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Synthesis and Characterization of Beijing Grass Mediated Silver Nanoparticles AgNO₃

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Abstract: Biosynthesis of silver nanoparticles appear as a new alternative approach that is important in utilizing the green source of mother earth. The biomediated silver nanoparticles were synthesized using Beijing grass, an attentive plant that were used by ancient people mainly for medication purpose. The Beijing grass extract were made using spray dried Beijing grass powder using hot extraction method. The effect of silver nitrate concentration as precursor and reactant volume ratio on the synthesis of silver nanoparticles were studied. All samples then proceeded to UV-Vis analysis to verify the formation of nanoparticles. The UV-Vis spectra for silver nanoparticles ranging from 390 nm to 470 nm. Generally, as preliminary conformation, the color changes on the solution indicated the formation of the silver nanoparticles. Based on the result obtained, 5 mM of silver nitrate at volume ratio of 5ml: 5ml of silver nitrate to BGE were chosen as the most optimum reaction condition for synthesis of silver nanoparticles. Even though silver nanoparticles have all the benefits, it still poses toxic characteristic as silver nitrate is a hazardous substance. Hence, the toxicity of the silver nanoparticles should be assess first by performing cytotoxic test before proceed to any broad applications. Lastly, in this report, comparative study on cytotoxicity of silver nanoparticles on living cells were emphasized.

Keywords: Biosynthesis, Silver Nanoparticles, Beijing Grass, Volume Ratio, Cytotoxic

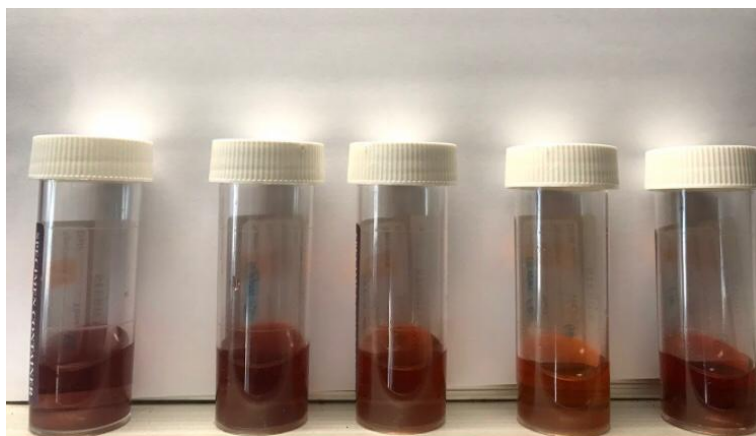


Figure 1: The synthesized silver nanoparticles using different concentration of silver nitrate (from left to right, 5.0 mM to 0.5 mM respectively)

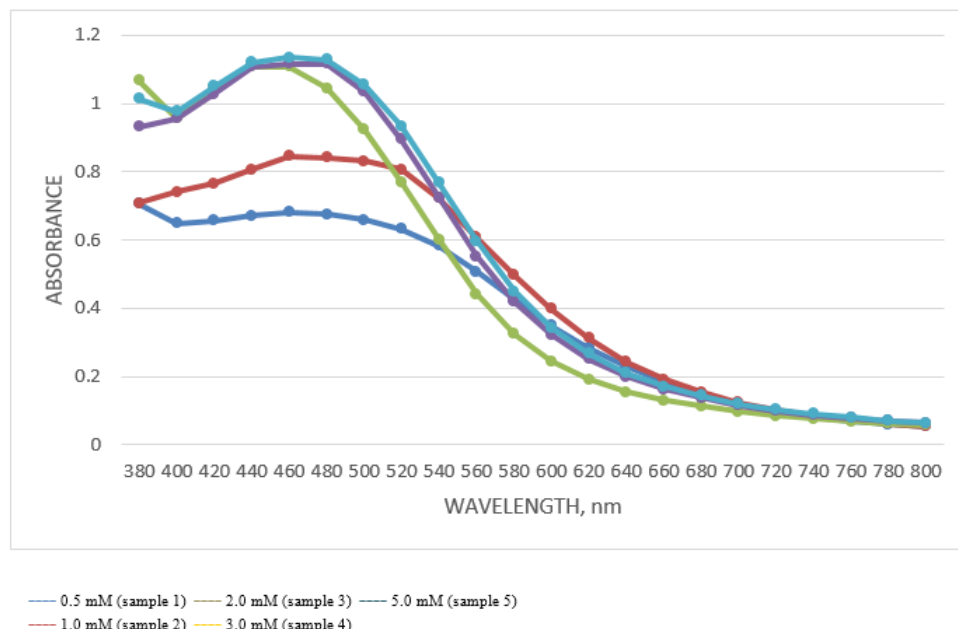


Figure 2: UV-Vis spectrum of Beijing Grass extract after addition of silver nitrate with concentration of 0.5 mM, 1.0 mM, 2.0 mM, 3.0 mM, and 5.0 mM

Conclusion: The green synthesis had attracted most of the researcher's due to its uniqueness if compared to other alternatives. In this study, a biosynthesis silver nanoparticles using Beijing Grass as the bioreducer was demonstrated. As mentioned in the introduction, the objective of this study were to synthesis silver nanoparticles and to study its optimum operating parameter such as concentration of silver nanoparticles and volume ratio of the reactant. The synthesis was fast, eco-friendly, and easy as the reaction could occur even at room temperature. The obtained silver nanoparticles were characterized in terms of optical properties using UV-Vis. Based on the UV-Vis absorption spectrum, it displayed peaks at 460 nm which lies within range that confirms the formation of silver nanoparticles. The optimum conditions for this process were at 5 mM of silver nitrate as precursor and reactant volume ratio was 5:5 (AgNO: BGE). High concentration of silver nitrate will release reduce more Ag⁺ that assist by high dose of the reducing agent, Beijing Grass extract. The result of this study clearly shows that the Beijing Grass has the ability to be good alternative plant for the green synthesis. However, based on cytotoxic analysis earlier, despite the goods, usage of the silver nanoparticles must be in proper dose as it may possess to be cytotoxic behaviour towards living cell, especially human cells and animal cells.