

# Synthesis of Silver Nano Particles and its Antifungal Activity

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## Abstract:

The aim of this study, biosynthesis of silver nanoparticles using aqueous extract of leaves black tea and tested the effected it as antifungal agent. The synthesized nanoparticles were characterized using UV- spectroscopy and Scanning electron microscope (SEM). Results, show that, silver nanoparticles formation in solution by changing in the color from yellow to brown. The absorption spectrum of silver nanoparticles by uv- visible shown in band of 400 nm, which signifying the existence of spherical shape nanoparticles. SEM analysis shows that the size of synthesized silver nanoparticles are with range of 10 -500 nm. Also, the biosynthesis of silver nanoparticles using aqueous extract of leaves black tea effected on growth of yeast *C.albicans* with inhibition zone 9mm compare with leaf extract 2.3mm.

**Key words** :Ag nanoparticles, Black tea, Biogenic synthesis, *C.albicans*, SEM, UV spectroscopy.

## INTRODUCTION:

Nanotechnology is manipulation of matter through certain chemical and/or physical processes to create materials with specific properties, which can be used in particular applications. A nanoparticle can be also known as a microscopic particle that has at least one dimension less than 100 nanometers in size.[1,2]. Unlike bulk materials, they have unique optical, thermal, electrical, chemical, and physical properties and, hence, they find a variety of applications in the areas of medicine, chemistry, environment, energy, agriculture, information, and communication, heavy industry, and consumer goods [3,4]. Whole or partial plant such as fruits, vegetables, black and green tea and marine algae extracts have been used to produce nanoparticles.[5,6]. Biogenic synthesis is useful not only because of its reduced environmental impact compared with some of the physicochemical production methods, but also because it can be used to produce large quantities of nanoparticles that are free of contamination and have a well-defined size and morphology [7,8]. Biosynthetic routes can actually provide nanoparticles of a better defined size and morphology than some of the physicochemical methods of production [9]. Thus, the present study using aqueous extract of leaves black tea for biosynthesis of Ag Nps and testing antifungal activity.

## MATERIAL & METHODS:

### \*-Fungal Strain:

*Candida albicans* which obtain from laboratory of microbiology of science college /university of AL-Qadisiyah.

### \*-Synthesis of silver nanoparticles :

2 g. of leaves tea put in beaker containing 20ml of DW. The mixture was thoroughly agitated over night by using a magnetic stirrer. Then the mixture was filtered to obtain brown liquor. The liquor was centrifuged and again filtered to remove the impurities. 1M of AgNO<sub>3</sub> solution was prepared in DW. Silver nanoparticles was prepared by mixed 0.2 ml of AgNO<sub>3</sub> solution, 0.1 ml of tea extract and 3.7 ml DW. Then it was kept overnight in dark to stabilize. Change in color was observed on the next day. [10].

### \* -spectrophotometer analysis :

Optical characters of the synthesized silver nanoparticles and AgNO<sub>3</sub> were studied by analyzing the UV-Vis specter using spectrophotometer at room temperature.

### \*-Scanning Electron Microscopy (SEM):

We used Scanning Electron Microscopy (SEM) technique for measuring nanoparticle size of silver.

\*-Antifungal activity : The Antifungal activity of the extracts was carried out by disc diffusion method [11]. Circular discs of 5 mm diameter were made from the Whatman No.1 filter paper and sterilized by autoclaving at 15lb/inch<sup>2</sup> for 15 minutes. The sterile discs were impregnated with equal volume (100µg/ml) of tea leaf extracts and silver nanoparticles. The discs containing each of 25µl samples were aseptically placed on plates containing SDA medium after being spreader with each of the test pathogens. The plates were incubated at 37 °C for 24 hours and the zone of inhibition was measured (in mm diameter).

## RESULTS & DISCUSSION

### \*-Synthesis of silver nanoparticles:

The formation of silver nanoparticles was found to be successful by initial changes in color and that silver nanoparticles exhibit brown color (fig.1) in aqueous solution which output from the surface Plasmon vibration in Ag Nps. Silver nitrate has distinctive characteristics such as good conductivity, catalytic, chemical stability. So the reduce of silver salt (silver nitrate) to metal nanoparticles in present bio reduction agent (leaf tea extract).

### \* - U-V-Vis Spectroscopy :

UV-Vis spectroscopy was used for detection the presence of silver nanoparticles, particularly absorbance in the range (400-450)nm. [12]. Results, in fig(2,3) appearance that the wavelength of synthesized silver nanoparticles in absorption band of 400nm. This results coordinated with Sarah *et.al.*[13].

