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3.4.3 Research Papers Published During Year 2019-20

Title of paper	Name of the author/s	Department of the teacher	Name of journal	ISSN number	Is it listed in UGC Care list
Biogenic silver and silver oxide hybrid nanoparticles: a potential antimicrobial against multi drug-resistant Pseudomonas aeruginosa	Manju Phadke	Microbiology	New Journal of Chemistry	1369-9261	YES
Biogenic silver and silver oxide hybrid nanoparticles: a potential antimicrobial against multi drug-resistant Pseudomonas aeruginosa	Lynn D'Lima	Microbiology	New Journal of Chemistry	1369-9261	YES
Biogenic silver and silver oxide hybrid nanoparticles: a potential antimicrobial against multi drug-resistant Pseudomonas aeruginosa	Vishal Dev	Physics	New Journal of Chemistry	1369-9261	YES

NJC

PAPER

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Cite this: DOI: 10.1039/c9nj04216d

Biogenic silver and silver oxide hybrid nanoparticles: a potential antimicrobial against multi drug-resistant *Pseudomonas aeruginosa*

Lynn D'Lima, [a] Manju Phadke[a] and Vishal Dev Ashok[b]

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rsc.li/njc

There is an undying need for inexpensive, energy efficient and eco-friendly protocols to produce biocompatible nanoparticles to be used in the field of medicine. To address this issue, exploratory research was performed to produce silver nanoparticles (AgNPs) using a novel strain of *Kitasatospora albolonga* isolated during the course of the study. The objective was to test their antimicrobial activity against Multi Drug Resistant (MDR) *Pseudomonas aeruginosa*. UV-visible spectroscopy, dynamic light scattering (DLS), X-ray diffractometry (XRD), scanning electron microscopy (SEM) and high resolution transmission electron microscopy (HRTEM) confirmed the presence of hybrid AgNPs. UV-visible spectroscopy showed a localized surface plasmon resonance (LSPR) absorption peak at approximately 420 nm. The DLS and SEM micrographs showed spherical particles ranging between 10 and 50 nm in size. XRD indicated a highly frustrated system comprising silver (cubic, $Fm\bar{3}m$) and silver oxide (cubic, $pn\bar{3}m$; 1) phases as identified from the diffraction peaks. The crystallite sizes of silver (Ag) were smaller than those of silver oxide (Ag_2O), indicating a possible core shell structure, also corroborated by the SEM and TEM studies. The Ag/Ag_2O hybrid nanoparticles (NPs) exhibited antimicrobial activity against MDR *P. aeruginosa*. The NP impregnated discs were compared with various commercially available antibiotic discs. Most of the antibiotic discs did not inhibit the growth of the MDR strain alone or in combination with the NPs. However, a synergistic action between Ag/Ag_2O NPs and carbenicillin (CN) drug was observed through the checkerboard assay against the MDR hospital isolate. The efficacy of this combination proved to be a lethal and viable option against MDR *P. aeruginosa*.

Introduction

Nanoparticles have a plethora of applications involving catalysis, electronics, optics, and detection of pollutants and toxins in environmental science and biotechnology. The interaction of light with noble metal nanoparticles produces a collective oscillation of conduction band electrons known as localized surface plasmon resonance (LSPR). Only materials with a negative real and small positive imaginary dielectric constant are capable of supporting surface plasmons. The most common materials used are gold and silver. When the incident electromagnetic field matches that of the oscillating electrons on the surface of the nanoparticle, a resonance condition is met.[1] Recently, LSPR has gained momentum due to its wide spectrum of applications ranging from photovoltaic cells to biological systems.[2–4] Various chemical and physical approaches, such as laser ablation, electrochemical techniques, and chemical and photochemical reduction have been used frequently to achieve nanoparticles.[5] However, these processes are expensive, time consuming and typically done on a small scale in the laboratory, rendering these methods less suitable for large-scale production.[3,6–8] There is a growing need for a newer generation of antibiotics. This is due to an increased rate in drug resistance because of the misuse and overuse of drugs. For centuries, silver has been known for its antimicrobial activity. The enhancement of these properties has been observed with a reduction in the size of the nanoparticles. Preparation of good quality nanoparticles (NPs) is critical as they inhibit the growth of micro-organisms because of their multi-directional attacking mechanism. A combination of nanoparticles and antibiotics gives us the possibility to further increase their potency against harmful organisms. The study of bactericidal nanomaterials is important because of the increase in new strains of bacteria which are resistant against the most potent antibiotics. This has promoted research on the activity of silver ions and silver-based compounds, including silver nanoparticles (AgNP).[9] This can be harnessed to combat superbugs.[2,3,5,10]

