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## New Families of Two-Dimensional Nano Materials

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### Abstract

To review the recent advances in the field of nanomaterial one dimensional nanostructure are used for field effect transistor. Especially applications of nanomaterial are now days used in a wide range for fabrication, functionalization, assembling of these nano sensors. In this study report we are going to study about various application of nano material structure of two dimensional which are used in the different part of society for the sake of human being. Several byproducts of nanomaterial are producing with the help of Nano mechanics and the products we got are nanowires and Nano rods of very small cross-section. By the process it is seen that how the molecules are detected and how the devices are enabled for this purpose of job. Finally it is concluded with recent challenges that are facing to do some work regarding carbon Nano tubes. Carbon nanotubes are made from some free molecules that are used for engineering purpose in every angle.

### Introduction

Nanotechnology and Nano-science which primarily deals with the synthesis, exploration, characterization of Nano structural material exploitation is now the emerging part of research. The characterization of these materials by one dimensional in the nanometer can be well measured. Nanostructures that are individually include clusters, quantum dots, Nano crystal, nanowires and carbon Nano tube here the nanostructure involve arrays, assemblies and lattices that are of super in nature of the individual nanostructure. The chemical and physical and chemical properties of nanomaterial are different from those of atomic molecular or those of bulk material of same composition. The basis of Nano science describes the nanostructure constitute of uniqueness of the structural characteristics, energetic response for the dynamic nature. The invention of new technology and devices controls the property and response of Nano structure. The Nano science and nanotechnology are two themes underlying twofold concept. Some of the important parts of material science are nanoparticle or Nano crystals of metals and semiconductors, nanotubes, nanowires and Nano biological system. Assemblies of nanostructure and the use of biological system such include DNA as molecular nanowire and templates for semiconducting structure that is Nano in nature. In various fields these product are used to help in every section of engineering and application. A nanostructure here describes the Nano science of uniqueness of structural characteristics that has helped to get some special of polymer that has helped us too. Here in this part of study we will have knowledge about nanomaterial such as carbon nanotubes, grapheme and their application to some engineering field and get to know how these things are happening by some process of study. We in this article review would definitely discuss about the use of nano materials in proper way. (Boyle, November 15, 2012).

## Body

Nano science and nanotechnology has grown unexpectedly in the last decade because of the demanding availability methods of synthesis of nonmaterial as well as tools of characterization of data that are manipulated. Several experiments were done for the methods of synthesizing nanoparticle and nanotubes. Single walled Nano carbon walled tube ought to be possess some tensile strength are non-practical analysis. Actually stress and strain responsible for strength at the failure rate.

### Strength and Breaking Mechanism of Multiwall Carbon Nanotubes

Single walled carbon Nano walled tube should possess heavy tensile strength, these are the theoretical analysis. Actually at the Nano stressing stage the single walled tensile strength are measured located within the scanned electron microscope. The microscopic and was recorded in video when the tensile loading experiments were done. A recent and more sophisticated model has been developed to show the experiments value shows the relaxation of tensile nanotubes. After that strength is then evaluated for both Nano tube structure and of parameter such to the temperature rate.

Actually we have measured the stress and strain response and strength at failure of individual are grown under the tensile loading for the specific carbon Nano tubes. Due to reason of the small size tensile loading experiment with individual Nano tubes are not been done for such specific purpose. Onto the firm attachment with AFM is very critical. There could many contributing factor to measuring tensile strength being lower than tensile strength. The small size includes the method of convention of attachment such as grip of both strong adhesive or the grip of both the tensile strength of larger diameter whiskies.

Solid carbon material can be deposited in the microscopic element into the surface element beam repeatedly scans and the rate of deposition on the parameter of imaging the vacuum quality and surface contamination. The residual organic species into the SEM chamber by the electron beam which is following the subsequent deposition into the chamber. It is done on the sample surfaced towards the focusing point of the electron beam followed by the dissociation and deposition. Majority of the Nano tubes fragments are broken projected essentially straight out from the AFM tip. (Yu, Lourie, Dyer, Moloni, Kelly, & Ruoff, 2000).

### Ultra-strong, Stiff, and Lightweight Carbon-Nanotube Fibers

From the very past till now the modern times, new material have been the main material for revolutionary technology. Vision application in the space exploration for a wide variety energy efficient aircraft, armor must significantly stronger. This material should have been stiffer and lighter than the available in the market. As per the report we have seen that carbon nanotubes are having more strength stiffer, low density, good chemical stability and high thermal and electric conductivities.

