



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

Number of research papers in the Journals notified on UGC CARE list year 2018

Sl No.	Title of Paper	Author	Department	Journal	Link	DoI
1	A Rough Approximation of Fuzzy Soft Set-Based Decision-Making Approach in Supplier Selection Problem	Supratim Mukherjee	Mathematics	Fuzzy Information and Engineering	https://www.tandfonline.com/loi/tfie20	https://doi.org/10.1080/16168658.2018.1517973
2	The Concept of Justice and the Status of Women in Islam: A Theological and Philosophical Study	MD Najir Hossain	Philosophy	International Journal of Creative Research Thoughts	www.ijcrt.org	https://ijcrt.org/papers/IJCR T1134462.pdf




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160

A Rough Approximation of Fuzzy Soft Set-Based Decision-Making Approach in Supplier Selection Problem

A. Chatterjee^a, S. Mukherjee^b and S. Kar^a

^aDepartment of Mathematics, National Institute of Technology, Durgapur, Burdwan, West Bengal, India;

^bDepartment of Mathematics, Tehatta Government College, Nadia, West Bengal, India

ABSTRACT

Nowadays, supplier selection process, a multicriteria decision-making problem, has become one of the most indispensable parts for every purchasing sector for the improvement of performances of business operations. Most of the literatures in this field have considered only the opinion of decision-makers. But in fact, each company has its own opinion about the suppliers. The purpose of this paper is to select the best supplier by integrating the opinions of both decision-makers and company's stake holders. In this literature, these opinions are taken as fuzzy soft sets. These two fuzzy soft sets are then integrated by the rough approximation theory. The attributes in this literature are taken in the form of linguistic variable. At the end of this paper, a case study is given to illustrate the proposed method for selecting the best supplier.

ARTICLE HISTORY

Received 4 September 2015

Revised 23 July 2016

Accepted 8 August 2016

KEYWORDS

Supplier selection problem; soft set; fuzzy soft set; rough set; rough approximation of fuzzy soft set

1. Introduction

As information technology develops and economic market faces globalisation, a well-planned and well-executed supply chain management (SCM) system plays an important role in amplifying the competitive advantage. Basically, SCM is the integration of key business process from the end user to the original supplier, and it provides product service and information that add value for customers. Therefore, it is very important for all companies to have long relationship with few reliable suppliers. The success of a company is highly dependent on the selection of proper suppliers. So, supplier selection problem (SSP) is an important part of SCM. Selecting right suppliers extensively reduces the material purchasing cost and improves corporate competitiveness. Dickson [1] in his literature identified 23 criteria that have been considered by purchasing managers in different situations. The SSP involves trade-off between multiple criteria that are both qualitative and quantitative in nature. Hence, supplier's selection problem is a multiple criteria decision problem and it is necessary to make a trade-off between conflicting tangible and intangible factors to find the best suppliers.

CONTACT A. Chatterjee  amitava.math@gmail.com

© 2018 The Author(s). Published by Taylor & Francis Group on behalf of the Fuzzy Information and Engineering Branch of the Operations Research Society of China & Operations Research Society of Guangdong Province.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

The Concept of Justice and the Status of Women in Islam: A Theological and Philosophical Study.

BY MD NAJIR HOSSAIN

Assistant Professor of Philosophy

Government General Degree College at Tehatta, Nadia(West Bengal)

Abstract

Justice is the basis of human life. Justice can be defined as fairness in the treatment to all people assigning rights, duties, honours and opportunities etc. The two supreme mind of ancient philosopher Plato and Aristotle, paid their greatest attentions to this subject. The questions of women status is a fundamental question almost all societies and communities. Women were deprived of their rights on the ground of intellectually, physically, and psychologically weaker than men. For this, main reason is patriarchal social order. Religion by inculcating social virtues like truth, honesty, peace, etc. Among the members of society helps people to become a moral and civilized citizen of the society and give rise to the spirit of brotherhood and humanity and promotes justice in the society. The issue of women status in Islam is much talked subject now and is highly controversial. The conservative Ulama insist on assigning women subservient position to men. But a deeper examination of Qur'anic verses makes it clear that it upholds dignity of women. Today all Islamic societies are experiencing fundamental social change and rethinking on many issues has become very vital. But what is important to keep in mind is such deformations or rethinking should be in the light of Qur'an and Hadith.

Introduction:

Justice is the basis of human life and the cardinal principle along which human society operates, as it is a source of all noble traits. Justice can be defined as fairness in the treatment to all people assigning rights and duties, honour and opportunities etc. In essence justice means giving everyone what is his or her due. It is a fundamental concept to any ethical system and as such it is one of the most important moral and philosophical concepts. The word 'justice' comes from the Latin word 'jus', meaning right or law. The Oxford English Dictionary defines the 'just' person as one who typically 'does what is morally right' and is disposed to 'giving everyone his or her due,' offering the word 'fair' as a synonym. But philosophers want to get beyond etymology and dictionary definitions to consider the nature of justice as both a moral virtue of individual character and a desirable quality of society, as well as how it applies to ethical and social decision making. Western philosophers generally regard justice as the most fundamental of all virtues for ordering interpersonal relations and establishing and maintaining a stable society. No virtue is of greater importance than justice, as it includes all other virtues. Aristotle in his book 'Nicomachean Ethics' claims that justice in the broad sense is the whole of virtue as 'in justice is every virtue comprehended and it is complete virtue in its fullest sense.' The concept of justice evoked an endless debate among the scholars concerning what really is justice, its scope and how its standard is to be realized in society. Consequently various theories of justice propounded by various scholars came into existence. The two supreme minds of ancient Greek civilization, Plato and Aristotle, paid their greatest of attentions to this subject and perhaps they were the earliest philosophers who developed theories of justice. Plato composed his immortal work 'The Republic' to deal with the question 'what is justice'. For Plato, justice is a supreme virtue establishing rational order and is the condition for the existence of other virtues like wisdom, courage and temperance. It is an ideal virtue according to Plato and as such its accurate form can be seen in an ideal society in which everyone performs his role appropriately according to his virtue and not interfering with the proper functioning of others. Aristotle in his 'Nicomachean Ethics' deals with the moral virtue of justice and asserts that justice consists in what is lawful and fair, fairness involves equitable distributions and the correction of what is inequitable. John Rawls drawing inspiration from Aristotle offers his theory of justice as fairness in



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

Number of research papers in the Journals notified on UGC CARE list year 2019

Sl No.	Title of Paper	Author	Department	Journal	Link
1	Effects of fractional and two-temperature parameters on stress distributions for an unbounded generalized thermoelastic medium with spherical cavity	Md Abul Kashim Molla	Mathematics	Arab Journal of Basis and Applied Science	https://www.tandfonline.com/doi/full/10.1080/025765299.2019.1621511




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160



Effects of fractional and two-temperature parameters on stress distributions for an unbounded generalized thermoelastic medium with spherical cavity

Md Abul Kashim Molla, Nasiruddin Mondal and Sadek Hossain Mallik

Department of Mathematics & Statistics, Aliah University, Kolkata, India

ABSTRACT

Effects of fractional and two-temperature parameters on the distribution of stresses of an unbounded isotropic thermoelastic medium with spherical cavity are studied in the context of the theory of two-temperature generalized thermoelasticity based on the Green-Naghdi model III using fractional order heat conduction equation. The surface of the cavity is considered to be free from traction and is subjected to a smooth and time-dependent-heating effect. A spherical polar coordinate system has been used to describe the problem and the resulting governing equations are solved in Laplace transform domain. Numerical Laplace transform inversion method has been then applied to get the stresses in time domain. The numerical estimates of the distributions of stresses are obtained and are presented graphically to study the effects of fractional and two-temperature parameters.

ARTICLE HISTORY

Received 27 December 2018
Revised 19 April 2019
Accepted 7 May 2019

KEYWORDS AND PHRASES

Two-temperature generalized thermoelasticity; Green-Naghdi model III; time-fractional heat conduction; spherical cavity

2010 MATHEMATICS
SUBJECT
CLASSIFICATION
74F05

1. Introduction

Because of two major imperfections of the classical uncoupled theory of thermoelasticity, it became essential to make them modified. The first imperfection was the absence of elastic term in the heat conduction equation for which the theory failed to explain the phenomenon of heat generation due to elastic changes and conversely, elastic changes due to heat supply in thermoelastic solids. The parabolic nature of the heat conduction equation was the second imperfection recommending the infinite speed of propagation of thermal waves throughout the body (Peshkov, 1944). This means that, at any point of the body, thermal effect is realised instantaneously after the heat supply, which is not practically tenable. The elimination of the first imperfection was due to Biot (1955), who introduced an elastic term in the heat conduction equation. This theory is known as classical coupled theory of thermoelasticity. Still this theory was suffering from a second imperfection. To remove the second imperfection several developments and modifications were carried out by several researcher in different times. These modified theories are known as the generalized

theory of thermoelasticity. The major contributions towards the formulation and development of generalized theory of thermoelasticity was due to Lord and Shulman (1967); Green and Lindsay (1972); Green and Naghdi (1991, 1992, 1993); Tzou (1995); Choudhuri (2007). For details one can refer to Ignaczak and Ostoja-Starzewski (2010) and Chandrasekharaiah (1986, 1998). It is to be noted that generalized theory of thermoelasticity can be applied to deal with practical problems where high heat fluxes appear for very short time-intervals, which generally occur in laser units, energy channels and nuclear reactors, etc. Many works have been carried out using these theories in the recent past, a few of which are mentioned hereunder. Abd-alla and Abbas (2002) have solved a magneto-thermoelastic problem for an infinitely long, perfectly conducting transversely isotropic cylinder using the theory of generalized thermoelasticity. Abbas and Youssef (2012) have established a generalized thermoelasticity model of temperature dependent materials and used it to solve a thermal shock problem of a generalized thermoelastic half-space by employing the finite element method. Abbas and Abo-Dahab (2014) have solved a thermal shock problem in generalized



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

Number of research papers in the Journals notified on UGC CARE list year 2020

Sl No.	Title of Paper	Author	Department	Journal	Link
1	সপ্তদশ লোকসভা নির্বাচন (২০১৯): মুর্শিদাবাদ জেলার নির্বাচনী ফলাফলের একটি পর্যালোচনা	Avijhit Saha	Political Science	Itikatha	https://www.bangiyaitikatha.in
2	Hunger as a Metaphor of Emasculation in Bhabani Bhattacharya' He Who Rides a Jourr Tiger	Saswata Kusari	English	Asian Quarterly: An International Journal of Contemporary issues	https://www.iasepune.in/aq/
3	Adsorption and anti-corrosion characteristics of vanillin Schiff bases on mild steel in 1 M HCl: experimental and theoretical study	Sanjoy Satpati	Chemistry	RSC Advances	https://pubs.rsc.org/en/content/articlehtml/2020/ra/c9ra07982c
4	Waves in generalized thermo-viscoelastic infinite continuum with cylindrical cavity due to three-phase-lag time-nonlocal heat transfer	Md Abul Kashim Molla	Mathematics	Journal of Thermal Stress	https://www.tandfonline.com/doi/abs/10.1080/01495739.2020.1749196
5	Threats of plastic pollution and awareness among common people: A multi attribute problem	Supratim Mukherjee	Mathematics	Eco. Env. & Cons	http://www.envirobiotechjournals.com/EEC/v26i420/EEC-65.pdf




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

6	Bis-benzothiazoles as efficient corrosion inhibitors for mild steel in aqueous HCl: Molecular structure-reactivity correlation study	Sanjoy Satpati	Chemistry	Journal of Molecular Liquids	https://www.sciencedirect.com/science/article/abs/pii/S0167732220313453
7	বিপ্লবে বারুদের গন্ধ নেই সুভাষ মুখোপাধ্যায়ের সমকালীনতা ও বিশ্বজনীনতা	Avijhit Saha	Political Science	Anustup	https://anustup.org.in/
8	Influence of position of hydroxyl group of flavonoids on their binding with single stranded polyriboadenylic acid: A spectroscopic evaluation	Susmita Chowdhury	Chemistry	Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy	https://www.sciencedirect.com/science/article/pii/S1386142520309872?casa_token=kVvg9uVNwZcAAAAA:LqBOWbdcUmCMgG6xMZ_fgTCLhMnnKdwaoN5WXIkzS1oL1zIguTJzIw_p62I8FWj4QLKJqjLhIg
9	Federalism at the Crossroads: Crisis of the Linguistic Minorities in India	Pritin Dutta	Political Science	Rupkatha Journal on Interdisciplinary Studies in Humanities	http://rupkatha.com/V12/n5/rioc1s24n2.pdf
10	A Spectroscopic Approach towards the Comparative Binding Studies of the Antioxidizing Flavonol Myricetin with Various Single-Stranded RNA	Susmita Chowdhury	Chemistry	Chemistry Select	https://chemistry-europe.onlinelibrary.wiley.com/doi/epdf/10.1002/slct.202003601




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160

প্রবন্ধ

সপ্তদশ লোকসভা নির্বাচন (২০১৯): মুর্শিদাবাদ জেলার নির্বাচনী ফলাফলের একটি পর্যালোচনা

অভিজিৎ সাহা*

(প্রাপ্ত: ৮ জুলাই ২০১৯ খ্রি., গৃহীত: ১২ অক্টোবর, ২০১৯ খ্রি.)

সারসংক্ষেপ

আলোচ্য প্রবন্ধটিতে সপ্তদশ জাতীয় লোকসভা নির্বাচনের (২০১৯) পরিপ্রেক্ষিতে মুর্শিদাবাদ জেলার তিনটি লোকসভা কেন্দ্রের ফলাফলকে পর্যালোচনা করা হয়েছে। নির্বাচনী ফলাফলকে বিশ্লেষণ করার জন্য যে সমস্ত পদ্ধতি ও মাপকাঠি অনুসরণ করা সরকার, আলোচ্য প্রবন্ধে উক্ত মাপকাঠিগুলিকে যতটা সম্ভব অনুসরণ করার চেষ্টা করা হয়েছে। প্রবন্ধটির মূল উদ্দেশ্য হল, প্রাপ্ত ফলাফলের ভিত্তিতে জেলার রাজনৈতিক বিন্যাসকে উপলব্ধি করা এবং এই নির্বাচনী ফলাফল যদি জেলার রাজনৈতিক বিন্যাসে কোনোরূপ মৌলিক পরিবর্তন নিয়ে আনতে সমর্থ হয়, তাহলে সেই রাজনৈতিক পরিবর্তনের ঝোঁকটিকেও চিহ্নিত করার চেষ্টা করা। মূলত চারটি অংশে বিভক্ত করে প্রবন্ধটি আলোচিত হয়েছে। এগুলি হল—(ক) সর্বভারতীয় লোকসভা নির্বাচনের পরিপ্রেক্ষিতে জেলার নির্বাচনী ফলাফলকে পর্যালোচনা করা; (খ) পশ্চিমবঙ্গের নির্বাচনী ফলাফলের পরিপ্রেক্ষিতে সংশ্লিষ্ট জেলার নির্বাচনী ফলাফলকে বিশ্লেষণ করা; (গ) উক্ত নির্বাচনে জেলার স্থানীয় ও নিজস্ব রাজনৈতিক সমীকরণ কতখানি ক্রিয়াশীল ছিল তার ওপর আলোকপাতের চেষ্টা করা; (ঘ) সাম্প্রতিক নির্বাচনী ফলাফল জেলার রাজনৈতিক সংস্কৃতিতে কোনোরূপ পরিবর্তন আনতে পেরেছে কিনা—সেটাও পর্যালোচনার মধ্যে রাখা হয়েছে। সবশেষে, উপরোক্ত মতামতগুলির পরিপ্রেক্ষিতে জেলার নির্বাচনী ফলাফলগুলিকে চিহ্নিত করার চেষ্টা করা হয়েছে।

* অ্যাসিস্ট্যান্ট প্রফেসর, রাষ্ট্রবিজ্ঞান বিভাগ, তেহাট সরকারি মহাবিদ্যালয়, নদিয়া।
e-mail : avijit.avijit.saha023@gmail.com

HUNGER AS A METAPHOR OF EMASCULATION IN BHABANI BHATTACHARYA'S *HE WHO RIDES A TIGER*

Saswata Kumar¹

In a typically heteropatriarchal society, man's position in the society is almost always dictated by his ability (or inability) to be a breadwinner. In *Manliness and Its Discontents*, Martin Summers argues the same. It is with this desire to have a 'manly' aura, Kalo, the protagonist of Bhabani Bhattacharya's *He Who Rides the Tiger*, decides to evict the village and his poverty and goes to the big city in expectation of financial escalation. However, after repeated failures to do so, Kalo, realizing more that he would fail as a man without being economically potent, decides to ride the tiger—a symbol for wealth and power and also of manliness. This paper, using the theoretical framework of Masculinity studies, especially that of R.W. Connell, would seek to explore how various shades of masculinities are very often inexorably linked with various economic conditions.

Key Words: Poverty, Hunger, Masculinity, Hegemony, Caste

One of the most devastating effects of colonialism in India was perceived in 1943 when Bengal suffered its worst famine. However, historians

¹SASWATA KUMAR is Assistant Professor, Govt. General Degree College at Tehatta & Ph.D. Research Scholar, Kalyani University

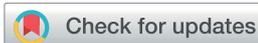
and critics have shown that this famine was not a natural calamity; rather it has been deemed as a man-made disaster. Paithi Chakraborty points the role of Winston Churchill behind this catastrophic event. She writes:

Winston Churchill, the hallowed British War prime minister who saved Europe from a monster like Hitler was disturbingly callous about the roaring famine that was swallowing Bengal's population. He casually diverted the supplies of medical aid and food that was being dispatched to the starving victims to the already well supplied soldiers of Europe. When entreated upon, he said, "Famine or no famine, Indians will breed like rabbits." The Delhi Government sent a telegram to him painting a picture of the horrible devastation and the number of people who had died. His only response was, "Then why hasn't Gandhi died yet?" (Para 7)

The utter recklessness of Churchill is a ghastly reminder of how the white men dehumanized the natives. Many Bengali intellectuals, through various creative mediums, have showcased this catastrophic event. And Bhabani Bhattacharya is undoubtedly one of the most prominent voices to bring out the catastrophic magnitude of this man-made disaster. Bhattacharya was one of the earliest social realists of Indian literature and remained unapologetically so throughout his life. M.K. Naik writes, "Bhattacharya believes that 'Art must teach, but unobtrusively, by its vivid interpretation of life. Art must preach, but only by being a vehicle of truth' (223). This paper would strive to show, using the lenses of gender studies and masculinity studies, how Bhattacharya's exploration of the issue of hunger, with special reference to his finest work, *He Who Rides a Tiger*, in many ways,

53

Attended
Ramij Roy Mondal
Assistant Prof.
Dist. of High


 Cite this: *RSC Adv.*, 2020, 10, 9258

Adsorption and anti-corrosion characteristics of vanillin Schiff bases on mild steel in 1 M HCl: experimental and theoretical study†

 Sanjoy Satpati,^a Sourav Kr. Saha,^b Aditya Suhasaria,^a Priyabrata Banerjee^c and Dipankar Sukul^d

 Received 1st October 2019
 Accepted 11th February 2020

DOI: 10.1039/c9ra07982c

rsc.li/rsc-advances

Herein, two Schiff base derivatives of vanillin and divanillin with 2-picolyamine, namely, 2-methoxy-4-((pyridin-2-ylmethylimino)methyl)phenol (compound A) and 3,3'-dimethoxy-5,5'-bis-((pyridin-2-ylmethylimino)methyl)-[1,1'-biphenyl]-2,2'-diol (compound B), respectively, were synthesized. Additionally, their adsorption characteristics and corrosion inhibition behavior were compared for mild steel in 1 M HCl using electrochemical impedance spectroscopy, potentiodynamic polarization and weight loss methods. Compound B was found to impart a better anti-corrosive effect (around 95% inhibition efficiency at 313 K) than compound A. The inhibitors act as effective mixed-type inhibitors and exhibit Langmuir-type adsorption behaviour. The kinetic–thermodynamic parameters together with the data obtained from density functional theory (DFT) and molecular dynamics (MD) simulations illustrate the mechanism of corrosion and mode of adsorption of both inhibitors on the metal surface. The better corrosion mitigation propensity of the dimeric form of the inhibitor (compound B) over the monomeric form (compound A) was tested experimentally and explained according to the theoretical data.

Introduction

The application of suitable corrosion inhibitors for the control of corrosion in metals and alloys is very important.^{1–4} However, due to ecological concerns, the use of inorganic inhibitors is gradually being restricted. This has resulted in a surge of studies involving organic corrosion inhibitors. Organic compounds containing N, S, and O atoms generally show good inhibition efficiency for mild steel in acidic media.^{5–12} In addition to various heterocycles,¹³ amines¹⁴ and imines,¹⁵ different other classes of organics, such as amino acids,^{16,17} vitamins,¹⁸ polysaccharides,¹⁹ surfactants,²⁰ polypeptides,²¹ lipids,²² polyphenols⁴ and others, have been reported to act as efficient

corrosion inhibitors. Schiff bases are versatile compounds, which are synthesized *via* the condensation of primary amines and carbonyl compounds, and used widely in pharmaceuticals, agrochemicals and materials science.^{23–25} In this work, we aimed to investigate the corrosion inhibition properties of two newly synthesized Schiff base derivatives of vanillin and divanillin with 2-picolyamine for mild steel in 1 M HCl.