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Isolation of a novel poly-γ-glutamic acid-producing Bacillus licheniformis A14 strain and optimization of fermentation conditions for high-level production	Pramod D. Ghogare	Microbiology	Preparative Biochemistry & Biotechnology	1532-2297	YES

PREPARATIVE BIOCHEMISTRY & BIOTECHNOLOGY
https://doi.org/10.1080/10826068.2019.1706560

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Isolation of a novel poly-γ-glutamic acid-producing *Bacillus licheniformis* A14 strain and optimization of fermentation conditions for high-level production

Anees Ahmed Mahaboob Ali[a], Bilal Momin[b], and Pramod Ghogare[a]

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ABSTRACT

In the present study, bacteria producing poly-γ-glutamic acid were isolated from marine sands, and an efficient producer identified. γ-PGA was rapidly screened by thin-layer chromatography and UV spectrophotometer assay. Media optimization was carried out, and for the cost-effective production of γ-PGA, monosodium glutamate was used as the substrate for the synthesis of γ-PGA instead of glutamic acid. Lastly, Plackett–Buman design (PB) and Response surface methodology (RSM) were used to determine significant media components and their interaction effect to achieve maximum γ-PGA production. With this integrated method, a bacterial strain with a high yield of γ-PGA was obtained rapidly, and the production was increased up to 37.8 g/L after optimization.

KEYWORDS

Integrated method; monosodium glutamate; optimization; poly-γ-glutamic acid; rapid screening

Study of the characteristics of mycobacteriophage – A novel tool to treat Mycobacterium spp.	Anita Desouza	Microbiology	International Journal of Mycobacteriology	2212-554X	YES

ORIGINAL ARTICLE

Study of Characteristics of Mycobacteriophage – A Novel Tool to treat Mycobacterium spp.

Satish, Rajitha; Desouza, Anita

Author Information

International Journal of Mycobacteriology 8(2):p 170-174, Apr–Jun 2019. | **DOI:** 10.4103/ijmy.ijmy_42_19

OPEN

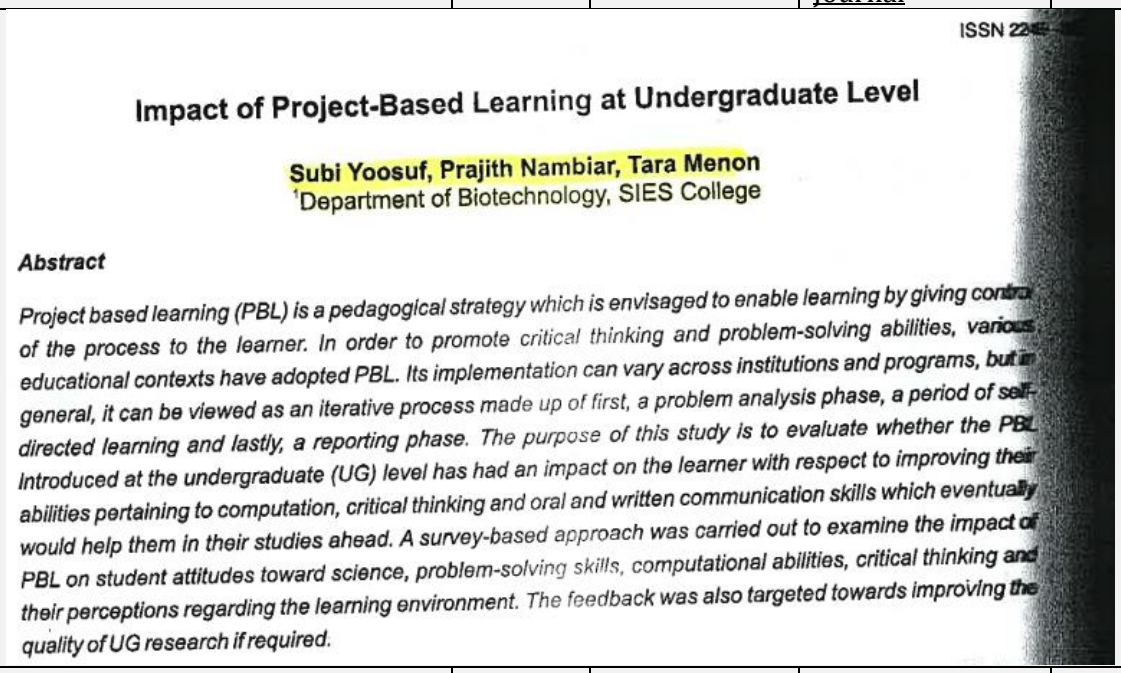
Metrics

Abstract

Background:

Mycobacteriophages are viruses that infect *Mycobacterium* spp. Till date, 10427 mycobacteriophages have been isolated and 1670 mycobacteriophage genomes have been sequenced https://phagesdb.org/hosts/genera/1/ (cited on 30th December,2018). In the previous study, 10 different mycobacteriophages from 14 soil samples were isolated, by qualitative plaque formation method using *Mycobacterium smegmatis* as host. Among these, three phages were found to infect four different species of *Mycobacterium*, i.e., *Mycobacterium fortuitum* subsp. *fortuitum* MTCC993, *Mycobacterium kansasii* MTCC3058, *Mycobacterium avium* subsp. *avium* MTCC1723, and *Mycobacterium tuberculosis* MTCC300, besides the host *M. smegmatis*. The phage lysates were concentrated by polyethylene glycol (PEG) precipitation. One of the three phages showing host diversity was selected for further study. The various phage growth parameters such as incubation temperature, time of adsorption, host cell density and effect of cations were standardised.

Impact of project based learning at undergraduate level	Subi Yusuf	Biotechnology	Xplore, The Xavier's Research Journal	2249-1878	YES
Impact of project based learning at undergraduate level	Prajit Nambiar	Biotechnology	Xplore, The Xavier's Research Journal	2249-1878	YES
Impact of project based learning at undergraduate level	Tara Menon	Biotechnology	Xplore, The Xavier's Research Journal	2249-1878	YES



ISSN 22

Impact of Project-Based Learning at Undergraduate Level

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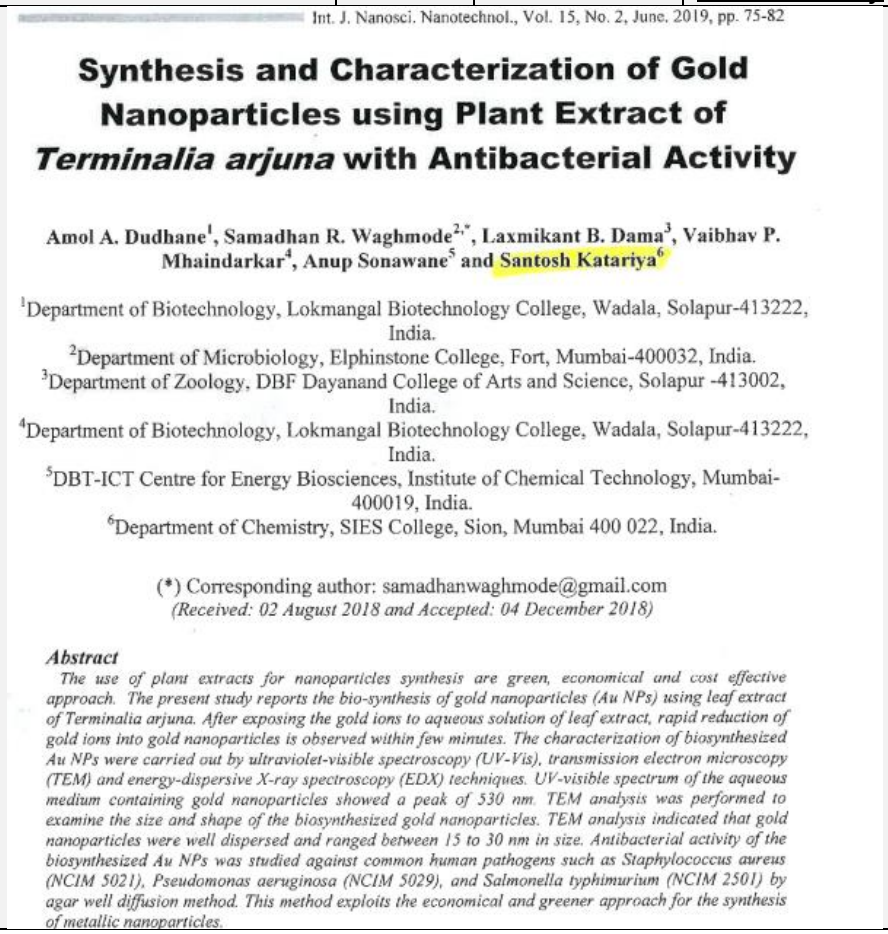
[1]Department of Biotechnology, SIES College

