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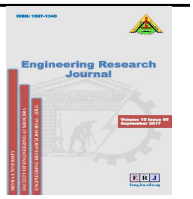

# Nanotechnology As a Language For a Futuristic Architecture

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**ABSTRACT**

Nanotechnology is one of the new developing advances of our contemporary occasions, because of the global spotlight on Nanoscience. Such innovation has made it feasible for us to control the issue on an iota by-molecule premise; this is required to change and upsets the manner in which we live. In engineering, it offers an assortment of uses, either in structuring new materials with the new properties, Nanosensors that can enable us to investigate the encompassing condition, Nanobots that may supplant the human work diminishing structure time and cost, or even in changing the manner in which the modeler think about the structures to plan his/her structure. Additionally helping our earth to battle the contamination, and diminish the an Earth-wide temperature boost impact.

The uses of nanotechnology are in all parts of our life, it tends to be related in prescription, industry, correspondences, transportation, and increasingly significant, engineering. The utilization of Nanotechnology in engineering is wide and fluctuates from the beginning times of drawing up to the last contacts of completing, particularly in picking the correct material which won't just mirror the structure yet in addition has an extraordinary impact in the system of considering design as indicated by the new immense choices that the nanotechnology offers.

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## 1-INTRODUCTION

Future has taken an incredible worry of researchers and modelers also. New Discoveries and new Technologies are rising without any breaking points. Researchers looks far in spaces .Though, they have concentrated consistently nearer through iotas. Researchers have arrived at close enough to one billionth of a meter in Nanoscience, another science that is developing with advancement to be connected into numerous fields and applications like Pharmacy, hardware, drug, and all things considered to materials. The errand for engineers today, is to hold onto hold of new advances, wisely apply them to structures materials have assumed a noteworthy job into numerous fields and it has discovered its way into engineering to serve supportable and inexhaustible methodology. Planners won't work with the equivalent ordinary glass, solid, blocks, rather new nanotech materials that will serve future needs. By and by, reasonable and natural ones will come to field.

Nanotechnology is one of the new rising advancements of the contemporary time, because of the universal spotlight on nano sciences. Such innovation has made it conceivable to control the issue on a nuclear premise; this is required to change and upsets the method for live. The nano world is a combination of a genuine blend of logical and innovative areas which used to be isolated . Nanotechnology is an energizing territory of logical advancement which guarantees more for less. It offers approaches to make littler, less expensive, lighter and quicker gadgets that can accomplish more and more astute things, utilize less crude materials and expend less vitality. The uses of nanotechnology incorporate practically all parts of our life, in prescription, industry, correspondences, transportation, and building façades. The use of nanotechnology in engineering is wide and shifts from the beginning periods of outlining up to the last contacts of completing, particularly in materials determination, which won't just be considered the plan, yet additionally greatly affects the strategy of considering planners as per the new immense alternatives that the nanotechnology offers. It might change the manner in which the planner think about the structures to structure structures, and help the earth to battle the contamination and decrease the a dangerous atmospheric deviation impacts.

## 2-RESEARCH OBJECTIVES

1. Highlight the fundamental changes that nanotechnology will do to our society and its reflection on architecture

2-Explain the significance of nanotechnology to the field of Architecture and the mix between them to demonstrate the Nanoarchitecture and spotlight on the impact in engineering and the draftsman thinking in the plan of structure.

3. Create a basic knowledge for architects about Nanotechnology in order to pay their attention to the enormous transformation it promise.

4. Meditation for the better by using nanotechnology to achieve sustainability in architecture.

**Definition of Nano :**

To start, "nano" is really a prefix that originates from the Greek word for "predominate".