Vanillin, a biomass-derived phenolic aldehyde, is widely used as a flavoring agent in foods, beverages and pharmaceuticals owing to its anti-microbial and anti-oxidant properties.²⁶ It was first extracted from vanilla beans, which are primarily obtained from the orchid *Vanilla planifolia*. The synthetic production of vanillin from the abundant lignin *via* metal-catalyzed air oxidation converts it into a potential renewable feedstock chemical.^{27,28} Herein, we provide further value to vanillin and explore its potential for applications in a new arena of green corrosion inhibitors, which are essentially of bio-origin and less toxic to the environment. To date, vanillin has been tested for its anti-corrosive propensity for aluminum in acid solutions.²⁹ However, since vanillin itself failed in this effort for ferrous metal, it was derivatized into a Schiff base, *i.e.*, 2-methoxy-4-((pyridin-2-ylmethylimino)methyl)phenol (compound A). Further, we synthesized divanillin, which was subsequently converted to another Schiff base, 3,3'-dimethoxy-5,5'-bis-(((pyridin-2-ylmethyl)imino)methyl)-[1,1'-biphenyl]-2,2'-diol (compound B). The molecular formulae of these two Schiff bases are shown in Fig. 1. Compound B is essentially the dimeric form of compound A. One of our main intentions of

^aDepartment of Chemistry, National Institute of Technology, Durgapur, West Bengal, 713209, India. E-mail: dipankar.sukul@ch.nitdgp.ac.in; Tel: +91 9434788066

^bSurface Engineering & Tribology Group, CSIR-Central Mechanical Engineering Research Institute, Durgapur 713209, India

^cAcademy of Scientific and Innovative Research, CSIR-CMERI Campus, Durgapur 713209, India. E-mail: pr_banerjee@cmeri.res.in; Tel: +91-343-6452220

^dFaculty of Engineering, Hokkaido University, Kita-13, Nishi-8, Kita-ku, Sapporo, Hokkaido 060-8628, Japan

† Electronic supplementary information (ESI) available: NMR, FTIR and mass spectra of the synthesized inhibitors, potentiodynamic polarization plots and impedance spectra in the presence of the inhibitors at different temperatures, variation in the free energy of adsorption with temperature, Arrhenius plots, electronic distribution in the frontier molecular orbitals for the protonated forms of the inhibitors, closest distance between the inhibitor atoms, metal surface data and various other relevant data. See DOI: 10.1039/c9ra07982c





Waves in generalized thermo-viscoelastic infinite continuum with cylindrical cavity due to three-phase-lag time-nonlocal heat transfer

Md Abul Kashim Molla, Nasiruddin Mondal, and Sadek Hossain Mallik

Department of Mathematics and Statistics, Aliah University, Kolkata, India

ABSTRACT

Generalized thermoelastic interactions due to three-phase-lag time-nonlocal heat transfer in a Kelvin-Voigt type infinitely extended visco-thermoelastic continuum with cylindrical cavity has been investigated. The two-temperature generalized thermoelasticity theory has also been taken into account. The problem has been solved in the domain of Laplace on the assumption that the surface of the cavity is free from traction and is subjected to a smooth and time-dependent-heating effect. Laplace inversion of the transformed solutions has been carried out numerically. The obtained numerical data for different considerations are plotted in graphs to study the effects of time-nonlocal parameter, two-temperature parameter and visco-thermoelastic relaxation parameter on different thermoelastic quantities of physical interest.

ARTICLE HISTORY

Received 13 December 2019
Accepted 20 March 2020

KEYWORDS

Axisymmetric deformation; cylindrical cavity; time-nonlocal three-phase-lag model; two-temperature generalized thermo-viscoelasticity

2010 MATHEMATICS SUBJECT CLASSIFICATION

74F

Introduction

Thermoelasticity theories are divided into two sections, classical thermoelasticity theories and generalized thermoelasticity theories. Classical thermoelasticity theories are also partitioned into classical uncoupled thermoelasticity theories and classical coupled thermoelasticity theories [1]. Both classical uncoupled and coupled thermoelasticity theories suffer from the crucial imperfection that the heat conduction equation of these theories recommends an unrealistic observation of unbounded speed of thermal wave propagation [2]. To prevail over this untenable observation, generalized thermoelasticity theories were introduced surpassing the classical thermoelasticity theories. First impressive contribution to this new horizon of thermoelasticity theories was due to Lord and Shulman [3]. Later on Green and Lindsay [4], Green and Naghdi [5–7], Tzou [8], S. K. Roy Choudhuri [9] and several other researchers developed different generalized thermoelasticity theories. The works of Ignaczak and Ostoja-Starzewski [10] and Chandrasekharaiah [11, 12] may be referred for details in this perspective. From the experimental view-points, it is evident that the theories of generalized thermoelasticity are more suitable than the classical theories of thermoelasticity to cope with short-lived practical problems with excessive heat fluxes which occur generally in nuclear power plant and laser beam etc.

Thermoelasticity theories for elastically deformable continuum accommodate two different sorts of temperatures [13–16], represented by θ , ϕ and respectively known as the thermodynamic temperature and the conductive temperature. θ appears for thermal processes and ϕ appears for

Threats of plastic pollution and awareness among common people: A multi attribute problem

Supratim Mukherjee

Department of Mathematics, Government General Degree College, Tehatta, India

(Received 24 February, 2020; Accepted 2 May, 2020)

ABSTRACT

Pollution is a global issue. It does not consider the international borders or any other human restricted conditions while spreading. Specially Plastic Pollution has been a recent topic of deep concern due to its immense capacity of causing Environmental threats. This work searches for the logical consistency between the threat and the awareness of the threat among common people. Uncertainty based logical tools have been used to determine the nature of the Multi Attribute Problem.

Key words: Plastic pollution, Fuzzy logic, MADM, Grey sets, Fuzzy sets, TFN.

Introduction

Fuzzy logic accommodates semantics for multivariate logic. Normally crisp sets are Cantorian collections consisting of core elements, but Fuzzy sets are like Russellian classes, based on membership grades criteria. Because Fuzzy sets are locally subjective, while assigning membership degrees, at least one membership degree has to be made subjective and also it relies on expert's choice, i.e., in broad sense it is context dependent. Fuzzy logic is a concept derived from the branch of mathematical theory of Fuzzy Sets. Unlike the basic Aristotelian theory that recognizes statements as only "true" or "false" (i.e., 1 or 0) as represented in digital computers, Fuzzy logic is capable of expressing Linguistic terms such as "may be false" or "sort of true". Fuzzy Logic allows one to emulate the human reasoning process, quantify the imprecise information, provide decision based on vague and incomplete data and arrive at a definite conclusion. The logic underlying Fuzzy set theory is multivalent. In general, a multivalent logic can be regarded as a calculus of either on the

level of credibility of propositions or on the truth values of the Fuzzy predicates. In most of the multivalent logics there is no longer an excluded middle law; this environment can be rendered as either the absence of decisive belief in one of the sides of an alternative or the imbrications of contrastive Fuzzy concepts.

The threats of plastic pollution are now a global issue. Almost in every Country, regular awareness programs are being arranged and executed to resist the threat. In this work, the aim is to evaluate country wise threats of Plastic Pollution by Fuzzy Multi Attribute Decision Making. In section 2, preliminaries on Fuzzy Sets and Fuzzy Logic are discussed. Section 3 briefly describes the model of Fuzzy Multi Attribute Decision Making Problem. In Section 4, some analytical results are revealed. Section 5 concludes the findings.

Fuzzy Logic and Fuzzy Sets

A Fuzzy set is normally expressed as a collection of elements with a continuum of grades of membership. It is characterized by a membership function,



Bis-benzothiazoles as efficient corrosion inhibitors for mild steel in aqueous HCl: Molecular structure-reactivity correlation study

Aditya Suhasaria^a, Manilal Murmu^{b,c}, Sanjoy Satpati^a, Priyabrata Banerjee^{b,c,*}, Dipankar Sukul^{a,*}

^a Department of Chemistry, National Institute of Technology, Durgapur 713 209, India

^b Surface Engineering & Tribology Group, CSIR-Central Mechanical Engineering Research Institute, Durgapur 713209, India

^c Academy of Scientific and Innovative Research, Ghaziabad 201002, Uttar Pradesh, India

ARTICLE INFO

Article history:

Received 3 March 2020

Received in revised form 2 June 2020

Accepted 4 June 2020

Available online 06 June 2020

Keywords:

Mild steel

Acid corrosion

Bis-benzothiazole

Potentiodynamic polarization

Electrochemical impedance spectroscopy

Molecular dynamics

ABSTRACT

Three different bis-benzothiazole (BBT) derivatives namely 2,6-bis(2-benzothiazolyl)pyridine (BBTP), bis(2-benzothiazolylmethyl)sulphide (BBTMS), and 1,2-bis(benzothiazolyl)ethylene (BBTE) are synthesized and characterized. Corrosion mitigation performance of these bis-benzothiazole derivatives have been inspected for mild steel in aqueous 1 M HCl using electrochemical and gravimetric methods. Corrosion inhibition potentiality of these inhibitors are in the order BBTP > BBTMS > BBTE. This is further substantiated from SEM images. Mixed type corrosion inhibition for all the inhibitors is affirmed from potentiodynamic polarization study. Effect of temperature and exposure time is also evaluated employing gravimetric method. Following Langmuir adsorption isotherm, thermodynamic parameters related to adsorption process are enumerated. Adsorption data together with activation parameters are used to deduce nature of adsorption process of these inhibitors on metal surface. Density functional theory (DFT) and molecular dynamics (MD) simulation are done to explain experimentally obtained result from theoretical view point. Observed corrosion inhibition trend is found to be related to spatial orientation of inhibitor molecules in their most stable energy states in aqueous medium as well as to their intrinsic molecular parameters.

© 2020 Elsevier B.V. All rights reserved.

1. Introduction

Inhibition of corrosion of metals in acidic media by heterocyclic organic bases remains an active field of research for many years now. Among these, azoles find a special interest due to good corrosion inhibition power, cost effectiveness, relatively low toxicity, bio-degradability, and solubility in acidic aqueous media. Accordingly, different azoles like indole, imidazole, benzimidazole, triazole, benzotriazole, pyrazole, tetrazole, and their derivatives have been studied [1–9]. Effect of different molecular parameters on corrosion mitigation like molecular volume, unsaturation, heteroatoms, energies of frontier molecular orbitals (FMO) and other intrinsic molecular parameters have been investigated in details. Our group has reported some interesting result on the effect of spatial orientation, particularly how it affects the energies of FMOs, and the nature of interaction with the metal surface employing benzimidazole (BI) derivatives for mild steel in aqueous HCl [8,9]. Here, we intend to extend our work for benzothiazole (BT) derivatives.

BTs are very important aromatic heterocyclic compounds having a 5-membered 1,3-thiazole ring fused to a benzene ring and its

heterocyclic moiety is mostly substituted at the unique methyne center of the thiazole ring. Its applications comprise diversified fields; from medicinal chemistry to material science [10,11]. In addition, BTs are known for imparting good corrosion protection to different metals under varied conditions [12–17]. Still, corrosion mitigation study involving bis-benzothiazole (BBT) derivatives is scarce. Also, structure-reactivity correlation involving a series of structurally comparable BT derivatives requires further elaboration. From this aspect, in the present work we have used three different BBT derivatives, where each BT group is separated from each other by a pyridine (in BBTP), or dimethylene sulphide (in BBTMS), or ethylene (in BBTE) groups (*vide Table 1*). Effect of these spacer groups on corrosion inhibition of mild steel in 1 M HCl is investigated in details using electrochemical and weight loss methods. Thermodynamic parameters of adsorption and activation parameters of corrosion reaction are evaluated. From DFT study, we obtain intrinsic molecular parameters. Effect of spatial molecular configuration in the most stable energy state and evaluated intrinsic molecular parameters are examined to decide on their effect on the extent and mode of adsorption of these BBT derivatives on mild steel surface in acidic medium. Among the mineral acids, HCl is used profoundly in many industrial processes, such as steel pickling, electroplating, cleansing algae and zebra mussels accumulated on any underwater structure, activating oil wells, for maintaining acidity in

* Corresponding authors.

E-mail addresses: pr_banerjee@cmeri.res.in (P. Banerjee), dipankar.sukul@ch.nitdgp.ac.in (D. Sukul).

৫৪ বর্ষ তৃতীয়-চতুর্থ সংখ্যা

অনুষ্ঠান

গ্রীষ্ম-বর্ষা ও প্রাক-শারদীয় যুগ্মসংখ্যা ২০২০



খোয়াবনামার ভাষ্যকার:
নগেন্দ্রনাথ বসুর বঙ্গের জাতীয় ইতিহাস: কুলজিশাস্ত্রে বিবাহ প্রসঙ্গ: শাস্বতী রায়
নিষিদ্ধের হাতছানি: প্রসেনজিৎ দাশগুপ্ত/৬৫

প্র য়া ণ লেখ

অধ্যাপক আনিসুজ্জামান: আঁধারের পারের জ্যোতির্ময় : লীনা দিলরুবা/৬৯
হরি শঙ্কর বাসুদেবন: শুরা সান্যাল/৭৫
বড়ো বেদনার মতো বেজেছে হৃদয়ে... : তরুণ সেন/৭৮
কবি থেকে গীতিকার: যোগেশ গওর: তরুণ সেন/৮৩

প্র বন্ধ

মার্কসবাদের উপেক্ষিত পথ: সুদীপ্ত কবিরাজ/৮৭
বঙ্কিমচন্দ্রর 'হিন্দুত্ব': প্রসাদ সেনগুপ্ত/১৩৫
চাঁদের আকাশে তারা: বিমান নাথ/১৬৩
ভারতের কমিউনিস্ট আন্দোলনের সূত্রপাত ও

মিরাট ষড়যন্ত্র মামলা: সুমিত্র চক্রবর্তী/১০

'স্বাভাবিক কাম', যৌন-মূল্যবোধ এবং উপদেশমূলক পত্রপত্রিকা:

উপনিবেশিক বাংলার প্রেক্ষিতে (১৮৭০-১৯৩০): সুমন সরকার/১৯
বাংলার প্রাচীন উৎপাদন ব্যবস্থা: কুটির শিল্পের কারিগরিকৌশল: সুস্মিতা মিশ্র/২২
আধুনিক দলিত মহিলাদের আত্মজীবনী ও বিবর্তন: কিঙ্কি চট্টোপাধ্যায়/২৩৭
ছোটগল্পের আসরে কবিতা পাঠ: সারমিন রহমান/২৪৫
বাংলা উপন্যাসের আলোয়: শিকল ভাঙার গান: ঐশিক দাশগুপ্ত/২৭৪

ক্রো ড় প ত্র - ১

সু ভা ষ মু খো পা ধ্যা য়

আমরা 'যত দূরেই যাই': পল্লববরন পাল/২৯৫

বিপ্লবে বারুদের গন্ধ নেই

সুভাষ মুখোপাধ্যায়ের সমকালীনতা ও বিশ্বজনীনতা: অভিজিৎ সাহা/৩১০

বিপ্লবে বারুদের গন্ধ নেই
সুভাষ মুখোপাধ্যায়ের সমকালিনতা ও বিশ্বজনীনতা
অভিজিৎ সাহা

প্রগতিশীল রাজনীতি হল তাই, যা ঐতিহাসিক হাল-হকিকত এবং কোনো আচরণ বা অভ্যাসের সুনির্দিষ্ট বিধিবিধান সনাক্ত করে থাকে; অপরদিকে অন্য রাজনীতি শুধুমাত্র আদর্শিক প্রয়োজন, একস্বরিক সংকল্প এবং ব্যক্তিগত উদ্যোগের অবাধ প্রসারকে মেনে নেয়।

মিশেল ফুকো, *History, discourse and discontinuity*

আলোচ্য প্রবন্ধটিতে সুভাষ মুখোপাধ্যায়ের সাহিত্যকীর্তির নানানদিক উপলব্ধি করার চেষ্টা করা হয়েছে। এক্ষেত্রে সমগ্র প্রবন্ধটিকে কতকগুলি পর্যায়ে ভাগ করে আলোচনা করা হয়েছে। প্রথম ভাগে সুভাষ মুখোপাধ্যায়ের লেখার শ্রেণিকৃত, দ্বিতীয় পর্যায়ে কবির কাব্যভাবনা, তৃতীয় পর্যায়ে তাঁর গদ্যভাবনা, চতুর্থ আর শেষ পর্যায়ে আজকের দিনে সুভাষপাঠের পদ্ধতি ও প্রাসঙ্গিকতাকে তুলে ধরার চেষ্টা করা হয়েছে। আর এই সবেরই মূল লক্ষ্য হল সুভাষপাঠের এক ক্ষুদ্র প্রচেষ্টা।

১

সুভাষ মুখোপাধ্যায় ও তৎকালীন পরিস্থিতি

প্রথম বিশ্বযুদ্ধের (১৯১৪-১৯১৮) অব্যবহিত পরেই সুভাষ মুখোপাধ্যায়ের (১৯১৯-২০০৩) জন্ম। প্রথম বিশ্বযুদ্ধ নানান রকম শর্ত, চুক্তি/সন্ধির মাধ্যমে শেষ হলেও এর মধ্যেই ভবিষ্যতের অনেক সংকট নিহিত ছিল, এমনকি আরও একটি বিশ্বযুদ্ধের ইঙ্গিত। প্রথম বিশ্বযুদ্ধের পরবর্তী সময়ে প্রায় এক দশক পরেই প্রথম অর্থনৈতিক মন্দা (১৯২৯-১৯৩৯) দেখা দেয়। এই আর্থিক মন্দার প্রভাব কবির পরিবারের ওপর পড়েছিল। যার উল্লেখ কবি তাঁর আত্মজীবনীমূলক উপাখ্যানে ব্যক্ত করেছেন।^১ বিশ্বজুড়ে চলা আর্থিক মন্দা রাজনৈতিক ক্ষেত্রে সমগ্র ইউরোপ জুড়ে এক



Contents lists available at ScienceDirect

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy

journal homepage: www.elsevier.com/locate/saa

Influence of position of hydroxyl group of flavonoids on their binding with single stranded polyriboadenylic acid: A spectroscopic evaluation

Susmita Chowdhury, Sutanwi Bhuiya, Lucy Haque, Suman Das*

Biophysical Chemistry Laboratory, Physical Chemistry Section, Department of Chemistry, Jadavpur University, 188 Raja S. C. Mallick Road, Kolkata 700032, India

ARTICLE INFO

Article history:

Received 26 June 2020

Received in revised form 19 September 2020

Accepted 22 September 2020

Available online 28 September 2020

Keywords:

Hypochromism

ESIPT

Groove binding

Role of hydroxyl groups

ABSTRACT

Single stranded polyriboadenylic acid [poly (rA)] has been accepted widely as a suitable drug target owing to its vital role in the development of cancer since it controls gene expression during cell growth and differentiation. The biological properties of poly (rA) depend on its structural morphology. Pharmacologically active flavonoids can act as suitable binders to poly (rA) and significantly change its biophysical properties. Different factors favour flavonoid-poly (rA) binding. In our present work we have explored the role played by the position of hydroxyl groups in the flavonoids namely 3, 5, 6 and 7 hydroxyflavones in their course of interaction with poly (rA). A range of spectroscopic experiments reveal that 3HF binds best to poly (rA) among the four chosen flavonoids. This is probably due to the presence of a hydroxyl group in '3' position that enables it to exhibit ESIPT phenomenon which is missing for the other used flavonoids.

© 2020 Elsevier B.V. All rights reserved.

1. Introduction

The discovery of nucleic acid structures has revolutionized drug designing [1,2]. Their study has helped scientists to understand the basis of most of the diseases and how to treat them. In most organisms DNA is the carrier of hereditary unit [3] and hence most researches involve in the studies of structural and functional aspects of drug-DNA interactions. However during the last two decades there has been an inclination towards drug-RNA interaction [4]. This came as a consequence of the role played by RNA in most virus related deadly diseases namely HIV-AIDS, hepatitis, etc. [5,6]. But the exact mechanism of drug-RNA interaction has not been explicitly illustrated so far.

RNA exists in different polymorphic forms in nature depending upon sequence and environmental conditions and single helical structure is the most abundant one. Among these, polyriboadenylic acid, hereafter, poly (rA) has been observed to have numerous biological functions [7,8]. Poly (rA) shows a pH dependent conformational change [9–11]. It exists as a double helical structure at acidic pH but at neutral pH the single stranded structure is predominant [12,13]. This is confirmed from X-ray diffraction and circular dichroism. The gene expression during cell growth and differentiation is determined by polyadenylate [14]. Most eukaryotic mRNAs have a lengthy polyadenylate tail which serves a significant role in its maturity, stabilization and also in the translation process [15]. The polyadenylate tail prevents the enzymatic degradation of mRNAs in the cytoplasm [16]. Prokaryotes on the other hand do not

have polyadenylate sequences. Thus, the longevity of eukaryotic mRNA over prokaryotic mRNA can be attributed to the presence of polyadenylate tails [17]. Poly (rA) has been found to be associated with a number of diseases. According to the reports of Green and Cartas, the genome of RNA tumour viruses contains polyadenylate sequences [18]. The polyadenylation of mRNA is catalysed by the enzyme poly A polymerase (PAP). In a recent study it was found that Neo-PAP, a human origin PAP, is dramatically expressed in cancer cells [19]. Thus, study of small molecules that can bind to poly (rA) in mRNA tail and may possibly interfere with its maturation and delay or rupture the encoded protein synthesis can open a new genre of therapeutic agents. This apart, polyadenylic acid has potential to develop G-Quadruplex structures [20] which play a significant role in immunoglobulin heavy chain switching [21].

Flavonoids are a multifunctional group of plant secondary metabolites that not only benefits the floral kingdom but has also contributed a lot towards modern day drug designing [22,23]. Their small size and planar structure make their binding to nucleic acids highly compatible. They have found a place as a part of dietary substituent since a long time. But it was their biological attributes that brought them into limelight. They have a wide range of biological activities ranging from anti-oxidising [24], anti-bacterial [25], anti-viral [26], anti-tumour [27], anti-inflammatory properties etc. [28]. They are well-known free radical scavengers responsible for DNA damage and tumours [29,30]. Studies show that their anti-oxidant property may be attributed to their extent and position of hydroxylation [31]. Flavonoids like quercetin and naringin are known to inhibit CYP3A4 which is the most abundant P450 enzyme in liver responsible for metabolism of carcinogens and medicines. This property has made them quite sought after as anti-

* Corresponding author at: Biophysical Chemistry Laboratory, Physical Chemistry Section, Department of Chemistry, Jadavpur University, India.

E-mail address: sumandas10@yahoo.com (S. Das).

Federalism at the Crossroads: Crisis of the Linguistic Minorities in India

Pritin Dutta

Assistant Professor in Political Science, Government General Degree College, Tehatta.

Nadia, West Bengal, India. ORCID: 0000-0002-8834-1904.

Email id: duttapritin1@gmail.com

Abstract

Polyglot federations face a challenge in reconciling between the national identities and regional identities. Demand for a second States Reorganisation Commission (SRC) in India in 2015 by some groups bears testimony to this fact. On the question of political remapping in post-independence period, the constitutional ancestors sought to save India from another religious bigotry and the menace of casteism. The emergence of language as a viable alternative gained momentum in Nagpur session (1920) of the Indian National Congress (INC). But subsequent years encountered with a difficulty in adopting territorial solution for accommodating India's multilingual identities. Pre-constitutional, extra-constitutional and constitutional arrangements have faced the challenge of linguistic accommodation. Dar Commission warned the risk of federal remapping with existing linguistic pocket corridors in the states. Inter-state migration has proliferated the problem over the years. Even the SRC could not provide adequate safeguards for large number of linguistic minorities living in all states (Kerala becomes exception with 97.03% linguistic majorities). There new minority emerged and accommodated but with limits. Census report of 2011 shows India having 19,569 languages which stood 1369 after linguistic scrutiny. Territorial machinations appear inadequate to satisfy all linguistic groups but only to incur huge expenditure. Indian federalism seems deficient in non-territorial power sharing which has succeeded in countries like Belgium in the form of Consociational representation. With its promise of inclusivity by means of a possible alternative it demands the attention of the policy makers as well as the academia.

