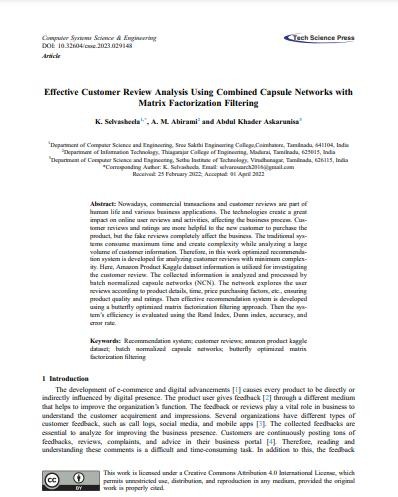
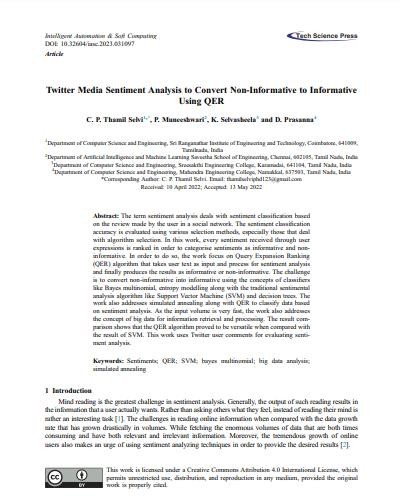
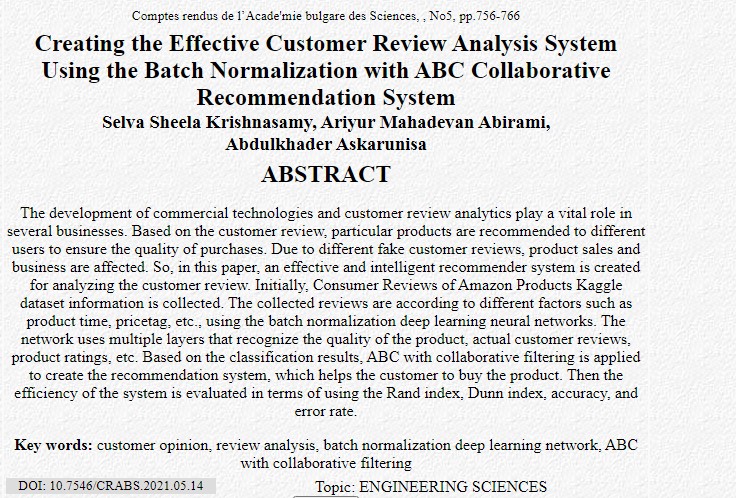


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GENDER INEQUALITY AS EVIDENT IN HENRY LAWSON’S, “THE DROVER’S WIFE”

A.ELAKKIYA

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Every society is made up of certain norms pertaining to family, relationships, religion, and gender. Among them, gender earns the ultimate claim which has prolonged conflicts and controversies till date, since the day of emergence of civilization and human beings. It is a social construct that has its own set of protocols within any family and society. The gender roles were created even before the arrival of tradition, customs, belief system and social values. Thus, gender precedes every social construct. Every human being must be given what they need for survival and must be given the freedom to attain self-gratification. The society has discrimination in various systems like social class, caste system, religion, education, occupation and so on. Similarly, there is discrimination among genders, their role and freedom. Gender inequality exists in all the fields and it is very hard to bring equality and realise it.

Men are being considered as the superior sex, women second to them and transgenders are not given any position. The position of men and women in the society is similar to the landlords and the working class people; the high and low culture; the capitalist and labour respectively. But trans-genders are rarely considered as human beings in most of the places. Each gender has been given different set of roles and rules to follow. The roles, though not acquired, are infused forcefully into any society. This is where the discrimination among genders begins. The gender hierarchy has man in the centre of the society; it makes the world masculine since men assume that they hold and possess the power. All the gender roles have been making men as the superiors and women as inferior beings whereas the trans-genders are not even considered for any role. When equal opportunities and roles are given to every gender, there is equality. “Gender equality implies a society in which women and men enjoy the same opportunities, outcomes, rights and obligations in all spheres of life” (Juru, 1).

Women are still marginalized in terms of gender, caste, border divisions and nationality.. The prolonged struggle, suppression and sufferings have made women fight the oppressors. Their sufferings and trauma have been serving as the stimulant for women to come out of them.

Australia is one of the colonized countries, which was occupied by the Britishers. The native Australians were treated like slaves where men were tortured and women were abused. Colonialism has left scars in the psyche of Australia.

Henry Lawson, an Australian writer and poet who has addressed colonialism and the trauma people underwent in his works. His oeuvre consisted poetry, ballads and short stories and he was called as Australia’s greatest short story writer. He was also known as the ‘bush poet’ and his short story “The Drover’s Wife” and published in the magazine, *The Bulletin* in 1892. He also republished the same story in his collection, *Short Stories in Prose and Verse* in the year 1894.

