makers, scientists and industry representatives. But despite these strong claims, it remains still under question, whether nanotechnology can be made sustainable and how its potential can be assessed and realized" [Fleischer, Grunwald, 2008].

Nanotechnology and sustainable architecture are important concepts. Because of its applications in different fields, such as environment and energy as well as in the sustainable development. Nowadays, our main energy sources for human activity are fossil and mineral fuels, nuclear and hidroelectric sources. They are very harmful to environment because they cause global warning, ozone layer depletion, biosphere and geosphere destruction, and ecological devastation. Consequently, the actual energy production can be considered a harmful industry both in terms of pollution production and environmental impact since the industrial revolution in the 18th century (Bernow et al., 1995).

Visionary scenarios, particularly those that drive the development of new products by manufacturers, typically have an outlook of 15 to 20 years. Given the longevity of building constructions and the liability period of the architects, this outlook is comparatively short in 15 years most architects will still be liable for buildings planned today. As such the use of nanosurfaces and nanomaterials in construction requires openness towards innovation and willingness to employ new and forward-looking technologies, not only from the architect but also the client. The association of sustainability with architecture only began after the publication, in 1987, of Our Common Future, the report of the Brundtland Commission (Formally known as the World Commission on Environment and Development (WCED), the Brundtland Commission's mission is to unite countries to pursue sustainable development together). Brundtland's Commission placed sustainability at the intersection of social, economic, and environmental factors (See Fig. 1).

Just over fifty years ago the concept of 'sustainable architecture' would have been inconceivable [Hawkes, 2014]. The issues were simply absent from the agenda. Indeed at that time we stood on the threshold of the period when the most resource-consuming structures in the entire history of building were about to be constructed. Across the globe buildings that were reliant on energy-hungry mechanical systems within sealed envelopes, with permanent artificial lighting and air-conditioning, began to replace the historic dominance of daylight and natural ventilation as the essential mode of environmental provision. The same period, however, saw the modest beginnings of a counter-view of the environmental nature of architecture. In this the emphasis was upon establishing a more deliberate link between buildings and the ambient environment. Such design is known as 'low-energy', 'passive solar', 'energy-conscious', 'green', among other titles, and, as the movement has grown, a substantial body of significant works now exist designed by a growing band of important architects. There is also a substantial body of related design theory and literature.

The growth of what we may, in the present context, describe as 'unsustainable' architecture began, at the end of the 18th century, with the industrial revolution, as more and more new technologies were incorporated into the fabric of buildings. Buildings for all purposes, residential, industrial and institutional

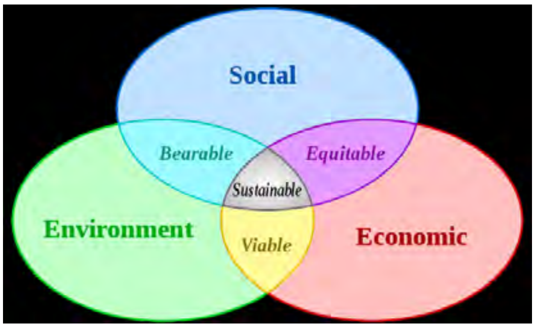
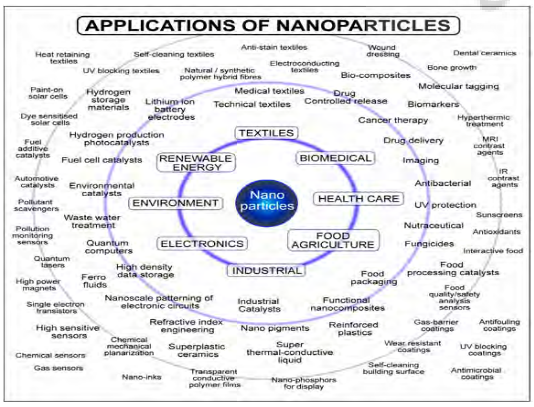


Fig 1. The 3 pillars of sustainability (Brundtland 1987)

came increasingly to adopt mechanical systems of heating, ventilation and illumination in the quest to adopt the latest technologies in the service of their inhabitants. The subsequent history of this kind of architecture correlates quite precisely with the historical increase in global consumption of fossil fuels and its inevitable complement of the growth of greenhouse gas emissions. Before these developments all architecture, whether noble or humble, was sustainable. From antiquity most buildings employed the properties of material and form to make appropriate adaptations to the relationships between their uses and the climates in which they were set. Their design was based on sophisticated empirical understanding of quite complex physical processes and relationships. From an early date these relationships were often codified in texts and treatises. The evidence of the many historic buildings that survive to the present day significantly complements all of this 'theory'. In a broad definition all of these buildings are sustainable. Therefore, in conclusion, we may suggest that the history of sustainable architecture is, in reality, a history of architecture since its modern origins two millennia ago. We now have a body of theory and practice accumulated in the last half century that provides a substantial source for contemporary design. But that short history should be underpinned by awareness of the longer history. There are many lessons for new design that may be learned from the 'sustainable' buildings that pre-date the industrial revolution. Recent scholarship in environmental history is making these more available. We should, in addition, not disregard the achievements of those architects and their colleagues in engineering, who fashioned the important buildings of the 19th and early 20th centuries, even when we may now interpret these as 'unsustainable' in our modern meaning of the term (Hawkes, 2014).