Keywords: Polyglot federations, political remapping, States Reorganisation Commission, linguistic minorities, Consociational Representation

Introduction

India with her vast multi-ethnic diversities has been commendably successful in maintaining a federation, as compared to the developed federal systems of the first world. Somewhat surprisingly, federal paradigm has been reduced to a half-cultivated discipline among the pupils of constitutional and political studies in India where federalism is meant to be a politico-administrative mechanism in a large region. Administrative decentralization may be possible without having a federated system, but remains hostile where demography of the region is enriched with vibrant diversity. This diversity lies with one's identity ranging from caste, religion, region, culture to language. India like any other multi-ethnic and polyglot federation seeks to accommodate her diverse identities with her national identity. After the fatal consequences of religion and caste, language appeared to be an obvious choice in the process of such accommodation which remains to be a challenge for any federal governance.

■ Biological Chemistry & Chemical Biology

A Spectroscopic Approach towards the Comparative Binding Studies of the Antioxidizing Flavonol Myricetin with Various Single-Stranded RNA

Susmita Chowdhury, Sutanwi Bhuiya, Lucy Haque, and Suman Das^{*[a]}

RNA based drugs have come to limelight owing to the major role played by RNA in the development of many viral diseases. Molecules which can effectively bind with RNA can induce morphological changes in RNA which further modifies its biological properties. Flavonoids are phytochemicals having a wide range of pharmacological properties and are known to interact with DNA. We have used RNA instead of DNA and aimed at establishing a comparison of binding of three single stranded forms of RNA homopolymers namely polyriboadenylic acid [poly(rA)], polyuridylic acid [poly(rU)] and polycytidylic acid [poly(rC)] with the flavonol myricetin (herein after MTN), our

probe of interest. A series of spectroscopic experiments like spectrophotometry, spectrofluorimetry and circular dichroism studies indicate a stronger binding of myricetin with poly(rA) followed by poly(rU) and finally poly(rC). This was confirmed from the construction of Scatchard plot using the Mc-Ghee von Hippel equation for cooperative binding. The magnitude of the order of binding was 10^3 M^{-1} at 25°C in all the cases. It is to be noted that most eukaryotic mRNAs have a poly adenylate tail. Binding of MTN to poly(rA) in virulent cells could effectively alter the encoded protein synthesis and reduce chances of occurrence of the disease.

1. Introduction

Flavonoids are Nature's doctor with the exemption of fees. They are phytohormones, more specifically; secondary metabolites belonging to the polyphenolic class and are abundant in citrus fruits, apple, olive oil, tea, red wine, berries and soy.^[1] They act as potent anti-proliferators and free radical scavengers - properties that have long mesmerized the scientists and encouraged them to indulge in flavonoid dependent drug designing.^[2] Myricetin, (hereafter, MTN) [IUPAC{3, 5, 7-Trihydroxy-2-(3, 4, 5-trihydroxyphenyl)-4-chromenone}], is a widespread flavonol. Its structure is analogous to fisetin and kaempferol only differing in the number of hydroxyl groups [Figure 1]. It has diverse pharmacological functions including antioxidizing as well as pro-oxidizing properties, anti-viral, anti-carcinogenic, mutagenic, anti-atherosclerotic^[3-5] anti-inflammatory, anti-diabetic and neuroprotective activities.^[6-8] It is also reputed to aid prevention of platelet aggregation.^[9,10] Its antioxidizing properties are attributed to the hydrogen donating ability resulting from the multiple hydroxyl groups attached to the aromatic rings.^[11] Research says that bivalent cations such as Fe^{2+} , Zn^{2+} and Ni^{2+} increase chances of lipid oxidation

in cooked fish which degrades its nutritional value; this oxidation process is arrested in presence of MTN.^[11] Studies in mice have revealed that MTN increases muscle strength and tolerance to reduced temperatures.^[12] MTN is useful in inducing apoptosis in carcinogenic liver cells and can benefit the cancer treatment sector.^[13] It has an important role in the inhibition of DNA/RNA replication and repair.^[14]

Recent advances have revealed the indispensable role of RNA in vital cellular processes viz. transcription, translation and a trail of processes leading to protein formation.^[15] The role played by RNA in the progression of critical diseases like HIV AIDS, Hepatitis C and cancer earned it an overwhelming importance.^[16] RNAs undergo allosteric conformational changes carving out suitable pockets for specific drug recognition.^[17] Biological relevance of single-stranded RNA (hereafter ss-RNA) having different sequences namely polyadenylic acid [poly(rA)], polyuridylic acid [poly(rU)], polycytidylic acid [poly(rC)] etc. have been documented in the literature. Poly(rA) is present in the mRNA (messenger RNA) tail. When this tail is bound to a drug, the encoded protein synthesis gets altered.^[18,19] Marshall Nirenberg discovered that poly(rU) encodes the homopolypeptide phenylalanine which has significant effects on depression, pain and skin disorders.^[20] Adenylate and uridylylate also play an imperative role in supervising gene expression during cell growth and differentiation and in immune response.^[21,22]

A lot of research has been carried out on flavonoid-DNA interaction owing to easy availability of DNA in nature and much is known about its structure.^[23-26] Flavonoids like quercetin and kaempferol show high binding affinity towards DNA and RNA duplexes.^[27] Another flavonoid luteolin has been found to stabilize the Hoogsteen paired strand in triple helical RNA.^[28] Compared to DNA, knowledge on structure and

[a] S. Chowdhury, Dr. S. Bhuiya, Dr. L. Haque, Dr. S. Das
 Biophysical Chemistry Laboratory,
 Physical Chemistry Section, Department of Chemistry,
 Jadavpur University, 188, Raja S. C. Mallick Road,
 Kolkata -700032, India
 Tel.: +91-94-3437-3164
 Tel.: +91-33-2457-2349
 Fax: +91-33-2414-6266
 E-mail: sumandas10@yahoo.com

Supporting information for this article is available on the WWW under <https://doi.org/10.1002/slct.202003601>



Amino acid and cinnamaldehyde conjugated Schiff bases as proficient corrosion inhibitors for mild steel in 1 M HCl at higher temperature and prolonged exposure: Detailed electrochemical, adsorption and theoretical study



Sanjoy Satpati^{a,b}, Aditya Suhasaria^a, Subhas Ghosal^a, Abhijit Saha^a, Sukalpa Dey^c, Dipankar Sukul^{a,*}

^a Department of Chemistry, National Institute of Technology, Durgapur 713 209, India

^b Department of Chemistry, Government General Degree College, Tehatta, Nadia 741 160, India

^c Department of Basic Science and Humanities, Dr. B. C. Roy Engineering College, Durgapur 713 206, India

ARTICLE INFO

Article history:

Received 27 September 2020

Accepted 12 December 2020

Available online 27 December 2020

Keywords:

Mild steel

Amino acid-cinnamaldehyde conjugated

Schiff base

Potentiodynamic polarization

Electrochemical impedance

Molecular dynamics

ABSTRACT

Three Schiff bases composing of cinnamaldehyde and three different amino acids, namely glycine (CGSB), histidine (CHSB) and tryptophan (CTSB) have been synthesized and investigated for their anti-corrosion propensity on mild steel in 1 M HCl. Both gravimetric and electrochemical experimentation establish the CTSB as superior inhibitor, while the CGSB as the least effective among the three. Effectiveness of the Schiff bases is tested upto 60 °C for an exposure of 6 h in HCl. Effect of various exposure times, maximum being 96 h, is also investigated at a fixed temperature of 30 °C. All the three inhibitors impart appreciable extent of corrosion inhibition efficiency under these extreme conditions. Thermodynamic adsorption and kinetic parameters ascertain chemisorption of these mixed-type corrosion inhibitors on mild steel. Mode and extent of interaction between Schiff bases and mild steel are evaluated from quantum mechanical calculation and molecular dynamics simulation.

© 2020 Elsevier B.V. All rights reserved.

1. Introduction

Evaluating structure-reactivity correlation remains an important aspect towards devising new and efficient organic corrosion inhibitors for potential industrial application [1–7]. Organic inhibitors available from bio-resources, including essential oils, have gained special attention for their sustainable availability, relative low cost and, most importantly environmental benign characteristics; and are termed as so-called green corrosion inhibitors [8–17]. Cinnamaldehyde, a major constituent of cinnamon oil, is an aromatic compound with a benzene ring and an aldehyde group attached to an unsaturated C = C bond at both ends. This unique combination has bestowed cinnamaldehyde some special properties conducive for its application in medicine [18], as well as in material science as corrosion inhibitor in high acid concentration and at elevated temperature [19–21]. To enhance solubility of cinnamaldehyde in aqueous medium and also to improve its other biological activities, cinnamaldehyde is derivatized in many ways, including formation of Schiff bases [22]. Some of these Schiff bases have been tested for anti-corrosion effectiveness [23–25]. But, no report on the corrosion mitigation by cinnamaldehyde and an amino acid conjugated

Schiff base is available till now. As a matter of fact, such study involving an amino acid Schiff base is very limited. Whatever literature suggests includes benzaldehyde and vanillin as the corresponding aldehyde precursor [26,27]. Amino acids, in general provide relatively lower degree of protection from corrosion for mild steel in aqueous HCl [28]. A Schiff base derived from an amino acid and cinnamaldehyde is expected to yield significant corrosion protection, as it will possess high electron density due to the aromatic moieties and heteroatoms like nitrogen, in addition to C = C and the imine (C = N) bonds. This should facilitate bonding with the metal through transfer a part of excess charge. To accomplish this, we have selected three different amino acids, namely glycine, histidine and tryptophan, which represents gradual enhancement of structural complexity. Corresponding Schiff bases are shown in Table 1 along with their IUPAC nomenclature.

The main objectives of this work are to elucidate the influence of structural factor, spatial orientation, and intrinsic molecular properties of these synthesized Schiff bases towards their adsorption characteristics on mild steel in aqueous HCl (1 M) and the extent of corrosion protection of the metal. In addition, how the conjugation of two naturally available products influence the corrosion inhibitory effect for prolonged time and at higher temperature will be interesting to investigate.

* Corresponding author.

E-mail address: dipankar.sukul@ch.nitdgp.ac.in (D. Sukul).



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

Number of research papers in the Journals notified on UGC CARE list year 2021

Sl No.	Title of Paper	Author	Department	Journal	Link
1	Amino acid and cinnamaldehyde conjugated Schiff bases as proficient corrosion inhibitors for mild steel in 1 M HCl at higher temperature and prolonged exposure: Detailed electrochemical, adsorption and theoretical study	Sanjoy Satpati	Chemistry	Journal of Molecular Liquids	https://www.sciencedirect.com/science/article/abs/pii/S0167732220373190
2	Probing blood plasma samples for the detection of diabetes using SERS aided by PCA and LDA multivariate data analyses	Sumit Kumar Das	Physics	New Journal of Chemistry	https://pubs.rsc.org/en/content/articlehtml/2021/nj/d0nj04508j?casa_token=7DPB5wXsq68AAAAA:9AsfUtZur317LPcR6q-kRjND9BjE0H9L_SgP5q5f5qr60TFiDbikB-ztUS8iTfHDKiRE-NGIQWk4w
3	One-pot facile synthesis and electrochemical evaluation of selenium enriched cobalt selenide nanotube for supercapacitor application.	Ajoy Mandal	Physics	Ceramics International	https://www.sciencedirect.com/science/article/abs/pii/S0272884221004508
4	স্ক্রেন্ডেসমীক্ষার আলোকে লোকপ্তষধ ও চিকিৎসা: তবু একলব্য	Nitish Ghosh	Bangla	Tabu Akolabya	https://portal.issn.org/resource/ISSN/0976-9463




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

5	Variational principle, uniqueness and reciprocity theorems for higher order time-fractional four-phase-lag generalized thermoelastic diffusion model	Md Abul Kashim Molla	Mathematics	Mechanics Based Design of Structures and Machine	https://www.tandfonline.com/doi/full/10.1080/15397734.2021.1882311?casa_token=OcqObQe2aRAAAAAA%3A14yPTmiMzVV4Nu2nfpLW1Ab54W_SNtdifnzFE1jJb_wjgDQ6-k73wkTFVCB3Z5TTwHgS_yJFhPdp-
6	Nitrogen vacancy and hydrogen substitution mediated tunable optoelectronic properties of g-C ₃ N ₄ 2D layered structures: applications towards blue LED to broad-band photodetection.	Ajoy Mandal	Physics	Applied Surface Science	https://www.sciencedirect.com/science/article/abs/pii/S0169433221008497
7	Interface engineering of moisture-induced ionic albumen dielectric layers through self-crosslinking of cysteine amino acids for low voltage, high-performance organic field-effect transistors.	Ajoy Mandal	Physics	Nanoscale	https://pubs.rsc.org/en/content/articlelanding/2021/nr/d1nr02759j/unauth
8	Fuzzy Membership Function Evaluation by Non-Linear Regression: An Algorithmic Approach	Supratim Mukherjee	Mathematics	Fuzzy Information and Engineering	https://www.tandfonline.com/doi/full/10.1080/16168658.2021.1911567
9	Silver nanodot decorated dendritic copper foam as a hydrophobic and mechano-chemo bactericidal surface.	Ajoy Mandal	Physics	Langmuir	https://pubs.acs.org/doi/abs/10.1021/acs.langmuir.1c00698




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

10	শান্তি প্রতিষ্ঠা, মানবাধিকার রক্ষা এবং আজকের আফগানিস্তান	Avijhit Saha	Political Science	Aparjan	https://aparjan.com/2021/09/30/september2021-avsaar/
11	গান্ধীজীর সত্যগ্রহ: একটি নৈতিক এবং রাজনৈতিক অস্ত্র	Raghnath Roy	History	Ebong Mohua	https://abcdindex.com/Journal/Ebong-Mahua-(print-only)-NA
12	Comparative binding studies on the interaction of the indoloquinoline alkaloid cryptolepine with the B and the non-canonical protonated form of DNA: A spectroscopic insight	Susmita Chowdhury	Chemistry	Biochimica et Biophysica Acta (BBA) - General Subjects	https://www.sciencedirect.com/science/article/pii/S0304416521001525?casa_token=kDThpgnjoYUAAAAA:sFnm_i_AbRrBKGv56vx5145shIcsqVcILg3ztZzwC2UwpJM8kgwDSjVL33u_TRwHU93kPRDP46A
13	The alkaloid cryptolepine as a source of polyadenylate targeting therapeutic agent: Induction of self-assembly in the polyadenylate moiety	Susmita Chowdhury	Chemistry	Archives of Biochemistry and Biophysics	https://www.sciencedirect.com/science/article/pii/S0003986121002915?casa_token=8Nut1O3T-TAAAAA:5XFZILwrwFT-r-Dvb8GegDkFjSXZhLg6GEXy26I2wF8fjp1W5dXG6cZXEap-MS0qhLCtbuRLzxg
14	বাংলা সাহিত্যে আফগান প্রসঙ্গ অনুসন্ধান	Shubhadi P Debnath	Bangla	Aparjon	https://aparjan.com/2021/09/30/september2021-shdear/
15	Time-Nonlocal Six-Phase-Lag Generalized Theory of Thermoelastic Diffusion with Two-Temperature	Md Abul Kashim Molla	Mathematics	Waves in Random and Complex Media	https://www.tandfonline.com/doi/full/10.1080/17455030.2021.1974601?casa_token=qv8o5ATo3tQAAAAA%3AQk-vhijs2EavSdcUIv0IwzZHZEIvF4sMcnk6EYOCjQcY3hbjz7T4IopmoUy_14bC_6OEE2r2Olze




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160



Cite this: *New J. Chem.*, 2021, 45, 2670

Probing blood plasma samples for the detection of diabetes using SERS aided by PCA and LDA multivariate data analyses†

Sumit Kumar Das,^{ab} Tara Shankar Bhattacharya,^c Manash Ghosh^d and Joydeep Chowdhury^{ib}*^a

The present paper reports the fabrication of an effective and reproducible SERS-active substrate for detecting individuals with “normal”, “moderately high” and “very high” diabetic conditions from the enhanced vibrational signatures of their respective label-free blood plasma samples. The SERS-active substrate has been fabricated by entrapping gold nanoparticles in the Langmuir-Reverse Schaefer film matrix of 5-CB liquid crystal molecules. The chemical composition of the as-fabricated substrate has been unveiled from the XPS spectrum, while the morphological features of the substrate are explored using FESEM and AFM images. The SERS efficacy of the substrate is primarily tested with 4-mercaptopyridine molecules. The experimental observations are supported by multivariate data analyses. The as-fabricated substrate is proved to have the unique efficacy to detect the SERS spectra of many types of molecules present in blood plasma samples, whose upregulation in diabetic patients is correlated with their glucose levels. We believe that the as-prepared SERS-active substrate can be used as a suitable alternative not only for detecting glucose levels indirectly from blood plasma samples but also in other real-world diagnostic applications.

Received 8th September 2020,
Accepted 6th January 2021

DOI: 10.1039/d0nj04508j

rsc.li/njc

1. Introduction

Diabetes of both type-I and type-II is a fatal disease and is increasingly affecting not only aged individuals but is also reported to be significantly prevalent in children and in young adults these days. Uncontrolled diabetes is considered to be a “silent killer” and is known to promote serious complications in vital organs like the heart and kidneys. Moreover it can lead to blindness, tissue damage, brain strokes and lower limb dysfunctions.^{1,2} According to the recent report of the World Health Organization (WHO), about 422 million people are living with diabetes worldwide accounting for around 1.6 million mortalities each year.³ There are several methods such as electrochemical,^{4,5} hexokinase,⁶ colorimetric conductimetry,⁷ laserpolarimetry⁸ and flourescence^{9,10} techniques that have been developed so far in monitoring glucose levels in blood.

Home monitoring and diagnostic laboratories commonly use enzymatic and hexokinase (HK) methods to detect glucose levels in blood. Enzymatic methods are the underlying techniques that are being applied in self-monitoring blood glucose (SMBG) and continuous-glucose-monitoring (CGM) devices to detect glucose levels directly from blood samples collected by pricking the fingers. The enzymatic and HK techniques are indirect methods of detecting glucose, relying on electrical signals and optical density (OD) measurements, respectively. Both techniques have their respective merits and demerits and are extensively discussed in various literature.^{4–6,11,12} However, neither of these techniques involve direct detection of glucose nor provide information about the vibrational signatures of detected glucose molecules, which are considered to be scientifically more precise and at times deterministic towards successful detection of blood glucose levels.^{13–18}

In this regard, surface enhanced Raman scattering (SERS) spectroscopy has emerged as a wonderful analytical tool and has the power to detect vibrational signatures of molecules at trace concentrations down to the single molecule detection limit.^{19–23} It involves large enhancements of Raman signals from molecules when they are adsorbed in the proximity of the plasmonic nanoparticles. The enhancement occurs due to the generation of gap plasmons on the SERS-active substrates, which in turn results from the excitation of surface like surface

^a Department of Physics, Jadavpur University, Kolkata 700032, India.

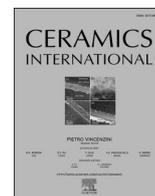
E-mail: joydeep72_c@rediffmail.com, joydeep.chowdhury@jadavpuruniversity.in

^b Department of Physics, Government General Degree College at Tehatta, Nadia 741160, India

^c Department of Physics, Bose Institute, 93/1 APC Road, Kolkata-700009, India

^d Department of Spectroscopy, Indian Association for the Cultivation of Science, Jadavpur, Kolkata 700032, India

† Electronic supplementary information (ESI) available. See DOI: 10.1039/d0nj04508j



One-pot facile synthesis and electrochemical evaluation of selenium enriched cobalt selenide nanotube for supercapacitor application

Suvani Subhadarshini^a, Eluri Pavitra^b, Ganji Seeta Rama Raju^d, Nilesh R. Chodankar^d,
Ajoy Mandal^e, Satyajit Roy^e, Suman Mandal^e, M.V. Basaveswara Rao^f, Dipak K. Goswami^{a,e},
Yun Suk Huh^{b,**}, Narayan C. Das^{a,g,*}

^a School of Nano Science and Technology, Indian Institute of Technology Kharagpur, India

^b Department of Biological Engineering, NanoBio High-Tech Materials Research Center, Inha University, South Korea

^d Department of Energy and Materials Engineering, Dongguk University-Seoul, Seoul, South Korea

^e Department of Physics, Indian Institute of Technology Kharagpur, India

^f Department of Chemistry, Krishna University, Machilipatnam, India

^g Rubber Technology Centre, Indian Institute of Technology Kharagpur, India

ARTICLE INFO

Keywords:

Cobalt selenide
Nanotube
Binder-less
Asymmetric
Supercapacitor

ABSTRACT

The present study emulates a one-pot facile synthesis of selenium-enriched CoSe nanotube using a chemical bath deposition (CBD) procedure. Schematic incorporation of 3D Ni foam current collectors as substrates for the growth of CoSe–Se nanotubes helped us achieve a binder-less thin film coating. The controlled synthesis of CoSe–Se nanotube was carried out by optimizing the temperature and time of the deposition. CoSe–Se nanotubes were grown on a porous Ni foam substrate using lithium chloride as a shape directing agent. The study found that the one dimensional structure of the nanotubes with porous nature results in an uninterrupted network of electroactive sites. Due to the superior conductivity, the as-fabricated material exhibited excellent rate capability and a higher degree of electrolyte ion diffusion across the CoSe–Se crystal structure. The CoSe–Se@Ni foam electrodes exhibited a specific capacitance of 1750.81 F g⁻¹ at 1 A g⁻¹. The electrode exhibited excellent cycling stability and showed a capacitance retention of 95% after 4000 charge-discharge cycles. Finally, an asymmetric supercapacitor (ASC) device was fabricated with the as-synthesized CoSe–Se@Ni foam electrode as the cathode, activated carbon@Ni foam electrode as the anode, and a thin filter paper separator soaked in 1 M aqueous KOH electrolyte solution. The ASC device showed a specific capacitance value of 106.73 F g⁻¹ at 0.5 A g⁻¹, and achieved an energy density of 37.94 Wh kg⁻¹ at a power density of 475.30 W kg⁻¹. The ASC device was utilized in an extended potential window of 1.6 V. The fabricated device displayed exceptional cycling stability with a capacitance retention of 93% after 5000 charge-discharge cycles.

1. Introduction

Excessive exploitation of fossil fuels for energy requirements of human civilization has resulted in ecological imbalance and pollution-related detrimental effects. To overcome the problems extensive studies are underway for sustainable and alternate energy sources [1–3]. Also, due to numerous ecological factors, renewable sources of energy suffer from discontinuous energy supply. Hence to utilize the non-conventional sources of energy continuously the energy-storing devices play a key role. Batteries and supercapacitors have established

themselves as efficient energy storage devices. Supercapacitors in contrast to batteries exhibit properties like better operational life, excellent rate of charge-discharge cycles, safe operation, and exceptionally high power density values [4]. Further, they are not only economical but also easy to fabricate. Lately, supercapacitor electrodes made up of porous carbon, metal oxides, metal sulfides, and conductive polymer-based materials have been widely reported [5,6]. But the reported materials have their inherent associated shortcomings. Supercapacitor electrodes made up of carbon evince moderate specific capacitance value. In case of conducting polymer and metal oxide-based

* Corresponding author. Rubber Technology Centre, Indian Institute of Technology, Kharagpur, 721302, India.