Here we have the report that Carbon Nano tubes fiber are stronger and stiffer rate than the material available in the market. Stiffer, stronger and lightweight are the main properties requires for the material that are used in construction space structure, aircraft and shuttles. A material specific strength and specific stiffness which are mainly defined as

the strength are the properties to evaluate the specific result. We can say that the most effective way to utilize the properties to assemble CNT into fiber. (Zhang, et al., 2007).

### Carbon Nanotube Fiber with Ultrahigh Specific Strength and Stiffness

We are here to discuss about the tensile testing procedure, the mechanical properties of the Carbon Nano tube fibers were only visualized by Rheometrics solid analyzer and the Shimadzu universal tester with load cell of 5N. In this method 10 mm mounted on the paper tab, which was cut after the paper tab before the testing started it was mounted on the testing machine.

Procedure for maintaining the density of CNT fibers are done using two methods both of which yields a constant value of 0.2. Fiber density from the individual CNT and its package involves the calculation and the packaging density inside the fiber. Quartz crystal microbalance is another method involves measuring the weight of Carbon Nano tube fibers. CNT density and CNT packing density can be estimated by some special methods of the CNT fibers that were under slight tension on the surface of specimens. The CNT fibers are then make in the tensile mode to measure by the carbon Nano tube (Strong, 2013).

### Mxenes

Two dimensional materials are having more popularity due to their unique properties. The most common example is grapheme, and atomically thin layer of atoms comprises of carbon. Measurement of the Elastic Properties and Intrinsic Strength of Monolayer Graphenecan also be get by some of special research that is going from decades. Relation between the changes of potential energy with crack growth of any brittle system is shown in this report. This is published by the groundbreaking structure made by Griffith in 1921. (Endo, Hayashi, Kim, Kim, & Dresselhaus, october 2004). He actually deduced that the actual breaking strength of a material that is brittle is governed by the size of defects and flaws that are found in any system.

The elastic properties and the intrinsic breaking strength of free monolayer are standing by the graphene membrane by Nano indentation of atomic force microscope. The nonlinear elastic stress strain response shows the force displace behavior which is interpreted by this kind of process. The young's modulus  $E = 1.0$  terapascal and the third order elastic stiffness is  $D = -2$  and the intrinsic strength is of value 130 gigapascal only for bulk graphite.

The maximum level of failure that can be supported by the material prior to the defects with intrinsic property, Intrinsic tensile strength by measuring the breaking strength of a serious glass fiber with progressive smaller diameter and intersecting the result to an atomic radius. Graphene which contains two dimensional sheet of bond that covalently attached with carbon atom, forms the basis of 3D graphite and ID carbon Nano tubes. The use of carbon fiber reinforces in advanced composite and may permit such exotic structure as a space elevator, if the microscopic fibers are seen from the closed angle. Above all the strength of intrinsic material cannot be measured due to the presence of inevitable presence of defects and grain boundaries in the microscope (Gogotsi & Gault, 2 october 2014).

## Solid Crystal

A new class of two dimensional early transition metal carbide compounds mixed with carbide known as MXenes. 2D solids, among them most notably graphene have now created some field of research that are going on because of their extraordinary electronics properties which can be used for various industries and biomedical application. Multilayer MXenes are very similar to the multi-layer graphene. (Editors, 2014) The electrochemical optical, mechanical and electronics properties of MXenes can be optimized by some of the parent compound which are define by some surface chemistry and intercalating organic compound for the production of novel material with application that actually range from all electronic devices with some conducting transparent electrode material.

## Applications

Lithium batteries and lithium capacitors are used for the energy storage. These are defines as the electrochemical capacitors with electro catalyst and photo catalysts. Conductors and semiconductors are also used for the advantages of devices. One of another part that is must to be discussed with reinforcement of components. Nanomaterial possess unique, beneficial chemical with mechanical properties, they can be used for a spread variety of application. Some applications are

## Next –Generation computer Chips

Microelectronics industry has been given some emphasize miniaturization, in the field of circuit as for example transistor, register and capacitor are remarkably reduced in size. The main target was to make faster microprocessor which can be getting by significant reduction in size which can contain this component can run much faster at far greater speed. Nano material help the industry break some kind of barrier with nano crystalline ultra-high material with the purity.

## Kinetic Energy

The department of defense is in the current using projectile for its lethal weapon hardened target for the armored vehicles. DU has radioactivity and toxic, explosive lethal to the personnel who are using them

## Ultrathin 2D nanomaterial

Actually the study here to describe about the difference of 2D nanomaterial with some other types of Nano material such as Zero dimensional nanowires, one dimensional nanowires and the 3D network to make it in a proper way. Usually there are some unique chemical modifications, the field which are externally affecting the field with mechanical deformation and doping at highly controlled level.

