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**DISSERTATION PROJECT**

**ENTITLED**

Green synthesis of silver nanoparticles: Plant extract mediated synthesis using *Oroxylum*

*Indicum* (L.) Vent

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## **Abstract**

As the world is in need of greener alternatives to methods and processes, it is also vital for development of green synthesis of products in nanotechnology. As a developing field of science it is vital to assume that more techniques in medicine and other fields such as microbiology will increase their use of nanotechnology. As such it is essential to develop and refine green methods of synthesis as has been done gradually in the previous 10 years. By-products of current methods of synthesis of nanoparticles such as Ag-NPs are hazardous to the environment and difficult to dispose of. The aim of this review is to describe some methods of Ag-NP synthesis and some applications while comparing efficiency of these green methods over the chemical and mechanical methods.

Keywords: Silver nanoparticles; antimicrobial; green synthesis; plant extracts

## **Introduction**

Nanotechnology is an expansive field in which research is focused on application of particles with sizes ranging from 1 to 100 nm thus are only observable at nanoscale (Ahmed, Saifullah, Ahmad, Lal Swami, & Ikram, 2015). Nanoparticles are categorized as organic and inorganic. Inorganic NPs include semiconductors, metallic and magnetic NPs like ZnO, Ag and Fe respectively. Organic NPs include quantum dots and carbon nanotubes (Muhammad, Iqra, Shahid, & Bilal, 2017). This small size along with varying structures are the main reasons for the recent increase in modern applications in various fields ranging from drug delivery, optics health care, electronics and chemical industry. Ag-NPs in particular are of great importance in pure sciences as they have applications in biosensors, catalysis, antimicrobial activity, DNA sequencing and biomedical applications (Ashraf, Zafar, Shah, Al-Ghanim, Al-Misned, & Mahboob, 2018). The Ag-NPs offer greater research scope as they have significant characteristics like large surface area to volume ratio, chemical stability, conductivity, catalytic, antibacterial, anti-viral, antifungal, anti-inflammatory activities (Shakeel, Ahmad, Babu, & Saiqa, 2016). In biomedicine, Ag-NPs are added to wound dressings, topical creams, antiseptic sprays and fabrics acting as an antiseptic.

Synthesis of nanoparticles is generally through chemical and physical methods which are not typically cost effective and can be quite detrimental to the environment due to toxic by-