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Synthesis Silver Nanoparticle and Study the Effect of Doping by Copper Nanoparticles and Radioactivity on the Absorbance Value

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Abstract: *Silver Nanoparticle materials had been synthesized to produce new alternate substance for reducing the rare or high cost of industrial materials. In this work, three samples of silver nitrate were prepared with different concentrations (0.04, 0.05 and 0.06) molar by chemical method, and synthesis copper Nanoparticles with 0.01molar and doping three other Silver Nanoparticle sample with different concentrations (0.04, 0.05 and 0.06) molar .And effect with gamma ray on the all sample that mead . The optical absorbance properties were investigated for all sample that made before and after to expose by used the ultraviolet-visible (UV-Vis) spectroscopies. The optical absorbance was changed confirm the sample treatment. The absorption value of Silver Nanoparticle decreasing by doped with copper oxide and increasing by gamma ray.*

Keywords: Silver Nanoparticle, copper Nanoparticles, ultraviolet-visible spectrometer (UV), Absorbance

1. Introduction

In recent days, nanotechnology has induced great scientific advancement in the field of research and technology. Nanotechnolo gy is the study and application of small object which can be used across all fields such as chemistry, biology, physics, material science and engineering. Nanoparticle is a core particle which performs as a whole unit in terms of transport and property [1]. As the name indicates nano means a billionth or 10^{-9} unit. Its size range usually from 1-100nm [1] due to small size it occupies a position in various fields of nano science and nanotechnology. Nano size particles are quite unique in nature because nano size increase surface to volume ratio and also its physical, chemical and biological properties are different from bulk material. So the main aim to study its minute size is to trigger chemical activity with distinct crystallography that increases the surface area [1]. "There's plenty of room at the bottom"; this statement by Richard Feynman in 1959 during a presentation to a meeting of the American Physical Society, is widely accepted as the spark that initiated the present 'nano' age Nano, "dwarf" in Greek, is defined as one billionth, it follows that the nanoscale is measured in nanometers, or 10-9 m. To put this in perspective; the average strand of a human hair is roughly 75,000 nm in diameter, or from the other extreme 1 nm is the length of 10 hydrogen atoms lined up end to end [3].

There are two methods of synthesis of metallic nanoparticles which are chemical method and physical method. In chemical approach it include chemical reduction [4], electrochemical technique [4], photochemical reduction [4].The chemical process is again subdivided into classical chemical method where some chemical reducing agent (such as hydrazine, sodium borohydride, hydrogen)are used, radiation chemical method generated by ionization radiation [5]. In the physical approach it includes condensation [5], evaporation [5] and laser ablation for metal nanoparticle synthesis [6]. The biological synthesis of nanoparticle is a challenging concept which is very well known as green synthesis. The biological synthesis of nanomaterial can solve the environmental challenges like solar energy conservation, agricultural production, catalysis [6], electronic, optics [6], and biotechnological area [6].

From the various literature studies it can be stated that the amount of accumulation of nanoparticle varies with reduction po tential of ions.Nanoscience is one of the most recent attractive branch of Physics. It is concerned of with the behavior of matter of the form of small isolated non-interacting particles having dimensions in the range of (1-300)nm. The term nm stands for nono matter, where 1nano meter is equal to one part, when one meter is divided to thousand million equal parts. Nano materials being very small, cannot be described by classical lows, instead it is described by quantum lows [1, 2, 3].

All these conventional studies had concentrated on the Synthesis of silver nanoparticles by various methods and optical properties of it, one of them was indicated that the Ag NPs possessed high stability to SSF for more than 90 days, which was not previou sly reported in the literature and the particle size and polydispersity decreased with increasing of PVA-SH content. Other one presents an overview of silver nanoparticle preparation by physical, chemical, and biological synthesis. The aim of this review article is, therefore, to reflect on the current state and future prospects, especially the potentials and limitations of the above mentioned techniques for industries. Moreover; there is a study has a results suggest that Ag nanoparticles can be used as effective growth inhibitors in various microorganisms, making them applicable to diverse medical devices and antimicrobial control systems [7].

