



बौद्ध काल की मृदभाण्डकला

*¹डॉ० शिवांगी राव

*¹ Assistant Professor, Department of Ancient History Culture & Archaeology, Ewing Christian PG College, University of Allahbad, Uttar Pradesh, India.

सारांश

बुद्ध काल छठी शताब्दी ईसा पूर्व बताया जाता है। इस काल में भारतीय जनसंख्या संतुष्ट और आर्थिक रूप से समृद्ध थी। इस समय अवधि के दौरान व्यावसायिक गतिविधि चरम पर थी। उत्तरी काले शानदार पोत परंपरा इस बिंदु पर मनुष्य के अस्तित्व में प्रवेश करती है। इस चरित्र परंपरा की शुरुआत और विकास भारत के दूसरे नागरिक आंदोलन से जुड़ा हुआ है। भारत के इतिहास में यह सबसे महत्वपूर्ण युगों में से एक था। ऐतिहासिक और बुद्ध युग की मिट्टी के बर्तनों की परंपरा उत्तरी काले चमकीले बर्तन परंपरा का दूसरा नाम है। काले रंग की सब्जियाँ अपनी अविश्वसनीय चमक और विशिष्ट व्यक्तित्व के कारण रंगीन रेस्तरां में एक महत्वपूर्ण अतिरिक्त हैं। इस मिट्टी के बर्तन का नाम उत्तर भारतीय पुरातात्विक स्थलों पर इसकी खोज के कारण पड़ा है। मंदिर, जो 500 ईसा पूर्व और लगभग 200 ईसा पूर्व के बीच के थे, उनमें तक्षशिला, हस्तिनापुर, कौशांबी और राजघाट शामिल हैं। यदि भगवान बुद्ध के शासनकाल के दौरान इस प्रकार के मिट्टी के बर्तनों का उपयोग बंद कर दिया गया होता, तो उस अनुमान में कोई समस्या नहीं होती। छठी और तीसरी शताब्दी ईसा पूर्व के बीच, उत्तरी काले चमकीले मिट्टी के बर्तन आम थे। पुरातात्विक आंकड़ों के आधार पर पुरातत्वविदों जैसे डी.एच. गार्डन और आर.ई.एम. व्हीलर उत्तरी ब्लैक लस्टरस पॉटरी के लिए प्रस्तावित समयावधि से असहमत हैं। डी. एच. गार्डन का दावा है कि वर्तमान पुरातात्विक साक्ष्यों के आधार पर उत्तरी ब्लैक लस्टरस वेयर को 400 ईसा पूर्व से पहले का नहीं माना जा सकता है। व्यापार-वाणिज्य के साथ-साथ नवीन वर्गों का विकास और लुहार, कुम्भकार, मनके तथा आभूषण बनाने वाले, मकान बनाने वाले शिल्पी, मिट्टी के खिलौने बनाने वाले शिल्पी आदि। आम लोग इस मिट्टी के बर्तनों का उपयोग नहीं करते थे। इसके बजाय, संभ्रांत समाज के सदस्य इसे खाने के लिए इस्तेमाल करते थे। उत्तरी काले चमकदार मृदभाण्ड काल के दौरान लोगों का सांस्कृतिक जीवन काफी उन्नत हुआ था। जिंदगी में बहुत कुछ बदल गया है। शहरी क्रांति ने काफी भौतिक परिवर्तन लाया है।

मूल शब्द: ऐतिहासिक और बुद्ध युग, मृदभाण्ड काल, आर्थिक रूप से समृद्ध

प्रस्तावना

छठी शताब्दी ई० पू० के समय को बुद्ध काल के रूप में जाना जाता है। इस समय भारतीय जनता आर्थिक रूप से सुखी और समृद्ध थी। इस काल में व्यापारिक गतिविधियाँ चरम पर थीं। इसी समय उत्तरी काली चमकीली पात्र परम्परा मनुष्य के जीवन में आती है। इस पात्र परम्परा का उद्भव तथा विकास भारत में द्वितीय नागरिक क्रान्ति के साथ जुड़ा है। भारत के इतिहास में यह सबसे महत्वपूर्ण कालों में से एक था। जबकि बड़े पैमाने पर गंगा घाटी में नगरों का विकास होता है साथ ही केन्द्रीकरण की राजनीतिक सत्ता का भी स्पष्ट स्वरूप दिखाई देता है। सोलह महाजनपदों का क्रमिक विलय, मगध का उत्कर्ष एवं मौर्य साम्राज्य की स्थापना एवं विकास काल उत्तरी कृष्ण मर्जित पात्र परम्परा के उद्भव, विकास तथा अन्त के साथ जुड़ी है। छठी शताब्दी ई० पू० का समय बुद्ध से सम्बद्ध है।^[1]

उत्तरी काली चमकदार मृदभाण्ड परम्परा को बुद्ध काल और प्रारम्भिक ऐतिहासिक काल की मृदभाण्ड परम्परा भी कहते हैं। अपनी अद्भुत चमक और स्पष्ट पहचान के कारण पुरातात्विक

उत्खननों में काल निर्धारण में इसका महत्वपूर्ण योगदान है। इस प्रकार के पात्र प्रारम्भ में उत्तर भारत के पुरास्थलों से मिले, इसलिए इसे यह नाम दिया गया। मार्टीमर व्हीलर के अनुसार "भारत के पुरास्थलों पर यह पात्र परम्परा उसी प्रकार विशिष्ट है जिस प्रकार यूरोप महाद्वीप के भूमध्यसागर के तटवर्ती क्षेत्रों में 'टेरा सिगिलाटा'(जमतत'पहपससंजं) नाम की पात्र परम्परा है।"^[2]

यह पात्र परम्परा सर्वप्रथम 1911-12 में इलाहाबाद के भीटा नामक पुरास्थल पर प्राप्त हुई। मार्शल को इसी प्रकार की पात्र परम्परा तक्षशिला के भीर टीले और सारनाथ से मिली है।

आज भी इन्हें उत्तरी काले चमकीले मृदभाण्ड की संज्ञा दी जाती है। यों तो ये दक्षिण के पैठन (धरनीकोट) तक मिले हैं।³ इन पात्रों का विस्तार उत्तर दक्षिण में 2121 किमी० तथा पूर्व-पश्चिम में 1790 किमी० के क्षेत्र में है। उदेग्राम इसका सबसे उत्तरवर्ती पुरास्थल स्वात घाटी में तथा सबसे दक्षिणवर्ती पुरास्थल धरनीकोट के निकट छेबरोलू है। प्रभासपाटन पश्चिमवर्ती पुरास्थल तथा सबसे पूर्ववर्ती पुरास्थल पश्चिमी बंगाल में चन्द्रकेतुगढ़ है। मध्यगंगा घाटी में उत्तर प्रदेश में इस पात्र के सबसे अधिक पुरास्थल मिले हैं।

Allelopathic Medicinal Plants: 2. Ginseng (*Panax*) species

K.M. Zhang*, Y.X. Guo¹, Z.L. Zhang¹ and N. Amist²

College of Biology and the Environment, Nanjing Forestry University,
Nanjing 210037, Jiangsu Province, China

E. Mail: kaimeizhang@163.com, 15053766099@139.com,

(Received in revised form: November 29, 2022)

CONTENTS

1. INTRODUCTION
2. GINSENG SPECIES
3. GINSENG CULTIVATION
4. CONTINUOUS CROPPING PROBLEM
5. MEDICINAL USES
6. FUTURE LINES OF RESEARCH
7. REFERENCES

ABSTRACT

Of the 12 ginseng medicinal species, only 3 spp. (*Panax ginseng*, *P. quinquefolium* and *P. notoginseng*) are important, due to their biological activities, hence, widely used worldwide. These are used for cardiovascular protection, immunomodulatory ability, antioxidants, antitumor, cholesterol lowering and anti-inflammatory activities. Hence, these are used in various products (food, health-food, daily necessities, cosmetics etc.). However, ginseng cultivation causes problems of replanting due to its allelopathic effects. This review provides a comprehensive insight of allelopathic ginseng plant and analyzes the allelopathic effects on soil diseases and soil microorganisms. More in-depth research is needed to reveal the mechanism of ginseng allelopathy.

Key words: Active ingredient, allelopathic effects, American ginseng biological activities, ginseng, ginseng spp., ginsenosides, medicinal plant, notoginseng, *Panax ginseng*, *P. quinquefolium*, *P. notoginseng*, replanting problem.

1. INTRODUCTION

Ginseng is one of the precious medicinal plants in the world. Its main component is ginsenoside, which has important pharmacological and medicinal uses. The ginseng products benefits 'Qi', invigorate spleen and replenishes blood to nourish heart. The ginseng roots contain saponins, polysaccharides, organic acids, proteins, volatile oils, trace elements etc. Hence, it is used to treat cardiovascular system and central nervous system diseases, improve myocardial function, improve memory, enhance immunity, improve sleep, anti-aging, anti-shock, anti-myocardial ischemia, etc.

Most of the ginseng species were wild and non-domesticated in the past, while, its cultivation has developed in past 50-60 Years. The ginseng needs specific climate and soil conditions, hence, its cultivation is done in China, South Korea, North Korea and Russia. *P.*

*Correspondence author, ¹School of Chinese Materia Medica, Beijing University of Chinese Medicine, Beijing 102488, China, ²Department of Botany, University of Allahabad, Allahabad -211002, India.

Challenges and future solutions for detection of *Clostridioides difficile* in adults

Rima Biswas^a, Hemanshi Dudani^a, Praveen Lakhera^b, Arun Kumar Pal^c, Phibalari Kurbah^d, Dinesh Bhatia^d, Archana Dhok^e, Rajpal Singh Kashyap^a

Dr. G.M. Taori Central India Institute of Medical Sciences, Nagpur; ^bAcademy of Scientific and Innovative Research (AcSIR), Ghaziabad, Uttar Pradesh and CSIR-Central Scientific Instruments Organization, Chandigarh; Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj; North Eastern Hill University, Shillong, Meghalaya; Datta Meghe Institute of Medical Sciences, Sawangi, India

Abstract

There are no established standards for the diagnosis of *Clostridioides difficile* infection (CDI), even though the importance of this infection in humans is well known. The effectiveness of the commercially available techniques, which are all standardized for use with human feces, is also limited in terms of the accuracy of the tests. Furthermore, the current approach lacks a point-of-care diagnosis with an acceptable range of sensitivity and specificity. This article reviews the challenges and possible future solutions for the detection of CDI in adults. Existing diagnostic methods, such as enzyme-linked immunoassays and microbial culturing for the detection of toxins A and B, appear to work poorly in samples but exhibit great sensitivity for glutamate dehydrogenase. Real-time polymerase chain reaction and nucleic acid amplification tests have been investigated in a few studies on human samples, but so far have shown poor turnaround times. Thus, developing a multiplex point-of-care test assay with high sensitivity and specificity is required as a bedside approach for diagnosing this emerging infection.

Keywords *Clostridioides difficile*, diagnosis, point-of-care device

Ann Gastroenterol 2023; 36 (4): 369-377

^aResearch Laboratory, Dr. G.M. Taori Central India Institute of Medical Sciences, Nagpur (Rima Biswas, Hemanshi Dudani, Rajpal Singh Kashyap); ^bAcademy of Scientific and Innovative Research (AcSIR), Ghaziabad, Uttar Pradesh and CSIR-Central Scientific Instruments Organization, Chandigarh (Praveen Lakhera); ^cDepartment of Molecular and Cellular Engineering, Sam Higginbottom University of Agriculture, Technology, and Sciences, Prayagraj (Arun Kumar Pal); ^dDepartment of Biomedical Engineering, North Eastern Hill University, Shillong, Meghalaya (Phibalari Kurbah, Dinesh Bhatia); ^eDepartment of Biochemistry, Datta Meghe Institute of Medical Sciences, Sawangi (Archana Dhok), India

Conflict of Interest: None

Correspondence to: Dr. Rajpal Singh Kashyap, Research Laboratory, Dr. G.M. Taori Central India Institute of Medical Sciences, 88/2, Bajaj Nagar, Nagpur, 440010, India, e-mail: rajpalsingh.kashyap@gmail.com

Received 23 November 2022; accepted 17 February 2023; published online 25 May 2023

DOI: <https://doi.org/10.20524/aog.2023.0802>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms

Introduction

Most cases of pseudomembranous colitis and 25-30% of cases of antibiotic-associated diarrhea are caused by *Clostridioides difficile* (*C. difficile*) [1]. As *C. difficile* continues to cause significant morbidity and mortality, patients who present with diarrhea after being hospitalized for 3 or more days should be tested [2]. With an attributable mortality rate of 6-15%, *C. difficile*-associated diarrhea poses a serious hazard to health with rising prevalence and severity. A drastic shift in the epidemiology of *C. difficile* infection (CDI), with substantial fatality rates, has been documented globally since 2003 [3,4]. For instance, a rare but highly infectious genotype BI/NAP1/027 has emerged as a potent cause of infection in healthcare settings [5,6]. The clinical diagnosis of *C. difficile* has improved over the last few decades, with rapid and advanced detection techniques developed during the past 20 years. According to the UK recommendations, laboratories should test specimens using either a neutralized cell cytotoxicity assay or an enzyme immunoassay (EIA) that can detect both *C. difficile* toxins (CDT) A and B [7]. A survey found that, so far, no single "gold standard" test has been developed for the diagnosis of CDI [8].

ORIGINAL RESEARCH ARTICLE

An investigation on 45S5 nanobioactive glass using FTIR and Raman spectroscopy

Sharda Sundaram Sanjay¹, Pratibha Yadav¹, Nidhi Asthana², Mrigank Mauli Dwivedi², Kamlesh Pandey^{2,*}

¹ Department of Chemistry, Ewing Christian College, University of Allahabad Allahabad, Uttar Pradesh 211002, India

² National Center of Experimental Mineralogy and Petrology, University of Allahabad Allahabad, Uttar Pradesh 211002, India

* Corresponding author: Kamlesh Pandey, kamleshpandey@allduniv.ac.in

ABSTRACT

Bioactive materials are those that cause a number of interactions at the biomaterial-living tissue inter-face that result in the evolution of a mechanically strong association between them. For this reason, an implantable material's bioactive behavior is highly advantageous. Silicate glasses are encouraged to be used as bioactive glasses due to their great biocompatibility and beneficial biological effects. The sol-gel method is the most effective for preparing silicate glasses because it increases the material's bioactivity by creating pores. Glass densities are altered by the internal network connectivity between network formers and network modifiers. The increase in the composition of alkali or alkaline oxides reduces the number of bridging oxygens and increases the number of non-bridging oxygens by retaining the overall charge neutrality between the alkali or alkaline cation and oxygen anion. Higher drying temperatures increase pore densities, while the melt-quenching approach encourages the creation of higher density glasses. Band assignments for the BAG structure can be explained in detail using Fourier Transform Infrared (FTIR) and Raman spectroscopic investigations. Raman spectroscopy makes it simple to measure the concentration of the non-bridging oxygens in the silica matrix.

Keywords: bioactive glass (BAG); FT-IR; Raman spectra; melt-quench; EPMA

ARTICLE INFO

Received: 10 November 2023

Accepted: 12 December 2023

Available online: 31 December 2023

COPYRIGHT

Copyright © 2023 by author(s).

Characterization and Application of Nanomaterials is published by EnPress Publisher, LLC. This work is licensed under the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0).
<https://creativecommons.org/licenses/by-nc/4.0/>

1. Introduction

Bioactive materials are becoming an essential component of everyday life. These materials are in between inert and resorbable materials. Bio active materials have the ability to form natural bonds with living tissue^[1,2]. During the 1970, this new class of materials, i.e., bioactive glass (BAG), gained attention^[3-7]. The first bioactive glass (Bioglass 45S5 with compositions of 45 wt% SiO₂, 24.4 wt% CaO, 24.5 wt% Na₂O, and 6 wt% P₂O₅) was developed and studied by Jones^[8] and Hench^[9]. BAG is mostly used for biomedical applications and consists of a silicate network incorporating sodium, calcium, and phosphorus in different relative proportions. It exhibits high bioactivity and may attach to soft tissues. Recently, bioactive glass nanoparticles doped with antimicrobial agents such as silver, zinc, and magnesium ions have been widely developed for medical applications. The bioactive glass nanoparticles in a polymeric composite system enable us to develop potential materials for orthopedic applications to avoid health risks^[10].

