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Green Synthesis of Nanoparticles Selenium

Farah S. Daabool [a]

[a] *College of Biotechnology, Al-Qasim Green University, Hilla, Iraq. Email: farah_s_daabool@uoqasim.edu.iq*

Abstract

The reaction of sodium selenite source with various extracted orange covers in an acidic suspension during ambient circumstances has been devised as a simple sol gel technique to generate selenium nanoparticles.
The selenium nanoparticles were stabilized with polyvinyl alcohol. A high-speed centrifuge can be used to isolate the nanoparticles from their sol, and a sonicator can be used to redisperse them in an aqueous media.
The produced selenium nanoparticles were characterized using UV-visible optical absorption spectroscopy and X-ray diffraction methods.

Keywords: Se, Nanoparticles, Orang, XRD.

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Introduction

The kinds of applications of nanomaterials have sparked study into their preparation and characterization. These materials were originally used in technology as catalysts and dyes.

The increased electrical, mechanical, and optical abilities of these materials are now the focus of much of the excitement around them. The particles in this nanoscale range have roughly the same short-range structures as the bulk, but they have optical and/or electrical properties that are substantially different from the bulk [1–3].

Due to various their nanoscale effects, enormous surface-to-volume ratio, and substantial variance in the characteristics of their surface atoms, they are a relatively novel family of materials that have been the subject of intense research.

There is a large literature on the production and utilization of nanomaterials made of metals like silver, gold, and platinum, as well as semiconductors like CdSe, ZnSe, and TiO_2.

Metalloid research, such as selenium, is, nevertheless, limited.

Resonators, solar cells, digital exposure meters, and xerography all use selenium [4].

It's also used in the glass sector to get rid of bubbles and reduce iron's unwanted hues.

The optical properties of selenium, both linear and nonlinear, as well as its reactivity to Cd and Zn, make this an essential subject of research. These are a newer family of materials that have been the focus of much research due to their quantum size effects. Selenium research has gotten a lot of interest recently, not only because of its technical implications, but also because of its unusual function in life sciences.

Selenium is an important trace element in the human body that has a role in nutrition and medicine [5].

It appears in a variety of crystalline forms, the most common of which are trigonal, which consists of helical chains, and monoclinic, which consists of Se8 rings [6].

Monoclinic Se (m-Se) is divided into three types, and, with the sole difference being how the rings are packed [6, 7].

The amorphous selenium (a-Se) molecule is made up of a jumble of disorganized chains.

Different synthetic approaches can be used to manufacture various types of nanoselenium [5, 8–12].

Chemical reduction [13], -radiolytic reduction [14], bacterial reduction [15], and other reduction methods are the most used methods for selenium nanoparticle formation.

However, some research on the oxidation approach for nanoselenium generation, such as the reaction of selenourea with hydroxyl radical [16], electrochemical oxidation of selenide [17-20], has been published.

We have discovered a new simple sol gel approach to synthesis polyvinyl alcohol-stabilized nanopowders using aqueous sodium selenite as a selenium source using ascorbic acid extracted from orange cover.

At ambient circumstances, the process may produce spherical selenium nanomaterials with sizes ranging from 50 to 80 nm.

X-ray diffraction (XRD) methods were used to analyze the produced selenium nanostructures.

Experimental

SeNPs were synthesis from a reduction of sodium selenite by Sodium borohydride. Briefly, 1.7 g of Na_2SeO_3 was added dropes of reduction reagent (from orange peels) was additional dropwise to sodium selenite. Solution with stirring at 200 C°. Selenium nanoparticles were formed after the addition of redacted reagent.

A change in color in the reactant mixture from pure white to pure orange may be seen. All of the solutions were produced in a sterile environment with double distilled water and a sterile closet. After that, the fluid was centrifuged at 12000 rpm to capture the selenium nanomaterials.