** Corresponding author. Department of Biological Engineering, NanoBio High-Tech Materials Research Center, Inha University, 402-751, South Korea.

E-mail addresses: yunsuk.huh@inha.ac.kr (Y.S. Huh), ncdas@rtc.iitkgp.ac.in (N.C. Das).

<https://doi.org/10.1016/j.ceramint.2021.02.093>

Received 18 November 2020; Received in revised form 23 January 2021; Accepted 10 February 2021

Available online 16 February 2021

0272-8842/© 2021 Elsevier Ltd and Techna Group S.r.l. All rights reserved.

ISSN : 0976-9463
Issue 26, Vol. 41
January - March 2021

অনু একমব

বিশেষ সংখ্যা
লোকসংস্কৃতি
ও
লোকসাহিত্য

UGC Approved Peer-Reviewed Research Journal on Arts and Humanities



সম্পাদনায়

দীপঙ্কর মল্লিক • দেবারতি মল্লিক



দি গৌরী কালচারাল অ্যান্ড এডুকেশনাল অ্যাসোসিয়েশন

81

TABU EKOLABYA

ISSN 0976-9463

তবু একলব্য

কলা ও মানববিদ্যা বিষয়ক গবেষণা পত্রিকা

২৬ বর্ষ • ৪১ সংখ্যা • ২০২১

TABU EKALABYA

UGC Approved International Peer-Reviewed (Refereed)
Research Journal on Arts & Humanities

UGC-CARE LISTED JOURNAL, SL. NO. 16

লোকসংস্কৃতি ও লোকসাহিত্য
বিশেষ সংখ্যা



দি গৌরী কালচারাল এন্ড এডুকেশনাল অ্যাসোসিয়েশন
সমাজ-সংস্কৃতি-সাহিত্য গবেষণাকেন্দ্র



TABU EKALAVYA

UGC Approved International Peer-Reviewed (Refereed) Research

Journal on Arts & Humanities

ISSUE 26, Vol. 41 • October - December, 2020

2nd Edn. : May 2021

ISSN : 0976-9463

প্রথম প্রকাশ : ২৫ ডিসেম্বর, ২০২০

দ্বিতীয় প্রকাশ : ২৫ বৈশাখ/৯ মে ২০২১

TABU EKALAVYA

Chief Advisor	: Swami Shastrajnananda Selina Hossin Ramkumar Mukhopadhyay Soma Bandyopadhyay Sadhan Chattopadhyay
President	: Biplab Majee
Vice-President	: Tapan Mandal
Executive Editor	: Sushil Saha
Editor	: Debarati Mallik
Joint Editor	: Tapas Pal
Editor-in-Chief	: Dipankar Mallik
e-mail	: tobuekalabya@gmail.com / tabuekalavya@gmail.com
Website	: www.tabuekalabya.in
facebook	: তবু একলব্য গবেষণা পত্রিকা
গ্রুপ	: তবু একলব্য গবেষণা পত্রিকা

প্রাপ্তিস্থান : দে'জ, দিয়া, দে বুক স্টোর (দীপু), পাতিরাম, ধ্যানবিন্দু, পাতাবাহার

মূল্য : ৪০০ টাকা





লোকসংস্কৃতি ও লোকসাহিত্য

মুখবন্ধের অভিমুখ	
লোকসংস্কৃতি ও লোকসাহিত্য : পাঠের ভূমিকা	১৩
দীপঙ্কর মল্লিক	
লোকসংস্কৃতি ঠিক কোন্ সংস্কৃতি	৫৫
সৌগত চট্টোপাধ্যায়	
কিরে দেখা	
বাংলার লোকউৎসব : তৃপ্তিহীন জিজ্ঞাসা ও মহান সম্বল	৫৯
তুবাব চট্টোপাধ্যায়	
পশ্চিমবঙ্গের লোকনৃত্যের ভূমিকা	৭১
সনৎকুমার মিত্র	
বাংলার লোকধর্ম ও লৌকিক দেবতা	৮১
সোপাল কুম্ব বসু	
বৃপকথা চর্চার সমস্যা ও বাংলা বৃপকথার প্রাচীনত্ব	৯০
অবুধকুমার রায়	
বাংলা লোকনাট্যে জীবন পাঠ	৯৯
মানিক সরকার	
বাক্যকেন্দ্রিক লোকসংস্কৃতি	
● ছড়া	১০৫
'ছড়া' প্রসঙ্গে রবীন্দ্রনাথ	
প্রতিন দত্ত	১১০
বাংলার লোকছড়া	
অম্বুরা মিত্র	
'সুমপাড়ানি ছড়া' থেকে 'সুমতাড়ানী ছড়া' : বাংলা ছড়ার বিবর্তনের ইতিহাস	১২০
অলোকদ্যুতি নন্দী	
● প্রবাদ-প্রবচন	১৩১
মিত্র অসমের ব্রহ্মপুত্র উপত্যকার চর অঞ্চলে প্রচলিত প্রবাদ	
আনন্দ ঘোষ	১৩৭
সাগর দ্বীপের প্রচলিত প্রবাদ	
বিনয় পাত্র	

লোকায়ত দেবী শীতলা ও শীতলাখ্যান গৌতম দাস	৫৩৬
পূজাপার্বণ-লোকউৎসব-লোকঅনুষ্ঠান	
● পূজাপার্বণ	
উত্তরবঙ্গের ক্ষত্রিয় রাজবংশী সমাজের পূজো-পার্বণ প্রাসেনজিৎ রায়	৫১৪
● মেলা	
মালগড়িয়া অশুবাটীর মেলা তমাল পাল	৫২০
মেলা : সাম্প্রদায়িক সম্প্রীতির মেলবন্দনে লোকজীবনের উৎসব অনিন্দিতা মুখার্জী চৌধুর	৫২৩
● গাজন	
লোকায়ত সংস্কৃতি চর্চায় কালুরায়ের গাজন : একটি সমীক্ষা মমতা খাঁ	৫৩০
● লোকউৎসব	
গাসি উৎসব প্রদীপ মণ্ডল	৫৩৫
ক্রীড়াকেন্দ্রিক লোকসংস্কৃতি-লোকক্রীড়া	
পূর্ব মেদিনীপুরের লোকক্রীড়া : একটি ক্ষেত্র-সমীক্ষামূলক অনুসন্ধান সোনালি গিরি	৫৪০
বাংলার লোকসংস্কৃতিতে লোকক্রীড়ার প্রভাব মহঃ আবু নাসিম	৫৪৬
ভরহই ও ডুয়ার্স অঞ্চলের লোকক্রীড়া : একটি সমীক্ষা ড. রিপন কুমার সাহা	৫৫৩
লোকঔষধ ও লোকচিকিৎসা	
ক্ষেত্রসমীক্ষার আলোকে লোকঔষধ ও চিকিৎসা নীতীশ ঘোষ	৫৬০
লোকচিকিৎসার স্বরূপ ও পর্যালোচনা আকবর হোসেন	৫৬৮
সাহিত্যে লোকায়ত পাঠ অনুসন্ধান	
'গণদেবতা' উপন্যাসে লোকায়ত উৎসব-অনুষ্ঠান পরিতোষ মণ্ডল	৫৭২
আশাপূর্ণা দেবীর 'প্রথম প্রতিশ্রুতি' উপন্যাসে প্রবাদ প্রয়োগের প্রাসঙ্গিকতা সুদেয়া কোনার	৫৭৯
লোকউৎসবের আলোকে 'তিতাস একটি নদীর নাম' প্রীতম মণ্ডল	৫৮৫
তিতাস তীরের লোকসংস্কৃতি ও লোকজীবন নিলায় বস্তু	৫৮৯

পর্ব : ১২

৩ লোকঔষধ ও চিকিৎসা

ক্ষেত্রসমীক্ষার আলোকে লোকঔষধ ও চিকিৎসা নীতীশ ঘোষ

ওঝা, গুণিন, দাইমা প্রভৃতি সম্প্রদায় লোকচিকিৎসক নামে পরিচিত। এই সম্প্রদায়ের মানুষজন যে ধরনের ঔষধ ব্যবহারে অভ্যস্ত, তাই হল লোকঔষধ। স্বরণাতিত কাল থেকে মানুষ আপদে-বিপদে, বিভিন্ন প্রকারের রোগ যন্ত্রণার হাত থেকে রেহাই পেতে এই লোকচিকিৎসকদের শরণাপন্ন হয়েছে। ভুলের পর ভুল শোধন এবং গোষ্ঠীগত ব্যবহারে সাফল্যপ্রাপ্তি লোকঔষধ প্রচলনের অন্যতম মানদণ্ড। পরে ধীরে ধীরে জন্ম হয়েছে লোকজ চিকিৎসার পরিশীলিতরূপ। বর্তমান সময়ে এই লোকঔষধ ও লোকচিকিৎসার স্বরূপ ও অবস্থানটি কেমন, মুর্শিদাবাদ জেলার খরগ্রাম থানার নির্দিষ্ট কতগুলি গ্রামঞ্চলের উপর ভিত্তি করে ক্ষেত্রসমীক্ষার আলোকে উক্ত বিষয়গুলির অনুসন্ধান এই গবেষণাপত্রটির মূল ভরকেন্দ্র। কতগুলি জিজ্ঞাসাকে সামনে রেখে ক্ষেত্রসমীক্ষা করা হয়েছে। যেমন—

১. লোকচিকিৎসা প্রণালীর সাথে যুক্ত হওয়ার কারণ কী
২. কতদিন ধরে এই পেশার সঙ্গে যুক্ত আনুমানিক কতজনের চিকিৎসা করেছেন সাফল্যের হার কেমন
৩. তার আয়ের উৎস কী চিকিৎসক হিসেবে কী ধরনের পারিশ্রমিক নেওয়া হয় বা পারিশ্রমিকের পরিমাণ
৪. লোকচিকিৎসকের কী কী গুণ থাকা আবশ্যিক
৫. কোন্ কোন্ রোগের চিকিৎসা করে থাকেন
৬. কী ধরনের ঔষধ ও চিকিৎসা প্রণালী ব্যবহার করা হয়ে থাকে
৭. তাঁদের মতে এই চিকিৎসার বর্তমান অবস্থান ও ভবিষ্যৎ
৮. মানুষের সার্বিকরূপে ভালো থাকার ক্ষেত্রে তাদের মতামত গ্রহণ

এই মূল কতগুলি জিজ্ঞাসাকে সামনে রাখতে গিয়ে উঠে এসেছে গুণিনদের আর্থ-সামাজিক প্রেক্ষাপট। যা আমাদের আলোচনাকে অন্য মাত্রা দিতে সক্ষম। লোকচিকিৎসকগণের সঙ্গে সাক্ষাৎকার পরবর্তী আলোচনায় তুলে ধরা হয়েছে। তার উপর ভিত্তি করে সাম্প্রতিক সময়ের নিরিখে লোকঔষধ ও লোকচিকিৎসাকেন্দ্রিক একটি সিদ্ধান্তে আসার চেষ্টা করা হয়েছে। সাক্ষাৎগ্রহণকালীন যে যে রোগ, লোকঔষধ ও লোকচিকিৎসাপদ্ধতি জানা গেছে, সেগুলি হলো—

৩ দুফুর্যা জ্বর : এই ধরনের জ্বরে আক্রান্ত রোগীরা সাধারণত সকালের দিকে ভালো



Variational principle, uniqueness and reciprocity theorems for higher order time-fractional four-phase-lag generalized thermoelastic diffusion model

Md Abul Kashim Molla and Sadek Hossain Mallik 

Department of Mathematics and Statistics, Aliah University, Kolkata, India

ABSTRACT

In the present paper, a variational principle is derived for the recently introduced higher order time-fractional four-phase-lag generalized thermoelastic diffusion model for a linear, isotropic and homogeneous thermoelastic diffusive continuum. Then uniqueness of the solution for the governing field equations of the considered model is proved under suitable conditions. Finally a reciprocity theorem is obtained for the said model.

ARTICLE HISTORY

Received 26 October 2020
Accepted 25 January 2021

KEYWORDS

Four-phase-lag generalized thermoelastic diffusion; higher order time-fractional Caputo derivative; reciprocity theorem; uniqueness theorem; variational principle

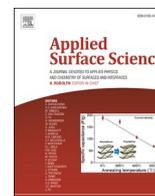
2010 MATHEMATICS SUBJECT CLASSIFICATION

74F

1. Introduction

Generalized thermoelasticity, a new mile-stone in the theories of thermoelasticity, prevails over the vital imperfections of classical theories of thermoelasticity. Lord and Shulman (1967) are the two pioneers who contributed first heavily to the coupled thermoelasticity by introducing generalized theory of thermoelasticity through alteration of the parabolic nature of the heat conduction equation to hyperbolic nature. They did this revolutionary change in the nature of the heat conduction equation by incorporating a relaxation time parameter in the Fourier's law of heat conduction and in doing so, the unrealistic phenomenon of infinite speed of thermal wave propagation was replaced by practical observation of finite speed of propagation of thermal waves. Later on a bunch of generalized thermoelastic theories viz., Green-Lindsay theory (Green and Lindsay 1972), Green-Naghdi theories (Green and Naghdi 1991, 1992, 1993), dual-phase-lag theory (Tzou 1995) and three-phase-lag theory (Choudhuri 2007) were introduced. Several works related to these theories are available in the articles (Abbas, Abd-Alla, and Othman 2011; Abbas, 2014; Abbas and Abo-Dahab 2014; Abbas and Zenkour 2014; Hobiny and Abbas 2017, 2018; Othman and Eraki 2017; Biswas 2019; El-Attar, Hendy, and Ezzat 2019; Kalkal, Gunghas, and Deswal 2020; Mondal and Kanoria 2020; Saeed, Abbas, and Marin 2020). It is to mention that generalized thermoelastic theories are more acceptable in compare to the classical thermoelastic

CONTACT Sadek Hossain Mallik  sadek.math@aliah.ac.in  Department of Mathematics and Statistics, Aliah University, Kolkata, India.
Communicated by Makoto Ohsaki.



Full Length Article



Nitrogen vacancy and hydrogen substitution mediated tunable optoelectronic properties of g-C₃N₄ 2D layered structures: Applications towards blue LED to broad-band photodetection

Arnab Ghosh^{a,h,*}, Himanshu Saini^c, Arijit Sarkar^d, Puspendu Guha^e, Aneeya K. Samantara^{f,g}, Ranjit Thapa^c, Suman Mandal^a, Ajoy Mandal^a, J.N. Behera^{f,g}, Samit K. Ray^a, Dipak K. Goswami^{a,b,*}

^a Department of Physics, Indian Institute of Technology Kharagpur, Kharagpur 721302, India

^b School of Nanoscience and Technology, Indian Institute of Technology Kharagpur, Kharagpur 721302, India

^c Department of Physics, SRM University – AP, Amaravati 522240, Andhra Pradesh, India

^d Advanced Technology Development Center, Indian Institute of Technology Kharagpur, Kharagpur 721302, India

^e Institute of Physics, SachivalayaMarg, Bhubaneswar, Odisha 751005, India

^f National Institute of Science Education and Research (NISER), Khordha, Odisha 752050, India

^g Homi Bhabha National Institute (HBNI), Mumbai, India

^h Department of Physics, Belda College, Belda 721424, India

ARTICLE INFO

Keywords:

Tailored g-C₃N₄

Optical/electronic properties modulation

PL quenching

Blue LED

2D/3D broad-band photodetection

ABSTRACT

Graphitic carbon nitride (g-C₃N₄), a 2D-organic semiconductor, has rapidly emerged as a potential alternative to the 2D-inorganic semiconductors in photocatalysis, but rare studies have been made hitherto about its applicability in optoelectronic devices. Considering the specific requirements of light-emitting diodes with efficient recombination of injected-carriers and photodetector devices with better charge separation, this work deals with synthesizing two variants of g-C₃N₄ samples with exclusively modified optical/electronic properties while keeping its basic structural framework. One sample is two-coordinated nitrogen deficient g-C₃N₄ (Nd-gCN) having very high photoluminescence (PL) and the other is hydrogen substituted g-C₃N₄ (H-gCN) exhibiting vanishingly low PL and ≈ 0.66 eV smaller bandgap than Nd-gCN. Role of nitrogen-vacancy and hydrogen substitution towards modulating optical/electronic properties of g-C₃N₄ are studied by combining experiments and density functional theory. Following strong luminescence, Nd-gCN sample manifests visibly blue emission in light-emitting devices; contrarily H-gCN sample shows potential in demonstrating efficient broadband photodetection. Besides moderate self-powered feature, photodetectors perform best at -5.0 V, corresponding to the highest responsivity $R_\lambda = 0.34$ A/W, $EQE_\lambda = 59\%$ and response time (0.18/0.29 sec). Efficient broadband photodetection performance of the heterojunction-devices is ascribed to the conjunct effects of drastic reduction in photogenerated carrier recombinations (PL quenching) and broadening of absorption regime facilitated by reduced bandgap and Si self-absorption.

1. Introduction

In the field of optoelectronics, considering major three classes of devices, such as photodetectors, light-emitting diodes (LEDs) and photovoltaics, two-dimensional (2D) layered materials have gathered comprehensive interest as a key element for next-generation devices owing to their unique properties emerging from atomic-level thickness, smaller than the mean free path that allows ballistic transportation of

the carriers including electrons, holes, excitons, and phonons [1–4]. In the last few decades' extensive research on 2D prototype optoelectronic devices [5–13] has been carried out with graphene and beyond, particularly 2D transition metal dichalcogenides (TMDs), hexagonal boron nitride (h-BN) [5], and black phosphorus [6]. Despite the considerable success that has already been witnessed in series of inorganic 2D layered materials, there are few challenges and drawbacks, such as, lack of cost-effective large-scale production, printable and

* Corresponding authors.

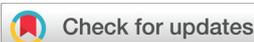
E-mail addresses: ghoarnab@gmail.com (A. Ghosh), dipak@phy.iitkgp.ac.in (D.K. Goswami).

<https://doi.org/10.1016/j.apsusc.2021.149773>

Received 22 December 2020; Received in revised form 9 March 2021; Accepted 4 April 2021

Available online 9 April 2021

0169-4332/© 2021 Published by Elsevier B.V.



Cite this: *Nanoscale*, 2021, **13**, 11913

Interface engineering of moisture-induced ionic albumen dielectric layers through self-crosslinking of cysteine amino acids for low voltage, high-performance organic field-effect transistors†

Suman Mandal,^a Ajoy Mandal,^a Shiv Prakash Verma^b and Dipak K. Goswami  ^{a,b}

The interface roughness between the semiconducting and dielectric layers of organic field-effect transistors (OFETs) plays a crucial role in the charge transport mechanism through the device. Here we report the interface engineering of a moisture induced ionic albumen material through systematic control of the temperature-dependent self-crosslinking of cysteine amino acids in the dielectric layer. The evolution of the surface morphologies of albumen and pentacene semiconducting films has been studied to achieve a smooth interface for enhanced charge transport. A structural transition of pentacene films from crystalline dendrite to amorphous was induced by the higher surface roughness of the albumen film. The devices showed a high transconductance of 11.68 μS at a lower threshold voltage of -0.9 V.

Received 30th April 2021,

Accepted 27th May 2021

DOI: 10.1039/d1nr02759j

rsc.li/nanoscale

Introduction

During the last few decades, organic electronics have taken a paradigm shift due to the significant improvements achieved in the performance of organic field-effect transistors (OFETs). The low-power consumption, cost-effective, lightweight and easily processable natures of OFETs have received tremendous attention due to their suitability in diverse fields of applications, such as radio-frequency identification tags (RFID),^{1,2} display technology,^{3–5} integrated circuits,^{6,7} electronic skins,^{8,9} memory devices,^{10–12} and various sensors and detectors.^{13–17} In general, charge transport through organic semiconducting films is poor due to the weak interaction between the molecules. However, the charge transport through OFETs takes place through charge accumulation at the interface between the semiconductor and dielectric layer. Therefore, the formation of a well-defined interface is crucial for the fabrication of high-performance OFETs. The rough interfaces of the semiconductor/dielectric layers may introduce excess trap densities that can significantly reduce the device's carrier mobility.^{18,19} Therefore, systematic engineering of this interface is essential for the fabrication of high-performance OFETs. The higher capacitance of the gate dielectric layer is also necessary to reduce the operating voltage. Besides, the

thickness of the gate dielectric layer defines the capacitance that controls the charge accumulation at the semiconducting/dielectric interface. Therefore, this interface crucially decides the transconductance (g_m), which is related to the field-effect carrier mobility of the devices. Several polymer based dielectric materials are used as dielectric layers to fabricate high performance flexible OFETs.^{20–22} However, the operating voltages of many of these OFETs are relatively high (>5 V) and the devices also suffer from higher leakage currents. Therefore, cross-linking of the polymer dielectric materials using various cross-linking agents is employed to reduce the operating voltage and leakage current.^{23–25}

Biodegradable materials, such as proteins, like gelatin, keratin, and silk protein, have been used as a dielectric layer to achieve low operating voltage OFETs.^{26–29} Interestingly, the reported protein-based OFETs showed very high performance in terms of carrier mobility, although the transconductance of the device is relatively poor. The overestimation of carrier mobility has recently been an issue for higher carrier mobility based OFETs.³⁰ The calculation of carrier mobility can be affected by various parameters, like contact resistances, the frequency-dependent capacitance of the gate dielectric, and the presence of kinks or double slopes in the transfer curves.^{30,31} A biopolymer-based dielectric material very often contains ions and polar groups, which induce slow polarization under the gate field. Therefore, the responses of such polar and ionic components are significantly high at a lower frequency operation.³¹ So, the device mobility should be measured considering the capacitance at the low-frequency region for such types of biopolymer-based OFETs. However, it is challenging to

^aOrganic Electronics Laboratory, Department of Physics, Indian Institute of Technology Kharagpur, Kharagpur – 721302, India. E-mail: dipak@phy.iitkgp.ac.in

^bSchool of Nanoscience and Technology, Indian Institute of Technology Kharagpur, Kharagpur – 721302, India

†Electronic supplementary information (ESI) available. See DOI: 10.1039/d1nr02759j

Fuzzy Membership Function Evaluation by Non-Linear Regression: An Algorithmic Approach

Rupak Bhattacharyya ^a and Supratim Mukherjee ^b

^aBijoy Krishna Girls' College, Howrah, India; ^bGovernment General Degree College at Tehatta, Nadia, India

ABSTRACT

In most researches on fuzzy sets and its application, it is found that the consideration of membership function is predetermined and mostly linear in nature. Extraction and evaluation of non-linear fuzzy membership function that can update itself with in different paradigms is still a matter of great concern to researchers. Here, we discuss 33 different membership function evaluation methodologies published between 1971 and 2016. In a approach to solve the problem, this paper presents a novel algorithm based non-linear fuzzy membership function evaluation scheme with the help of regression analysis and algebra. Three different case studies are done to check the applicability and tractability of the method. A comparative analysis with recent literature justifies the robustness of the proposed method.

