ISSN: 2776-0960 Volume 3, Issue 5 May, 2022

GRAPHENE OXIDE NPS WERE PREPARATION BY CHEMICAL METHOD USING PLANT EXTRACT

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Abstract

Graphene oxide nanoparticles (GONPs) have been widely used in medical applications because they are inexpensive, safe and effective. This research successfully produced GONPs preparation of mixing the plant extract (onion) with graphene solution at 300 °C for 2 hours by chemical method. GONPs prepared by using the plant extract (onion) was characterization by X-ray diffraction (XRD), Ultravilote visible (UV-visible) Spectrum, and fourier transform infrared (FT-IR) spectrum. The small crystalline size (23 nm), and (hexagonal) structure, UV-visible spectrum shows for the optical band gap value (4.0) eV at 300 °C for GONPs using onion extract. FT-IR spectrum show the absorpption band strong is 726 cm^{-1} of GONPs using onion extract.

Keywords: Graphene oxide NPs; Simple chemical method; Environmental friendly; onion extract.

Introduction

Today, nanotechnology has become a major focus of modern research, as well as one of the most important fields in the physical and chemical worlds as well as other scientific disciplines. By "nanoscience" we mean the branch of science concerned with the characterization and study of nanomaterials in addition to determining their physical and chemical properties between (1-100 nanometers)"[1], and we mean the study of materials at scales starting from the inner grain to the last. No technology has occurred in any other era Equally interesting is nanotechnology, which is key to current advances in every industry[2].The unique and distinct properties of this technology hold the key to the mystery The physical and chemical properties of nanoparticles differ greatly from those of the bulk of the same material, and this is what distinguishes nanoparticles And makes it a new scientific miracle and always in progress [3] The term nanotechnology is derived from the nanometer, and this science opens a new era of basic research integration at the nanoscale, as important products are manufactured within this scale, as research is underway to manufacture More efficient devices and that the priority for the next five years at the present time will focus on each of the medical field, energy conversion, agriculture, nanoelectronics, catalysts, and pharmaceuticals[4]. Scientists have been able to manufacture nanostructure shapes that are not visible to the naked eye, similar in reality to shapes that exist in nature or do not exist, for example, the manufacture of nanorods, nanowires, nanotubes, and nanofibers), and many forms of wonderful formation, as well as the manufacture of well-known electronic devices such as transistors, solar cells, diodes, sensors, and others [5].

Nanomaterials are unique due to their small size, making them ideal for medical use in delivering drugs to specific tissues. Once the nanoparticles (NPs) penetrate the cell wall, they can be coated with drugs or proteins and then delivered to the target area [6]. It is of utmost importance to determine the appropriate preparation method for nanomaterials in order to improve their final properties, and this choice must be guided by a number of factors, such as the physical and chemical parameters of the compound, nanoparticle diameter, surface shape, or environmental considerations, which certainly constitute an indisputable procedure. growing. It is under control [7-8]. The garlic and onion peels and excels in the properties of their fruit as a plant-flavonoid quercetin that is as high as the amount of onions and garlic and is a reduction, stabilization and clumping agent that enables the production of large amounts of nanoparticles. These peels also contain iron, magnesium and may be used in water purification and environmental therapy [8-13].

Green synthesis has been discovered by scientists in recent times and linked to chemical and physical methods in order to produce nanoparticles that are environmentally friendly, cheap, safe, socially acceptable and economically available. The green synthesis method uses biological systems, especially plant extracts, because they are completely safe from toxins and produce large quantities of nanoparticles and are fast in synthesis and do not leave toxic residues after use, including leaves, seeds, stems, fruits, peels, etc [14-17].

This research was able to synthesize GONPs with extracts of graphen by chemical technique (onion), at 300 ° C for an hour. The GONPs were characterized using XRD analyzes in the Nanotechnology Laboratory and Advanced Materials / Department of Materials Research / The Ministry of Science and Technology, by XRD's (XRD6000 Shimadzu, Company / Japan). A Jobin Yvon HR800UV spectrometer equipment is used to analyze SEM through (JAEL JSM-6460LV).