To study the structural changes during the synthesis of BAG, Zachariassen^[11] observed that the silicate crystals had a three-



Analytical Study of Solvent trapping nature of Biocompatible PVA Polymer

Kamlesh Pandey¹, Mrigank Mauli Dwivedi¹, Diptarka Roy² & Sharda Sundaram Sanjay³

¹National Center of Experimental Mineralogy and Petrology, University of Allahabad

²Department of Physics, Babasaheb Bhimrao Ambedkar University, Lucknow (India)

³Department of Chemistry, Ewing Christian College, University of Allahabad

Allahabad-211002, U. P., India

Abstract

Polyvinyl alcohol (PVA) is a fabulous, non-toxic, synthetic solvent swelling polymer having widespread novel applications for its biocompatible characteristics. However, water is an excellent solvent for PVA, except this, it is soluble in numerous polar, organic solvents such as DMSO, DMF, etc. The present study is associated with the synthesis of PVA polymeric membranes by using different solvents. The spectroscopic analysis both from density functional theory and experimental observations indicate the co-existence of solvents in the PVA polymeric membrane, where the solvents remain trapped inside the membrane and impossible to remove completely despite the application of higher temperature to the membrane, which helps to refute the basic concept of membrane technology of “solvent-free membrane” formation. The XRD patterns of membranes show a peculiar phase changing phenomenon after annealing the membranes at 125°C. The FTIR and Raman spectroscopic studies showed a comprehensive perception on solubilization mechanism for the preparation of PVA membrane in different solvents with the variation in annealing temperatures and provided information regarding the polymer-solvent interactions during the formation of the polymeric membrane. The SEM images show the beautiful fish scale-like (spherulite) surface morphologies of the synthesized PVA-membranes.

Keywords: Polyvinyl Alcohol; FTIR; XRD; Solvent swollen, DMF, DMSO, SEM, Raman-Laser, Biomedical, Biocompatible

Introduction:

Polyvinyl alcohol (PVA), is a biodegradable polymer with excellent mechanical and acousto-optical properties. It has been used extensively in various fields such as medicals (drug delivery, contact lens, artificial blood vessel etc.), optoelectronics (polarization, retardation, optical filtration etc.), absorbants, membrane materials and other fields [1-3]. PVA consists of the basic recurrent unit $[-CH_2-CH(OH)-]_n$, where a hydroxyl group is attached with each monomer as shown in the schematic diagram represented by Fig. 1. Within the macromolecular structure of PVA, there is a wide range of stereo-chemical

Gold Nanorod-Induced Effects in a Mesogenic Compound 4-(*trans*-4-*n*-Hexylcyclohexyl) isothiocyanatobenzene

Abhinav Lal,* Himanshu Verma, Saikumar Chirra, Ravindra Dhar,* Roman Dabrowski, and Kusum Lata Pandey

Cite This: *ACS Omega* 2023, 8, 29012–29024

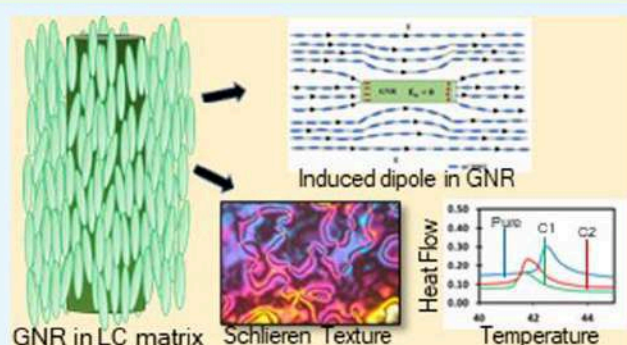
Read Online

ACCESS |

Metrics & More

Article Recommendations

ABSTRACT: Gold nanorods (GNRs) have a capsule-like structure with different optical properties than spherical gold nanoparticles due to surface plasmon resonance. Liquid crystals (LCs) are mesogenic compounds having crystal-like orientation and liquid-like fluidity. They are important materials from a technological point of view. Both GNRs and LC compounds are anisotropic in shape and properties. Different nano entities show interesting results when dispersed in different liquid crystalline materials which are instrumental from the application point of view. In the present work, GNRs have been dispersed in nematic liquid crystalline materials, namely 4-(*trans*-4-*n*-hexylcyclohexyl) isothiocyanatobenzene (6CHBT). Calorimetric, texture, spectroscopic, and dielectric studies were carried out for a pure 6CHBT and its composites with GNRs. Different calorimetric and dielectric parameters such as transition temperature, enthalpy, heat flow, permittivity, dielectric strength, dielectric anisotropy, and relaxation frequency have been determined, and the effect of GNRs has been explored. This article gives an insight into the influence of GNRs on the morphology and anisotropic physical properties of the nematic liquid crystalline material.



1. INTRODUCTION

The study of new and advanced materials is carried on extensively to meet various technological, energy, and economic needs. One such material is a liquid crystal (LC). They are mesogenic molecules that show a counterintuitive combination of fluidity and long-range order. Due to this, they show various properties intermediate to that of crystalline solids and isotropic liquids. Although LCs are not new to this area of research but studies on them are going on broadly in the field of synthesis of new LC materials, their characterization, and preparation of composites by addition of different kinds of dopants to meet certain applicative needs. LCs find their application in the field of display technology, optics, electro-optics, bioscience, biophotonics, actuators, etc. These applications are due to their structural, orientational, transitional, thermal, dielectric, and optical properties.^{1,2} LCs are majorly classified on the basis of the driving force for their existence as mesogenic molecules, namely thermotropic, lyotropic, and metallotropic. Thermotropic LCs are the most widely studied LC due to the existence of their mesogenic properties on temperature change. They are further classified into calamitic and discotic on the basis of the structure and orientation of molecules. In the case of calamitic LCs, the overall length of the molecule is significantly greater than its

width.^{3,4} The most common phase used in various applications shown by the calamitic LCs is the nematic phase. The nematic phase is the least ordered where no translational but only orientational order is present.^{5,6} As far as stereochemistry is concerned, nematic LC is symmetrical with the C_2 axis along the director with the D_{2h} point group. Materials with a size range of 2–100 nm are known as nanomaterials. They vary in shape depending upon the material of which it is prepared and also on the type of method by which they are prepared. As the shape varies, their physical property will also vary. Nanorods come under 1D nanomaterials along with nanotubes and nanowires. Nanorods have no internal surface in comparison to nanotubes whereas in comparison to nanowires, the length of nanowires is considerably larger than in nanorods.⁷

Various research reveals that nanomaterials play an important role in altering and improving the properties of LC molecules. A large number of LC-nanomaterial composites

Received: March 20, 2023


Accepted: July 21, 2023

Published: August 3, 2023






Quick catalytic responsive chitosan flakes@Ag/CuO nanocomposites in organic synthesis and environmental remediation

Vinai K. Singh ^a, Krishna Kumar ^a  , Shailja Rai ^a, Aradhana Chaudhary ^a, Kranthikumar Tungala ^b, Anupam Das ^c

Show more 

 Share  Cite

<https://doi.org/10.1016/j.jece.2023.110632> 

[Get rights and content](#) 

Highlights

- Fabrication of chitosan flake based microgel without using any divinyl crosslinker.
- Synthesis of Ag/CuO nanocomposites by doping microgel through hydrothermal method.
- Catalytic reduction of MB, PNP and DMAB in presence of NaBH₄ and UV light.
- Ag/CuO nanocomposites have excellently worked as catalyst in reduction.
- The catalyst reduces MB, PNP and DMAB completely in lesser reaction time at neutral pH.

Abstract

This report deals with polymeric microgel of chitosan flakes (CF) for catalytic applications of bimetallic Ag/CuO nanoparticles (NPs). Nanocomposites, based on fabricated chitosan flakes, act as nanocatalyst and are used for swift chemical reduction of methylene blue (MB), para-nitro phenol (PNP) and dimethyl amino-benzaldehyde (DMAB) in presence of sodium borohydride or UV light. In our present work N-hydroxyl methyl acrylamide, instead of the traditional divinyllic cross linker, has been employed as monomer as well as cross linker for the synthesis of chitosan flakes. The fabricated chitosan flakes have been doped with Ag/CuO NPs to yield nanocomposites. Three grades of nanocomposites have been synthesized by varying the amounts of N-hydroxyl methyl acrylamide, to optimize the crosslinking and suitable network, to yield stabilized NPs. FT-IR, XRD, TGA, SEM, TEM, EDX, DLS and Ultraviolet-Visible (UV-Vis.) spectroscopic characterization techniques have been performed to establish the polymeric chitosan flakes and nanocomposites. When the nanocomposites are employed as catalysts, the percentages of reduction of MB, PNP and DMAB, using sodium borohydride (NaBH₄) or presence of UV-light, are over 90%, with lesser reaction time. The catalytic reduction in case of NaBH₄ exhibits pseudo first order kinetics and the corresponding rate constant (k_{app}) values have been determined.

Graphical Abstract



183 | 0

Views | CrossRef citations to date | Altmetric

1

Research Article

***In silico* evaluation of S-adenosyl-L-homocysteine analogs as inhibitors of nsp14-viral cap N7 methyltransferase and PLpro of SARS-CoV-2: synthesis, molecular docking, physicochemical data, ADMET and molecular dynamics simulations studies**

Ritika Srivastava, Saroj Kumar Panda, Parth Sarthi Sen Gupta, Anvita Chaudhary, Farha Naaz, Aditya K. Yadav, ...show all

Received 18 Jul 2023, Accepted 13 Dec 2023, Published online: 26 Dec 2023

Cite this article <https://doi.org/10.1080/07391102.2023.2297005>[Full Article](#)[Figures & data](#)[References](#)[Supplemental](#)[Citations](#)[Metrics](#)[Reprints & Permissions](#)[Read this article](#)[Share](#)

Abstract

A series of S-adenosyl-L-homocysteine (SAH) analogs, with modification in the base and sugar moiety, have been designed, synthesized and screened as nsp14 and PLpro inhibitors of severe acute respiratory syndrome corona virus (SARS-CoV-2). The outcomes of ADMET (Adsorption, Distribution, Metabolism, Excretion, and Toxicity) studies demonstrated that the physicochemical properties of all analogs were permissible for development of these SAH analogs as antiviral agents. All molecules were screened against different SARS-CoV-2 targets using molecular docking. The docking results revealed that the SAH analogs interacted well in the active site of nsp14 protein having H-bond interactions with the amino acid residues Arg289, Val290, Asn388, Arg400, Phe401 and π -alkyl interactions with Arg289, Val290 and Phe426 of Nsp14-MTase site. These analogs also formed stable H-bonds with Leu163, Asp165, Arg167, Ser246, Gln270, Tyr274 and Asp303 residues of PLpro proteins and found to be quite stable complexes therefore behaved as probable nsp14 and PLpro inhibitors. Interestingly, analog **3** showed significant *in silico* activity against the nsp14 N7 methyltransferase of SARS-CoV-2. The molecular dynamics (MD) and post-MD results of analog **3** unambiguously established the higher stability of the nsp14 (N7 MTase):**3** complex and also indicated its behavior as probable nsp14 inhibitor like the reference sinefungin. The docking and MD simulations studies also suggested that sinefungin did act as SARS-CoV-2 PLpro inhibitor as well. This study's findings not only underscore the efficacy of the designed SAH analogs as potent inhibitors against crucial SARS-CoV-2 proteins but also pinpoint analog **3** as a particularly promising candidate. All the study provides valuable insights, paving the way for potential advancements in antiviral drug development against SARS-CoV-2.

Communicated by Ramaswamy H. Sarma

Highlights

203 | 5

0


Views | CrossRef citations to date | Altmetric

Research Article

Silica derived from rice husk ash and loaded with iron oxide for As(III) adsorption from water: experimental and modelling studies

Arijit Dutta Gupta, Vivek Bhadauria & Harinder Singh 

Pages 5771-5794 | Received 26 Apr 2021, Accepted 09 Jun 2021, Published online: 24 Jun 2021

 Cite this article  <https://doi.org/10.1080/03067319.2021.1943373> Check for updates Sample our Physical Sciences journals, sign in here to start your FREE access for 14 days Full Article Figures & data References Citations Metrics Reprints & Permissions

Read this article

 Share

ABSTRACT

Arsenic in water at low concentration (1–5 mg/L) presents difficulty in its removal by adsorption due to low concentration gradient. In the present study, silica was extracted from rice husk ash via sol–gel method and loaded with iron oxide using co-precipitation method. The maximum removal As(III) percentage (97.5%) was achieved using 0.1 g/L of adsorbent with a contact time of 90 min at pH = 7.0. Modelling of the experimental data with Freundlich isotherm and pseudo-second-order kinetic models showed the highest regression coefficient ($R^2 > 0.95$). Adsorption was spontaneous at all temperatures (ΔG° value). Film and intraparticle diffusivities followed power-law model with initial concentration. FTIR spectra (at 825 cm^{-1}) indicated the presence of monodentate arsenic complexes. The presence of PO_4^{3-} ions affected the As(III) removal from water. The synthesised adsorbent exhibited excellent reusability up to three adsorption-desorption cycles.

KEYWORDS: Arsenic adsorption silica iron oxide modelling monodentate complexes

Acknowledgments

HS and ADG are thankful to Technical Education Quality Improvement Programme (TEQIP-III) for providing the required funding to carry out the experiments and MRC department, IIT Kanpur for SEM analysis.

Disclosure statement

The authors declare that they have no conflict of interest regarding the publication of this paper.

Log in via your institution



A review on 'Triazoles': their chemistry, synthesis & pharmacological characteristics.

¹Vaibhav Tripathi, ²Amulya Sinha, ³Arzoo Siddiqui, ⁴Girish Singh, ⁵Amit Yadav, * Vivek Bhadauria -Department of Chemistry; Ewing Christian College(University of Allahabad), Prayagraj 211003

Abstract: *Heterocyclic chemistry serves as an illustration for the lack of clear boundaries because it permeates many of the other chemical fields. The processes of life are intricately linked with heterocycles. Heterocycles are crucial to the pharmaceutical and agricultural industries, and this interest is frequently related to the fact that they naturally occur. The chemistry-biology interaction and heterocycles are present in more than 90% of newly developed drugs. Triazole, also known as pyrradiazole, has the chemical formula $C_2H_2N_3$ and contains a nitrogenous heterocyclic component. Numerous studies have been conducted on five-member heterocyclic triazole rings. The focus of this review is on the many pharmacological properties of the triazole ring and its derivatives. Triazole compounds have a wide range of pharmacological effects, including antitubercular, antituberculosis, anticonvulsant, antibacterial, anti-inflammatory, antioxidant, antimalarial, and antinociceptive properties.*

Keywords: Triazoles, pharmaceuticals, anti-inflammatory, anti-fungal, anti-tubercular, anti-malarial.

Introduction: Heterocyclic chemistry is crucial in the field of research and the synthesis of novel bioactive molecules. The discovery and design of the important physiologically active drug molecule is the focus of medicinal chemistry, a branch of the medical and pharmaceutical sciences. These heterocyclic compounds with nitrogen and oxygen have been found to have the most robust biological activity. There are numerous different compounds that have been created and that show various forms of beneficial pharmacological activity. Due to their importance in biological function and synthetics, triazoles and their fused heterocyclic derivatives have garnered a lot of interest in recent years. Due to their successful application in medicinal chemistry, azolic derivatives such as thiazole, triazole, oxadiazole, and thiadiazole are pharmacologically active substances.