“The Drover’s Wife” gives a clear picture of the predicament of the African women through the character of a drover’s wife. The protagonist is an Australian bush woman. The plot portrays the difficulties faced by her in the absence of her husband, and depicts how she confronts all the tough situations on her own.

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**Vol.2**

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ANAPHORA AS A DEVICE IN SELECT POEMS OF CHAOBA PHURITSHABAM

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**Abstract**

*North-east India has been a victim of colonial invasion as well as of the ethnic conflicts because of its geographical isolation. The region consists of the seven sister states which were the princely states before they merged with India. The North-east region has been facing a lot of struggles since when it merged with the Indian sub-continent in 15th October, 1949 which lead to the Second World War. Hence, literature from the North-east India largely deals with violence. It is the predominant theme of all the literary works of art produced from the region. There is a clash among the diverse ethnic groups claiming for autonomy. The secessionist movements and the armed insurgencies are playing a major role in the conflict and violence. The native people have been deprived of their fundamental rights, needs and they are forced live under domination and suppression. Women are doubly marginalised by the male colonizers and also by their own native men. The people express their plight, sufferings and emotions through literature. This paper aims to bring about the postcolonial aspects and its effects using a literary device, Anaphora, in select poems of the Manipuri woman poet, Chaoba Phuritshabam from Tattooed with Taboos An Anthology of Poetry by Three Women from Northeast India*

***Keywords****: North-east Indian Literature, Anaphora, Postcolonialism.*

The North-east Indian literature in English comes under the broad category of Indian English Literature. It represents the literature from the seven sister states of the North-east India which includes the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. The North- east people own up the oral tradition in literature. The seven states were once the Princely states. Soon after India got independence in 1947, there were several partition and divisions in the borders of the states. The division resulted in the completely land-locked position of the North-east region. A major part of the region has been sharing its border with the neighbouring countries such as China, Bhutan, Myanmar, Bangladesh and Nepal. It leads to the multiple ethnicities of the region. Each ethnic group wants to claim autonomy and individuality. So there is an employment of secessionist movements along with the armed insurgencies and militant outfits. Even after the independence, there is no freedom because of the divisions and the ethnicities. There are bomb blasts, terrorist activities, inter-ethnic conflicts, clash between militant groups and the government. It leads to

the predominance of the theme of violence in the literature of the North-east.

*Tattooed with Taboos An anthology of poetry by three women from Northeast India* is an anthology published in 2011. It is a collection of 77 poems by three Manipuri women poets, Chaoba Phuritshabam, Shreema Ningombam and Soibam Haripriya. The book has three sections where the first one is entitled as ―Tattooed with Taboos‖. It depicts the suppression, physical and mental violation of women they undergo in that region. Second one is ―Angst for Homeland‖ which deals with the thirst for freedom. Third is ―Love and Longingness‖ which expresses the craving for love, family relationships and the happy past.

Chaoba Phuritshabam is a poet from Manipur. She has got a master‘s degree in Chemistry and an LLB. She is also an occasional journalist, worked for ‗The Sangai Express‘. She has published some of her poems in the journal,

‗Our Private Literature‘, by Burning Voices. In the anthology *Tattooed with Taboos*, Chaoba has written eighteen poems in total. In the section,

―Angst for Homeland‖, two of her poems have

**1**

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**LITERARY QUEST**



**An International, Peer-Reviewed, Open Access, Monthly, Online Journal of English Language and Literature**

### Multiculturalism for Reformation in Select Novels of Rick Riordan

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Abstract

Culture is a holistic entity which summarises the customs, ritual, tradition, language, food habit, belief, religious practices, etc… Its manifestation may vary because of nations and ethnic groups. It is ever evolving and dynamic. It plays a major role in the development of the society and is also influenced by another culture. The end result is newer form of culture with many outcomes. When more than two cultures mingle it leads to a multiplicity and plurality of culture and there will be a celebration of multiculturalism. It may lead to positive effects in the society. This paper is dealing with the role of multiculturalism in the selected novels of Rick Riordan along with its results and impacts on the society. The

*novels are interspersed with Greek, Roman, Japanese, Persian, Hawaiian,*

Arabian, Caribbean, Australian, French, Italian, Indian, Ethiopian and the

*Western cultures. Besides the myth, the presence of multiculturalism in these*

novels makes the young adults to have the knowledge of many cultures along

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### DeterminationofSomePropertiesofReusedCookingGrou ndNutOilusingFTIRSpectroscopy

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1-

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**ABSTRACT**

Depending upon temperature and the duration of the deep-frying process, the heating offats and oils will change the composition of the medium and eventually lead to the degradation ofthe fat. In the present work we can use Groundnut oil to different temperature conditions andanalysesusingFTIRspectroscopy.