ARTICLE HISTORY

Received 16 April 2019
Revised 27 July 2020
Accepted 24 March 2021

KEYWORDS

Fuzzy sets; membership function; membership curve; non-linear regression

1. Introduction

A fuzzy set is a collection of elements with a continuum of grades of membership. It is characterized by membership function, which assigns to each object a grade of membership in the real interval $[0, 1]$. The notion of a fuzzy set provides a convenient point of departure for the construction of a conceptual framework used in ordinary sets, and, may prove to have a much wider scope of applicability, particularly in the fields of pattern classification, information processing and statistical process control.

Essentially, such a framework provides a natural way of dealing with problems in which the source of imprecision is the absence of sharply defined criteria of class membership. For most control-oriented problems, it is assumed that the membership functions are linear and usually triangular. However, for other problems, these triangular membership functions are not appropriate, as they do not represent accurately the linguistic terms, which are being modeled. Therefore, it will have to elicit directly from the expert.

The number of possible membership functions should not be arbitrary. As the number of membership functions increases, the precision of the system may increase too; but its relevance will decrease. In the limit, when the number of membership functions approaches the number of data, a fuzzy system becomes a numeric system.

CONTACT Supratim Mukherjee  raja_lalbagh@yahoo.co.in

Silver Nanodot Decorated Dendritic Copper Foam As a Hydrophobic and Mechano-Chemo Bactericidal Surface

Suvani Subhadarshini, Rashika Singh, Ajoy Mandal, Satyajit Roy, Suman Mandal, Samik Mallik, Dipak K. Goswami, Amit K. Das, and Narayan C. Das*



Cite This: *Langmuir* 2021, 37, 9356–9370



Read Online

ACCESS |



Metrics & More

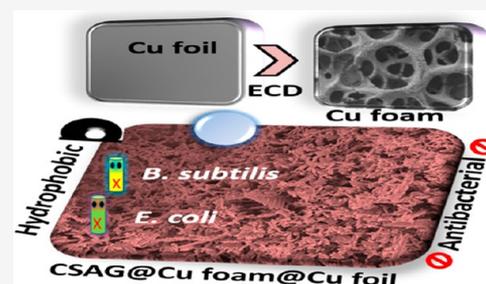


Article Recommendations



Supporting Information

ABSTRACT: The present work investigates the time-dependent antibacterial activity of the silver nanodot decorated dendritic copper foam nanostructures against *Escherichia coli* (Gram-negative) and *Bacillus subtilis* (Gram-positive) bacteria. An advanced antibacterial and antifouling surface is fabricated utilizing the collective antibacterial properties of silver nanodots, chitosan, and dendritic copper foam nanostructures. The porous network of the Ag nanodot decorated Cu foam is made up of nanodendrites, which reduce the wettability of the surface. Hence, the surface exhibits hydrophobic nature and inhibits the growth of bacterial flora along with the elimination of dead bacterial cells. The fabricated surface exhibits a water contact angle (WCA) of $158.7 \pm 0.17^\circ$. Specifically, we tested the fabricated material against both the Gram-positive and Gram-negative bacterial models. The antibacterial activity of the fabricated surface is evident from the growth inhibition percentage of bacterial strains of *Escherichia coli* ($72.30 \pm 0.60\%$) and *Bacillus subtilis* ($48.30 \pm 1.71\%$). The micrographs obtained from scanning electron microscopy (SEM), transmission electron microscopy (TEM), and atomic force microscopy (AFM) of the treated cells show the damaged cellular structures of the bacteria, which is strong evidence of successful antibacterial action. The antibacterial effect can be attributed to the synergistic mechano-chemo mode of action involving mechanical disruption of the bacterial cell wall by the nanoprotusions present on the Cu dendrites along with the chemical interaction of the Ag nanodots with vital intracellular components.



1. INTRODUCTION

Bacterial infections have successfully rooted themselves in society and are one of the leading causes of death worldwide. To cope with the present situation, common antibacterial materials are often used frequently and excessively, resulting in further intricate outcomes like bacterial resistance against common antibacterial agents and biofouling.¹ Research and development of strategically engineered nanomaterials that offer superior inhibition and resistance to bacterial colonization have achieved great attention due to their growing demand in domestic, medical, and industry-based applications.^{2,3} Silver- and copper-based nanomaterials have attracted considerable attention due to their nontoxic nature toward healthy human cells and toxic attributes toward pathogenic organisms, with the former having greater efficiency than the latter.^{4–11}

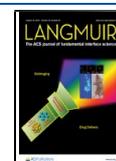
Metal nanodots/nanoclusters belong to the subnanometer terrain bridging the gap between molecules and nanoparticles. Their notable physiochemical properties have fascinated many research groups to work in the field of metal nanocluster synthesis.¹² Metal nanodots are 0D nanomaterials and belong to a family of subnanometer-sized entities mostly comprising a few atoms that are also called quantum clusters.¹³ Intense quantum confinement effects due to the comparable size of the nanoclusters with the Fermi wavelength of the electron is manifested in the properties such as size-dependent

fluorescence, size-dependent band gap, excellent photoluminescence, discretization of the electron energy levels, nonlinear optics, etc.¹⁴ Excellent biocompatibility, antibacterial quality, innocuous effect, and miniature size of noble metal nanodots have made them promising candidates in the field of biomedical applications.¹⁵ The antibacterial nature of silver nanodots, which is yet another outstanding property, has not been fully scrutinized. Recently, very few reports have focused on the antibacterial property of silver nanodots, namely, silver nanodots@kevlar,¹⁶ silver nanodots silica composite on stainless steel,¹⁷ silver nanodots–silica bioactive glass,¹⁸ silver nanodots incorporated silk fibers,¹⁹ polyethylenimine@silver nanodots,²⁰ antibacterial 29-atom silver clusters,²¹ silver nanocluster bombs,²² silver nanodots@colistin-loaded poly-dopamine,²³ and silver nanodot reservoir.²⁴ The biggest challenge associated with Ag nanodots is their low long-term stability. Thus, nanodots have been dispersed in different matrixes like polymers or silica to improve their stability. In the

Received: March 16, 2021

Revised: July 19, 2021

Published: July 30, 2021



দুস্বপ্ন

সেপ্টেম্বর ২০২১

ISSN 2582 3701

আ ফ গা নি স্তা ন

لا إله إلا الله
الله أكبر
لا اله الا الله
الله أكبر





অপরজন সেপ্টেম্বর ২০২১

সম্পাদক – দেবাশিস দত্ত

প্রচ্ছদ – অর্ঘ্য বন্দ্যোপাধ্যায়

সম্পাদকীয়

প্রচ্ছদকাহিনি – আফগানিস্তান

প্রচ্ছদকাহিনি | প্রবন্ধ

নেপথ্য কথন – প্রসঙ্গ আফগানিস্তান : বরুণ

বন্দ্যোপাধ্যায়

শান্তি ও গণতন্ত্র পুনর্গঠনের নেপথ্যে থাকা রাজনৈতিক-
অর্থনীতি : প্রসঙ্গ আফগানিস্তান – কৌশিক চট্টোপাধ্যায়

আফগানিস্তানের অর্থনৈতিক অবস্থা: প্রথমের পতন ও

দ্বিতীয় উত্থান পর্বে : ড. বিশ্বম্ভর মণ্ডল

আফগানিস্তানের বদলানো সময় ও ব্যাকিং ব্যবস্থার

বর্তমান চিত্র : দেবাঞ্জন বাগচী

লগ্নি পূজির আত্মকথা : বাদল দত্ত

‘শত শত সাম্রাজ্যের ভগ্নশেষ’-এ আফিমের ফুল:

আফগানিস্তান, মাদক-অর্থনীতি ও সাম্রাজ্যবাদের

দুর্বলতা : অর্ঘ্যমা ঘোষ

আফগানিস্তানের বর্তমান পরিস্থিতি এবং সাংহাই কো-
অপারেশন অর্গানাইজেশন ও তার সদস্য রাষ্ট্রের ভূমিকা
- ড. বিমলেন্দু ঘোষ

আফগানে সাবধানে : বিশ্ব-রাজনীতির নতুন আঙ্গিক -
ড. প্রতীপ চট্টোপাধ্যায়

আফগানিস্তান : একটি ব্যর্থ রাষ্ট্রের সমাজ-নৃতাত্ত্বিক
পর্যালোচনা : সুচরিতা চট্টোপাধ্যায়

শান্তি প্রতিষ্ঠা, মানবাধিকার রক্ষা এবং আজকের
আফগানিস্তান : অভিজিৎ সাহা

আফগানিস্তান ফ্যান্টাসি - সংহতির ব্যাকরণ ও নিপাতন
: তাহমিদাল জামি

ঠাণ্ডা যুদ্ধ ও যুদ্ধোত্তর রাজনীতির কবলে আফগানিস্তান
: ড. শঙ্কর কুমার বিশ্বাস

আফগান সমস্যা ও পরিবর্তিত বিশ্ব রাজনীতির
প্রেক্ষাপটে ভারতের বৈদেশিক নীতি : শুভাশীষ চক্রবর্তী
আজকের আফগানিস্তান এবং ভারতীয় রণকৌশল :
আলিউল হক

আফগানিস্তান - অতীত ও ভবিষ্যৎ : সংগ্রাম চক্রবর্তী
তালিবানবিরোধী নারী জাগরণের কোলাজ : শঙ্কর রায়
জনতার প্রতিরোধের মধ্যেই আফগানিস্তানে চলছে
তালিবান জমানা : নিত্যানন্দ ঘোষ

আফগানিস্তানের শিক্ষাব্যবস্থা: আলো-আঁধারির এক
ইতিহাস : ডঃ রাজীব সাহা

আফগান নারীর অধিকার : বর্তমান ও ভবিষ্যৎ - অরিন্দ্র
ঘোষ

আজকের কাবুল : অবশ্যস্তাবীর স্বাভাবিক পরিণতি -

‘এবং মহুয়া’-বিষয়বস্তু মঞ্জুরী আয়োগ (U.G.C.-CARE List-I 2021)

অনুমোদিত অবিকার অন্তর্ভুক্ত। ২০২১ সালে প্রকাশিত
১৬ পৃ. অবিকার (৩১৯ টির মধ্যে) ৩ পৃ. ৬০ নং উল্লেখিত।

এবং মহুয়া

(বাংলা ভাষা, সাহিত্য ও গবেষণাধর্মী মাসিক পত্রিকা)

২৩ তম বর্ষ, ১৩৭ (ক) সংখ্যা, আগস্ট, ২০২১

সম্পাদক

ডা. মদনমোহন বেরা

কে. কে. প্রকাশন

গোলকুঁয়াচক, মেদিনীপুর, প.বঙ্গ।

**U.G.C.- CARE List-I 2021 approved journal, Indian
Language-Arts and Humanities Group, out of 16 pages
placed in Page 3 & No.60 out of 319**

EBONG MOHUA

**Bengali Language, Literature, Research and Referred with
Peer-Review Journal**

23th Year, 137(A) Volume

Aug, 2021

Published By

K. K. Prakashan

Golekuachawk, P.O.-Midnapur,721101.W.B.

DTP and Printed By

K.K.Prakashan

Cover Designed By

Kohinoorkanti Bera

Special Editorial Co-ordinator

Amit Kumar Maity

Communication :

Dr. Madanmohan Bera, Editor.

Golekuachawk, P.O.-Midnapur, 721101. W.B.

Mob.-9153177653

Email- madanmohanbera51@gmail.com /

kohinoor bera @ gmail.com

Rs 600

৩২.জঙ্গলমহলের আদিবাসী মানুষের জীবন-জীবিকা ও উন্নয়ন: বাঁকুড়া জেলার রানিবাঁধ ব্লকভিত্তিক একটি পর্যালোচনা :: সৌরভ বাগ.....	৩৪২
৩৩.প্রান্তিক জীবনের সংবাদ—সময়ের অভিঘাত ও বাংলা নাটক :: রজত দত্ত.....	৩৫১
৩৪.কোয়ান্টাম কম্পিউটিং এর বর্তমান এবং ভবিষ্যৎ সম্ভাবনা :: কপিল মণ্ডল.....	৩৬২
৩৫.অবনীন্দ্রনাথ ঠাকুরের 'এসপার ওসপার' :: ড.বিদিশা মাহাতো.....	৩৬৭
৩৬.ভারত-ভূটান সম্পর্কে চীনের প্রভাব : সাম্প্রতিক প্রবণতা :: ড.মিহির দে.....	৩৮১
৩৭.'উৎসর্গ পত্র', 'উপহার'-উদ্ধৃত খণ্ড কবিতার বিভিন্ন পরিপ্রেক্ষিতে ব্যক্তি রবীন্দ্রনাথ : একটি সমীক্ষা :: দেবশ্রী ভট্টাচার্য.....	৩৮৮
৩৮.সমসাময়িক ভারতবর্ষে নব সামাজিক আন্দোলনের ধারা :: গঙ্গোত্রী ভট্টাচার্য.....	৩৯৬
৩৯.জাতিভেদ, অস্পৃশ্যতা ও রবীন্দ্রনাথ :: ড.নেপাল বিশ্বাস.....	৪০৭
৪০.অধ্যাপক বিনয়কুমার সরকার ও তাঁর শিক্ষাদর্শন :: ড.অমরচন্দ্র কর্মকার.....	৪১৯
৪১.বাংলায় ফোরাম থিয়েটারের সামাজিক প্রয়োগ: সমীক্ষায় প্রাপ্ত তথ্যের ভিত্তিতে আলোচনা :: নীলাঞ্জন হালদার.....	৪২৫
৪২.গান্ধীজীর সত্যপ্রহ : একটি নৈতিক এবং রাজনৈতিক অঙ্ক। :: রঘুনাথ রায়.....	৪৩৪
৪৩.ভারতীয় সুন্দরবনের মেলা-সংস্কৃতির সেকাল একাল :: ড.প্রদীপ কুমার মণ্ডল.....	৪৪৫
৪৪.সূর্য দীঘল বাড়ী : প্রথা ভাঙা প্রান্তিক নারীর জীবন সংগ্রাম :: মোসা: সারমিন সুলতানা.....	৪৫৫
৪৫.হুদুম দেও পূজা ও রাজবংশী সমাজ:: ড.নারায়ণচন্দ্র বসুনিয়া.....	৪৬৪
৪৬.রবীন্দ্রনাথের সাহিত্যকর্মে লোকজ উপাদানের প্রভাব বিশ্লেষণ :: বিকাশ মন্ডল.....	৪৭২
৪৭."রবীন্দ্রনাথের জীবন দর্শনে মৃত্যু ভাবনা" :: ড. শাশ্বতী সিনহাবাবু.....	৪৭৭
৪৮.ঔপনিবেশিক শাসনকালে প্রশাসনিক কেন্দ্রে রাপে সিউড়ি শহরের উৎপত্তি ও বিকাশ :: কিয়ামত সেখ.....	৪৮৩

গান্ধীজীর সত্যাগ্রহ : একটি নৈতিক এবং রাজনৈতিক অঙ্গ

রঘুনাথ রায়

সারসংক্ষেপ:

সত্যাগ্রহ নামক দর্শনটি গান্ধীজীর সারা জীবনব্যাপী আদর্শ, মূল্যবোধ ও নৈতিকতার ওপর ভিত্তি করে দাড়িয়েছিল। এই দর্শন কিভাবে নৈতিক ও রাজনৈতিক অঙ্গ হিসাবে পরিণত করেছিল সেই বিষয়টি এই আলোচনায় উপস্থাপন করা হয়েছে। পাশাপাশি সত্যাগ্রহের অর্থ, বৈশিষ্ট্য, ধরণ, সত্যাগ্রহীর আচরণাবলী, কর্তব্য, আন্দোলন প্রভৃতি দিকগুলি তুলে ধরে হয়েছে। সামগ্রিকভাবে সত্যাগ্রহকে গান্ধীজী কিভাবে একটি নৈতিক ও রাজনৈতিক অঙ্গ প্রয়োগ করেছিলেন তার ইতিহাস তুলে ধরা হয়েছে।

শব্দসূচক:

সত্যাগ্রহ, মূল্যবোধ, নৈতিক, রাজনৈতিক অঙ্গ।

প্রতিপাদ্য বিষয় :

গান্ধীজীর জীবনদর্শন ও সত্যাগ্রহ বিষয়-দুটি একে অপরের পরিপূরক। সত্যাগ্রহ কথাটিকে সারা পৃথিবীতে তিনিই জনপ্রিয় করে তুলেছিলেন। সত্যাগ্রহ নামক অভিনব শক্তি দ্বারা গান্ধীজী যে কোনো দ্বন্দের সমাধান করতে চেয়েছিলেন। নৈতিক, সামাজিক ও রাজনৈতিক প্রতিটি ক্ষেত্রেই এই সত্যাগ্রহের প্রয়োগ করেছেন। গান্ধীজীর সত্যাগ্রহের উৎস ও স্বরূপ কী? সেগুলি আলোচনা করার পরিপেক্ষিতে সত্যাগ্রহ পন্থাকে মূল্যায়ন করার চেষ্টা করা হয়েছে। পাশাপাশি গান্ধীজীর জীবন কাহিনী, হিন্দ-স্বরাজ, হরিজন, ইয়ং ইন্ডিয়া'র সত্যাগ্রহের অর্থ, সত্যাগ্রহের বৈশিষ্ট্য, সত্যাগ্রহীর গুণাবলী বা কর্তব্য, এছাড়া দক্ষিণ আফ্রিকায় ও ভারতবর্ষে সত্যাগ্রহ আন্দোলন প্রভৃতিও আলোচনা করা হয়েছে। উক্ত বিষয়গুলির ওপর ভিত্তি করেই সত্যাগ্রহ কিভাবে নৈতিক ও রাজনৈতিক অঙ্গ হিসাবে পরিণত করেছিল সেই বিষয়টি উপস্থাপন করা



Comparative binding studies on the interaction of the indoloquinoline alkaloid cryptolepine with the B and the non-canonical protonated form of DNA: A spectroscopic insight

Susmita Chowdhury, Sutanwi Bhuiya, Suman Das*

Biophysical Chemistry Laboratory, Physical Chemistry Section, Department of Chemistry, Jadavpur University, 188 Raja S. C. Mallick Road, Kolkata 700032, India

ARTICLE INFO

Keywords:

Alkaloid-nucleic acid interaction
DNA polymorphism
Non-cooperative binding
Conversion of protonated DNA
Spectroscopy

ABSTRACT

Background: Low pH induced nucleic acid polymorphism and the interaction of naturally occurring small molecules with different polymorphic forms of DNA have been the focus in developing new drugs. Recent studies have revealed that low pH plays an active role in growth and development of cancer cells. Our target is to find whether and how the indoloquinoline alkaloid cryptolepine (CRP) interact with different polymorphic forms of natural DNA, in hope to explore this group of alkaloids as new therapeutics.

Methods: Multiple spectroscopic techniques that include UV-visible absorption spectrophotometry, fluorimetry, CD spectroscopy along with thermal melting studies were employed to characterize the interaction between the alkaloid cryptolepine with the B and protonated forms of DNA.

Results & conclusions: Cryptolepine has been found to interact with either forms of DNA. The nature of binding is non-cooperative in both cases. Data show that the affinity of CRP to B form of DNA is relatively higher than that for the protonated form of DNA. Circular dichroic studies reveal that the alkaloid converts the left handed protonated DNA into bound right handed form. Fluorescence quenching experiments reveal that cryptolepine intercalates within the DNA base pairs. Thermal melting studies show that the alkaloid stabilises the DNA structures.

General significance: Such non-B DNA structures are often present at the 'mutation hotspots' that are associated with genetic instability related diseases such as cancer. The ability of cryptolepine to interact to such non-B DNA structures makes it a useful substrate in the designing of potential chemotherapeutic agents.

1. Introduction

The well-defined structure and biological functions of DNA make it an effective chemotherapeutic target by various small molecules [1–4]. The last few decades have seen a lot of biomedical efforts directed to uncover a range of drug-DNA interactions [5,6]. Researches have revealed that apart from the canonical B form of DNA several other alternative non-B DNA structures can be specifically targeted by the drugs. These non-B DNA polymorphic structures are often present at the 'mutation hotspots' that are associated with genetic instability related diseases like cancer [7–11]. One such non-canonical form of DNA is the protonated form of DNA which can exist under low pH and low temperature conditions [12,13]. Unlike the B form of DNA, the protonated form of DNA is left-handed and characterized by Hoogsteen base-pairing rather than the typical Watson-Crick base-pairing that is present in the B

DNA structure. Spectrophotometric studies have revealed that protonation mainly occurs at the cytosine which causes the native DNA structure to alter [14]. Pulleyblank et al. suggested that the structures of protonated form of DNA, $d(TC)_n \cdot d(GA)_n$ is sufficiently similar to that of Z-DNA. They may interact with antibody binding sites leading to similar conformations and hence can be recognized by the same antibody [15,16]. The H-bonding in A:T base pairs differ significantly from that of C:G base pairs. It is seen that under mild acidic conditions, the A:T base pairs can be used as molecular rectifiers. This action can be regulated by regulating the pH [17]. Although the protonated form of DNA is not exactly found in living bodies, it can serve as a model system to study the effect of low pH on DNA conformation and its impact on drug binding [18]. The roles played by the non-B forms of DNA can be studied with the help of molecular probes that can interact with such structures and in turn alter their functions. Alkaloids are one such category of small

* Corresponding author.

E-mail address: sumandas10@yahoo.com (S. Das).

<https://doi.org/10.1016/j.bbagen.2021.129993>

Received 27 February 2021; Received in revised form 16 July 2021; Accepted 22 August 2021

Available online 25 August 2021

0304-4165/© 2021 Elsevier B.V. All rights reserved.



