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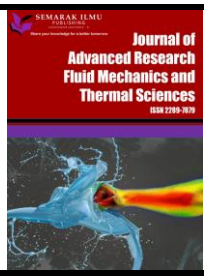

Designation of Nano-Analytical Reagents and Evaluation of Nano-Applications

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ABSTRACT

The nanostructures of materials are those that have intermediate sizes between molecular structures and between microstructures (micrometric in size). When describing nanostructures, it is necessary to distinguish between the number of dimensions according to the nanometer scale. The surfaces of the nano-textures are one-dimensional according to the nanometer scale, with the surface thickness of the object ranging between [0.1 and 100] nanometers. And nanotubes are two-dimensional according to the nanometer scale, the diameter of the tube ranges between [0.1 and 100] nanometers, and its length may be greater than that. Finally, the three-dimensional spherical nanoparticles are on the nanometer scale, where each spatial dimension of the particle ranges between [0.1 and 100] nm. The terms nanoparticles and ultrafine particles are often used synonymously even though ultrafine particles can reach into the micrometric range. The term 'nanostructure' is often used when referring to magnetic technology., All Nano Analytical reagents analysed by instrumental analysis that gave clear evidences of their chemical structures via many technical instruments like (FT IR-Spectra, ^{1}H.NMR-Spectra, ^{13}C.NMR-Spectra, and Nano-Study by Scanning Electron Microscopy (FESEM).

1. Introduction

Nowadays, nanotechnology has received wide interest from specialists and scientists in various scientific fields and disciplines [1-3]. Applications and employments of this technology, where we find that this technology has become ranked first among the priorities of scientific research in these countries, as universities, centres and research institutions in these countries have sought to employ nanotechnology in new products and industries, and this confirms the view of scientists who view this technology as the constituent factor of the world of the future, that factor that led and will lead to a new industrial revolution [4-10]. We find the interest of some Arab countries in this technology and its investment in various different fields of life, including studies related to the

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fields of solar energy, water treatments, information technology and its use in modelling and simulation software [11,12].

Nanotechnology can also be considered as extensions of traditional disciplines in order to look at these properties explicitly. In addition, traditional disciplines can be reinterpreted as special applications of nanotechnology [13,14]. Hence, this lively exchange of ideas and concepts contributes to a civilized understanding of the field. In general, nanotechnology is a process of assembling and applying the ideas of both science and engineering with the aim of understanding and producing new materials and devices, as these products generally contribute to the wide use of physical properties associated with small scales [15-18]. It is one of the most important bright modern applications of this promising technology, as this technology contributes to the production of building materials with unique thermal, electrical, physical, chemical and mechanical features and properties [19-23]. Buildings designed on the basis of using nanotechnology will be able to resist high temperatures, harmful radiation, and fire protection. And the ability to self-clean, and the buildings will be able to maintain and treat any cracks and cracks early, and repair them themselves directly and automatically [24-28], below Figure 1 showed structure of nano, while Figure 2 showed application of nano molecule, but Figure 3 showed classification of nano materials.

