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# NANOTECHNOLOGY USING COMPUTER SCIENCE IN AERONAUTICS

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## ABSTRACT

This thesis attempts to provide insight into the valuation of nanotechnology firms by examining the value relevance of non-financial variables in the equity valuation of nanotech institution. In this paper is used to motivating the fact that nanotechnology companies often have rapid growth rates while not receiving significant income. Before research points to cannot be touched assets being the primary value drivers for nanotech institution. We paper analyzes how traditional valuation methods used by potential investors or justice partners can be applied to such institution. The main focus of this nanotechnology paper is the DCF-method with the CAPM used to determine the discount rate, that defines the company risk and is therefore directly link to the subjective appraisement of risk. Brunswik's lens model is applied in order to quantify how such non-financial data is used by analysisthe estimate value asset to be true. This study is mainly to apply the lens model to business evaluation technique. Correlation and regression analysis of forecasts state how important each any every information factors is evaluating for a companies. Actual market caps of examined nanotechnology institution are used for accuracy comparison to the predicted values. The results of the nanotechnology study indicate a high relevant on the risks of non-financial variables for the valuation of nanotechnologyinstitute. Analysts are successful for applying relevant to be composed the information. As findings shows a large dependency on non-financial factors for equity values to the analyzed institute, recommendations are give for improve the valuations develop by nanotechnology analysts and investors. Aeronautics using nanotechnology in computer science through sensors and also we discussed about materials and other aspects of nanotechnology.

## KEYWORDS

Nanotechnology, Nano Fiber, Aeronautics, Sensor.

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## 1. INTRODUCTION

Nano science primarily deals with synthesis, characterization, exploration, and exploitation of nanostructured materials. These Nano materials are defined by at least one dimension in the nanometer range. One nanometer size is the length equivalent to 10 hydrogen or 5 silicon atoms aligned in a single line. The processing structure and essential quantity of materials with grain size in the tens into several hundreds of nanometer range are research areas of consider for interest over the past years.

On Nano scale, some physical and chemical material properties can differ significantly from those of the bulk structured materials of the same composition; for example, the theoretical strength of nanomaterial's can be reached or quantum effects may appear; crystals in the nanometer scale have a low melting point (the difference can be as large as 1000°C) and reduced lattice constants, since the number of surface atoms or ions becomes a significant fraction of the total number of atoms or ions and the surfaceenergy plays a significant role in the thermal stability.

Therefore, many material properties must now be revisited in light of the fact that a considerable increase in surface-to-volume ratio is associated with the reduction in material size to the Nano scale, often having a prominent effect on material performance. Historically, fundamental material properties such as elastic modulus have been characterized in bulk specimens using macroscopic, and more recently microscopic, techniques. However, as nanofabrication advances continue, these bulk properties

are no longer sufficient to predict performance when devices are fabricated with small critical dimensions. Although nanotechnology is a new area of research, nanomaterial's are known to be used for centuries. For example, the Chinese used gold nanoparticles as an inorganic dye to introduce red color into their ceramic porcelains more than thousand years ago.

## 2. PURPOSE OF THIS NANOTECH REPORT

The purpose of this nanotech report is to assist EPA in its exploration of the potential for usingNano-enabled technologies in the cleanup of radioactive contamination, and in decisionsto assist with the development of viable technologies in this area. For the purposes of this nanotechreport, "Nano-enabled technologies" is based to the technologies that are make abled by a Nanosub system. This report will be used to identify and evaluate emerging applications andimplications (both health and ecological) of Nano-enabled technologies for themediation of sites contaminated with radionuclides.

## 3. APPLICATION OF NANOTECHNOLOGY

Descriptions of nanotechnology that characterize it purely in terms of the minute size ofthe inner features with that it is concerned assemblies between the size of an atomand about 100 molecular diameters make it noise as even nanotech is simplyusing many smaller parts than conventional engineering. However, the working mattersare truly more complexity. Rearranging the atoms and molecules leads to newquantity andunusual behaviors. A transition is plain between the fixed behavior of all the individualatom, molecules and the adjustable behavior of collectives things. Many scientists are nowresearching the fundamental nature of nanotechnology thing in a large spectrum of academic fields from the basic sciences things to engineering things. Much of science are knowingsuch as colloidscience, electronics, chemistry, physics, and genetics. These will be applicable, but increasingnew breakthroughs.