**Keywords:**ReusedCooking,Nut,Oil.

**INTRODUCTION**

Peanut oil also known as groundnut oil, isa mild tasting vegetable oil derived from peanuts.Theoilisavailableinrefined,unrefined,coldp ressed and roasted varieties, the latter with astrongpeanutflavourandaroma,analogoustotoaste d sesame oil. It is often used in Chinese,South Asian and Southeast Asian cuisine, both forgeneral cooking, and in the case of roasted oil, foradded flavour. Peanut oil has a high smoke pointrelativetomanyothercookingoils.Itsmajorcomp onent fatty acids are oleic acids (46.8% asolein),linoleicacid(33.4%asalinolein),andpalmitic acid(10.0%aspalmitin). Theoilalsocontains somestearic acid, arachidicacid,arachidonic acid, behenic acid, lignoceric acid andotherfattyacids.Peanutoilisacommonoilforfryingf oods,duetothehighsmokepoint.

GroundnutoilcontainheartfriendlyMUF A( Mono Unsaturated Fatty Acids) that lowerthe levels of bad cholesterol in our body withoutloweringthelevelsofgoodchelestrol1.

Deep frying is a cooking process, withwater containing foodstuff is immersed into edibleoils or fats at temperature between 140 - 190°C. Inthe first phase, within a few seconds, a thin crustforms, whose structure crucially affects the deep-

fryingprocessandthequalityofthefoodwithregadstofa tabsorptionandcrispness2-3.

Withtheriseoftemperatureintheboundary layer to more than 120°C, the formationof acrylamide begins, in particular in the presenceofreducingsugarsandasparagineslikeingr ain-orpotatoproducts

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Journal of Future Sustainability

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**A sustainable inventory model for growing items considering carbon emissions, product expiry, and profit-sharing policy**

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*aThe Gandhigram Rural Institute, India*

**C H R O N I C L E A B S T R A C T**

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*Multi-echelon supply chain Growing items*

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*Carbon emissions*

In this article, a multi-echelon supply chain for growing and deteriorating items, where the grower has a lot of live newborn items (growing) is discussed. The grower transfers the matured inventory to the processor in each shipment. The processor begins to process the stock as a ready-sale product in the market. The processor also delivers the processed inventory to the retailer in each shipment in the non-processing period of his cycle length. Then the processor offers trade credit to the retailer and makes the retailer agree to share a portion of his profit with him. The product’s life cycle when in the hand of the retailer is certain and it expires after some time 𝑡. Carbon emission during processing is considered while packing and preserving the livestock for sale. Depending on these assumptions, there are six possibilities to discuss profit values. Sensitivity analysis was also brought to verify the optimal determined values. The profit- sharing sharing method’s outcome benefits the processor and the retailer more.

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**1. Introduction**

Trade credit is a company (B2B) agreement by which users can buy items without paying in cash out the advance, and then pay the provider at a later point. Typically, businesses that use trade credit may allow clients to pay in a few days, with the transaction documented by an invoice. Trade credit is a sort of 0% financing that increases a company’s assets while postponing payment for a predetermined amount of products or services to a later date and requires no tax to be repaid in connection to the payback period. In general, offering trade credit to a buyer always gives benefits to a company’s cash flow. The duration a credit is granted is defined by the company granting the advance and is negotiated upon by both companies granting the favor and the firm receiving it. Trade credit can also be used to help businesses finance short-term expansion. Trade credit, which is a sort of borrowing with no interest, is frequently used to boost sales. In the end, trade credit is a type of commercial lending that is extremely beneficial to firms. It is an equity mortgage that allows a buyer to purchase products with repayment at a future stage at no additional cost. This results in enhanced free cash flow and the reduction of traditional finance costs. Profit sharing is a method in which staff is paid a percentage of the company’s net earnings based on a predetermined written formula. Such benefits, which may vary depending on salary or compensation, are separate from and in addition to ordinary wages. Profit sharing is a sort of pre-tax employee contribution plan in which employees receive a portion of a company’s profits. The profit-sharing payments are determined by: 1. Profitability of a company 2.Regular salary and bonuses for employees 3. The amount is determined by the company. A profit-sharing plan (PSP) pays employees a percentage of the company’s earnings over a certain period of time (e.g., a year). In most cases, a worker gets a proportion or cash of the company’s profits in cash or stock holdings. Many companies provide revenue sharing as a lifetime pension to their employees. If an employer does not earn a profit during the time frame (e.g., year), they are not required to contribute that year. Since these two are playing the most important role in revenue earning and also concentrate on customer welfare we planned to include this in our model to make it more user-friendly for the growing