Every human being needs food, water, energy, shelter, clothing, healthcare, employment, etc., to live and prosper on Earth. One of the greatest challenges facing the world in the 21st century is providing better living conditions to people while minimizing the impact of human activities on Earth's ecosystems and global environment (Diallo, Brinker: 157).

In 2000, the nanotechnology research agenda was primarily focused on the discovery, characterization, and modeling of nanoscale ma-



Diag 1. Application of nanitechnology; sources: url 1.

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terials and phenomena. As nanotechnology continues to advance, the agenda is increasingly focused on addressing two key questions related to sustainability over the next 10 years (Diallo, Brinker: 157, 158):

1. How can nanotechnology help address the challenges of improving global sustainability?
2. Can nanotechnology be developed in a sustainable manner?

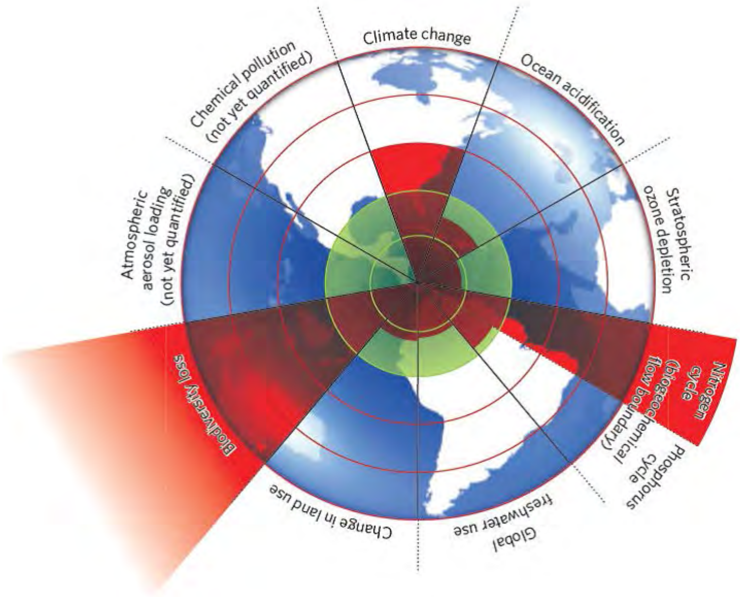
Soon after the inception of the National Nanotechnology Initiative (NNI), it was envisioned that nanotechnology could provide more sustainable solutions to the global challenges related to providing and protecting water, energy, food and shelter habitat, mineral resources, clean environment, climate, and biodiversity. Indeed, sustainability has been a goal of the NNI from the outset: "Maintenance of industrial sustainability by significant reductions in materials and energy use, reduced sources of pollution, increased opportunities for recycling" was listed as an important goal of the NNI in the 1999 Nanotechnology Research Directions Report (Roco, Williams, and Alivisatos 1999). Also, in a subsequent address at the Cornell Nanofabrication Center on September 15, 2000, Mike Roco (2001) of the National Science Foundation (then co-chair of the Nanoscale Science and Technology Subcommittee of the National Science and Technology Council's Committee on Technology), discussed how nanotechnology could improve agricultural yields for an increased population, provide more cost-efficient and cost-effective water treatment and desalination technologies, and enable the development of renewable energy sources, including highly efficient solar energy conversion systems. Continuing in that vein, he has also noted that nanotechnology promises to "extend the limits of sustainable development… For example, nanoscale manufacturing will provide the means for sustainable development: less materials, less water, less energy, and less manufacturing waste for manufacturing, and new methods to convert energy and filter water …" (Roco 2003, pp. 181, 185).

Although Earth has experienced many cycles of significant environmental change, during which civilizations have arisen, developed, and thrived, the planet's environment has been stable during the past 10,000 years (Rockström et al. 2009). This stability is now threatened as the world's population will reach about 7.0 billion in 2012 (U. S. Census Bureau, 2010), and industrial output per capita continues to increase around the world.

Rockström and colleagues (2009) suggested planetary boundaries in nine areas underlying global sustainability: climate change, rate of biodiversity loss (terrestrial and marine), interference with the nitrogen and phosphorus cycles, stratospheric ozone depletion, ocean acidification, global freshwater use, change in land use, chemical pollution, and atmospheric aerosol loading (See Fig. 2).