The latent applications of nanotechnology range across a broad scale in the fields. In medical sciencethat could be possible to improve the tissues are suitable of implants tocreate a platform for execution a buildings for tissue regeneration otherwise perhaps even to the build unnatural organs. Examples are given below:

- IBM has added Nano scale layering to disk drives, thus exploiting the giantmagneto resistive effect to attain highly dense data storage.
- Gilead Sciences is mainly used for nanotechnology in the form of lipid spheres that also knownas liposomes. Then which measured about 100 nm in diameters to encase the anticancerdrug to be treated for the AIDS related Kaposi's sarcoma.
- Carbon Nanotechnologies, a company co-founded by Bucky ball discovererRichard E. Smalley is developing carbon nanotubes more flexible by using a newthing and more efficient manufacturing processing things.
- Nano phase Technologies is utilizing Nano crystalline particles, incorporated intoother materials, to produce tough ceramics, transparent sun blocks, and catalystsfor environmental uses, among other applications.

## 4. DESIGN AND ASSEMBLING

Design and assembling of such artificial media, search for new unusual effects and phenomena, as well as development of the up to date Nano devices on their base seems to be the most promising way in the nearest NT development. The example is the discovery of "left" matter or met materials, in which unconventional inverse refraction law, inverse Doppler and inverse Cherenkov effects were observed. In nanomaterial's science the structure-form engineering will put in the forefront in addition to the impurity engineering.

Material becomes not a raw or a pig but it is forming at once as a Nano work piece. Note that advantage of nanomaterial's is hoped to proclaim itself just at developing of Nano devices, the electronic gnat for example, rather than in the large scale industry. By peculiarity of the Nano worldis the cancellation of distinctions between the living and inorganic matter. The exchange of substance being the indication of life manifests itself on the supramolecular level rather than a molecular one. Proteins, membranes, and nucleon acids refer to giant natural nanostructures built in result of self-assembling.

The analogy opens a fantastic opportunity for nanomaterial's and Nano devices fabrication by such bio mimicry. Artificial growth of pearls inside mussels, as well as ordering of no equilibrium defects into 2D nanostructures on a surface of semiconductors under the

ion bombardment and implantation are the examples. Principal question is "what are the peculiar features inherent to nowadays nanotechnology taking into consideration that atomic and molecular physics, chemical synthesis technologies, microelectronics, etc., were existed before NT era?" .The novelty includes:

- The artificial manipulating by Nano objects and manual or automatic assembling of theNano devices designed beforehand using a "bottom-up" approach.
- The deliberate meddling in processes mechanisms with the comprehensive control of a chemical self-assembling at molecular level.
- The invention, design and production of Nano devices of sub micrometer size followed by their integration into micro, mezzo, and macro systems.

Entering into NT it should be warn of some illusions and problems. Firstly, decrease in particles size is restricted from below because it does not always result into improvement of the properties. For instance, the optimal size of disperse inclusions in oxide ceramics ca. ~10–20 k was shown to exist at which the optimal combination of hardness and durability is achieved. Secondly, with particles size decrease the processes of thermal instability and phase transitions were shown to take place resulting in no durability of Nano systems. For instance, the well-known words IBM, NANO, and corals drown on substrate by atomic force microscopy were turn out to be unstable due to fast surface diffusion of building atoms.

Since the covalent bonded semiconductors and ceramics preferably appear to be stable and durable, the nanomaterial's for NT are thought to be nonmetallic. Thirdly, a cosmic irradiation and radiation background are capable atoms to knockout from nanostructures leading in degradation of their properties and in worsening of Nano device operation. Fourthly, a thermal noise and vibrations will be significant circumstances influencedthe properties and characteristics of Nano devices. In particular, it limits certainty of probe microscope position, which must never be less then a half-amplitude of thermal vibrations.

Fifthly, even negligible concentration of inherent impurities and irremovablecontamination enable to destroy the assembling processes, so a super-high-purity feedreagents and clean-room processes are required.Concluding, all physical discoveries in vacuum have been already made exceptfurther discovery of the vacuum itself. Novel discoveries, laws, phenomena, technicaldecisions, solutions, and inventions will be possibly made only in special designed andassembled artificial nanostructures to be fabricated by future materials science.Materials science concept is shown in fig. 1 illustrating the inherent interconnectionbetween the composition, structure, properties, technology and applications.