### \*- SEM Images:

Fig(4,5,6,7) explain the results of SEM analysis which revealed a characteristics of synthesized silver nanoparticles by leaf black tea extract, its appear spherical

particles with variety size (2.7,3,5,7.3)nm .this a coordinated with [14] .

The present results revealed that leaf tea extract at room temperature was able to act as reducing and stability agent .and confirmed the formation of silver nanoparticles . Biogenic synthesis is useful not only because of environmental decline for mental effect [7] . Compared with some physicochemical Production methods, but also because they can be used to produce large quantities of nanoparticles that are free from contamination .The source of plant extract effect on the characteristics of nanoparticles that these extracts contain different concentration of organic reducing agents [15].

\* -Antifungal activity:

The antifungal activity of biosynthesis produced was tested on *Candida albicans* .The inhibition test were due to by disc diffusion method .Fig.(8,9) appearance growth inhibition of yeast by silver nanoparticles compare with aqueous leaf tea extract and emphasis the antifungal activity of AgNps biosynthesis by leaf black tea extract .This results agreement with Vivek [16] and Bhattacharya and Mukherjee [17] which reported that antifungal effects of silver nanoparticles have been demonstrated .Silver nanoparticles are known to affect the permeability of membranes of microbial and other cells [18,19,20].

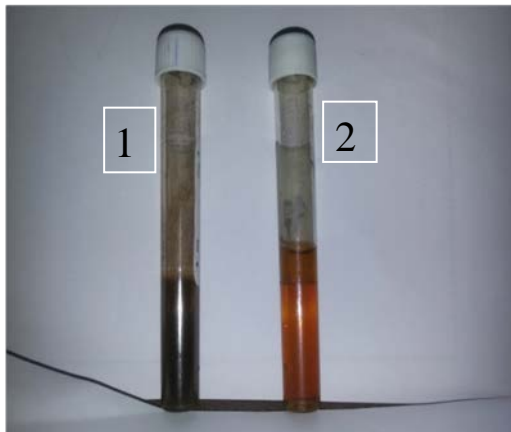


Fig.(1) : (1) aqueous of leaf tea extract ,(2) synthesized Ag Nps

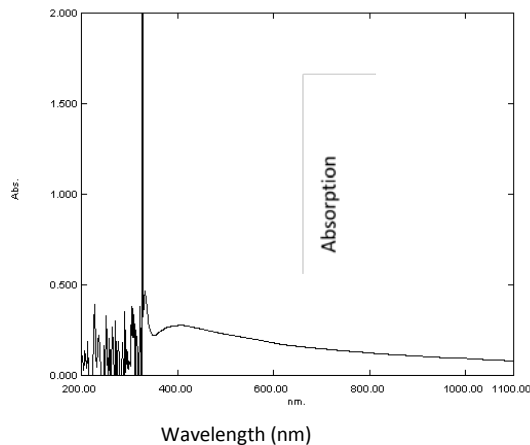


Fig.(2) VIS absorption spectra of Ag nanoparticles

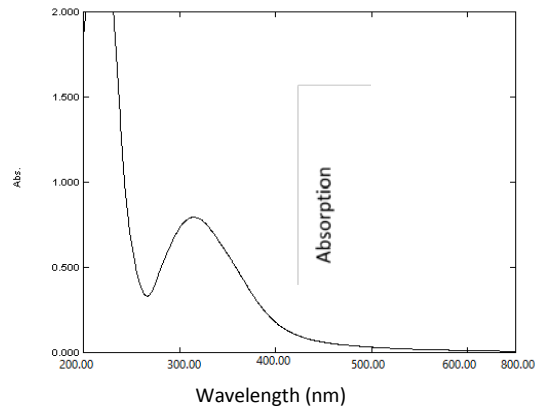


Fig.(3) VIS absorption spectra of AgNO<sub>3</sub>

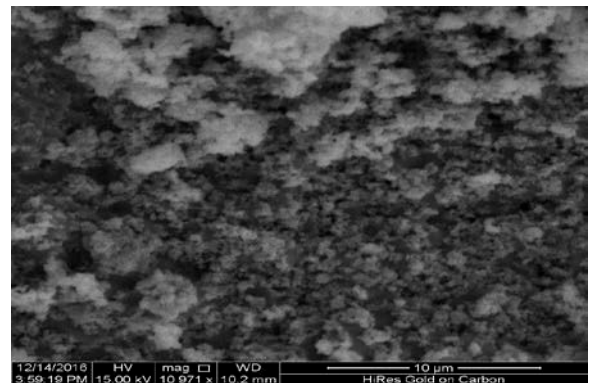


Fig.(4) ESM sections of the biosynthesis of AgNps with size (3nm)

