**Green Synthesis of Nanoparticles: Novel Applications in**

**Harvesting Sunlight for Solar Thermal Generation**

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**Abstract**

Nanotechnology is an emerging field of science. The base of nanotechnology is nanoparticles. 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. Here, the biosynthesized Ag NPs were utilized in harvesting sunlight for solar thermal generation. Surface plasmon resonance (SPR) for the green synthesized Ag NPs with the dark color were adjusted at nearly 450 nm. Once the Ag NPs are excited at the SPR, a large amount of heat is released, which causes a change in the local refractive index surrounding the Ag NPs. The released heat from the Ag NPs under the solar irradiation at the precise wavelength of plasmon resonance significantly increased the temperature of the aqueous medium. This investigation is rare and unique, and it shows that utilizing a small amount of the biosynthesized Ag NPs can increase the temperature of the aqueous medium remarkably.

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