

Green Synthesis Mediated Preparation and Characterization of Metallic Nanoparticles of Cactus (*Opuntia ficus-indica*)

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Abstract: Metal nanoparticles (MNPs), sized between 1–100 nm, possess unique physical, chemical, and biological properties, making them valuable across fields such as biomedicine, catalysis, electronics, and environmental remediation. This study explores the green synthesis of MNPs using *Opuntia ficus-indica* (prickly pear cactus) extract, which serves as a natural reducing and stabilizing agent. This eco-friendly method eliminates the need for toxic chemicals, offering a sustainable alternative to conventional synthesis. The biosynthesized nanoparticles show promise in diverse applications including biomedical therapies, water purification, cosmetics, agriculture, and food packaging, highlighting their multifunctional potential in enhancing human health and environmental sustainability..

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