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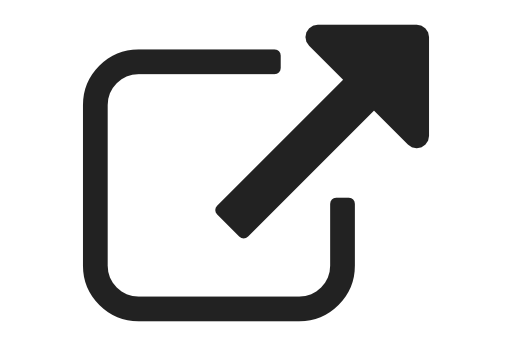
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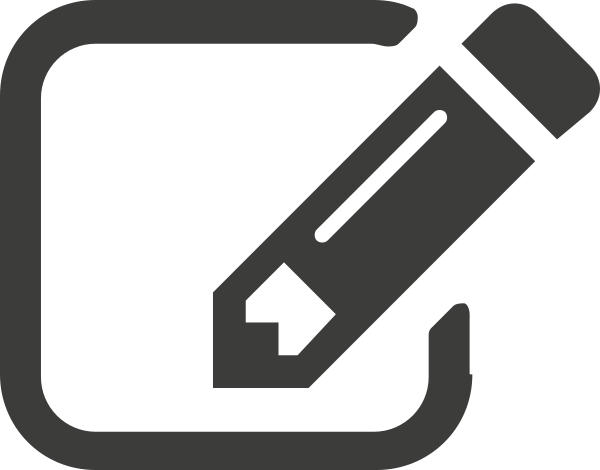
**A multi-objective economic production quantity model for deteriorating items with impact of the pandemic, social and environmental concerns**

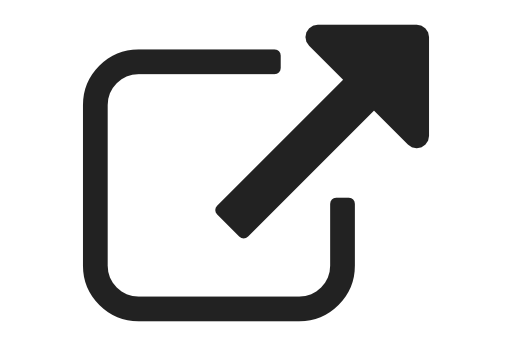
**Jayasankari Chandramohan & Uthayakumar R.**

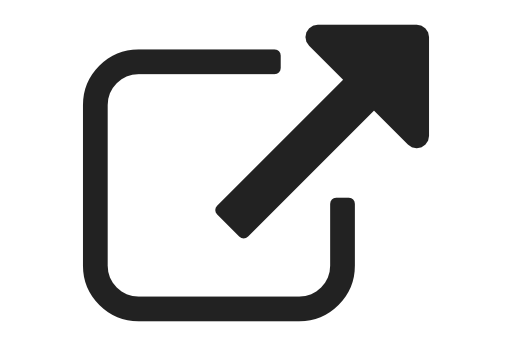
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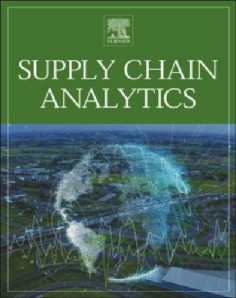
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A comprehensive inventory management system for non-instantaneous deteriorating items in supplier- retailer-customer supply chains

Jayasankari Chandramohan⁎,1, Ruba Priyadhasrhini Asoka Chakravarthi2, Uthayakumar Ramasamy2

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A B S T R A C T

This study develops an inventory management system for non-instantaneous deteriorating items in a supplier- retailer-customer supply chain. The proposed model considers carbon emissions during production and applies a carbon tax to regulate the emission. Promotional prices are considered to boost demand. The supplier offers a credit period to the retailer and the retailer to the customers. Imperfect products in the proposed model are separated from the lot using an inspection process performed by the retailer. Finally, a learning process is proposed to spot misclassified products and avoid using misclassification errors. Two models with and without shortages are further developed in this study. The proposed model considers imperfect quality, non-in- stantaneous deteriorating items based on learning effects, multi-variate demands, and multi-credit periods with the carbon tax. Models with and without shortages are also developed. Numerical examples and sensitivity analysis are provided to verify the applicability and demonstrate the efficacy of the model proposed in this study.

1. **Introduction**

Inventory management of non-instantaneously deteriorating items (NIDIs) is dependent on the firm's internal and external operations, as well as its available resources. The most common research concern today is the preservation of NIDIs. Deterioration is characterized as spoilage, damage, dryness, and vaporization that diminishes the product's useful life. In the field of inventory management, it is critical to analyses the inventory pro- blem for decaying commodities since some items, such as vegetables, fruits, cereals, and medicines, will begin to decay only after a certain amount of time. Furthermore, commodities such as fashion items and electronic de- vices may lose their whole value over time. Another important component in the research of degrading items inventory is the deteriorating rate, which indicates the nature of the deterioration. In their practice, most things keep their quality or original condition over time; that is, deterioration does not occur during this time, and then it begins in the following era. Foodstuffs, fresh vegetables, and fruits have a short shelf life during which fresh quality

is maintained and nearly no spoiling occurs. These processes are defined as the product's non-instantaneous degradation. The quality of the products is seen to be another primary factor influencing a consumer's purchase deci- sion. Besides, the merchant receives things with a time-varying degradation rate based on the expiration date, such as seasonal products, and an in- spection will take place during the period of no deterioration to monitor the quality of the products. The shop finds defective items and discards them during the screening process. With all these concerns, we tried to develop a model for non-instantaneous deteriorating items with learning in inspection process to avoid the misclassification of the products by the retailer, it helps to minimize the loss and goodwill.