Main Text: Triazole is a five-member heterocyclic ring with the chemical formula $C_2H_2N_3$ and two isomeric forms, 1,2,3-triazole and 1,2,4-triazole, which are also known as pyrradiazole. It has two carbon and three nitrogen atoms. The 1,2,3-triazole, which consists of two double-bonded carbon atoms and two regular nitrogen atoms, is an unsaturated, aromatic, five-membered, p-excessive nitrogen heterocycle with a 6 pi electron ring structure. Three nitrogen atoms are present, two of which are pyridine types and one of which is pyrrole type. The 1,2,4 - triazole is more significant because it forms the basis of the best modern agricultural fungicides as well as medications for fungal disease in humans. All the atoms in 1,2,3-triazoles are sp^2 hybridised, and the available 6 pi electrons are delocalized around the ring, which gives them their aromatic character. Triazoles are white to pale yellow crystals with a mild odour that are soluble in water and alcohol at melting points of 120 °C and 260 °C, respectively. Both triazoles have the potential for tautomerism.

Due to their wide range of biological applications, including their anticonvulsant, antimicrobial, antiviral, antitubercular, antidiabetic, anti-inflammatory, antiproliferative, antioxidant, anti-urease, and antimalarial activities, five membered heterocyclic nitrogen-containing compounds, such as triazole, are of great importance in medicinal chemistry.



JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

REVIEWING VARIABLES OF FINANCIAL WELLBEING: AN INDIAN PERSPECTIVE

¹Juhi Jaiswal, ²Dr. Shabana Mazhar

¹Research Scholar, ²Associate Professor

¹Joseph School of Business Studies & Commerce,

¹ Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India

ABSTRACT

Financial well-being has emerged as a significant issue for people, families, societies, and nation due to inadequate savings and insufficient long-term financial preparation for retirement. Financial well-being is characterized as a feeling of future stability with appropriate financial management in the present. Thus, the goal of this review is to determine how different variables affect financial well-being in context of India. The research methodology used in this paper is to study the existing literature on various factors influencing financial well-being. The review analysis of the existing literature indicates that factors like financial Literacy, knowledge; financial attitude; financial behaviour; financial consciousness; unemployment & Socio-economic factors like future security, savings and investments, people's attitudes towards money assessment, people's financial education, etc. have a substantial effect on people's financial well-being in Indian context. The result of this study can be utilized by academics, financial advisers, and others to understand the financial well-being from Indian perspective.

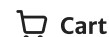
Keywords: Financial wellbeing, financial attitude, financial behaviour, financial literacy, financial stability.

INTRODUCTION

Every individual in the world is becoming more conscious about their financial situation and is seeking ways to improve it by making decisions about their spending, saving, investments, and other financial activities in order to increase their assets and safeguard their resources. However, with the changing financial system, technology advancements, easy availability of financial products and services, and the decrease in individual purchasing power, making financial decisions has become more challenging. Hence it becomes necessary to improve the financial well-being of people.

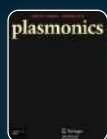
The 2008 global financial crisis and the recent turmoil of COVID-19 have hit essential sectors of the Indian economy, posing significant risks to India's economic growth and livelihood stability. As a result of which, healthy investing and saving habits has become a topic of increasing importance not only for individuals but also for businesses, policymakers, and others. This gives rise to the need to present this paper.

Many academics have examined financial well-being using various variables since it has become a hot topic of conversation. Financial wellness is described by the US Consumer Financial Protection Bureau (CFPB) as a state in which a person tries to maintain control over their day-to-day finances, has the ability to withstand financial shock, and has the freedom to make financial decisions in order to achieve their goals (CFPB, 2014). Another definition provided by Porter indicates that one's attitude towards their financial situation based on the future objectives and how they are judged in relation to their living standards constitutes their financial well-being (Porter, 1990). The World Bank notes that the policymakers around the

[Home](#) > [Plasmonics](#) > Article

Recent Advances in Optical Biosensors for Sensing Applications: a Review

| Published: 22 February 2023

| Volume 18, pages 735–750, (2023) [Cite this article](#)**Plasmonics**[Aims and scope](#) →[Submit manuscript](#) →

Arun Uniyal, Gaurav Srivastava, Amrindra Pal , Sofyan Taya & Arjuna Muduli

 4995 Accesses [Explore all metrics](#) →

Abstract

Merging engineering with medical science and adopting artificial intelligence to get further exact results specifically for preventive health care has made it challenging to detect the concentration or presence of biological analytes. The basic building blocks of such a system require recognition of an analyte, producing a signal that must be passed through a signal conditioning unit, and, finally, a detector that recognizes the specific analyte. The detection extends to the sensing of bacteria, tumor cells, tumor biomarkers, toxins, drugs, and other biomarkers with admirable accuracy with sensitivity. In optical biosensors, most commonly, it is the fluorescence technique. It measures the intensity, decay time, quenching efficiency, anisotropy, and quenching. Use plain sensor stripes, optical waveguide systems, arrays, and capillary-based technical sensors. This paper deals with the study of available optical biosensors, mentioning their working principle, merits, demerits, and application. The prime focus of this current study is the most widely used surface plasmon resonance (SPR) relied optical biosensors, including SPR imaging, and magneto-optical surface plasmon resonance. With this, some other optical biosensors are discussed, like evanescent wave fiber optic biosensor, evanescent wave fluorescence, and colorimetric polymerase chain reaction-based biosensor, as well as interferometric, ellipsometric, surface-enhanced Raman scattering biosensors, and Photonic crystal fiber sensor.

 This is a preview of subscription content, [log in via an institution](#) to check access.**Access this article**[Log in via an institution](#) →

[Home](#) > [Optical and Quantum Electronics](#) > Article


Sensitivity enhancement of optical plasmon-based sensor for detection of the hemoglobin and glucose: a numerical approach

| Published: 02 September 2023

| Volume 55, article number 963, (2023) [Cite this article](#)

**Optical and Quantum
Electronics**



[Aims and scope](#) →[Submit manuscript](#) →

[Abdulkarem H. M. Almawgani](#), [Arun Uniyal](#), [Partha Sarkar](#), [Gaurav Srivastava](#), [Amrindra Pal](#) , [Adam R. H. Alhawari](#), [Sofyan A. Taya](#)
& [Arjuna Muduli](#)

 413 Accesses  18 Citations [Explore all metrics](#) →

Abstract

In the proposed surface plasmon resonance sensor, bimetallic plasmonic metal copper (Cu) and platinum (Pt) are coated over the BaF₂ prism for the occurrence of the surface plasmon phenomena. The black phosphorous (BP) nano-sheet enhances the sensitivity for detecting water containing the solution, hemoglobin (Hb), and glucose from the body fluid samples. This paper numerically investigated the effect of the bimetal (Cu–Pt) and black phosphorous (BP) on the performance of the Kretschmann configured SPR biosensor with a visible range of 633 nm wavelength. The maximum sensitivity of 495.7°/RIU is obtained at a sensing layer of 1.330–1.335. The angular interrogation technique optimizes the thickness of the metals and 2D material for minimum reflectance. The maximum sensitivity of 382.5°/RIU and 399.78°/RIU are achieved for detecting hemoglobin and glucose, respectively. The proposed work has much better sensitivity than pre-existing SPR biosensors in the Hb and glucose biosensor literature. The proposed paper can advance the research in sensing Hb and glucose in the medical field.

 This is a preview of subscription content, [log in via an institution](#)  to check access.

Access this article



[Log in via an institution](#) →



Measurement

Volume 216, July 2023, 112957

A theoretical analysis of refractive index sensor with improved sensitivity using titanium dioxide, graphene, and antimonene grating: *Pseudomonas* bacteria detection

Khaled Aliqab ^a, Arun Uniyal ^b, Gaurav Srivastava ^c, Arjuna Muduli ^d, Meshari Alsharari ^a, Ammar Armghan ^a  [Show more](#)  Share  Cite<https://doi.org/10.1016/j.measurement.2023.112957> [Get rights and content](#) 

Highlights

- Analysis of Refractive Index Sensor with Improved Sensitivity using Titanium Dioxide, Graphene, and Antimonene Grating: Pseudomonas bacteria Detection.
- The sensor design consists of two silvers (Ag), a Titanium dioxide (TiO₂), graphene, and an affinity layer with antimonene grating placed over a BK7 coupling prism based on the Kretschmann configuration.
- The principle of attenuated total reflection (ATR) is used to investigate the performance of our proposed SPR-based biosensor.
- A comparative analysis is made between the proposed and the existing structures. The sensitivity, quality factor, and detection accuracy parameters 370.8 RIU⁻¹, 137.843 (1/RIU), and 0.371747⁻¹ are achieved.

Abstract

A surface plasmon resonance (SPR) based biosensor is proposed to detect Pseudomonas bacteria. The sensor design consists of two silvers (Ag), a Titanium dioxide (TiO₂), graphene, and an affinity layer with antimonene grating placed over a BK7 coupling prism based on the Kretschmann configuration. The principle of attenuated total reflection (ATR) is used to investigate the performance of our proposed SPR based biosensor. The sensor's performance parameters, such as sensitivity, detection accuracy, and quality factor, have been evaluated numerically and then analyzed. Inclusion of the TiO₂ and affinity layers improves the suggested structure's efficacy in detecting Pseudomonas bacteria. A comparative analysis is made between the proposed and the existing structures. The sensitivity, quality factor, and detection accuracy parameters **370.8°(RIU)⁻¹**, **137.843(1/RIU)**, and 0.371747 **degree⁻¹** are achieved.

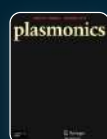
Introduction

An optical sensor is a sensing device that translates the quantity to be measured into the output quantity that is often encoded into one of the characteristics of a light wave by optical means [1], [2]. These optical sensors from the last decade have shown massive development. Optical biosensors following the surface plasmon resonance (SPR) principle are rapidly gaining increased popularity in various applications like monitoring the environmental (physical factors), biological inspections and sensing, and food safety [3],

[Home](#) > [Plasmonics](#) > Article

Creatinine Detection by Surface Plasmon Resonance Sensor Using Layers of Cerium Oxide and Graphene Over Conventional Kretschmann Configuration

| RESEARCH | Published: 31 May 2023

| Volume 18, pages 1743–1752, (2023) [Cite this article](#)**Plasmonics**[Aims and scope](#) →[Submit manuscript](#) →

[Abdulkarem H. M. Alkawagani](#), [Arun Uniyal](#), [Partha Sarkar](#), [Gaurav Srivastava](#), [Ahmad Alzahrani](#), [Sofyan A. Taya](#), [Arjuna Muduli](#) & [Amrindra Pal](#)

539 Accesses 25 Citations [Explore all metrics](#) →

Abstract

In this study, creatinine in solutions at varied concentrations (non-enzymatic samples) is detected utilizing a surface plasmon resonance (SPR) sensor design. The presence of creatininase enzymes in the creatinine solutions (enzymatic samples) was used to evaluate the sensor's performance. An optical wavelength of 633 nm was used in the angular interrogation technique. The proposed SPR sensor detects the presence of creatinine in blood samples ranging from 10 to 200 mM. The goal of researching the enzymatic sample was to improve the sensor's sensitivity to creatinine in the samples. The non-enzymatic creatinine sample had a sensitivity of 18.42 Degree/RIU, and for creatinine-creatininase, the enhanced sensitivity of 250 Degree/RIU has been achieved when exposed to 633 nm optical wavelength. The increased sensitivity may be owing to an increase in the refractive index of the analyte sensing layer because of creatinine-creatininase coupling activity.

This is a preview of subscription content, [log in via an institution](#) to check access.

Access this article

[Log in via an institution](#) →

Subscribe and save

Springer+ Basic

€32.70 /Month

- Get 10 units per month
- Download Article/Chapter or eBook
- 1 Unit = 1 Article or 1 Chapter
- Cancel anytime

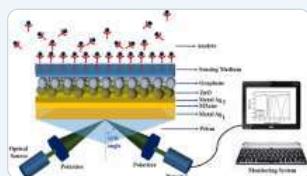
[Subscribe now →](#)
[Buy Now](#)
[Buy article PDF 39,95 €](#)

Price includes VAT (India)

Instant access to the full article PDF.

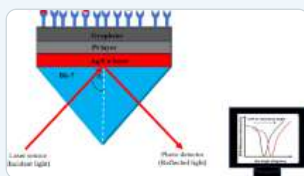
[Rent this article via DeepDyve](#)
[Institutional subscriptions →](#)

Similar content being viewed by others



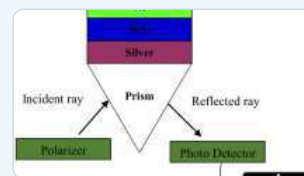
Sensitivity Improvement of Surface Plasmon Resonance Sensor for Glucose Detection in Urine Samples Using Heterogeneous Layers:...

Article | 16 October 2023



Advancement in glucose concentration measurement in human blood: a surface plasmon resonance-based optical sensing...

Article | 17 August 2024



Enhanced Performance of BK7-Ag-WS₂-Ni-Graphene Surface Plasmon Resonance Sensor for Glucose Detection in Urine

Article | 25 November 2024

Availability of Data and Material

No data available.

Code Availability

Not applicable.

References

1. Sinkeler SJ et al (2013) Creatinine excretion rate and mortality in type 2 diabetes and nephropathy. Diabetes Care 36(6):1489–1494. <https://doi.org/10.2337/dc12-1545>

[Article](#) [CAS](#) [PubMed](#) [PubMed Central](#) [Google Scholar](#)

2. Kumar P, Jaiwal R, Pundir CS (2017) An improved amperometric creatinine biosensor based on nanoparticles of creatininase, creatinase and sarcosine oxidase. *Anal Biochem* 537:41–49.
<https://doi.org/10.1016/j.ab.2017.08.022>
[Article](#) [CAS](#) [PubMed](#) [Google Scholar](#)
3. Pundir CS, Kumar P, Jaiwal R (2019) Biosensing methods for determination of creatinine: a review. *Biosens Bioelectron* 126:707–724. <https://doi.org/10.1016/j.bios.2018.11.031>
[Article](#) [CAS](#) [PubMed](#) [Google Scholar](#)
4. Sarkar K (2022) A review on the development of spectroscopic sensors for the detection of creatinine in human blood serum. *Int J Life Sci Pharma Res* 11(1):91–101. <https://doi.org/10.22376/ijpbs/lpr.2021.11.1.191-101>
[Article](#) [CAS](#) [Google Scholar](#)
5. Talalak K, Noiphung J, Songjaroen T, Chailapakul O, Laiwattanapaisal W (2015) A facile low-cost enzymatic paper-based assay for the determination of urine creatinine. *Talanta* 144:915–921.
<https://doi.org/10.1016/j.talanta.2015.07.040>
[Article](#) [CAS](#) [PubMed](#) [Google Scholar](#)
6. Gamagedara S, Shi H, Ma Y (2012) Quantitative determination of taurine and related biomarkers in urine by liquid chromatography-tandem mass spectrometry. *Anal Bioanal Chem* 402(2):763–770.
<https://doi.org/10.1007/s00216-011-5491-4>
[Article](#) [CAS](#) [PubMed](#) [Google Scholar](#)
7. Magalhães JMCS, Machado AASC (2002) Array of potentiometric sensors for the analysis of creatinine in urine samples. *Analyst* 127(8):1069–1075. <https://doi.org/10.1039/b201173e>
[Article](#) [CAS](#) [PubMed](#) [Google Scholar](#)
8. Uniyal A, Srivastava G, Pal A, Taya S, Muduli A (2023) Recent advances in optical biosensors for sensing applications : a review. *Plasmonics* 0123456789. <https://doi.org/10.1007/s11468-023-01803-2>
9. Nguyen HH, Park J, Kang S, Kim M (2015) Surface plasmon resonance: a versatile technique for biosensor applications. *Sensors* 15(5):10481–10510. <https://doi.org/10.3390/s150510481>
[Article](#) [CAS](#) [PubMed](#) [PubMed Central](#) [Google Scholar](#)
10. Detection V (2002) Recent progress in plasmonic biosensing schemes for
11. Bellassai N, D'Agata R, Jungbluth V, Spoto G (2019) Surface plasmon resonance for biomarker detection : advances in non-invasive cancer diagnosis 7:1–16. <https://doi.org/10.3389/fchem.2019.00570>

[Article](#) [CAS](#) [Google Scholar](#)