Methodology

- Synthesis of Silver Nanoparticle:

Three samples of silver nitrate were prepared with different concentrations 0.04, 0.05, 0.06 and dissolved in 1.5 liters of distilled water and placed in magnetic stirring to be well dissolved. Its temperature is 80 ° C (Warmth Solution - Then a freshly prepared sodium borohydride solution of 0.01 was prepared. Sodium borohydride solution was added to the silver nitrate solution (drop wise) to mix well. The reaction, shape and color of the solution were monitored. Color change, separation and precipitation were observed. The samples were placed in the dark room for 24 hours to complete the sediment formation, after which the water was separated from the sediments and distilled water was added to them again and they were placed in a Centrifuge for 5 minutes to completely separate the sediment, after which the water was withdrawn from the sediment and ethanol was added to completely withdraw the sediment. Then, samples were placed on a bridresh and placed in a preheating oven at 85 ° C for drying.

- Synthesis of Copper Nanoparticles

Ascorbic acid solution (0.02) was prepared in de-ionized water. A 0.01M solution of copper nitrate prepared in de-ionized water and this was added to ascorbic acid solution under continuous magnetic stirring. To adjust the PH, 1M solution of NaOH in de-ionized water was added. After stirring for 30 minutes at room temperature, 0.1 M solution of $NaBH_4$ in de-ionized water was added under continuous stirring. The stirring continued for 15 minutes in ambient atmosphere to complete the reaction. The blue color of initial reaction mixture turned red-brown color.

- Synthesis of Silver doped Copper nanoparticles

The solution of copper nanoparticles 0.01M was divided into four samples, One of them has been dried to produce copper nanoparticles (0.01)M And the other three have added silver nitrate 0.01M, 0.02M, 0.03M respectively, and immediately added sodium borohydride to produce silver doped copper nanoparticles.After preparing the samples study the optical characterization by UV-Vis. Spectra analysis. The silver nanoparticles, copper nanoparticles and silver doped by copper nanoparticles were confirmed by measuring the wave length of reaction mixture in the UV-Vis spectrum of the PerkinElmer spectrophotometer at a resolution of 1 nm (from 190 to 800 nm) in 2 ml quartz cuvette with 1cm path length.samples.

3. Result and Discussion

After preparing the samples the optical absorbance properties were investigated for all sample that made before and after to expose by used the ultraviolet-visible (UV-Vis) spectroscopies as showing before

