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PLANT- MEDIATED SYNTHESIS OF GOLD NANOPARTICLES

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ABSTRACT

Nanotechnology is the growing field of nanoscale materials, it is necessary to merge medicine and nanotechnology. The present study shows that if gold nanoparticles are plant mediated, they are cost-effective, rapid, and efficient. Gold nanoparticles were synthesized by using the *Couroupita guianensis* and they were characterized by using the FTIR, XRD, and SEM. Interestingly these plants mediated gold nanoparticles will be used in several applications of electronics, medical applications such as drug delivery, diagnostics, and treatments.

Reference Guide:

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INTRODUCTION: WHAT IS NANOTECHNOLOGY?

Nanotechnology is the combination of two fields engineering and science and this technology is conducted at the nanoscale level having a diameter of (10 to 100 nm). Nanotechnology is the study of little objects that can be used in other fields of science like chemistry, material science, biology, and physics, etc. In medicine,

nanotechnology applications are playing a significant role in drug targeting, molecular imaging, disease diagnosis, etc. Nanotechnology is the science of materials at the molecular or subatomic level. It involves the manipulation of particles smaller than 100 nanometres (one nanometre is one-billionth of a meter) and the technology involves developing materials or devices within that size invisible

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to the human eye and often many hundred times thinner than the width of human hair. In the diverse field's nanotechnology and nano-engineering stand to produce technological advancement. For the applications in physiology and medicine, these devices can be designed, and they can coordinate with the target tissue and the target cells. (Lieber, 2003)

WHAT ARE GOLD NANOPARTICLES?

Gold nanoparticles have been utilized for many centuries by scientists, but they were invented by the artist when they observed different color patterns produced when these particles were creating contact with light. These optical-electronic properties are further researched by the scientist and they decided that they will utilize them in high technology applications like drug delivery, sensory probes, medical applications, and photovoltaics. These optical properties of the nanoparticles are tunable as they change such as size, shape, and chemistry. (Ghosh and Pal, 2007)

PLANT-MEDIATED SYNTHESIS OF THE GOLD NANOPARTICLES:

Plants and plant extracts have been used to manufacture the range of metallic nanoparticles having a well-defined size. Gold nanoparticles can be synthesized from different routes and they give excellent properties such as they serve as the reducing and capping agents. Intracellular and Extracellular plants have been proved to be capable of the synthesis of gold nanoparticles. Gold nanoparticles are consumed in the field of agriculture, medicine, and pharmaceuticals. (Mittal et al., 2013)

MATERIAL AND METHODS:

1.Preparation of Flower Extract:

Fresh flowers of *C. guianensis* were collected and they were washed by using the distilled water. Then they were dried

and ground in the fine powder. About 1 g of the flower extract was added into the 50 mL of distilled water and mixed well. This extract was filtered, and the filtrate was stored in a separate flask.

2.-Mediated Synthesis of Gold Nanoparticles:

One hundred milliliter solution of 1mM chloroauric acid with a concentration of 10⁻³ M was prepared and dissolved into the solution of distilled water. *C. guianensis* and chloroauric acid with different concentrations of (1:9, 2:8, 3:7, 4:6 and 5:5) were subjected, respectively. After 5 minutes the gold ions are reduced to the gold nanoparticles, and this synthesis of gold nanoparticles is confirmed by changes appearing into the color of the solution, the pale-yellow color solution changed into the red color solution. This formation was continuously monitored by visual inspection and by measuring the solution on UV- visible spectrometer with the range of 300-800 nm.

3.Characterization of the Gold Nanoparticles:

The gold nanoparticles were characterized by using the FTIR. For these, the synthesized gold nanoparticles were centrifuged at 8000 rpm for 10 min and the remaining suspension was washed with the distilled water. The purified pallet that was remaining, were separate out and was dried. These pallets were analyzed by using the Thermo Nicolet Quator instrument.

For the XRD measurements, the gold nanoparticles solution was coated on the glass surface and operated with a voltage of 40 kV. The scanning Electron microscope was used to determine the morphology of gold nanoparticles. (Ho et al., 2007)

GENERAL APPLICATIONS OF GOLD NANOPARTICLES:

Gold nanoparticles application is increasing rapidly they include:

Electronics:

They are used to make the conductors that are consumed for the manufacture of electronic chips. They are used to connect the conductors, resistors, and other elements that are required in the composition of an electronic chip.. (Li and Wong, 2006)

Drug and Therapeutic Delivery:

Onto the surface of gold nanoparticles, these drugs are loaded and delivered to the body. Gold nanoparticles are easily entered into humans with the least damage effect and cannot be distinguished by the immune system as a foreign particle. (Huang et al., 2008)

Sensors:

Gold nanoparticles are consumed in the synthesis of various sensors. These sensors are utilized to know if food is safe to be consumed and for the detection of pollutants, proteins, and other toxic agents.

Diagnostics:

In cancer, heart disease, and other body diseases gold nanoparticles are used to detect the biomarkers. They are also used in various diagnostic tests such as pregnancy tests and immunoassays. (Belushkin et al., 2018)

RECOMMENDATIONS:

If Pakistan uses this advanced technology for diagnosis and pro-diagnosis of diseases, it will help save the life of people as early detection will be possible. Also, plant-mediated gold nanoparticles will not be harmful to humans as they are environment friendly.

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