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Short Communication

Review on Synthesis of Silver Nanoparticles Mediated Plant

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Introduction

Nanotechnology has dramatically developed as an important field of modern research with potential effects in electronic and medicine and they are the particles with a characteristic size range from 1 - 100 nm. Nanoparticles are at the leading edge of nanoscience and nanotechnology since, the applications of nanosize materials have increased significantly. Nanoscale materials have been used in chronic disease diagnostics, food industry, pharmaceutical, nanoengineering and nanochemistry to enhance the immobilization and activity of catalysts [1]. Recently, green synthesis of nanoparticles has received particular interest in various fields ranging from material science to biotechnology [2]. Green synthesis of nanoparticles from plant extracts is an important branch in biosynthesis reaction. Bulk production of metal nanoparticles was synthesized from several microorganisms, such as yeasts, fungi and bacteria. The synthesis of metal nanoparticles from plant extract has drawn attention recently, because of its economical, eco-friendly and single step technique [3].

Metal oxide nanoparticles which have high specific surface area and a high fraction of surface atoms have been studied extensively because of their unique physico chemical characteristics including magnetic, optical, electronics, catalytic and antibacterial properties [4]. The properties of many conventional materials change when they formed from nanoparticles because; nanoparticles have a greater surface area per weight than larger particles. This causes them to be more reactive to certain other molecules. Nanoparticles are effectively a bridge between bulk materials and atomic or molecular structures [5].

Nanoparticles synthesis from plant

The microorganisms such as bacteria, actinomycetes, yeast and fungi have been continued to be researched and investigated in synthesis of metallic nanoparticles. The use of plants for similar nanoparticle biosynthesis methodologies are an exciting possibility that is relatively unexplored and under exploited [6]. The use of plants or plant extracts are the most adopted method of green, ecofriendly production of nanoparticles because the plants are widely distributed, easily available, much safer to handle and act as a source of several metabolites.

Silver nanoparticles from plant

The leaf extract of *Euphorbia hirta* was reported to reduce 1 mM solution of silver nitrate to silver nanoparticles [7]. Similarly, the aqueous leaf extract of *Hibiscus rosa-sinensis* when challenged with 1 mM silver nitrate at ambient temperature have the capacity to produce silver nanoparticles [8]. A novel Switch grass (*Panicum virgatum*) extract mediated green process was demonstrated for the synthesis of silver nanoparticles from silver nitrate was also reported [9]. Later, plant latexes of *Alstonia scholaris, Calotropis gigantea, Ficus religiosa, Hevea brasiliensis, Musa paradisiaca and Achras sapota* were used in silver nanoparticles synthesis Biosynthesis of silver nanoparticles was also conducted using Cycas leaf extract and the bark powder and water extract from *Cinnamon zeylanicum* tree were used for silver nanoparticle synthesis [10]. Recently, silver nanoparticles were prepared with sea weed *Padina tetrastromatica* and used for the photo catalytic and dye degradation [11].

Fabrication of silver nanoparticles using the callus extract of *Carica papaya* has been reported [12]. Very recently several researchers exploited plant extracts for the synthesis of silver nanoparticles using Nicotiana tabacum leaf extract [13], leaf and flower extract of *Cassia auriculata* [14], *Ocimum sanctum L* leaf extract and *Leucas linifolia* leaf extract [15]. Another study revealed an inexpensive, versatile and very reproductive method for the large-scale synthesis of silver nanoparticles by reduction process using flower extract of *Millingtonia hortensis*. A simple, fast and efficient microwave-assisted route of green synthesis of silver nanoparticles from *Saraca indica* bark extract was recently reported which showed spherical shaped structure with diameter range of 5 to 50 nm [16].

Gold nanoparticles from plant

Synthesis of gold nanoparticles exploiting plants and plant related products is viable and eco-friendly relative to microbes considering their pathogenicity [17]. Several plants and their parts have been successfully used for the extracellular synthesis of metal nanoparticles. Extracellular synthesis of gold nanoparticles has been reported by [18]. They synthesized gold nanoparticles using pine apple extract with 0.002M of $AuCl_4$. The formation of brown colour was confirmed clearly as gold nanoparticles [19]. Previous reports showed that gold nanoparticles synthesized from leaf extract of *Terminalia catappa* [6] and antiparkinsonian drug *Mucuna pruriens* plant extract [20].

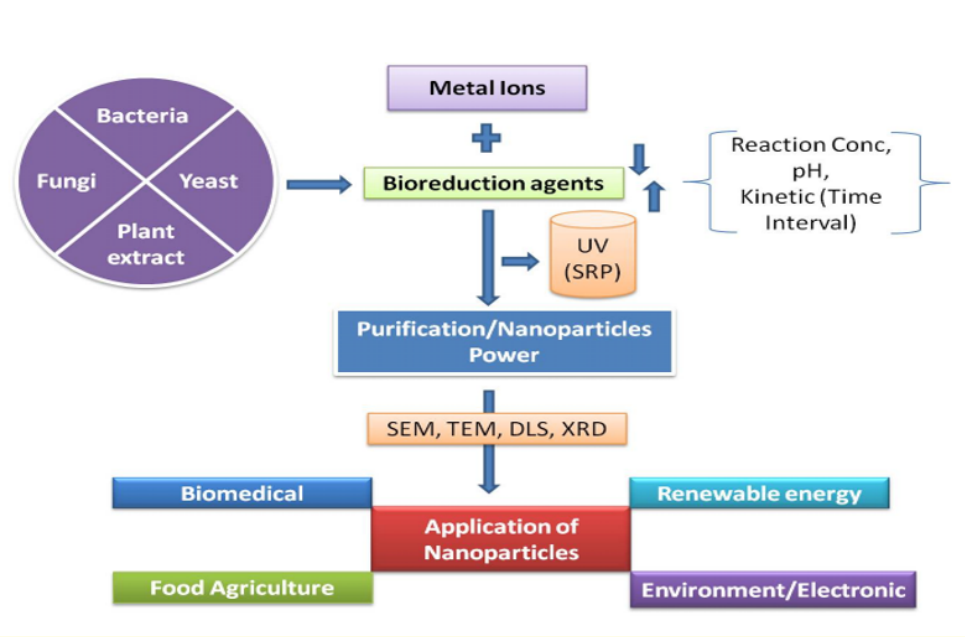

Figure 1: *Flow chart of biological synthesis of nanoparticles.*

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