* 1. *Trade credit offers*

The most basic definition of trade credit is an agreement to buy goods and/or services on credit without making timely cash or check payments. A trade credit is a short-term line of credit extended by a

*Abbreviations:*NIDI, Non-Instantaneous Deteriorating Items

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**POLLUTION PERCEPTIVE INVENTORY MODEL WITH STOCK-DEPENDENT DEMAND FOR DETERIORATING ITEMS UNDER BI-LEVEL APPROACH**

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**Abstract**

With the instantaneous effects of sustainable implements, supply chain members are curious about achieving economic and environmental benefits. This study presents the two models, namely the integrated and bi- level approaches, and compares the results to maximize the profit for the supply chain. The demand is stock- dependent, and shortages are not allowed. The pollution factor considered here is regarding production alone. Also, the deterioration induces to do some effective practices to curb consequential losses for investment in preservation technology. The main objective of this study is to determine the optimal cycle length, preservation technology investments, shipments that tends to maximize the profit per unit time. To prove the clarity of the proposed model, a numerical example is given. We analyzed the effects of various parameters on the behaviour of the profit function.

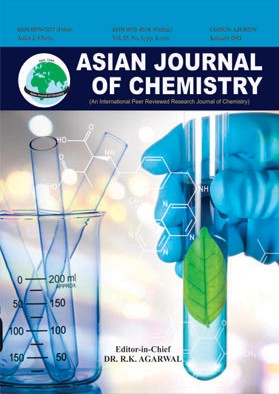
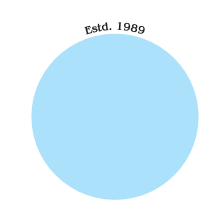
**Keywords**: STOCK-DEPENDENT DEMAND; BI-LEVEL APPROACH, INTEGRATED SUPPLY CHAIN, POLLUTION SENSITIVE INVENTORY

1. Introduction

Any region's economic growth aims to increase the well-being and career prospects available to ordinary people. While industrial development mostly benefits those, it has a negative impact on the environment. In terms of industrial pollution, industrialization has resulted in environmental degradation; yet, a pollution-free world is a delusion. To reduce the negative effects on the environment, adequate and effective pollution control methods are essential. Industrial wastes have been acquired in vast numbers, but their utilization has been disregarded for a long time. When sustaining the environment is a primary concern, recycling and reusing rejected components should be promoted. Scientists have been working on developing ingenious recycling techniques throughout the world.

Consumers are constantly demanding new eco-value market offerings, rating them on factors such as product characteristics, quality, origin, quality, price, packaging, labeling, productivity, lifespan, activities, and any other environmental factors which may fulfill their needs19. Because of globalization, low labour costs, and the expansion of modern lifestyle, polluting sectors, notably those in the manufacturing sector, are becoming highly common in lower and middle-income countries. As a result, the rates of chronic diseases related to pollution have risen38.

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Electrochemical Degradation of Reactive Red 195 from its Aqueous Solution using RuO2/IrO2/TaO2 Coated Titanium Electrodes



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The electrochemical oxidation of reactive red 195 from aqueous solution was carried out using titanium electrode in an electrochemical cell reactor. The effect of different operating parameters such as dye concentration, current density, electrolyte concentration, pH and stirring speed were investigated. The UV-visible spectroscopy confirmed the removal and degradation of reactive red 195. Three different supporting electrolytes such as NaCl, NaNO3 and Na2SO4 were used for electrolysis and NaCl were found to be effective for the removal of reactive red 195 dye from its aqueous solution. The maximum percentage of colour removal was 94%, under the optimum operating conditions with electrolyte (NaCl) concentration 0.075 M, current density 25 mA/cm2, pH 5 and stirring speed of 250 rpm. This method was found to be relatively more effective to the conventional treatment techniques.

**Keywords: Electrochemical oxidation, Reactive Red 195, Titanium electrodes.**

**INTRODUCTION**

More than 10,000 types of dyes are commercially avail- able and more than 7 × 105 tons of dyes are produced every year, which can be classified as anionic and cationic based on their structure [1]. Textile effluents containing dyes, when rele- ased into water bodies, considerably affect the photosynthetic activity in water because of reduced light penetration. Even

<1 ppm dye concentration in effluents can affect light penetra- tion in water bodies. Furthermore, these dyes, along with other contaminants, subsequently deplete dissolved oxygen concen- tration and thus alter the aquatic ecosystem [2]. Generally, dyes are derived from petroleum products that consist of an unsaturated chromophore molecule group, which absorb light present in the visible region of the electromagnetic spectrum (400-750 nm). Most of the dyes are recalcitrant molecules that chemically lock the colour onto fibres or other materials and resist decolourization on exposure to soap, water, light or other mild chemical agents [3]. The textile industry majorly affects the environment through the release of untreated sewages into

water bodies [4]. The effluents with high dye concentration can change biological cycles when released into the aquatic environ- ments through alteration of photosynthesis and water oxygen- ation and their high potential to harm living organisms and cause mutations in them [5].