The alkaloid cryptolepine as a source of polyadenylate targeting therapeutic agent: Induction of self-assembly in the polyadenylate moiety

Susmita Chowdhury, Kasturi Kanrar, Sutanwi Bhuiya, Suman Das^{*}

Biophysical Chemistry Laboratory, Physical Chemistry Section, Department of Chemistry, Jadavpur University, 188, Raja S. C. Mallick Road, Kolkata, 700032, India

ARTICLE INFO

Keywords:

Single-stranded polyriboadenylic acid
RNA-Alkaloid interaction
Self-assembly
Cooperative binding

ABSTRACT

RNAs have become a well-known target for chemotherapeutic agents in the recent years. The tails of most eukaryotic m-RNA are characterized by the presence of a long polyadenylate sequence which plays an important role in its growth and maturation. This lays emphasis on development of molecular probes that target the polyadenylate sequence. Cryptolepine (hereafter, CRP) is an indoloquinoline alkaloid well known for its anti-malarial activities. A series of spectroscopic experiments namely absorption studies, fluorimetric studies and circular dichroism studies show that cryptolepine binds with single-stranded polyriboadenylic acid (hereafter, ss-poly (rA)) with a binding constant of $\sim 5 \times 10^3 \text{ M}^{-1}$ at 25 °C. Moreover thermal denaturation experiments show that the bound form of polyriboadenylic acid shows a characteristic transition profile. Such a profile is indicative of the ability of cryptolepine to induce self-assembly in the polyriboadenylic acid sequence on binding to it. Such ability of CRP to modulate the structural conformation of poly (rA), which in turn may cause functional aspects of the RNA to change, may give us a chance to develop effective alkaloid based chemotherapeutic agents.

1. Introduction

The unique structural morphology of RNA and its ability to bind small molecules makes it a useful target in therapeutic science [1]. It plays an unparalleled role in vital cellular processes like transcription, translation and a long trail of processes leading to protein formation [2, 3]. The shift in RNA based drug designing came after the discovery of the role played by RNA in viral diseases like HIV-AIDS, hepatitis etc. [4,5]. Polyriboadenylic acid [hereafter poly (rA)], has gained considerable interest because of its significant role in controlling gene expression, stability and maturation of RNA [6,7]. The structure of poly (rA) is a major factor that governs its biophysical properties [8]. Poly (rA) shows a pH dependent conformational change [9]. At acidic pH it exists as a double helical structure formed by two parallel intertwined strands but at neutral pH the single-stranded structure is predominant. This has been confirmed in earlier studies like X-ray diffraction and spectropolarimetric experiments [9]. The poly (rA) tail is a long chain of adenine nucleotides that is added to the 3'-end of the primary RNA transcript during the transcription of a specific gene in eukaryotic cells [10]. This tail prevents the enzymatic degradation of mRNAs in the cytoplasm. Such a poly (rA) sequence is absent in prokaryotes. Thus, the longevity of eukaryotic mRNA over prokaryotic mRNA can be attributed

to the presence of polyadenylate tails [11–13]. The poly adenylation of mRNA is catalysed by the enzyme poly A polymerase (PAP). Neo PAP in humans is associated with cancerous cells [14]. Poly (rA) exists as a double helix only under acidic pH but not under physiological pH. So molecules that can bind and modulate the structure of poly (rA) under physiological pH may interfere with PAP and alter the encoded protein synthesis. Such molecules can be used in the development of chemotherapeutic drugs.

Alkaloids are one such category of small molecules which can bind to RNA [15–17]. They are plant secondary metabolites (PSMs) characterised by the presence of nitrogen. They belong to different classes according to their pharmacokinetics and structure [18]. In the recent years there has been an inclination towards phytohormone based drugs because of their high compatibility and lower toxicity [19,20]. Their planar structure ensures their easy incorporation into nucleic acid motifs leading to binding. Cryptolepine (Fig. 1), a medicinally active indoloquinoline alkaloid, is isolated from the roots of the shrub *Cryptolepis sanguinolenta* found in the Central and Western regions of Africa [21]. It has a lot of potential as an anti-malarial, anti-bacterial, and anti-hyperglycemic agent [22–24]. Studies show that the alkaloids extracted from *Cryptolepis sanguinolenta* can act as potent inhibitors of SARS CoV and SARS CoV-2 viral proteins [25,26]. Also both

^{*} Corresponding author.

E-mail address: sumandas10@yahoo.com (S. Das).

<https://doi.org/10.1016/j.abbi.2021.109042>

Received 8 February 2021; Received in revised form 4 September 2021; Accepted 20 September 2021

Available online 22 September 2021

0003-9861/© 2021 Elsevier Inc. All rights reserved.

অপরজন

Aparjan—Bengali Webzine on Social, Cultural & Literary Issues | ISSN 2582-3701

অপরজন সেপ্টেম্বর ২০২১

সম্পাদক — দেবাশিস দত্ত

প্রচ্ছদ — অর্ঘ্য বন্দ্যোপাধ্যায়

সম্পাদকীয় (<https://aparjan.com/2021/09/30/september2021-editorial/>)

প্রচ্ছদকাহিনি — আফগানিস্তান

প্রচ্ছদকাহিনি | প্রবন্ধ

নেপথ্য কথন – প্রসঙ্গ আফগানিস্তান ; বরণ বন্দ্যোপাধ্যায় (<https://aparjan.com/2021/09/30/september2021-babaar/>)

শান্তি ও গণতন্ত্র পুনর্গঠনের নেপথ্যে থাকা রাজনৈতিক-অর্থনীতি ; প্রসঙ্গ আফগানিস্তান – কৌশিক চট্টোপাধ্যায়
(<https://aparjan.com/2021/09/30/september2021-kachar/>)

আফগানিস্তানের অর্থনৈতিক অবস্থা: প্রথমের পতন ও দ্বিতীয় উত্থান পর্বে ; ড. বিশ্বম্ভর মণ্ডল
(<https://aparjan.com/2021/09/30/september2021-bimoar/>)



আফগানিস্তানের বদলানো সময় ও ব্যাকিং ব্যবস্থার বর্তমান চিত্র : দেবাঞ্জন বাগচী

(<https://aparjan.com/2021/09/30/september2021-debaar/>)

লগ্নি পূজির আত্মকথা : বাদল দত্ত (<https://aparjan.com/2021/09/30/september2021-baduar/>)

'শত শত সাম্রাজ্যের ভগ্নশেষ'-এ আফিমের ফুল: আফগানিস্তান, মাদক-অর্থনীতি ও সাম্রাজ্যবাদের দুর্বলতা : অর্যমা ঘোষ

(<https://aparjan.com/2021/09/30/september2021-arghar/>)

আফগানিস্তানের বর্তমান পরিস্থিতি এবং সাংহাই কো-অপারেশন অর্গানাইজেশন ও তার সদস্য রাষ্ট্রের ভূমিকা - ড.

বিমলেন্দু ঘোষ (<https://aparjan.com/2021/09/30/september2021-bighar/>)

আফগানে সাবধানে : বিশ্ব-রাজনীতির নতুন আঙ্গিক - ড. প্রতীপ চট্টোপাধ্যায়

(<https://aparjan.com/2021/09/30/september2021-prchar/>)

আফগানিস্তান : একটি ব্যর্থ রাষ্ট্রের সমাজ-নৃতাত্ত্বিক পর্যালোচনা : সুচরিতা চট্টোপাধ্যায়

(<https://aparjan.com/2021/09/30/september2021-suchar/>)

শান্তি প্রতিষ্ঠা, মানবাধিকার রক্ষা এবং আজকের আফগানিস্তান : অভিজিৎ সাহা

(<https://aparjan.com/2021/09/30/september2021-avsaaar/>)

আফগানিস্তান ফ্যান্টাসি - সংহতির ব্যাকরণ ও নিপাতন : তাহমিদাল জামি

(<https://aparjan.com/2021/09/30/september2021-tazaar/>)

ঠাণ্ডা যুদ্ধ ও যুদ্ধোত্তর রাজনীতির কবলে আফগানিস্তান : ড. শঙ্কর কুমার বিশ্বাস

(<https://aparjan.com/2021/09/30/september2021-sabiar/>)

আফগান সমস্যা ও পরিবর্তিত বিশ্ব রাজনীতির প্রেক্ষাপটে ভারতের বৈদেশিক নীতি : শুভাশীষ চক্রবর্তী

(<https://aparjan.com/2021/09/30/september2021-suchar-2/>)

আজকের আফগানিস্তান এবং ভারতীয় রণকৌশল : আলিউল হক ([https://aparjan.com/2021/09/30/september2021-](https://aparjan.com/2021/09/30/september2021-alhaar/)

[alhaar/](https://aparjan.com/2021/09/30/september2021-alhaar/))

আফগানিস্তান - অতীত ও ভবিষ্যৎ : সংগ্রাম চক্রবর্তী (<https://aparjan.com/2021/09/30/september2021-sachar/>)

তালিবানবিরোধী নারী জাগরণের কোলাজ : শঙ্কর রায় (<https://aparjan.com/2021/09/30/september2021-saraar/>)

জনতার প্রতিরোধের মধ্যেই আফগানিস্তানে চলছে তালিবান জমানা : নিত্যানন্দ ঘোষ

(<https://aparjan.com/2021/09/30/september2021-nighar/>)

আফগানিস্তানের শিক্ষাব্যবস্থা: আলো-আঁধারির এক ইতিহাস : ডঃ রাজীব সাহা

(<https://aparjan.com/2021/09/30/september2021-rasaar/>)

আফগান নারীর অধিকার : বর্তমান ও ভবিষ্যৎ - অরিত্র ঘোষ ([https://aparjan.com/2021/09/30/september2021-arghar-](https://aparjan.com/2021/09/30/september2021-arghar-2/)

[2/](https://aparjan.com/2021/09/30/september2021-arghar-2/))



অপরজন

Aparjan—Bengali Webzine on Social, Cultural & Literary Issues | ISSN 2582-3701

বাংলা সাহিত্যে আফগান প্রসঙ্গ অনুসন্ধান : শুভদীপ দেবনাথ

চলতি বছরের আগস্ট মাসে ন্যাটো কর্তৃক সেনা প্রত্যাহার ঘোষণার সঙ্গে সঙ্গে আন্তর্জাতিক মানচিত্রে আফগানিস্তান আবার খবরের শিরোনামে চলে আসে। মার্কিন সেনা বিদায় নেওয়ার আগেই আফগানিস্তানের সিংহ ভাগ অঞ্চল চলে যায় তালিবানদের দখলে। গত কয়েক দশক ধরে তালিবানি ক্রিয়াকলাপের যে নমুনা বিশ্ববাসী প্রত্যক্ষ করে এসেছে, তালিবানদের ক্ষমতা দখলের ঘটনায় সেই দুঃসহ স্মৃতি আবার ফিরে আসছে। যদিও আফগানিস্তানের ইতিহাসের দিকে লক্ষ করলে এই ক্ষমতা দখলের রাজনীতি কোনো বিচ্ছিন্ন ঘটনা বলে মনে হবে না। ভারতের উত্তর-পশ্চিম সীমান্তবর্তী এই দেশ ভৌগোলিক কারণে বারংবার বিদেশি আক্রমণের শিকার হয়েছে, বিভিন্ন শক্তিশালী রাষ্ট্র আন্তর্জাতিক ক্ষেত্রে নিজেদের গুরুত্ব বজায় রাখার জন্য আফগানিস্তানকে ‘করিডর’ হিসাবে ব্যবহার করেছে, সোভিয়েত রাশিয়া এবং আমেরিকার ঠাণ্ডা যুদ্ধে ‘গিনিপিগ’ হয়ে উঠেছে আফগানিস্তান। গত শতকের সাতের দশকের শেষ দিকে ইসলামিক মৌলবাদী গোষ্ঠীর বাড়বাড়ন্ত রোধ করতে কমিউনিস্ট সোভিয়েত ইউনিয়ন আফগানিস্তানের আভ্যন্তরীণ রাজনীতিতে সরাসরি হস্তক্ষেপ করে। সঙ্গে সঙ্গে আসরে অবতীর্ণ হয় ধনতন্ত্রের প্রতিভূ মার্কিন যুক্তরাষ্ট্র। সোভিয়েত ইউনিয়নের শক্তি খর্ব করতে শুরু হয় তীব্র মৌলবাদী ইসলাম ধর্মের অপপ্রচার। পাকিস্তান এবং আমেরিকার প্রত্যক্ষ মদতে জন্ম হয় কটর মৌলবাদী সংগঠন তালিবানের। নিরন্তর বৈদেশিক শক্তির হস্তক্ষেপ আর গৃহযুদ্ধে

তুলে আনেন; তালিবানদের শত অত্যাচারের পরও সেখানকার গুরুদ্বার-মন্দিরের টিকে থাকার অজানা কাহিনী বয়ান করেন।

আসলে আফগানিস্তানের মত সকল অর্থে সম্পূর্ণ বিপরীতধর্মী একটি দেশ সম্পর্কে বাঙালির চিরকালই এক অদম্য কৌতূহল রয়েছে। আর সৈয়দ মুজতবা আলীর সৌজন্যে ভ্রমণ পিপাসু বাঙালি পাঠকের কাছে এই দেশ যেন মানস ভ্রমণের এক অবিচ্ছেদ্য অঙ্গ হয়ে উঠেছে। কাজেই বিশ্ব রাজনীতির দোলাচলতায় আফগানিস্তান যখনই খবরের শিরোনামে উঠে আসে বাঙালি তখনই নস্টালজিক হয়ে পড়ে। তাই গল্প-উপন্যাস-স্মৃতিকথা-ভ্রমণ সাহিত্য কিংবা রম্য রচনা— বাঙালির লেখনীতে বারেবারে ফিরে এসেছে আফগান প্রসঙ্গ। ভবিষ্যতে এই ধারা আরও পুষ্ট হবে এবং সমস্ত দুর্যোগ কাটিয়ে আফগানিস্তান আবার স্বমহিমায় ফিরবে এই আশা নিয়েই আমাদের আলোচনা সঙ্গ করছি।

তথ্যসূত্র:-

১. রবীন্দ্রনাথ ঠাকুর, গল্পগুচ্ছ, শ্রাবণ ১৪১০, পৃষ্ঠা ১১২
২. সৈয়দ মুজতবা আলী, দেশে বিদেশে, পৌষ ১৩৬৪, পৃষ্ঠা ৪৮
৩. ঐ, পৃষ্ঠা ৬১
৪. ঐ, পৃষ্ঠা ৭১
৫. ঐ, পৃষ্ঠা ৭৯-৮০
৬. সৈয়দ মুজতবা আলী, শবনম, আগস্ট ২০০০, পৃষ্ঠা ৩৯
৭. ঐ, পৃষ্ঠা ৬৫
৮. রামনাথ বিশ্বাস, আফগানিস্তান, ১৯৪২, পৃষ্ঠা ১৪
৯. ঐ, পৃষ্ঠা ২২
১০. ঐ, পৃষ্ঠা ১৩৩
১১. সুস্মিতা বন্দ্যোপাধ্যায়, কাবুলিওয়ালার বাঙালি বউ, ১৯৯৭, পৃষ্ঠা ৯-১০
১২. ঐ
১৩. পান্থজন, কাবুলের পথে পথে, পৃষ্ঠা ১৬
১৪. ঐ, পৃষ্ঠা ৩৮
১৫. অমিতাভ রায়, কাবুলনামা, পৃষ্ঠা ১০৮-১১০
১৬. ঐ, পৃষ্ঠা ১০৭

[লেখক – সহকারী অধ্যাপক, বাংলা বিভাগ, তেহট গভর্নমেন্ট কলেজ, নদীয়া।]

Facebook Comments





Time-nonlocal six-phase-lag generalized theory of thermoelastic diffusion with two-temperature

Md Abul Kashim Molla and Sadek Hossain Mallik 

Department of Mathematics and Statistics, Aliah University, Kolkata, India

ABSTRACT

A mathematical model for time-nonlocal six-phase-lag generalized thermoelastic diffusion with two-temperature is proposed for a linear, isotropic and homogeneous thermoelastic diffusive continuum by considering modified Fourier's law of heat conduction together with modified Fick's law of mass diffusion. The modified Fourier's law includes temperature gradient and thermal displacement gradient among the constitutive variables whereas the modified Fick's law includes chemical potential gradient and the chemical potential displacement gradient among the constitutive variables. The Fourier's law of heat conduction is replaced by a fractional-order approximation to a modification of the Fourier's law with three different phase lags for the heat flux vector, the temperature gradient and the thermal displacement gradient whereas the Fick's law of mass diffusion is replaced by a fractional-order approximation to a modification of the Fick's law with three different phase lags for the mass flux vector, the chemical potential gradient and the chemical potential displacement gradient. The proposed model includes some of the existing thermoelastic diffusion models as special cases. A variational principle is derived and a uniqueness theorem is proved. Finally, a dynamic reciprocity theorem is established for the proposed generalized thermoelastic diffusion model.

ARTICLE HISTORY

Received 7 September 2020
Accepted 23 August 2021

KEYWORDS

Generalized thermoelastic diffusion; time-nonlocal six-phase-lag; two-temperature thermoelasticity; variational principle; uniqueness theorem; reciprocity theorem

2010 MATHEMATICS

SUBJECT CLASSIFICATION
74F

1. Introduction

Generalized thermoelasticity, a new milestone in the theories of thermoelasticity, prevails over the crucial imperfections of the classical theories of thermoelasticity. Lord and Shulman [1] are the two pioneers who contributed first heavily to the coupled thermoelasticity by introducing generalized theory of thermoelasticity through alteration of the parabolic nature of the heat conduction equation to hyperbolic nature. They did this revolutionary change in the nature of the heat conduction equation by incorporating a relaxation time parameter in the Fourier's law of heat conduction, and in doing so, the unrealistic phenomenon of infinite speed of thermal wave propagation was replaced by practical observation of finite speed of propagation of thermal waves. Later on, a bunch of generalized thermoelastic theories [2–7] were introduced. The three-phase-lag generalized thermoelastic theory is the most general form of almost all other generalized



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

Number of research papers in the Journals notified on UGC CARE list year 2021

Sl No.	Title of Paper	Author	Department	Journal	Link
1	সদর্খক অন্তর্ঘাতের দুই সেনানী: সুবিমল-নবারুণ	Shubhadip Debnath	Bangla	Jonpod Prayas	
2	ত্রিদোষ তত্ত্ব ও হিউমোর্‌য়াল থিয়োরির প্রেক্ষিতে গোসানী-মঙ্গল : তবু একলব্য	Nitish Ghosh	Bangla	Tabu Akolabya	https://portal.issn.org/resource/ISSN/0976-9463
3	Atomic-Scale Imaging and Nano-Scale Mapping of Cubic α -CsPbI ₃ Perovskite Nanocrystals for Inverted Perovskite Solar Cells.	Ajoy Mandal	Physics	ACS Applied Materials & Interfaces	https://pubs.acs.org/doi/abs/10.1021/acsam.1c20794
4	Application of Memory Dependent Derivatives on Three Phase Lag Theory with Two Temperature for an Unbounded Generalized Thermoelastic Medium Having Spherical Hole	Md Abul Kashim Molla	Mathematics	Journal of the Calcutta Mathematica I Society	https://acrobat.adobe.com/id/urn:aaid:sc:AP:f542403-f214-4303-b9be-41b6f20e8244
5	The Weaver Community of Murshidabad District: an overview	Avijit Saha	Political Science	International Journal of Integrated Research and Development	https://www.ijird.org/
6	Anti-corrosive propensity of naturally occurring aldehydes and 1-(3- aminopropyl)imidazole condensed Schiff bases:	Sanjoy Satpati	Chemistry	Journal of Molecular Structure	https://www.sciencedirect.com/science/article/abs/pii/S002228602013394




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

	Comparison on the effect of extended conjugation over electron donating substituents				
7	Diffusion-induced ingress of angiotensin-converting enzyme2 into charge conducting path of pentacene channel for efficient detection of SARS-CoV-2 in saliva samples.	Ajoy Mandal	Physics	ACS Sensor	https://pubs.acs.org/doi/abs/10.1021/acssensors.2c01287
8	Fabrication of gold nanoparticles tethered in heat-cooled calf thymus-deoxyribonucleic acid Langmuir-Blodgett film as effective surface-enhanced Raman scattering sensing platform	Sumit Kumar Das	Physics	Front. Chem	https://www.frontiersin.org/articles/10.3389/fchem.2022.1034060/full
9	Self-assembled gold nanoparticles on the serpentine networks of Calf Thymus-DNA Langmuir-Blodgett films as efficient SERS sensing platform: Fabrication and its application in thiram detection	Sumit Kumar Das	Physics	Materials Chemistry and Physics	https://www.sciencedirect.com/science/article/pii/S0254058422014468?casa_token=ZUPY4_cHQoAAAAA:K4vQWBHyCv_5RTQUnR_vRwPZSC8nZMKJOhI2eQcdC2YaAG08Cs_FzfLZok3ZERZozloO42te_g
10	Two-Temperature Generalized Piezo-Thermoelastic Problem with Eringen's Non-local Effect and Memory-	Md Abul Kashim Molla	Mathematics	Waves in Random and Complex Media	https://www.tandfonline.com/doi/full/10.1080/17455030.2022.2161023?casa_token=sQYWD-




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160



GOVERNMENT GENERAL DEGREE COLLEGE, TEHATTA

Tehatta, Nadia, Pin-741160

	Dependent Derivatives under Three Phase Lag Heat Transfer				aDGA4AAAAA%3AtjO- uTGU7Cj36F- b_hlIdALjRUPvH03- 8OIQ- Vb2pitXwiby3ZSs3ZUL 1Gr16scE94VdzL1MjG TR
--	---	--	--	--	---




Dr. Sibsankar Pal
Officer-in-charge
Govt. Gen. Degree College, Tehatta
Nadia-741160