Abstract

Project based learning (PBL) is a pedagogical strategy which is envisaged to enable learning by giving control of the process to the learner. In order to promote critical thinking and problem-solving abilities, various educational contexts have adopted PBL. Its implementation can vary across institutions and programs, but in general, it can be viewed as an iterative process made up of first, a problem analysis phase, a period of self-directed learning and lastly, a reporting phase. The purpose of this study is to evaluate whether the PBL introduced at the undergraduate (UG) level has had an impact on the learner with respect to improving their abilities pertaining to computation, critical thinking and oral and written communication skills which eventually would help them in their studies ahead. A survey-based approach was carried out to examine the impact of PBL on student attitudes toward science, problem-solving skills, computational abilities, critical thinking and their perceptions regarding the learning environment. The feedback was also targeted towards improving the quality of UG research if required.

Synthesis and characterisization of gold nanopraticles using plant extract of Termanalia arjuna with antibacterial activity	Santosh Katariya	Chemistry	International Journal of nanoscience and nanotechnoloy	2423-5911	YES



Int. J. Nanosci. Nanotechnol., Vol. 15, No. 2, June. 2019, pp. 75-82

Synthesis and Characterization of Gold Nanoparticles using Plant Extract of *Terminalia arjuna* with Antibacterial Activity

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Abstract

The use of plant extracts for nanoparticles synthesis are green, economical and cost effective approach. The present study reports the bio-synthesis of gold nanoparticles (Au NPs) using leaf extract of Terminalia arjuna. After exposing the gold ions to aqueous solution of leaf extract, rapid reduction of gold ions into gold nanoparticles is observed within few minutes. The characterization of biosynthesized Au NPs were carried out by ultraviolet-visible spectroscopy (UV-Vis), transmission electron microscopy (TEM) and energy-dispersive X-ray spectroscopy (EDX) techniques. UV-visible spectrum of the aqueous medium containing gold nanoparticles showed a peak of 530 nm. TEM analysis was performed to examine the size and shape of the biosynthesized gold nanoparticles. TEM analysis indicated that gold nanoparticles were well dispersed and ranged between 15 to 30 nm in size. Antibacterial activity of the biosynthesized Au NPs was studied against common human pathogens such as Staphylococcus aureus (NCIM 5021), Pseudomonas aeruginosa (NCIM 5029), and Salmonella typhimurium (NCIM 2501) by agar well diffusion method. This method exploits the economical and greener approach for the synthesis of metallic nanoparticles.

Co-biodegradation studies of naphthalene and phenanthrene using bacterial consortium	Manju Phadke	Microbiology	Journal of Environmental science and Health, part-A	1532-4117	YES

JOURNAL OF ENVIRONMENTAL SCIENCE AND HEALTH, PART A
2020, VOL. 55, NO. 7, 912–924
https://doi.org/10.1080/10934529.2020.1754054

Co-biodegradation studies of naphthalene and phenanthrene using bacterial consortium

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ABSTRACT

Degradation studies of phenanthrene and naphthalene as a mixture was carried out using a developed bacterial consortium. The isolates used in consortium were identified as *Chryseobacterium* sp., *Sphingobacterium* sp., *Stenotrophomonas* sp., *Agromyces* sp. and *Pseudomonas* sp. Limited work is done on genus Agromyces in degradation studies of PAHs. Catechol production was detected using Arnow's assay suggested that the pathway used for degradation is the meta-cleavage pathway. Results showed that Tween 80, as a surfactant, had maximum effect on the growth of isolates during PAH degradation. This suggests that use of Tween 80 as a surfactant enhanced the uptake of PAH by bacterial isolates during degradation. The study further revealed that, bacterial consortium was successfully utilized in the treatment of water contaminated with PAH in a laboratory-scale biofilm bioreactor. The bacterial consortium was able to degrade 99.9% of naphthalene and 92.9% of phenanthrene as a mixture at a high concentration of 2000 mg/L within 6 days. Further scaling up of the biofilm bioreactor can prove beneficial in large scale treatment of PAH contaminated water. This study showed promising results and these bacterial strains can be used as potential tools for bioremediation of PAH in contaminated sites.

ARTICLE HISTORY
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KEYWORDS
Environment pollutants; bacterial PAH degradation; biofilm bioreactor; soapnut surfactant; agromyces PAH degradation; polycyclic aromatic hydrocarbon biodegradation; bioremediation application

Principal

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