3.4.5 Number of research papers per teacher in the Journals notified on UGC website during the last five years: 3.648

3.4.5.1: Number of research papers in the Journals notified on UGC website during the last five years: 421

<u>Supporting Documents</u>

S. No.	Documents	Page No.
1.	Number of research papers in the Journals notified on UGC website during 2021-2022	01-71

PAPER

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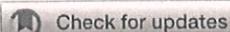
Facile synthesized zinc oxide nanorod film humidity sensor based on variation in optical transmissivity†

Rajni Verma, ‡*[a] Saurabh Pathak, ‡[b] Kajal Kumar Dey, [c] Samiksha Sikarwar,[d] B. C. Yadav [d] and A. K. Srivastava[e]

Variation in the transmitted light intensity from metal oxide thin films with moisture content provides a great opportunity to use them for humidity sensing. Herein, we have developed a novel and simple humidity sensor based on ZnO nanorod (ZNR) thin films which work as transmission-based sensing elements in an in-house fabricated sensing setup. The ZNR sensing element shows excellent linear sensing performance in the relative humidity (RH) range 10–90% and does not show any hysteresis. A maximum change in optical power of ∼95 μW is observed with the change in RH in the range 10–90%, for the sample with the smallest crystallite size (ZNR1) and highest pore diameter of the ZNR film. Also, a maximum sensitivity of 1.104 μW/% RH is observed for the ZNR1 sample which drops to 0.604 μW/% RH for the highest crystallite size sample (ZNR4). The presence of oxygen vacancies and the micro-porous nature of the film allow the absorption of water vapour on the film which deflects light at different angles that vary with the moisture content. The experimental results suggest that the ZNR film with a smaller crystallite size and larger pore diameter is more sensitive for humidity measurements. Further, an improved sensing performance is perceived in ZNRs because of the larger surface area of the nanorods. The ZNR based sensing elements do not suffer from ageing effects and exhibit high repeatability (88.74%). Further, the humidity sensor has a response time of 62 seconds and recovery time of 100 seconds which can be considered as a fairly quick response.

1 Introduction

The stipulation for monitoring/controlling the ambient environment (temperature, atmospheric pressure and humidity) for balancing the microclimate surroundings in museums, organic farming, paper industry, sophisticated instruments, pharmaceuticals, electronics manufacturing, packaging, research laboratories, the medical industry, and standard/calibration labs has led to the development of novel and advanced sensing techniques.[1–4] Humidity is a widespread measured quantity that plays a very significant role in diverse fields of applications from small-scale domestic applications to large-scale industrial processing.[5–7] It is a physical quantity which quantifies the content of water vapour in the air or any other gases and is generally measured in terms of absolute humidity, dew point, and relative humidity.[8,9] Humidity sensing and control has attracted tremendous attention as water vapour tends to condense or evaporate at the surface with the slightest change in surrounding temperature.[10,11] Water vapour is composed of highly reactive dipolar molecules, due to the difference in electronegativity of oxygen and hydrogen atoms which changes with minute variations in surroundings, making accurate sensing and control key for industrial and scientific applications.[12,13] Also, the accurate control and measurement of humidity plays a key role in triggering different chemical processes and optimizing device performance and ergonomics, making precise measurement of humidity important.[14–16] Maintaining the humidity level is not only challenging but also intricate in many cases such as in highly sophisticated instruments, pharmaceutical processing, respiratory equipment, biological products and in agriculture.[17,18]

Humidity sensors have been developed based on numerous mechanisms such as optical, electrical, mechanical, thermal (conductivity), electronic (ionic or resistive) or acoustic.[19] All these techniques possess certain pros and cons for different application areas.[7,20–23] Nowadays, many novel mechanisms based on the optical and optoelectronic properties of materials

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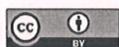† Electronic supplementary information (ESI) available. See https://doi.org/10.1039/d1na00893e

‡ These authors contributed equally.

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NANO EXPRESS

PAPER

Probing into crystallography and morphology properties of MoS₂ nanoflowers synthesized via temperature dependent hydrothermal method

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Abstract

This paper reports the formation of flower-like hierarchical molybdenum disulfide (MoS₂) nanoparticles following a simple one-step hydrothermal process with varying temperatures (200 °C and 220 °C). The as-synthesized particles were examined crystallographically by X-ray diffraction (XRD) method which revealed the formation of hexagonal MoS₂ (2H-MoS₂) and that the crystallite size of the particles increased with increasing hydrothermal temperature. Surface morphological characteristics of the particles were investigated by a field emission scanning electron microscope (FESEM) and interesting details were revealed such as the rounded 3D flower-like microstructure of the MoS₂ particles and the petals of the flowers were composed of platelets built up by stacked-up MoS₂ nanosheets. With the increase in hydrothermal temperature, the interlayer spacing of stacked layers of intense (002) plane is slightly decreased although the crystallinity of the material is improved. Both diameter and thickness of the nanoflowers and the nanoplatelets increased twice with increasing the temperatures. A visual crystallographic perspective was presented through simulation of 3D wireframe unit cell associated with the individual lattice planes as observed in the XRD pattern of the samples. In addition, a plausible growth mechanism is proposed for the formation of the obtained MoS₂ nanoflowers on the basis of experimental observations and analysis.

1. Introduction

Both the preparation and property studies of novel two-dimensional (2D) and/or three-dimensional (3D) nanostructured materials based on metal chalcogenides such as metal-oxides, -sulfides, -selenides, -nitrides with controlled morphology have attracted enormous interest that has steadily grown worldwide because of their exotic properties that are important for various innovative applications [1–12]. In recent years, intensive research has been devoted to producing high-quality 2D and 3D metal sulfide (CoS₂, FeS₂, MoS₂, NiS₂, SnS₂, and WS₂) nanostructures of various morphologies e.g. nanoparticles, nanoflowers, nanosheets, nanospheres and nanolamellar morphology [2, 6, 13–18]. Among the widely known metal sulfides, molybdenum disulfide (MoS₂) is a naturally occurring, well-defined two-dimensional (2D) layered material that has been reported to be an excellent material capable of various

ORIGINAL RESEARCH

Prediction of Phishing Websites Using Stacked Ensemble Method and Hybrid Features Selection Method

Mithilesh Kumar Pandey[1] · Munindra Kumar Singh[1] · Saurabh Pal[1] · B. B. Tiwari[2]

Abstract

Phishing is considered a big concern in this age of data and digital technologies because of its significant influence on the banking and online retailing industries. Cybercriminals target all economic activity on the Internet; thus, it is critical to take security precautions to safeguard assets. One of the first steps in constructing a safe cyberspace is to prevent phishing attacks before they happen. The detection mechanisms for these assaults were created using machine learning and other methods. However, there is still room for improvement in terms of detection accuracy. This paper proposes the optimization of an ensemble classification algorithm for phishing website (PW) detection. The suggested technique was optimised using a hybrid features selection method (Chi-square, extra tree, and heatmap) by modifying numerous machine learning (ML) method parameters, including random forest, naive Bayes, J48, and KNN. These were achieved by rating the optimal classifiers and selecting the top classifiers to serve as the foundation for the suggested technique. The obtained results by all experiments show that assigned optimized stacking ensemble approach outperforms previous ML-based detection methods. The level of precision attained was 99.7%.

Keywords Phishing websites · Random forest · Naïve Bayes · KNN · J48 · Stacked ensemble method and features selection methods: Chi-square, extra tree, and heatmap

This article is part of the topical collection "Advances in Computational Approaches for Artificial Intelligence, Image Processing, IoT and Cloud Applications" guest edited by Bhanu Prakash K N and M Shivakumar.

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Introduction

The Internet, covering a broad area of our daily lives, is an indispensable element. Many individuals use it for a variety of purposes, including shopping, bill payment, banking, and communication. Users suffer security issues as a result of increased usage, as well as in identifying theft, hacking phishing, and other cybercrimes. The most prevalent cyber-crime assault is phishing. It is characterised as a social engineering technique used to trick customers into visiting phoney websites to steal sensitive details of customers such as bank details. People often fall for the information included in phishing emails and websites due to a lack of awareness, which is utilised by the attacker as a way of penetrating the user's privacy and obtaining critical information. This occurs when an attacker creates a phishing website that is so similar to legal websites that it is impossible for certain users to tell the difference. Sending an email with links to bogus websites that are identical to actual websites is one of the most prevalent strategies employed by fraudsters. They appear to be legitimate pages when they are opened, regarding details of bank account or check account regarding details [1].

ORIGINAL PAPER

Chronic Kidney Disease Prediction Using Machine Learning Techniques

Saurabh Pal[1]

Abstract

Chronic kidney disease (CKD) is a life-threatening condition that can be difficult to diagnose early because there are no symptoms. The purpose of the proposed study is to develop and validate a predictive model for the prediction of chronic kidney disease. Machine learning algorithms are often used in medicine to predict and classify diseases. Medical records are often skewed. We have used chronic kidney disease dataset from UCI Machine learning repository with 25 features and applied three machine learning classifiers Logistic Regression (LR), Decision Tree (DT), and Support Vector Machine (SVM) for analysis and then used bagging ensemble method to improve the results of the developed model. The clusters of the chronic kidney disease dataset were used to train the machine learning classifiers. Finally, the Kidney Disease Collection is summarized by category and non-linear features. We get the best result in the case of decision tree with accuracy of 95.92%. Finally, after applying the bagging ensemble method we get the highest accuracy of 97.23%.

Keywords Chronic kidney disease · Decision Tree · Support Vector Machine · Logistic Regression and Bagging Ensemble Method

Introduction

Engineers and medical researchers are trying to develop machine learning algorithms and models that can identify chronic kidney disease at an early stage. The problem is that the data generated in the health industry is large and complex, making data analysis difficult. However, we can process this data into a data format using data mining technology, and then this data can be translated into machine learning algorithms.