বিকাশ শীল সম্পাদিত

জনপদপ্রয়াস

পঞ্চবিংশতি বর্ষ ॥ যুগ্ম সংখ্যা
জানুয়ারি ২০২২

ISSN 2349-2414

সাহিত্য সংখ্যা

প্রচ্ছদ
অয়ন চৌধুরী

অলংকরণ
সুবীর কয়াল

সংযোগ
শীলবাগান, ফুলপুকুর রোড
চুচুড়া ৭১২১০১
হুগলি
মুঠো ফোন : ৬২৯১০৬৯৮৬৫

সূচী

- কথাকার প্রিমো লেভি ॥ রবিন পাল ৭
- ক্রাইম অ্যান্ড পানিশমেন্ট : সত্তার পুর্গেটোরিয়ো ॥ তপোধীর ভট্টাচার্য ১৭
- ‘বলছিলাম কী,’ চৌহদ্দি এ-ফোঁড় ও-ফোঁড় ॥ শিবাংশু মুখোপাধ্যায় ৩০
- বাঙালির সৃজনশীলতা ॥ অশোক মিত্র ৪৯
- কবিতালেখা কবিতাপড়া ॥ শঙ্খ ঘোষ ৬০
- নীরদ চৌধুরী: তিনটি অনুষ্ঙ্গ: জাবালি, নচিকেতা, মোক্ষমূলার ॥ ধীমান দাশগুপ্ত ৭৯
- অন্নদাশঙ্কর প্রণতি: ছড়ায় ॥ সুখেন্দু মজুমদার ৮৯
- মধ্যরাত্রি সংলাপ ॥ সন্দীপ দত্ত ৯০
- নতুন বীক্ষা নতুন সংজ্ঞা: নতুন কবিতার সন্ধান ॥ চিরঞ্জীব শূর ৯১
- চারজন কবি—সুভাষ, সমর, বীরেন্দ্র, নীরেন্দ্র : ইমেজের তুলনা ॥ জয়িতা ভট্টাচার্য ১০০
- শহর জীবনের নগ্নরূপ : শংকরের ‘জন-অরণ্য’ ॥ শান্তনু প্রধান ১১৭
- সুনীল, শক্তি, শঙ্খ, অলোক : বাক প্রতিমার প্রতিতুলনা ॥ অজয় সরকার ১৪০
- ‘মহাকাব্য’: আরেক ভারতবর্ষ ॥ মৌসুমী ঘোষ ১৫১
- সদর্থক অন্তর্ঘাতের দুই সেনানী : সুবিমল-নবারুণ ॥ শুভদীপ দেবনাথ ১৬১
- চিরকিশোর ॥ দেবজ্যোতি ভট্টাচার্য ১৭৭
- ভিতর থেকে আসা আলো : মানিক চক্রবর্তীর কবিতা ॥ অরুণি বসু ১৮৬
- সৈকত রক্ষিতের ‘মদনভেরি’: একটি নৃতাত্ত্বিক বিশ্লেষণ ॥ সৃজা মণ্ডল ২০০
- অঁথে রূপকথার মাঠে নির্জনতার রঙ : সুশান্ত সৎপতির কবিতা ॥ পাথপ্রিয় বসু ২১২
- ঔপন্যাসিক-গল্পকার : রমানাথ রায় ॥ রাণা গুপ্ত ২১৯
- সন্দীপন ও উদয়নের কথাসাহিত্যের আঙ্গিক ও গদ্যশৈলী ॥ প্রত্যাষ পাল ২৩৮
- লালেশ্বরীর কবিতা ॥ দীপ্ত মুখোপাধ্যায় ২৪৫
- সমাজ বদলের গবেষণাগার ॥ ডোরিশ লেসিং : অনুবাদ : ইমন চট্টোপাধ্যায় ২৬২
- আমি ভীষণ উদ্বিগ্ন ॥ রোমিলা থাপার : অনুবাদ: সাগর গুহ ২৭৩
- সামাজিক সংকটের কথকতা: হাসান আজিজুল হকের গল্প ॥ শুভেন্দু মণ্ডল ২৯৪
- ‘দরজা খোলো, আমাকে প্রবেশপত্র দাও’ মণীন্দ্র গুপ্তের কবিতা ॥ মনোতোষ চক্রবর্তী ৩০৭
- লোকসংস্কৃতি ও প্রেম : ত্রয়ী উপন্যাসের নিরিখে ॥ সুশ্বেতা বড়াল ৩২৩
- ‘কোজাগর’: এক অন্য ভারতের আখ্যান ॥ সঞ্চারী বড়াল ৩৩৪
- এক অমোঘ বক্তৃনির্ঘোষ: সাবিত্রী রায়ের ‘স্বরলিপি’ ॥ অমিত মণ্ডল ৩৪৫
- ‘পুনশ্চ’: পুনশ্চ পাঠ ॥ বিকাশ শীল ৩৬৫

সদর্শক অন্তর্ঘাতের দুই সেনানী: সুবিমল-নবারুণ

শুভদীপ দেবনাথ

সভ্যতার প্রাথমিক পর্বে মানুষ যে নিয়মতান্ত্রিকতায় সভ্যতাকে সুসংহত করতে চেয়েছিল, সেই নিয়মই যখন সৃষ্টিশীলতায় বাধা তৈরি করল, সংঘাতের সূচনা সেই পর্যায় থেকেই। ছোটো-বড়ো নিয়মনীতিকে মান্যতা দিয়ে যে প্রতিষ্ঠানের জন্ম হল, কালক্রমে সেই প্রতিষ্ঠানই হয়ে উঠল স্থিতিশীলতার ধারক ও বাহক। ক্ষমতাকে কেন্দ্রীভূত করে প্রতিষ্ঠানই হয়ে উঠল সমাজের নিয়ন্ত্রক। সভ্যতা যত আধুনিক হচ্ছে সমাজের প্রতিটি ক্ষেত্রে প্রতিষ্ঠান ততই শক্তিশালী হয়ে উঠছে। নিজ শ্রেণিস্বার্থ বজায় রাখার জন্য যে কোনো ধরনের বিরোধিতাকে নস্যাৎ করাই হয়ে উঠছে তার মূল লক্ষ্য। শিল্প-সংস্কৃতির জগতেও প্রতিষ্ঠানের খবরদারি বিচ্ছিন্ন কোনো বিষয় নয়, বাজার অর্থনীতির সৌজন্যে যে খবরদারি ক্রমশ মহীরুহ হয়ে উঠেছে। এই ক্রিয়ারই বিপরীতমুখি প্রতিক্রিয়া স্বরূপ প্রতিষ্ঠান বিরোধিতার ক্ষেত্র প্রস্তুত হয়। সর্বক্ষমতা সম্পন্ন প্রতিষ্ঠানের বিরুদ্ধে ব্যক্তি বিশেষের প্রতিবাদ একটু একটু করে পরিচিতি পেতে থাকে। প্রচারসর্বস্ব প্রাতিষ্ঠানিক সাহিত্যের সমান্তরালে এই শ্রেণির সাহিত্য প্রচেষ্টা মননশীল পাঠকের চেতনাকে আলোড়িত করতে থাকে। বাংলা সাহিত্যে যে প্রাতিষ্ঠানিকতা পাঠকের মধ্যবিন্দু মানসিকতাকে সযত্নে লালিত করছিল, প্রতিষ্ঠান বিরোধী অন্তর্ঘাত সেই মানসিকতায় আঘাত হানে। প্রাতিষ্ঠানিকতার প্রাচীরে সদর্শক অন্তর্ঘাত সৃষ্টিকারী এমনই দুই সাহিত্যিকের প্রতিষ্ঠান বিরোধী মানসিকতার স্বরূপ উন্মোচনই আমাদের অধিষ্ট।

বাংলা সাহিত্যে প্রতিষ্ঠান বিরোধিতার প্রসঙ্গ উত্থাপিত হলে যে ব্যক্তিনাম সর্বাগ্রে উপস্থিত হয় তাহল সুবিমল মিশ্র (১৯৪৩)। ১৯৬০-এর গোড়া থেকেই বাংলা সাহিত্যে প্রতিষ্ঠানের স্বরূপ প্রকাশ পেতে থাকে, কিন্তু সুবিমল মিশ্রের আগে প্রতিষ্ঠান বিরোধিতা নিয়ে কোনো তাত্ত্বিক সমালোচনা বাংলা সাহিত্যকে আলোড়িত করেনি। সুবিমল মিশ্রের প্রথম গল্পগ্রন্থ ‘হারাণ মাঝির সমালোচনা বাংলা সাহিত্যকে আলোড়িত করেনি। সুবিমল মিশ্রের প্রথম উপন্যাস বিধবা বৌয়ের মড়া বা সোনার গাঙ্গীমূর্তি’ প্রকাশিত হয় ১৯৭১ সালের জুন মাসে। প্রথম উপন্যাস ‘আসলে এটি রামায়ণ চামারের গল্প হয়ে উঠতে পারতো’ প্রকাশিত হয় ১৯৮২ সালে। এই সময়পর্ব জুড়ে অর্থাৎ গোটা সাতের দশক বিভিন্ন লিট্‌ফ্ল ম্যাগাজিনে প্রকাশিত হতে থাকে প্রতিষ্ঠান বিরোধিতা সংক্রান্ত সুবিমল মিশ্রের প্রবন্ধ। সাত ও আটের দশকে প্রকাশিত বিভিন্ন প্রবন্ধ ও সাক্ষাৎকার নিয়ে ১৯৮৮ সালে বাণীশিল্প কর্তৃক প্রকাশিত হয় সুবিমল মিশ্রের প্রথম প্রবন্ধ গ্রন্থ ‘সুবিমলের বিরুদ্ধে সুবিমল এবং উস্কানিমূলক অনেককিছুই, আপাতভাবে’। নানা কারণে এই

ত্রিদোষ তত্ত্ব ও হিউমোর্যাল থিয়োরির প্ৰেক্ষিতে গোসানী-মঙ্গল নীতীশ ঘোষ

উদ্ভবকালে বিশেষত কোচবিহার অঞ্চলে সাহিত্য সাধনার যে প্রবাহ শুরু হয়, তার প্রধান কেন্দ্র ছিল রাজদরবার। কিন্তু তার পাশাপাশি রাজ আনুকূল্য নিরপেক্ষ একটি সাহিত্যধারা গড়ে উঠতে থাকে। এই ধারার অন্যতম উজ্জ্বল নিদর্শন রাধাকৃষ্ণ দাস বৈরাগী বিরচিত 'গোসানী-মঙ্গল' কাব্য। গ্রন্থটির প্রথম প্রকাশক ব্রজচন্দ্র মজুমদার বিজ্ঞাপনে 'গোসানী-মঙ্গল'কে কোচবিহারের আদিকাব্য বলে দাবি করেছিলেন। গোসানী-নামধেয় লৌকিক দেবী চণ্ডীকে কেন্দ্র করে অষ্টাদশ শতকের শেষভাগে কাব্যখানি রচিত হয়। ঐতিহাসিক ও লৌকিক তথ্যে পরিপুষ্ট এই কাব্যখানি কোচবিহারের সাহিত্যসাধনার সোনালি ফসল। এই কাব্যের শিরায় শিরায় কোচবিহারের আঞ্চলিক মানুষের রীতি-নীতি ও ভাবচেতনার প্রাণস্পন্দন ধ্বনিত হয়েছে। এই 'গোসানীমঙ্গল' কাব্য থেকে আমরা তৎকালীন সমাজচিত্রের একটি পরিষ্কার রূপরেখা অঙ্কন করতে পারি। কাব্যে উল্লিখিত কোচবিহার অঞ্চলের তৎকালীন মানুষের স্বাস্থ্যভাবনা ও লোকচিকিৎসা পদ্ধতিকে তুলে ধরা হয়েছে। প্রাসঙ্গিকভাবে আয়ুর্বেদ শাস্ত্রের ত্রিদোষ তত্ত্ব ও পাশ্চাত্যের Humoral Theory-র আলোকে প্রাপ্ত লোকচিকিৎসা পদ্ধতিকে বিশ্লেষণের চেষ্টা করা হয়েছে। উক্ত বিষয়গুলিই এই প্রবন্ধটির মূল ভরকেন্দ্র।

মানব শরীর ক্ষিতি, অপ, তেজ, মবুৎ ও ব্যোম এই পঞ্চ উপাদানের সমবায়ে গঠিত। আমাদের দেহের গঠন, বৃদ্ধি, পরিণমন এমনকী বিভিন্ন রোগ প্রতিরোধ ও নিরাময়ের সব স্তরেই এই পঞ্চ উপাদানের প্রভাব প্রত্যক্ষগোচর। একটি বীজের মহিবুহে পরিণতিতে যেমন মাটি, জল, উষ্ণতা, বায়ু ও মুক্ত পরিবেশ দরকার, ঠিক তেমনি এই একই কথা মানব শরীরের ক্ষেত্রেও প্রযোজ্য। প্রকৃতি আমাদের দেহকে এমনভাবে নির্মাণ করেছে যে, এর ভিতরেই রয়েছে আত্মরক্ষা ও রোগ থেকে আরোগ্যলাভের উপায় ও কৌশল। প্রকৃতির সঙ্গে সম্পর্ক ছিন্ন করে, প্রকৃতির নিয়মকে লঙ্ঘন করার ফলেই আমাদের স্বাস্থ্যাবনতি ঘটে এবং রোগ-ব্যাদি আক্রমণ করে। পরিবেশের বাহ্যিক উপাদানের গ্রহণ ও বর্জনের ওপর ভিত্তি করে দেহের সাম্যাবস্থা নিয়ন্ত্রণই সুস্বাস্থ্য রক্ষার অন্যতম কৌশল। পঞ্চ ইন্দ্রিয়ের দ্বারা আমরা যেমন পরিবেশের বিভিন্ন উপাদানকে গ্রহণ করি, তেমনি শরীর অভ্যন্তরস্থ অবস্থিত উপাদানকে

- মধ্যযুগের বন্দর-নগরী সপ্তগ্রাম : মঞ্জলকাব্যের আলোকে/সুদীপ্ত দাস
৭৩
- প্রাণরাম চক্রবর্তীর বিদ্যাসুন্দর ও অন্যান্য কবির
বিদ্যাসুন্দর : একটি তুলনামূলক আলোচনা/সায়ন্তন মণ্ডল
৮৪
- মনসা এবং চণ্ডী : মধ্যযুগের দুই দেবী চরিত্রের তুলনা/সুজাতা বন্দ্যোপাধ্যায়
৯০
- নাটকের প্রেক্ষিতে মনসামঞ্জল কাব্যের প্রসঙ্গ
বিশ শতকের চাঁদ সদাগরের নৌকা/মৌ চক্রবর্তী
৯৮
- মানিক দত্তের চণ্ডীমঞ্জল কাব্যে সৃষ্টিকথা/কল্পনা রায়
১০৫
- মঞ্জলকাব্যের সপ্তডিঙার পালে ভ্রমণকথার রসভাস/চন্দনা চক্রবর্তী
১১১
- ত্রিদোষ তত্ত্ব ও হিউমোর্যাল থিয়োরির প্রেক্ষিতে গোসানী-মঞ্জল/নীতীশ ঘোষ
১১৯
- বেতুলা-কথা: মধ্যযুগের কাব্যধারা আধুনিক যুগের ছোটগল্পে/বুদ্ধজিৎ দাস ঠাকুর
১২৬
- মানিক দত্তের চণ্ডীমঞ্জল কাব্যের ঐতিহাসিক গুরুত্ব/সঞ্জীত বর্মণ
১৩৬
- ঘনরাম চক্রবর্তীর 'শ্রীধর্মমঞ্জল' কাব্যে পুরাণ প্রসঙ্গ/রত্নজ্যোতি নায়ক
১৪৩
- অভয়ামঞ্জল কাব্যে শ্রীমন্ত চরিত্র : স্বতন্ত্র সত্তা, স্বতন্ত্র সৃষ্টি/অলি আচার্য
১৫৬
- রবীন্দ্রোত্তর কবিতায় মনসামঞ্জল ও চণ্ডীমঞ্জলের প্রভাব/পল্লবী সাহা
১৬২
- শিকারি কালকেতু উচ্চবর্গের শিকার : যুগ বদলায়, ছবি বদলায় না/অনিবৃদ্ধ বিশ্বাস
১৬৭

43

TABU EKALAVYA

An International Peer-reviewed & Refereed Research Journal

Volume 26, Issue 2

Number 43

Published July 2021 September

First Edition : February 2022

ISSN : 0976-9463

TABU EKALAVYA

Chief Advisor : Swami Shastrajnananda

Selina Hossin

Ramkumar Mukhopadhyay

Soma Bandyopadhyay

Sadhan Chattopadhyay

President : Biplab Majee

Vice-President : Tapan Mondal

Executive Editor : Sushil Saha

Editor : Debarati Mallik

Working Editor : Tapas Pal

Editor-in-Chief : Dipankar Mallik

e-mail : tabuekalavya@gmail.com

Website : www.tabuekalavya.in

facebook : তবু একলব্য গবেষণা পত্রিকা

group : তবু একলব্য গবেষণা পত্রিকা

প্রাপ্তিস্থান : দে'জ, দিরা, সে বুক স্টোর (দীপু), পাতিরাম, ধ্যানকিন্দু, পাতাবাহার

মূল্য : ৫০০ টাকা

ISSN 0976-9463

তবু একলব্য

২৬ বর্ষ • ২ সংখ্যা
ক্রমিক ৪৩

TABU EKALAVYA

An International Peer-reviewed & Refereed Research Journal

কলা ও মানববিদ্যা বিষয়ক গবেষণাধর্মী রেফার্ড

ও

পিয়ার-রিভিউড ত্রৈমাসিক পত্রিকা

৪৩

মঙ্গলকাব্য

বিশেষ সংখ্যা



দি গৌরী কালচারাল এন্ড এডুকেশনাল অ্যাসোসিয়েশন

সমাজ-সংস্কৃতি-সাহিত্য গবেষণাকেন্দ্র

Atomic-Scale Imaging and Nano-Scale Mapping of Cubic α -CsPbI₃ Perovskite Nanocrystals for Inverted Perovskite Solar Cells

Somnath Mahato,^{*,†} Arup Ghorai, Ajoy Mondal,[†] Sanjeev Kumar Srivastava, Mantu Modak, Shreyasi Das, and Samit K Ray^{*}



Cite This: *ACS Appl. Mater. Interfaces* 2022, 14, 9711–9723



Read Online

ACCESS |



Metrics & More



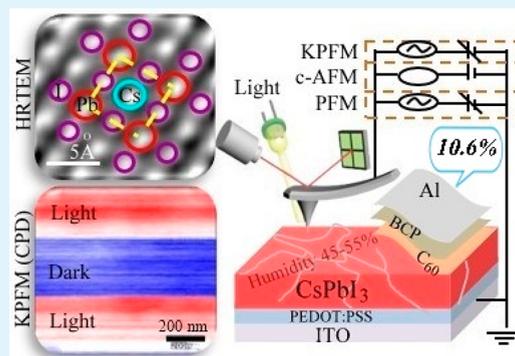
Article Recommendations



Supporting Information

ABSTRACT: Colloidal synthesized cubic α -CsPbI₃ perovskite nanocrystals having a smaller lattice constant ($a = 6.2315 \text{ \AA}$) compared to the standard structure, and nanoscale mapping of their surfaces are reported to achieve superior photovoltaic performance under 45–55% humidity conditions. Atomic scale transmission electron microscopic images have been utilized to probe the precise arrangement of Cs, Pb, and I atoms in a unit cell of α -CsPbI₃ NCs, which is well supported by the VESTA structure. Theoretical calculation using density functional theory of our experimental structure reveals the realization of direct band to band transition with a lower band gap, a higher absorption coefficient, and stronger covalent bonding between the Pb and I atoms in the [PbI₆]⁴⁻ octahedral, as compared to reported standard structure. Nanoscale surface mapping using Kelvin probe force microscopy yielding contact potential difference (CPD) and conductive atomic force microscopy for current mapping have been employed on α -CsPbI₃ NCs films deposited on different DMSO doped PEDOT:PSS layers. The difference of CPD value under dark and light illumination suggests that the hole injection strongly depends on the interfaces with PEDOT:PSS layer. The carrier transport through grain interiors and grain boundaries in α -CsPbI₃ probed by the single-point c-AFM measurements reveal the excellent photosensitivity under the light conditions. Finally, inverted perovskite solar cells, employing α -CsPbI₃ NCs film as an absorber layer and PEDOT:PSS layer as a hole transport layer, have been optimized to achieve the highest power conversion efficiency of 10.6%, showing their potential for future earth abundant, low cost, and air stable inverted perovskite photovoltaic devices.

KEYWORDS: cesium lead iodide, atomic resolution TEM, KPFBM, c-AFM, inverted perovskite solar cells



1. INTRODUCTION

In 2020, the certified power conversion efficiency (PCE) of organic–inorganic hybrid perovskite solar cells has reached above 25%, revealing their potential to compete with silicon photovoltaic technology.^{1,2} However, the stability of organic–inorganic perovskites due to high volatility of hydrophilic organic A-site cations (e.g., CH₃NH₃⁺) still remains a critical concern.^{3,4} To overcome this bottleneck, all-inorganic cesium lead halide (CsPbX₃; X = I, Br, and Cl) perovskite films and nanostructures have been under intense investigation, due to the remarkable improvement in their stability, for application in high performance optoelectronic devices such as solar cells, light emitting diodes, photodetectors, and two-dimensional/three-dimensional (2D/3D) perovskite heterojunctions under the ambient condition.^{5–8} Especially colloidal synthesized cesium lead iodide (CsPbI₃) nanocrystals (NCs) show a great potential as a new class of stable photoactive perovskite material for low-cost, high-performance, next-generation photovoltaic devices.^{9–11} It has easier processability, higher absorption in the visible spectrum, lower bandgap, and better photostability in the ambient condition, as compared to other

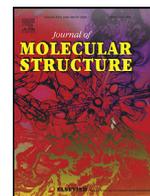
halide perovskites.^{12,13} Among four existing phases (α -cubic, β -tetragonal, γ -orthorhombic, and δ -orthorhombic) of CsPbI₃ NCs,^{14,15} α -cubic phase is more stable due to its low surface-to-volume ratio without any octahedral inclination or lattice distortion in [PbI₆]⁴⁻ octahedra as well as in the unit cell.^{16,17} However, the stability of α -CsPbI₃ is still a concern due to its phase transition from the radiative cubic (α -phase) to the nonradiative orthorhombic (δ -phase) crystals structure, under exposure to the light, humidity, and temperature.¹⁸ To date, several groups have made enormous efforts to synthesize and postsynthesis modifications to improve the stability of α -CsPbI₃ in ambient conditions. The choice of surface passivation using different ligands by controlling their shape and size is an alternative approach to stabilize perovskite

Received: October 27, 2021

Accepted: January 31, 2022

Published: February 8, 2022





Anti-corrosive propensity of naturally occurring aldehydes and 1-(3-aminopropyl)imidazole condensed Schiff bases: Comparison on the effect of extended conjugation over electron donating substituents

Sanjoy Satpati^{a,b}, Aditya Suhasaria^a, Subhas Ghosal^a, Utpal Adhikari^a, Priyabrata Banerjee^{c,d}, Sukalpa Dey^e, Dipankar Sukul^{a,*}

^a Department of Chemistry, National Institute of Technology, Durgapur 713 209, India

^b Department of Chemistry, Government General Degree College, Tehatta, Nadia 741 160, India

^c Surface Engineering and Tribology Group, CSIR-Central Mechanical Engineering Research Institute, Durgapur 713209, India

^d Academy of Scientific and Innovative Research (AcSIR), AcSIR Headquarters CSIR-HRDC Campus, Sector-19, Kaila Nehru Nagar, Ghaziabad 201002, India

^e Department of Basic Science and Humanities, Dr. B. C. Roy Engineering College, Durgapur 713 206, India

ARTICLE INFO

Article history:

Received 25 May 2022

Revised 4 July 2022

Accepted 6 July 2022

Available online 8 July 2022

Keywords:

Mild steel

Schiff base

Corrosion inhibitor

DFTB+

Irreversibility test

ABSTRACT

Schiff bases prepared by condensation of 1-(3-aminopropyl)imidazole and three different naturally occurring aldehydes, namely salicylaldehyde, vanillin and cinnamaldehyde (ISSB, IVSB and ICSB, respectively) are tested as corrosion inhibitors for mild steel in 1 M HCl. Comparative effects of extended conjugation and +R effect bestowed by the electron donating group are explored towards the extent of corrosion protection of mild steel. ICSB, having extended conjugation, stands out to be the most efficient one. At 1 mM concentration, it imparts nearly 99% inhibition efficiency at 40 °C after 48 h of exposure of mild steel in 1 M HCl. DFTB+ study reveals the active centers of inhibitor molecules responsible for bi-directional electron transfer with metal surface. Irreversibility test with ICSB layer formed after exposure in 1 M HCl for 24 h having 1 mM ICSB, provides 78% inhibition efficiency to mild steel when exposed to the uninhibited 1 M HCl for 3 h. From detailed temperature dependence study, thermodynamics and kinetic parameters are obtained, which are instrumental to ascertain the nature of adsorption of the studied inhibitors.