Several physical, chemical and biological treatment methods are commonly used for removal of dyes from textile effluents. Presently, an efficient and cost-effective technique is urgently required for wastewater treatment. Currently, advanced oxidation process and electrochemical process are used to treat drinking water and industrial effluents. Electrocatalytic oxidation can efficiently remove organic and inorganic pollutants from indus- trial wastewaters [6]. Various physico-chemical processes are used to treat wastewater effluents, such as adsorption, coagulation/ flocculation, precipitation, activated carbon, ozonation, memb- rane filtration and ion exchange. However, most of these treat- ments are expensive and generate pollution because of the many chemicals used in the processes [7].

Recently, electrocatalytic oxidation has received increa- sing attention in environment-related studies because it can

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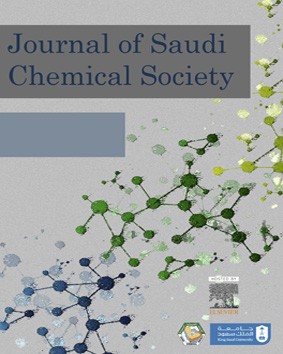
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ORIGINAL ARTICLE

# Catalytic activity of nanocrystalline ZnM2O4 (M = Fe, Co) prepared via simple and facile

synthesis of thermal decomposition of mixed metal complexes of Schiﬀ bases generated from

# a-ketobutyric acid and diaminoguanidine

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Abstract Metal complexes ([ML2], where M = Fe, Co, or Zn; HL = 2-[(6-ethyl-5-oxo-4,5-dihy dro-2H-[1,2,4]triazin-3-ylidene)-hydrazono]-butyric acid, C9H13N5O3) of a Schiff base derived from a-ketobutyric acid (a-KBA) and diaminoguanidine (Damgu) were synthesized and characterized

KEYWORDS

Nanomaterials; Catalytic activity; Precursor materials; Spinel phases

using elemental, spectral, and thermal studies. The metal complexes exhibited similar decomposi-

tion behavior, with a highly exothermic final decomposition step resulting in the formation of metal oxides. Isomorphism among the complexes was revealed using a powder X-ray diffraction (PXRD) technique. Solid solution precursors ([Zn1/3M2/3(L)2], where M = Fe, Co) were synthesized and characterized using various physico-chemical techniques. A thermal decomposition technique was used to prepare spinel-type zinc cobaltite (ZnCo2O4) and zinc ferrite (ZnFe2O4) nanocrystalline par- ticles with the synthesized single source precursors. Structural studies using PXRD ascertained the predominant crystal phase to be spinel. Transmission electron microscopy (TEM) and high- resolution TEM (HRTEM) showed a mean nanoparticle size of 18 ± 2 nm. Magnetic measure- ments revealed a weak magnetic behavior in the synthesized spinels. In the aqueous phase, the spi- nels exhibited catalytic activity, reducing 4-nitrophenol (4-NP) in the presence of NaBH4 at room

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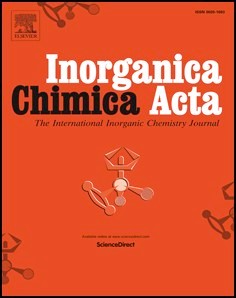
E-mail addresses: [thathanpremkumar@gmail.com](mailto:thathanpremkumar@gmail.com) (T. Premkumar), [drsgovind@yahoo.co.in](mailto:drsgovind@yahoo.co.in) (S. Govindarajan),. Peer review under responsibility of King Saud University.

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Neutral and ion-pair silver(I) complexes of Schiff bases derived from methyl and ethyl carbazates with glyoxylic acid: Synthesis, structure, thermal behavior and cytotoxic activity