A combination of estimated glomerular filtration rate (GFR), age, diet, existing medical conditions, and albuminuria can be used to assess the severity of kidney disease, but requires more accurate information about the risk to the kidney is required to make clinical decisions about diagnosis, treatment, and referral [1].

The purpose of this model is to develop and validate predictive models for chronic kidney disease. The main goal will be to evaluate kidney failure, which means the need for kidney dialysis or kidney transplant first [2].

These models also teach the patient how to live a healthy life and help the doctor see the risk and severity of the disease, as well as how to proceed with the treatment in the future. It may be possible to identify patterns of data collection using ANN, mining methods, and the future occurrence of certain diseases that may cause harm can be predicted in advance [3].

The purpose of the proposed model is to predict whether the patient will suffer or develop chronic kidney disease in the future if he continues their lifestyle. This information can be used to determine whether the kidney disease is using eGFR (glomerular filtration rate), which helps the doctor plan the appropriate treatment. Estimated glomerular filtration rate (eGFR) defines the degree of kidney disease and measures kidney function [4].

The main function of the kidney is to filter the blood in the body. Kidney disease is a silent killer because it can cause kidney failure without causing any symptoms or concern. Chronic kidney disease is defined as a decline in kidney function over a period of months or years. Kidney disease is often caused by diabetes and high blood pressure. Chronic kidney disease is a major health problem that affects people worldwide. Not getting the right treatment for chronic kidney disease can have serious consequences, affecting people who can't afford it. Glomerular filtration rate (GFR) is

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Performance Investigation of Artificial Intelligence and Machine Learning Approaches in Breast Cancer Detection Due to the Coronavirus (COVID-19) Pandemic

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Abstract

The novel coronavirus disease (COVID-19) has spread as a pandemic across 219 countries, wreaking havoc on health care, socioeconomic conditions, and international connections. The study's main goal is to give current technological features of artificial intelligence (AI) and other important technologies, as well as their implications for dealing with COVID-19 and preventing the pandemic's disastrous repercussions. This article introduces AI approaches that have made significant contributions to health care, then highlights and categorises their applications in combating COVID-19, such as detection and diagnosis, data analysis and treatment procedures, research and drug development, social control and services, and outbreak prediction. The research looks at the relationship between technology and epidemiology, as well as the possible effects of technology in health care with the advent of machine learning and natural language processing techniques.

Keywords

artificialintelligence(AI),coronavirusdisease(COVID-19),deeplearning(DL),healthcare,machinelearning(ML)technology

Introduction: The year 2020 began with the advancement of several digital technologies that will benefit health care. These technologies1, which include the internet of things (IoT) with fifth generation (5G) networks,2,3, bigdata,4, artificial intelligence (AI), including machine learning (ML) and deep learning (DL),5,6, and blockchain technology7, are being used to address problems in traditional health care systems and the pandemic. 8 The globe is currently facing a global health disaster caused by the coronavirus illness (COVID-19). 9 COVID-19, which was caused by a novel coronavirus (severe acute respiratory syndrome coronavirus-2 [SARS-CoV-2]), was identified using the World identification, isolation, rapid management, spread prediction, and contact tracking systems. 13 The primary challenges, however, include delays in viral tests, treatments, or medicines, as well as providing services to key zones. The primary goal is now to detect and diagnose the virus as early as possible, to monitor and nurse contacts continuously, to analyse epidemiological and medical reports from patients, and to track the progress of treatment procedures and drugs. Industry 4.0 technologies, such as AI, 5G-based IoT devices, and other digital technologies, are critical for health, social, and economic performance in the fight against the coronavirus. These technologies are capable of offering enhanced digital solutions for addressing difficulties throughout the disaster14-17 and alleviating the global health crisis caused by this disease. 1,7,18,19AI is one of the promising health-care technologies for better understanding and tackling the COVID-19 situation.
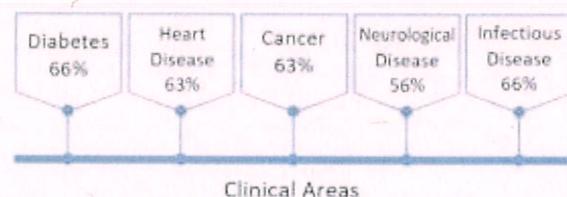

Figure 1 depicts the major therapeutic domains where AI and machine learning show the most potential.

According to the WHO, there will be 132 million people on the planet on April 4, 2021. 11,12,30 According to

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An ensemble framework-stacking and feature selection technique for detection of breast cancer

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Abstract: Breast cancer is the second most common cancer in women worldwide. The machine learning (ML) method is a modern and accurate technique that researchers have recently applied to predict and diagnose breast cancer. In this research article, we developed stack-based ensemble techniques and feature selection methods for the comprehensive performance of the algorithm and comparative analysis of breast cancer datasets with reduced attributes and all attributes. This article uses five-feature selection technique because it affects the overall performance of the model. After applying feature selection method, now we have dataset with reduced features as well as all features. We implemented logistic regression on a dataset with all features and a dataset with reduced features. Finally, we see that the dataset with reduced features have got improved accuracy.

Keywords: breast cancer; *k*-nearest neighbour; KNN; perceptron; stacking; machine learning; feature selection; algorithm; ensemble techniques; logistic regression; sub-models.

Biographical notes: Vikas Chaurasia holds an MSc in Math and MCA from the UNSIET VBS Purvanchal University, UP, India. He is currently a PhD student and Teaching Assistant in the Computer Applications Department at VBS Purvanchal University, where he teaches data mining, mathematics and computer organisation. His research interests focus on the data mining techniques to predict diseases. He has published more than 12 international research papers related to disease perdition using data mining methods in reputed journals. His area of research includes data mining, machine learning, python programming, deep learning and artificial intelligence.

Saurabh Pal received his MSc in Computer Science in 1996 and obtained his PhD in 2002. He then joined the Department of Computer Applications, VBS Purvanchal University, Jaunpur as a Lecturer. Currently, he is working as the Head and Associate Professor. He has authored more than 53 research papers in international/national conference/journals as well as four books and also guides research scholars in computer science/applications. He is an active member of the CSI, Society of Statistics and Computer Applications and working as member of editorial board for more than 15 international journals. His research interests include bioinformatics, data mining and artificial intelligence.

Gelatin Adsorbed Solid Lipid Nanoparticles (SLN) For Targeted Drug Delivery Of Anti -Inflammatory Drug

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Abstract

The purpose of this research was to study the effects of surface modified solid lipid nanoparticle of diclofenac as targeted and controlled drug delivery system. Diclofenac SLN were developed using glyceryl monostearate by solvent emulsification diffusion technique followed by sonication and then characterized by particle size analysis, zeta potential, TEM, drug entrapment efficiency. The in vitro dissolution profile showed that the GSLN were able to sustain the release of the Diclofenac for considerable period of time (89.04% within 24 hr.). The in vitro data fits to zero order, first order, Higuchi model, r^2 value showed the drug release characteristics and mechanism. The paw edema test after i.p administration showed that GSLN had extended anti-inflammatory effects compared with Diclofenac. The stability study showed the no alteration in physical appearance, size, shape, drug content and in-vitro drug release after storage at 4^0C and 25^0C during the 60 day (7, 15, 30, 45, and 60 days). These results suggest that GSLN could be promising target drug delivery for Diclofenac with an extended pharmacological effect owing to delayed released of parent drug and were stable at room temperature.

Keywords: Diclofenac: solid lipid nanoparticle: sustain release system: anti-inflammatory: targeted drug delivery.

Abbreviations: SLN, solid lipid nanoparticle: GSLN, gelatin adsorbed solid lipid nanoparticle: PCS, photon correlation spectroscopy: NSAID, non-steroidal anti-inflammatory drug: GMS, glyceryl monosterate: TEM, transmission electron micro spectroscopy.

INTRODUCTION

SLN are sub-micron colloidal carriers (50-1000nm) which are composed of physiological lipid, dispersed in water or in an aqueous surfactant solution. [1] Solid lipid nanoparticles (SLNs) have recently gained significant attention as potential alternate colloidal drug delivery systems for liposomes and lipid emulsions. The use of solid lipid is an attractive innovation that is advantageous because the solid matrix of the lipid provides more flexibility in controlling the drug release and protects the encapsulated ingredients from chemical degradation. [2] The efforts to improve drug effectiveness have led to developments in drug delivery technology. Targeted drug delivery implies selective and effective localization of pharmacologically active ingredient at preselected target in therapeutic concentration, while restricting its access to non-target area, thus maximizing the effectiveness of the drug. [3] SLNs have attracted increasing attention as a potential

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RSC Advances

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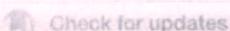
Reinforcement of nanoporous lanthanum-doped zinc borate by vanadium selenide nanosheets for improved tribological activity†

Alok K. Singh,[a] Nivedita Shukla,[a] Kavita,[a] Dinesh K. Verma,[b] Bharat Kumar,[c] K. D. Mandal [a] and Rashmi B. Rastogi [*a]

Nanoporous zinc borate (ZB) and 10% lanthanum-doped porous zinc borate (LZB) were synthesized to explore the role of porosity and doping in zinc borate during lubrication. HR-SEM, TEM, and HR-TEM authenticated nanoporous structures. The tribological properties of their blends with paraffin oil (PO) were compared by employing ASTM D4172 and ASTM D5183 norms on a four-ball tester. Vanadium selenide nanosheets (VSe$_2$) were used to reinforce the structure of LZB for further advancement of the tribological properties. The superiority of the LZB/VSe$_2$ over LZB and VSe$_2$ nanosheets could be adjudged by tribological data. The porosity and lanthanum doping have yielded commendable tribological activity. The VSe$_2$ nanosheets have strengthened the LZB matrix. The other constituent oxides of tribofilm from the LZB matrix, based on EDX analysis and XPS studies of the worn surface, ZnO, B$_2$O$_3$, La$_2$O$_3$, and V$_2$O$_5$, have abetted lubrication. The AFM and SEM investigations of wear track corroborated the tribological results.