Experimental Work

2.1 Materials and Methods

The facilities were acquired as preliminary work from the local market in (Baghdad / Iraq). The graphene materials (Baghdad / Iraq) has been localized. The distilled water (distilled water, Company / Gallery, England) cleansed all-glass goods. Furthermore, all solutions were developed with distilled water. The extract (onion) contains both glucosidane and parabaloin and a compound. It includes resin, organic and poly acids, onion -emodins and a few minerals. There is gel in onion plant leaves, and 0.542% solid, 42% carbohydrates, 1.95% nitrogen, 0.113% fatty substances have demonstrated gel in onion plant leaves [18].

2.2 Preparation of plant extract

The onion extract was rinsed with distilled water and then seven days dried in the sunlight. Then the (onion) with electric grinding was pulverized. A (5 g) powder is mixed in the hotplate stirrer at 70°C with 100 ml of distilled water for 1 hour. This observes the change in color of the solution and shows how a graphene oxide NP substance is formed. The final resolution is freezing and filtering to room temperatures using the filter sheet [19-20].

2.3 Preparation of graphene oxide NPs

This is produced by adding graphene oxide NPs from 100 mL of graphene solution to 100 ml the (onion). After that, the solution was put to 70°C for 60 minutes on the hotplate stirrer. During synthesis, it detects that the color of the exhaust reaction rapidly changed from translucent off White to dark and refers to the forming of NPs made from graphene oxide. At room temperature, the resultant resolve was chilled. The 30 ml graphene oxide solution NPs was put to a ceramic vine at a steaming temperature of 300°C for 3 hours to achieve the graphene oxide nanometric solution. Lastly, NP-solves of graphene oxide were stored for subsequent diagnosis in sealed serum tubes.

3. Result and Discussion

X-ray diffraction (XRD) was performed for samples prepared by a simple chemical method using different plant extracts (onion) at a concentration of (1) molar at 300°C and for all samples prepared by using an X-ray diffraction device. Figures (1) and Table (1) show the X-ray diffraction patterns of graphene oxide nanoparticles (GONPs) prepared by simple chemical (oxidation and reduction) reactions, respectively. The results of X-ray diffraction (XRD) showed that the diagnostic peaks of crystalline graphene oxide NPs were obtained at the angles (2θ = 27.28°, and 69.88°) of the crystalline planes (002), and (112) respectively as shown in figure (1) and (2), with a hexagonal crystal structure, corresponding to the diagnostic peaks of the standard card (JCPDS 89-2482). It was observed that changing the plant extract (onion extract) used in the preparation of nanoparticles had no effect on the hexagonal crystal structure of graphene oxide nanoparticles (GONPs).

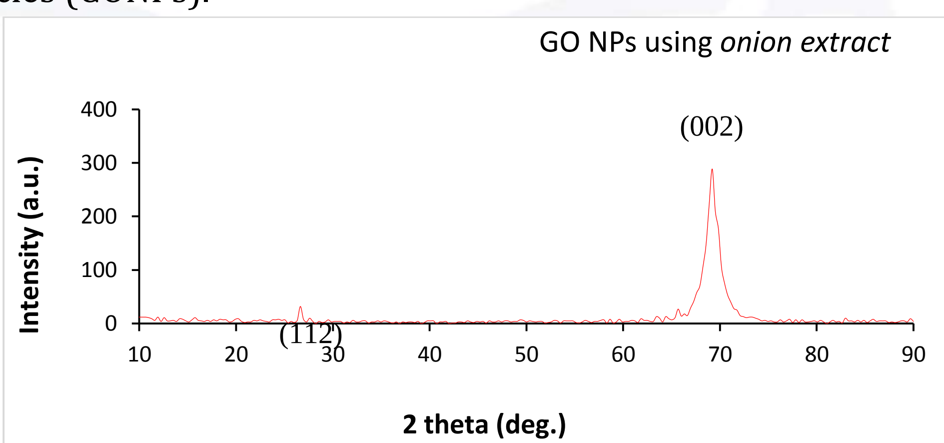


Figure 1. X-ray diffraction (XRD) patterns of graphene oxide nanoparticles (GONPs) prepared using onion extract.

