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BIOSYNTHESIS OF PLATINUM NANOPARTICLES USING PLANT EXTRACT: MINI REVIEW

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ABSTRACT

During last decade metal nanoparticles have more interest due to their distinct physical, chemical and biological properties. Researchers are expanding their interest towards synthesis of platinum nanoparticles as they provide various applications. Consequently nanoparticles are synthesis by different physical and chemical methods, having negative impact on environment. Plant extract acts as a reducing and capping agent in the synthesis of nanoparticles. This method does not produce toxic by-products and carried out in room temperature. The plant extract mediated nanoparticles provide simple, economical, ecofriendly, rapid and safe method. This review article provides the recent trend in the biosynthesis of platinum nanoparticles and its applications.

KEYWORDS: Platinum nanoparticles; Plant extract; Biosyntheis.

INTRODUCTION

The nanoparticles are of great interest due to their extremely small size and large surface to volume ratio and they exhibited utterly novel characteristics compared to the large particles of bulk material.[1] Nanoparticles of precious metals are widely used in fast-moving consumer goods such as shampoos, soaps, detergents, shoes, cosmetic products, toothpaste, besides their applications in medical and pharmaceutical products.[2] Various physical, chemical, and biological methods have been employed to synthesize nanomaterials. Biological systems such as bacteria, fungi, actinomycetes, yeasts, viruses, and plants have been reported to synthesize various metal and metal oxide nanoparticles. Among these, biosynthesis of nanoparticles

from plants seems to be a very effective method in developing a rapid, clean, nontoxic and eco-friendly technology.[3]

Particularly, noble metal nanoparticles viz Ag, Au, Pd and Pt have wide recognition owing to their potential role in physics, chemistry and material science, biological and medicinal areas.[4] Among them, platinum has high surface area, high melting point (1769 ˚C) and good resistance to corrosion and chemical attacks. It is an efficient catalyst for the reduction of automobile pollution, hydrogen storage material, proton membrane exchange fuel cells, direct methanol fuel cells and so forth. Up to now, various approaches were developed for the synthesis of Pt NPs by different methods such as sol-gel route, chemical precipitation, pyrolysis, hydrothermal synthesis, sol process, vapor deposition and electro-deposition. The aforementioned techniques have some limitations such as multi-step process, high energy requirement and the use of unsafe chemicals. To overcome these problems, plant-mediated synthesis technique is simple, low cost, eco-friendly and commodious route for the synthesis of Pt NPs. Recently, very few reports available for the synthesis of Pt NPs using several plant extracts including Cacumen platycladi, Prunus yedoensis, Azadirachta indica, Cochlospermum gossypium, honey, Diopyroski kaki, Quercus Glauca Extract.[5-11]

This review focuses on the biosynthesiss of platinum nanoparticles using plant extract and their various applications.

Plant Extract Madiated Nanoparticles

Biosynthesis of nanoparticles using various physical and chemical methods, but such methods is used toxic chemicals and hazardous .Recent development in nanotechnology focus on ecofirendly and cost effective. Plant extract mediated synthesis of nanoparticles is a safe and ecofirendly. This has motivated the researchers to synthesis of nanoparticles using green route is better for control shape, size and various applications.

Future Prospective

Platinum nanoparticles are most attractive maerials for variety of applications in catalysts, biomedical, electronics, antimicrobial etc. The present review summerises biosynthesis of platinum nanoparticles using pant extract. Biosynthesis platinum nanoparticles are very useful not only because of its ecofriendly also economical processes. Plant extract may act as a reducing and stabilising agent. Syntheses of platinum nanopartiles using plant extract have advantage over the other physical methods safe, eco-fiendly and simple to use. Plant

materials have huge potential for the production of platinum nanoparticles of wide applications with the desired shape and size.

A detailed study is required to give a biosynthesis of platinum nanoparticles using biomolecules present in plant materials which will be valuable to improve the properties of platinum nanoparticles.

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