Biosynthesis of silver nanoparticles using extracts of medicinal plants

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Abstract - Synthesized silver nanoparticles using extracts of Calendula officinalis and Arnica montana callus biomass. It is shown that the rate of nanoparticle formation is influenced by plant cultivation conditions. It was found that in the presence of an extract obtained from callus, the process of nanoparticle formation occurs rapidly. The synthesized silver nanoparticles were studied by spectroscopy.

Keywords – nanoparticle, csllus biomass, *Calendula officinalis, Arnica montana,* extract, polyphenols.

Introduction

Nanoparticle (NPs) biosynthesis is environmentally friendly, without the use of harmful chemicals, has a low cost, has no by-products and contaminants. Plant extracts are an interesting medium for NPs synthesis because they contain many biologically active compounds, which act as reducing agents and stabilizers [1,2]. With this method you can get a woofer of controlled size and shape, which is important for further use in medicine and cosmetology.

The aim of study is to obtain silver nanoparticles (AgNPs) in the medium of an aqueous extract of *Calendula officinalis* and *Arnica montana* callus biomass.

Results

The ability of calluss biomass to accumulate secondary metabolites opens the possibility of using it for extracts. For all the studied plants, the conditions were selected and the nutrient medium was optimized under which the maximum amount of biomass was formed. The methodology of biotechnological research is based on conventional classical methods of working with the culture of isolated tissues of plants [3]. 250 ml of bidistilled water and 10 g of biomass of plant were used, the solution was boiled for 10 min, filtered and added to 1 mM AgNO3 solution (1:10, V/V), stirred at 35 °C on a magnetic stirrer. The solution was incubated at 60 °C for 24 hours in the dark. AgNPs were investigated by spectroscopy.

The color of the extract changes from light yellow to brown after about 15 minutes of stirring, indicating the formation of AgNP. Absorption in the UV spectrum was not observed for AgNO3 solution. The absorption peak of the aqueous extract of *C. officinalis* and *A. montana* was detected at 325 nm. Absorption of a solution containing leaf extract and AgNP was determined after 5, 10, 15 and 20 minutes. The peak absorption of the solution was observed at 420 nm after 15 minutes, indicating the presence of AgNP.

Conclusion

Biosynthesis of AgNPs in *C. officinalis* and *A. montana* callus biomass extract was performed. The presence of AgNPs was confirmed visually and by spectrophotometry. The process of nanoparticle formation depending on the cultivation conditions was also studied and their antimicrobial activity was studied.

References

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