

## **Nanotechnology and its impact on changing and developing the properties of materials in the interior design**

**Prof. Ali Abd-Elmonaem Shams**

**Professor Emeritus of Design, Department of Interior Design and Furniture, Faculty of Applied Arts, Helwan University**

**Prof. Rania Mosad Saad**

**Professor of Furniture Design, Department of Interior Design and Furniture, Faculty of Applied Arts, Helwan University**

**Prof. Doaa Abd-Elrahman Mohamed**

**Professor of Design Fundamentals, Department of Interior Design and Furniture, Faculty of Applied Arts, Helwan University**

**Researcher. Raafat Abd EL-Sayed Bekhit**

**Interior Designer**

**[Josa\\_2008@hotmail.com](mailto:Josa_2008@hotmail.com)**

### **Research Summary: -**

When controlling materials at Nano scales, different physical laws appear in front of scientists, that enable them to produce new materials, and to change and develop the properties of different materials in terms of shape, function and performance.

For example, gold particles that have been subjected to ultra-fine nanotechnology become red in color and they are highly active in chemical reactions, and are completely different from natural gold particles, and so whenever the size of the grains changes, their color and properties change.

The research deals with the study and details of nanotechnology, which depends in its work on rearranging the atoms of the elements and materials, and of course, whenever the atomic arrangement of the material changes, its properties change. These are materials that change to respond to the surrounding environment, and some of them now contain "Tiny Computers" that can send signals and paints, that warn from gas leakage or electrical defects, and paints that resist microbes and dirt, or that store electricity during the day to transmit it at night.

### **Research problems: -**

- The scarcity of knowledge about the added value of nanotechnology in interior design materials.
- The lack of application of the various and innovative nanotechnology outputs and materials in interior design.

### **Research goal: -**

- Learn about the latest nanomaterials and their relationship to interior design and furniture.

### **Research Methodology:**

The research follows the descriptive analytical method, which relied on displaying different models of producing new materials and changing the properties of raw materials using nanotechnology.

**Key words:**

Nano - Nano technology - Materials - Changing Properties - Interior design.

**Research axes:**

- 1- Producing new materials using nanotechnology.
- 2- Nanotechnology and coatings.
- 3- Applications of nanotechnology in the field of energy.
- 4- Nanotechnology and its impact on changing and developing the properties of materials.

**Introduction: -**

Nanotechnology (micro technologies) still brings us daily many amazing surprises in all areas of life and in the field of architecture and interior design in particular.

The field of architecture and interior design is one of the most important modern bright applications of this promising technology, as this technology contributes to the production of building materials with unique thermal, electrical, physical, chemical and mechanical features and properties. On the self-cleaning, buildings will also be able to maintain and treat any cracks and damages early, and repair them themselves directly and automatically. Nanotechnology will enter into the production of building materials to improve their properties and functions, such as materials used in paints (coatings) and additives to concrete mixtures, such as silica (silica sand or silicon dioxide), cement materials, gypsum, tiles, ceramics, and improving the glass and wood industry, and steel industry, and to raise energy efficiency in buildings and others, to make them lighter, more robust, durable, and resistant to cracks and corrosion, and to benefit in protecting surfaces and walls from adhesion of dust and pollutants, maintaining color stability, thermal insulation, UV resistance, and moisture resistance. In addition to the environmental properties, represented in helping building materials reduce the amount of carbon dioxide emissions into the environment, thus maintaining the integrity of the ecosystem.

**Results: -**

The materials used in nanotechnology work on developing existing products, or producing new materials with many characteristics and advantages in terms of resistance, weight, ease of installation, ease of formation, resistance to harmful sunlight, rain, salinity, energy conservation and storage, and the use of these materials in developing design in terms of form and function. Nano applications reduce maintenance due to the multi-functionality they perform, as they are self-cleaning, reduce environmental pollution, renew the air inside the place, and resist bacteria and germs to give a healthy environment.

**Recommendations: -**

- 1 - The necessity of scientific institutions' interest in spreading the concept of nanotechnology and its future importance in terms of design and technology among designers, with the publication of projects in which nanotechnology was used in sound and image to clarify the extent of its future importance.
- 2 - The importance of spreading the various fields that apply nanotechnology in life in general and in specialization in particular.

- 3- Spreading the importance of this technology in saving energy, preserving the environment and sustainability.
- 4 - The dangers arising when using nanotechnology must be taken into account.
- 5- The Furniture Industry Chamber adopts modern nanotechnology applications and spreads its culture among Egyptian furniture manufacturers.
- 6 - Clarify the importance of nanotechnology in developing the thought and philosophy of the interior designer.