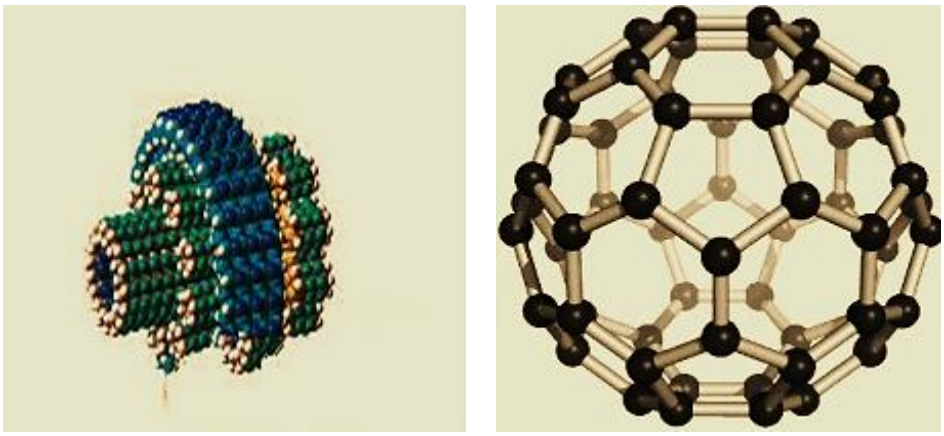

Fig. 1. Nano structure

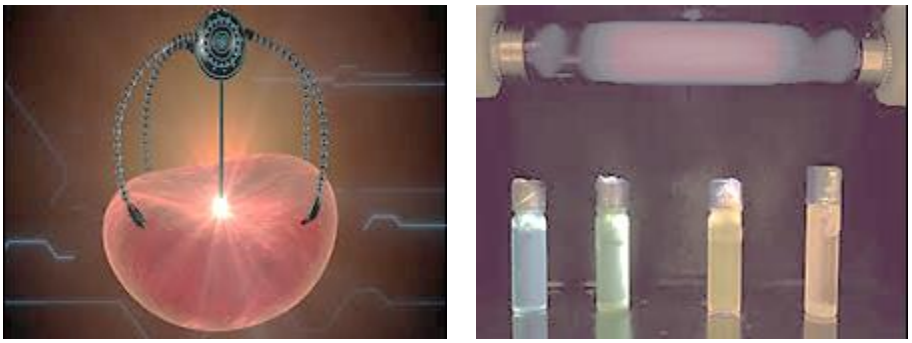

Fig. 2. Nano-technical in bioengineering field

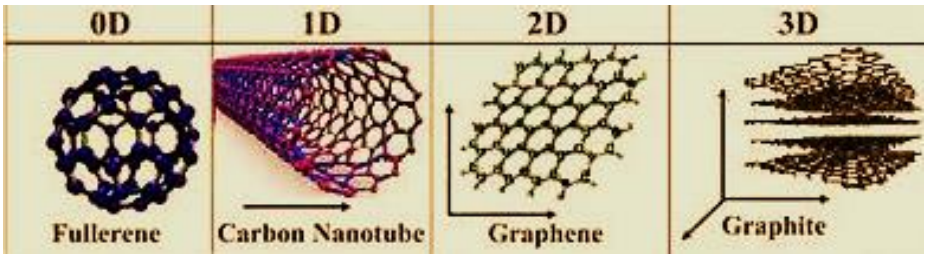

Fig. 3. Classification of nano materials

2. Methodology

2.1 Methods and Devices

The research included analyzes and nano-study of the prepared Nano- Analytical Reagents , and then measured them using a nano-light microscope, which deals with the atoms and single molecules that make up the materials, using precise tools to build and this technique is concerned with the design and manufacture of materials and machines at the nanometer scale, and in general this technique aims to study the behavior or Nano-applications on the prepared materials by using Scanning Electron Microscopy (FESEM), which are characterized by their infinitesimal size, in addition to their economic cost, which does not exceed the raw material and energy used in the process of manufacturing these means and products.

2.2 Experimental Approaches

2.2.1 Designation of nano-analytical reagent {1}

This primary Nano- Analytical Reagent prepared via condensation step by using condition to formation Imine as a starting material, then purified product as same procedure in studies [13,14].

2.2.2 Designation of nano-analytical reagent {2}

This Nano- Analytical Reagent prepared via cyclization step by using condition to produce cyclic nano-compound, then purified product as same procedure in studies by cyclization of di groups of Imine compounds [13,14].

2.2.3 Designation of nano-analytical reagent {3}

This Nano- Analytical Reagent synthesized via cyclization step by using condition to produce cyclic nano-compound, then purified product as same procedure in studies by Aljamali [13,14] by cyclization of di groups of Imine compounds, purified the product by absolute ethanol.

2.2.4 Designation of nano-analytical reagent {4}

This primary Nano- Analytical Reagent prepared as same method of nano-organic material [1] but with other type of compound which appeared in scheme (2) via condensation step by using condition to formation Imine as a starting material, then purified product as same procedure in studies by Aljamali [13,14].

2.2.5 Designation of nano-analytical reagent {5}

This Nano- Analytical Reagent prepared via cyclization step by using other type of compound as appeared in scheme (2) by using condition to produce cyclic nano-compound, then purified product as same procedure in studies by Aljamali [13,14] by cyclization of di groups of Imine compounds.

2.2.6 Designation of nano-analytical reagent {6}

This Nano-Analytical Reagent prepared via cyclization step by using other type of compound as appeared in scheme (2) by using condition to produce cyclic nano-compound, then purified product as same procedure in studies by Aljamali [13,14] by cyclization of di groups of Imine compounds., All structures of Analytical Nano-Reagents in Figure 4.