It just methods one billionth. Along these lines, one nanometer (1nm) is one billionth of a meter. There are three significant "nano" comprehend the expanding news inclusion and logical advancements in the field of nanotechnology

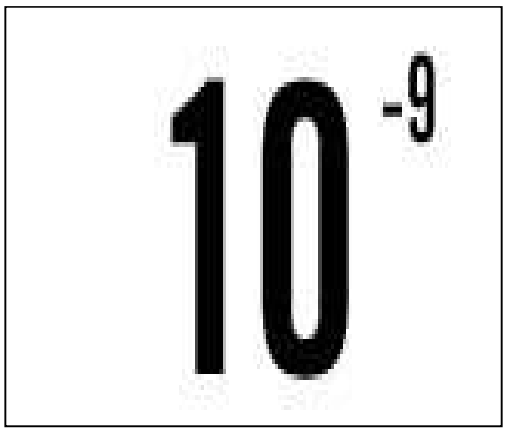


**Fig.1.one Nanometer is one Billion of a meter**

**3-Nano Scale**

Nanoscale items have in any event one measurement (stature, length, nanometers (1-999 nm). As expressed beforehand, a nanometer is one billionth of a meter. Everybody battles to envision this little scale, however you can get a thought through correlation. How about we take a gander at some ordinary articles. Get a book and take a gander at the thickness of an individual page. The normal Remember, to be considered Nanoscale the article must have one measurement somewhere in the range of 1 and 999 nanometers, so this is certainly not inside the Nanoscale run. An extremely fine human hair is around 10,000 nanometers wide, which is the littlest measurement we can see with the unaided eye. At the point when articles are underneath 100 nanometers in size they can show unforeseen substance and physical properties. For instance, you could cut a square of gold into littler and littler pieces and it would at present have a similar shading, softening temperature, and so on. Be that as it may, at specific scopes of the nanoscale, gold particles carry on in an unexpected way.

**4-Definition OF Nanoarchitecture**

Nanotechnology will significantly influence the business of engineering at all scales; and, inside structure, building plan and city configuration will all profit. Design will be able to work at increasingly ideal levels – upsetting the manner in which occupants live. Nanoarchitecture is the conversion of architecture in the new Nano revolution in the 21 century . The use of nanotechnology in architecture varies from materials, equipments, to forms and design theories

**5-NANO ARCHITECTURE APPLICATION**

**5.1 Materials**

**5.1. A. Self-cleaning: Lotus-Effect**

This is extraordinary compared to other known methods for structuring surfaces with Nonmaterials . The name "Lotus-Effect" is suggestive, conjuring up relationship of globules of water beads, and in this way the impact is frequently mistaken for "Simple to-clean" surfaces.

The Lotus-Effect is most appropriate for surfaces that are routinely presented to adequate amounts of water, for example water. Little amounts of water regularly lead to water bead "runways" framing drying stains, which may leave a surface looking dirtier as opposed to more clean. Without the nearness of water, the utilization of such surfaces has neither rhyme nor reason.

**The advantages are self-evident**: a cleaner appearance and considerably reduced maintenance demands.

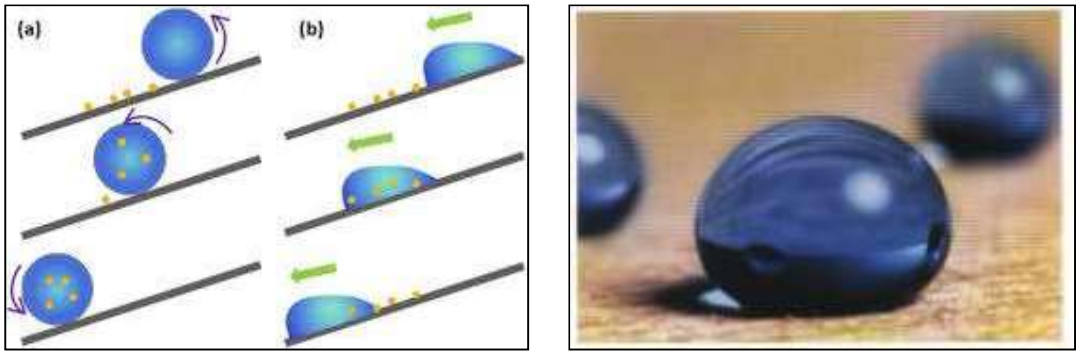


**Fig.2. Wood Can be given an. extremely water-repellent self-cleaning surface.**

**5.1.B. Self-cleaning: Photocatalysis**

Photocatalytic self-cleaning is probably the most widely used Nano-function in building construction. There are numerous buildings around the world that make use of this function. Its primary effect is that it greatly reduces the extent of dirt adhesion on surfaces.

