

# Nanotechnology: A New Sight Toward The Future

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## Abstract

Lately, all over the world, increasing attention has been paid to highlight the importance of employing Nanotechnology in various practices and industries. Nanotechnology seems to be the first rank among the priorities of scientific researches. The present study concentrates on the awareness of Nanotechnology. It was conducted as a partial fulfillment of the requirement for (B.Sc.) degree in the chemistry department in Sirte university in 2017 - 2018. It aims to discover the extent of general knowledge regarding Nanotechnology and its advantages. Information was collected in analytic descriptive method. A survey has been applied by using a questionnaire and library research. A sample of 95 participants was undertaken in Sirte university. Data was analyzed using the statistician program (SPSS). The result shows that the majority of respondents (33.7%) have no idea about Nanotechnology. However, some of them trust that the advantages of Nanotechnology are more than its disadvantages. Also, as an interesting outcome, most of the answers (84.2%) approve that; participants have been stimulated to quest about the technology and its benefits. This paper confirms the view which announces Nanotechnology as a component of the world's future leading to a new industrial revolution.

**Keywords:** *Nanotechnology, awareness, nanomaterials, applications, difficulties; and questionnaire.*

## 1. Introduction

Recently, the world witnessed a remarkable and exceptional acceleration in the technological development in all areas of life. Science has surpassed our familiar idea. A new technology has been developed. It is the nanotechnology. Nanotechnology is one of the approaches to understand how the science is evolving every day. It has become a practicality of excessive concerns. Nanotechnology has been highlighted the first rank among the precedencies of scientific researches in the world, and the most widely used invention to be employed in new products, industries, & technology.

## 2. Nanotechnology Concept

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The meaning of the word "Nano" in Greek is "part of the whole" and is part of the billion or a fraction of a millionth of a meter or a fraction of a thousand of a micrometer. The smallest length that a human can see with the naked eye is 10,000 nm .

To approximate the concept by examples, the head hair is about 75,000 to 80,000 nm, and the blood cell is about 2000 nm[1].

Nanotechnology outcomes of several complex research studies that deal with nanotechnology between 0.1 to 100 nm values of any agreement, with the nuclear concentration ranging between five thousand atoms. It is lesser than the tiniest bacterium.[2] The concept of nanotechnology relies on the foundation that particle size of less than one hundred nanometers delivers a material containing the properties of different performances (new physical and chemical theories). Accordingly, it has been determined that this theory is a worthy practice effect on an widespread variety of technical series. Generally, nanotechnology deals with many mixtures of dimensions of the rank of nanometer materials.[3] However, the announcement that nanotechnology is fairly innovative, the presence of devices work with this principle and structures with nanoscale dimensions is not innovative.[1]

### **3. History Of Nanotechnology**

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Nanotechnology became a phenomenon. it is a quite new developing technique in the recent years. Development has continued until today, where more than 2000 of only 4004 transistors in processors for the year 1971 have been grown to more than 700 million transistors in Intel Core 2, there was, also, a similar decrease in the size of individual electronic objects, and go from millimetres to hundreds of nanometres in electrical circuits.[2] However, there is no definite period of time when the Nanotechnology was emerged. It has been thought to be in the middle Ages and the Age of the Pharaohs, as this technology was used by the glass's makers for collaring purposes. It is fairly possible to follow the history of the Nanotechnology's revolution through the researches of the interested scientists like the physicist Richard in 1959 and Uhlir in 1956. Starting the new century, three potent technologies have met its space on a joint-Nano-scale, which is a revolution in the world of electronics and biology.[4] With the opening of the three great present century, technologies amounted to public values-standards of nanotechnology with promises in both global electrons and neighbourhoods has been developed.[5]

## **4. Materials of Nanotechnology**

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Nanomaterials are a range of advanced resources which can be produced in scale dimensions between 1 to 100 nm. The materials in the new small size differently behave from the materials in the normal big sizes. They have fresh properties and uses. Generally, nanomaterials take many shapes and dimensions, each one has special formation; properties; uses; and scale of its diameter and length. This made each material to be differently seen in the visible extent and level. What scientists seek to achieve through the nanotechnology is having the ability to modify the materials' properties on the atomic and molecular levels, getting materials with high qualification and properties in the visible levels. Nanomaterials are being therefore classified depending on their dimensions (One-dimensional; Two-dimensional; Three-dimensional) and their shapes (Quantum dots; Fullerene; Nano balls; Nano particles; Nano tubes; Nano fibres; Nano wires; Nano composites).[6]