Serrano et al. (Serrano, Rus, Garcia-Martinez, 2009) described Sustainable energy production, transformation and use are very much needed to maintain the readily and cheap access to energy to the growing and increasingly demanding world population while minimizing the impact on the environment. The novel multifunctional materials produced from the broad and multidisciplinary field that is nowadays called nanotechnology are critical to overcome some of the technological limitations of the various alternatives to the non-renewable energies. In 2013, Daryoush et al. (Daryoush and Darvish, 2013) Study and Review of Nanotechnology and Nanomaterials in Green Architecture. This study sought to study and investigate the application of nanomaterials in reduced energy consumption, which is one of the objectives of green architecture, economically and practically by introducing the nanomaterials and their application in the green architecture.

Federico Leone in 2015, explored the recent innovations in architecture materials developed through nanotechnology, based on



▲ Fig 2. Planetary boundaries: "The inner (green) shaded nonagon represents the safe operating space with proposed boundary levels at its outer contour. [Rockström et al. 2009].

▲ Fig 3. Uses of Nanotechnology in architecture; url 1.

the design of material properties in order to obtain specific performances. In particular, nanostructured cementitious materials, represent an interesting application of nanotechnology in the construction industry, considering the significant performance advantages compared to conventional products and the potential in reduction of resources and energy consumption throughout the life cycle connected to their use [Federico Leone 2015].

The architectural disciplines must then be able to support and guide the innovations produced in the field of nanotechnology, understanding the complexity of these processes in order to provide a cultural and technical support that may lead to a gradual diffusion of nanotechnology in construction, minimizing the possible risk factors and maximizing the benefits achieved through their conscious application in the field of the materials and the design of the architecture [Federico Leone 2015].

In this Paper, first we brief describe about sustainable architecture and nanotechnology, then we shows nanotechnology it can achieving the goals of sustainable architecture. We propose a new strategy of nanotechnology to achieve sustainable development. Finally, we present a new model for nanotechnology to achieve sustainable development. This work,

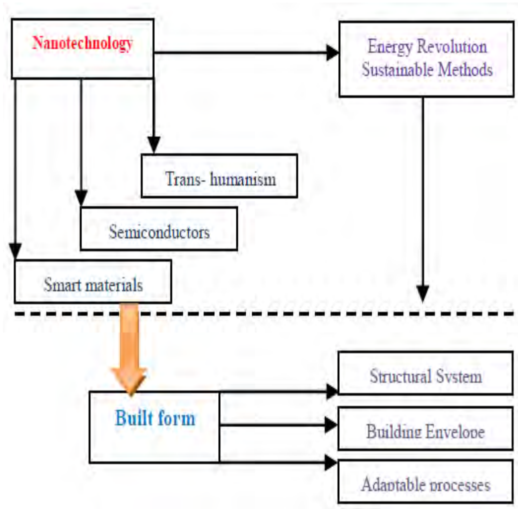


Fig 5. Plans for the future of our built environment (Faten Fares Fouad, 2012: 48)

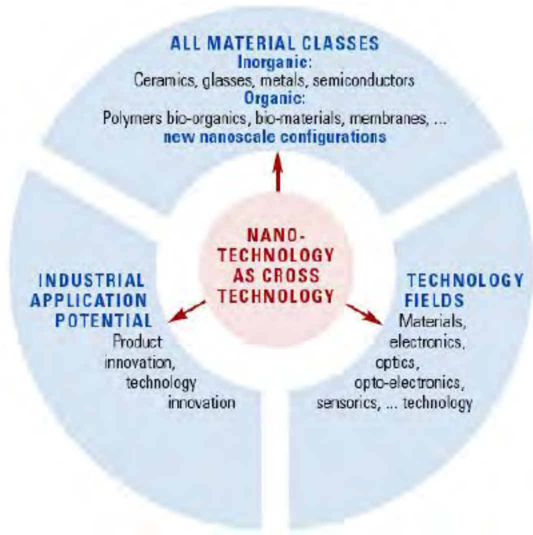


Fig 4. Nanotechnology as transsectoral technology influences all important materials classes and technology fields, providing both product and technology (Nanoforum: Nanotechnology and Construction 2007)

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presents the theory of analytical methods and the analytical approach has explanatory.

The rest of the paper is organized as follows. In section 2, preliminary concepts and definitions are stated, for the sake of clarity. Section 3 we propose a Modern Method of Nanotechnology to Achieve Sustainable Architecture (sustainable nanotechnology). Lastly, the paper is concluded in Section 4.