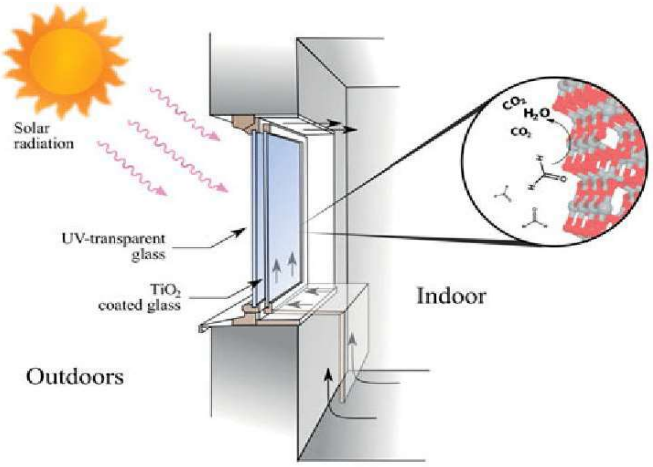


**Fig.3. The diagram shows the basic process: Organic dirt & grime is broken down and "decomposed". Until now UV light, such as present in sunlight, is necessary to initiate photocatalysis.When water impacts on the surface, it spreads to form a film washing away the loose dirt**

**Fig.2. This picture shows a granite wall which has become old and dirty after years of weathering**

**C- Anti-fogging**

**-Clarity for steamed-up surfaces**

Because of nanotechnology a forever clear view is currently conceivable without the utilization of power. The arrangement is a ultra-flimsy covering of nanoscalar TiO2 , which shows a high surface vitality and hence more noteworthy dampness fascination. On hydrophilic surfaces dampness shapes a ultra-flimsy film rather than water beads. Despite everything it chooses the surface yet stays imperceptible.

**Fig.4. Mirrors with anti-fogging coating do not steam up**

The film is straightforward, making a mist free clear appearance.Washroom Mirrors are clear andidates for such covering, as are glass surfaces in cooled rooms in the tropics, which will in general cloud when open air streams into a room. Hostile to hazing coatings can likewise be connected to plastics.

**D- Solar protection:**

**-No blinds necessary.**
**-or is switchable without the need for a constant electric current (memory effect).**

The coming of nanotechnology has given another methods for coordinating electochromatic glass in structures. The essential distinction to the previous item is that a consistent electric flow is never again important. The Advent of nanotechnology has given another methods for coordinating electochromatic glass in structures.
The essential contrast to the previous item is that a steady electric flow is no longer necessary.A single switch is all that is required to change the level of light transmission starting with one state then onto the next, for example on change to change from straightforward to obscure and one moment to change back. The electrical vitality required to shading the ultra-slender nanocoating is negligible and the exchanging procedure itself takes a couple of minutes.

Photochromatic glass is another answer for obscuring glass boards. Here the daylight itself makes the glass Darken consequently Without the switching Nanotechnology has made it conceivable to give a vitality proficient methods for sun oriented assurance that can likewise be joined with different glass capacities.

**Fig.6. Glass darkens automatically**

**E- Anti-reflective**

-Improving solar transmission

The use of anti-reflective glass to solve the problem of reflection is in itself nothing new. In interior architecture.

Transparent nanoscalar surface structures, where the particles are smaller than the wavelength of visible light, offer not only an innovative but also a cost- effective and efficient anti-reflective solution. Their structure consists of minute 30-50nm large silicon- dioxide ($SiO_2$) balls. A coating thickness of 150nm is regarded as ideal. The ratio of reflected light reduces from 8% to less than 1%. Another cost-effective means of producing anti-reflective surfaces is the moth-eye effect, the cornea of moths, which are active mostly at night, exhibits a structure that reduces reflections .The disadvantages of conventional anti-reflective technology, such as the limited spectral region and the complex production process, are eradicated .using nanotechnology

Anti-reflective glass can now be used in large quantities in construction in order to benefit from the increased solar transmission resulting from broadband spectral de-reflection.

