**Green Synthesis of Nanoparticles: From Preparation to Applications**

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**Abstract**

Nanotechnology is an emerging field of science. The base of nanotechnology is nanoparticles. The size of nanoparticles ranges from 1 to 100 nm. The nanoparticles are classified into different classes such as inorganic nanoparticles, organic nanoparticles, ceramic nanoparticles and carbon base nanoparticles. The inorganic nanoparticles are further classified into metal nanoparticles and metal oxide nanoparticles. Similarly, carbon base nanoparticles classified into Fullerene, Carbon nanotubes, Graphene, Carbon nanofiber and carbon black. Nanoparticles are also classified on the basis of dimension such as zero-dimension, one-dimension, two-dimension and three-dimension nanoparticles. The nanoparticles are synthesized by using two approaches like top-down approach and bottom-up approach. Since the main methods for producing nanoparticles are chemical and physical methods which are often expensive and potentially harmful to both the environment and the user. So, we did our best in our researches to synthesize metallic nanoparticles using plant extracts and stay away from expensive and toxic chemicals at the same time. Therefore, it is with great pride that our research group is considered a pioneer in the region, and many high quality research articles have been published by our group highlighting the necessary needs of the community [1-22] regarding green synthesis nanomaterials. After synthesizing different types of nanoparticles, using easy, one-pot, inexpensive and green process, from locally grown plant extracts, different characterization techniques have been used to investigate structure, size, morphology, thermal behavior, surface area, surface charge, chemical composition and optical properties of the nanoparticles. After synthesizing and characterization process, the green synthesized nanoparticles were employed in thin film application, gas-sensing, enhancing solar panel efficiency, wastewater treatment, catalytic application, harvesting sunlight for solar thermal generation and many other applications.

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