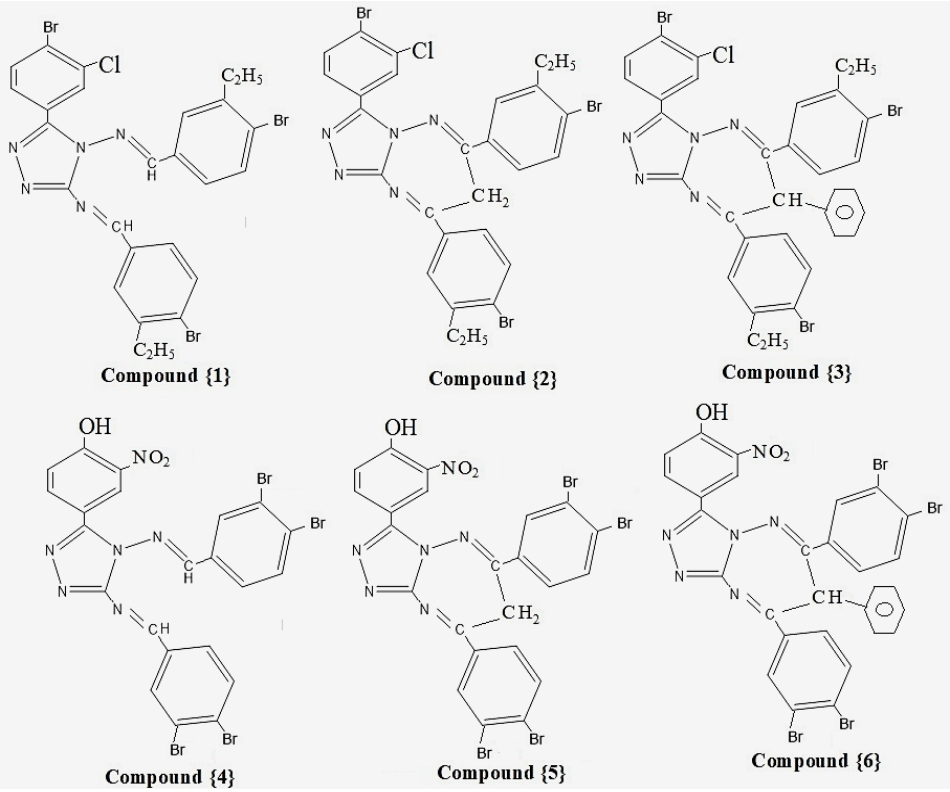

Fig. 4. Synthesized nano analytical reagents [1-6]

3. Results and Discussion

The current scientific study complicated synthesis of Nano- Analytical Reagents via invented method by cyclization of di-groups of Imine compounds which is innovated by Aljamali [13,14] and analyzes and nano-study of the prepared materials, and then measured them using a nano-light microscope, which deals with the atoms and single molecules that make up the materials, using precise tools to build and this technique is concerned with the design and manufacture of materials and machines at the nanometer scale, and in general this technique aims to study the behavior or Nano-applications on the prepared materials by using Scanning Electron Microscopy (FESEM) , which are characterized by their infinitesimal size, in addition to their economic cost, which does not exceed the raw material and energy used in the process of manufacturing these means and products.

3.1 Indications and Identification of Nano-Analytical Reagents

Identification for designation of Nano-analytical reagents involved spectral techniques and Nano–analysis, all spectral techniques appeared bands in IR-spectra and Signals in H-NMR with C-

NMR spectra that gave good evidences of designed Nano-Reagents, all functional groups in some figures (1-10).

3.1.1 FT.IR spectral investigation

Via appearance band of Anil group at about (1620) which shifted to higher frequencies to (1635, 1642) in Nano analytical reagent as a result to formation endocycle, all band in Figure 5 and Figure 6:

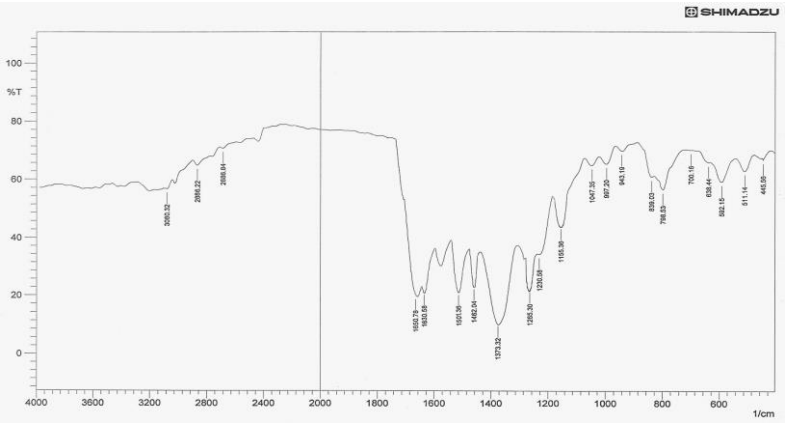

Fig. 5. FT-IR [1]

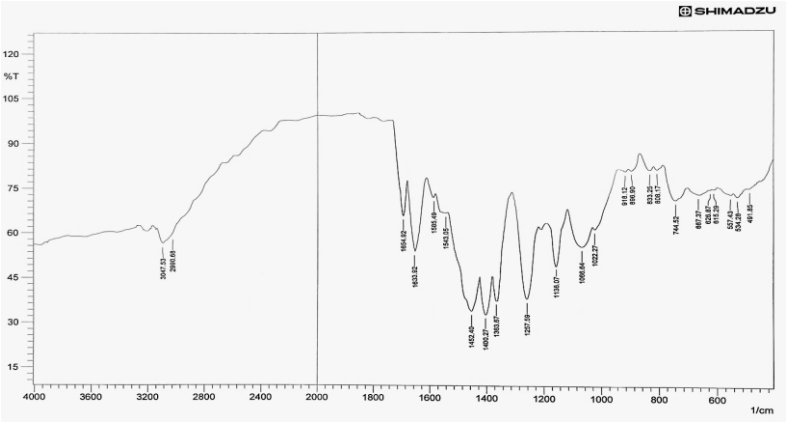

Fig. 6. FT-IR [2]

3.1.2 H-NMR spectral investigation

Via appearance peak for proton of Anil (CH=N) in Nano-Reagents {1 and 4), that will disappear in Nano-regents {2, 3, 5 ,6}, all functional groups in some Figure 7 to Figure 12.