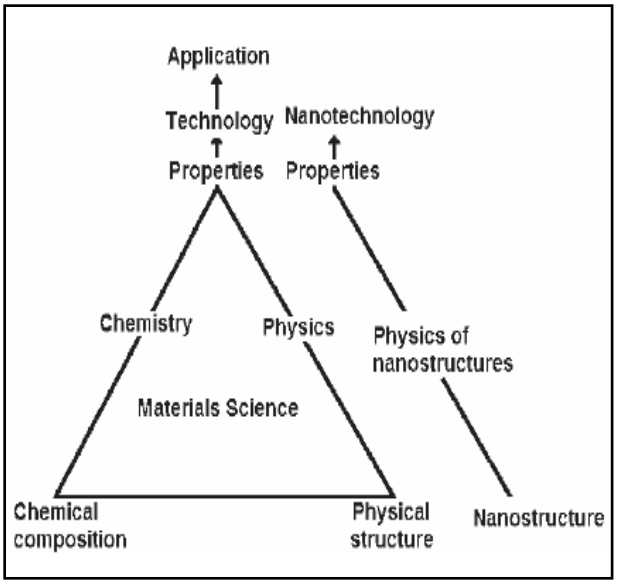


**Fig. 1**Fundamental triad of materials science.

Material is not a dull bar, blank, block, pig, but it is the immense word, the Universe, the media in which new physical laws may be discovered. Actually, there are 100 pure natural elements in the Periodical Table on base of which 10,000 XY binary, 1,000,000 XYZ ternary, 100,000,000 quaternary, etc, compounds may theoretically exist accounting the chemical composition. This abundance in many times increases with account of physical structure including nanostructures. However only 500,000 compounds are known presently to exist in modern crystallography database. Hence the abundance of novel undiscovered compounds with new unique properties is very huge forming the challenging frontier of research for future nanotechnology. At present time we meet NT in child age.

The announcement of grand projects, such as biochips and Nanobio robots for medicine, smart dust for space research, etc., have become as motivation for its intense development, that may influence upon a civilization development. In USA, EC, Japan, Russia and other leading countries the great funds were released for NT projects. The perspectives of NT at the beginning of 21 century looks very optimistic, since a severe reality is

capable to darken these somewhat naive prospects. However, in any case the development of NT is unavoidable and it is doomed to success.

## 5. DISCUSSION

This study only refers to a small amount of non-financial factors which are consideredwhen valuing a nanotech firm. The small sample size of 17 evaluated companies cannotbe representative enough to ensure results which are relevant for the complete nanotechindustry. Other limitations of this study can be found in the experimental setting. Suchan experiment cannot fully replace real life conditions. The evaluation of the risksemanating from the management team of a nanotech firm could not fully reflect a realsituation to make real investment decisions. The investor may be interestedin having the right personal relationship between him and the management of the company. Thisis important as the investor will usually have the same interest as the entrepreneur oftrying to make the company a success in the future. However, such face-to-faceimpressions of management team members were missing when nanotech companieswere evaluated in this experiment.

This study is therefore highly dependent on the experience and knowledge of theparticipants. Analysts who participated in this experiment can all refer to a fair amountof experience to call themselves investment analysts. Analysts' experience combinedwith their willingness to contribute and interest in the results of this study made valuepredictions reliable enough to use them as theoretical investment decisions in this study.

Private equity investors usually do not just rely on only one company value estimationand thus compute three different discount rates to have different case scenariosavailable. Additionally it must be noted that participants made ex post valueestimations during October and November 2008.

Due to the financial crisis which started in 2008 analysts were probably more discreet intheir decision making than they were for 2003 when the valuation was assumed to takeplace.This study was meant to represent the valuation methods mainly used in practice and isnot meant to consider all possible valuation approaches to find the one which fits theevaluation of a nanotech company best. Even if this study does not face the wholevaluation issue, the lens model analysis can still provide valuable clues to consider therelationship between the subjective and the ecological systems.

