SUMMARY

Zingiberaceae family has been used as sources of indigenous medicines, vegetables, food flavours, spices, dyes, condiments as well as ornamentals. The rhizomes of this family are endowed with a sweet smell and rich sources of essential oils that consist of numerous complex terpenoid mixture. Many species of this family are widely known for a broad range of pharmacological activities.

This thesis will focus on the identification of bioactive compounds along with separation, isolation and characterization of compounds from the rhizomes of Curcuma plants namely Curcuma leucorrhiza Roxb., Curcuma caesia Roxb. and Curcuma aromatica Salisb. The aqueous rhizomes extracts of some selected medicinal plants of Zingiberaceae family act as an environmentally benign reductants and stabilizers for the synthesis of silver nanoparticles by green method. Therefore, the aim of this thesis is to isolate, identify the bioactive compounds from three Curcuma plants and study of the antioxidant, antimicrobial activities of some extracts and some phytochemicals. It also aims to synthesize silver nanoparticles (AgNPs), characterize and study of the antimicrobial activity as well as catalytic activity of the as prepared AgNPs.

Herein, in this research work, the chemical constituents of the three plants have been studied. This work is divided into five chapters which is briefed below.
Chapter 1 is a review on some medicinal plants of Zingiberaceae family which are used as traditional medicine. The study of bioactive compounds of these plants, which have a broad range of pharmacological activities, has been reviewed in this chapter.

Chapter 2 deals with the study of extraction, isolation, identification and characterisation of compounds isolated from the rhizomes of *Curcuma leucorrhiza* Roxb. Open column chromatography, thin layer chromatography (TLC), preparative TLC (PTLC) and High Performance Liquid Chromatography (HPLC) are used for separation, monitoring and purifications of compounds respectively. The compounds isolated from this plant have been identified using FT-IR, $^1$H NMR, $^{13}$C NMR and mass spectra. The compound 1 is further confirmed by single Crystal X-ray analysis. The antioxidant, antimicrobial activity of some extracts and some phytochemicals are also studied.

Chapter 3 deals with the study of extraction, isolation, identification and characterisation of compounds isolated from the rhizomes of *Curcuma caesia* Roxb. Sesquiterpenoids have been isolated along with a naturally polymer compound and a known steroid from the dried rhizomes of this plant. The isolated compounds have been identified using FT-IR, $^1$H NMR, $^{13}$C NMR, mass spectra and further confirmed by single Crystal X-ray analysis. Second harmonic generation (SHG) efficiency of zederone is found to be higher than that of KDP.
Chapter 4 describes study of extraction, isolation, identification and characterisation of the extracts and compounds isolated from *Curcuma aromatica* Salisb. The transformations of the bioactive compounds by semi-synthesis are discussed. The derivatives of zederone are characterized by FT-IR, $^1$H NMR, $^{13}$C NMR and mass spectra.

Chapter 5 deals with green synthesis and characterization of Silver nanoparticles (AgNPs) using some Zingiberaceae plants - *Curcuma aromatica*, *Curcuma caesia*, *Curcuma leucorrhiza*, *Hedychium coccineum* and *Kaempferia galanga* and their antimicrobial activities. The use of plant extracts containing secondary metabolites act as reductants and as stabilizers. Compounds isolated from these plants are used for the synthesis of silver nanoparticles. The as synthesized AgNPs are characterized with UV–Vis spectroscopy, Fourier transform infrared spectroscopy (FT-IR), Electron paramagnetic resonance (EPR), X-ray diffraction (XRD), Energy Dispersive X-ray (EDX) spectroscopy, Scanning electron microscopy (SEM), Transmission Electron Microscopy (TEM) and selected area electron diffraction pattern (SAED). According to the particle size distribution, average size range estimated from our studies was found to be 4–8nm, 4-12nm, 3-6nm, 2-4nm and 2-4nm for AgCL, AgCC, AgCA, AgHC and AgKG NPs respectively. The as synthesized AgNPs showed the antibacterial and catalytic activities.