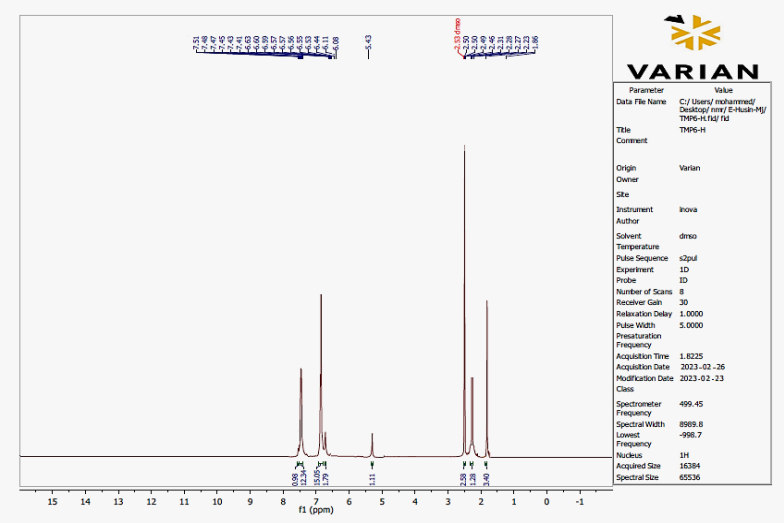

Fig. 7. ^{1}H.NMR [1]

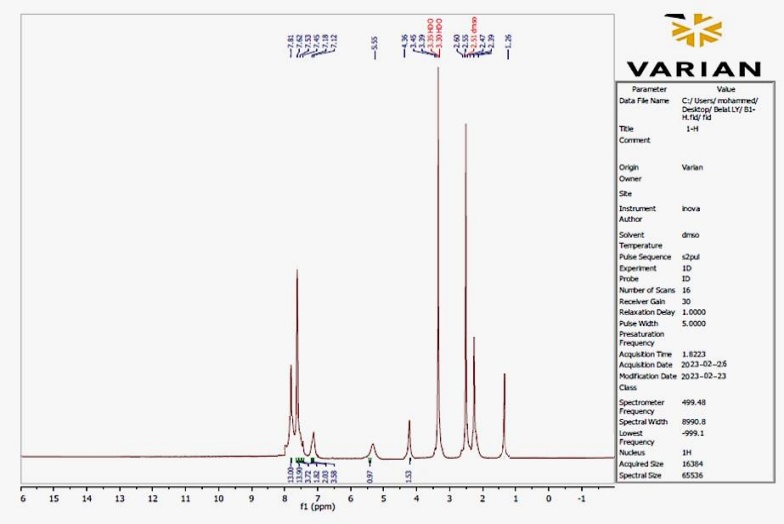

Fig. 8. ^{1}H.NMR [2]

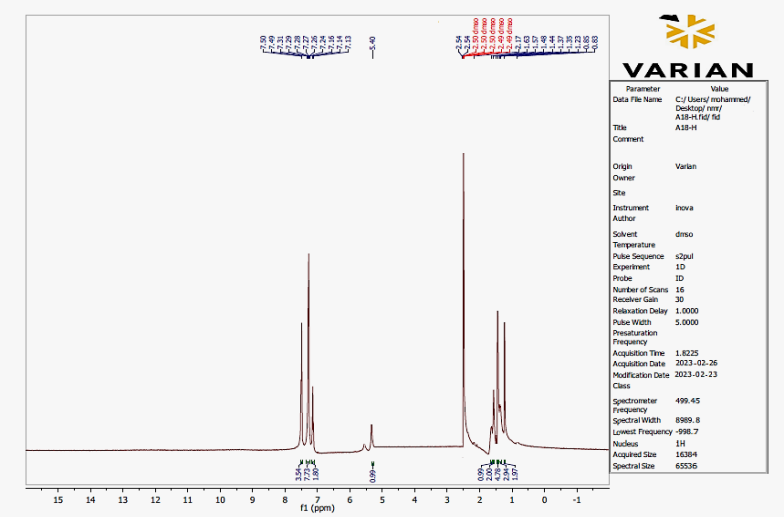

Fig. 9. ^{1}H.NMR [3]

