Chapter 7

GREEN SYNTHESIS OF METALLIC NANOPARTICLES AND IT'S BIOMEDICAL APPLICATIONS

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◆ INTRODUCTION

Nanotechnology is a discipline that allows studies such as processing, measurement, design, modeling and arrangement on materials in the size of 1-100 nm [(1)]. Nanotechnology aims to give the substance advanced or completely new physical, chemical and biological properties at the level of atoms and molecules and is developing rapidly. The most important difference of nanotechnology from other disciplines is the increase of surface / volume ratios of the material in nanoscale, which means the increase of surface atoms compared to all of the material [(2)]. Thus, large changes in the properties of the material can be achieved. These include mechanical strength, thermal stability, electrical conductivity, magnetic and optical properties. Nanoparticles (NP) are one of the cornerstones of nanotechnology and different nanoparticles have different application areas [(3)]. With innovative technologies developed in the current century, NPs have gained a strategic value and have found themselves in many fields such as energy, food, agriculture, health, water treatment, information and communication technologies, environment or biomedical applications [(4)].

The methods used for the production of NP vary according to the desired properties from the material. Production and working parameters greatly affect the size, morphology, crystal structure or chemical composition of the nanoparticle to be obtained. Therefore, the development of specific properties of the material is directly related to the control of the process used.

There are two types of nanoparticles, inorganic and organic [(5)]. Inorganic NPs contain metal and metal oxides, which are potential antibacterial agents. Silver, iron oxide, titanium oxide, copper oxide and zinc oxide are examples of inorganic NPs. Organic NPs include poly-lysine, quaternary ammonium components, cationic quaternary polyelectrolytes, N-halamine components and chitosan. Organic NPs are generally less stable at high temperatures. Therefore, inorganic NPs are more preferred as antimicrobial polymers.

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advantages in using many different applications with their large surface / volume ratios. Various physical, chemical, biological or hybrid methods are used for the synthesis of different types of nanoparticles. Non-biological methods contain toxic solvents, form dangerous by-products and require high energy consumption. It also has negative effects on the environment and health. Therefore, there is a need for new processes as well as clean and renewable alternative sources in the production of materials covering nanostructures. In this review, we suggest that a sufficient amount of nanoparticle synthesis may be increased by increasing the studies in this direction in terms of obtaining green synthesis by using biological products, being non-toxic and environmentally friendly.

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