## **5. Applications of Nanotechnology**

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Nanotechnology has various applications employed in our life in different fields. For instance, Nanomedicine has incredible prospects in developing the identification and treatment of human diseases. This technique can be utilize for imaging the body's cells without worries to take a normal picture, and, is able to control these cells in other behaviors. Nanotechnology has potential to transform an extensive range of tools in biotechnology, thus they become more personalized, portable, safer, cheaper, and easier to administer. In addition, Nanotechnology in the computer and communications area, notably, nanoscale optical fibers to be able to send information and calls directly with no need to transform light to electricity, consequently increasing the transfer speed to approximately 100 times. The industry is able to nanoscale lasers, making small communications devices. Generally, this technology by its special nanoparticles and nanomaterials has invaded many other fields such as clothes; buildings; television screens; submarines; automotive switches, electrical ground power generators; ships engines; and magnetic resonance analysis devices; air filters; desalination and water purification; military areas; refrigerators; washing machines; intervention vehicles; detecting leaks of gases; medical surveillance; monitoring of environmental and industrial hazards; battery carbon tubes; organic light-emitting diodes; fuel cells for hydrogen storage.[1]

## **6. Difficulties Faced Nanotechnology**

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Nanotechnology has a worry which comes from the ability to control the atoms made after breakdown the material. Accordingly, it needs to be very precise devices of hand size, standards,

and procedures of realizing the molecules under examination. Once getting the level of the atom, the pressure of reaching an accurate measurement is an extra struggle added to this fresh science. Moreover, despite the broad applications of nanotechnology, there are still disagreement and concerns about the possibility of side effects in human life as a result of using this technique [5].

However, as the technical learning is an essential part of the educational process, institutions in many countries are trying to introduce their lecturers and students to nanotechnology aiming to raise their interest in it. These institutions seek to engage nanotechnology in new products and applications. Learners will consequently follow any developments in the area of nanotechnology. Moreover, why this measure is different. Therefore, in the present work, we have presented nanotechnology to the members and students of Sirte University. It was by examining the extent of their knowledge about this technology using a questionnaire, and via explaining the scientific concept and the fundamentals of nanotechnology; its importance; nanomaterials and some of its applications.

## 7. Research Goals

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1. To know how knowledgeable the members and students of the Sirte university with nanotechnology as a new practice of sciences.
2. To spread awareness about the culture of nanotechnology at the university by highlighting the above headlines.

## 8. Research Method

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Regarding the nature of the study and the required aims, analytic descriptive method was used. It studies the phenomenon as it is in the reality, concerns to precisely describe it and expresses it in quantitative and qualitative way. This method collects the information about the phenomenon targeting its aspects and different relations, then analyzing and explaining them to get conclusions. Which collectively increases the knowledge about the subject .

Two sources of information were utilized:

1. Primary sources: this source was to collect primary information by using a questionnaire as a main manner for the present study .
2. Secondary sources: the sources of the secondary information were presented in Arabic and English references as books; scientific journals and previous researches which handled the subject of this study.

This questionnaire is a part of the graduate research requirements of the Chemistry Department at the Sirte University. The survey's questions were prepared by looking at a websites of specialized questionnaires in this field, some questionnaires were selected as being relevant to the

present study's aims. Questions that are compatible with the research topic and its category were lastly chosen to be included in the questionnaire. The questionnaire was firstly distributed for the truth and stability examination. For the truth test, it was been given to 3 specialized members of the chemistry department at the university. For the stability investigation, it was been filled in by 5 students in the department who were randomly chosen. After that, the questionnaire was distributed to the main class of the study, which includes faculty members, students and staff within the university, who were 95 samples. After the questionnaire was filled out by the participants, it was compiled for the purpose of analysis and discussion of the results obtained. The SPSS program was used to analyze the collected data and plot curves and calculate the repetition ratios of the Pearson coefficient.

## 9. Results And Discussion

The truth and stability examination displayed satisfactory results. Only few comments were been received from the specialized members of the chemistry department. Consequently, some changes were done .

In respect to the personal primary properties of the study's sample, from the data in table,(1) It is clear that the proportion of the male population is the largest percentage participated in answering the questions of the study, where the percentage was "66.3%". While the proportion of females was "33.7%" of the total. This indicates the reluctance of the female to the questionnaire, which may be attributed to their lack of knowledge of the technique .