## 6. NASA: Computer Technology things

### 6.1 Carbon Nanotube SPM Tips

- Moore's Law
- Manipulate molecules with sub-angstrom accuracy
- Engrave patterns on silicon surface
- Application to electronics

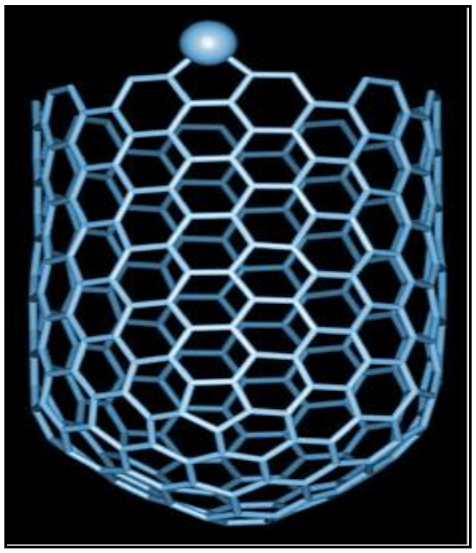

**Fig 2.** Carbon Nanotube

### 6.2 MATERIALS

Nanotechnology may also lead to more efficient and effective use of materials. For example, nanotech that improve the functionality things of catalytic converters and it reduce by upper to 95% and the mass of platinum group metals materials are required. This is a overall product lifecycle benefits for nanotech. Because a platinum group of metals occurredto the low concentration and these reduction is used for may be reduced the ecological impacts from the mining. However, manufacturing precise nanomaterial's can be material intensive.

With nanomaterial's' increased material functionality, it may be possible in some cases to replace toxic materials and still achieve the desired functionality (in terms of electrical conductivity, material strength, heat

transfer, etc.). That often with other life cycle benefits in terms of material and energy are used. One example for the materials are lead a free conductive adhesives formed by self assembled monolayers molecules based on nanotech. then which could substitute for leaded solder will be indicated. Leaded solder is used to broadly in the electronics industry field. In addition to benefits of reducing the lead used for the conductive adhesives could be simplify the electronics manufactured by eliminating several processing steps will be happened that including the needed for the acid flux and cleaning with the detergent and also a water.

Nanotechnology is also mainly used for Organic Light Emitting Diodes (OLEDs). OLEDs are used for displayed technology substitute for Cathode Ray Tubes that which contain lead. OLEDs is also do not required the mercury. And which are used for conventional Flat Panel Displays. The OLED displays is to have additional benefits of reducing the energy uses and overall materials used through the life cycling.

## 6.3 ADVANCED COMPOSITES MATERIALS

- Traditionally used: Aluminum metal,
- Aluminum made planes heavier, consume more fuel,
- Fiberglass was first used in the Boeing 707 passenger jet in the 1950s, only 2% of the structure,
- Now , about one-third of the structure of the commercial planes uses composites,
- Composites are stronger,

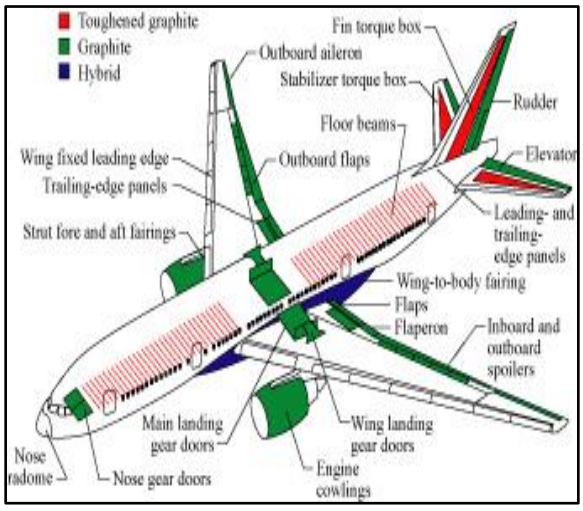



**Fig 3.** Advanced composite materials used for aeronautics

- Composites makes aircrafts lighter ~ 20% lighter,
- Fuel efficient,
- Nano wire are laid out in tape or fabric form put in a mold under heat and pressure,
- The resin matrix flows over Nano fibers,
- Heat is remover and it solidifies,
- It can be formed into various shapes. In some other cases which The fibers are to be wounded tightly to increase the strength.