### References:

- 1- alhabshi , nahaa 'abu bakr , ma hi alnanw? muqadimat mujazat ealaa shakl durus basitat , tibiaetan watawzie wizarat althaqafat wal'ielam fi almamlakat alearabiat alsaeudiat , 2011 , s 54 , 55.
- 2- almaghribiu , yasir muhamad salah aldiyn , taqniat alnnanu wa'athariha fi aleamarat min hayth turuq albina' wamawadu altashtib , majstyr , kuliyyat alhandasat , jamieat alqahirat , 2013 , s 96-97.
- 3- alyasiriu , sadaan eabd alkhalig hasan , "abtikar waistidamatan mawadun saghirat limabnaa kabir" , jamieatan alqadisiat , 2013 , s. 21
- 4- eabd alqadir , limays syd muhamadi - dawr altiknulujia fi tanmiat aleanasir almiemariat altaqlidiat , risalat majstyr , kuliyyat alfunun aljamilat , jamieat al'iiskandariat , 2011 , s 158-165.
- 5-al'ijnjazat: taqniat alnnanu alsewdyt , majalat nuafiz , majalat sadiratan ean jaridat risalat aljamieat , jamieat almalik sueud , aleadad alththalith (ywliu 2009 m). alsafahat , 4-10
- 1- CELTIKCI, N. T., & Serap GUCLU. (2009). Steel Structure of Astana Stadium – Kazakhstan. Proceedings of the International Association for Shell and Spatial Structures (IASS), (October), P 1420–1431
- 2- Collaboration for a Better Quality of the Built Environment. 2nd International Conference on Energy Systems and Technologies, 2013, p 295–304.
- 3- Dutta, J. and Hofmann, H. Nanomaterials, Electronic Book, 2005.
- 4- Elvin,G,Nano technology for Green Building, Green technology,USA.2007 .
- 5- Farshad Kheiri : Material Follows Function: Nanotechnology and Sustainability in Steel Building Constructions ,International Journal of Science and Research (IJSR)ISSN (Online): 2319-7064 Volume 2 Issue 12, December 2013 ,P2
- 6- Gaurao, P., & Swapnal, P.. Light Transmitting Concrete- A New Innovation. International Journal of Engineering Research and General Science, Volume 3 Issue (2), (2015) ,P 806–811.
- 7- Hontelez, EEB SECRETARY Green, Issue april 2009 ,pn 13, wwwenergy picturesonline.com .
- 8- Husien, B., Hamdi, G., Agha, M., & Mohamed, M. B. (2013). Nano Smart Home an Interdisciplinary Metropol Parasol à Séville Une Prouesse Mondiale ,D'ingénierie bois. (2011). Finnforest, P 1–7
- 9- IVAM UvA BV:, “Nano in Furniture” , State of the art ,2012,p-20
- 10- Joshua Meltzer, “After Fukushima: What’s Next for Japan’s Energy and Climate Change Policy?”,Global Economy and Development at Brookings, 2011.
- 11- Sada, H, "The use of Nanotechnology in construction sector Lecture". Al-Qadisiya Journal For Engineering ,Sciences, Volume 7 Issue (1),2014, P 68–80.

- 12- Sciancalepore, C., & Bondioli, F.. Durability of SiO<sub>2</sub>- TiO<sub>2</sub> Photocatalytic Coatings on Ceramic Tiles. International Journal of Applied Ceramic Technology, 12, (2014) ,P 679 – 684.
- 13- The 4<sup>th</sup> International On Nanotechnology for the Plastic and Rubber industries, feb 2009(53), conference
- 14- Rye Senjeu : "Challenger and Opportunites to Green Nanotechnologies: و Editor responsible ,John
- 15- YılmazOcaka ,AysunSofuoglu, "Sustainable bio-nano composite coatings for the protection of marble surfaces" Journal of Cultural Heritage ,Volume 16, Issue 3, May–June 2015, Pages 299-30
- 16- <http://www.plasticsindustry.com/plastics-and-nanotechnology.asp>
- 17- <http://ntcstone.ucoz.com>
- 18- <https://www.archdaily.com/catalog/us/products/12628/terroxy-resin-systems-in-hotels-restaurants-terrazzo-marble/119200>
- 19- <https://www.archdaily.com/783728/plastic-architecture-12-projects-that-highlight-the-potential-of-polymers>
- 20- <https://www.nanoshel.com/aluminium-metal-foam-application>
- 21- <https://www.archdaily.com/catalog/us/products/10969/aluminum-foam-small-cell-panel-cymat-technologies-ltd>