2- Back Ground Information

The most compelling argument for using nanotechnology in architecture is for greater energy efficiency. Nanotechnology offers a new technological means with which to tackle climate change and help reduce greenhouse gas emissions in the foreseeable future.

Though there are a number of ways of defining nanotechnology and sustainability for the purposes of this paper we adopt the following definition.

2-1- Nano

The term nano derives from the Greek word for dwarf. It is used as a prefix for any unit such as a second or a meter, and it means a billionth of that unit. Hence, a nanometer (nm) is a billionth of a meter, or 10−9 meters. To get a perspective of the scale of a nanometer (Faten Fares Fouad, 2012: 47).

2-1-1- Nanotechnology

Nanotechnology is the use of very small pieces of material by themselves or their manipulation to create new large scale materials. Nanotechnology is an enabling technology that allows us to develop materials with improved or totally new properties Fig. 3.

The biggest plans for the future of our built environment are extremely small. The eight billion dollar per year nanotechnology industry has already begun to transform our buildings and how we use them; if its potential becomes reality, it could transform our world in ways undreamed of. Nanotechnology has the potential to radically alter our built environment and how we live. It is potentially the most transformative technology we have ever faced, generating more research and debate than nuclear weapons, space travel, computers or any of the other technologies that have shaped our lives. It brings with it enormous questions, concerns and consequences. It raises hopes and fears in every aspect of our lives—social, economic, cultural, political, and spiritual. Yet its potential to transform our built environment remains largely unexplored

Fig 6. Plans for the future of our built environment

Fig. 4.

2-1-2- NanoArchitecture (Nanotechnology + Architecture = Nano Architecture)

The biggest changes that led to shaking up architecture in a long time have their origins in the very small Nanotechnology. The understanding and control of matters at a scale of one- to one hundred-billionths of a meter brought incredible changes to the materials and processes of building. Yet the question how ready we are to embrace these changes that could make a big difference in the future of architectural practice. Nano Architecture will allow having designs that interact better with the human senses. Experiencing this type of architecture could feel more "natural" and less forced than many of the designs we experience today (Faten Fares Fouad, 2012: 56). Overall, it still seems fairly optimistic that most scientists think that nanotechnology will unveil more solutions that are needed to meet some of the biggest challenges of our time

2-2- Sustain

2-2-1- Sustainable

Pertaining to a system that maintains its own viability by using techniques that allow for continual reuse. It's involving the use of natural products and energy in a way that does not harm the environment. Capable of being maintained at a steady level without exhausting natural resources or causing severe ecological damage.

2-2-2- Sustainability

Sustainability could be defined as an ability or capacity of something to be maintained or to sustain itself. It's about taking what we need to live now, without jeopardizing the potential for people in the future to meet their needs.

Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. It is important to making sure that we have and will continue to have. There are six principles of sustainability that can help a community ensure that its social, economic, and environmental systems are well integrated and will endure.

(Chukwudi, 2016).

1. Maintain and, if possible, enhance, its residents' quality of life
2. Enhance local economic vitality
3. Promote social and intergenerational equity.
4. Maintain and, if possible, enhance, the quality of the environment.
5. Incorporate disaster resilience and mitigation into its decisions and actions.
6. Use a consensus-building, participatory process when making decisions.

2-2-3- Sustainable development

It is development which meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987).

In the extensive discussion and use of the concept since then, there has generally been a recognition of three aspects of sustainable development (See, E. G., Holmberg, E. D. 1992).

•Economic:An economically sustainable system must be able to produce goods and services on a continuing basis, to maintain manageable levels of government and external debt, and to avoid extreme sectorial imbalances which damage agricultural or industrial production.

• Environmental: An environmentally sustainable system must maintain a stable resource base, avoiding over-exploitation of renewable resource systems or environmental sink functions, and depleting non-renewable resources only to the extent that investment is made in adequate substitutes. This includes maintenance of biodiversity, atmospheric stability, and other ecosystem functions not ordinarily classed as economic resources.

• Social: A socially sustainable system must

Fig 6. Nanohouse and architecture; url 1.

achieve distributional equity, adequate provision of social services including health and education, gender equity, and political accountability and participation.

Clearly, these three elements of sustainability introduce many potential complications to the original simple definition.

2-2-4- Sustainable Architecture

Sustainable architecture is a general term that describes environmentally-conscious design techniques in the field of architecture. Sustainable architecture is framed by the larger discussion of sustainability and the pressing economic and political issues of our world. In the broad context, sustainable architecture seeks to minimize the negative environmental impact of buildings by enhancing efficiency and moderation in the use of materials, energy, and development space. Most simply, the idea of sustainability, or ecological design, is to ensure that our actions and decisions today do not inhibit the opportunities of future generations. This term can be used to describe an energy and ecologically conscious approach to the design of the built environment (Faten Fares Fouad, 2012: 14).

