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Performance Materials, Nano-biotechnology in Agriculture as Biological Sensors

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Abstract: Nano-sensor and relatively low market value of $ 185 million in 2005 to 2.7 billion dollars in 2008 and will reach 17.3 billion dollars in 2012. This enormous figure may seem irritating. But there is truth behind the market of micro and nano sensor consists of customers who get together each of their needs, urgency and complexity of its own. Regarding the economic criteria, to analyze the performance of nano-biotechnology in agriculture as biological sensors that turn. The frequency required for the production, recovery and purification for gene therapy, nano-bio materials, nano-structures assembly of proteins as drug carriers and the virus particles There is a vaccine for use. Relationship of this article by nano-bio materials (diameter 10-300 nm) between production and utilization of recycled materials and second-generation biotechnology products that pay. Nano-bio materials for the manufacture of top-down and bottom-up methods used. This paper reviews the biological nano-structures, multi-layer film, the bio-nanotech sensor we use is agriculture.

Key words: nano-bio materials, agriculture, sensor, environmental, biological, protein.

INTRODUCTION

1 - Nano-sensor Abilities:

Nano-enabled sensors and sensors with different nanotechnology applications in various industries such as transportation, communications, construction, and welfare facilities, medical, health, and national security (including national defense and military operations) are. Among these sensors can be wired to the chemical and biological nano-sensors can recognize, nano-sensors that are placed in blood cells and very rapidly due to radiation damage in astronauts and nano-shells that can recognize recognize and destroy tumors, he noted. Smaller scale, with a tendency to start downsizing the macro and micro technology was leading to the present is quite common. Technologies, microelectronics, optical and mechanical sensors, all of the benefits of smaller, smarter and more affordable that the work on information technology, fiber optics, optical instruments micron and micro-electro mechanical systems, they were entitled. Progress with the construction of these units are very small, between nanotechnology, biology and information technology convergence and of progress there are also benefits. Smaller size leading to lower weight, lower energy consumption, are becoming more sensitive and specific, and these are just some of the impact of nanotechnology on sensors.

Make the world of nanotechnology advances were made in the late twentieth century. The most important of these developments is the ability to manipulate individual atoms to form control (a building with atoms) by methods such as scanning microscope survey pointed out to you. Initial success in producing significant quantities of nano particles such as silver and gold exploration properties and new materials and useful tools in molecular and atomic scale (which is partly due to quantum effects and surface) to the other factors helped production of carbon nano tubes (CNTs) that are very thin and hollow cylinders of carbon atoms are. Both single wall and multi-walled nano tubes can be found in his own end and as a biological sensor for the detection of DNA or protein are used.

This coupled with the ability to grow nano tubes at specific locations and then working it by hand, creating the possibility that these nano tubes can be used in electronic equipment and sensors. And the form of single or an array of sensors to be used in making logical Roubeshgar. Technologies related to materials, tools and systems that were once relatively isolated from now on have to be integrated. First came the transistor and the IC, the micro-optical micro-mechanical tools integrated together and created the PCB. Chips using flip (when the chip is one) and putting the components inside the PCB, which is caused by the boundary between the tool and the system is already fading. The high level of integration of nanotechnology into basic

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materials created by very smart, tools and systems is likely. We are serious about making sense of interaction between a small number of molecules, processing and data transfer and storage of information by a small number of electrons in nano-scale structures think. Single molecule fluorescence and other diagnostic tools have been developed. Data storage systems (single-molecule detection tools) for creating and reading on the origin of nearly Roubeshgar on polymer nano-scale uses. And can give information about the density Go and read bits per square inch on the density of magnetic memory available is much higher. Although the nano-scale integration technologies, creates substantial challenges, but can lead to production of small sensors, and intelligent use of the low prices that are cheap to produce in large quantities. The sensor probe of the structural materials in situ, in many sensor systems such as satellites and space station structure and the size and weight limitations are met, if applicable. Nano materials and nano-structures in other application areas be. For many sensors, particularly those that are used to identify the chemical and biological materials, there are two separate functions:

A- Identification of molecule, or anything about the other.
B- Convert the signal to be detected.