12. Asif M et al (2020) ScienceDirect Electrochemistry The role of biosensors in coronavirus disease-2019 outbreak. Curr Opin Electrochem 23:174–184. <https://doi.org/10.1016/j.coelec.2020.08.011>

[Article](#) [CAS](#) [PubMed](#) [PubMed Central](#) [Google Scholar](#)

13. Akowuah EK, Gorman T, Haxha S (2009) Design and optimization of a novel surface plasmon resonance biosensor based on Otto configuration. Opt Express 17(26):23511. <https://doi.org/10.1364/oe.17.023511>

[Article](#) [CAS](#) [PubMed](#) [Google Scholar](#)

14. Verma A, Prakash A, Tripathi R (2015) Sensitivity enhancement of surface plasmon resonance biosensor using graphene and air gap. Opt Commun 357:106–112. <https://doi.org/10.1016/j.optcom.2015.08.076>

[Article](#) [CAS](#) [Google Scholar](#)

15. Lixia Li et al (2017) Dual Kretschmann and Otto configuration fiber surface plasmon resonance biosensor 25(22):595–598

16. Karki B, Pal A, Singh Y, Sharma S (2021) Sensitivity enhancement of surface plasmon resonance sensor using 2D material barium titanate and black phosphorus over the bimetallic layer of Au, Ag, and Cu. Opt Commun 508. <https://doi.org/10.1016/j.optcom.2021.127616>

17. Gifford LK, Sendroiu IE, Corn RM, Lupták A (2010) Attomole detection of mesophilic DNA polymerase products by nanoparticle-enhanced surface plasmon resonance imaging on glassified gold surfaces. J Am Chem Soc 132(27):9265–9267. <https://doi.org/10.1021/ja103043p>

[Article](#) [CAS](#) [PubMed](#) [PubMed Central](#) [Google Scholar](#)

18. Karki B, Uniyal A, Sharma T, Pal A, Srivastava V (2022) Indium phosphide and black phosphorus employed surface plasmon resonance sensor for formalin detection : numerical analysis. Opt Eng 61(1):017101. <https://doi.org/10.1117/1.OE.61.1.017101>

19. Nur JN, Hasib MHH, Asrafy F, Shushama KN, Inum R, Rana MM (2019) Improvement of the performance parameters of the surface plasmon resonance biosensor using Al₂O₃ and WS₂. Opt Quantum Electron 51(6):1–11. <https://doi.org/10.1007/s11082-019-1886-9>

[Article](#) [CAS](#) [Google Scholar](#)

20. Karki B, Uniyal A, Chauhan B, Pal A (2022) Sensitivity enhancement of a graphene, zinc sulfide-based surface plasmon resonance biosensor with an Ag metal configuration in the visible region. J Comput Electron. <https://doi.org/10.1007/s10825-022-01854-4>

21. Seong G, Dejhosseini M, Adschiri T (2018) A kinetic study of catalytic hydrothermal reactions of acetaldehyde with cubic CeO₂ nanoparticles. Appl Catal A Gen 550:284–296. <https://doi.org/10.1016/j.apcata.2017.11.023>
[Article](#) [CAS](#) [Google Scholar](#)
22. Mishra TK, Kumar A, Sinha SK, Gupta B (2018) Wear behavior and XRD analysis of reinforced copper matrix composite reinforced with Cerium Oxide (CeO₂). Mater Today Proc 5(14):27786–27794.
<https://doi.org/10.1016/j.matpr.2018.10.014>
[Article](#) [CAS](#) [Google Scholar](#)
23. Sebastiammal S, Mariappan A, Neyvasagam K, Fathima AL (2019) Annona muricata inspired synthesis of CeO₂ nanoparticles and their antimicrobial activity. Mater Today Proc 9:627–632.
<https://doi.org/10.1016/j.matpr.2018.10.385>
[Article](#) [CAS](#) [Google Scholar](#)
24. Fugane K et al (2012) Improvement of cathode performance on Pt–CeO_x by optimization of electrochemical pretreatment condition for PEFC application. Langmuir 28(48):16692–16700.
<https://doi.org/10.1021/la302912r>
[Article](#) [CAS](#) [PubMed](#) [Google Scholar](#)
25. Pouretedal HR, Tofangsazi Z, Keshavarz MH (2012) Photocatalytic activity of mixture of ZrO₂/SnO₂, ZrO₂/CeO₂ and SnO₂/CeO₂ nanoparticles. J Alloys Compd 513:359–364.
<https://doi.org/10.1016/j.jallcom.2011.10.049>
[Article](#) [CAS](#) [Google Scholar](#)
26. Wang Y et al (2013) Ordered mesoporous CeO₂–TiO₂ composites: highly efficient photocatalysts for the reduction of CO₂ with H₂O under simulated solar irradiation. Appl Catal B Environ 130–131:277–284.
<https://doi.org/10.1016/j.apcatb.2012.11.019>
[Article](#) [CAS](#) [Google Scholar](#)
27. Hamidian K, Najafidoust A, Miri A, Sarani M (2021) Photocatalytic performance on degradation of Acid Orange 7 dye using biosynthesized un-doped and Co doped CeO₂ nanoparticles. Mater Res Bull 138:111206. <https://doi.org/10.1016/j.materresbull.2021.111206>
28. Sun M, Li Z, Li H, Wu Z, Shen W, Fu YQ (2020) Mesoporous Zr-doped CeO₂ nanostructures as superior supercapacitor electrode with significantly enhanced specific capacity and excellent cycling stability. Electrochim Acta 331:1–10. <https://doi.org/10.1016/j.electacta.2019.135366>
[Article](#) [CAS](#) [Google Scholar](#)

29. Wang M et al (2022) Exploring the enhancement effects of hetero-metal doping in CeO₂ on CO₂ photocatalytic reduction performance. Chem Eng J 427:130987. <https://doi.org/10.1016/j.cej.2021.130987>
30. Hameed MFO, Obayya S (2018) Computational photonic sensors. Springer Cham
31. Ansari G, Pal A, Srivastava AK, Verma G (2023) Detection of hemoglobin concentration in human blood samples using a zinc oxide nanowire and graphene layer heterostructure based refractive index biosensor. Opt Laser Technol 164(2):111. [https://doi.org/10.1016/0030-3992\(80\)90045-6](https://doi.org/10.1016/0030-3992(80)90045-6)
[Article](#) [Google Scholar](#)
32. Yadav A, Sharan P, Kumar A (2020) Surface plasmonic resonance based five layered structure-biosensor for sugar level measurement in human. Res Opt 1:100002. <https://doi.org/10.1016/j.rio.2020.100002>
[Article](#) [Google Scholar](#)
33. Yadav A, Kumar A, Sharan P (2022) Sensitivity enhancement of a plasmonic biosensor for urine glucose detection by employing black phosphorous. JOSA B 39(1):200–206. <https://doi.org/10.1364/JOSAB.444838>
[Article](#) [CAS](#) [Google Scholar](#)
34. Uniyal A, Pal A, Chauhan B (2022) Long-range Spr sensor employing platinum diselenide and cytop nanolayers giving improved performance. Phys B Condens Matter 649:414487. <https://doi.org/10.2139/ssrn.4230023>
[Article](#) [Google Scholar](#)
35. Karki B, Uniyal A, Srivastava G, Pal A (2023) Black phosphorous and cytop nanofilm-based long-range SPR sensor with enhanced quality factor. J Sensors. <https://doi.org/10.1155/2023/2102915>
36. Alkawgani AHM, Sarkar P, Pal A, Srivastava G, Uniyal A (2023) Titanium disilicide, black phosphorus – based surface plasmon resonance sensor for dengue detection. Plasmonics 0123456789. <https://doi.org/10.1007/s11468-023-01856-3>
37. Yadav A, Kumar S, Kumar A, Sharan P (2023) Effect of 2-D nanomaterials on sensitivity of plasmonic biosensor for efficient urine glucose detection. Front Mater 9(January):1–12. <https://doi.org/10.3389/fmats.2022.1106251>
[Article](#) [Google Scholar](#)
38. Aliqab K, Uniyal A, Srivastava G, Muduli A, Alsharari M(2023) A theoretical analysis of refractive index sensor with improved sensitivity using titanium dioxide, graphene, and antimonene grating : pseudomonas bacteria detection. Measurement 216:112957. <https://doi.org/10.1016/j.measurement.2023.112957>

39. Karki B, Ansari G, Uniyal A, Srivastava V (2022) PtSe₂ and black phosphorus employed for sensitivity improvement in the surface plasmon resonance sensor. J Comput Electron 0123456789. <https://doi.org/10.1007/s10825-022-01975-w>
40. Menon PS et al (2018) Urea and creatinine detection on nano- laminated gold thin film using Kretschmann-based surface plasmon resonance biosensor 1–14
41. Panda A, Pukhrambam PD (2021) Modeling of high-performance SPR refractive index sensor employing novel 2D materials for detection of malaria pathogens. IEEE Trans Nanobioscience 1–1. <https://doi.org/10.1109/tnb.2021.3115906>
42. Mostufa S, Paul AK, Chakrabarti K (2021) Detection of hemoglobin in blood and urine glucose level samples using a graphene-coated SPR based biosensor. OSA Contin 4(8):2164. <https://doi.org/10.1364/osac.433633>
43. Hossain B, Paul AK, Islam A, Rahman M, Sarkar AK, Abdulrazak LF (2021) A highly sensitive surface plasmon resonance biosensor using SnSe allotrope and heterostructure of BlueP/MoS₂ for cancerous cell detection. Optik 252:168506. <https://doi.org/10.1016/j.ijleo.2021.168506>
44. Moznuzzaman M, Islam MR, Khan I (2021) Effect of layer thickness variation on sensitivity: an SPR based sensor for formalin detection. Sens Bio-Sensing Res 32:100419. <https://doi.org/10.1016/j.sbsr.2021.100419>
45. Singh S, Sharma AK, Lohia P, Dwivedi DK, Kumar V, Singh PK (2023) Simulation study of reconfigurable surface plasmon resonance refractive index sensor employing bismuth telluride and MXene nanomaterial for cancer cell detection. Phys Scr 98(2). <https://doi.org/10.1088/1402-4896/acb023>
46. Channei D, Nakaruk A, Phanichphant S, Koshy P, Sorrell CC (2013) Cerium dioxide thin films using spin coating. J Chem 0–4. <https://doi.org/10.1155/2013/579284>
47. Jussila H, Yang H, Granqvist N, Sun Z (2016) Surface plasmon resonance for characterization of large-area atomic-layer graphene film. Optica 3(2):151. <https://doi.org/10.1364/optica.3.000151>

[Article](#) [CAS](#) [Google Scholar](#)

[Article](#) [CAS](#) [Google Scholar](#)

Funding

The authors are thankful to the Deanship of Scientific Research at Najran University for funding this work under the Research Groups Funding program grant code (NU/RG/SERC/12/7).

Author information

Authors and Affiliations

Electrical Department, College of Engineering, Najran University, Najran, Kingdom of Saudi Arabia

Abdulkarem H. M. Alkawgani & Ahmad Alzahrani

Department of Electronics and Communication Engineering, Institute of Technology Gopeshwar, Chamoli,

Uttarakhand, 246424, India

Arun Uniyal

Department of Electronics and Communication Engineering, National Institute of Technology, Mahatma Gandhi

Road, Durgapur, West Bengal, 713209, India

Partha Sarkar

Department of Electronics and Communication, University of Allahabad, Prayagraj, Uttar Pradesh, 211002, India

Gaurav Srivastava

Physics Department, Islamic University of Gaza, P.O. Box 108, Gaza, Palestine

Sofyan A. Taya

Department of Electronics and Communication Engineering, Koneru Lakshmaiah Education Foundation,

Vaddeswaram, Andhra Pradesh, 522302, India

Arjuna Muduli

Department of ECE, School of Engineering and Technology, DIT University, Dehradun, Uttarakhand, 248009,

India

Amrindra Pal

National Research Foundation Nepal, Bijulibazar, Kathmandu, 44600, Nepal

Amrindra Pal

Contributions

Conceptualization, A.H.M.A., P.S., and A.P.; investigation, A.H.M.A., A.P., and A.U.; writing—original draft preparation, G.S., P.S., and A.P.; writing—review and editing, A.A., S.A.T., and A.M.; software and simulation, A.H.M.A.; visualization, A.U., A.A., S.A.T.; supervision, S.A.T., A.P., and A.M.

Corresponding author

Correspondence to [Amrindra Pal](#).

Ethics declarations

Competing interests

The authors declare no competing interests.

Ethics Approval

Not applicable. The work presented in this manuscript is mathematical modeling only for the proposed biosensor. No experiment was performed on the human body and living organisms/animals. So, ethical approval from an ethical committee is not required.

Consent to Participate

I am willing to participate in the work presented in this manuscript.

Consent for Publication

The author has given their consent to publish this work.

Conflict of Interest

The authors declare no conflict of interests.

Additional information

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Rights and permissions

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

[Reprints and permissions](#)

About this article

Cite this article

Almawgani, A.H.M., Uniyal, A., Sarkar, P. *et al.* Creatinine Detection by Surface Plasmon Resonance Sensor Using Layers of Cerium Oxide and Graphene Over Conventional Kretschmann Configuration. *Plasmonics* **18**, 1743–1752 (2023).

<https://doi.org/10.1007/s11468-023-01891-0>

Received

01 May 2023

Accepted

23 May 2023

Published

31 May 2023

Issue Date

October 2023

DOI

<https://doi.org/10.1007/s11468-023-01891-0>

Keywords

[Creatinine detection](#)

[Kretschmann configuration](#)

[Cerium oxide](#)

[Graphene](#)

[Refractive in sensor](#)

[Home](#) > [Plasmonics](#) > Article

A Simulation Study for Dengue Virus Detection Using Surface Plasmon Resonance Sensor Heterostructure of Silver, Barium Titanate, and Cerium Oxide

RESEARCH | Published: 29 June 2023

Volume 18, pages 2031–2040, (2023) [Cite this article](#)**Plasmonics**[Aims and scope](#) →[Submit manuscript](#) →Bhishma Karki , [Nasih Hma Salah](#), [Gaurav Srivastava](#), [Arjuna Muduli](#) & [Ram Bharos Yadav](#) 673 Accesses 34 Citations [Explore all metrics](#) →

Abstract

Surface plasmon resonance (SPR) sensor devices accommodate immense capability for several applications in monitoring and detecting the progress of a disease. SPR sensors are a vital subset of chemical sensors that offer exceptional sensitivity and cost-effectiveness. Silver-barium titanate (BaTiO_3)-cerium oxide (CeO_2) multi-layered nanostructure integrated SPR sensor has been designed for the early diagnosis of dengue virus. The thickness of the multilayer structure has been optimized. The optimized structure consists of one layer of Ag, one layer of BaTiO_3 , and 28 layers of CeO_2 . The numerical study conducted here monitors the resonance angle. The observation indicated that the functional molecule on the SPR led to a shift in the SPR angle towards a higher incident angle, which signifies the alteration in the refractive index proportionate to the number of attached molecules. The sensitivity, FWHM, DA, and FoM has been computed and obtained as 203.22 deg/RIU, 3.28 deg, 0.54 deg^{-1} , and 73.13 RIU^{-1} respectively. The output results demonstrated that the SPR could potentially be a useful tool for detecting dengue viruses with promising results.

 This is a preview of subscription content, [log in via an institution](#) to check access.

Access this article

[Log in via an institution](#) →

Subscribe and save



Spooking the Real and Patriarchal: Reading *Bulbbul* and *Qala* as Female Fantastic Cinema

Riya Mukherjee*, Suraj Gunwant**

Abstract

The issue of representation of women in Hindi drama and its horror counterpart has attracted much debate. Confined to passive roles following the dictates of patriarchy, a transformation in women's representation has been slow to manifest, notwithstanding the arrival of the so-called 'New Woman' on the screen. The fantastical Hindi horror, like other popular genres, has faithfully reflected and naturalised dominant social norms. The present study aims to understand how some recent fantastic films, namely *Bulbbul* and *Qala*, subvert the patriarchal gaze and narrative domination prevalent in Fantastic. In doing so, the paper tries to look at the manner in which these films reshape the male-centred narratives of the fantasticas they forge an alternate space where a new female subjectivity can be foregrounded.