1 Introduction

Two-dimensional layered nanomaterials, like graphene, graphitic carbon nitride, molybdenum disulfide, tungsten disulfide, and metal–organic frameworks, have numerous research applications because of a large specific surface area and weak physical interactions (van der Waals type) existing amongst the adjacent layers.[1–4] These weak interactions furnish outstanding thermal, mechanical, optical, and electrical properties to such nanomaterials.[1] Consequently, their applications have been fully admitted in diverse fields, like catalysis, sensors, photonics, water splitting, energy-storing, hydrogen evolution, and electronics.[1]

Furthermore, for the sustainability of the machine and endurability of its components, 2D nanomaterials have been frequently used as wear and friction-reducing additives to the base lubricating oil.[1–3,5,6] Recently, the tribological properties of some metal selenides such as MoSe$_2$, WSe$_2$, NbSe$_2$, and monoselenide ZnSe, have been investigated.[7–12] Zhao *et al.* investigated macroscale superlubricity of MoS$_2$/MoSe$_2$

heterostructures.[13] The lubricating properties of MoS$_2$ and WSe$_2$-based nanocomposite coatings were studied by Meister and coworkers.[14] Zhang and associates studied the tribological behavior of ZnSe nanoplates as lubricant additives.[13] The lubricating behavior of MoSe$_2$ hollow nanospheres, nanoflowers, and MoSe$_2$ hybrids with other nanomaterials was studied in detail.[15–17] Zhang and collaborators have shown the tribological applications of the composite of a copper matrix reinforced with Ni/NbSe$_2$.[18] Ultrasound-assisted preparation of NbSe$_2$ micro/nanoparticles and hybrid material was achieved by Qu and coworkers.[19] They tested them for sliding electrical contact as a solid lubricant. The tribological properties of hexagonal NbSe$_2$ nanoplates were examined by Sun *et al.*[19] Cao and his associates studied the tribological behavior of the tower-like structure of WSe$_2$ ultrathin nanosheets as an additive to paraffin oil.[9] Besides the above selenides, VSe$_2$ also holds a layered hexagonal lamellar structure and is well known mainly for hydrogen evolution reactions.[20,21] Li and coworkers tested VSe$_2$ nanosheets for ultrafast fiber lasers.[22] Investigations on VSe$_2$ nanosheets for the storage of alkali metal ions were conducted by Ming *et al.*[23] and Yang *et al.*[24] The nanocomposite of VSe$_2$ with graphene was used as anode for Li-ion batteries by Wang *et al.*,[25] and as cathode material for an aqueous zinc-ion battery by Narayanasamya *et al.*[26] Ghobadi and associates[27] investigated the catalytic properties of VSe$_2$. NbSe$_2$, VSe$_2$ being congeners, VSe$_2$ is expected to be a potential lubricant additive like NbSe$_2$; however, to the best of our knowledge, the tribological properties of VSe$_2$ have not been explored.

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Thermal, mechanical and water barrier properties of graphene oxide/polyvinyl alcohol/polyol composite films

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ABSTRACT

The novel polymer composite of polyvinyl alcohol (PVA), polyol(PO) and graphene oxide (GO) was used to prepare the PVA/PO and GO/PVA/PO with different weight percents of GO (0.5 and 1% denoted as (0.5 wt%) GO/PVA/PO and (1 wt%)GO/PVA/PO, respectively) through solution casting blend technique. The structure-properties of all used films were confirmed by scanning electron microscope (SEM), Transmission Electron Microscope (TEM), X-ray powder diffraction (XRD), thermogravimetric analysis (TGA) and mechanical properties. The SEM results exhibited the uniform and homogeneous dispersion of GO in the PVA/PO blend matrix. The TEM and XRD analysis confirmed the structure and exfoliation of GO nanosheets, respectively. Thermal stability suggested that (0.5 wt%)GO/PVA/PO and (1 wt%) GO/PVA/PO films are more stable than PVA/PO. The tensile strength of (0.5 wt%)GO/PVA/PO and (1 wt%)GO/PVA/PO films reached 270.5% and 1349.6%, respectively, which are higher than that of the PVA/PO film. The decrease in the water absorption (WA) of GO/PVA/PO was found from 110.5 to 38.4%. The physico-mechanical properties of used films suggested that the prepared GO/PVA/PO blend composite films can be applied in food packaging areas.

1. Introduction

Recently, plastics based packaging materials used by humans generated health and environmental issues due to its nondegradable, hazards and global warming [1] behaviour. Therefore, nowadays, scientists focussed on natural/synthetic biopolymers as alternative materials to plastics because such materials are biodegradable, renewable and abundant [2]. Also, the benefits of such biopolymers include the potential to create a sustainable industry as well as enhancement in various properties such as durability, flexibility, high gloss, clarity, and tensile strength. The biopolymers obtained from Vegetable oils (VOs) made attention for industry by its physical, chemical and thermal properties [3-5]. VOs such as linseed oil (LO) with 22% oleic acid, 14% linoleic acid and 44% linolenic acid is used for synthesis of polyol (PO). PO is very useful in paints and coatings. But, the application of PO in packaging area has some limits because it cannot form free standing films. So, PO is blended with other polymers, such as polyvinyl alcohol (PVA), to produce free-standing films. PVA, a water-soluble synthetic biopolymer, prepared from polyvinyl acetate [6] is very useful in industry such as coatings, adhesives, fibres [7], textile and oil chemicals due to its non-toxicity [8], biocompatibility and biodegradability

behaviour. PVA showed high mechanical [9] due to presence of hydrogen bonding between its polymeric chains; while its processability and toughness behaviour is poor. The poor toughness behaviour of PVA is controlled by blending with some elastomer [10]. Literatures [11-14] revealed that the use of nanofillers like carbon nanotubes [15], clay [16], silica [17] and graphene [18] had verified to be affective in numerous methods to increase the thermal, mechanical and electrical properties of polymers. The GO (namely functionalised graphene) [19], obtained by Hummers' method, is an impressive smart material [20]. Due to having numerous oxygen groups [21] such as C=O, –COOH, -OH, and -O-, on GO surface, it is easily dissolved in water and organics solvents [22]. Therefore, GO can be applied in many areas [23-25]. GO based PVA films are very useful in packaging [26,27] and coating area [28]. The graphene/PVA composite films can be used for gas barrier [29]. Recently, Mehmood et al. [30] found that graphene/PVA bucky paper is very applicable for strain sensing. The multi fillers with PVA has also been used by many researchers [31,32]. However, the three component based composite of GO, PVA and PO is unique and the effect of GO on thermal and mechanical properties for PVA/PO blend is not reported yet.

In this study, GO-reinforced PVA/PO composite films is prepared by

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Psychosocial Challenges Faced by Students During Covid-19 Pandemic

Dr. Janhvi Srivastava
Asst. Professor

ABSTRACT

Background. Psychosocial problems refer to the difficulties faced by adolescents in different areas of personal and social functioning and psychological functioning during COVID-19 Pandemic. Therefore, this study was conducted to identify psychosocial problems among Board Appearing Students of Jaunpur district in

India.

Methods. Non probability convenient sampling technique was used for selecting respondents. PSC-Y Questionnaire was used for data collection. In this scaleReliability coefficient of the Y-PSC was 0.808. Data collection was done in 2021. Descriptive statistics were used to analyze the data.

Results. The findings of this study shows that 39 percent of High School and 44 percent intermediate adolescents had psychosocial problems While categorizing psychosocial problems, the adolescents had internalizing problems (40%), attention deficit hyperactive disorder (ADHD) (54%), and externalizing problems (20%).

Conclusion. It is concluded that psychosocial problems (i.e., internalizing problems, ADHD, and externalizing problems) were prevalent among Indian school adolescents. This study recommended that school authority, health professionals, and other professional related to child health and mental health should play an important role for the prevention and earlier recognition of and intervention for psychosocial problems and should seriously take care of all School going students

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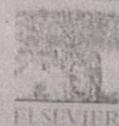
Detection and discrimination of water (H₂O) and heavy water (D₂O) by an off-the-shelf fluorescent probe

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ABSTRACT

Coumarin based small molecule 6,7-dihydroxycoumarin or Esculetin (ES) has been used for the colorimetric and fluorogenic detection of trace amount of water in acetonitrile, acetone and 1,4 dioxane. The deprotonated (anionic) form of ES namely ES-F is reprotonated by trace amount of water. It was observed that the compound ES itself act as a water sensor through formation of hydrogen bonding interactions with the water. But, the probe ES-F shows high sensitivity in acetonitrile as low as the limit of detection (0.0167 wt%). ES-F found to be more sensitive for moisture detection as compared ES. Di-hydroxide group present in the ES play an essential role in sensing the moisture in the organic solvent and it was confirmed by a model compound. Further, taking advantage of basic nature of D₂O, compound ES was used as an efficient optical sensor to detect D₂O in organic solvents and H₂O contamination in D₂O. The response mechanism of sensor ES to D₂O is based on deprotonation. The different spectral behaviour of ES with D₂O and water also used to discriminate between D₂O and H₂O. The probe ES has many advantages such as economical, readily available, no multistep chemical synthesis, good sensitivity, fast response and used to discriminate D₂O and H₂O.