© 2022 Elsevier B.V. All rights reserved.

1. Introduction

A variety of Schiff bases have been investigated for their potential anti-corrosive activities both for ferrous and non-ferrous metals and alloys in recent past [1–14]. Schiff bases possess several characteristics conducive for corrosion mitigation. However, in many cases the reported inhibition efficiencies are not very high. In some instances, the inhibitory effect does not last long, particularly at elevated temperature. These shortcomings are associated with the insolubility of Schiff bases, as well as instability of the inhibitor layer in highly acidic medium under prolonged exposure or at higher temperature. In addition, report on the irreversibility test for corrosion inhibitors, *i.e.*, how long the inhibitor layer can sustain in the aggressive uninhibited acid solution, is really scarce [15]. This is an important aspect in regard to applicability of inhibitors in real situation. Most of the works involving Schiff bases as corrosion inhibitors focus on the effect of multiple imine bonds,

presence of electron donating/withdrawing groups, aromatic moieties, heteroatoms, aliphatic chain length etc. [1–14]. Some studies have pointed out better performance of the Schiff bases having extended conjugation, which results into higher electron density on the imine group [3,16–18]. In the present work, we intend to present a comparative study between the effect of extended conjugation and that of electron donating substituents. For this, we have used structurally comparable inhibitor molecules and took mild steel as the test material and 1 M aqueous HCl as the corrosive medium. Mild steel is one of the most widely used structural materials because of its strength, malleability, ductility, weldability, machinability, and most-importantly cost effectiveness [19] As it is very prone towards corrosion, protecting mild steel, particularly from mineral acid environment like HCl is still a challenge [19]. There are diversified uses of mineral acids like HCl. These include chemical processing, pickling, acid de-scaling, oil-well acidifying processes and many others [20]. During these processes, as well as during transportation and storage of acid, application of suitable corrosion retardant is a pre-requisite.

* Corresponding author.

E-mail address: dipankar.sukul@ch.nitdgp.ac.in (D. Sukul).



ISSN: 2278-8670
ISSUE-21, JUNE, 2022
VOLUME-I

**INTERNATIONAL JOURNAL
OF
INTEGRATED RESEARCH AND DEVELOPMENT**
(Peer Reviewed and Multi-Disciplinary)



Basudev

Artist: Basudev Mondal. Title: New Dawn.

BARIN KUMAR ROY
Editor-in-Chief

DEBABRATA DAS
Additional Editor

BISWAJIT MAITI
Managing Editor



INDEX

1. Blockchain Technology Aiding Cryptocurrencies and The Inception of Central Bank Digital Currency	Abeera Mallick & Dr. Barin Kumar Roy	01 – 08
2. Primary Components in the Structure of Revolutionary Ideologies in British Indian Political Scenario	Ahin Roychoudhury	09 – 20
3. An Assessment of Apple as a Major Horticultural Crop in Himachal Pradesh	Dr. Anupriya Chatterjee	21 – 32
4. The Weavers' Community of Murshidabad District: An Overview	Avijit Saha	33 – 43
5. Sigmund Freud's View on Error	Madhuri Ray	44 – 51
6. Arsenic Toxicity in Tehatta and Krishnanagar Subdivisions of Nadia District, West Bengal	Susmita Mandal	52 – 61
7. Humanity and Politics: Effect of Partition in Khuswant Singh's Train to Pakistan	Dr. Debasree Bhattacharya	62 – 67
8. Healthcare Services Access by the Children in Rural West Bengal	Dr. Mahua Patra	68 – 77
9. FDI in the Retail Sector in India – Prospects and Challenges	Dr. Tulika Kar	78 – 86
10. ব্যক্তিগত গঠনে স্মৃতির ভূমিকা	Jagadish Das	87 – 97
11. Ecological notes on habitat and species diversity in Sikkim	Debabrata Das and Pampi Ghosh	98 – 109
12. Fasting: A Boon	Dr.Nusrat Jahan	110 – 114
13. Importance of Economic Thought in Times of Pandemic	Sutapa Malakar , Dr. Lalita Gauri Kulkarni & Dr. Santanu Ghosh, WBSES	115 – 123



The Weavers' Community of Murshidabad District: An Overview

Avijit Saha

Assistant Professor, Department of Political Science,
Government General College, Tehatta, Nadia, West Bengal
Email.id-avijit.avijit.saha023@gmail.com,

&

PhD. Scholar, Department of Political Science
University of Kalyani, Nadia, West Bengal.

Abstract

The main aim of this article or research work is to explore the social, economic, and political life and conditions of the Weavers' community of the Murshidabad district in the state of West Bengal. As a student and researcher of social science as well as political science, such kind of research work should be treated as an unavoidable task and especially, those who come from a social science background cannot deny his responsibility in this regard. Weavers as a productive group and their contribution to society are immense. Thus, we have tried to explore the social, economic, and political aspects of the Weavers' community. To do it, we have followed and used various techniques of research methods as much as possible. For this purpose, this article is divided into nine parts. These are: i) introduction; ii) statement of the main theme; iii) objectives of the study; iv) historical & theoretical context of the study; v) research questions; vi) research methodology; vii) findings; viii) research gap; ix) conclusion.

Keywords: *Weavers', Community, Social, Economic, Political, Production-Management, Trade union.*

(Paper published on 1st June, 2022.)

Introduction

In this research work, the researcher has tried to analyse the socio-economic and political conditions and overall lifestyle of the weavers' community scattered across Murshidabad district in the state of West Bengal. In the study or research in any area of social science, communities or groups situated in various strata of society— are very important. The prime responsibility of any scholar of social science is to highlight the conditions or roles of those communities which are directly or indirectly associated with the work of social production. No social scientist can deny this role of his/her. This is no exception for the scholar here. This kind of research that deals with those who are associated and are involved in social production must identify two things at the outset: a) identification of the community on which the research would be carried out and b) to create an understanding of the community with its problems, needs, and demands. The weaving industry is an indigenous and eco-friendly industry. The weavers are scattered across the Murshidabad district and these weavers can broadly be categorized into three groups: i) Hereditary weavers, those who depend on others, especially on *Mahajans*, ii) Labour weavers, iii) *Samiti* weavers. The socio-economic and political conditions of these three groups of weavers are completely different because they all

Journal of the Calcutta Mathematical Society, **18**, (1) 101–120 (2022)

APPLICATION OF MEMORY DEPENDENT
DERIVATIVES ON THREE PHASE LAW
THEORY WITH TWO-TEMPERATURE FOR
THE UNBOUNDED GENERALIZED
THERMOELASTIC MEDIUM
HAVING SPHERICAL HOLE

NASIRUDDIN MONDAL¹, MD. ABUL KASHIM MOLLA²
AND SADEK HOSSAIN MALLIK^{3,*}

(Received 1 March 2022)

Abstract. In this work a theory of two temperature generalized thermoelasticity in the context of three-phase-lag model with memory dependent derivative is constructed using Taylor's series expansion. The theory is then implemented to study the thermoelastic interactions in an isotropic infinite medium with spherical cavity where thermal and mechanical loadings are prescribed. State space method is used to find the solution of the problem in the Laplace transform domain. Numerical solution for thermophysical quantities are obtained and plotted in graphs to investigate the influence of pertinent parameters.

Key Words and Phrases: Two-Temperature Generalized Thermoelasticity; Three-Phase-Lag Model; Memory-Dependent Derivative; State Space Approach; Vector-Matrix Differential Equation.

2010 Mathematics Subject Classification : 74F05

1. Introduction. Generalized thermoelasticity, a new mile-stone in the theories of thermoelasticity, prevails over the vital imperfections of classical theories of thermoelasticity. Lord and Shulman (1967) are the two pioneers who contributed first heavily to the coupled thermoelasticity by introducing generalized theory of thermoelasticity through alteration of the parabolic nature of the heat conduction equation to hyperbolic nature. They did this revolutionary change in the nature of the

Diffusion-Induced Ingress of Angiotensin-Converting Enzyme 2 into the Charge Conducting Path of a Pentacene Channel for Efficient Detection of SARS-CoV-2 in Saliva Samples

Ajoy Mandal, Samik Mallik, Sovanlal Mondal, Suvani Subhadarshini, Riya Sadhukhan, Tanmay Ghoshal, Suman Mitra, Mousam Manna, Suman Mandal, and Dipak K. Goswami*



Cite This: *ACS Sens.* 2022, 7, 3006–3013



Read Online

ACCESS |



Metrics & More



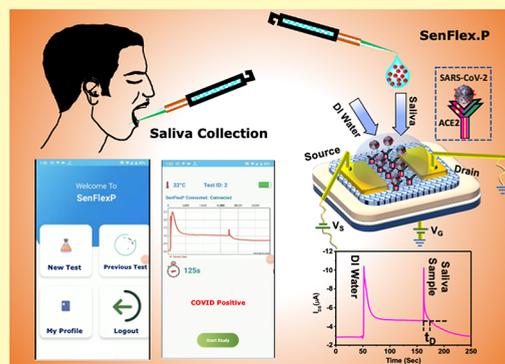
Article Recommendations



Supporting Information

ABSTRACT: Rapid and accurate identification of a pathogen is crucial for disease control and prevention of the epidemic of emerging infectious like SARS-CoV-2. However, no foolproof gold standard assay exists to date. Nucleic acid-based molecular diagnostic tests have been established for identifying COVID-19. However, viral RNAs are highly unstable in handling with poor laboratory procedures, leading to a false negative that accelerates the spread of the disease. Detection of the spike protein (S1) of the SARS-CoV-2 virus through a proper receptor, commonly used in antigen-based rapid testing kits, also suffers from false-negative predictions due to decreasing viral titers in clinical specimens. Organic field-effect transistor (OFET)-based sensors can be highly sensitive upon properly integrating receptors in the conducting channel. This work demonstrates how angiotensin-converting enzyme 2 (ACE2) molecules can be used as receptor molecules of the SARS-CoV-2 virus in the OFET platform. Integration of ACE2 molecules into pentacene grain boundaries has been studied through the statistical analysis of rough surfaces in terms of lateral correlation length and interface width. The uniform coating of ACE2 molecules has been confirmed through growth studies to achieve better ingress of the receptors into the conducting channel at the semiconductor/dielectric interface of OFETs. We have observed less than a minute detection time with 94% sensitivity, which is the highest reported value. The sensor works with a saliva sample, requiring no sample preparation or virus transfer medium. A prototype module developed for remote monitoring confirms the suitability for point-of-care (POC) application at large-scale testing in more crowded areas like airports, railway stations, shopping malls, etc.

KEYWORDS: COVID-19, SARS-CoV-2, field-effect transistor, angiotensin-converting enzyme 2 (ACE2), biosensor



The massive impact of coronavirus (COVID-19) infection on human health has continued through new mutants since its outbreak in 2019.^{1,2} Although the mortality rate has subsided in the recent mutants, the disease predominantly affects the respiratory system, leading to many pulmonary dysfunction-related diseases.^{3,4} Quick detection of the COVID-19 virus (SARS-CoV-2) has become crucial for the termination of the SARS-CoV-2 infection chain. Several potential and practical detection techniques have been developed, such as reverse transcription-polymerase chain reaction (RT-PCR),^{5,6} clustered regularly interspaced short palindromic repeats (CRISPR),⁷ loop-mediated isothermal amplification (LAMP),^{8,9} computed tomography (CT),¹⁰ and Fourier-transform infrared spectroscopy (FTIR).¹¹ However, in most cases, these detection methods require a more sophisticated primer and probe design, multistep reactions, many reagents, trained technicians to run the machines, bulky instruments involving time-consuming procedures, etc.¹² The typical sensitivity of these techniques is also limited to about 81%.¹³ Nevertheless, these techniques are not adequate to

detect at a large scale, which is of utmost necessity to stop the spread. Therefore, developing a rapid, cheap, easy-to-use, high-accuracy, and point-of-care (POC) testing method is urgently needed. Several antigen-based test kits are being used.^{14–16} Among the many antigen-based COVID-19 diagnosis methods, the field-effect transistor (FET)-based biosensors have many advantages, such as high sensitivity, ultrafast response, high selectivity, and the requirement of a small volume of analytes for the test.^{17–20} FET also offers biodegradability, potential flexibility, and biocompatibility and involves low-cost fabrication.^{21,22} These devices are, in most cases, fabricated on 1D or 2D structures as conducting

Received: June 19, 2022

Accepted: September 9, 2022

Published: September 21, 2022





OPEN ACCESS

EDITED BY
Arif Engin Cetin,
Dokuz Eylul University, Turkey

REVIEWED BY
Pilar Cea,
University of Zaragoza, Spain
Marystela Ferreira,
Federal University of São Carlos, Brazil

*CORRESPONDENCE
Joydeep Chowdhury,
joydeep72_c@rediffmail.com,
joydeep.chowdhury@
jadavpuruniversity.in

[†]These authors have contributed equally
to this work

SPECIALTY SECTION
This article was submitted to Analytical
Chemistry,
a section of the journal
Frontiers in Chemistry

RECEIVED 01 September 2022
ACCEPTED 31 October 2022
PUBLISHED 15 November 2022

CITATION
Sinha R, Das SK, Ghosh M and
Chowdhury J (2022), Fabrication of gold
nanoparticles tethered in heat-cooled
calf thymus-deoxyribonucleic acid
Langmuir-Blodgett film as effective
surface-enhanced Raman scattering
sensing platform.
Front. Chem. 10:1034060.
doi: 10.3389/fchem.2022.1034060

COPYRIGHT
© 2022 Sinha, Das, Ghosh and
Chowdhury. This is an open-access
article distributed under the terms of the
[Creative Commons Attribution License
\(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or
reproduction in other forums is
permitted, provided the original
author(s) and the copyright owner(s) are
credited and that the original
publication in this journal is cited, in
accordance with accepted academic
practice. No use, distribution or
reproduction is permitted which does
not comply with these terms.

Fabrication of gold nanoparticles tethered in heat-cooled calf thymus-deoxyribonucleic acid Langmuir-Blodgett film as effective surface-enhanced Raman scattering sensing platform

Rajdeep Sinha^{1†}, Sumit Kumar Das^{2†}, Manash Ghosh³ and Joydeep Chowdhury^{1*}

¹Department of Physics, Jadavpur University, Kolkata, India, ²Department of Physics, Government General Degree College, Tehatta, India, ³Department of Spectroscopy, Indian Association for the Cultivation of Science, Kolkata, India

SERS active substrate fabricated through self-assembly of Gold nanoparticles on the disjointed networks of Heat-cooled Calf Thymus DNA (HC-Ct DNA) Langmuir-Blodgett (LB) film has been reported. Adsorption kinetics of HC-Ct DNA molecules at the air-water interface has been studied explicitly. The UV-Vis electronic absorption spectra in conjunction with the FESEM images collectively suggest the presence of H- type aggregated domains most likely owing to plane-to-plane self-association of the HC-Ct DNA molecules aligned vertically on the surface of the LB film. Elemental composition and the morphological features of the as-prepared substrate (APS) are explored from XPS analysis and the FESEM, AFM images respectively. The SERS efficacy of the APS has been tested with trace concentrations of 4-Mercaptopyridine molecule. Finally, this SERS active substrate has also been used for the detection of malathion at ultrasensitive concentrations.

KEYWORDS

calf thymus DNA, Langmuir-Blodgett film, gold nanoparticles, SERS, malathion detection

1 Introduction

Surface-enhanced Raman scattering (SERS) spectroscopy has now emerged as a fascinating analytical tool for the detection of molecules at trace concentrations in the limit of single molecule regime (Nordlander et al., 2004; Kneipp et al., 2008; Hernandez-Sanchez et al., 2018; Tian et al., 2022). The reason behind the colossal enhancements of Raman bands is now been attributed to the collective response from the electromagnetic (EM) and charge transfer (CT) mechanisms, of which the former



Self-assembled gold nanoparticles on the serpentine networks of Calf Thymus-DNA Langmuir-Blodgett films as efficient SERS sensing platform: Fabrication and its application in thiram detection

Rajdeep Sinha^{a,1}, Sumit Kumar Das^{b,1}, Manash Ghosh^c, Joydeep Chowdhury^{a,*}

^a Department of Physics, Jadavpur University, Kolkata, 700032, India

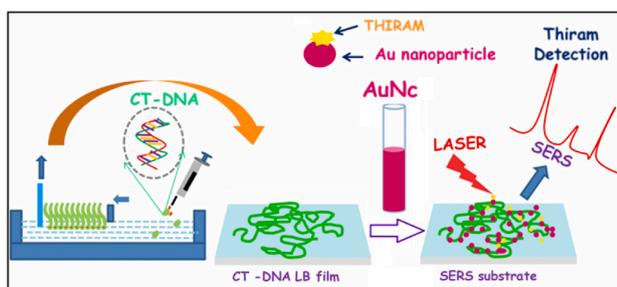
^b Department of Physics, Government General Degree College, Tehatta, Nadia, 741160, India

^c Department of Spectroscopy, Indian Association for the Cultivation of Science, Jadavpur, Kolkata, 700032, India

HIGHLIGHTS

- Fabrication of SERS active substrate from the Langmuir-Blodgett film of CT-DNA.
- Relaxation kinetics of CT-DNA molecules at the air-water interface studied.
- FESEM images of CT-DNA film exhibit complex pattern of serpentine networks.
- SERS active substrate used for thiram detection at ultrasensitive concentration.

GRAPHICAL ABSTRACT



ARTICLE INFO

Keywords:

Langmuir-Blodgett film
SERS
Calf thymus-DNA
Thiram detection

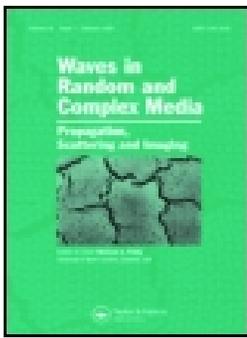
ABSTRACT

Fabrication of efficient SERS active substrates from the Langmuir-Blodgett (LB) films of Calf Thymus-DNA (CT-DNA) molecule after incubation into gold nanocolloid for 24 h has been presented. Relaxation kinetics of CT-DNA molecules at the air-water interface has been explicitly studied. The experimental observations from UV-Vis electronic absorption spectra together with the FESEM and AFM images of CT-DNA molecule organized in LB film collectively suggest the presence of H-type aggregated domains due to plane-to-plane self-association of the CT-DNA molecules on the surface of the LB film. XPS spectrum of the as prepared substrate has been unveiled to identify its chemical compositions while their morphological features are explored from the FESEM and AFM images. The SERS efficacy of the substrate has been tested with the 4-Mercaptopyrindine (4-MPy) molecule at trace concentration. SERS enhancement factors ranging from 10^6 – 10^7 orders of magnitude have been evaluated for the characteristic bands of the 4-MPy molecule. The substrate not only exhibits appreciable spectral reproducibility, but it also confirms its stability and uniformity. The as prepared SERS active substrate has also been used for thiram detection at ultrasensitive concentration.

* Corresponding author.

E-mail addresses: joydeep72_c@rediffmail.com, joydeep.chowdhury@jadavpuruniversity.in (J. Chowdhury).

¹ have equal contributions.



A two-temperature generalized piezo-thermoelastic problem with Eringen's non-local effect and memory-dependent derivatives under three-phase-lag heat transfer

Nasiruddin Mondal, Md Abul Kashim Molla & Sadek Hossain Mallik

To cite this article: Nasiruddin Mondal, Md Abul Kashim Molla & Sadek Hossain Mallik (2022): A two-temperature generalized piezo-thermoelastic problem with Eringen's non-local effect and memory-dependent derivatives under three-phase-lag heat transfer, *Waves in Random and Complex Media*, DOI: [10.1080/17455030.2022.2161023](https://doi.org/10.1080/17455030.2022.2161023)

To link to this article: <https://doi.org/10.1080/17455030.2022.2161023>



Published online: 29 Dec 2022.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)



A two-temperature generalized piezo-thermoelastic problem with Eringen's non-local effect and memory-dependent derivatives under three-phase-lag heat transfer

Nasiruddin Mondal, Md Abul Kashim Molla and Sadek Hossain Mallik 

Department of Mathematics & Statistics, Aliah University, Kolkata, India

ABSTRACT

This article deals with piezo-thermoelastic interactions in a homogeneous, isotropic generalized thermoelastic semi-infinite medium whose boundary is assumed to be traction free and subjected to a thermal loading. This study has been carried out in the context of two-temperature three-phase-lag generalized theory of thermoelasticity considering Eringen's non-local theory and memory-dependent derivatives. The governing equations of the problem are solved in Laplace transform domain by applying state space approach. The inversion of Laplace transform of the solutions has been done numerically. Numerical solutions obtained for different thermophysical quantities are represented in graphs to study the effects of different relevant parameters.

ARTICLE HISTORY

Received 6 November 2021
Accepted 11 October 2022

KEYWORDS

Two-temperature generalized piezo-thermoelasticity; Eringen's non-local elasticity; three-phase-lag model; memory-dependent derivative; state space approach; vector-matrix differential equation

2010 MATHEMATICS SUBJECT CLASSIFICATION
74F05

1. Introduction

Generalized thermoelasticity, a new milestone in the theories of thermoelasticity, prevails over the vital imperfections of classical theories of thermoelasticity. Lord and Shulman [1] are the two pioneers who contributed first heavily to the coupled thermoelasticity by introducing generalized theory of thermoelasticity through alteration of the parabolic nature of the heat conduction equation to hyperbolic nature. They did this revolutionary change in the nature of the heat conduction equation by incorporating a relaxation time parameter in the Fourier's law of heat conduction and in doing so, the unrealistic phenomenon of infinite speed of thermal wave propagation was replaced by practical observation of finite speed of propagation of thermal waves. Later on a bunch of generalized thermoelastic theories viz., Green-Lindsay (G-L) theory [2], Green-Naghdi (G-N) theories [3-5], dual-phase-lag theory [6] and three-phase-lag theory [7] were introduced. To know in detail, one can go through the works of Ignaczak [8] and Chandrasekharaiah [9,10]. It is to mention that generalized thermoelastic theories are more acceptable in compared to the classical thermoelastic theories to tackle real-life oriented problems with high heat fluxes and very short interval of time, which generally occur in nuclear reactors, energy channels, LASER beams, etc.

CONTACT Sadek Hossain Mallik  sadek.math@aliah.ac.in