

Nanotechnology in Construction of New Materials

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Abstract: Phenomena associated with characteristic molecular nanotechnology materials to enhance their quality is. Indeed, the methods used, the distances between molecules or atoms substance that reduces the maintenance of their properties, new properties such as hardness, transparency and provides insulation. Now the technology has grown substantially in all industries. Economic development is associated with inexpensive materials. Ability to develop a new material under their control, can reduce dependence on limited sources of international reserves. Ability of new and improved conversion efficiency, and ensure access and provision of materials for domestic needs, will be vital. Construction industry in the developing world today, capital investment and long-term and should help the industry with technology and the latest technology and obsolescence of the bicolor. The buildings are huge and long-term investments are accounted for should be parallel to the growth of new trade and investment. Today, nanotechnology, and understanding the huge potential of this technology evolves, the organization and development of national programs in many countries of the world. This program is designed primarily to exploit the capabilities of nanotechnology and staying beyond the back country of the rapid developments and achievements of this technology has been growing. The building material and construction plant life can be very, very vulnerable, low brittleness, low values of deformation noted. Therefore, this application of nanotechnology in construction materials and facilities we are building.

Key words: Building, Construction, Nanotechnology, Materials, CNT, Insulation.

INTRODUCTION

Nanotechnology and the understanding of the great features of this revolutionary technology, the organization and development of national programs in many countries of the world. This program is designed primarily to exploit further the capabilities of nanotechnology and the countries behind the rapid developments and achievements of this technology has been growing.

The countries of nanotechnology has been so high that the investment figure in the realm of \$ 800 million in 2000 to more than \$ 3 billion in 2003, has reached. Of direct government investment in nanotechnology, showing the importance of It is this: in 1997, was \$ 430 million state investment in this area and in 2002 this figure had increased to two billion and \$ 200 million and 604 million U.S. dollars from the country and is dedicated to total of \$ 450 million to 650 million dollars to Europe and Japan, and the remaining amount is allocated to the other countries. In 2003, four billion dollars of investment in nanotechnology has made it a 3 billion public sector and the private sector has provided one billion. From 1990 onwards, nanotechnology theories were proposed and have had moderate trend growth in 1994 and was active in nanotechnology in the production of knowledge and products to the serious discussion in recent years has been proposed. The U.S. National Nanotechnology Initiative in 2002 to develop and organize research programs, allocating funds for activities focused on nanotechnology and launched several national laboratories have been made in this field. In Iran, a new approach has been associated with nanotechnology, but the current restrictions (for reasons such as economic stagnation and lack of compatibility with international standards) is during this process slowly. Of nanotechnology as a "renaissance of technology" and "lubricant flow investments" is mentioned. Products of this technology relies on well-being and quality of life in the big LV and defense capabilities and the environment will lead to displacement economy will be large. Now public and private sectors of different countries including Japan, USA, Europe Union, China, India, Taiwan, South Korea, Australia, Israel and Russia in intense competition over at least one of the world's leading information technology spend . Together, the now 30 countries in the field of nanotechnology "national plan" or are being developed, five years in nanotechnology research and development budget to 5 / 3 times have increased. Japan and the United States and nano technology have announced their first priority.

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Nano in Three Kinds of Heat Transfer Including Thermal Radiation, Convective Transport and:

Phenomena associated with characteristic molecular nanotechnology materials to enhance their quality is. Indeed, the methods used, the distances between molecules or atoms substance that reduces the maintenance of their properties, new properties such as hardness, transparency and provides insulation. Now the technology has grown substantially in all industries. Nano or Nanotechnology NANSULATE new thermal insulation material is a good thermal insulation and protection against all three types of radiation heat transfer, convective transport and is. With this property that can easily be used in buildings in the operation and no apparent change in the composition does not cause the building. Heat insulator nano lowest among all the insulators and the special character of the liquid product that can take advantage of it by any means, painting provides. Types of technology products to cover all surfaces with high adhesion properties is provided. Prevent corrosion under insulation pipe insulation is the most important problem is the oil and gas industry. Provides Nano insulation is insulation that is just as easy to paint on metal surfaces and non-metallic by Pystvlh, brush and roll painting can be used with the relatively low cost and saving space without any change in the energy loss of be. It has different types of insulation for GP types of non-metallic surfaces and metal surfaces used for the PT is great. The insulation products for buildings, commercial, storage tanks, pipes used in oil and gas and shipbuilding industry. Nano-thermal heat transfer characteristics in three types of radiation, and convective transport are: A - preventing corrosion and insulation B - Easy to use by brush, roller or spray C - non-toxic water-based D - Color: transparent, white coating, which is also available E - can see the layers of insulation under the direction of visual F - Excellent stability with excellent adhesion on steel, aluminum and galvanized steel, fiber glass, PVC, wood, concrete and plastic, and other derivatives. G - no anti-microbial additives harmful or fatal H - Resistance to various molds and fungi. I - cost savings in the long run J - 150 to cover 175 square feet per gallon depending on the tissue that covers the three stages (14 to 5 / 16 m) Benefits of nanotechnology in three types of heat transfer including thermal radiation, and convective transport are: A - Protection against corrosion under insulation (CU) B- heat insulation while being a little thin and thick C - Resistance to moisture and fungus D - to save space (both wet coating 5-3 mm in inches (mm 125/0- mm 075 / 0) 3 coating it completely dry in only 5/4-5/7 inch mm (112/0- 181 / 0) space will work) E - washable with soap and water F - can be stained G - Installation cost H- Anti-fire I - Stainless G - Ideal pipe insulation K- to withstand the high temperature boundary of 204 ° C (400F) L - Easy application M - Suitable for domestic and industrial uses. N - energy saving

CNT in Building Materials:

CNT is (Carbon Nano Technology) have many special properties. Chirality range of electronic tubes depends on the chair, and other types of metallic tubes (Semiconductors) are semiconductors. degree of conductivity or semiconductor can be controlled by doping. Gradually the presence of oxygen on the conductivity (Conductivity) affects the CNT. Changes in size or change the time on mechanical and electronic properties, is effective. CNT also Field Emitters (field emission devices) are of high quality. The carbon nano tubes in a strong electrical field causes electrons to be emitted with high efficiency without damaging the tubes. From a mechanical perspective, CNT is the strongest material ever known. A degree of elasticity (elasticity) is that the amount be increased Tpa1. The ultimate measure of Strength & Strain (strain hardening), but it is very difficult to measure Yield Strength (yield point) SWNT single-walled nano-tubes of 63 Gpa, and Yield Strains of around 6% or more. CNT highly flexible manner so that the bending circle or not, such as microscopic tubes that can fit under this flat or Buckle (wound) are. May Thermal conductivity (thermal conductivity), they are much closer to the way carbon Ed Theoretical hair is considerably high. If these estimates and assessments are correct, CNT is a material that has the highest thermal conductivity Thermal conductivity at room temperature. CNT thermal conductivity along the tubes than they are wide, thus creating the potential for the thermal conductivity properties of anisotropic (heterogeneous). Many applications of CNT for further expansion of industries and applications will be developed for the construction industry, there are at least three areas of research that leads to products exclusively and specifically for the building. The research areas include construction of CNT composites and building materials available, using strings and string as elements of the CNT and CNT systems, heat transfer due to superior strength, stiffness and high aspect ratio amplifiers is are excellent. Polymer, cement and glass materials for all potential candidates are the CNT matrix. CNT reinforced with glass fiber or other nano-nano-fiber or nano-tubes due to their ability to enhance strength without interruptions in the transmission of light are considered. CNT longer produce enough rope to form a clear and obvious possibilities for future applications such as suspension bridges (suspension bridges) will be created. Strength and elasticity to the design of CNT Spans (talc and stepper), considerably taller than anything that will bring the technology makes available. The use of the CNT rope concrete improvements in the