1. Introduction

Many chemical reactions and chemicals are water sensitive. Even a trace amount of water is enough to spoil the chemical reactions and final product yield. Sometimes water-sensitive chemicals can react vigorously with moisture to make life-threatening accidents followed by explosive reactions. Therefore, water is considered as one of the key impurities in solvents[1]. Hence, water detection is crucial for academic and industrial research[2,3]. Water is also undesirable impurity in heavy water (D₂O). A trace amount of water in D₂O plays a vital role in indulging chemical analysis and spectral characterization. Due to its highly hygroscopic nature, it is easily contaminated with water. Unfortunately, there is no simple way to distinguish D₂O from the water content. Traditional Karl Fischer titrator and other sophisticated analytical instruments are available for the accurate measurements of trace level water. But they are expensive and require skilled persons for the operation and measurement. To avoid these limitations, colorimetric and fluorescent responsive chemical sensors provide a promising alternative [4].

Though recently several chemical sensors are reported for detecting water in organic solvents [4-13], chemical sensor that detect and discriminate D₂O from H₂O is very rare, due to the similar chemical and physical properties between them. Most of the existing reports of water/moisture sensors failed to detect or measure water in D₂O and discriminate D₂O from H₂O. Only few chemical probes based on small organic molecule [14,15] and Lanthanide complexes [16,17] are known to detect D₂O and differentiate D₂O from H₂O [18]. Though they are well-designed with high sensitivity, they require multistep complicated chemical synthesis. Therefore, it is essential to invent a cheap and readily available probe for detecting water and D₂O.

Recently, we have discovered optical chemical probes having hydroxyl groups to detect water in organic solvents [19,20]. Deprotonation by fluoride ion and protonation by water has been involved for water detection in those reports. Deprotonation of –OH group to yield respective phenolate anion species, upon addition H₂O, the anionic probe gets protonated to recover original spectral properties [21-23]. It is known that D₂O is more alkaline than H₂O, owing to the less acidic nature of H₂O (pH ~ 6.5-7.0) compared to D₂O (pH ~ 7.5) at RT.

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Self Att.

Polyaniline intercalated vanadium pentoxide nanosheets for the improvement of lubricity of base oil

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GRAPHICAL ABSTRACT

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ABSTRACT

Vanadium pentoxide (V₂O₅) nanosheets were prepared and tested as an additive to improve the wear-friction-reducing and load-carrying properties of the base lube, paraffin oil. For further advancement of these properties, in situ intercalation of polyaniline (PANI) was achieved hydrothermally using the starting materials as V₂O₅ powder and aniline. During the process, V₂O₅ powder was exfoliated into nanosheets, and aniline was oxidatively polymerized under acidic conditions producing polyaniline, which intercalated between the nanosheets to yield the composite PANI-V₂O₅·nH₂O (PVO). Separately synthesized PANI, exfoliated V₂O₅ nanosheets, and the in situ synthesized composite were characterized by p-XRD, HR-SEM, TEM, FTIR, and XPS. Intercalated PANI prevented restacking of nanosheets and reduced their agglomerating tendencies. A significant increase of interplanar spacing corresponding to the (001) plane of V₂O₅ in the nanocomposite confirms considerable interaction between the nanosheets and PANI. Although there is no chemical interaction, the noncovalent interactions like hydrogen bonding between the organic and the inorganic components through NH(PANI)...O-V (V₂O₅) and van der Waals forces hold the structure firmly. Tribological tests performed on a four ball tester following ASTM D4172 and ASTM D5183 standards in paraffin oil revealed significant enhancement in friction/wear reducing and load carrying properties of the composite compared to V₂O₅ nanosheets and PANI. The advanced activity of the nanocomposite validates synergy between PANI and V₂O₅ nanosheets. The morphological studies of the worn surface by SEM and AFM studies endorsed the observed results. The EDX and XPS

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Shakti Yadav*, Ramanshu P. Singh, Giridhar Mishra and Devraj Singh

Mechanical and thermophysical properties of 4d-transition metal mononitrides

Abstract: The second and third order elastic constants (SOECs and TOECs) of 4d-transition metal mononitrides XN (X: Zr and Nb) have been computed in the temperature range 0 K–500 K using Coulomb and Born–Mayer potential up to second nearest neighbours. In order to investigate the mechanical stability of XN, the computed values of SOECs have been utilized to find out Young's modulus, bulk modulus, shear modulus, Zener anisotropy and Poisson's ratio. Furthermore, the SOECs are applied to compute the wave velocities for shear and longitudinal modes of propagation along (100), (110) and (111) crystallographic orientations in the temperature range 100 K –500 K. Temperature dependent Debye average velocity, ultrasonic Grüneisen parameters (UGPs) and Debye temperature have been evaluated. In present work the thermal conductivity of chosen materials has also been evaluated using Morelli-Slack's approach. Specific heat and total internal thermal energy have been calculated in the temperature range 100 K–500 K on the basis of Debye theory. Thermal relaxation time, acoustic coupling constants and attenuation of ultrasonic waves due to thermo-elastic relaxation and phonon–phonon interaction mechanisms have been calculated in the temperature range 100 K–500 K. The obtained results of present investigation have been compared with available other similar type of materials.

Keywords: elastic properties; thermal properties; transition metal mononitrides; ultrasonic attenuation.

1 Introduction

Transition metal mononitrides have been significantly attracted by researchers due to their anomalous physical

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behavior. The presence of partially filled shells of the d-electrons in the transition element ions provides distinctive chemical and physical properties to transition elements which are not exhibited by other compounds [1–3]. The transition metal mononitrides possess high melting point, high hardness, good thermal and electrical conductivity and high resistance to corrosion [4]. These mononitrides are suitable materials to be applied in high temperature environment including aerospace and refractories [5]. The mononitrides were used for protective coating of industrial machines, diffusion barrier layer in electronic devices [6]. Many attempts have been made to synthesize nano-tubes composed of nitrides due to their important applications in material science. The mononitrides are found in various crystal structures but the natural structure has been reported as the cubic rocksalt, moreover, other hexagonal wurtzite structures are possible [7, 8]. Ab-initio study on the stability, electronic and mechanical properties of the transition metal mononitrides under external pressure has been investigated by Tan et al. [4]. The first-principles study of the structural preference and magnetic properties of mononitrides of the d-block metals has been determined by Hlynsson et al. [8]. The study on elastic properties and electronic structures of 4d- and 5d-transition metal mononitrides has been performed by Chen et al. using CASTEP code based on DFT [9]. Ab initio investigations of the phase stability in group IVB and VB transition metal mononitrides have been done by Weinberger et al. [10]. The structural, mechanical and electronic properties of 4d-transition metal mononitrides have been explored by Zhao et al. [11] using the linear muffin-tin orbital method. Study on structural, mechanical, electronic properties and Debye temperature of four NbN structures has been done by Yang et al. [12]. Thus, the study of transition metal mononitrides has vast scope in the emerging field of materials science and technology.

Ultrasonics is accounted as an important branch of acoustics, which has vast applications in various fields of scientific studies ranging from materials science to medical science [13–15]. As per knowledge of the authors, the ultrasonic and thermophysical properties of ZrN and NbN have not been investigated at different physical conditions. This motivates us to study elastic, mechanical, ultrasonic and thermophysical properties of these materials in high

Study of elastic, mechanical, thermophysical and ultrasonic properties of divalent metal fluorides XF_2 (X = Ca, Sr, Cd and Ba)

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Abstract. This paper described the behaviours of four divalent metal fluorides (CaF_2, SrF_2, CdF_2 and BaF_2) in terms of their superior elastic, mechanical and thermophysical properties. Initially, higher-order elastic constants of the chosen divalent metal fluorides have been calculated using the Coulomb and Born–Mayer interaction potential in the temperature regime 100–300 K. With the help of these constants, other elastic moduli, such as Young's modulus (Y), bulk modulus (B), shear modulus (G), Poisson's ratio (σ) and Pugh's ratio (B/G) have been computed using Voigt–Reuss–Hill approximation. The Born stability criteria and Vicker's hardness parameter (H_v) have been used for analysing the nature and strength of the materials. Later on, ultrasonic velocities including Debye average velocities were evaluated using calculated values of second-order elastic constants and density in the same physical conditions. Thermal properties such as the lattice thermal conductivity, thermal relaxation time, thermal energy density and acoustic coupling constant have also been computed at the same physical conditions and along (100). The temperature-dependent ultrasonic properties have been correlated with other thermophysical properties to extract important information about the microstructural quality and the nature of the materials. The obtained results have been analysed to explore the inherent properties of the chosen divalent metal fluorides, which are useful for numerous industrial applications.

Keywords. Divalent metal fluorides; elastic constants; mechanical property; thermophysical property; ultrasonic attenuation.