Table (1) some crystalline parameters of graphene oxide nanoparticles.

Plant extract	materials	2Θ (deg) Practical	2Θ (deg) Standard	FWHM (deg)	Crystalline size (nm)	d_{hkl} (°A) Practical	d_{hkl} (°A) Standard	(hkl)
onion	Graphene oxide	40.01	40.21	0.36000	23.2	2.2442	2.2402	)002(

3.1. UV-Vis spectrophotometry of IONPs prepared using the onion peel extract.

Figure 2 A-D shows the UV-vis transmittance and absorbance bands of biosynthesized Graphene oxide NPs (GONPs) sample using onion extract. Figure 2 A reveals the optical transmittance spectra between 200 and 900 nm for the biosynthesized GONPs. Figure 2 A shows a high transmittance percentage below 400 nm, indicating a strong absorbance of the GO NPs (hexagonal). An increase in the absorbance of the GO NPs using onion extract was observed above 400 nm, as shown in Figure 2 A.

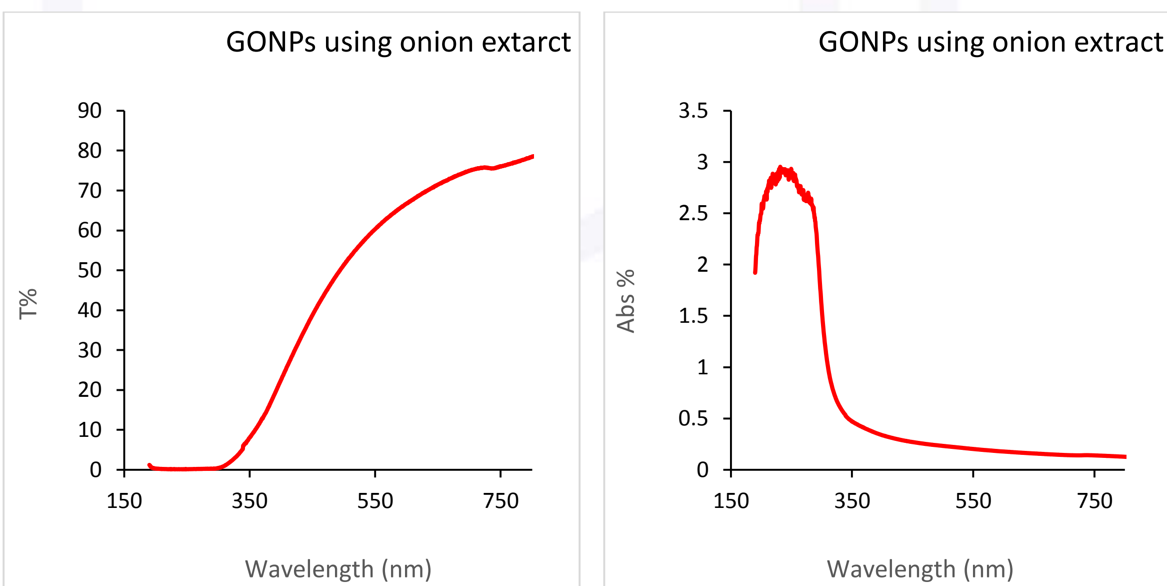


Figure (2): UV-visible spectrum of GONPs, (A-B) using onion extract.

An optical energy gap of GONPs is found to be (4.1 eV) for GONPs using onion extract, as shown in figure (3).