Generally there are some unique chemical modifications to present excellent mechanical properties due to mechanical thickness. The development of feasible and reliable method for the preparation ultra-thin 2D nanomaterial had a great importance for the exploration of all the properties. (Zhang H. , 2015)

## Synthesis and characterization

Due to the success in the synthesis of nanomaterial in conjunction with the advent of tools are for the growth of Nano science and nanotechnology which has drastically changed in last decade. The synthesis of nanomaterial lasts for organic, inorganic and biological system for manipulations. One dimensional Nano material represents incremental development surfaces with some properties application that are now on the way to great research for new inventions.

## Energy based Graphene nanotechnology

In energy related area graphene based nanomaterial some applications that are challenging in nature. In the recent development improves came from both energy capacity and with the charge rate like in some rechargeable batteries. Graphene are used to make solar cell that are inexpensive, flexible and lightweight with some of catalysts system. (Graphene Nanotechnology in Energy, 2016).

## Promises and concern

Thousands of products are using in the market like clothing, food, sporting goods and medicines are manufacturing using nanomaterials. These are extremely small with at least one dimension not larger than 1 to 100 nanometer. Actually we can say that 1 nanometer is 100,000 smaller than human hair. The most flexible challenge for nanomaterial can be the making of cement, cloth and other material in order to make stronger and durable and also they are lighter than ever made. In case of emergency service like in drug delivery and some electronics has given invaluable service.

As we know the definition Nano size particle have some unique properties with well-studied material considered as very safe in nature just like silver, but may lead to hazard when made it Nano size. On the other hand Nano size material can enter into the human body by indigestion, inhalation and also absorption through skin. Toxicological reaction can also happen in lungs in exposed animal according to the studies. Some workshop has also been presented to give positive perspective on the issue that has been raise for the Nano material. According to Weis Nanomaterial exposure limit are set by some strategic occupational parameter. Human when expose to the nanomaterial is not theoretical, it can only be achieve with some report that took place certainly. Exposures to the nanomaterial are happening daily. (Loose, 2012)

## Some application of Nano mechanics

Resistance of clay under freezing cycle is one of work done in to provide some information for Nano-clay performance. The study here investigates the Nano clay of resistance to the soil that is exposed in freezing condition. Some mixture strategies were taken in the rate of 1.5, 3, 4.5 and 6 percent as well as without Nano clay particle. (HARRIS, 2009)

Nano technology has given good impact on food technology system. The main concern should be now a day is about production of foods as much possible by some natural process without hampering nature's content. Material that have used in a very small while they actually get significant new properties that are not visible greater level as they are micro granular in nature. The ultimate goal for the studies is should be like to achieve a new class of material which they can define for performance and high quality with some versatility. Geotechnical engineering is the

massive part of engineering working for the sake of human being to produce foods my Nano mechanics and Nano materials. (ZAHEDI, SHARIFIPOUR, JAHANBAKHSI, & BAYAT, September 2014)

### **Electrochemical Biosensor using Nanotechnology**

Recent advances in biosensors based on one dimensional Nano structure FET that is Field effect transistor. Some study has been base on the fabrication, assembling, functioning with sensing application of FET based on carbon Nano tubes, with silicon nanowires.

One dimensional nanostructure are nanowires, Nano belts, nano tubes and nano spring is been the main focus of intensive research for the properties and their potential for fabrications into the scale of nano density including some electronics device. For the efficient transport of electron which is thus critical to the function and integration of some anno scale device. In comparison to the 2D thin film where binding to the surface which leads to the depletion or accumulation of charge. Sometime sin the charge accumulation or some charge depletion in the one dimensional nano structure take place in the form of bulk in nature. 1D structure is sometimes inherent with the 2D thin film as results for the current shunting in the carbon nanostructure to avoid reduction in signal. Sensing modality for level free direct electrical read out when nana structure is actually used as a semiconducting channel of FET. (Berger, Mar 15, 2016)

The sometimes summarizes the advancement so far have done in biosensor based one dimensional nano structure. Controls on the dimension, properties and morphology depend on good methods for generating nano structure. Solid state structure is covering various nano structures like use of templates with some one-dimensional morphology to direct the formation of one dimensional nana structure. Some crystallographic structure of a solid in solid state nana structure is mostly used to describe widely. Symmetry of seeds is maintained by using liquid and solid interface by reducing it into specific part.