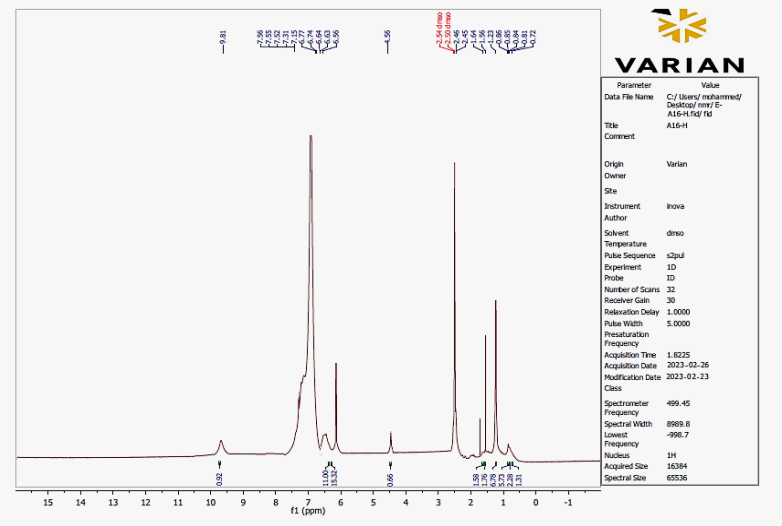

Fig. 10. ^{1}H.NMR [4]

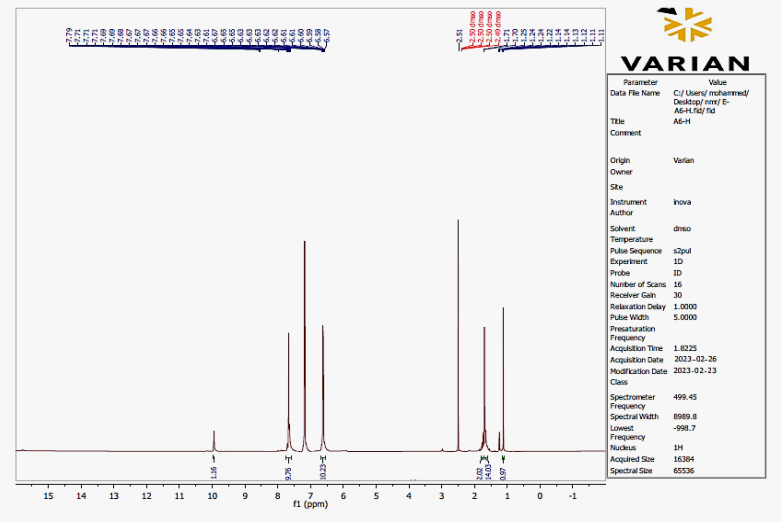

Fig. 11. ^{1}H.NMR [5]

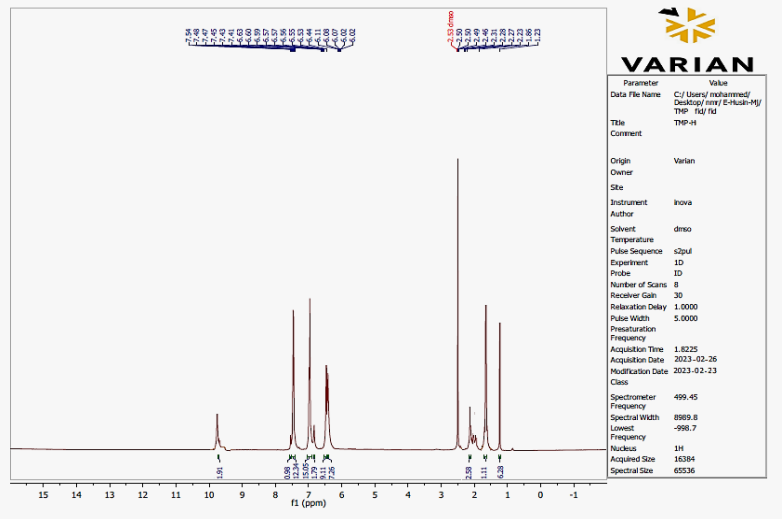

Fig. 12. ^{1}H.NMR [6]

3.1.3 C-NMR spectral investigation on nano-analytical reagents

Via appearance peak of anil group at (152) in reagent {1} which disappeared and other peaks appeared at about {99.8 and 99.6) for (C=N) endo cycle in Reagents {2 and 3}, Figure 13 to Figure 18 appears all peaks.

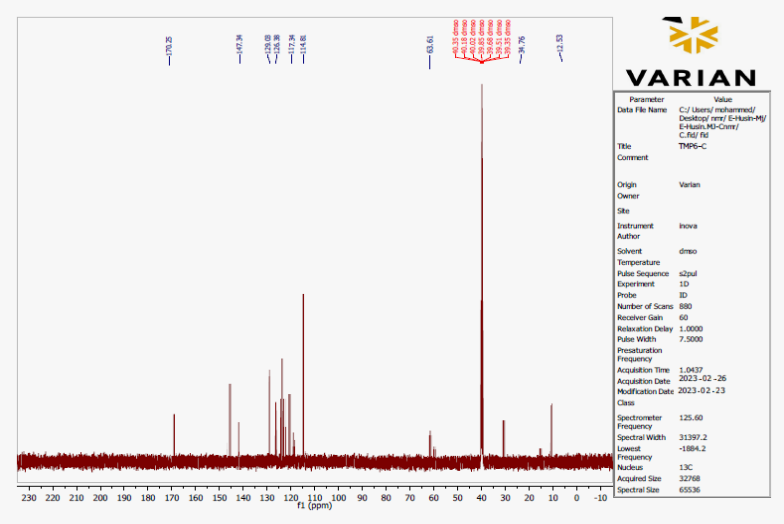

Fig. 13. C.NMR [1]