PACS Nos 43.35.Cg; 62.20.dc; 63.20.kr

1. Introduction

Divalent metal fluorides XF_2 (X = Ca, Sr, Cd and Ba) fascinate material scientists and researchers due to their intrinsic low phonon energies and high physical and chemical stability [1–4]. The divalent metal fluorides exhibit extensive optical, electrical, thermal, superconducting, semiconducting, thermo-optical and wide transmission band properties [3–6]. The potential applications of the divalent metal fluorides are raw materials for manufacturing optical elements for average and high power lasers, elementary particle and γ-ray detectors, sensors, high-temperature batteries, chemical filters, etc. [7–10]. In recent years, several studies have been conducted on the optical, thermal and electronic properties of divalent metal fluorides. In particular, optical anisotropy parameters and Euler angles of crystallographic axis orientation of CaF_2, SrF_2 and BaF_2 cubic crystals were measured by Snetkov et al [3]. The structural phase stability of the alkaline-earth divalent metal fluorides had been studied by Kanchana et al [4]. Band structures of divalent metal fluorides were reported by Ching et al [5]. A detailed study considering the effect of pressure in the electronic and optical properties of BaF_2, by applying the equation of state has been done by Jiang et al [6]. Heise et al [7] investigated pressure dependency of the elastic constants of CaF_2 using phase comparison and Cook's method. The thermodynamic and phonon transport properties of FCC structured divalent metal fluorides at high temperature

Proterozoic sandstone of Rajgarh Formation, Alwar sub-basin, Northeastern Rajasthan: sedimentological and paleo-hydrodynamical implications

Sadia Khanam ✉ K. F. Khan, ... Faiz Ahmad

+ Show authors

Abstract

The Proterozoic Rajgarh Formation Sandstone, Alwar sub-basin, Northeastern Rajasthan, was studied utilising a range of methodologies, including sedimentary features such as grain size, shape, and characteristics of microtextures presented on the quartz grain surfaces (determined in Stereozoom Binocular microscope and scanning electron microscope). The representative samples of sandstone were collected from

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Origin of breccia in mud volcanoes of the Andaman accretionary prism: Implications for forearc processes

Alok Kumar [a, b] ... Kanchan Pande [f]

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Abstract

Mud volcanoes at convergent margins are important pathways through which clay minerals and fluids, collectively known as mud breccia, originating from deep within forearcs, are ejected at the surface, opening an important window to shallow level processes in subduction zones. Although the mud breccia is the only detachable part of a subducting slab at shallow depths, its origin and implications for the chemistry of crustal material getting recycled into the mantle remain largely unknown. To understand the chemical transformation of slabs within fo_____
chemistry of recycled component

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Microwave assisted formation of trimetallic AuPtCu nanoparticles from bimetallic nano-islands: Why it is a superior new age biocidal agent compared to monometallic & bimetallic nanoparticles

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Performance of ionic liquid–based quasi-solid-state hybrid battery supercapacitor fabricated with porous carbon capacitive cathode and proton battery anode

Manoj K. Singh ✉, Sujeet Kumar Chaurasia

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Abstract

The present paper reports preparation, characterization, and application of proton-conducting ionic liquid–based gel polymer electrolyte (ILGPE) obtained by immobilizing liquid electrolyte solution (0.3M NH_4Tf in EMIMTf) to the polymer PVdF-HFP. These ILGPE offer excellent ionic conductivity ~1.30 × 10^{-2} S/cm at room temperature and used as separator membrane in the hybrid BatCap. DSC study confirms glass transitions and melting temperatures (T_g's and T_m's) of

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Structural, thermal, and electrochemical studies of biodegradable gel polymer electrolyte for electric double layer capacitor

Sujeet K Chaurasia, Atul K. Sharma, [...], and Manoj K. Singh 🌐 ✉ ➕ View all authors and affiliations

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Abstract

A quasi-solid-state supercapacitor is fabricated using a biodegradable gel polymer electrolyte (GPE), and graphene nano-platelets (GNPs) capacitive electrodes. The GPE film comprises biodegradable polymer cellulose acetate (CA), ionic liquid, 1-ethyl-3-methylimidazolium thiocyanate (EMImSCN) and dopant salt potassium thiocyanate (KSCN). The polymeric gel films are prepared using the standard "solution cast technique" and characterized by using X-ray dif

⚙ Privacy

Structural, thermal and optical properties of magnesium ion conducting biopolymer electrolytes for supercapacitor applications

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ARTICLE INFO

ABSTRACT

This paper reports the physical properties of magnesium ion (Mg^{2+}) conducting biopolymer electrolyte films of cellulose acetate (CA) + xwt.% $Mg(ClO_4)_2$ containing different amounts of magnesium salt (x = 10, 20, 30, 40 and 50 wt%) which have been prepared by the solution cast technique. The prepared biopolymer films were characterised by XRD, FTIR, DSC and UV–vis spectroscopy. The structural analysis carried out by X-ray diffraction (XRD) study confirms the structural changes & decrease in the degree of crystallinity of the host biopolymer matrix CA upon incorporation of magnesium salts $Mg(ClO_4)_2$. And this effect is more pronounced at higher loading. The DSC thermograms of the electrolyte films showed that the glass transition temperature (T_g) increases with the increase of salt content in the biopolymer CA matrix which is attributed to the restriction in the mobility of the polymeric chains. This hindrance was caused by the high density constituent ions of dopant salt. Fourier transform infrared (FTIR) spectroscopic study confirms the complexation between the cations of the dopant salt (Mg^{2+}) and ester group (i.e. C = O) of the biopolymer chain owing to Lewis acid-base interactions. The UV–visible spectroscopic analysis demonstreted that optical absorption edge as well as direct & indirect optical band gap decreases with the incease of the concentration of dopant magnesium salt.

1. Introduction

Ion conducting polymers or polymer electrolytes are the essential component for many solid-state electrochemical devices like rechargeable batteries, supercapacitors, fuel cells, solar cells, etc. These are generally obtained by embedding mobile ionic species into the soft polymer matrices. The initial important reports on the ion conduction properties in polymers were documented by P.V. Wright, 1975 [1] while its technological application demonstrated by Armand et al., 1979 [2]. Earlier most of the studies was manily focused on the synthetic polymers based electrolyte systems which employed in the development of many high energy density energy conversion and storage devices [3-5]. Nowadays, due to the environment awareness and use of clean energy technologies in furure landscape, natural polymers are being taken as advantage over synthetic polymers [6]. A lots of outstanding properties of biopolymers such as high thermal stability, good mechanical stability, enhanced ionic conductivity and wider electrochemical stability window makes them suitable candiadates for their application in many solid-state electrochemical devies [7-9]. Recently, a lots of biopolymer electrolyte systems based on various host matrices like cellulose acetate (CA) [10], potato starch [11], starch [12], agarose [13], seaweeds [14], geletin [15], chitosan [16] are utilised as an active component in many clean energy generation and storage technologies for the sustainable development. The natural cellulose acetate (CA) based biopolymers have many advantages over others like excellent film formation ability, low cost, biocompatibility, non-toxic nature and biodegradability etc. [17]. However, the biopolymer CA is semi-crystalline in nature and it has some limitations like highly crystalline nature and low

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Recent advances on magnetoelectric coupling in BiFeO₃: Technological achievements and challenges

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ARTICLE INFO

ABSTRACT

The control on magnetization via applied electric field is the centre of attention in multiferroic materials for the achievement of technological device applications. The bismuth ferrite (BiFeO₃) is best multiferroic material which has the ferroelectric as well as weak magnetic nature simultaneously in the single phase near the room temperature. There are many unsolved problems in the path of the actual device applications of multiferroic BiFeO₃ (BFO) due to the transformation of several scientific progresses into technical innovations. So, there is a need to solve these complications via focused research movements, which may convert this useful material into actual device applications. This review article is mainly concentrated on look over the recent advances on technological achievements and challenges in BFO via the magnetoelectric coupling and presents the latest devices achievements.

1. Introduction

Multiferroics are special class of solid state compounds which exhibit simultaneous coexistence of two or more ferroic orders i.e. ferroelectricity, ferromagnetism and ferroelasticity [1]. These compounds attract a lot of interest especially due to its magneto-electric (ME) effect that offers strong interaction between electric and magnetic order parameters [2]. Specifically, ME effect in multiferroics induced electric polarization on applying magnetic field (direct ME effect) or vice versa i.e. induction of magnetization by applying electric field (inverse ME effect). Another important parameter of ME effect is magnetoelectric voltage coefficient ($\alpha_E = \delta E/\delta H$), used in designing numerous applications based on multiferroics. Fig. 1 exhibits the connection between magneto-electrics and multiferroics with all probable coupling in multiferroics [3,4].

In 1961, ME effect was experimentally observed in single-phase multiferroic Cr₂O₃. In sequence of study on Cr₂O₃, there were found numerous other ME materials. In past decade, many studies have focused on single-phase multiferroic materials such as Cr₂O₃, LiCoPO₄, TbPO₄, YIG, BiFeO₃, BiMnO₃, YMnO₃, and BaMnF₄ [5]. Out of these materials, BFO is only known single-phase multiferroic which shows linear ME effect at room temperature. It possesses distorted rhombohedral perovskite (space group $R3c$) structure with relatively high antiferromagnetic (AFM) and ferroelectric transition temperature at 643 K and 1100 K, respectively [6]. The magnetic structure of BFO is such that the Fe moment is arranged in G type AFM ordering along pseudocubic direction [1 1 1] leading to uncompensated cycloid spin structure of 62 nm length that inhibit ME coupling in BFO [7]. The recovery of ME coupling can be achieved by destroying cycloid spin structure of BFO by using chemical doping and strong magnetic field [8]. Since it is difficult to find strong ME coupling in none of single phase multiferroics, therefore, composite multiferroics become more prominent, which offers potential applications with desired properties that are lacking in single phase multiferroics [9]. In 1970, most of the studies were focused on composite multiferroic that were consisted of ferroelectric and ferromagnetic phases [10]. However the presence of defects, impurities, leakage current and micro-cracks

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Dielectric properties and ac conductivity behavior of rGO incorporated PVP-PVA blended polymer nanocomposites films