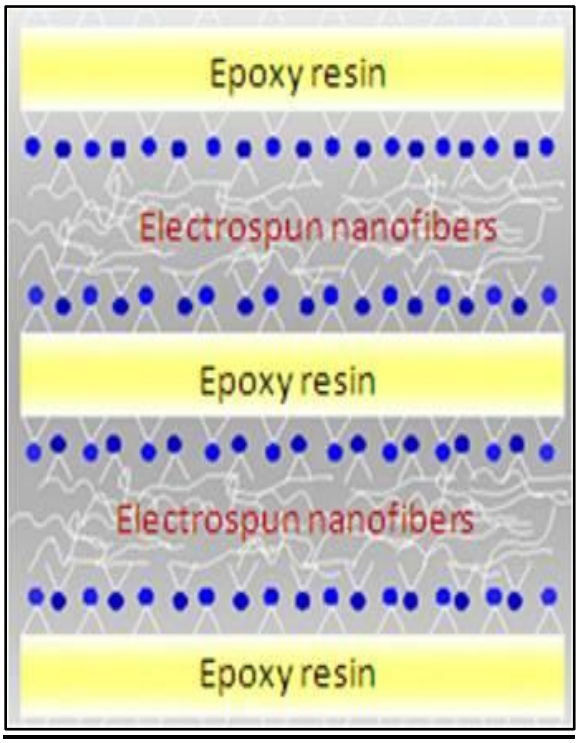


**Fig 4.**Epoxy resin and electrospun nanofibers structure.

### 6.4 FUEL ADDITIVES

Nanomaterial's also show potential as fuel additives and automotive catalysts and as catalysts for utility boilers and other energy-producing facilities. For example, cerium oxide Nano particles are being employed in the United Kingdom as on- and off-road diesel fuel additives to decrease emissions. These manufacturers also claim a more than 5- 10 % decrease in fuel consumption with an associateddecrease in vehicle emissions.

## 7. SENSORS

Sensor development and application based on Nano scale science and technology is growing rapidly due in part to the advancements in the microelectronics industry and the increasing availability of Nano scale processing and manufacturing technologies. In general, Nano sensors can be classified in two main categories:

(1) sensors that are used to measure Nano scale properties (this category comprises most of the current market) and

(2) sensors that are themselves Nano scale or have Nano scale components. The second category can eventually result in lower material cost as well as reduced weight and power consumption of sensors, leading to greater applicability and enhanced functionality.

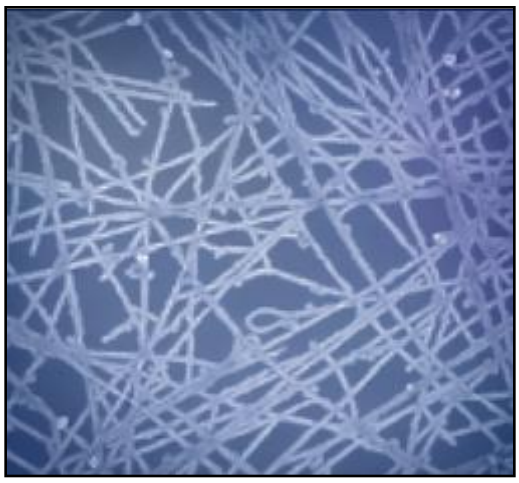

**Fig 5**. CNT

Fig 5 depicts, CNT are also at the heart of a new chemical sensor platform technology. These are easily manufactured the reusable sensors that can be designed to the accurately detect a wide range of the gases. And the volatile organic compounds is a battery powered handheld devices. These platforms that could be potentially support a large range of applications are included the monitoring systems for human space flight area, industrial chemical detection and also medical diagnostics.

## 8. CONCLUSIONS

The goal of this thesis was to understand value estimations used in practice and to testtheir suitability for nanotech companies. The process for nanotechnology firms by modeling therelationships between an individual value prediction and the actual equity value of ananotech company. Nanotechnology was chosen to see if the valuation of such anemerging

industry where the future is extremely uncertain, can give any indication onwhat the future value might be.

With the underlying hypothesis of this thesis in mindthat nanotechnology valuation is more an art than a science, I was motivated todetermine and analyze variables which have not been measured when valuing acompany. Thus, the question was asked if such variables can explain equity values fornanotech firms. To find an answer an experiment was made in which seventeennanotech companies were evaluated.

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