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Bioconjugated nano-bactericidal complex for potent activity against human and phytopathogens with concern of global drug resistant crisis

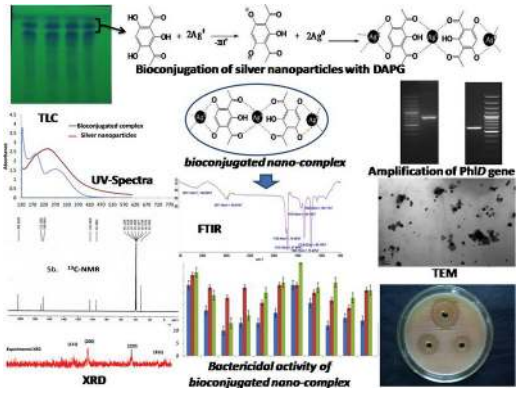
Baker Syed [a,d], M.N. Nagendra Prasad [b], Mohan Kumar K. [c], S. Satish [d,*]

[a] Siberian Federal University, 79 Svobodny pr., Krasnoyarsk 660041, Russia
[b] Department of Biotechnology, Sri Jayachamarajendra College of Engineering, JSS Science and Technology University, JSS Technical Institutional Campus, Mysore 570006, India
[c] Department of Chemistry, Madanapalle Institute of Technology & Science, Post Box No: 14, Kadiri Road, Angallu (V), Madanapalle, 517325 Chittoor District, Andhra Pradesh, India
[d] Bionanotechnological Laboratory, Department of Studies in Microbiology, Manasagangotri, University of Mysore, Mysore 570 006, Karnataka, India

HIGHLIGHTS

- Novel strategies for antimicrobial resistance
- WHO: Antimicrobial resistant top priority
- Bioconjugated complex
- Human and phytopathogens

GRAPHICAL ABSTRACT



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ABSTRACT

The present study emphasizes the need for novel antimicrobial agents to combat the global drug resistant crisis. The development of novel nanomaterials is reported to be of the alternative tool to combat drug resistant pathogens. In present investigation, bioconjugated nano-complex was developed from secondary metabolite secreted from endosymbiont. The endosymbiont capable of secreting antimicrobial metabolite was subjected to fermentation and the culture supernatant was assessed for purification of antimicrobial metabolite *via* bio-assay guided fraction techniques such as thin layer chromatography (TLC), high performance liquid chromatography (HPLC) and column chromatography. The metabolite was characterized as 2,4-Diacetylphloroglucinol (2,4 DAPG) which was used to develop bioconjugated nano-complex by treating with 1 mM silver nitrate under optimized conditions. The purified metabolite 2,4 DAPG reduced silver nitrate to form bioconjugated nano-complex to form association with silver nanoparticles. The oxidized form of DAPG consists of four hard ligands that can conjugate on to the surface of silver nanoparticles cluster. The bioconjugation was confirmed with UV–visible spectroscopy which displayed the shift and shoulder peak in the absorbance spectra. This biomolecular interaction was further determined by the Fourier-transform spectroscopy (FTIR) and nuclear magnetic resonance (NMR) analyses which displayed different signals ascertaining the molecular binding of 2,4,DAPG with silver nanoparticles. The transmission electron microscopy (TEM) analysis revealed the cluster formation due to bioconjugation. The XRD analysis revealed the crystalline nature of nano-complex with the characteristic peaks indexed to

* Corresponding author.
E-mail address: satish.micro@gmail.com (S. Satish).

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