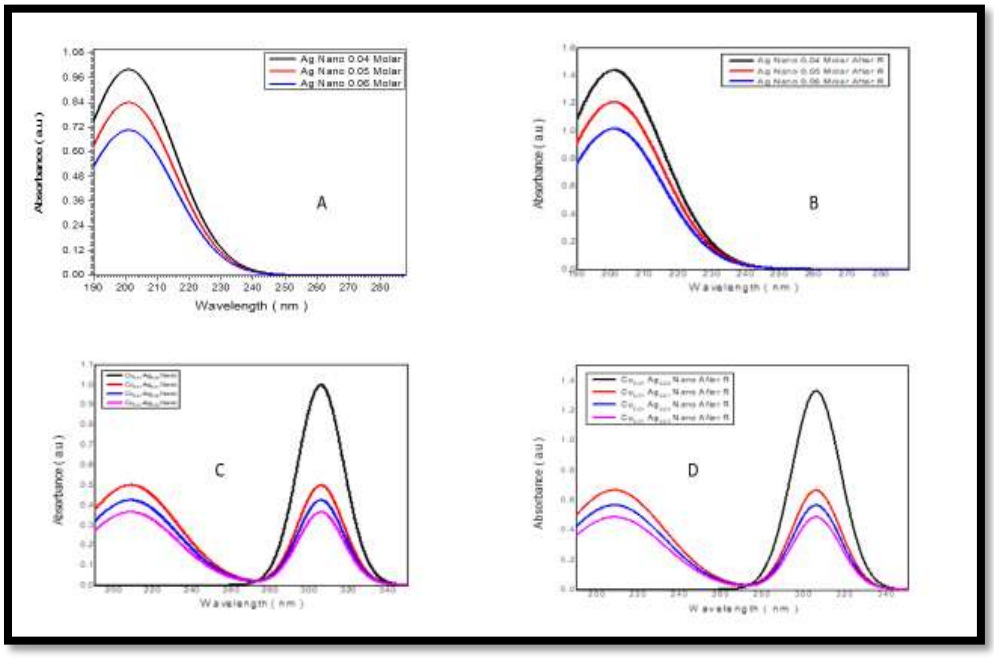

Figure (1) Absorption Spectra of all sample that made (A) Silver Nanoparticles (0.04, 0.05, and 0.06) Molar. (B) Silver Nanoparticles (0.04, 0.05, 0.06) M after irradiated by gamma rays. (C) Silver Nanoparticles (0.01, 0.02, 0.03)M doped copper nanoparticles (0.01)M. (D) Silver Nanoparticles (0.01, 0.02, 0.03)M doped copper nanoparticles (0.01)M after irradiated by gamma ray.

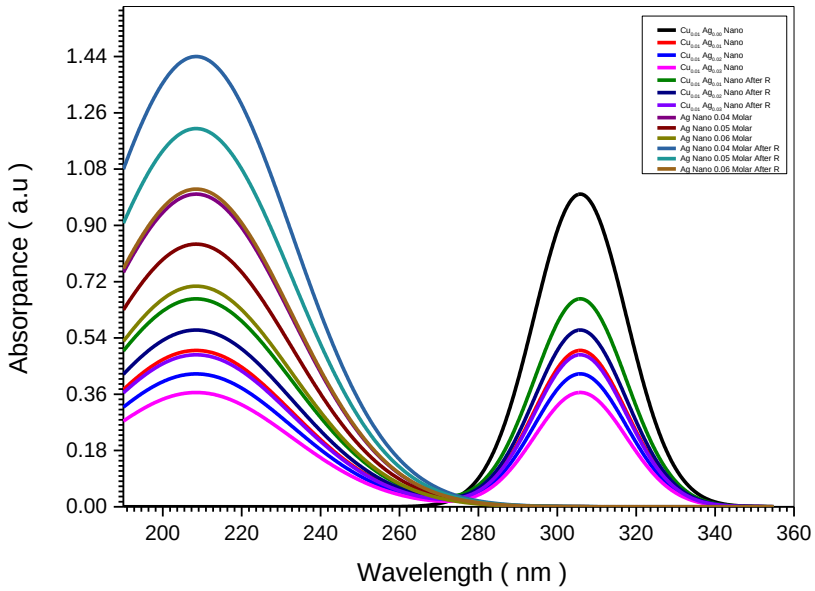

Figure (2) Absorption Spectra of all sample that made before and after to expose by used the ultraviolet-visible (UV-Vis) spectroscopies

Table (1) absorbance value of all samples that made before and after to expose by used the ultraviolet-visible (UV-Vis) spectroscopies at 272 nm wavelength

No	Samples	Mean Absorbance Value (a.u)
1	Cu0.01 Ag0.00 Nano	0.17877
2	Cu0.01 Ag0.01 Nano	0.23274
3	Cu0.01 Ag0.02 Nano	0.19783
4	Cu0.01 Ag0.03 Nano	0.17013
5	Cu0.01 Ag0.01 Nano After R	0.30955
6	Cu0.01 Ag0.02 Nano After R	0.26311
7	Cu0.01 Ag0.03 Nano After R	0.22628
8	Ag Nano 0.04 Molar	0.28671
9	Ag Nano 0.05 Molar	0.24084
10	Ag Nano 0.06 Molar	0.20231
11	Ag Nano 0.04 Molar After R	0.41287
12	Ag Nano 0.05 Molar After R	0.34681