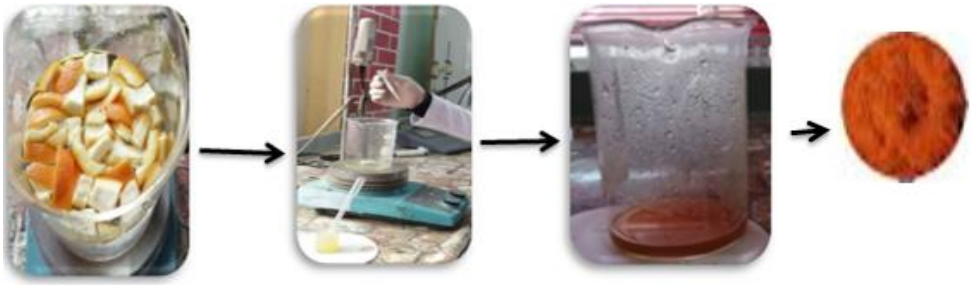


Fig. 1: Method of Synthesis of Se Nanoparticles

Results and Discussion

1. X-Ray Diffraction Study of the Synthesized Selenium Nanoparticles

The XRD technique was used to determine the crystalline phase of the selenium nanoparticles. Figure 2 shows the typical Xrd spectra of the synthesized material following a 2-hour heat treatment at 200°C. It is believed that amorphous selenium is red in colour, which is further confirmed by selenium sol presented in Figure 2.

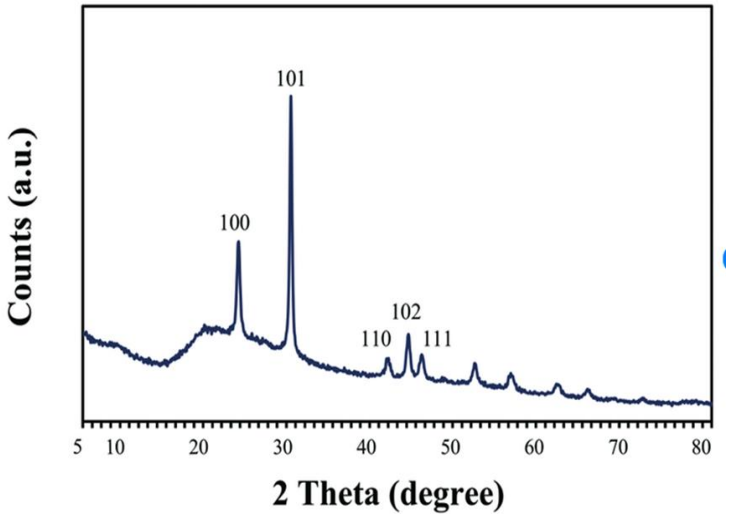


Figure 2: XRD of Selenium Nanoparticles

3.2. Scanning Electronic Microscopy (SEM)

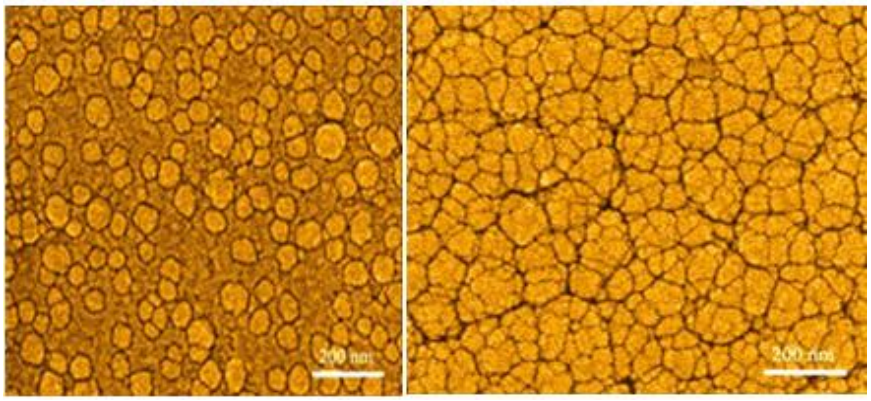


Figure 3: Scanning Electronic Microscopy of Selenium Nanoparticles

The morphological investigation of the prepared Se powder took place by means of scanning electron microscopy (SEM). As presented in Fig. 3, the estimation for the average size of Se particles would be about 50-80 nm.

Conclusions

Can synthesis metal nanoparticles by used green chemistry. This is investigation by prepared redaction reagent natural from plant such as orange peels. This method give good product without agglomerate of nanoparticles when is formed, and can used this reagent with other materials.

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