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ARTICLE INFO

ABSTRACT

We have reported dielectric and ac conductivity investigations on reduced grapheme oxide (rGO) incorporated PVP-PVA blend polymer nanocomposite films (BPNC) prepared via standard solution casting technique. The dielectric properties and ac conductivity have been explored using the complex electro-chemical impedance technique that has been studied at room temperatures. The frequency-dependent dielectric constant (ε') is maximum at low frequencies region which value increases with increasing rGO concentration, while at higher frequency region their value decreases with increasing frequency for all BPNC films. The appearance of the loss tangent ($\tan \delta$) peaks at specific frequency suggested the existence of recline dipoles which has been found to shift towards high frequency side with increasing weight ratios of rGO in all the BPNC films. The fluctuation of a.c conductivity behavior as a function of frequency follow Jonscher Power-law model. The a.c. conductivity shows an increasing trend with an increase in the doping concentration of rGO. The electrical modulus has been examined for supporting the complex permittivity part. The relaxation peaks occur in electric modulus (M'') indicates the presence of orientation dipoles in the blend polymer nanocomposites, which support the fast ion conduction.
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1. Introduction

The development of energy storage materials has been the focus of current research interest due to its broad application ranges such as battery, solar cell, chemical sensors, and supercapacitors [1–3]. The electrolyte is an very crucial part of an electrochemical energy storage devices and plays a very important role in ion migration between the electrodes. Polymer-based electrolytes have gained much attention because of its lightweight, low cost, and mechanical flexibility. As polymers are insulators, so they need to be made conducive for their utilization in solid-state electrochemical devices by incorporating additives. A lot of research work has been focussed on the development of new polymer electrolytes which provides high ambient conductivity and good mechanical

integrity along with better electrode–electrolyte contacts for application in battery and supercapacitor [4,5]. Recently, the method of polymer blending showed the admirable property as compared to specific single polymer because of combined properties of the individual. This is one of the easy and versatile approach to fabricate flexible polymer electrolyte membranes with desirable properties. The polyvinyl pyrrolidone (PVP) (C_6H_9ON)n based blend polymer electrolytes are highly considerable due to its amorphous nature, non-toxic nature, and can make a complex with other polymers, and metal salt cations. The presence of highly amorphous phase witin the matrix supports the faster ionic movement compared to other semicrystalline polymers and used as active materials in numerous potential applications [6–9]. This makes polymer PVP superior over the other semi-crystalline polymers. The presence of carbonyl group (C = O) in the PVP side chain enables the formation of complexes with the variety of inorganic salts which leads to mobility in the electrolyte systems. Another attractive candidate

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Optimization of eco-friendly amendments as sustainable asset for salt-tolerant plant growth-promoting bacteria mediated maize (*Zea Mays* L.) plant growth, Na uptake reduction and saline soil restoration

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ARTICLE INFO

ABSTRACT

Soil salinity is progressively affecting global agriculture area, and act as a brutal environmental factor for the productivity of plants, therefore, sustainable remediation of the saline soil is urgently required. In this study, we tested the effectiveness of PM (poultry manure), SMS (spent mushroom substrate), and CD (cow dung) for the recovery of salt soil and the optimization of the productivity of the maize plant. PM and SMS showed the valuable source of OC, N, P, K as the CD. The HCA analysis showed that 47% of the bacterial population from PM, SMS, and CD survived at 6% NaCl (w/v), which had PGP attributes such as IAA, P-solubilizers, and siderophore activity. The results from pot experiments of plant growth and PCA analysis of bacterial PGP attributes revealed an formulation of PM, SMS, and CD, which were further optimized at the saline field level. T-2 treated plant increased their shoot length, chlorophyll content, reducing sugar, nitrogen, phosphorus, and potassium levels significantly after 30 and 60 days, followed by T-4 and T-3 as the control. A significant (P < 0.01) increase in particle density and decrease in bulk density was observed for all combinations treated (T-2 to T-7). A two-year field study revealed that the T-2 combination increased 43% OC, 57% N, 62% P, 40% K, 32% DHA, 76% PPO in the soil than the control after 60 days. T2-combination decreased ≈50% of Na content in root and shoot, and increased 37% of maize crop yield. The dose of 10% PM + 10% SMS can significantly induce the growth of maize plants and the restoration of saline soil health.

1. Introduction

The harmful effects of soil salinization lead to the deterioration of agricultural soils and dampen crop production worldwide. Extensive farming, the application of synthetic chemicals, urbanization, uncontrolled irrigation practices, etc. are the main factors triggering salinity in agricultural land. The salinization of the soil is increasing and it can be assumed that around 50% of the global arable land will be contaminated with salt by 2050 (Butcher et al., 2016). About 6.74 million hectares of land in India are affected by salt and 44% of the salt areas are covered by twelve states (Kumar and Sharma, 2020). The maximum salt area cover is in the Indo-Gangetic area of India (Arora and Sharma, 2017). Several reports indicate that the high salinity in agricultural soils affects plant growth and soil fertility (Arora and Sharma, 2017; Saghafi et al., 2019; Sabab et al., 2021). Soil salinity is a challenge to meet the United Nations' sustainability goal for food security; hence, it is necessary to maintain crop production for global food needs and the restoration of soil health.

Eco-friendly amendments (EFA) can be a better sustainable management tool to overcome the impacts of soil salinity on plant growth and restore soil health. EFA also minimizes the doses of synthetic chemicals in the agriculture sector (Wang et al., 2017). EFAs such as manure and compost are used for plant growth in agricultural soils, but little information is available on spent mushroom substrate (SMS) and poultry manure (PM) to support plant growth in saline conditions. Cow dung is rich source of plant nutrients (Wang et al., 2017), favors microbial diversity and well known eco-friendly soil amendment for plant growth (Behera and Ray, 2021). Urdsr (2017) reported that SMS contains a rich source of nutrients for microflora and improving soil fertility. SMS also induces seedling emergence and plant growth (Gaikela et al., 2019). Likewise, PM is a rich source of macro and micronutrients that stimulate plant growth in the *Phaseolus vulgaris* (Ngoroyi et al., 2020), *Spinacia oleracea* (Dikinya and Mufwanzala, 2010), *Solanum Lycopersicum* (Ewulo et al., 2008) including soil fertility. In the purview to tackle

Mechanistic Insights and Potential Use of Siderophores Producing Microbes in Rhizosphere for Mitigation of Stress in Plants Grown in Degraded Land

Pratiksha Singh[1†], Prabhat K. Chauhan[2], Sudhir K. Upadhyay[2*], Rajesh Kumar Singh[3], Padmanabh Dwivedi[4], Jing Wang[1], Devendra Kumar[5] and Mingguo Jiang[1*]

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Plant growth performance under a stressful environment, notably in the agriculture field, is directly correlated with the rapid growth of the human population, which triggers the pressure on crop productivity. Plants perceived many stresses owing to degraded land, which induces low plant productivity and, therefore, becomes a foremost concern for the future to face a situation of food scarcity. Land degradation is a very notable environmental issue at the local, regional, and global levels for agriculture. Land degradation generates global problems such as drought desertification, heavy metal contamination, and soil salinity, which pose challenges to achieving many UN Sustainable Development goals. The plant itself has a varied algorithm for the mitigation of stresses arising due to degraded land; the rhizospheric system of the plant has diverse modes and efficient mechanisms to cope with stress by numerous root-associated microbes. The suitable root-associated microbes and components of root exudate interplay against stress and build adaptation against stress-mediated mechanisms. The problem of iron-deficient soil is rising owing to increasing degraded land across the globe, which hampers plant growth productivity. Therefore, in the context to tackle these issues, the present review aims to identify plant-stress status owing to iron-deficient soil and its probable eco-friendly solution. Siderophores are well-recognized iron-chelating agents produced by numerous microbes and are associated with the rhizosphere. These siderophore-producing microbes are eco-friendly and sustainable agents, which may be managing plant stresses in the degraded land. The review also focuses on the molecular mechanisms of siderophores and their chemistry, cross-talk between plant root and siderophores producing microbes to combat plant stress, and the utilization of siderophores in plant growth on degraded land.

Keywords: plant stress, siderophores, molecular mechanism, rhizospheric microbes, degraded land

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Original article

Early selective strategies for higher yielding bio-economic Indian ginseng based on genotypic study through metabolic and molecular markers

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ABSTRACT

Applying biotechnological tools to the selection of higher-yielding bio-economic crops is a promising and remarkable means of reducing the burden on production on a global scale. In the present study, 25 germplasms of Indian ginseng (Withania somnifera (L.) Dunal) were examined for their genetic diversity by using morphological, biochemical, and molecular markers for twenty plant growth traits. The properties of plant growth differed significantly in the maximum genotypes of Indian ginseng, the markers of randomly amplified polymorphic DNA (RAPD) and inter simple sequence repeat (ISSR) showed considerable diversity between the genotypes. The combined unweighted pair group technique with arithmetic mean (UPGMA) dendrogram of morphological, biochemical, and molecular markers grouped all 25 genotypes into two main clusters at 0.61 coefficient value. In addition to this, secondary metabolite profiling by high-performance liquid chromatography (HPLC), there were high variations for withanolide-B (WI-B), withanoside-V (WS-V), withaferin A (WF-A) content between different genotypes. For the total alkaloid and withanolide concentration in the root and leaves high heritability with an increased genetic gain was observed, indicating that selection based on these traits could be an effective method in breeding programs. Furthermore, the path coefficient analysis showed a direct positive impact of the total root fiber, WI-B (leaves), WF-A (leaves), WS-IV (roots), WDL (roots), and the total alkaloid content on the dry root yield. High content of WDL, a high-quality bioactive withanolide, was also described for the first time in the genotype UWS23. These properties can further be exploited to improve the dry root yield in W. somnifera genotypes. The outcomes of the present study also provide an essential foundation for the selection of high-yielding bio-economic varieties that could be utilized to improve Ashwagandha breeding programs.