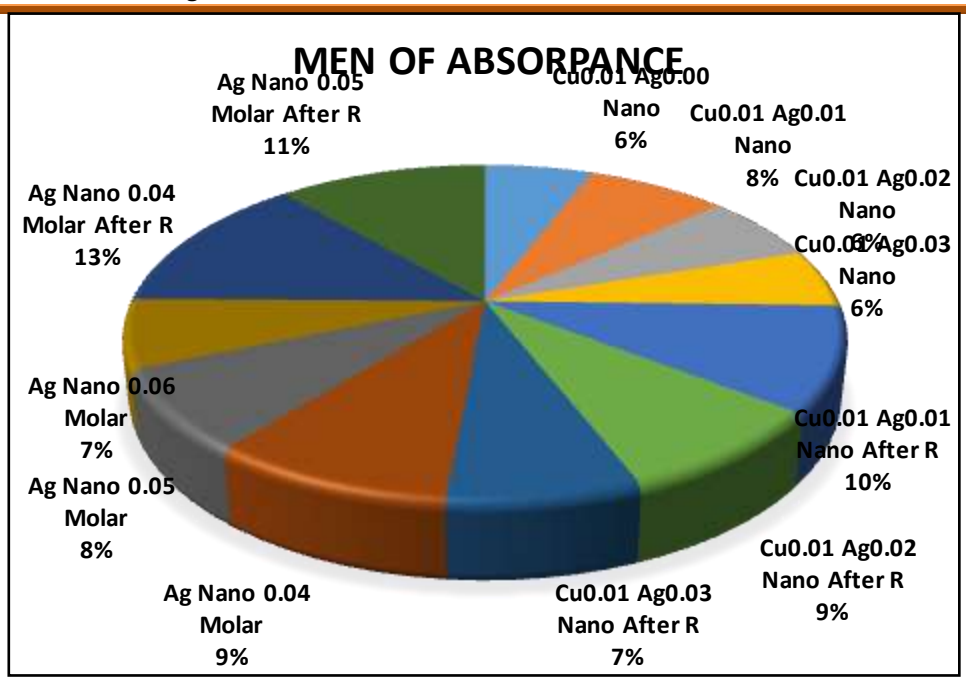

Figure (3) semantical graph to counting the mean absorbance value of all sample that made before and after to expose at 272 nm wavelength

Discussion

The absorption spectral pattern changed is indicator to change in other properties of all Silver Nanoparticle samples according the treatment method. For fig (1) shows that the absorption peak for all Silver Nanoparticle samples that made. Fig (1-A) show the retaliation sheep between absorbance value and wavelength of Silver Nanoparticles (0.04, 0.05, and 0.06) Molar at ranged (190 to 288)nm , the maximal absorbance value is 1.004 (a.u) for the Ag Nano sample 0.04 molar at 200 nm , but for the sample 0.05 molar in the same wavelength equal 0.84 (a.u) and at last sample 0.06 molar at the same wavelength also equal 0.71 (a.u) .We show that the value of absorbance decrease when increasing concentration is observed. This means that the absorption peak and pattern are slight dependent on material density and thickness. This means that increasing molar of Silver Nanoparticle concentration decrease the absorbed photon value thus increases the minimum photon threshold energy which cause electrons to transfer from valence to conduction band. And for fig (1-B) is absorption spectra of Silver Nanoparticles (0.04, 0.05, 0.06) M after irradiated by gamma rays also at ranged (190 to 288) nm, the maximal absorbance value is 1.449 (a.u) for the Ag Nano sample 0.04 molar at 200 nm, but for the sample 0.05 molar in the same wavelength equal 1.212 (a.u) and at last sample 0.06 molar at the same wavelength also equal 1.017 (a.u). The absorbance value increasing by increasing the molar of Silver Nanoparticle ,and also show that the value moor increasing after to exposed by gamma ray .In fig (1-C) show that absorption spectra of Silver Nanoparticles (0.01, 0.02, 0.03)M doped copper nanoparticles (0.01)M, also in this fig show that at 305 nm the peak pattern of copper nanoparticles and the value equal 1.012 (a.u) and at this wavelength some peak after doping Silver Nanoparticle but by low value and on the area of Silver Nanoparticle (200) nm also lower than Silver Nanoparticle pours. But for the fig (1-D) for the Silver Nanoparticles (0.01, 0.02, 0.03) M doped copper nanoparticles (0.01) M after irradiated by gamma ray, we show that the value of the absorption increasing than fig (1-C).All above mention that notated in the discussion showing in table (1) and drawing in graph (3).

Conclusion

The efficiency of doped with copper oxide on Silver Nanoparticle absorption value to decreasing, but when to affected by gamma ray increasing , this means that increasing or decreasing related to change on the sample concerted and properties.

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