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A R T I C L E I N F O

*Keywords:*

Schiff base ligands Silver complexes

Thermal and structural characterization FESEM

Biological screening

A B S T R A C T

New hydrazone ligands methoxycarbonyl-hydrazono-acetic acid, (**HL1**) and ethoxycarbonyl-hydrazono-acetic acid, (**HL2**) generated from methyl and ethyl carbazates with glyoxylic acid, and their respective silver(I) complexes [Ag(HL1)(L1)].H2O (**1**) and [Ag(HL2)2]+1[Ag(L2)2]−1 (**2**) were synthesized and characterized by various physico-chemical techniques. Single crystal X-ray structures of the ligand, **HL1** and complexes (**1** & **2**) were determined. In complex **1**, the five coordination sites around silver are occupied by one each of a neutral bidentate (N, O) **HL1** ligand, with a free carboxyl group and an anionic tridentate (O, N, O) **L1** carboxylate ligand, while complex **2** is unique with a homo nuclear ion-pair nature. In the cationic moiety, the silver ion is *hexa*-coordinated to two neutral tridentate (O, N, O) hydrazone ligands with the binding carboxyl groups pro- tonated; whereas in the anionic moiety, the silver ion is penta-coordinated with two negatively charged car- boxylate ligands with one of them as bidentate (N, O) and the other as tridentate (O, N, O). Thermal data for the prepared complexes **1** and **2** show a low temperature *endo*-followed by an exothermic decomposition pattern as that of the Schiff base ligands (**HL1 & HL2**), in the range 175–350 °C to give metallic silver as the end residue, which was confirmed by PXRD, FTIR and FESEM analyses. All of the compounds are water soluble and hence used for biological studies, such as antimicrobial (antibacterial and antifungal stains) and anticancer activities (*Hela, MCF-7,* and compared with a normal cell *HBL-100*). From a biological screening test, the silver complexes tend to be a potential applicant expandable as efficient cytotoxic agents. Further, the path of cell death (apoptosis) was also examined through fluorescence staining methods (AO/EtBr and DAPI).

**1. Introduction**

Inspired science activities towards d10 transition metal complexes especially silver complexes attracted owing to the versatility in adopting different coordination geometry [1–3], orientation of metal ions [4,5], structural motifs [6,7] and coordination number [8,9]. Also, various silver carboxylate systems [9–13] are well studied due to their versatile coordination ability. In this regard our approach is to syn- thesize Schiff base silver (I) complexes having carboxyl groups, where the coordination bonds exist between Ag and donor atoms (N,O) from

ligand determining the physical and chemical property of the materials have been investigated [14,15].

In general, oxo-carboxylic acid is a monobasic, bi-functional and biologically active system having both carbonyl and carboxyl groups. The carbonyl group is crucially important to synthesize a key compo- nent azomethine functional group which increases the lipophillicity and ligand exchangeability of a material on coordination towards a metal atom [15–17]. Secondly, the nitrogen in the azomethine group having a tendency to create hydrogen bonds with the active centers of a cell identifies a promising biological effect [18–21]. A literature survey

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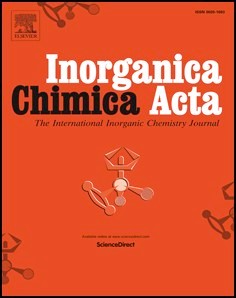
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##### Neutral and ion-pair silver(I) complexes of Schiff bases derived from methyl and ethyl carbazates with glyoxylic acid: Synthesis, structure, thermal behavior and cytotoxic activity

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A R T I C L E I N F O

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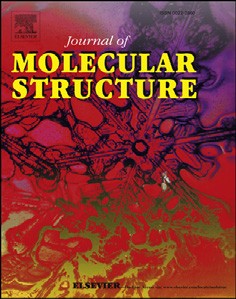
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##### Synthesis and characterisation of double-layered octahedral coordination polymers built up from divalent metal ions, mixed carboxylate anions, and ethyl carbazate ligands

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*Keywords:*

Layered coordination network Mixed carboxylate

Bidendate ligand Crystal structure

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A new family of mixed formateeacetate containing coordination polymers of formulae M(HCOO)2

e*x*(CH3COO)*x*(C3H8N2O2) [M ¼ Mn (1), Co (2), Zn (3) and Cd (4)] and Cd(CH3COO)2(C3H8N2O2) (5)

(C3H8N2O2 ¼ ethyl carbazate) are described. The compounds have been crystallised from aqueous solu- tion and characterised using elemental analysis, IR and UV/visible spectroscopy, TGA, NMR and PXRD and

the single-crystal structures of 1 and 3 have been determined. These isostructural compounds consist of M2þ ions coordinated by N,O-chelating ethyl carbazate molecules and four bridging acetate or formate anions (some of which are disordered). The resulting coordination polyhedra for the metal atoms are distorted MO5N octahedra. The polyhedral connectivity (*via* both formate and acetate bridges) generates

double layers propagating in (100) with the topology of a square grid for the metal … metal links. Intra- layer NeH…O hydrogen bonds help to establish the structures.

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* 1. Introduction

Metal-organic frameworks (MOFs) have been intensively stud- ied in recent years due to their structural diversity and potential applications in various ﬁelds including catalysis, gas storage, magnetism and separation [1e5]. A variety of ligands have been used to synthesise MOFs with different structures: in this context, carboxylate ligands have been particularly effective owing to the diversity of their coordination modes [6e8]. A large number of different carboxylates in combination with various neutral blocking ligands have been hitherto used to synthesis MOFs with different topologies [9e11]. As well as long-chain and aromatic carboxylates, simple anions such as formate and acetate are effective in forming MOFs, where their small size, strong coordinating power and ﬂexible coordination modes lead to distinct structures, which are

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often layered [12e16].