2-2-4-1- Sustainable Building

Sustainable building is an important architectural concept in the 21st century. The key emphasis on the design of the building lies in recycled material, energy-saving, and nature conservation. It is not only beneficial to human health but also protective for the earth, fulfilling the responsibility of sustainable development. This trend emerged in Europe, and then spread to Japan and America. Thanks to the lead of certain advanced countries, it has become the mainstream of the architecture in the 21st century. As for Taiwan, the Green Buildings Movement is innovated and promoted by the government administrative system. National Council for Sustainable Development of Executive Yuan was established in 1996. It lists Green Buildings into their top priorities of urban sustainable development policies.

3- A Modern Method of Nanotechnology to Achieve Sustainable Architecture (sustainable nanotechnology)

In this section we use the nanotechnology of sustainability and thus to achieve sustainable architecture. It is generally obvious that sustainable development calls for a convergence between the four pillars of economic development, social equity, and environmental protection (involve. It should be considered that because of the extent in sub sustainability topics we describe it in detail.

Nanotechnology revolution is bringing dramatic improvements in building performance, energy efficiency, environmental sensing, and sustainability, leading the way to greener buildings. "The nanotech and building sector have to get to know each other a lot better in order to realize the dramatic benefits awaiting each of them. The nanotech community needs to be explored. It should explain the enormous economic opportunities in Green Building Design, Construction and Operation and demonstrate to Architects, Building Owners, Contractors, Engineers and others in the $1 trillion per year global building industry that nanotech is at this moment beginning to fulfill its promise of healthful benefits for people and the environment" (Leydecker, 2008).

3-1- Nanotechnology and Environment

In recent years, the rapid advance of science and technology, especially in the field of nanotechnology has been followed by a great change in the industry, the environment and biological sciences. Removing pollutants, polluted soil, surface water and groundwater, removing micro-organisms, reducing darkening and water hardness and salinity and desalination its disposal are some of the Nanotechnology benefits. Generally nanotechnology efficient machines and tools used in different sectors and as well as reducing raw material and energy consumption provide possibility of effective measures for natural resources and the environment protection. Nanotechnology in energy supply can significantly influence performance, storage and energy production and also reduce energy consumption. But other aspects of this capability, the potential hazards associated with the use of nanotechnology products in the event of failure to comply with certain rules and regulations which has been created for this matter. Despite that nanotechnology make available products to be more effective and efficient also the size of the particles which is one of its important properties can threaten health and the environment. Manufacturers of Nano products are of the opinion that this product is environmentally safer than other products but more research needs to be done on these products.

3-2- The nano-architecture, eco-friendly architecture

Environmental sustainability which defined as buildings structural adjustment based on their placement in nature in the past with organic architecture by Frank Lloyd Wright, nanotechnology will be discussed today in the form of sustainable architecture and its new horizons. Wright was of the view that the architecture must arise out of the nature of objects and each object in turn has a particular language to speak and express feelings. For example, proportions, layout and brick house removing tissue indicate a vast expanse of land on the horizon. Baked bricks is derived from nature and returns to it again. Now imagine the time when the constituent material of the house is too small which only can be seen with the naked eye, then imagine that how relationship between shapes, man and the environment will change. Since by using nano-technology achievements an object -a building- at different times and places can show different behavior, hard and inflexible or soft and fluid cognitive theories of general changes. In fact, material lose their fixed identity and architecture will no longer have a limited in time and space definition. Structures and buildings will be able to adjust geology intelligently with a variety of temperatures, air flow, energy consumption and other climate conditions. All these conditions also given to buildings and their constructions by design planners in form of raw data to change every effecting factor on human life condition if it is needed in order to achieve his comfort zone to the environment. An Intelligent construction is one that think itself and take step by examining its needs to solve them.

3-3- Nanotechnology and the creation of sustainable buildings

Nanotechnology is one way to achieve sustainability in construction industry. Energy used in residential buildings, commercial and industrial buildings is responsible for almost 43% of carbon dioxide emissions in America. Worldwide, buildings consume 30 to 40 percent of the electricity. About 40% of waste occupied landfill of America made by construction waste Construction waste and Sick Building Syndrome include approximately $ 60 billion of health care costs in America. Deforestation, soil erosion, environmental pollution, acidification, ozone depletion, fossil fuels reduction, global climate change and the human health risks are all issues that should be considered in construction and its implementation. It is clear that buildings play an important role in the current circumstances in the environment, including energy consumption, carbon dioxide emissions wastes. By working on material at the molecular level nanotechnology has opened a way to the production and design of new material. Today, nanotechnology is not just an opportunity but it is a necessity. According to a report titled "Nanotechnology for Sustainable Energy" announced that current use of nanotechnology in the world, led to reduce 8,000 tons of carbon dioxide in 2007 and the amount of it goes up to one million tons in 2014. Nanotechnology is expected globally to reduce amount of carbon emitted in three main areas: 1. transportation 2- Advance insulation used in commercial residential and buildings (3) production of photovoltaic renewable energy.

