

## Quest for an Efficient Green Multifunctional Agent for the Synthesis of Metal Nanoparticles with Highly Specified Structural Properties

**Authors :** Niharul Alam

**Abstract :** The development of energy efficient, economic and eco-friendly synthetic protocols for metal nanoparticles (NPs) with tailor-made structural properties and biocompatibility is a highly cherished goal for researchers working in the field of nanoscience and nanotechnology. In this context, green chemistry is highly relevant and the 12 principles of Green Chemistry can be explored to develop such synthetic protocols which are practically implementable. One of the most promising green chemical synthetic methods which can serve the purpose is biogenic synthetic protocol, which utilizes non-toxic multifunctional reactants derived from natural, biological sources ranging from unicellular organisms to higher plants that are often characterized as "medicinal plants". Over the past few years, a plethora of medicinal plants have been explored as the source of this kind of multifunctional green chemical agents. In this presentation, we focus on the syntheses of stable monometallic Au and Ag NPs and also bimetallic Au/Ag alloy NPs with highly efficient catalytic property using aqueous extract of leaves of Indian Curry leaf plant (*Murraya koenigii* Spreng.; Fam. Rutaceae) as green multifunctional agents which is extensively used in Indian traditional medicine and cuisine. We have also studied the interaction between the synthesized metal NPs and surface-adsorbed fluorescent moieties, quercetin and quercetin glycoside which are its chemical constituents. This helped us to understand the surface property of the metal NPs synthesized by this plant based biogenic route and to predict a plausible mechanistic pathway which may help in fine-tuning green chemical methods for the controlled synthesis of various metal NPs in future. We observed that simple experimental parameters e.g. pH and temperature of the reaction medium, concentration of multifunctional agent and precursor metal ions play important role in the biogenic synthesis of Au NPs with finely tuned structures.

**Keywords :** green multifunctional agent, metal nanoparticles, biogenic synthesis

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