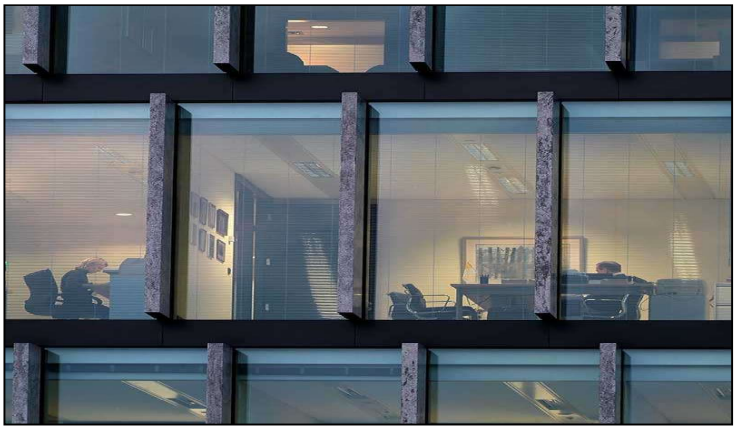

**Fig.6. A Photovoltaic module with and without anti-reflective (AR) solar glass coating.**

**F-Anti-fingerprints**

-No more visible fingerprints

Steel and glass are prominent materials in engineering when utilized in insides they have an impediment – fingerprints show all around unmistakably and influenced by continued contacting. The presence of tidiness, regardless of whether alluring for tasteful or sterile reasons, disappears when surfaces are canvassed in fingerprints. An enemy of unique mark covering can offer an appropriate answer for this issue and now and again makes it conceivable to utilize such materials in any case.

With the assistance of these coatings unique mark imprints are made for all intents and purposes undetectable. The covering changes the refraction the light similarly the fingerprints itself does as such that new fingerprints have little impact – one can think about the covering as a sort of amplified unique finger impression. The light reflections on the covering make steel or glass surfaces seem smooth, giving the impression of tidiness that numerous clients have generally expected

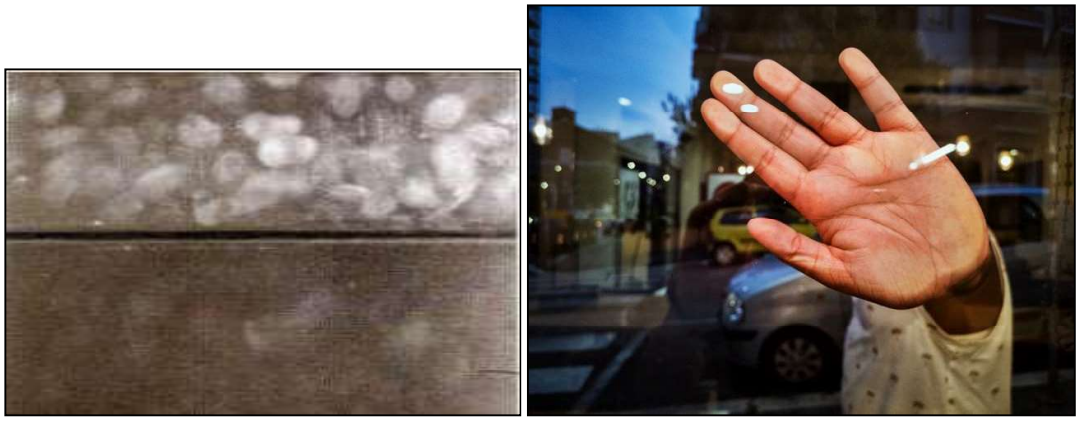

**Fig.7. fingerprints show very clearly and affected by repeated touching**

**Next Generation Building Cleaning Solution**

- Keeps the building clean

- Purifies the air pollutants near and on the surface

- Decomposes the organic pollutants on the surface.

- Reduces the energy consumption for cooling building in summer

- Restrains mildew or alga from growing

-Kills bacteria and virus on the surface and in the air near the coated Building.

- Restrains the dust electrostatic adsorption

- Protects the surface from residue, corrosive downpour and air contamination harm .