Table (1): the proportion of female and male who participated in the questionnaire

Gender	Number	Percent
Male	63	66.3
Female	32	33.7
Total	95	100.0

It can be seen from table (2) that the percentage of people who do not know about the nanotechnology is 33.7%, which is the highest percentage among the all. In the second place (31.6%) comes people who are slightly familiar with the technique. The third place (28.4%) represents people who have medium knowledge about the technology. In the fourth place (6.3%) are those with not as much of knowledge about the nanotechnology. These percentages generally indicate that there is some awareness or familiarity of this technology by the sample of the study.

Table 2: participants' knowledge about nanotechnology

Knowledge	Number	Percent
No thing	32	33.7
Few	30	31.6
Medium	27	<b>28.4</b>
High	6	6.3
Total	95	100.0

From figure (1), it is recognized that the most common source of the knowledgeable about nanotechnology is the Internet (37.9%), followed by the field of study (34.7%). While the choice of other sources register (21.1%). The percentage of newspapers and radio stations is the lowest (6.3%). Clearly, the most current sources of the knowledge about nanotechnology is the Internet. This is being an anticipated result, since there were not any kind of publications related to nanotechnology found at any Libyan universities in general and Sirte University in particular .

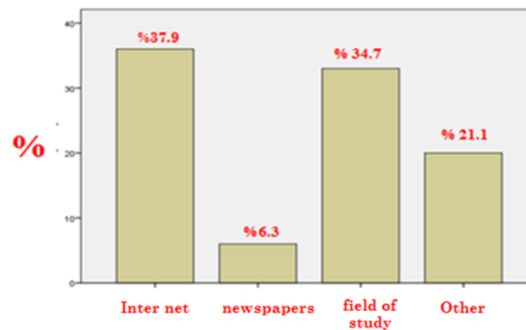


Figure (1): the source of knowledge about nanotechnology.

The figure (2) illustrates that participants who believe that the negatives predominate on the positives are being present in the ratio of 27.4%. While those who said the opposite, in the meaning that the technique has positives more than negatives have percentage of 72.6%. These different personal views on nanotechnology depend on Several different factors like the level of education for participants, and the personal interest in nanotechnology.

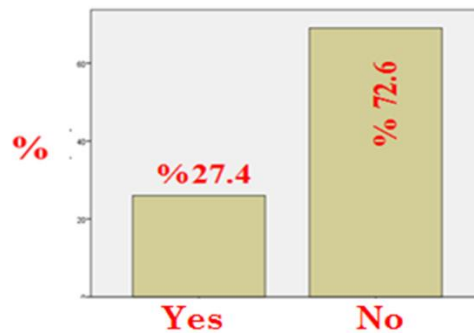


Figure (2): participants' views on the positives and negatives of nanotechnology.

Data in table (3) demonstrate that the proportion of those who study or work in the area of nanotechnology at the university is (20.0 %), while those who do not record (80.0%). There is a dramatic drop in the ratio of those who study or work in the field. The high rate of the second indicator might be related to the statement that there is a low turnout of those who study or work in the area of nanotechnology. this is a noticeable point to be considered in analysing the reasons for the drop. This could mean that the more the scientific level and knowledge of the individual, the greater the ability to accept this technique as an area to be studied or worked in .

Table (3): participants who study or work in the field of nanotechnology

Answer	Number	Percent
Yes	19	20.0
No	76	80.0
Total	95	100.0

Table (4) highlight the participants' views on the unit that to be thought as the accurate in designing and measurement. The proportion of those who believe that the most precise unit is the nanometer, is (65.3%). Only (7.4%) is for those who think the micrometer is the one. (27.4%) is the ratio for who have the view that both units are equal in their accuracy. This last opinion could be due to their lack of knowledge about the subject which resulted in a random answer.

Table (4): participants' views on the accurate unit in designing and measurement

Unit	Number	Percent
Nanometer	62	65.3
Micrometer	7	7.4
Both	26	27.4
Total	95	100.0

By looking at figure (3), it is clear from the drawing that, there is a considerable difference among the opinions. The blue area of those who said yes to the importance of nanotechnology has presented the majority of views in proportion of 83.2%. Whereas the green zone of those who said "No" has revealed the minority of opinions in proportion of 16.8%. These percentages heralds a positive result for the importance of this new technology. In view of this importance, the world has been striving in researches and developments using nanotechnology .