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1. Introduction

Due to the increasing population pressure, the demand and the consumption of food are increasing rapidly worldwide. This requires increasing food production from agribusiness while balancing the production and consumption of nutritious foods but remain a difficulty for all nations (Zia-Ul-Haq et al., 2013; Kiran et al., 2020; Priyadarshini and Abhilash, 2021). From the point of view of agricultural practices and food security, the grading of plant species according to their bio-economic value is increasingly recognized (Daniel et al., 2020; Kouhi et al., 2020; Nawaz et al., 2020).

Recently, the global demand for nutritious foods has mainly focused on immune boosting food ingredients. Several plant

Review

Nanotechnology in the Restoration of Polluted Soil

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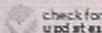2   Department of Environmental Science, V.B.S. Purvanchal University, Jaunpur 222003, India;

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Abstract: The advancements in nanoparticles (NPs) may be lighting the sustainable and eco-friendly path to accelerate the removal of toxic compounds from contaminated soils. Many efforts have been made to increase the efficiency of phytoremediation, such as the inclusion of chemical additives, the application of rhizobacteria, genetic engineering, etc. In this context, the integration of nanotechnology with bioremediation has introduced new dimensions for revamping the remediation methods. Hence, advanced remediation approaches combine nanotechnological and biological remediation methods in which the nanoscale process regulation supports the adsorption and deterioration of pollutants. Nanoparticles absorb/adsorb a large variety of contaminants and also catalyze reactions by lowering the energy required to break them down, owing to their unique surface properties. As a result, this remediation process reduces the accumulation of pollutants while limiting their spread from one medium to another. Therefore, this review article deals with all possibilities for the application of NPs for the remediation of contaminated soils and associated environmental concerns.

Keywords: pollution; heavy metals and metalloids; phytoremediation potential; phytorestoration strategy; nanotechnology

1. Introduction

Rapidly increasing anthropogenic/technogenic activities are adding potentially toxic metals, agrochemicals, and an excess of nutrients to the soil [1]. Soil is a basis of crop production as it supports plants to uptake nutrients [2]. In fact, agriculture sustains and defines human lives; however, it is often disruptive of natural ecosystems. Humans' voracious appetites for getting the benefits from natural resources grow in tandem with population growth. The conflict between the benefits and the sustainable management of agricultural land and its conservation has been reported in the literature for a long time [3,4]. Land pollution is a threat to livelihoods, quality of life, and sustainable development [5]. Thus, conserving soil is the utmost requirement for the current era owing to the pressures of increasing population and the shrinking of arable lands by technogenic activities.

The advancements in nanotechnology open a window globally to remediate or restore polluted soil in an effective way [6,7]. It has been claimed that nanotechnology has great potential as an environmentally cleaner technology, including by alleviation of the toxicities of various metals/metalloids [8,9]. Besides, nanotechnology has been recognized as a potential method for the remediation of pollutants in a variety of environmental matrices, including soils [6]. In this context, soil remediation is one of the main domains where nanotechnological approaches have been widely used. The uses of NPs have been explored lately to remove contaminants in a variety of ways, including by adsorption, redox reactions,

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ELSEVIER

Eco-friendly dual-edged management of fly ash and its antagonistic interplay with *Meloidogyne incognita* on beetroot (*Beta vulgaris* L.)

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ABSTRACT

Fly ash (FA) management is a key concern of ecologists around the world, so its potential as a nutritional supplement for agro-ecosystems needs to be explored. Therefore, alternate techniques that are eco-friendly to manage this emerging dual-edged waste are preferable in this field. The current study sought to determine the soil-modifying, crop yield improvement, and nematicidal properties of FA. In this study, beetroot seeds were sown in pots comprising field soil amended with differing proportions of FA (w/w) revealed the bio-fold properties of FA. Biomineralization and mapping of elements revealed that increased nutritional elements in soil supplemented with 15% FA induced growth-performance and yield of beetroot. Molecularly and morphologically characterized *Meloidogyne incognita* was used as nematode in this study for optimization of nematicidal properties FA. Plant growth performance, photosynthetic pigments, and yield of beetroot were significantly reduced owing to M. incognita as compared to control (un-treated and un-inoculated), and 15% FA reversed the negative affect of M. incognita significantly ($P < 0.05$) as compared to control plants. Confocal laser microscopy confirmed that 15% FA augmented in soil reduced nematode-juvenile invasion in beetroot as compared with control. The PCA (principal component analysis) accounted for 90.63% and 90.8% for the total-data variability in plants without nematodes and total data variability in treated plants (M. incognita + FA) respectively, which showed fit for a significant correlation between the various studied parameters in present study.

1. Introduction

In agro-ecosystems, plants are subjected to a wide range of environmental stresses that reduce and limit the productivity of the crops. Stress in plants indicates an external condition that negatively affects the growth and productivity of plants (Upadhyay et al., 2019). Due to the sessile nature of plants, they cannot avoid these stresses and therefore suffer in contrast to plants (Goli et al., 2019). Stress is classified as either biotic or abiotic based on where it originates. Pathogens and insects are examples of biological stresses (Farhangi et al., 2019; Hidegu et al., 2013). One of the most prominent biotic stresses is root-knot nematodes, notably *Meloidogyne* spp., which limit the agricultural output as they are widespread and ubiquitous in agro-ecosystems. Therefore, cause severe crop losses worldwide (Shakeel et al., 2020a). Plant-parasitic nematode infestation has resulted in 19.6% of crop yield losses in India (Manjunatha et al., 2017), and M. incognita known as common parasite for vegetables and beetroot (Mustofa, 2017; Khan and Siddiqui, 2020). The utilization of chemical compounds against plant-parasitic nematodes

has increased dramatically in the last 50 years, which has disrupted the natural equilibrium of the soil ecosystem and reduced microbial diversity (Mohan, 2011), resulting in the loss of soil's ability to self-defense management against pathogens (Westphal, 2005). The remarkable and attainable aims in plant-disease management are a comprehensive understanding of agro-ecosystems that protect soil-borne plant diseases (Moosavi, 2015; Naseri and Hemmati, 2017). Beetroot (*Beta vulgaris* L.) is a root vegetable that belongs to the Amaranthaceae family in the plant kingdom. Since it contains the antioxidant pigment betalain, it is considered to be one of the most potent vegetables in terms of antioxidant properties (Chhikara et al., 2019). However, during its cultivation, the beetroot is easily susceptible to quantity and quality damage from soil pathogenic nematodes. In India, there are several studies of root-knot nematode infestation on beetroot and yield losses of 12–40% have been reported (Singh and Kumar, 2015; Bahadur, 2020; Khan and Siddiqui, 2020).

Fly ash (FA) is a heterogeneous supplement of different macro and micro elements which are beneficial to plants (Upadhyay and Edrisi,

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Screening and Optimization of Zinc Removal Potential in *Pseudomonas aeruginosa*-HMR1 and its Plant Growth-Promoting Attributes

Ali Asger Bhojiya[1] · Harshada Joshi[2] · Sudhir K. Upadhyay[3] · Abhishek K. Srivastava[4] · Vinayak Vandan Pathak[5] · Vimal Chandra Pandey · Devendra Jain

Abstract

The soil samples of old Zawar mine sites were sandy texture, basic, electric conductivity range from 16 to 59 dSm^{-1} with a high content of heavy metals of Zn, Pb, Cd, and Fe, indicating poor soil-health. Two bacterial isolates *Pseudomonas aeruginosa* HMR1 and *P. aeruginosa* HMR16 (GenBank-accession-number KJ191700 and KU174205, respectively), differed in the Phylogenetic tree based on 16S-rDNA sequences. HMR1 isolate showed the high potential of Plant growth-promoting attributes like IAA, Phosphate-solubilization, Exopolysaccharide production, and Proline activities at high concentration of Zn augmented nutrient media after 24 h, followed by HMR1+HMR16 and HMR16. Both isolates were survived at 100 ppm Zn (w/v) concentration, followed by Pb, Cd, and Fe. Linear R_L value from Langmuir and Freundlich isotherms revealed that the suitable condition of Zn adsorption by HMR1 was at pH8 with 40°C. The value of r^2 from pseudo-second-order kinetics and Transmission-Electron-Microscopic analysis confirmed Zn adsorption by HMR1.

Keywords *Pseudomonas aeruginosa* · Plant growth-promoting attributes · Zn-adsorption · Langmuir and Freundlich isotherms kinetics · First and second-order kinetics · Transmission-Electron-Microscope · Phylogenetic analysis

Heavy metal pollution is mainly a consequence of the speedy growth of industrialization, intensive use of the chemical in agriculture, mining (El-Meihy et al. 2019), fly ash deposits (Pandey 2020) including geogenic sources (Paul et al.

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2020a). Toxic metals act as a brutal factor for the entire ecosystem, soil health, and human health via contaminating agricultural products (Wuana and Okieimen 2011; Dwivedi et al. 2013; Bolan et al. 2014). The extraction of economically valuable minerals for the development of human beings creates pressure on mining activity. Simultaneously, targeted minerals, other toxic heavy metals (THM) are emerging on the land surface (El-Baz et al. 2015; El-Meihy et al. 2019). The agency for toxic substance and disease registry listed the priority of hazardous compounds in the year 2019 and reported that arsenic is at first number followed by lead, while cadmium, cobalt, and zinc were at 7, 51, and 75 numbers respectively (Glick 2015). Mitigation of THM from soil has gain attention across the globe, and the mechanism for its removal is based on physical, chemical, and biological processes (Pandey and Singh 2019; Upadhyay et al. 2021). An eco-friendly and sustainable approach is a promising remarkable tract to the mitigation of THM mediated by microbes (Gupta and Diwan 2017; Kour et al. 2019). Microbes mediated THM removal has a distinguished mechanism like extracellular accumulation/precipitation, cell surface adsorption, and intracellular accumulation (Singh et al. 2011; Singh and Srivastava et al. 2016; Paul et al. 2020b).