Keywords: Hindi cinema, horror, *Bulbbul*, *Qala*, fantastic, female

Women's representation in popular Hindi cinema, popularly known as Bollywood, has been gaining attention for some time, though in most readings, film criticism usually takes one of the two routes. The first is the good old feminist critique which unwraps the unconscious, hidden mother/whore binary in the typical construction of women in Hindi films. In such critiques, the film(s) in question is/are read to create the *sanskari* or rooted heroine by

* Department of English, S.S.Khanna Girls' Degree College, University of Allahabad.

** Department of English, Ewing Christian College, University of Allahabad.

(FG, σ)- Purity and Semi-simple Modules**Ashok Kumar Pandey***

Department of Mathematics, Ewing Christian Post Graduate College (An Autonomous College of University of Allahabad, Prayagraj), Allahabad, India

***Corresponding Author:** Ashok Kumar Pandey, Department of Mathematics, Ewing Christian Post Graduate College (An Autonomous College of University of Allahabad, Prayagraj), Allahabad, India.

Received: October 04, 2022**Published:** December 13, 2022

© All rights are reserved by **Ashok Kumar Pandey**.

Abstract

The torsion sub-module of $A \subseteq M$ is denoted by $\sigma(A)$. Since it was proved by Walker [18] that the class of I- pure (J- copure) sequences form a proper class whenever $I(J)$ is closed under homomorphic images (sub-modules) of a R- module M and if $I(J)$ is closed under factors (sub-modules) then for any I- pure (J- copure) sequence $E: 0 \rightarrow A \rightarrow B \rightarrow C \rightarrow 0$ if $E \in \pi^{\wedge}(-1)(I)$ ($E \in i^{\wedge}(-1)(I)$) and hence in this case Walker's I- purity (J- copurity) coincides with the earlier notion of purity. We also study about class of R-modules dual to the modules of B. A sequence $E: 0 \rightarrow A \rightarrow B \rightarrow C \rightarrow 0$ is I- pure (J- copure) if and only if given $C' \leq C \in I$, there exists $B' \leq B$ such that $B' \cong C'$ and $A \cap B' = 0$; we consider another notion of purity stronger than the Cohn's purity [13]. If FG denotes the class of all finitely generated R-modules, since, this class is closed under factors. We shall try to give some characterizations of FG-purity and to determine its relationship with the FG-flat modules. We relativist this concept and also relate it with that of finite projectivity of Azumaya [10] with respect to a torsion theory and to study the inter-relationship between these concepts. We also try to consider finite σ -projectivity or (FG, σ)- pure flatness, cyclically σ - pure projectivity and cyclically σ - pure flatness, the concept of locally σ - projectivity and locally σ - splitness and study its inter-relationship with (FG, σ)- purity and semi-simple module.

Keywords: R- Modules; (FG, σ)- Purity; σ - Pure Projective; R-Modules; I- Pure (J- copure); FG-flat Modules; Cyclically σ - Pure Projectivity; σ - Pure Infertility; Locally σ - Splitness; Semi-Simple Module. Subject classification: 16D99

Introduction

The notion of purity plays an abecedarian part in the theory of abelian groups as well as in module categories. We say that an R- module M is absolutely pure, (respectively regular, flat) with reference to the purity if any short exact sequence with M as the first (respectively second, third) position is pure in the given sense. Now we take a free presentation of N where N is a right R- module and $\bigoplus_i R \xrightarrow{f} \bigoplus_j R \rightarrow N \rightarrow 0$.

We take all the sub-matrices associated with μ are of the column finite matrix. The class of all co-kernels of the right R- maps between $\bigoplus_j R$ and $\bigoplus_i R$ convinced by these sub-matrices is expressed by $\wp(N)$. Now we take all row finite sub-matrices of the matrix and take co-kernels of all left R- maps between $\bigoplus_i R$ and $\bigoplus_j R$ induced

by these sub-matrices and this class of left R- modules is denoted by $f(N)$. An accurate sequence $E: 0 \rightarrow A \rightarrow B \rightarrow C \rightarrow 0$ is called τ - pure (\wp - copure) if any torsion (torsion free) module is projective (injective) relative to it. Since $\tau(\wp)$ is closed under factors (sub-modules). In this situation Walker's criterion of Co-purity is applicable. The notation of a R- module M is τ -pure projective (\wp - copure injective) if and only if $\text{Pext}_\tau(M, A) = 0$ ($\text{Pext}_\wp(A, M) = 0$) for all $A \subseteq M$. Since, $\text{Pext}_\tau(T, A) = 0$ for all $T \in \tau$.

The torsion sub-module of $A \subseteq M$ is denoted by $\sigma(A)$. It's proved by Walker that the class of f - pure (J - copure) sequence form a proper class when $f(J)$ is closed under homomorphism images (sub-modules) of an R- module M and if $f(J)$ is closed under factors (sub-modules) then for any f - pure (J - copure) sequence



Plant Archives

Journal homepage: <http://www.plantarchives.org>
DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2023.v23.no2.014>

RESPONSE SURFACE METHODOLOGY AND SPF DETERMINED THE PHOTO-PROTECTIVE CAPACITY OF *TARGETES PATULA* AGAINST UV-B RADIATIONS

Deepshikha Kushwaha^{1*}, Prashant Katiyar¹, Yashodhara Verma¹ and Narayani Shukla²

¹Department of Biochemistry and Biochemical Engineering, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj, U.P- 211007, India

²Department of Biotechnology, BFIT, Dehradun, Uttarakhand,- 248007, India

Corresponding Author Email: deepshikhak200@gmail.com

Orchid id: 0000-0002-5492-7069

(Date of Receiving : 06-04-2023; Date of Acceptance : 13-06-2023)

ABSTRACT

The present study investigates the solar radiation protective competency in *Tagetes patula* extract. The *Tagetes* extract can be used as therapeutic remedy against the harmful erythema solar-rays and protect soft & sensitive skin from sun tanning and sun poisoning.

Tagetes extract have been treated combinedly with ultrasonication and ethanol followed by filtration. Filtered ethanol extract diluted in a significant quantity of ethanol and undergone for UV-spectrophotometer analysis, where ethanol was used as a reference. Finally, the Mansur equation evaluates the significant sun protection factor (SPF) value of *Tagetes patula* extract.

This study demonstrated the *Tagetes patula* extract have a remarkable tendency to reflect the harmful solar UV-B rays. *Tagetes patula* flower and leaf extract had showed the significant sun protection factor value, reflected as (SPF-30) and (SPF-12), respectively. However, the Response surface methodology significantly establishes the correlation between the reflection and photon energy. The studied erythema factor have been optimized and evaluated through the optimization plot and shows the significant positive correlation between the reflectance and erythema response factors. In addition, *Tagetes patula* leaves (NRL) and (NRF) flower extract has application on UV-exposed skin, and help to prevent the skin tissues and cure the sensitive skin from harmful effect of the UV-B rays.

This study concluded that NRF extract of *Tagetes patula* had found greater competency and compatible than NRL extract, in terms of reflectivity and SPF property.

Keywords: Erythema Response; Sun Protection Factor; *Tagetes patula*, response surface methodology; Photon energy

Introduction

Solar radiation has an adverse effect on the skin tissues, after a continuous exposure of intense sunlight (Modenese *et al.*, 2018). An ultimate consequence of harmful solar radiations can eventually provoked an unwanted oxidative stress reaction in mammalian skin tissues and arise numerous skin problems such as sunburn, skin ageing *etc.* (Dunaway *et al.*, 2018).

UV radiation emitted from sun has electromagnetic radiation spectrum of 200-400 nm. Ultraviolet (UV) electromagnetic spectra broadly distinguished into the three major spectral bands: UV-A (320-400 nm), UV-B (290 to 320 nm) and UV-C (100-290 nm). UV-A spectra cover entire wavelength ranges that were not completely filtered out by atmospheric ozone layer (Kushwaha *et al.*, 2021). In spite of this, it penetrates deeply into the skin epidermis and badly affects the dermal layer tissues, causing an inflammation and thus, leading to a premature skin ageing (Rai and Agrawal, 2017).

UV-B radiation provokes highly damaging effects to the human skin as a result of ozone-layer partial absorption

(Melendez-Martínez *et al.*, 2019) and eventually had adverse effects on human life-style. At last, UV-C radiation is completely filtered out by earth atmosphere. Thereby, UV-B rays among them had more detrimental effects on skin tissues and is responsible to disturbed the integrity of lipids, proteins and nucleic acids which leads to sun burn, premature ageing and even responsible for causing a skin cancer (Ebrahimzadeh *et al.*, 2014). Thus the, UV protective bio-cosmetic products development is a crucial step to prevent the sensitive skin from the detrimental effect of UV radiations, thereby, a dermatologist, prescribed to use regularly sunscreen products (Azarafshan *et al.*, 2020; Kushwaha *et al.*, 2021). However, many synthetically synthesized sunscreens are already present in a cosmetic market in order to, protect the dermal layer of skin from a detrimental effects of UV-radiations (Gamoudi and Srasra, 2018) but these sunscreen were actually formulated chemically by harnessing the property of nanoparticles like ZnO, TiO₂ (Sargent, and Travers, 2016; Sharma *et al.*, 2020). These unwanted side effects in skin arises on account of a continuous exposure of UV radiations (Rai *et al.*, 2012), which trigger the activation of number of protein kinases



Plant Archives

Journal homepage: <http://www.plantarchives.org>
DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2023.v23.no2.003>

COMPARATIVE STUDY OF IMMOBILIZED ENZYME AND FREE ENZYME OF PARTIALLY PURIFIED BETA AMYLASE ISOLATED FROM SWEET POTATO (*IPOMOEA BATATAS*)

Shiksha Dwivedi, Deepshikha Kushwaha* and Yashodhara Verma

Department of Biochemistry & Biochemical Engineering, JIBB,
Sam Higginbottom University of Agriculture Technology & Sciences, Prayagraj-211007, UP, India

*Email:- deep_shikha200@yahoo.com

(Date of Receiving-03-03-2023; Date of Acceptance-18-05-2023)

ABSTRACT

Exoamylase / β -amylase hydrolyzes polyglucan chains' α -1,4-glycosidic connections at the non-reducing end to create maltose (4-O- α -d-Glucopyranosyl- β -d-Glc). Maltose's lowering Glc is present in the β -form. The primary function of β -amylase is involvement in starch breakdown in plants. Aim of the present study was to make immobilized beta amylase enzyme using natural matrix by entrapment method under optimum temperature and pH. Then compare the immobilization of beta-amylase which is extracted from *Ipomoea batatas* (sweet potato) with free enzyme (partial purification). Extraction was performed by ammonium sulfate precipitation method whereas partial purification was finished by dialysis bags. Then performed starch hydrolysis confirmatory test using iodine solution. The partially purified enzyme was immobilized through 4% of sodium alginate and agar dissolved in 0.1M phosphate buffer in addition of 0.4M CaCl_2 respectively. The molecular weight of enzyme was determined to be 8KDa through PAGE electrophoresis. After immobilization of enzyme, its stability was checked on weekly basis. Hence all comparatively study demonstrated that immobilization of beta amylase produced with sodium alginate show relatively great properties that can be applicable in various fields

Keywords: Beta amylase, Immobilization, Partial purification, electrophoresis, Sodium alginate.

Introduction

The hydrolase class of enzymes includes a sizable group called amylase, comprising 30 members. Within this group, the hydrolytic nature is exhibited by two enzymes known as α and β -amylases. α -amylases break down starch into maltose, glucose, and maltodextrin, while β -amylases hydrolyze the non-reducing chain end of starch, yielding specific enzymes such as maltose and dextrin (Souza and Magalhaes, 2010). β -amylase, also known as α -1,4-glucan maltohydrolase, is a highly prevalent and thermostable enzyme that is renowned for its ability to break the α -1,4-glycosidic bond at the non-reducing end of starch, ultimately yielding maltose and maltodextrins. The glucose unit in the reducing end of maltose is in the β -form, hence the name β -amylase (Xuguo Duan *et al.*, 2021; Kushwaha *et al.*, 2021). As the industrial applications of β -amylase are being evaluated, its production is currently increasing (Kossmann and Lloyd, 2000). Sweet potatoes, soybeans and barley are extensively utilized as sources for producing β -amylase in industrial sectors (Das *et al.*, 2018 Kushwaha *et al.*, 2020). The role of sweet potatoes in the global effort to combat vitamin A deficiency (VAD) is significant (Schweigert *et al.*,

2003; Stephenson *et al.*, 2000; Underwood and Arthur, 1996).

Functions of β -amylase

β -amylase plays a crucial role in breaking down starch, facilitating seed germination and fruit ripening, as well as contributing to their sweet taste. Starch, found in granules, is the primary form of energy storage in plants. It comprises two glucose polymers, amylose and amylopectin, which are linked by glycosidic bonds. These constituents of starch possess distinct structures and properties (Figure 1). Extensive research has been conducted on the involvement of β -amylase in hydrolyzing starch reserves in cereal endosperm, promoting germination under in vivo conditions. Additionally, various plant tissues, including leaves, have been found to possess high levels of β -amylase activity. For instance, in pea and *Arabidopsis*, β -amylase activity exceeds that of other glucan-metabolizing enzymes by multiple folds (Wu *et al.*, 2011). β -amylases predominantly produce maltose as the primary product during starch degradation, while glucose is a minor product. Both glucose and maltose are transported out of the chloroplast through specific transporters (Zeeman *et al.*, 2004).

RESEARCH ARTICLE

Effect of Aprotic Ionic Liquids and Process Parameters on Coconut Shell Biomass: Increment of Cellulosic Sugar and Lignin Exclusion

Prashant Katiyar^{1,*}, Shailendra Kumar Srivastava¹, Deepshikha Kushwaha¹ and Vinod Kumar Tyagi²

¹Department of Biochemistry and Biochemical Engineering, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj-211007, India; ²Harcourt Butler Technical University, (HBTU), Kanpur-208002, India

ARTICLE HISTORY

Received: June 01, 2023
Revised: July 29, 2023
Accepted: September 08, 2023

DOI:
10.2174/0113862073254286231005102815

Abstract: Introduction: Coconut shell residue is a potential renewable source of raw material for the biorefinery industries by extracting lignin and digesting cellulose, which in turn converts into total reducing sugar by using 1-Butyl-3-Methylimidazolium chloride [BMIM][Cl⁻] and acetate [BMIM][COO⁻] ionic liquids (ILs). Effect of [Butyl-methyl imidazolium] acetate and chloride on lignin reduction and recovery reducing sugar yield from coconut shell residue for biofuel production.

Aims: The aim of the study was to pre-treat the coconut shell residues with ionic liquids for lignin dissolution and generation of cellulosic sugar.

Materials and Methods: A series of aprotic ionic liquids (ILs):[BMIM][COO⁻] and [BMIM][Cl⁻] were used for the pre-treatment purpose. For the pre-treatment purpose, aqueous-ionic-liquid technology was used, where a mixture of deionized water, ILs, and shell residue was mixed in a fixed (1:10:0.1) load-size ratio under a vacuum state.

Results: The results indicate there was a significant improvement in the total reducing sugar (TRS) yield (46.6%) and residual lignin (36.3%) from shell biomass after being treated with [BMIM][Cl⁻] and [BMIM][COO⁻] at 150°C for 2h under vacuum. Conversely, an increment in TRS yield to 4.6 and 3.1 fold times was observed as shell pre-treated with [BMIM][Cl⁻] and [BMIM][COO⁻], respectively. However, the significant effect of water content compared to temperature and time duration on delignification yield was recorded during the processing of ILs pre-treatment by means of the Taguchi approach.

Conclusion: Using an aqueous ionic liquid treatment strategy, it could be possible to resolve the issue of shell rigidity and lignin dissolution and promote the expulsion of higher total reducing sugar yield to produce high-quality biofuels.

Keywords: Ionic-liquids, lignin, coconut shell, cellulose, cellulose digestibility, reducing sugar.

