# Thrust Area: Bio-organic and Green Chemistry

# Green Nanotechnological enhancement in Antioxidant bio-efficacy of the plant *Madhuca longifolia* using flavonoid loaded mono and bimetallic nanoparticles

Mukti Sharma1, Saurabh Yadav1, Narayan Ganesh2,

Man Mohan Srivastava1 and Shalini Srivastava1\*

1*Department of Chemistry, Faculty of Science,*

*Dayalbagh Educational Institute, Agra, 282005, India*

*2Jawaharlal Nehru Cancer Hospital & Research Centre Bhopal, 462001, India*

*Email: dei.shalinisrivastava@gmail.com*

**Abstract**

Green nanotechnology is the fascinating tactic for enhancing bio-efficacy of herbal drugs. Plant-mediated monometallic nanoparticles have witnessed to enhance various bio-efficacies. Further, bimetallic nanoparticles are likely to exhibit not only additive combination of the properties of two individual metals, but also add favourable synergistic effects.

The present communication warrants the single step green synthesis of flavonoid loaded Au (Mlbf@AuNps), Ag (Mlbf@AgNps), and Au-Ag bimetallic (Mlbf@Au-AgNps) nanoparticles using bark extract of the plant *Madhuca longifolia* and explored for enhancement in antioxidant bio-efficacy. A family of seven flavonoids has been ascertained in the bark extract using LCMS-8030 analysis**.** The bio-fabricated *Ml*b*f@AuNps, Ml*b*f@AgNps, andMl*b*f@Au-AgNps* nanoparticles have been thoroughly characterized. The antioxidant bio-efficacy of bio-fabricated nanoparticles has shown the following order: **Native bark extract <*Ml*b@AgNps < *Ml*b@AuNps < *Ml*b@Au-AgNps ≈ Ref. drug.** In general, the enhancement in the target bio-efficacy is ascribed to the nano sizing, surface plasmon resonance, permeability and simultaneous capping of medicinally important flavonoids (antioxidant) on freshly generated nanoparticles. The most promising bio-efficacy of bimetallic M*l*bf@Au-AgNps has been explained on the basis of the higher catalytic activity of bimetallic Au-Ag nanoparticles. The catalytic activity of Au-Ag bimetallic nanoparticles is found to be higher than that of Au nanoparticles. The observed surface plasmon resonance (SPR) band of bimetallic Au-Ag is sharper and stronger than that of the Au and Ag nanoparticles and enhances the tendency of scavenging free radicals. The proposed bio-fabricated nanoparticles have bright prospects for the development of complimentary herbal nanomedicine for the antioxidant bio-efficacy.

**Keywords:** *Madhuca longifolia*, Flavonoid loaded mono and bimetallic nanoparticles, Enhanced antioxidant bio-efficacy