buildings may not be practical. The theoretical ability to reach beyond cable systems have the Geo Synchronous orbits of the Earth's surface. Lifting the upper and lower chambers are the cable and transfer the load to the Earth from space and vice versa, will provide the lowest energy. CNT is the only substance that handle large loads of construction will be necessary. CNT material with cement and concrete systems are an interesting potential. As matrix materials for carbon steel and cement micro-meter diameter was used. CNT is expected to be greater than the benefits of this type of fiber. First, because of the greater strength of the CNT fiber, which will improve the overall mechanical behavior. Second, higher aspect ratios of CNT and gaps around pipes need a lot of energy to release. Conversely, compared with the width of the tube with the aspect ratio will be lower. Thirdly CNT with diameters smaller than the matrix cement in a wide interval of the fiber can be distributed, interactions and their interaction with the cement matrix will be different than the larger. CNT with diameters close to the thickness hydrated cement and CSH, a very different behavior can indicate different mechanisms such as bonding (bonding). The carbon nano tubes can operate so that the chemical elements and compounds, cement, and the response to other forms of passive and active control systems for cement, expanding and improving. Other composites such as CNT, in order to achieve the major issues on the supply of cement composites - High-quality CNT, CNT distribution in the cement and the bonding between two materials is achieved. One way to spread (disperse) to the CNT in surfactant water is mixed with other solvents, is very common in polymer composites using synthesizers for concrete improvement in performance is clear. The small amount of water containing 5% Super Plasticizer CNT can be dispersed using sanitation. The second track is the path to improvement alumina composites - CNT has been done. This CNT dispersed in ethanol are under Sanitation. These preliminary results are presented in this paper. Value equal to 0.007 gr, CNT Commercial production (1.4 nm single-walled carbon nano tubes Carbon Nano production Technology Ins), and pure as the "Bucky pearls" (2 hours in ethanol with (Power) to low Sonic ate. Ordinary Portland cement was added 0.43 gr of powder and liquid to cement Slurry - CNT - ethanol is formed. Slutty Sonic ate was continued for 5 hours again. Next, ethanol evaporates and a thin sheet of brittle cement - CNT composite of carbon nano-tubes attached to the cement particles will remain in place, which are tectonic porous. It appears that the evaporation process and Sanitation on the shape and composition surface of cement particles with the appearance of them is harder. Sanitation of isolation and separation of other particles if the particles are very fine cement particles trapped in the CNT paper are longer than the depth of the paper. Then part of the paper, cement - CNT materials separated by a mortar mill, single-cement particles can be examined. Both powder and paper mill using SEM, (Hitachi S 48001 cold field emission gun scanning electron micros cope) with moderate to high magnification (X200000 - X54000) were tested. Typically in the form of nano-catalyst particles are present. Thought to be the single carbon atoms and particles to penetrate its surface. The tube or tubes that join growing. Depending on the particle size and shape of the existing environmental conditions, SWNT or MWNT will be formed. The final length of the CNT is dependent on growth conditions. The catalyst for CNT production results in the production of large single crystals of strings or regular CNT is composed of several tubes, controlling the position of the catalyst, however, most of nano tubes to form a group or field produced, cohesive format that multiple tubes together with the forces have. More images of CNT in the CNT field images, the AFM is only the "Atomic Force Microscopes "and electron microscopes with high resolution (High resolution) can show the images of individual tubes. (Fig 1).

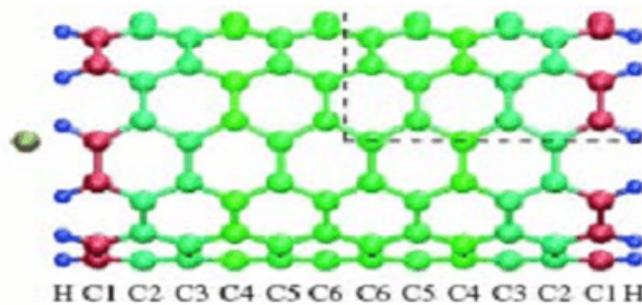


Fig. 1:

Failure Analysis (Failure Analysis):