- Makes the surface without water recolor subsequent to sprinkling

- Absorbs UV beams from sun and shields the surface from UV harm

**6-Nanotechnology's potential to reduce greenhouse gases**

Several examples of how nanoscale materials are currently being used. Applications include many optical films for light, color, or thermal control,surfaces that are self-cleaning, antibacterial, or self-healing and that aid pollution reduction; for thermal insulation; solar cells; and a host of applications related to the strength and stiffness of members.
Fear of nanotechnology has led to taking precautions against its side effects on man and the environment. Hence, the importance of the approach of and the insistence on continuity in the employment of new technology in the field of architecture so as to make the green nano architecture a guarantee for benefiting from Nanotechnology and for avoiding its side- effects on society and the environment.

The role of nanotechnology in serving the nanoarchitecture becomes clearer in reaching to useful and smart properties of materials contributing in modern architecture; its main aim to reach to the highest level of efficiency of a friendly environment building and significantly reducing the harmful rays'emissions of the building resulting from using the old systems using petroleum and coal energy which harm the environment and substituting it with new clean techniques and systems reducing the energy consumption enhance energy saving and carbon free

**7- Recommendations**

1- The role of nanotechnology in the production of new materials with smalldimensions, area and features a highly efficient and functional help to raise the operational efficiency of the building through the improvement of the environment internal to the vacuum and make it more interactive with the user through smart materials and sensor equipment that intervention in the manufacture of nanotechnology.
2- the need to enact laws, architecture and environmental requirements, which works to assess the building in stages of design the primary before the actual implementation, giving an area of change for the materials used and design that work on the optimal utilization of space available to be done in the framework of an environmental organizations, local and international so that all buildings are under the laws of those organizations.
3- To spread awareness among the architects of the impotence of nanotechnology and renewable resources and how annexation of teaching curricula for inclusion in the process design and implementation process as a prelude to creating clean environment and non-pollution cities.
4- Coordination between all institutions of society from government institutions, educational and business to increase public awareness of the importance of the trend towards nanoarchitecture because of their active role in protecting the environment and raising the standard of living of the human through the techniques and devices that enter the industry.
5- The role of housing and building national research center to focus on nanomaterials that serve the building products used in building construction, both finishing materials outside or finishing materials inside which is working to provide those materials in the local market, which will change the shape of local architecture and contribute greatly in finding nano architecture into reality to address the problem of Egypt with global warming.

6- The change of construction material must be in two key sectors, namely the first part is the construction of treatment of existing buildings effectively by replacing the materials and techniques of ancient articles of modern and the second part is the construction of new building, through the introduction os such materials and new techniques in the initial stages of process design.
7- The contribution of nanotechnology in solving the problem of global warming is not limited to its contribution in the field of architecture, but extends to the field of environmental studies and various fields.

**8-Conclusion**

Nanotechnology is a fusion technology and therefore incorporates, for instance, bio and information technologies. The synergy effects, resulting from the interface of two or more systems, will amplify the complexity and inevitably exceed the hypothetical consequences of one single technology. Nano has the potential to become the flagship of the new millennium building methods and architectural style in the developed as well as in the developing worlds.

Nanotech will certainly not replace all other technologies used in architecture, but will coexist with andborrow from the technological inventions of the past. It is thus unlikely that the nano era will replace the digital. Instead, the digital age will converge with the nano, and their synergy effects will lead to fundamental and irreversible alterations in the existing, cultures and institutions of society, societal organization, and various mechanisms and patterns, including the demographic structure of society.

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**تقنيه النانو كلغه لعماره المستقبل**

لقد سيطرت تقنيه النانو على مختلف مجالات الحياه وخصوصا العماره فى هذا الوقت من خلال استغلالها فى انتاج مواد جديده او تحسين خواص مواد معينه .مما ادى الى ظهور عماره النانو وهيه احدث واهم ما انتجته التقنيات الفائقه. حيث اعطت العماره امكانيه انتاج مبنى معمارى متفاعل مع البيئه الطبيعيه من خلال استخدام مواد محسنه بتقنيات النانو مثل الزجاج والدهانات وغير ذلك . ويتناول البحث المفاهيم المتعلقه بمجال النانو وتأثير هذه التقنيه على العماره وما اتاحته من خصائص متقدمه مثل مواد الاكساء التى اثرت على كفاءه المبنى المعمارى.واضافت ابعاد جديده للمصمم المعمارى وقدمت حلول بيئيه جديده ساعدت على استدامه المبنى وقللت من التكلفه .