1. INTRODUCTION

Lignocellulosic feedstock materials, derived from agricultural crops or woody waste like wood chips, bark, groundnut shells, corn cobs, and coconut shells, offer the potential for generating biorefinery products. Intense research focuses on utilizing lignocellulosic biomass as an attractive alternative to depleting fossil resources. It offers cost-effectiveness, high sugar content, and abundant supply,

making it a promising and sustainable source of renewable precursor materials for value-added byproducts [1-3] and biofuel generation.

Several European countries previously relied on starch-based resources, known as first-generation fuels. However, the limited supply of starch-based resources led to energy scarcity issues and food versus fuel competition worldwide. To address this, many agricultural-based nations have suggested using lignocellulosic biomass as a primary material for chemical industries [4, 5]. However, the strong chemical bonding among these polymers makes lignocellulosic biomass highly recalcitrant, resistant to chemical and microbial degradation, and challenging to convert into simple mono-

*Address correspondence to this author at the Department of Biochemistry and Biochemical Engineering, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj-211007, India; Tel: 8573971856; E-mail: katprashant27@gmail.com

वर्ष 37, अंक 2

जुलाई--दिसम्बर, 2023

(29)

उज्ज्मीलन

मानसिक हिन्दस्वराज का वैतालिक
दार्शनिक षाणमासिक

संस्थापक-सम्पादक
यशदेव शल्य

सम्पादक
अम्बिकादत्त शर्मा
प्रदीप कुमार खरे

दर्शन प्रतिष्ठान

जयपुर

अनुक्रमणिका

1. शिक्षा में 'स्व' केंद्रित बदलाव की अपरिहार्यता
गिरीश्वर मिश्र 5
2. भारतीय चित्त, मानस और काल : वैश्विक एवं
वैज्ञानिक परिप्रेक्ष्य 13
बृजेन्द्र पाण्डेय
3. प्रोफेसर टी.आर.वी. मूर्ति : अद्वय और अद्वैतवादी 52
तत्त्वमीमांसा के विश्वतोमुख प्रतिष्ठापक
संजय कुमार शुक्ल
4. ध्यान की अपारंपरिक अवधारणा : जिहू कृष्णमूर्ति की दृष्टि 75
प्रियव्रत शुक्ल
5. वैश्विक संकट और गांधीय विकल्प की प्रासंगिकता 88
कमलनयन, रामनारायण मिश्र
6. अहिंसा की श्रामण्य दृष्टि और गाँधी 111
राजवीर सिंह शेखावत

प्रोफेसर टी.आर.वी. मूर्ति : अद्वय और अद्वैतवादी तत्त्वमीमांसा के विश्वतोमुख प्रतिष्ठापक

संजय कुमार शुक्ल

आचार्य टी.आर.वी. मूर्ति (1902-86) भारतीय दर्शन के निष्णात विद्वान् थे किन्तु इसके साथ ही पाश्चात्य दार्शनिक परंपरा की भी उनमें विलक्षण समझ थी। उनके अकादमिक व्यक्तित्व को दर्शनशास्त्र के तीन ख्यातिलब्ध विभूतियों ने गंभीररूपेण प्रभावित किया—सर्वपल्ली राधाकृष्णन, कृष्णचन्द्र भट्टाचार्य एवं श्री अरविन्द। वे हिन्दु शास्त्रों के मनोवैज्ञानिक व्याख्या के संदर्भ में श्री अरविन्द के 'दी सीक्रेट ऑफ वेद' से प्रभावित रहे हैं। राधाकृष्णन के दार्शनिक विमर्श (अनुचिंतन) एवं आध्यात्मिक अनुभूति में सामंजस्य के प्रयास का वे समर्थन करते हैं, और इसके अतिरिक्त उन्हें राधाकृष्णन द्वारा प्रतिपादित चेतना एवं स्वतंत्रता के रूप में निरपेक्ष (सत्) का विचार मान्य है। राधाकृष्णन शंकराचार्य की भांति यह स्वीकार करते हैं कि मायारूपी जगत् न तो सत् है और न ही असत् है अपितु अनिर्वचनीय है। मूर्ति की भी दृष्टि इसके अनुरूप ही है — माया से बचना (मुक्ति)। वस्तुतः जगत् के प्रति विकृत अवबोध अथवा बंधन से मुक्ति का अर्थ जगत् का निषेध नहीं है। राधाकृष्णन ने आध्यात्मिक अनुभूति के नैतिक एवं ज्ञानमीमांसीय पक्ष को उद्घाटित किया है। इन दोनों दार्शनिकों का यह मानना है कि ब्रह्म साक्षात् अनुभूति का विषय है और श्रुति की भूमिका उसे इंगित करने की है। मूर्ति का यह विचार उपयुक्त है कि श्रुति की आवश्यकता (उपादेयता) ब्रह्म के लिए है किन्तु जब उसकी अपरोक्षानुभूति हो जाती है तो "श्रुति की सीढ़ी" अनावश्यक हो जाती है जिसका त्याग किया जा सकता है। यह कहना सर्वथा उपयुक्त है कि राधाकृष्णन ने जहाँ उन्हें बौद्ध दर्शन की ओर ले जाते हैं वहीं के.सी. भट्टाचार्य उन्हें अद्वैत वेदान्त की दिशा में प्रेरित करते हैं। भट्टाचार्य नव्य-वेदान्त के मौलिक

उन्मीलन - वर्ष 37, अंक 2, जुलाई-दिसम्बर 2023

ISSN-0974-0053

U.G.C. Care List : Arts & Humanities, Sl.No. 310

वर्ष 37, अंक 1

जनवरी-जून, 2023

30

उज्ज्मीलन

30

मानसिक हिन्दस्वराज का वैतालिक
दार्शनिक षाण्मासिक

संस्थापक-सम्पादक
यशदेव शल्य

सम्पादक
अम्बिकादत्त शर्मा
प्रदीप कुमार खरे

दर्शन प्रतिष्ठान
जयपुर

अनुक्रमणिका

1. हेगेल की वैचारिक विरासत और उपनिवेशकालीन
भारतीय दार्शनिक चिन्तन 5
शरद देशपाण्डे
अनुवाद – मोहित टण्डन
2. इतिहास और संस्कृति के परिप्रेक्ष्य में मिथिला की
न्यायपरंपरा 23
अरूण मिश्र
3. कुमारप्पा का अर्थायन 109
मिथिलेश कुमार तिवारी
4. प्रोफेसर जीतेन्द्र नाथ मोहन्ती (पूरब और पश्चिम की
अन्तःपदीय समझदारीके उन्मीलक आचार्य) 125
संजय कुमार शुक्ल

श्रद्धांजलि

प्रोफेसर जीतेन्द्र नाथ मोहन्ती

(पूरब और पश्चिम की अन्तःपदीय समझदारी के उन्मीलक आचार्य)

संजय कुमार शुक्ल

प्रोफेसर जीतेन्द्र नाथ मोहन्ती का जन्म 26 सितम्बर, 1928, कटक (उड़ीसा) में हुआ था। दस वर्ष की अल्पायु में ही उन्होंने पण्डित नीलकण्ठ मिश्र जी से पाणिनी के संस्कृत व्याकरण, कालिदास के रघुवंशम् एवं तर्कसंग्रह का अध्ययन घर पर ही सम्पन्न किया। दसवीं एवं बारहवीं की परीक्षा ख्यातिलब्ध रावेनशाव कालेज से प्रथम स्थान के साथ उत्तीर्ण करने के पश्चात् उनका दाखिला प्रेसीडेन्सी कॉलेज, कलकत्ता में हुआ। दर्शनशास्त्र (ऑनर्स) प्रथम वर्ष के विद्यार्थी स्तर पर उनका एक आलेख "दी फाइनाइट एण्ड दी इनफाइनाइट" कालेज की पत्रिका में प्रकाशित हुआ जो इस तथ्य को प्रमाणित करता है कि उनकी अभिरुचि दार्शनिक चिंतन एवं लेखन में प्रारम्भ से ही थी। उन्होंने अपने पिता जगन्नाथ मोहन्ती जो कि प्रसिद्ध अधिवक्ता एवं न्यायाधीश थे, की इच्छाओं का सम्मान करते हुए विधि विषय का अध्ययन किया, किन्तु अंतिम परीक्षा में सम्मिलित नहीं हुए। स्वेच्छा से उन्होंने अकादमिक जगत् का चुनाव किया और इसका ही प्रतिफल है कि उनके रूप में भारत को एक उच्च कोटि का दार्शनिक प्राप्त हुआ। दर्शनशास्त्र में परा-स्नातक पाठ्यक्रम के दौरान कलकत्ता विश्वविद्यालय में वे भारतीय दर्शन के मौलिक ग्रंथों से परिचित हुए। उन्होंने अपनी कृति "रीजन एण्ड ट्रैडिशन इन इन्डियन थॉट" को महामहोपाध्याय पण्डित योगेन्द्रनाथ तर्कवेदान्त तीर्थ एवं अनन्त कुमार तर्कातीर्थ को समर्पित किया है, क्योंकि इन दोनों के सान्निध्य में उन्होंने क्रमशः वेदान्त एवं न्याय का ज्ञान अर्जित किया था। प्रोफेसर मोहन्ती ने गोर्टिन्जेन विश्वविद्यालय से पी.एच.डी. की उपाधि (1952-54) हरमन वीन के निर्देशन में प्राप्त की थी।

उन्मीलन - वर्ष 37, अंक 1, जनवरी-जून 2023

ISSN-0974-0053

U.G.C. Care List : Arts & Humanities, SI.No. 310

(31)

मध्य भारती

मानविकी एवं समाजविज्ञान की द्विभाषी शोध-पत्रिका

ISSN 0974-0066

UGC Care List, Group-C (Multi disciplinary), Sl.no.-15

(अंक-84, जनवरी-जून, 2023)

संरक्षक

प्रो. नीलिमा गुप्ता
कुलपति

प्रधान सम्पादक

प्रो. अम्बिकादत्त शर्मा

सम्पादक

प्रो. भवतोष इन्द्रगुरु
प्रो. ब्रजेश कुमार श्रीवास्तव
डॉ. आशुतोष कुमार मिश्र



डॉक्टर हरीसिंह गौर विश्वविद्यालय

सागर (मध्यप्रदेश) - 470003

दूरभाष : (07582) 297133

ई-मेल : madhyabharti.2016@gmail.com

Family Matters : Changing Paradigms of Care for the Disabled <i>Biswajit Sarkar, Vipin Kumar Singh</i>	153
Genesis and Journey of NCC as General Elective Credit Course (GECC) in HEIs of India : A Pathbreaking Step Aligned with NEP-2020 <i>Dharmendra Kumar Sarraf</i>	159
Size and Spacing of Rural Settlements in Singrauli District, Madhya Pradesh <i>Pawan Kumar Sharma, Kaluram Chouhan</i>	172
An Analysis of India's Social Sector Spending <i>Shalini Choithrani</i>	183
Financial Performance Analysis of State Bank of India Before and After Merging <i>Ankita Rajput, Gautam Prasad</i>	188
The Working and Living Conditions of Unorganised Sector Workers : A Literature Review <i>Alok Kumar Vishwakarma, VeenaThawre</i>	196
Questioning the Loss of Selfhood and Depicting Gender Scorn in Salman Rushdie's Shame <i>Dimple Dubey</i>	204
Philosophy of Love : Indian and Western Perspectives <i>Sanjay Kumar Shukla</i>	211

Philosophy of Love : Indian and Western Perspectives

Sanjay Kumar Shukla

I

The baffling issue amongst the philosophers is the nature and definition of man. Man is defined in different ways such as a biped rational or social or political animal, a laughing creature, a self-justifying or loving being etc. We are proposing here the thesis that man is essentially a loving being. Love is the intrinsic nature of man or it is the necessary precondition of human existence. The proposed thesis demands an appropriate justification for it. In the Judeo-Christian religion it is clearly stated that "God has created man in his own image" - Bible Genesis 1:2.7. This scriptural passage does not mean that God is in human form, but rather, that humans are in the image of God in their moral, spiritual and intellectual nature. Since the nature of God is all loving and man is created by him (God) in his own image, and we are in a position to infer logically that love is the essence of human beings. Jesus Christ advises us to 'Love thy neighbour as thyself' and everyone is your neighbour. The 'Tathāgatagarbha sūtras', in the Buddhist tradition, are a group of Mahāyana sūtras that present the concept of the womb or embryo (garbha) of the tathāgata, the Buddha. Every sentient being has the possibility to attain Buddhahood because of the Tathāgatagarbha. Buddha is the embodiment of true love and great compassion, and so, by implication we can easily conceive the possibility of each one of us acquiring the traits of love and compassion in our life. The essential feature of Hinduism is the spiritual unity of mankind, and this is based upon our firm conviction that the same spiritual reality pervades in all of us. We can feel the element of divinity in all sentient creatures. It is quite relevant to refer Swami Vivekānanda at this juncture that man is potentially divine, and the need is to only realise it. It is needless to say that divinity includes supreme values or cardinal virtues of truth, love, sacrifice, benevolence etc. Rene Descartes has predilection for the rational account of man, and for that reason he maintains thinking to be the very condition of one's own existence in his celebrated statement - 'Cogito Ergo Sum.' Our proposed justified thesis offers the counter perspective to Cartesian one in the form of 'Amor Ergo Sum.'

Descartes has given the primacy of reason over faith, and this truly depicts the paradigm shift of modern Western philosophy from medieval Scholastic one. The clarity and distinctness are regarded by him as criteria of truth. He wanted to start his philosophical enquiry 'de novo' as it is to be free from all sorts of preconceived notions

Gold Nanorod-Induced Effects in a Mesogenic Compound 4-(*trans*-4-*n*-Hexylcyclohexyl) isothiocyanatobenzene

Abhinav Lal,* Himanshu Verma, Saikumar Chirra, Ravindra Dhar,* Roman Dabrowski, and Kusum Lata Pandey

Cite This: *ACS Omega* 2023, 8, 29012–29024

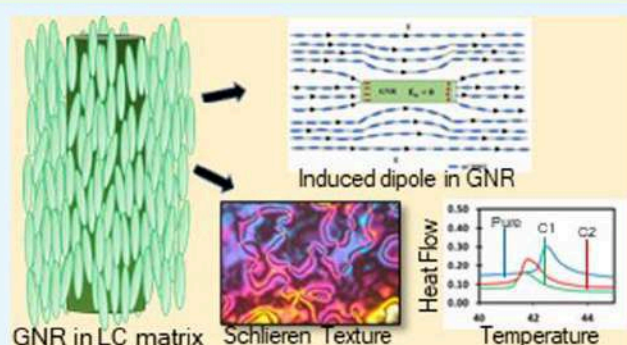
Read Online

ACCESS |

Metrics & More

Article Recommendations

ABSTRACT: Gold nanorods (GNRs) have a capsule-like structure with different optical properties than spherical gold nanoparticles due to surface plasmon resonance. Liquid crystals (LCs) are mesogenic compounds having crystal-like orientation and liquid-like fluidity. They are important materials from a technological point of view. Both GNRs and LC compounds are anisotropic in shape and properties. Different nano entities show interesting results when dispersed in different liquid crystalline materials which are instrumental from the application point of view. In the present work, GNRs have been dispersed in nematic liquid crystalline materials, namely 4-(*trans*-4-*n*-hexylcyclohexyl) isothiocyanatobenzene (6CHBT). Calorimetric, texture, spectroscopic, and dielectric studies were carried out for a pure 6CHBT and its composites with GNRs. Different calorimetric and dielectric parameters such as transition temperature, enthalpy, heat flow, permittivity, dielectric strength, dielectric anisotropy, and relaxation frequency have been determined, and the effect of GNRs has been explored. This article gives an insight into the influence of GNRs on the morphology and anisotropic physical properties of the nematic liquid crystalline material.