Nanotechnology enables us to design our sensor are much smaller, more energy efficient and more sensitive than existing sensors are micro or macro. Therefore, applying this type of sensor to be useful in micro-electro-mechanical or micro-sensor systems than the other. Recent advances in the production process of top-down micro and nano technologies are accelerating growth. Advanced IC manufacturers of lithography, engraving and custom layer structures on the site for building material such as silicon are used. Microelectronics to the nano scale are normal. Near 100 nm wide lines on chips has been growing. By means of micro-electro-mechanical systems are built with the same top-down processes. The smaller dimensions of this process can produce nano-scale components to process different. Bottom-up approach in nano-structures useful for a variety of atoms and molecules and the structure of atoms and molecules can be useful. Appropriate in the circumstances, atoms, molecules and larger structures can make their own arrangements. Otherwise, the arrangement is used directly. A combination of top-down and bottom-up nano-scale processes, the various tools available to designers, materials and tools development. Designers can also develop new sensor systems, micro and nano technologies will together. There are powerful computers and algorithms to simulate the nano-scale Interaction nanotech sensor means that we not only experimentally but also to the calculation of charges. This code, using molecular dynamics and computational tools that have become essential; done.

Many issues must be considered in the design of nano-sensors (such as issues related to exposure levels, spreading heat and electrical and mechanical problems related to interference), micro-sensors are the same issues, the contact surface in a micro system the transfer of unwanted electrical, mechanical, thermal and possibly chemical, noise and light. For solving problems related to unwanted signals and molecules in very small systems, the low temperatures required for noise reduction equipment is secondary. Biological and chemical sensors in gas or liquid that enters the system, then it is off, flow control is vital. Moreover, appropriate levels of sensitive and prone to degradation by the sensors of foreign material, are heat and cold. But too many of these sensors be installed in a small space that can cause poor performance of the sensor regardless of the system and we have a long life.

2 - Nano Sensor:

Sensors that are only based on nano-science, are very low and the development of sensors that are capable of nanotechnology is in its early stages, nano-sensors are divided into several categories:

A - Physical Sensors for Nano:

A small particle of carbon nanotube mounted to an end and to the other, a charge is applied. Carbon nanotubes are strong and flexible like a spring practice and started to swing it without breaking. Particle of mass changes in the vibrational frequency of nano-tubes, with and without particles, are calculated. Thus, this method may be used to measure the mass of single biological molecules. And an electro mechanical sub-micron meter to make and alter its characteristics.

B - Chemical Sensors:

Nanotube hydrogen sensors based on titanium in a network of wireless sensors is used to measure the concentration of hydrogen in the atmosphere. A chemical sensor for gaseous molecules such as NO2 and NH3, which was developed based on the molecular wire is a nanotube. Ion beam methods for nano production of marmalade and a conversion method for measuring the electron motion is used to jell. This method can be somewhat sensitive to the chemical and biological molecules can be identified with it.

C - Biosensors:

Using nanotechnology, a highly selective and sensitive detection can provide a wide range of biological molecules. The revival of intermittent electrochemical metal ions on alumina substrate can be a cylindrical rod made ??of the length varies from 50 nm to 5 micro meters. These particles or nano-barcodes with different molecules such as antibodies can be coated to selectively detect complex molecules used.

Surface of a chip with millions of carbon nano tubes 30 to 50 nm in diameter that are located vertically, cover. When the DNA molecules attached to the ends of the nano tubes in particular are liquid containing DNA, DNA on the chip connected to the target molecule and its electrical conductivity increases. The sensitivity of this method is that it is comparable with the sensitivity of fluorescence-based methods can be used in portable sensors.