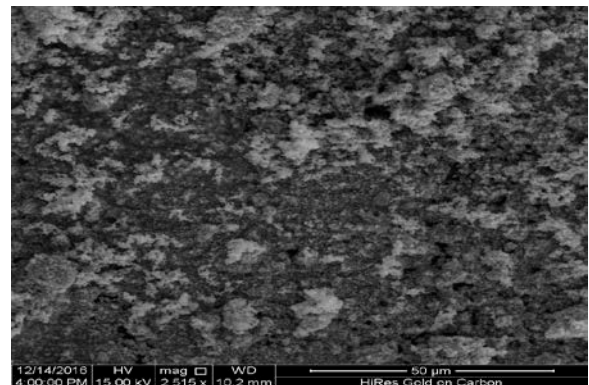


Fig.(5) ESM sections of the biosynthesis of AgNps with size (5nm)

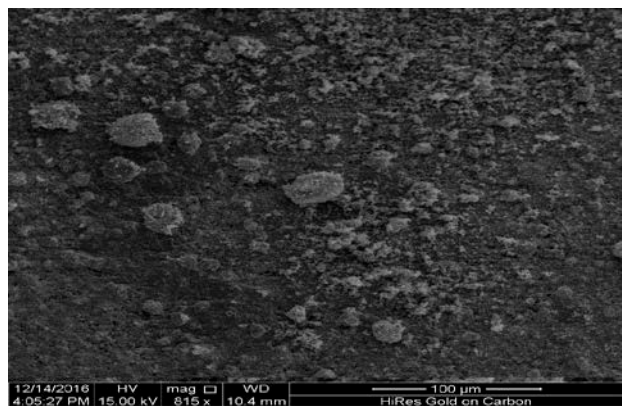


Fig.(6) ESM sections of the biosynthesis of AgNps with size (7.3nm)

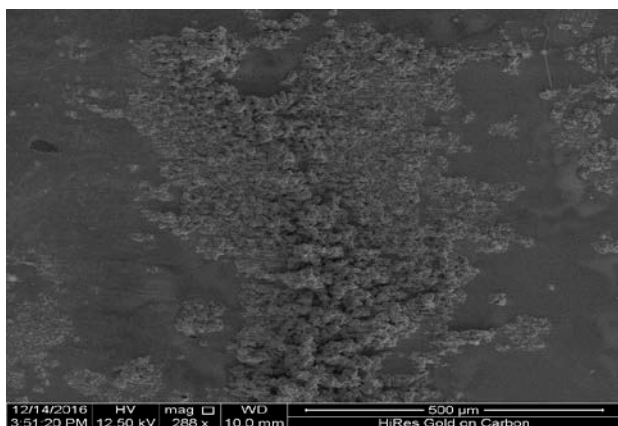


Fig.(7) ESM sections of the biosynthesis of AgNps with size (2.7nm)



Fig.(8) Effect of biosynthesis of Ag Nps on *C.albicans*

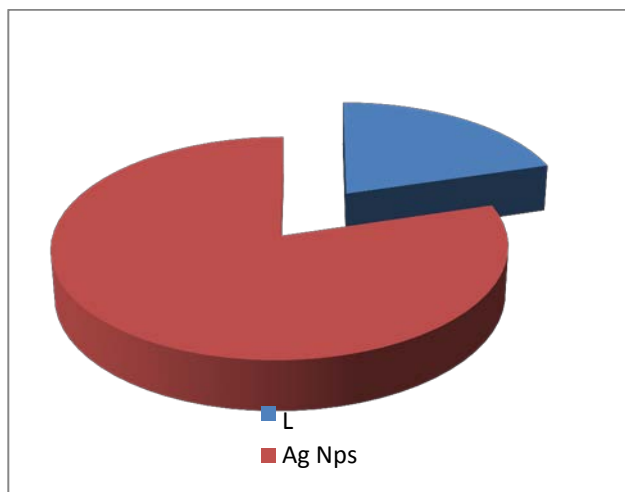


Fig.(9) Effect of biosynthesis of Ag Nps on *C.albicans*  
L= An aqueous extract of leaf black tea, AgNps= The biosynthesis Ag nanoparticles

### CONCLUSIONS

Silver nanoparticles are produced by reduction of silver ions, in this study leaf extract of black tea was used as reduced agent. The biosynthesis method considers an easily, eco-friendly and Cost effective for prepare

nanoparticles. Silver nanoparticles have effective for reducing the growth of yeast, *C.albicans*.

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