It is important to note that 2 of 3 regions are concentrated in the construction industry and this has led to the Green Revolution of Nano. Many advanced nano products and processes on the market creates sustainable building material, energy-saving and also provides material that reduce the amount of waste and toxins that are dependent on non-renewable resources. Nano material can increase development of power, versatility, durability of construction and non-construction material and also reduce the use of toxic material and insulation in the building.

3-4- Nano-technology and its impact on the architectural design

In the future, the biggest plans for the environment, will be extremely small. Small projects presented in the categories of nanotechnology and its impact on the human environment can be traced in three stages:

First, what role does nano-technology plays in today architectural design? Some material with nano-engineered structures are now accessible by architects and builders for use in buildings which the transformation of buildings with the use of these material is much discussed. Some examples of products that are in development, including thin film transparent scratch-resistant protective windows that are automatically by absorbing the ultraviolet rays of the sun and rain to clean themselves, glasses that change their colors by reduction or increase of ambient temperature and regulate the ambient light and concrete resistant against bumps and cracks. Of course, these products are still expensive and not mass produced. But even with the expensive use of this material being in the present, with a view to reducing energy consumption by insulating and use of nano-glasses, not needing to cover the surfaces and insulation and so on, use of these material in long-term would be optimal and economic.

Second, by looking beyond, todays' Nanotechnology experts efforts we will acquire an achievement in 15 to 20 years which it common example would be carbon nanotube that brings unique strength and flexibility to buildings and inspiring ways to build new forms, new functions and new connections between people, buildings and the environment.

Third, on the distant horizon we can see the pervasive impact of nanotechnology on human life and how his communicating with the surrounding environment and buildings which will be inevitable and unimaginable. Shielding shell against the sun, invisible walls, and coping of generating structures are all within the realm of possibility. Social, economic and environmental development will not be separated from this evolving progress.

Nano technology by changing the structure of human life makes fundamental changes, maybe some predictions about nanotechnology seem exaggerated, but its ultimate goal is creating a detailed material with diverse properties.

The famous words of Winston Churchill, English statesman, who said, "We shape our buildings, and (mutually) buildings shape us" before recognizing nanoscience but may anticipated its strength in changing building shape and consequently human in which how nanotechnology by controlling raw material of creating constructions (material) and unprecedented power in the hands of architects to create impossible, form human lives and transform communications around the world. So designers and experts efforts in order to assess the achievements of this science in the areas of personal, social, moral, etc. seem absolutely necessary, because the configuration of a healthy and decent human habitation, with initial thinking, Conversation and conclusions, assistance to the conscious development of this science in the future.

3-5-Fields of nanotechnology in the construction industry

Nanotechnology takes us one step closer to have our material that have the desired characteristics, material that have unique characteristics and separate engineers from using old material, which had particularly numerous problems when using it in the construction process. By releasing from restraints of available traditional material we can define clear and differently performance for new material of nanotechnology products which are mainly raw material and differ in their very essence and basic features. Perhaps the most important contribution of nanotechnology in the field of building material outline helping to raw material consumption and lower energy usage. From an economic standpoint and also in terms of environmental issues, human use of nanotechnology in the long run, could be his trump card. According to the published results of studies in the ten field of application of nanotechnology in the development of the world, construction industry took eighth place. Although today, the construction industry is left from other areas-such as water and health Applied Sciences, but in the case of engineers, architects and builders luck to nano material and their awareness of the many advantages of this new material, perhaps predict the state of the construction industry in the ranking table will recover.

Areas where nanotechnology can improve the construction industry, the summary can be outlined as:

• Optimization of available material and products;
• Injury Prevention;
• Reduced in weight and volume of material and construction elements;
• Reduce in production process;
• More efficient use of material;
• reducing the need for maintenance and low maintenance costs;

This improvement will be a direct result of:

• Reduce in consumption of raw material and energy as well as reducing carbon dioxide emissions;
• preserve and strengthen natural resources;
• More dynamic economy;
• More comfort.

3-6-Application areas for nanotechnology in building

Construction industry is one the industries where nanotechnology can be very useful.

Construction industry according to their needs in terms of strength, resistance, durability and high performance are the most important users of nano-structured material. Of course, having the ability of material such as carbon nanotubes, can revise in the way of building design and expected performance. For example, perhaps we could eliminate the main difference between the overall building structure and building shell and with the help of capable material that can function in the building structure and shell of the building's exterior the structure, a lot of the limitations of the designers would be eliminated.