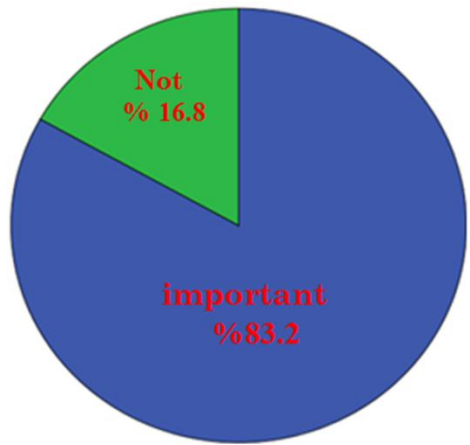


Figure (3): participants' opinions on the importance of nanotechnology.

Figure (4) demonstrates an interesting result as there is clear contrast among the ratios. Those who do not support the use of this technology at all have recorded percentage of 9.4% .

Others who do not currently care about it and it does not make difference for them the matter of using this technology reach percentage of 27.4%. An equal result of 27.4% is for those who support using nanotechnology, while who strongly support the practice of the technology record only 7.4% . However, the highest proportion (28.4%) among all is of those who support the usage of nanotechnology but after making sure that the technology is free of negatives. In regard to the participants' knowledge about nanotechnology in table (2), this last ratio (28.4%) is fairly sensible and expected as participants do not have good information about nanotechnology. This result confirm the significance of the current study's goal that is represented in spreading awareness about the culture of nanotechnology at the Sirte university.

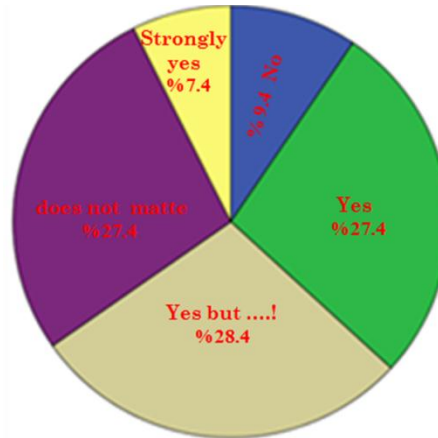


Figure (4): support for nanotechnology.

Table (5) clarifies participants' confidence in nanotechnology. The percentage of those who have confidence in the technique is 83.2%, while who do not have is just 16.8%. The high ratio of 83.2% seems to be a controversial outcome compared with the results above in Table 2 and Figure (4). It is because the percentage of participants' knowledge about nanotechnology and their support to it does not correspond with their confidence in the technique. Therefore, this discrepancy among these results can be referred back to the fact that participants' answers are being built to random. However, there are always some of those answers which are being based on participants' Knowledge about the technology.

Table (5): participants' confidence in nanotechnology.

Confidence factor	Number	Percent
Yes	79	83.2
No	16	16.8
Total	95	100.0

Table (6): who will learn about nanotechnology after this questionnaire.?



Answer	Number	Percent
Yes	80	<b>84.2</b>
No	15	15.8
Total	95	100.0

Table (6) indicates answers on the question that "who will learn about nanotechnology after this questionnaire?". The percentage of those who have given positive answers (84.2%) is obviously higher than the negative ones (15.8%). An interesting result have been reached through this question, where participants of positive answers confirmed that they have been motivated by the questionnaire to read more about nanotechnology. Thus, we are confident to report that there has been consequent interaction from the participants toward nanotechnology. This outcome reflects the importance of the two goals of the current study.

## 10. Conclusion

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Nanotechnology is a new, active and very fast field of research that is being studied by many scientists around the world, it will trigger an industrial revolution in the near future, bringing major shifts in the education and technology. The essential goal of this research was to spread awareness of Nanotechnology at Sirte University, aiming to make this technology a notable part of the future syllabus and studies at the University. This will be through studying the history of this technology; its nature; its materials; and its applications in different aspects of our life, then applying that in the practical researches. The result of the current research reveal that participants have been motivated to know more about this technology. Actually, this outcome is what was being expected by the researchers and what prompted them to conduct this study aiming to raise awareness; education and dissemination of this new technology in this scientific edifice. The result also confirm the significance and need to concentrate on Nanotechnology as an essential measure of future studies at universities.

## 11. Recommendation

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Regarding the results of the current study, some recommendations are being listed, which aim to push more concern toward Nanotechnology and its applications. The researchers would recommend the followings to be applied at the Sirte university :

- a. appealing to adhere to this new technology by spreading more information about it among all the scientific Faculties (the Faculty of Science in particular), through their syllabus; practical practices and by providing online access and library books to all interested students and members .
- b. To support those who have the desire to complete their scientific career in the field of Nanotechnology and sponsoring their advanced researches .

- c. Encouraging the scientific Faculties to gather a group of interested members to open a special department for Nanotechnology.

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