Failure analysis and prevention, is an important work that is necessary for all civil structures. One of the very important role in engineering analysis and failure analysis has been engineering materials. Whether a piece is broken or not working at the time. Or during production (during the manufacturing process), in each case the failure to understand how to prevent from happening again in future, be determined. One of the cases

studied to determine how the use of instruments, components and structures, which should be studied. Analysis of failure on the part of the industries in which the pressure constant and variable (eg presence of elevator) there. Failure analysis (Failure analysis) sometimes prevent us from failure (Failure Prevention) is called. How is a fatigue fracture of components. The materials used in construction machines, in places where this occurs there regularly. Failure to analyze the structural components, mechanical testing should be performed. For example, we shall know when the garage doors in place this spring on how much force is applied. Also, the number of times that this force for a period of one year in the know into pieces. Using analytical methods and computer modeling methods can be used to answer our questions and we predict that the fatigue after the spring or cycle occurs several times. By comparing the results of the model with fatigue test results can be assessed accurately using the model. tensile test and fatigue test is performed on a sample of the spring. A prototype system for testing of building materials due to fatigue and exhaustion caused by small periodic forces (dynamics) is. The device works in both tension and pressure. The possibility of fracture occurring in the building was expressed by the fatigue phenomenon. How can I tell that to the fracture occurred due to fatigue and brittle due to other mechanisms is not being metal? In response to the piece Fractography do. X-ray study is the failure of a microscope. Before the advent of electron microscopy (TEM, SEM) was performed difficult.

Nanotechnology, New Materials:

Future buildings should be able to apply new technologies and create a healthier environment, the higher the level of productivity, enhance security and to prevent wasting energy. Despite the problems in the field of Architecture (increased costs of construction, polluted cities) and its direct impact on the building, more attention to new technologies and their role in optimizing energy consumption in buildings required. Nanotechnology promise significant advances in solar energy conversion and storage, thermoelectric converters, and more, the fuel cells are very efficient. Controlled nano-structures and compositions and methods for obtaining new materials used in modern buildings, many hopes for building energy management in buildings and cities, especially for the promising future. Nanotechnology activities in the developing world, and learn important aspects of nanotechnology have been stranded without a coordination of strategic research and development programs is difficult. To prepare appropriate materials for building energy control is possible by this technology. Given the characteristics of this technology can be put at the disposal of construction materials to meet the new expectations:

- A- Limiting the heat transfer in the amount authorized.
- B- Sealing and packaging are not required
- C- Create more sustainable in environmental and climatic factors
- D- Stable enough to fire (thermal insulation and shell parts Grmabndy External) with static and stress resistance
- E- The thermal insulation (heat rating) of the building, securing and maintaining comfort conditions Spaces easily controlled with heat and energy saving should be done.
- F- Reducing the thickness of the thermal resistance of a shell form.
- G- Durability and super strength
- H- High hardness
- I- Glass reinforced (enhanced strength without interruptions in the transmission of light)
- J- More strength in the construction of suspension bridges.
- K- The design of arches and bridges with the larger jet.
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But given the rapid growth of scientific research (theoretical) and practical in all areas of nano science and technology, very little attention to the construction industry and general applications of this phenomenon is in construction.

Conclusion:

Building design and construction costs are not only a cost but the cost of maintenance and its use is also included. Many buildings with different uses for their performance targets are not functioning properly in order to provide the highest return possible for users. These buildings are no facilities for energy management and cannot respond to environmental changes, and new needs are. Nano or Nanotechnology NANSULATE new thermal insulation material is a good thermal insulation and protection against all three types of radiation heat transfer, convective transport and is. With this property that can easily be used in buildings in the operation and no apparent change in the composition does not cause the building. How is a fatigue fracture of components. The materials used in construction machines, in places where this occurs there regularly. Failure

to analyze the structural components, mechanical testing should be performed. Ability to prepare materials suitable to control energy in buildings caused by the nano-hardness is very high - glass reinforced (enhanced strength without interruptions in the transmission of light) - more strength in the construction of suspension bridges and arches of the bridges with a bit larger.

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