In fact, nano-architecture, combining nanotechnology with an architecture that uses nano products, nano material, nano communications and even shapes and forms of nano is possible. Nano architecture means a change in the architecture according to the nanotechnology revolution in the twenty-first century. Application of Nanotechnology in architecture encompasses a wide range of material and equipment which its purpose is to materialization and implementation of theories.

Generally areas of construction industry that nanotechnology can cause future developments in them could be summarized as follows:

• Producing capable material and intelligent in addition to the restoration and renovation of existing structures;
• New and innovative systems that optimize the chain of "design, production, exploitation, destruction" in building facilities. This is done by developing new tools based on information technology;
• New technologies for processing of multicultural products / performances;
• New methods of producing material that have a significant impact on reducing water and energy consumption and also produce

much less waste.

In addition, the development of production methods based on environmental sustainability that can also recycle products and building products, penetrate areas of nano-technology.

Practitioners and activists in the field of construction, predict that within 10 to 15 years, nano-technology in the following areas can have significant effects on the construction industry:

• Increase understanding of structural engineers from nano and its impacts;
• Modified nanoscale material;
• Capable and highly competent structural material;
• Thin films, covers and multipurpose colors;
• Multi-functional material and composites;
• Tools, production methods and new control in the production of building material and products;
• Intelligent structures and the use of tiny sensors;
• Integrated system monitoring and diagnosis;
• Lighting systems with low energy consumption, fuel cells, computing and communicating devices.

In view of the progress made in the field of understanding structural behavior and old material and its relation to the control of matter on the nanometer scale has been achieved, should expect a quantum leap in the field of material science. In this way, we can say that gradually approach "deliberate and targeted production" of material replaces the old method of "trial and error" traditional material geared to fit them for special functions.

If we summarize the most prominent direct result of the use of nanotechnology in the construction industry to be mentioned, are as follows:

1.Structural composite material (composite) lighter and more resistant;
2. covering with less care requirement (such as easy-cleaning surfaces);
3. Improve pipes and fittings methods and material;
4. Better features for cement based material;
5. Reduced heat transfer coefficient of fire insulation material;
6. Improving the ability to absorb sound waves, sound-absorbing material;
7. Increase glass reflection;
8. Provide empowering concrete;
9. Nano-sensors.

3-7- The role of nanotechnology in achieving environmental sustainability in the construction industry

Nano-based material are multi-functional and small volume of nano-based material can be few alternatives to traditional bulk material, in a way that nano-product material, could perform all of traditional material functions. This fact means less material consumption and consequently, less use of natural resources. For example, nanocomposites can be stronger, more resistant, lighter and thinner than similar traditional examples and most importantly, conductive and anti-fire construction. Self-cleaning nano covers or contaminants debugger is another example of using nanotechnology moving towards environmental sustainability. By this covering, the use of chemicals or pesticides and germ debuggers less detergent and release them into the atmosphere will be reduced as well.

Researchers considers' six main pillars to help solve problems and environmental challenges of nanotechnology in the construction industry. Based on these categories, the construction industry will benefit from six groups based nanomaterial:

• Nano-basis material (volume);
• Nano-basis surfaces (two-dimensional);
• Nano-optic material;
• Nano-electric material and nano-sensors;
• Production, storage and energy storage;
• Check and clean environment with nano-basis approaches.

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3-8- Nano houses, design houses with nanotechnology and the principles of sustainable architecture

Nano house is a combination of form, function, control the main features and control of a shelter that does not waste energy and can annually save a million dollars in energy consumption and prevent the arrival of 12,500 tons of carbon dioxide into atmosphere.

Nano house composed of two layers. The first layer, called nano-layer. This layer is the physical structure of the data stored in it. The second layer is a logical layer that analyzes the raw data and performs the necessary changes to adapt to the environment. The goal is to design a new type of home that is so desirable level compatible with their environment.

Some nano-technology used in the houses are as follows:

- Filtering windows by reflect solar radiation and heat from the sun.
- Self-cleaning glasses.
- Colors and shell radiation protection and guidance.
- Containers used at house with environmentally friendly features to keep most of their content against infectious factors.
- Cold lighting systems to get light during the day and at night using light sources on night.
- Water quality control systems that meet water pollution and it is potable.
- The creation of the material being disinfected to prevent the spread and transmission of diseases.
- Use of covers that aren't stunning against most intense lights.

Due to the above, we have a new model as follows:

According to the proposed model to achieve sustainable development must to get it in various sectors. One of the best ways to achieve the sustainable development is nanothenology. With the implementation of nanothenology and development in various sectors, we can reach the final sustainable development. As a result, in this article the proposed model in order to achieve sustainable development is getting to various sectors of sustainable development with the use of nanothenology so we introduce it as an overall strategy to meet this goal.