1. INTRODUCTION

The study of new and advanced materials is carried on extensively to meet various technological, energy, and economic needs. One such material is a liquid crystal (LC). They are mesogenic molecules that show a counterintuitive combination of fluidity and long-range order. Due to this, they show various properties intermediate to that of crystalline solids and isotropic liquids. Although LCs are not new to this area of research but studies on them are going on broadly in the field of synthesis of new LC materials, their characterization, and preparation of composites by addition of different kinds of dopants to meet certain applicative needs. LCs find their application in the field of display technology, optics, electro-optics, bioscience, biophotonics, actuators, etc. These applications are due to their structural, orientational, transitional, thermal, dielectric, and optical properties.^{1,2} LCs are majorly classified on the basis of the driving force for their existence as mesogenic molecules, namely thermotropic, lyotropic, and metallotropic. Thermotropic LCs are the most widely studied LC due to the existence of their mesogenic properties on temperature change. They are further classified into calamitic and discotic on the basis of the structure and orientation of molecules. In the case of calamitic LCs, the overall length of the molecule is significantly greater than its

width.^{3,4} The most common phase used in various applications shown by the calamitic LCs is the nematic phase. The nematic phase is the least ordered where no translational but only orientational order is present.^{5,6} As far as stereochemistry is concerned, nematic LC is symmetrical with the C_2 axis along the director with the D_{2h} point group. Materials with a size range of 2–100 nm are known as nanomaterials. They vary in shape depending upon the material of which it is prepared and also on the type of method by which they are prepared. As the shape varies, their physical property will also vary. Nanorods come under 1D nanomaterials along with nanotubes and nanowires. Nanorods have no internal surface in comparison to nanotubes whereas in comparison to nanowires, the length of nanowires is considerably larger than in nanorods.⁷

Various research reveals that nanomaterials play an important role in altering and improving the properties of LC molecules. A large number of LC-nanomaterial composites

Received: March 20, 2023

Accepted: July 21, 2023

Published: August 3, 2023



[< Back](#)

Advertisement

WILEY

Turn your book publishing goals into reality with guidance from start to finish

X-Ray Spectrometry / Volume 53, Issue 4 / p. 220-231

RESEARCH ARTICLE

Elemental concentration in renal stones by wavelength dispersive X-ray fluorescence spectrometry

Varun Bali, Yugal Khajuria, Ashok K. Pathak, Upendra Kumar, Pradeep K. Rai, Charles Ghany, Vivek K. Singh 

First published: 28 February 2023

<https://doi.org/10.1002/xrs.3338>

Citations: 2

Abstract

Renal stone formation inside the kidney is one of the major causes of renal failure all over the world. To create preventative measures, it is crucial to examine renal stone's composition and identify the minerals that are responsible for their pathogenesis. Various concerns regarding the pathophysiology of renal stones remain unresolved and have been put forward. However, till date, the complete information is still unclear. In recent years, spectroscopic studies have gained much attention in identifying the chemical compositions that lead to the formation and growth of renal stones. This work employed wavelength-dispersive X-ray fluorescence (WDXRF) and Fourier transform infrared (FTIR) spectroscopy to study renal stones. WDXRF results of renal stone samples give the presence of numerous heavy and trace elements. Different elemental constituents like zinc (Zn), copper (Cu), iron (Fe), molybdenum (Mo), nickel (Ni), strontium (Sr), chromium (Cr), zirconium (Zr), palladium (Pd), bromine (Br), ruthenium (Ru), lead (Pb), and arsenic (As) were detected and quantified in the renal stones. Vibrational spectroscopic studies were carried out to know the chemical compositions of renal stones such as calcium oxalate monohydrate (COM), uric acid (UA), and carbonate apatite (CA). Quantitative results of WDXRF have been compared with the results from atomic absorption spectroscopy (AAS) of these stone samples. The available clinical details of the patients were correlated with the spectroscopic results obtained using WDXRF and FTIR spectroscopy.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

Open Research

DATA AVAILABILITY STATEMENT

Research data are not shared.

REFERENCES

- 1 N. Johri, B. Cooper, W. Robertson, S. Choong, D. Rickards, R. Unwin, *Nephron - Clin. Pract* 2010, **116**(3), 159.

[PubMed](#) | [Google Scholar](#)

- 2 C. Y. C. Pak, *Lancet*. 1998, **351**(9118), 1797.

[CAS](#) | [PubMed](#) | [Web of Science®](#) | [Google Scholar](#)

- 3 P. Durgawale, A. Shariff, A. Hendre, S. Patil, A. Sontakke, *Biomed. Res.* 2010, **21**(3), 305.

[CAS](#) | [Google Scholar](#)

[< back](#)[No Access](#)

m_T scaling approach to study the identical spectral shape and similar suppression patterns of π^0 and η mesons at RHIC and LHC energies

Kajal, P. K. Khandai, and M. K. Singh

<https://doi.org/10.1142/S0218301323500076> | Cited by: 0 (Source: Crossref)[< Previous](#)[Next >](#)[View Article](#)

Abstract

We present a systematic study of the transverse mass ($m_T - m$) spectra of π^0 and η mesons in $Cu + Au$ collisions at $\sqrt{s_{NN}} = 200$ GeV, $U + U$ collisions at $\sqrt{s_{NN}} = 192$ GeV, $Pb + Pb$ collisions at $\sqrt{s_{NN}} = 2.76$ TeV and $p + Pb$ collisions at $\sqrt{s_{NN}} = 5.02$ TeV. The published data of invariant yields of π^0 and η mesons as a function of p_T are taken from PHENIX and from ALICE collaborations in the mid-rapidity region for different centrality cases. The primary object is to check the similar suppression patterns and identical spectral shapes of π^0 and η mesons at different center-of-mass energies in different collision systems. We employ m_T scaling approach to study the spectral shapes of η meson from the given pion (π^0) spectra. For this purpose, we use the modified Hagedorn function as a fit function. We obtain m_T scaled $\frac{\eta}{\pi^0}$ ratio to study the spectral shape and suppression pattern of π^0 and η mesons. This ratio is useful to obtain the decay contribution of π^0 and η mesons in photonic and leptonic channels but also points to the quantitative changes in the dynamics of the heavy ion collisions.

Keywords: m_T scaling = modified Hagedorn function = π^0 and η meson spectra

PACS: 12.38.Mh, 25.75.-q, 13.85.Ni

We recommend

Physical Review C

[Outline](#)
[Information](#)

Measurement of ϕ -meson production in Cu + Au collisions at $\sqrt{s_{NN}} = 200$ GeV and U + U collisions at $\sqrt{s_{NN}} = 193$ GeV

[N. J. Abdulameer](#)¹⁵, [U. Acharya](#)²⁰, [C. Aidala](#)^{39,44}, [N. N. Ajitanand](#)^{64,*}, [Y. Akiba](#)^{59,60,†}, [R. Akimoto](#)¹¹, [J. Alexander](#)⁶⁴, [M. Alfred](#)²³, and [M. Alibordi](#)⁴⁵ *et al.* (PHENIX Collaboration)

[Hide](#)


[M. Alibordi](#)⁴⁵, [K. Aoki](#)^{32,59}, [N. Apadula](#)^{28,65}, [H. Asano](#)^{35,59}, [E. T. Atomssa](#)⁶⁵, [T. C. Awes](#)⁵⁵, [B. Azmoun](#)⁷, [V. Babintsev](#)²⁴, [M. Bai](#)⁶, [X. Bai](#)¹⁰, [B. Bannier](#)⁶⁵, [K. N. Barish](#)⁸, [S. Bathe](#)^{5,60}, [V. Baublis](#)⁵⁷, [C. Baumann](#)⁷, [S. Baumgart](#)⁵⁹, [A. Bazilevsky](#)⁷, [M. Beaumier](#)⁸, [R. Belmont](#)^{12,53,71}, [A. Berdnikov](#)⁶², [Y. Berdnikov](#)⁶², [L. Bichon](#)⁷¹, [D. Black](#)⁸, [B. Blankenship](#)⁷¹, [D. S. Blau](#)^{34,50}, [J. S. Bok](#)⁵², [V. Borisov](#)⁶², [K. Boyle](#)⁶⁰, [M. L. Brooks](#)³⁹, [J. Bryslawskyj](#)^{5,8}, [H. Buesching](#)⁷, [V. Bumazhnov](#)²⁴, [S. Butsyk](#)⁵¹, [S. Campbell](#)^{13,28}, [V. Canoa Roman](#)⁶⁵, [C.-H. Chen](#)⁶⁰, [M. Chiu](#)⁷, [C. Y. Chi](#)¹³, [I. J. Choi](#)²⁵, [J. B. Choi](#)^{30,*}, [S. Choi](#)⁶³, [P. Christiansen](#)⁴⁰, [T. Chujo](#)⁷⁰, [V. Cianciolo](#)⁵⁵, [B. A. Cole](#)¹³, [M. Connors](#)²⁰, [R. Corliss](#)⁶⁵, [Y. Corrales Morales](#)³⁹, [N. Cronin](#)^{46,65}, [N. Crossette](#)⁴⁶, [M. Csanád](#)¹⁶, [T. Csörgő](#)^{43,73}, [L. D'Orazio](#)⁴¹, [A. Datta](#)⁵¹, [M. S. Daugherty](#)¹, [G. David](#)^{7,65}, [C. T. Dean](#)³⁹, [K. Dehmelt](#)⁶⁵, [A. Denisov](#)²⁴, [A. Deshpande](#)^{60,65}, [E. J. Desmond](#)⁷, [L. Ding](#)²⁸, [V. Doomra](#)⁶⁵, [J. H. Do](#)⁷⁴, [O. Drapier](#)³⁶, [A. Drees](#)⁶⁵, [K. A. Drees](#)⁶, [J. M. Durham](#)³⁹, [A. Durum](#)²⁴, [T. Engelmöre](#)¹³, [A. Enokizono](#)^{59,61}, [R. Esha](#)⁶⁵, [K. O. Eyser](#)⁷, [B. Fadern](#)⁴⁶, [W. Fan](#)⁶⁵, [D. E. Fields](#)⁵¹, [M. Finger, Jr.](#)⁹, [M. Finger](#)⁹, [D. Firak](#)^{15,65}, [D. Fitzgerald](#)⁴⁴, [F. Fleuret](#)³⁶, [S. L. Fokin](#)³⁴, [J. E. Frantz](#)⁵⁴, [A. Franz](#)⁷, [A. D. Frawley](#)¹⁹, [Y. Fukao](#)³², [T. Fusayasu](#)⁴⁸, [K. Gainey](#)¹, [C. Gal](#)⁶⁵, [P. Garg](#)^{3,65}, [A. Garishvili](#)⁶⁷, [I. Garishvili](#)³⁸, [M. Giles](#)⁶⁵, [F. Giordano](#)²⁵, [A. Glenn](#)³⁸, [X. Gong](#)⁶⁴, [M. Gonin](#)³⁶, [Y. Goto](#)^{59,60}, [R. Granier de Cassagnac](#)³⁶, [N. Grau](#)², [S. V. Greene](#)⁷¹, [M. Grosse Perdekamp](#)²⁵, [T. Gunji](#)¹¹, [H. Guragain](#)²⁰, [Y. Gu](#)⁶⁴, [T. Hachiya](#)^{49,60}, [J. S. Haggerty](#)⁷, [K. I. Hahn](#)¹⁷, [H. Hamagaki](#)¹¹, [J. Hanks](#)⁶⁵, [M. Harvey](#)⁶⁸, [S. Hasegawa](#)²⁹, [K. Hashimoto](#)^{59,61}, [R. Hayano](#)¹¹, [T. K. Hemmick](#)⁶⁵, [T. Hester](#)⁸, [X. He](#)²⁰, [J. C. Hill](#)²⁸, [A. Hodges](#)^{20,25}, [R. S. Hollis](#)⁸, [K. Homma](#)²², [B. Hong](#)³³, [T. Hoshino](#)²², [J. Huang](#)^{7,39}, [T. Ichihara](#)^{59,60}, [Y. Ikeda](#)⁵⁹, [K. Imai](#)²⁹, [Y. Imazu](#)⁵⁹, [M. Inaba](#)⁷⁰, [A. Iordanova](#)⁸, [D. Isenhower](#)¹, [A. Isinhue](#)⁴⁶, [D. Ivanishchev](#)⁵⁷, [B. V. Jacak](#)⁶⁵, [S. J. Jeon](#)⁴⁷, [M. Jezghani](#)²⁰, [X. Jiang](#)³⁹, [Z. Ji](#)⁶⁵, [B. M. Johnson](#)^{7,20}, [K. S. Joo](#)⁴⁷, [D. Jouan](#)⁵⁶, [D. S. Jumper](#)²⁵, [J. Kamin](#)⁶⁵, [S. Kanda](#)^{11,32}, [B. H. Kang](#)²¹, [J. H. Kang](#)⁷⁴, [J. S. Kang](#)²¹, [J. Kapustinsky](#)³⁹, [D. Kawaii](#)⁴², [A. V. Kazantsev](#)³⁴, [J. A. Key](#)⁵¹, [V. Khachatryan](#)⁶⁵, [P. K. Khandai](#)³, [A. Khanzadeev](#)⁵⁷, [A. Khatiwada](#)³⁹, [K. M. Kijima](#)²², [C. Kim](#)³³, [D. J. Kim](#)³¹, [E.-J. Kim](#)³⁰, [T. Kim](#)¹⁷, [Y.-J. Kim](#)²⁵, [Y. K. Kim](#)²¹, [D. Kincses](#)¹⁶, [A. Kingan](#)⁶⁵, [E. Kistenev](#)⁷, [J. Klatsky](#)¹⁹, [D. Kleinjan](#)⁸, [P. Kline](#)⁶⁵, [T. Koblesky](#)¹², [M. Kofarago](#)^{16,73}, [B. Komkov](#)⁵⁷, [J. Koster](#)⁶⁰, [D. Kotchetkov](#)⁵⁴, [D. Kotov](#)^{57,62}, [L. Kovacs](#)¹⁶, [F. Krizek](#)³¹, [B. Kurgiy](#)¹⁶, [K. Kurita](#)⁶¹, [M. Kurosawa](#)^{59,60}, [Y. Kwon](#)⁷⁴, [Y. S. Lai](#)¹³, [J. G. Lajoie](#)²⁸, [D. Larionova](#)⁶², [A. Lebedev](#)²⁸, [D. M. Lee](#)³⁹, [G. H. Lee](#)³⁰, [J. Lee](#)^{17,66}, [K. B. Lee](#)³⁹, [K. S. Lee](#)³³, [S. H. Lee](#)^{28,44,65}, [M. J. Leitch](#)³⁹, [M. Leitgab](#)²⁵, [B. Lewis](#)⁶⁵, [N. A. Lewis](#)⁴⁴, [S. H. Lim](#)^{58,74}, [M. X. Liu](#)³⁹, [X. Li](#)¹⁰, [X. Li](#)³⁹, [D. A. Loomis](#)⁴⁴, [D. Lynch](#)⁷, [S. Lökös](#)¹⁶, [C. E. Maguire](#)⁷¹, [T. Majoros](#)¹⁵, [Y. I. Makdisi](#)⁶, [M. Makek](#)^{72,75}, [A. Manion](#)⁶⁵, [V. I. Manko](#)³⁴, [E. Mannel](#)⁷, [M. McCumber](#)^{12,39}, [P. L. McGaughey](#)³⁹, [D. McGlinchey](#)^{12,19,39}, [C. McKinney](#)²⁵, [A. Meles](#)⁵², [M. Mendoza](#)⁸, [B. Meredith](#)²⁵, [Y. Miake](#)⁷⁰, [T. Mibe](#)³², [A. C. Mignerey](#)⁴¹, [A. Milov](#)⁷², [D. K. Mishra](#)⁴, [J. T. Mitchell](#)⁷, [M. Mitrankova](#)⁶², [Iu. Mitrankov](#)⁶², [S. Miyasaka](#)^{59,69}, [S.](#)