### **Carbon Nanotube**

In the year 1991 the carbon nana tubes were first observed which occurs as multiwall nano tube and single walled nana tube. There are some primary methods like laser ablation, gas phase catalytic growth for carbon monoxide. Carbon nana tube synthesis, subsequent purification steps are required. Whereas the process forma large scales nano tubes are produced with fewer impurities. In the process of arc discharge technique generally we use the two high purity graphite rods. Under the helium atmosphere the rods are brought together and a voltage is applied in the stable atmosphere.

As the anode consumed here, a constant gap is being produced between the anode and cathode is maintained by adjusting the position. To create nanotubes electrodes are need to be doped with small amount of catalyst particle. On the other hand laser ablation method is used over the years for the production of fullerenes to produce carbon nanotubes. (Johnson, New 2-D Material Hits the Goldilocks "Just Right" Button, 1 Mar 2016 )

Both arc discharge and the ablation techniques produce a limited volume of sample in relation for the size of carbon source and sometimes need subsequent purification steps to tubes from other sided byproducts. So after having this disadvantage gas phase technique such as chemical vapor deposition in which nanotubes are formed by the process of decomposition of some hydrocarbons or carbon monoxide. This gas phase process is the continuous process since the carbon source is continuously exchanged by some other gas that is not used such in the process of gas. Carbon nanotube is the greatest invention we made for the molecules, actually carbon particle sand ferrous part helps to



make that carbon nano tubes. (Johnson, Piezoelectric Graphene Ink Enables Thin-Film Pressure Sensors of Any Size, 26 Feb 2016 )

### Silicon nanowires

By the process of thermal evaporation the reported synthesis was sublimed a hot press silicon target mixed with iron at 1200 degree centigrade. The vapor liquid solid method involves the use of liquid metal solvent with low solubility for silicon and other element that are soluble material in nature. This method is the popular and successful to produce carbon nano wires in a large quantity at very low temperature. In the VLS process gold that forms low temperature eutectic phase where silicon is used as the catalyst for nanowires. A silicon gas source is a source of silicon tetra chloride for eutectic temperature with silicon is used as a catalysts which is heated. (Wanekaya, Chen, Myung, & Mulchandani, 17 January 2006).

### Theme

The basic theme of this report about the nano materials is to deal with the inventions that are quietly affecting the society. Nano materials are using in different part of field to functionalize, assemble and maintenance of particular. If summarized the 2 dimensional recent advancement of biosensor in the field of nano material. Fabrication methods are very important that are used to take some time to proof about particular things. My report is also covering the theme of carbon graphene and its application the certain process which are fruitful for society. Nano crystalline tungsten alloy of heavy mixture such as boundary sliding are evaluated for the potential nature. Recent trend of market has changed so far due to the need we have, as we all know need is the mother of all inventions.

All the things that are so far invented are due so some need. The basic theme of this part of study is that to take in account of all advantages and disadvantages. Nowadays people are more attracted to the part that are nano in nature whatever they want in their life. Suppose engineering field has improved a lot to invent these types of carbon nanotubes that are really helpful to find those materials. There are various dimensional factors of nanotubes, one dimensional part not always discloses the part of material we are searching from number of experiments.

### Conclusion

The main purpose of nano technology proves that it has some unique properties. We have studies here about carbon nano tubes which are made from carbon monoxide and iron compound. Subsequent purification steps are being used to take of that entire element to make Carbon nano tube. Carbon nano tubes are most promising for range of application in wide range applications involving electronics, mechanical strengthening, photons and also heat dissipation. Semiconducting carbon nano tubes emit some luminance in the wavelength region. Metallic nano tubes have low resistance and high capacitance to carry larger current than metals.

Carbon nano tubes have excellent thermal conductivity which makes it for heat dissipation. In this chapter of study we have focused on carbon nanomaterial. We describe and analyze its synthesis process with their electronics and physico chemical properties with some real time examples in hand. The making of quantum device is solely responsible from the exotic application is the use of this types of molecules. The study was on the various chemical syntheses that have been applied from monomers and dimers to large have 1D and 2D architecture to make carbon nano tubes.

We here discuss the properties of grapheme and all carbon nano tubes. Here we have also covered the quantum phenomena can be study using this material and performance are checked at some of the operational level where innovative science can be at very early stage. Carbon nano tubes and nano material that we are discussing have also some disadvantage at their particular range with their potential and application ranging from quantum to the medicine industry. Our intention was to make molecule more visible and unique that need to be overcome. This part of study is the testament of importance of carbon nanotubes and their derivatives are also not far from finding their own way in the term of several experiments that has done to solve such properties that are came into being for carbon nanotubes.

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