

Plant mediated synthesis of ZnO/CuO nanocomposite using juice extracts of *Citrus limon* and the evaluation of its antioxidant activity

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The green synthesis of nanoparticles and nanocomposites has received a great deal of interest due to its low cost, easy scalability, non-toxicity, and environmental friendliness. In contrast to chemical synthesis, green synthesis of nanoparticles and nanocomposites necessitates the employment of fungus, yeast, actinomycetes, bacteria, and plants. This research focuses on the green synthesis and characterization of a 10% ZnO/CuO nanocomposite (ZnO:CuO ratio; 90:10) utilizing *Citrus limon*, a plant that is rich in citric acid, which functions as a good capping and stabilizing agent. This study evaluates the antioxidant activity of the synthesized nanocomposite in comparison to ascorbic acid (standard). The produced nanocomposite was characterized using a variety of methods, such as UV-Visible spectroscopy to confirm the formation of the ZnO/CuO nanocomposite, FTIR (Fourier Transform Infrared) spectroscopy for the identification of functional groups present, and scanning electron microscope (SEM) analysis for the investigation of the surface morphology. Antioxidant experiments using DPPH (2,2-diphenyl-1-picrylhydrazyl) assay validated the nanocomposite's function as an antioxidant. Upon evaluation of the IC₅₀ values, it was found that the test sample, ZnO/CuO nanocomposite, has an IC₅₀ value of 934.4 mg/L, while the standard has an IC₅₀ value of 335.6 mg/L. Hence, it can be concluded that the ZnO/CuO nanocomposites show promising antioxidant activity and can be used as free radical scavengers. As a result, for the first time, this work reveals the green synthesis of ZnO/CuO nanocomposite using *Citrus limon* and its role as an antioxidant.

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