A.Nanotechnology is an enabling technology that is opening a new world of materials functionalities, and performances. But it is also opening new possibilities in construction sustainability.

B.Nanosensors building components will become smarter, gathering data on temperature, humidity, vibration, stress, decay, and a host of other factors. This information will be invaluable in monitoring and improving building maintenance and safety. Thus, dramatic improvements in energy conservation can be expected (Elvin, 2009).

C.Space-scraper (Innovative photovoltaic elevators): The new skyscraper typology was creatively invented using advanced NASA technology; Innovative Electromagnetic Vertical Mass Transportation, carbon-fiber structural skins and advanced environmental control systems (nanosensors) support new spacescraper technology (Faten Fares Fouad, 2012).

D.Community Center 2200: Molecular Nanotechnology (MNT) represents a new phase in the evolution of manmade structures. The cost of molecular engineering - minus licensing fees, insurance, and business expenses - is comparable to the cost of creating plastic or industrial chemicals. The building would be programmed to monitor its environment and adjust or alter its design so as to be in harmony, or symbiotic relationship, with nature.

E.Off the Grid. Sustainable Habitat 2020: eco-systems can help us to formulate strategies for a sustainable urban future with Nanotechnology. The new skin acts like a membrane which absorbs air, water and light from the outside and brings them into the interior. This means that it is possible to forget about our dependence on the grid because the new skin provides us with every necessary source.

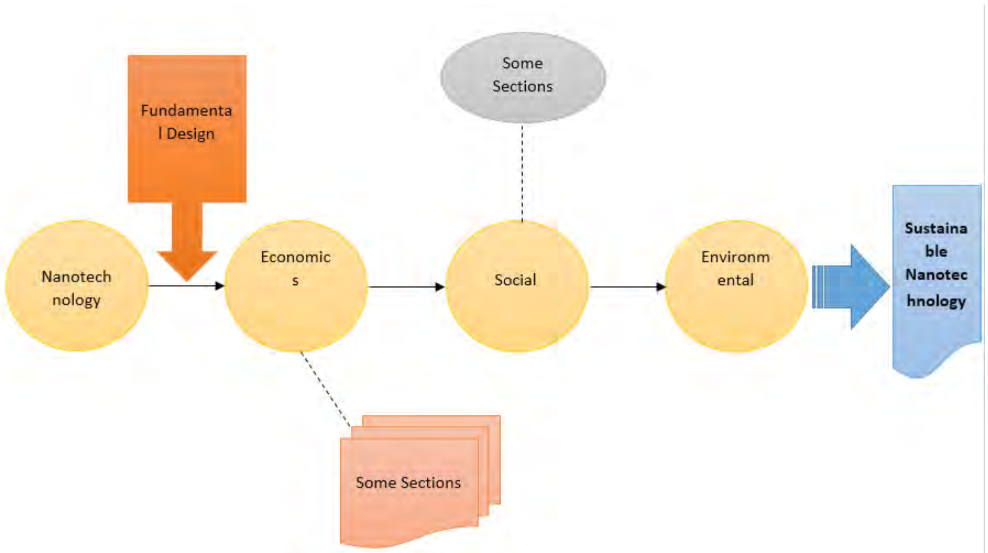

Fig 7. a new strategy of nanotechnology to achieve sustainable development

The membrane will move around in order to get into the best position to make use of as much energy as possible.

4-Conclusion

With the development of the construction industry we will be forced to witness the huge amount of synthetic products that sometimes exceed the benefits that have been made to it, will be accompanied by environmental hazards. According to the principles of sustainable architecture in three areas of environment, economic and social concerns at the same time and in earnest, it is ideal for construction products to manufacture in line with these principles and to be designed and constructed. Nanotechnology in many cases can reduce energy consumption by insulation, reducing the need to use fossil energy by optimizing energy production or use of renewable energy (daylight without the harmful infrared rays, proper natural air flow, etc.), according to health by using water purification, air purification, self-cleaning windows and surfaces, reducing emissions as well as reduce costs by reducing the need for their use of fossil fuels, reducing the cost of maintenance of the building by construction nanostructures products with a long life and long life and many other areas in the field of environment, economy and society will be effective and useful. The only dark spot and unknown nano-technology is in the field of recycling and elimination of waste, which still has not announced a final decision. In this Paper, first we brief described about sustainable architecture and nanotechnology, then we showed nanotechnology it can achieving the goals of sustainable architecture. We proposed a new strategy of nanotechnology to achieve sustainable development. Finally, we presented a new model for nanotechnology to achieve sustainable development. This work, presents the theory of analytical methods and the analytical approach has explanatory.

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