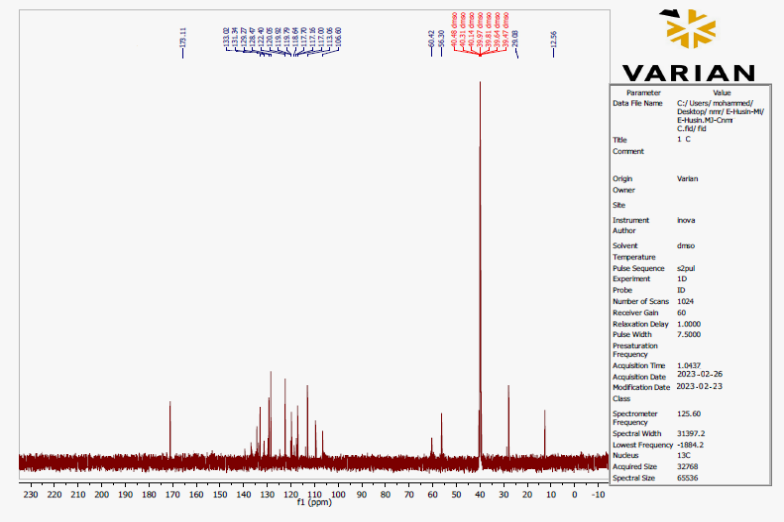

Fig. 14. C.NMR [2]

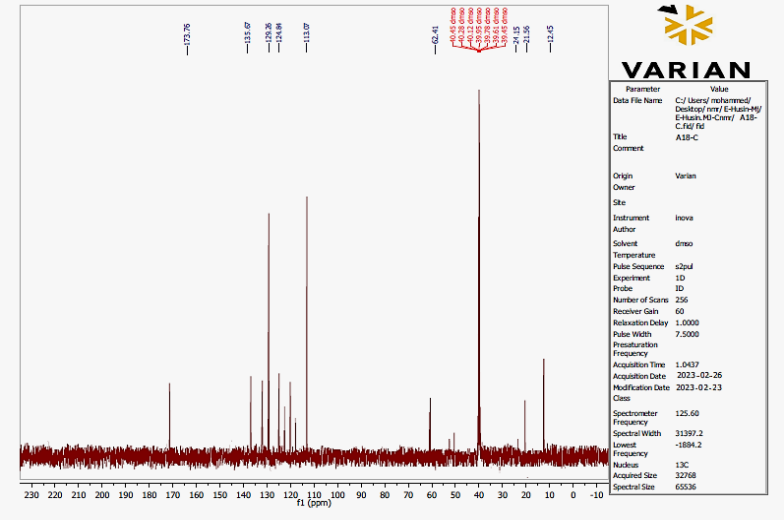

Fig. 15. C.NMR [3]

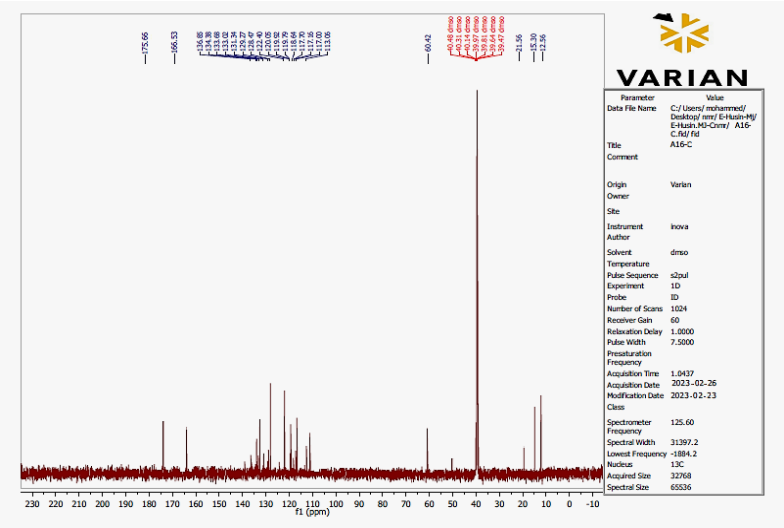

Fig. 16. C.NMR [4]

