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Green synthesis of silver nanoparticles with extract of *Mimusops coriacea* and light

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Abstract

Biological methods of nanoparticle synthesis using plant extracts have been suggested as promising ecofriendly alternative to chemical and physical methods. In this study, spherical silver nanoparticles (AgNP) were synthesized from the aqueous extract of *Mimusops coriacea* leaves at room temperature. To accelerate the reduction of Ag^+ ions was used photoreduction process with Xenon lamp. A presence of resonant surface plasmon band at approximately 415nm confirms the formation of the nanoparticles. The shape and size of the particles were determined by transmission electron microscopy images indicating sizes from 10 to 30nm in diameter. Zeta potential indicates good stability. To identify the products for the reduction of Ag^+ ions and stability of AgNP, FTIR analysis were performed. An intense reduction in chlorophyll fluorescence was observed after formation of the nanoparticles.

Keywords: Silver nanoparticles, *Mimusops coriacea*, photoreduction

1. Introduction

Metallic nanoparticles, such as gold (AuNP), silver (AgNP) and platinum (PtNP), have unique and adjustable electrical, optical and chemical properties allowing their application in various fields such as diagnostic medicine, pharmacy, food industry, textiles, energy, bioremediation, among others [1].

Most of the physico-chemical techniques traditionally used in the synthesis of metallic nanoparticles involve toxic solvents and generation of residues potentially harmful to health and the environment [2,3]. In view of this situation, there is great interest in the search for safer synthetic processes, among them, the green synthesis process from the use of vegetal extracts instead of chemical reagents, has been shown to be a sustainable alternative [4]. In addition, the nanoparticles synthesized by these routes generally exhibit biocompatibility and biodegradability, generally low cost of production, and a high yield of the product of interest can be obtained. Gardea-Torresdey et al. [5] obtained silver nanoparticles using *alfalfa sprouts*. In this study the authors report the reduction of Ag^+ to Ag^0 and later organization of Ag^0 in silver nanoparticles. The plant was used in its entirety and the process slow and laborious. These difficulties were overcome with the use of plant extracts, which minimized the Ag^+ reduction time for minutes, depending on conditions such as temperature, metal concentration and solution pH [6].

The synthesis of nanoparticles from plant extracts can be attributed to the abundance of biomolecules such as proteins, carbohydrates, fatty acids and vitamins present in plants [7]. Studies indicate the secondary metabolites found in essential oils

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