Mizuno^{59,70}, A. K. Mohanty⁴, S. Mohapatra⁶⁴, M. M. Mondal⁶⁵, T. Moon³³, D. P. Morrison⁷, M. Moskowitz⁴⁶, T. V. Moukhanova³⁴, B. Mulilo^{33,59,76}, T. Murakami^{35,59}, J. Murata^{59,61}, A. Mwai⁶⁴, T. Nagae³⁵, S. Nagamiya^{32,59}, J. L. Nagle¹², M. I. Nagy¹⁶, I. Nakagawa^{59,60}, Y. Nakamiya²², K. R. Nakamura^{35,59}, T. Nakamura⁵⁹, K. Nakano^{59,69}, C. Nattaras⁶⁷, S. Nelson¹⁸, P. K. Netrakanti⁴, M. Nishashi^{22,59}, T. Niida⁷⁰, R. Nouicer^{7,60}, N. Novitzky^{31,65,70}, T. Novák^{43,73}, G. Nukazuka^{59,60}, A. S. Nyanin³⁴, E. O'Brien⁷, C. A. Ogilvie²⁸, J. Oh⁵⁸, H. Oide¹¹, K. Okada⁶⁰, M. Orosz¹⁵, J. D. Osborn⁵⁵, A. Oskarsson⁴⁰, K. Ozawa^{32,70}, R. Pak⁷, V. Pantuev²⁶, V. Papavassiliou⁵², I. H. Park^{17,66}, J. S. Park⁶³, S. Park^{45,63,65}, S. K. Park³³, L. Patel²⁰, M. Patel²⁸, S. F. Pate⁵², J.-C. Peng²⁵, W. Peng⁷¹, D. V. Perepelitsa^{12,13}, G. D. N. Perera⁵², D. Yu. Peressoukko³⁴, C. E. PerezLara⁶⁵, J. Perry²⁸, R. Petti^{7,65}, C. Pinkenburg⁷, R. P. Pisani⁷, M. Potekhin⁷, A. Pun⁵⁴, M. L. Purschke⁷, H. Qu¹, P. V. Radzevich⁶², J. Rak³¹, N. Ramasubramanian⁶⁵, I. Ravinovich⁷², K. F. Read^{55,67}, D. Reynolds⁶⁴, V. Riabov^{50,57}, Y. Riabov^{57,62}, E. Richardson⁴¹, D. Richford⁵, N. Rivel⁵⁴, D. Roach⁷¹, S. D. Rolnick⁸, M. Rosati²⁸, J. Runchey²⁸, M. S. Ryu²¹, B. Sahlmueller⁶⁵, N. Saito³², T. Sakaguchi⁷, H. Sako²⁹, V. Samsonov^{50,57}, M. Sarsour²⁰, S. Sato²⁹, S. Sawada³², K. Sedgwick⁸, J. Seele⁶⁰, R. Seidl^{59,60}, Y. Sekiguchi¹¹, A. Sen^{20,28}, R. Seto⁸, P. Sett⁴, D. Sharma⁶⁵, A. Shavel²⁸, I. Shein²⁴, Z. Shi³⁹, M. Shibata⁴⁹, T.-A. Shibata^{59,69}, K. Shigaki²², M. Shimomura^{28,49}, K. Shoji⁵⁹, P. Shukla⁴, A. Sickles^{7,25}, C. L. Silva³⁹, D. Silvermyr^{40,55}, B. K. Singh³, C. P. Singh³, V. Singh³, M. Skolnik⁴⁶, M. Slunečka⁹, K. L. Smith¹⁹, S. Solano⁴⁶, R. A. Soltz³⁸, W. E. Sondheim³⁹, S. P. Sorensen⁶⁷, I. V. Sourikova⁷, P. W. Stankus⁵⁵, P. Steinberg⁷, E. Stenlund⁴⁰, M. Stepanov^{42,*}, A. Ster⁷³, S. P. Stoll⁷, M. R. Stone¹², T. Sugitate²², A. Sukhanov⁷, J. Sun⁶⁵, Z. Sun¹⁵, R. Takahama⁴⁹, A. Takahara¹¹, A. Taketani^{59,60}, Y. Tanaka⁴⁸, K. Tanida^{29,60,63}, M. J. Tannenbaum⁷, S. Tarafdar^{3,71}, A. Taranenko^{50,64}, E. Tennant⁵², A. Timilsina²⁸, T. Todoroki^{59,60,70}, M. Tomášek^{14,27}, H. Torii¹¹, R. S. Towell¹, I. Tseruya⁷², Y. Ueda²², B. Ujvari¹⁵, H. W. van Hecke³⁹, M. Vargyas^{16,73}, E. Vazquez-Zambrano¹³, A. Veicht¹³, J. Velkovska⁷¹, M. Virius¹⁴, V. Vrba^{14,27}, E. Vznuzdaev⁵⁷, R. Vértesi⁷³, X. R. Wang^{52,60}, Z. Wang⁵, D. Watanabe²², K. Watanabe^{59,61}, Y. Watanabe^{59,60}, Y. S. Watanabe^{11,32}, F. Wei⁵², S. Whitaker²⁸, S. Wolin²⁵, C. P. Wong^{20,39}, C. L. Woody⁷, M. Wysocki⁵⁵, B. Xia⁵⁴, Y. L. Yamaguchi^{11,65}, A. Yanovich²⁴, S. Yokkaichi^{59,60}, I. Yoon⁶³, I. Younus^{37,51}, Z. You³⁹, I. E. Yushmanov³⁴, W. A. Zajc¹³, A. Zelenski⁶, S. Zhou¹⁰, and L. Zou⁸ (PHENIX Collaboration)

¹Abilene Christian University, Abilene, Texas 79699, USA

²Department of Physics, Augustana University, Sioux Falls, South Dakota 57197, USA

³Department of Physics, Banaras Hindu University, Varanasi 221005, India

⁴Bhabha Atomic Research Centre, Bombay 400 085, India

⁵Baruch College, City University of New York, New York, New York, 10010 USA

⁶Collider-Accelerator Department, Brookhaven National Laboratory, Upton, New York 11973-5000, USA

⁷Physics Department, Brookhaven National Laboratory, Upton, New York 11973-5000, USA

⁸University of California-Riverside, Riverside, California 92521, USA

⁹Charles University, Faculty of Mathematics and Physics, 180 00 Troja, Prague, Czech Republic

¹⁰Science and Technology on Nuclear Data Laboratory, China Institute of Atomic Energy, Beijing 102413, People's Republic of China

¹¹Center for Nuclear Study, Graduate School of Science, University of Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo 113-0033, Japan

¹²University of Colorado, Boulder, Colorado 80309, USA

¹³Columbia University, New York, New York 10027 and Nevis Laboratories, Irvington, New York 10533, USA

¹⁴Czech Technical University, Zikova 4, 166 36 Prague 6, Czech Republic

¹⁵Debrecen University, H-4010 Debrecen, Egyetem tér 1, Hungary

¹⁶ELTE, Eötvös Loránd University, H-1117 Budapest, Pázmány P.s. 1/A, Hungary

¹⁷Ewha Woman's University, Seoul 120-750, Korea

¹⁸Florida A&M University, Tallahassee, Florida 32307, USA

¹⁹Florida State University, Tallahassee, Florida 32306, USA

²⁰Georgia State University, Atlanta, Georgia 30303, USA

²¹Hanyang University, Seoul 133-792, Korea

²²Hiroshima University, Kagamiyama, Higashi-Hiroshima 739-8526, Japan

⁶³Department of Physics and Astronomy, Seoul National University, Seoul 151-742, Korea

⁶⁴Chemistry Department, Stony Brook University, SUNY, Stony Brook, New York 11794-3400, USA

⁶⁵Department of Physics and Astronomy, Stony Brook University, SUNY, Stony Brook, New York 11794-3800, USA

⁶⁶Sungkyunkwan University, Suwon, 440-746, Korea

⁶⁷University of Tennessee, Knoxville, Tennessee 37996, USA

⁶⁸Texas Southern University, Houston, Texas 77004, USA

⁶⁹Department of Physics, Tokyo Institute of Technology, Oh-okayama, Meguro, Tokyo 152-8551, Japan

⁷⁰Tomonaga Center for the History of the Universe, University of Tsukuba, Tsukuba, Ibaraki 305, Japan

⁷¹Vanderbilt University, Nashville, Tennessee 37235, USA

⁷²Weizmann Institute, Rehovot 76100, Israel

⁷³Institute for Particle and Nuclear Physics, Wigner Research Centre for Physics, Hungarian Academy of Sciences (Wigner RCP, RMKI) H-1525 Budapest 114, P.O. Box 49, Budapest, Hungary

⁷⁴Yonsei University, IPAP, Seoul 120-749, Korea

⁷⁵Department of Physics, Faculty of Science, University of Zagreb, Bijenička c. 32, HR-10002 Zagreb, Croatia

⁷⁶Department of Physics, School of Natural Sciences, University of Zambia, Great East Road Campus, Box 32379, Lusaka, Zambia

*Deceased.

†PHENIX Spokesperson: akiba@rcf.rhic.bnl.gov

PDF

Share ▾

Phys. Rev. C **107**, 014907 – **Published 13 January, 2023**

DOI: <https://doi.org/10.1103/PhysRevC.107.014907>

Export Citation



Show metrics ▾

Abstract

The PHENIX experiment reports systematic measurements at the Relativistic Heavy Ion Collider of ϕ -meson production in asymmetric Cu + Au collisions at $\sqrt{s_{NN}} = 200$ GeV and in U + U collisions at $\sqrt{s_{NN}} = 193$ GeV. Measurements were performed via the $\phi \rightarrow K^+K^-$ decay channel at midrapidity $|\eta| < 0.35$. Features of ϕ -meson production measured in Cu + Cu, Cu + Au, Au + Au, and U + U collisions were found to not depend on the collision geometry, which was expected because the yields are



J. Appl. Zool. Res. (2023) 34(2): 83-88
ISSN 0970-9304

FECUNDITY AND GONADOSOMATIC INDEX OF *CIRRHINUS MRIGALA* (HAMILTON, 1822) FROM UTTAR PRADESH, INDIA

SANJAY CYRIL MASI¹, RAVINDRA KUMAR PATHAK¹, BHATRAYEES AHMAD^{2*} AND JITENDRA KUMAR SUNDARAY³

¹Department of Zoology, Ewing Christian Post Graduate College, Allahabad

²Department of Zoology, Kurukshetra University, Kurukshetra.

³ICAR-Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar, Odisha,

Correspondence author : Bhat Rayees Ahmad; email, (bhatrayees8@gmail.com)

Received: 30 July, 2023

Accepted: 15 November, 2023

ABSTRACT: One of the most important measures of fish breeding biology is fecundity. The gonadosomatic index (GSI) is used to assess the reproductive capacity and breeding time of fish species. The current research examined at *Cirrhinus mrigala*, a type of carp, which was taken from several ponds and tanks in the Uttar Pradesh districts of Allahabad and Pratapgarh between April 2018 and March 2019. Both sexes had similar average body weights of 1270.9 610.96g. The male GSI (%) ranged from 0.23 to 7.93 with a peak value in July (7.93), and the female GSI varied between 0.83 to 16.9 with a peak level in July (16.09). In the months of July and November, respectively, the gonads grow to their maximum weights of 472.5 and 124.41g for males and females. The maxima of GSI show that the fish has a single spawning season that lasts from April-May to August. The relative and absolute fecundity varied from 69,244 - 2, 15,680; 74,783 - 4, 14, 416 respectively. The sampled fish's total length (0.749), gonad weight (0.747), and body weight (0.807) all revealed a substantial positive connection (r) with fecundity. According to the present results, the *C. mrigala* has higher fecundity and reproductive potential in July than it does in June and August..

Key words: Gonadosomatic index, fecundity, *Cirrhinus mrigala*, reproductive potential.

INTRODUCTION

Cirrhinus mrigala is referred to as "Nain" locally in Uttar Pradesh. In South Asia, it is a common food fish and a significant freshwater species for aquaculture. (GRAFF and LATIF, 2002). It is a natural inhabitant of South East Asian rivers and streams. Polyculture with other main carp species is essential. This fish grows rapidly in natural waters throughout its first four years of life (JHINGRAN and PULLIN, 1985). Under cultured conditions, *C. mrigala* grows more slowly than two other major carps and reaches a weight of 600-700g in its first year (JENA *et al.*, 1998). Fish reach maturity in one to two years after being reared in captivity, which is typically proven to last no more than two years (HORA and PILLAY, 1962; FAO, 2005; IQBAL and KAUSAR, 2009). Fecundity and gonadosomatic index (GSI) are

INCIDENCE OF MULTI DRUG RESISTANT *ENTEROCOCCUS* SPP. AT SANGAM GHAT AT PRAYAGRAJ, INDIA

Lily Saroj Nathan^{1*}, R. K. Pathak¹ and Anupriya Paul²

¹Department of Zoology, Ewing Christian P. G. College (University of Allahabad), Prayagraj - 211 003, India.

²Department of Statistics, SHUATS, Prayagraj - 211 007, India.

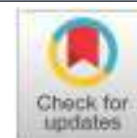
*e-mail : lilynathan723@gmail.com

(Received 22 January 2023, Revised 20 March 2023, Accepted 31 March 2023)

ABSTRACT : Study was conducted to detect the presence of Multi Drug resistant *Enterococcus* species in rural-urban landscape along river Ganga in northern India at Prayagraj District, Uttar Pradesh, India. The study revealed that the water was found to be contaminated with *Enterococcus faecalis* and *Enterococcus faecium* species. The obtained isolates were found to be resistant for 10 antibiotics viz. Rifampicin, Gentamycin, Vancomycin, Streptomycin, Oxacillin etc. Resistance in *Enterococci* against these antibiotics may cause serious health hazards to the human beings. Constant monitoring of the antibiotic resistant profiles of *Enterococci* in ground and recreational water sources could provide a comprehensive data of the resistant patterns of these pathogens in the area. This would improve information on treatment options for Enterococcal infections in humans.

Key words : *Enterococcus* species, MDR strains, river water, Prayagraj.

How to cite : Lily Saroj Nathan, R. K. Pathak and Anupriya Paul (2023) Incidence of multi drug resistant *Enterococcus* spp. at Sangam Ghat at Prayagraj, India. *Biochem. Cell. Arch.* **23**, 511-515. DOI: <https://doi.org/10.51470/bca.2023.23.1.511>, DocID: <https://connectjournals.com/03896.2023.23.511>



INTRODUCTION

The quality of surface water has declined in developing countries due to rapid population growth and industrialization. The microbiological quality of a life-sustaining surface water resource i.e. river Ganga, for large population of northern India, is adversely affected by several types of pollution. Further, unprocessed surface waters are used for drinking and various household purposes in India making the people vulnerable to various water-borne diseases. *Enterococci*, the 'indicator' of water quality, correlates best with the incidence of gastrointestinal diseases as well as prevalence of other pathogenic microorganisms (Lata *et al*, 2009). *Enterococci* are gram positive cocci, which are generally regarded as commensal organism in the alimentary canal and act as opportunistic pathogens in humans. *Enterococci* are capable of developing strategies to enhance their survival in adverse situations (Giraffa *et al*, 1997 and Flahaut *et al*, 1996) such as conditions of high salinity, temperature difference, heavy metals or antimicrobial agents, and hence continue to be important nosocomial pathogens. *Enterococci* are found to be more disinfectant resistant than *E. coli* (Havelaar *et al*, 1985). Arora *et al* (2013) reported SPC (log 6.79

cfu ml⁻¹) and most probable number (210 and 150 MPN 100 ml⁻¹ for total and faecal coliform, respectively) in river Ganga. It is previously reported that the water was found to be extremely contaminated and not suitable for drinking on some religious festivals such as Somvati Amavasya, Maghi Poornima, Maha Shivratri and Baisakhi. The root of the problem lies in the fact that there is a conflict between the belief systems of people and the strategies applied to de-pollute the river (Singh, 2013). Further, other non-point sources include wastes from agriculture, health sector, practices of holy-dip and crematory processes along the river banks. Therefore keeping in view the above mentioned facts following study was conducted to detect the presence of multi drug resistant *Enterococcus* species in fresh water rivers and to find out most possible solution for this problem.

MATERIALS AND METHODS

Place of work

The present study entitled "Incidence of Multi Drug Resistant *Enterococci* at Sangam Ghat in Allahabad city" was conducted at Department of Zoology, Ewing Christian College (An Autonomous Constituent Post Graduate College of Allahabad University), Allahabad during 2016