In terms of our own studies in this area, we have recently described a series of coordination polymers using bridging anionic ligands such as formate and thiocyanate in combination with ethyl carbazate as a chelating, blocking ligand [17,18]. In continuation of these studies, we now describe the synthesis, characterisation and

single-crystal structures of a new series of mixed formateeacetate compounds M(HCOO)2e*x*(CH3COO)*x*(C3H8N2O2) (M ¼ Mn, Co, Zn and Cd) and Cd(CH3COO)2(C3H8N2O2) where C3H8N2O2 ethyl carbazate.

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* 1. Experimental

Elemental analyses for C, H, and N were carried out using a Perkin Elmere240B CHN element analyzer. The metal contents were determined using EDTA complexometric titrations after decomposing the complexes with dilute hydrochloric acid. Hydra- zine contents were determined by titration using KIO3 solution

[19]. The IR spectra (KBr pellets) were recorded between 4000 and 400 cm—1 using a Shimadzu FTIR 8000 spectrophotometer. The UV/ visible spectrum for an aqueous solution of the cobalt compound

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**Generation of ultra-long multiple optical tubes using annular Walsh function filters**

**D. Thiruarul1 · K. B. Rajesh1 · M. Lavanya2 · G. Mahadevan3 · Dhayalan Velauthapillai4 ·**

**Z. Jaroszewicz5**

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**Abstract**

The tight focusing properties of an azimuthally polarized Bessel Gaussian beam phase modulated by annular Walsh function filter is studied numerically by vector diffraction theory. It is observed that upon suitable optimization of order and annular obstruction ratio of an annular Walsh function filter, one can generate multiple sub wavelength scale optical tubes (optical holes) with super long focal depth. Such a focal system is usable for Nano- lithography, particle trapping and transportation, as well as confocal and STED micros- copy, microstructure fabrication etc.

**Keywords** Walsh filter · Azimuthally polarized beam · Bessel Gaussian beam

**1 Introduction**

In Askin et al. (1986) successfully trapped the microscopic particles using the gradient force of a strongly focused Gaussian beam. Recently, optical tweezers finds more applica- tions in single molecule and cell studies (Choudhary et al. 2019), studying the elasticity of cell membrane (Nussenzveig 2018), red blood cells (Jinyong Lin et al. 2018), etc.,.In an optical tweezers setup, the conventional gradient force acting on the particle is proportional to ± ΔE2,where E denotes the electric field of the beam and ±sign indicates the refractive index difference between the surrounding medium (n1) and trapping particle (n2). If the refractive index of the particle is higher than that of the surrounding medium, normally the fundamental Gaussian beam having peak centered intensity profile is used to trap and

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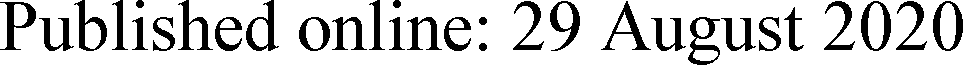
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###### Generation of ultra-long multiple optical tubes using annular Walsh function filters

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## 1 3

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###### Generation of multiple focal pattern via phase modulated radial and azimuthal variant vector beam

**D. Thiruarul1 · J. William Charles1 · M. Lavanya2 · K. B. Rajesh1 · Z. Jaroszewicz3**

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**Abstract**

The multiple focal patterns such as longitudinally/transversely polarized multiple focal spots/holes, longitudinally/transversely polarized annular dark multiple spots with petal shapes are in high demand for applications such as multiple optical trapping and manipulating, light-sheet fluorescence microscopy and optical lithography. This article numerically demonstrated the possibility of achieving the above task by subjecting phase modulation of radial and azimuthal variant vector beam through suitable annular Walsh function filter. Here it is demonstrated that the inherited self similarity properties of annular Walsh function and the flexibility of tuning the radial and azimuthal index of input beam is a state of art in landscaping multiple focal segment of desirable spatial and polarization distribution.

**Keywords** Annular Walsh function · Tight focusing · States of polarization (SoPs) · Petal shape beam · Multiple optical trapping

**1 Introduction**

Due to its potential applications in optical fields such as axial multiple optical trapping and manipulating, optical fluorescence microscopy, high-density optical storage, optical lithography, and others, the generation of multiple focal patterns has been extensively investigated in recent years (Li et al. 2015, 2020; Pesce et al. 2020; Liang et al. 2020; Tang et al. 2019; Field et al. 2016; Nhu et al. 2020; Gao et al. 2014; Olarte et al. 2018; Gohn- Kreuz and Rohrbach 2017; Gu et al. 2014a; Gan et al. 2013; Stuerzebecher et al. 2015; Salter and Booth 2019). Many ways have recently been developed by researchers to construct such multiple focal patterns by modifying the amplitude, phase, or polarization of incident vector beams at the input pupil plane using various types of pupil plane filters. Special types of novel multiple optical structures, such as axial multiple sub wavelength

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