Cu-DOPED ZnO NANOPARTICLES: SYNTHESIS, CHARECTERIZATION AND ANTIBACTERIAL PROPERTIES

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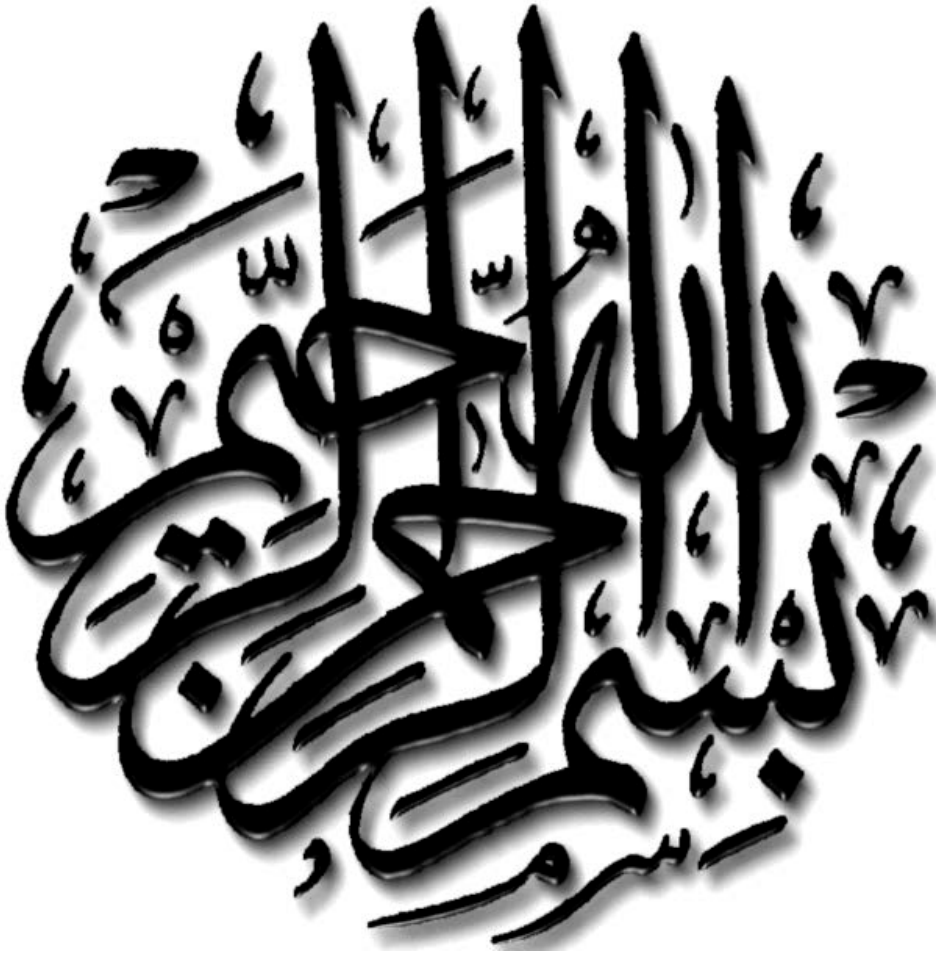

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The most merciful

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Certified that the research work contained in this thesis titled, "Co-Doped ZnO Nanoparticles: Synthesis, Characterization and Antibacterial Properties" has been carried out and completed by Shaista Jabin, **ID: 13001140015**. The quantum and the quality of the work contained in this thesis is adequate for the award of Degree of M.Phil.

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DEDICATION

Affectionately Dedicated to

My Beloved Parents

due to whom Prayers and Cooperation

I am able to reach this status.

ACKNOWLEDGEMENT

First of all my humble praise and gratitude to **Allah Almighty**; the most merciful, the most beneficent, for showering His blessings on me throughout my life and affectionate love to **Prophet MUHAMMAD (PBUH)** for being constant source of guidance.

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ABSTRACT

In the present study, synthesis, characterization and antibacterial properties of copper doped zinc oxide nanoparticles have been investigated. Pure and copper doped ZnO nanoparticles have been synthesized by using co-precipitation method. The synthesized copper doped ZnO nanoparticles were characterized by spectroscopic and analytical techniques such as XRD, SEM, EDAX and UV-Vis spectroscopy. The antibacterial activity of copper doped ZnO nanoparticles was carried out based on the agar diffusion method.

From the analysis of XRD the formation of nanoparticles was confirmed. XRD measurements show that the prepared nanoparticles have different microstructure without changing the hexagonal wurzite structure. The average grain size of undoped and copper doped ZnO nanoparticles was calculated from the XRD analysis. The calculated grain size of undoped ZnO sample was 16.72 nm and that of Cu doped ZnO samples was 17.49 nm and 20.73nm for method 1 and method 2 samples, respectively.

SEM analysis confirms the surface morphology and particle size of the synthesized nanoparticles. EDAX analysis confirms the presence and amount of copper and other impurities in the sample. UV-Vis spectroscopic studies measure the amount of band gap energy. The band gap energy of Cu doped ZnO samples was 3.378eV and 3.36eV for method 1 and method 2, respectively.

The antibacterial properties of copper doped zinc oxide nanoparticles against two bacteria (*E.coli* and *B.subtilis*) were investigated by using agar diffusion method. The antibacterial test results reveal that as the concentration of copper doped ZnO nanoparticles was increased, the growth of inhibition zone also increases. This reveals that Cu doped ZnO nanoparticles show antibacterial activity against these two bacteria i.e. *E.coli* and *B.subtilis.*

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