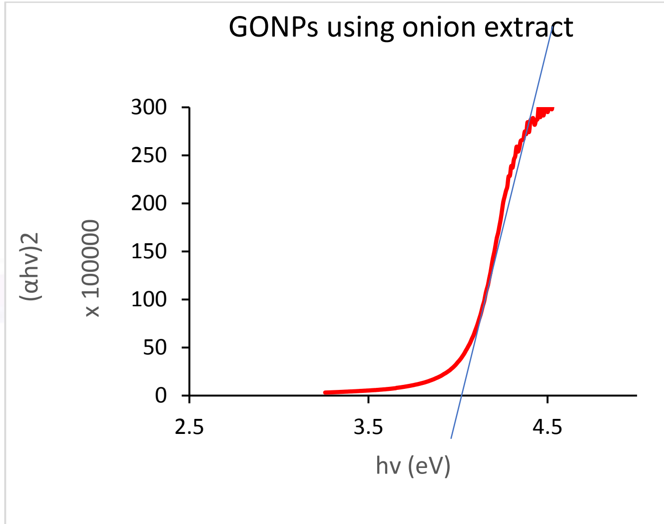
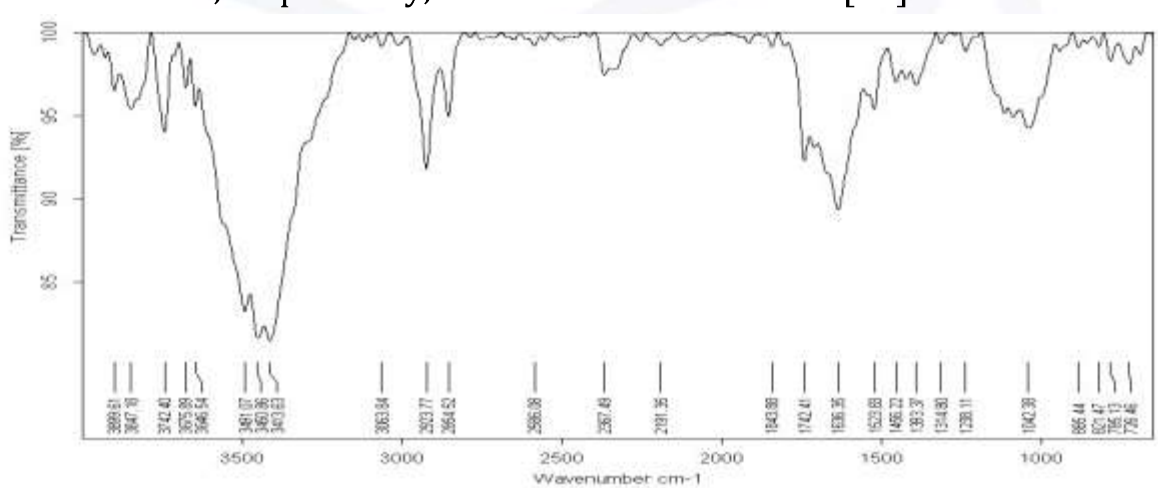


Figure (3): Energy band gap of GONPs using onion extract.

3.2 Fourier transform infrared (FT-IR) spectrum

The Functional Group Analysis, the absorpption peak strong, and the compounds were determining by fourier transform infrared (FT-IR) spectrum of prepared GONPs at temperature (300 °C) for 2 hours. Figures 4 present the FT-IR spectrum of pure GONPs synthesized by chemical method.

The annealed GONPs sample shown in Figure 4 has a hexagonal structure GONPs structure, which is supported by the FT-IR spectrum. An absorption broad band at 3480 cm^{-1} (bending mode of H_2O) showed that GO nanoparticles have water molecules on their surfaces. It was found that stretching vibrations of C=C were the cause of the very weak band at 2334 cm^{-1}, the existence of EA on the GO nanoparticles' surfaces. At (726) cm^{-1} of GONPs, the strong peaks represent the G–O vibrations, respectively, of GO structure at 300 °C [20].



Conclusion

This work has succeeded in producing graphene oxide NPs (GONPs) by the chemical method, utilizing modern plant extracts (onion). XRD Measures explained the small size of the crystalline (23 nm), and (hexagonal) structure, UV-visible spectrum shows for the optical band gap value from (3.36) eV to GONPs NPs using onion extract of 300 °C, the optical band gap value (4.0) eV at 300 °C for GONPs using onion extract. FT-IR spectrum show the absorpption band strong is 726 cm^{-1} of GONPs using onion extract.

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