3 - Attractions in Nano-sensor:

The clear advantages of such a nanotech sensor is causing the market as an opportunity to be considered. Nano sensors are inherently smaller and more sensitive than other sensors. They also have the capacity , they cost less than the cost sensors are available in the market. If the economic justification for the mass production of nano-sensors will find their cost of production can be much less than conventional sensors. If the price of common industrial sensors today are some 10 thousand dollars for the nano-sensor that can do no more to be won over $ 10. The nano scale sensor also reduce the cost because they inherently lower power consumption. Finally, since the purchase and running costs, reduce nano-sensors, may be using them as an array of affordable and ubiquitous, and even be able to find used parts additional; to as a sensor of nano and could fall out of orbit, regardless of the safety factor, and remains satisfactory, because many other nanotech sensor system can take it to work. It quickly leads to this conclusion, we find that a nanotech sensor technology, the technology is very safe and acceptable, but when we look at supply and demand equation to find nano-sensors that trade is at the beginning and at the outer angles of view as a dream of amassing wealth. Nanotech sensor of relatively low market value of $ 185 million in 2005 to 2.7 billion dollars in 2008 and will reach 17.2 billion dollars in 2012. This enormous figure may seem irritating, but there is truth behind it is that the market for nanotech sensor consists of a large and small customers who get together each of their needs, emergencies and their specific complexities. The great need for the production, recovery and purification of nano-bio materials for gene therapy, virus particle assembly protein nanostructures as carriers for drugs and vaccines are in use. Created by nano-bio materials here in the Relationship (10-300 nm diameter) and the production and use of recycled materials and second-generation biotechnology products that pay. Nano-bio materials for the manufacture of top-down and bottom-up methods used. Nanotech sensor for 2010 to more than 10 percent of the market has its own sensors, but the size of the sensor market is so vast that even the least growth in the market for nanotech sensor means and the amount of money would be equivalent to several billion dollars within just a few years to come. Involvement in the market value of a good chance to reach such a goal is creating

4 - Barriers to Market Development of Nano-sensors:

All manufacturing industries policy priorities and a nanotech sensor to sensor is so superior are not specific. One reason is that companies, nanotech sensor problems, economic and technical benefits important to know. Such problems and barriers to market nanotech sensor is summarized in the following five factors.

A - Price of Material:

The construction of nano-sensors that are produced in the laboratories of toxic substances (such as gold nano particles) widely used for applications can be very expensive.

B - Production Problems with Materials or Technology Platform:

Basic principles of nanotechnology platform that still are used in the construction of a nanotech sensor manufacturing problems are considered.

C - Construction of the Problems Associated with Nano-sensors:

Long way from models of nano-sensors in industrial laboratories, to reach and easily purchase products that are found everywhere there. In fact, today many of the nano-sensors are at the beginning of this road to its end.

D - No Relation to Real World:

Way communication between devices and nano-sensors are important today. Nano materials and nano-electronics is creating many benefits, but they need to have a tool that can communicate and work with them in the nanometer size. This means that the effects of nano-sized devices must be moved up and this needs to:

D-1. High compatibility of sensitive materials in the nanoscale CMOS nano-electrical components and methods can be used as a microelectronic integrated circuit was assembled.

D-2. Create a software application or part of a nanotech sensor is able to analyze data that may be required.

E- the Assembly of Nano-components:

Nano particle economic need rather than trying to assemble a research program needs to be. To reduce prices and expand the use of large arrays of sensors or sensors, nano-scale integrated circuits manufacturing technology must improve.

5 - Nano-sensor Technology in Agriculture:

One of the major role of nanotechnology-based tools to increase their use of sensors that work together to control the nano-sensors are connected to a GPS device can field across the distribution of soil and control of the product growth they regulate. Using this technology enables us to recognize the history of food. Social and biological sensors, nano-technology will create a tool that is capable of reacting quickly to environmental changes. Using nano-tubes or nano-carriers can be too small to make nano-sensors that can measure a protein or smaller molecules are calculated. Nano-particles or nano-surfaces that can be made ??that are able to pollutants such as bacteria, electrical and chemical signals are produced. To work with smart sensors in the way of agricultural production can be raised and helped farmers make better decisions. Generally, precision agriculture, a new attitude in the field of management that are currently using the nano sensor that determines how much each small part of the farm nutrient and pesticide needs, and thereby prevent environmental pollution, health products and makes it possible to increase economic efficiency. Nano-sensors can control the plants' needs for timely and accurate reporting to the central data processing system to assist in the maintenance of products. Nano-structures can be made ??in small volume but large-scale greenhouse created with a size of approximately 10% of the total land under cultivation at present, the current world population could be fed to the farm to the millions of hectares of land natural for the animals living around the world are returned.

