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Green Synthesis and Characterization of Silver Nanoparticles

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ABSTRACT

In this study, we have successfully green synthesized the silver nanoparticles (Ag NPs) using Lotus Corniculatus aqueous extract as the natural reducing and stabilizing agent, and aqueous $AgNO_3$ solution as a precursor using anew approach which attracts the interest of researchers worldwide. The as-prepared was characterized by Ultraviolet–Visible (UV–Vis) spectrophotometry, X-ray diffractometry (XRD), Fourier transform infrared (FT-IR) spectroscopy and scanning electron microscopy with energy dispersive X-ray (SEM with EDX).

Introduction

Because of their size-dependent physical and chemical properties, nanoparticles are gaining attention [1]. Metallic silver nanoparticles (AgNPs) have received considerable attention for their potential application as a biocide in products ranging from facade paints to textiles, which is reflected in recent product inventories [2].

Experimental

A volume of the extract (96 ml) is placed in a beaker, with stirring a solution of silver nitrate (1 mM) was added drop by drop, the obtained mixture has an orange-yellow color. The mixture was stirred overnight and it's color becomes brown. After that, a precipitate appeared. After precipitation of the solid phase, the latter is dried in an oven at a temperature of 80 ° C, in order to obtain a powder. This powder is calcined for 3 hours at a temperature of 400 ° C with a rise of 2 ° C /min.

Results and Discussion

In order to confirm the composition and crystallinity of theobtained nanopowder, XRD was used for further detectionand analysis. As shown in figure-1, The synthesized Ag NPs were identified by XRD analysis as a cubic facecentered crystal system [3] and the average crystallite sizeis 11nm. The aqueous suspension of Ag NPs shows a UV–Vis absorption maxima of 390 nm demonstrating NPs formation. FT-IR analysis identified the presence of functional groups in the aqueous extract responsible for the production of stable AgNPs . As showing in figure-1 SEMshowed that the nanoparticles were spherical in shape withnanometric size.

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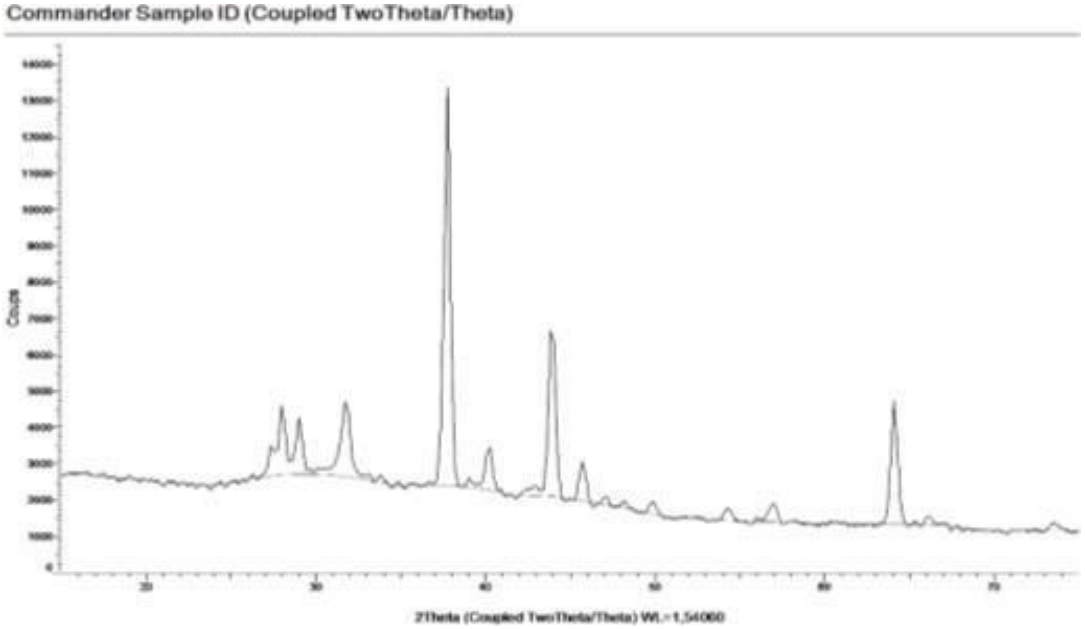

Figure-1:XRD pattern of Ag NPs.

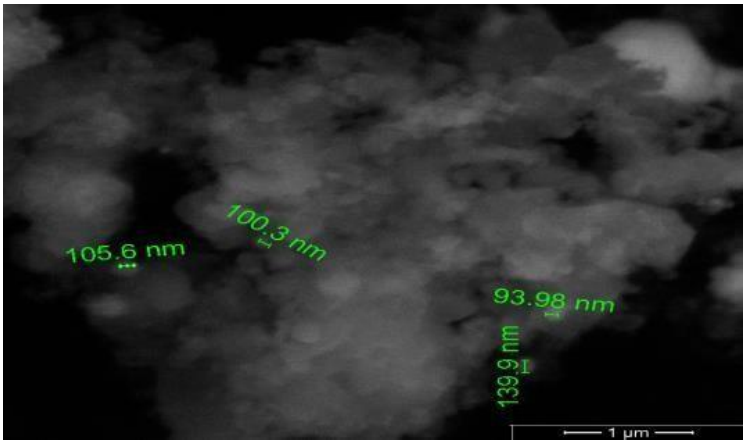

Figure-2: Scanning Electron Micrograph ofbiosynthesized silver NPs

Conclusion

These biosynthesized nanoparticles can be used multifield purpose medical applications.

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