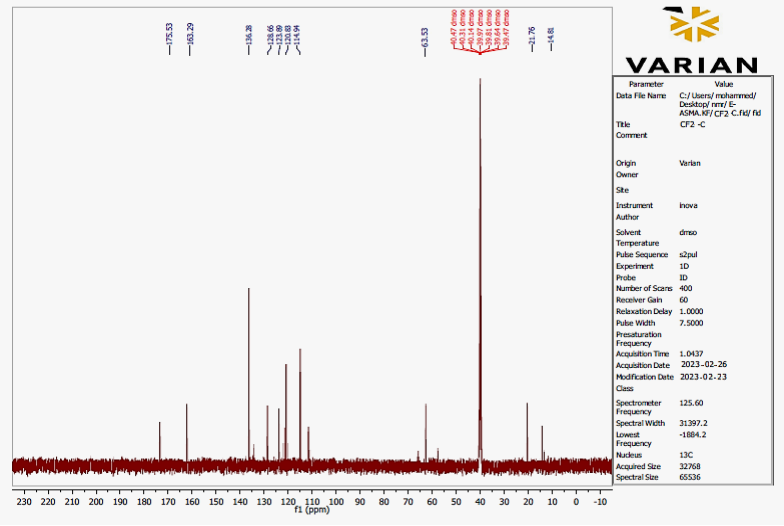

Fig. 17. C.NMR [5]

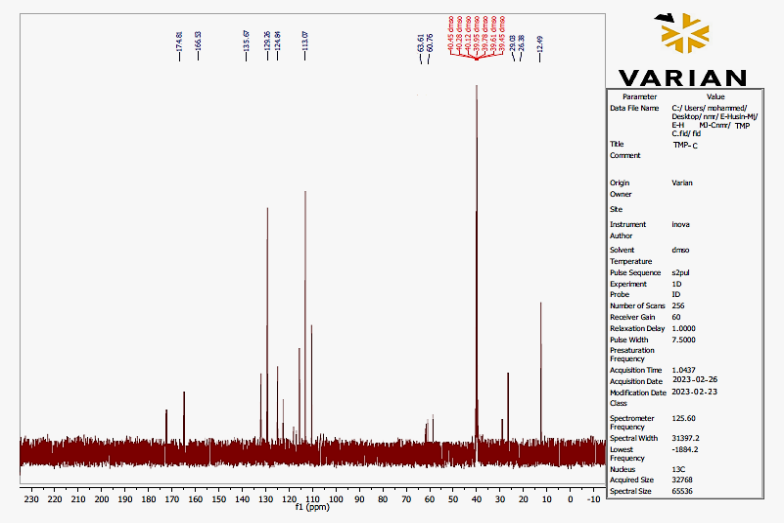

Fig. 18. C.NMR [6]

3.2 Nano Study of Analytical Reagents

One of the characteristics of nanotechnology is the high surface area-to-volume ratio of many nano-materials, which in turn results in new potential quantum mechanical effects, for example the "quantum size effect" whereby the electronic properties of solids change with a huge decrease in particle size. However, this effect is not effective by switching from macro to micro dimensions. However, it becomes apparent when the nano scale range is reached. A certain set of physical properties also change with changing microscopic systems. Hence, novel mechanical properties of nano-materials are one of the research topics in nano-mechanics. The stimulating activities also reveal a new way of interacting with biological materials as shown in Figure 19 to Figure 22 [29-33].

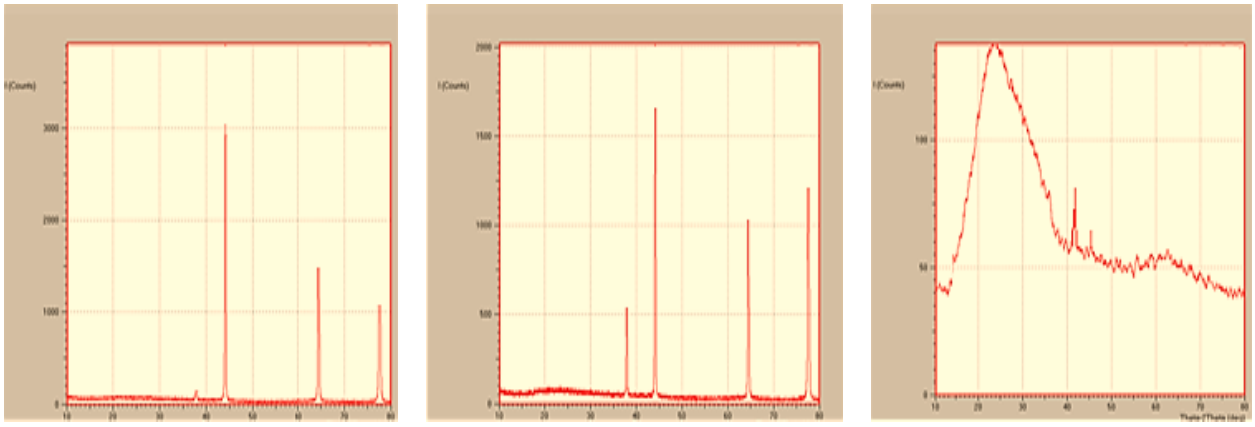

Fig. 19. XRD pattern of nano reagents [2,5,6]

Fig. 20. SEM images of nano reagents [2,5,6]