The human nose is an electronic nose design mimicked the design of gas sensor is used to detect odors. The main purpose of the identification and estimation of odor concentration and odor characteristics, especially the human nose is able to identify the main components of this design are the gas sensor. These sensors are based on zinc oxide nanoparticles as nano-wires. Change in resistance of these materials can cause electrical signals to identify which factor is considered. The changing pattern of signals from sensors, for example, the user can smell the quality and quantity. Corn is applying nanotechnology, surface area for greater absorption of food wastes and provide gas nano-sensors are detected. For example, many different colors of fluorescent nano particles in contact with food pathogens can be used to detect contamination. Nano-sensors capable of detecting the pathogen in short time (several minutes, and seconds) that the nano-sensor that can be placed directly on the packaging of food so that the electronic nose to detect chemical or language from Article Food can play. Examples of nano-sensors based on micro system detect pathogens in a short time with high sensitivity and speed are used. The main advantage of these nano-sensors micro, small and their ability to detect substances in very low volumes (micro liters) is a tool for chemical analysis in biological and medical fields is appropriate. In food analysis systems, nano-electromechanical systems (NEMS), which includes parts of the nanoscale dimensional mg, are designed to control food storage medium and a tool that can be used to protect food. A digital spectrometer (DTS) to work with NEMS technology can measure the amount of trans fat in foods to determine. These systems can be designed to control the quality of food because of chemical and biochemical signal trans developed for a specific diagnosis can be used. Benefits of micro-nano systems, food industry, the design of portable devices with faster response, lower cost and intelligent communication between the different frequency levels to the user. In the areas of food safety and quality of these systems due to their ability to detect and monitor any changes in storage conditions, storage and packaging of food are appropriate.

Councilor group of nano-biosensors are based on the principles of their diagnostic ability to detect collisions is bound to biological structures (eg, antigen and antibody, enzyme and substrate and receptor and ligand or small factor in the electromagnetic signals or mechanical physical). Their structures are based on

silicon, the capacity to identify proteins and viruses and bacteria are pathogenic. In studies designed to identify the molecular and chemical pollutants, toxins and antibiotic residues in food products is a good application. Detection of pathogens based on their ability to create multiple frequency vibration on the organisms that produce disease. The technology for diagnosing cancer or pathogens in food and water is based on collisions between the ligand receptor. Councilor nano silicon surface can be coated with antibodies which alter the resonance frequencies of the matter is connected. E. coli bacteria that has been modified with the agarose surface with water and food contamination is a factor can recognize.

6 - Time to Develop Nano-sensor Scenario:

What really prevents the development of nanotech sensor market is a lack of clear and obvious idea is for the industry. Who does not know how much time is needed to find a thriving market for these devices. This in turn a major problem for venture capitalists, investment banks, committees provide local companies and private investors.

It can be assumed that nano-sensors in 10 different industry sectors to be used in any part of the application will find similar types of sensors used in the industries of 7 (gas sensors, biosensors, etc.) and What method of 8 Different aspects of the materials used (such as nano particles, nano coatings, spintronics, etc.) in the $560 = 8 \times 7 \times 10$ and 560 customers for this type of product market are obtained. The relationship of time, we believed that each potential customer must make the following analysis.

Conclusion:

Of today's nano-sensors, nano-particles in various types of expensive metals are used to clay. Nano-sensor technology based on spintronics and nano-tube electronics are located in the early stages of commercialization. Sensors based on quantum dots have been the end of the business process. Now, what really prevents the development of nanotechnology sensor market is a lack of clear and obvious idea is for the industry. Social and biological sensors, nano-technology will create a tool that is capable of reacting quickly to environmental changes. Nano-sensors can control the plants' needs for timely and accurate reporting to the central data processing system to assist in the maintenance of products. Councilor group of nano-biosensors are based on the principles of their diagnostic ability to detect collisions is bound to biological structures.

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