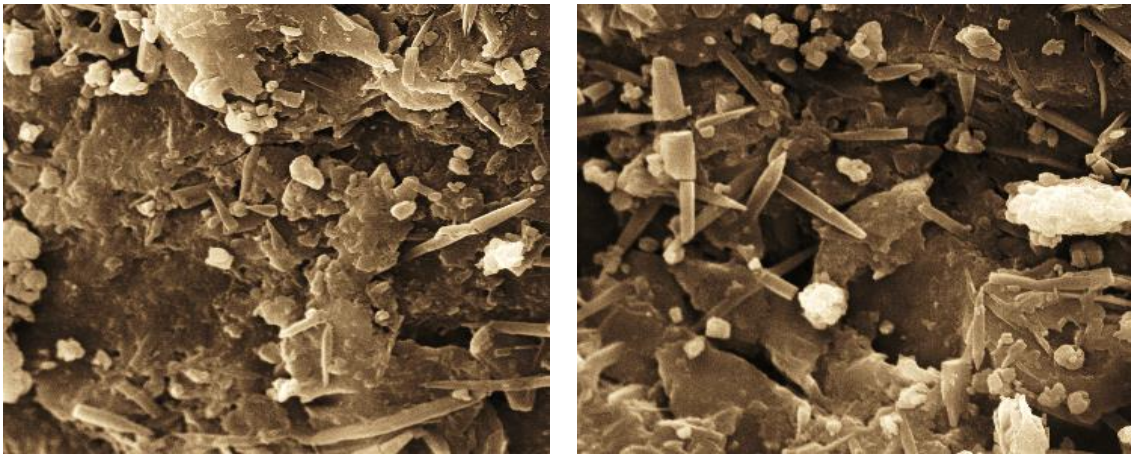

Fig. 21. SEM images of nano reagents [1,3]

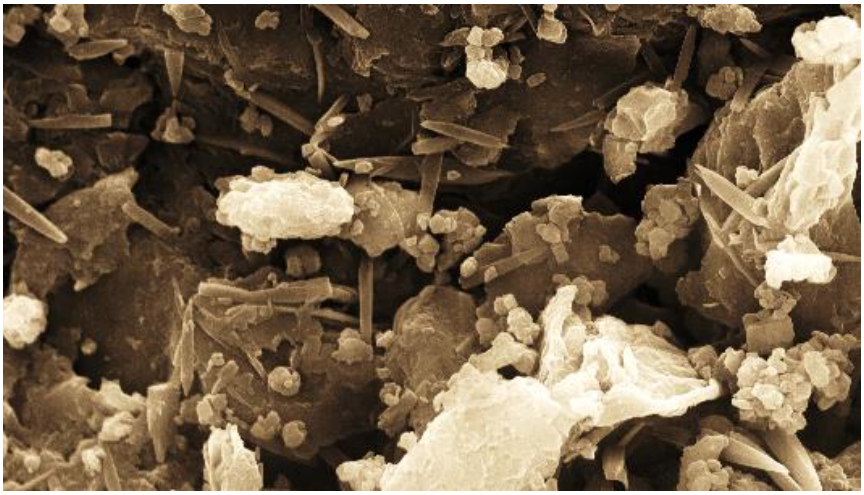

Fig. 22. SEM images of nano reagent [4]

Nanotechnology will be involved in the production of building materials to improve their properties and functions, such as materials used in paints (coatings) that act as moisture insulators, as well as additives for concrete mixes (concrete), such as silica (silica sand or silicon dioxide), cement materials, gypsum, Tiles, ceramics, improving the glass industry, the wood industry, and the steel industry, raising energy efficiency in buildings, etc., to make them light in weight, stronger, more durable, and resistant to cracks, cracks, and corrosion, and to be useful in protecting surfaces and walls from adhesion of dust and pollutants, and maintaining color stability, and thermal insulation, And resistance to ultraviolet rays, resistance to moisture, and the formation of fog on

the glass, and you will be able to clean the surfaces automatically and automatically, in addition to the environmental properties, represented in helping building materials in reducing the amount of carbon dioxide emissions in the environment, and thus maintaining the integrity of the system environmental [30-35].

Based on the foregoing: Those in charge of building and designing library buildings can benefit from the developments introduced by nanotechnology in the field of construction and building, in order to achieve many benefits that help protect the paper collections of libraries and make them settle in an appropriate environment free from causes of damage and deterioration (by These developments make the library buildings resistant to heat, ultraviolet radiation, humidity, dust and dirt, and direct sunlight, by using glass panels made of nano-materials for the windows of library buildings, which have a great ability to emit light inside the building in a form that is characterized by purity while achieving complete isolation [36-44]. Therefore, the paper collections stored in the buildings of these libraries enjoy a good environment with standards and specifications that are able to protect them and keep them for long periods of time used by the beneficiaries [45-48].

4. Conclusions

Nanotechnology had and still has an impact and a prominent role in increasing the speed of scientific progress, through which great scientific leaps occurred that exceeded the developments that occurred in the scientific fields in the past hundred years, and today we see uses of nanotechnology in various fields (nano-engineering, nano-film, nanotechnology, Nano-polymer, medicine, industry, transportation, communications, space, aviation, information technology, electronics industry, consumer products such as stain-resistant clothing, etc.). Below we briefly present some of the contributions of nanotechnology in various scientific fields.

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