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Organocatalysis: A recent development on stereoselective synthesis of o-glycosides: Catalysis Reviews: Vol 0, No 0

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Organocatalysis: A recent development on stereoselective synthesis of o-glycosides

Ram Naresh Yadav ✉ ⓘ, Md. Firoj Hossain ⓘ, Aparna Das ⓘ,
Ashok Kumar Srivastava & Bimal Krishna Banik ✉ ⓘ

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ABSTRACT

Organocatalysis is the use of non-stoichiometric amounts of low-molecular-weight organic molecules made up of C, H, N, O, S, and P to accelerate stereoselective chemical transformations. Despite having a long history, the use of small organic molecules as chiral catalysts in enantioselective synthesis has only recently intrigued scientists interest. However, in synthetic and medicinal chemistry, there has been a resurgence of interest in performing asymmetric synthesis of a variety of important targets by utilizing an organocatalytic approach as a leading reaction. The

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RESEARCH ARTICLE

Fabrication of minimal capital-intensive scratch-resistant and hydrophobic tungsten oxide film on stainless steel through spray pyrolysis

Robbi Vivek Vardhan, Subodh Kumar, Saumen Mandal ✉

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Abstract

In this contribution, a pure and robust tungsten oxide (WO_3) film was accomplished on stainless steel (SS) substrate at 400°C through a minimal capital intensive, simplistic spray pyrolysis method by utilizing a precursor comprising tungsten hexachloride and 2-methoxyethanol. Thermal analysis revealed the precursor's thermal decomposition and crystallization at ~230°C and 255°C, respectively. The fabricated polycrystalline (monoclinic crystal structured) film was uniform and dense in nature, exhibiting surface porosity and average surface roughness of 4.7 % and 15.9 nm, respectively. The average

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Mechanical, Elastic and Thermal Properties of Hexagonal BC$_2$N Superhard Material

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Abstract

The ultrasonic properties of the hexagonal BC$_2$N superhard material were studied at temperature-dependent following the interaction potential model. Higher-order elastic constants are used for the determination of other ultrasonic parameters. The temperature variation of the ultrasonic velocities is evaluated along with different angles with z-axis (unique axis) of the crystal using the second-order elastic constants temperature variation of the thermal relaxation time, and Debye average velocities are also calculated along with the same orientation. The temperature dependency of the acoustic properties is discussed in correlation with elastic, thermal, and mechanical properties. It has been found that thermal conductivity and thermal energy density are the main contributors to the behavior of ultrasonic attenuation as a function of temperature. The responsible cause of attenuation is phonon-phonon interaction. Mechanical properties of BC$_2$N superhard material at temperature 400K are better than at other temperatures because, at this temperature, it has low ultrasonic attenuation. Superhard material BC$_2$N has many industrial and engineering applications.

Keywords: Superhard material; Thermal conductivity; Elastic properties; Ultrasonic properties.

1. Introduction

Over the past few decades, B-C-N compounds were attracted important attention due to their predictable intermediates [1-3] or better properties than carbon and boron nitrides [4-6]. Super materials can provide special performance in a wide variety of applications. In particular, a covalent insulator with simple electronic and lattice structures for Diamond has long been known as one of the hardest [7] and highest thermometer conductive materials [8,9]. Consequently, discovering superhard thermometer conductive materials with desirable properties is a recurring subject in condensed matter physics and materials science. BC$_2$N has attracted widespread attention because it is expected to be thermally

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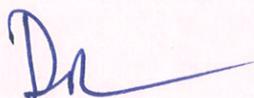
Research Article

Facile in-situ synthesis of reduced graphene oxide/TiO$_2$ nanocomposite: a promising material for the degradation of methyl orange

Kunwar Vikram ✉, Rajesh Kumar Srivastava, Amit Raj Singh, Ummer K, Santosh Kumar & Manish Pratap Singh

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Abstract

Titanium oxide (TiO$_2$) and reduced graphene oxide-TiO$_2$ (r-GO/TiO$_2$) layered nano-composite were synthesized by the one step hydrothermal method. In this study, one step hydrothermal technique is adopted for the facile and in-situ synthesis of r-GO/TiO$_2$ nano-composite. Crystal structure, surface morphology, chemical composition of TiO$_2$ and r-GO/TiO$_2$ layered nano-composite were investigated by Powder XRD, TEM, FT-IR, UV, and Raman spectroscopy. The unique feature of resultant r-GO/TiO$_2$ nano-composite template is intercalation of TiO$_2$ nanoparticles with well dispersion between

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Impact of ionic liquid incorporation on ionic transport and dielectric properties of PEO-lithium salt-based quasi-solid-state electrolytes: role of ion-pairing

Authors: Sujeet Kumar Chaurasia, Manish Pratap Singh, Manoj K. Singh, Pramod Kumar, A. L. Saroj

Abstract

The present paper reports the preparation and characterization of ionic liquid immobilized quasi-solid-state electrolytes (QS-SEs) "PEO-LiPF$_6$-ionic liquid (IL)" with polymer PEO, dopant salt (LiPF$_6$) and ionic liquid, BMIMPF$_6$ having common anion (). AC impedance and Raman spectroscopic measurements showed that ionic conductivity (σ) of QS-SEs increases with IL-content and partly controlled by number of free mobile ions and their mobility/polymeric chain flexibility. Differential scanning calorimetry (DSC) results showed that melting temperature (T_m), glass transition temperature (T_g) and degree of crystallinity (X_c) of QS-SEs decreases with IL-content due to the plasticization effect of added IL(BMIMPF$_6$). Furthermore, the composition-dependent conductivity data with IL-concentration is discussed in terms of increasing amorphicity (or deceasing crystallinity) as well as ion-polymer and ion-ion interactions. Ion dynamics of QS-SEs is examined by converting the impedance data into different ionic

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RESEARCH ARTICLE

Chronic kidney disease: a prediction and comparison of ensemble and basic classifiers performance

Vikas Chaurasia[1] · Mithilesh Kumar Pandey[1] · Saurabh Pal[1]

Abstract

Artificial intelligence (AI) technology can be used to predict future value, especially for the healthcare industry. With the improvement of AI promotion strategies (bringing exploration in different fields), it is not difficult to predict certain advances. This article describes the use of AI in patients with kidney disease, such as chronic kidney disease (ckd) or patients without kidney disease (notckd). Five basic machine learning (ML) classifiers were used, and the confusion matrix and ROC curve were used to check their accuracy. The ensemble method is also used to extract the accuracy rate through the four ensemble classifiers, and confirm it through the confusion matrix, accuracy rate, recall rate, F1 score, and support value. Finally, the accuracy results obtained by the basic classifier and the ensemble classifier are analyzed. The accuracy result obtained by the ensemble classifier is higher than that of the essential classifier. The overall framework can be seen as a better ensemble method than basic classifiers. It is smarter to respond differently to a query that we come to a single choice, so in order to accomplish the decisive goal, ensemble method is better than some other well-known programs.

1 Introduction

Chronic renal disease is becoming a growing problem in both developed and developing world. In India, the increase in the number of deaths due to ongoing disease will rise from 3.78 million in 1990 (40.4% of all deaths) to 7.63 million in 2020 (all deaths 66.7%) (World Health Organization, 2005; Agarwal and Srivastava 2009).

AI has changed our lifestyle, from language identification, image recovery, handwriting identification, climate anticipating and GPS courses to online web crawlers. It is currently an ideal opportunity to focus on achievements in AI for natural disclosure to profit human wellbeing. AI is a part of computer science which can possibly investigate complex information. Their latent capacity is to extricate out important relationship with an informational collection and it tends to be utilized in the analysis, treatment, and anticipating result in numerous clinical situations. The motivation behind artificial intelligence is to make data science more

helpful and to comprehend the standards. Non-transferable ailments (NCDs), otherwise called ceaseless ailments, are not passed from individual to individual (Singh and Chaurasia 2020). They are of long term and for the most part moderate movement. The four primary kinds of non-transferable illnesses are kidney disease, cardiovascular, tumors, incessant respiratory ailments, and diabetes (Rajesh and Priyadharson 2018).

Early finding of any incessant malady is useful in limiting complications of illness. It helps in choosing treatment conventions. There are different finding and treatment conventions which demonstrate that computerized intelligence is an aid in social insurance. The motivation behind man-made brainpower is to make computer more valuable in understanding tricky human services difficulties and by utilizing PCs we can decipher information which is gotten by analysis of different interminable infections. A portion of the regions secured will uncover how man-made intelligence is useful in finding and therapies of different chronic infections (Mondal and Das 2021).

A developing region of exploration identifies with the utilization of strategies from AI applied to the handling of data fundamental for the clinical conclusion. Strategies that rely on wise framework guidelines, such as the nervous

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EVALUATION OF CHRONIC MYELOGENOUS LEUKEMIA (CML) AS THE CHRONIC PHASE OF DISEASE USING MACHINE LEARNING TECHNIQUES

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Abstract:

Background-Leukemia is a heterogeneous category of hematologic malignancies that create an increased quantity of aberrant or immature white blood cells by bone marrow or other blood-forming organs and suppress the growth of normal cells. Chronic myeloid leukaemia (CML) is an acquired myeloprulferative illness that affects the hematopoietic stem cell. Leukemia is mostly used in machine learning methods, whether it's for classifying various leukaemias or for detecting whether leukaemia is present in a patient.

Methods: In this paper we use Vector Machines, Nearest Neighbor, Naïve Bayes and Deep Learning algorithms for evaluating chronic myelogic leukaemiaas the chronic phase of disease.The SFS approach is used to compare data set accuracy with all features and classifier accuracy with the characteristics that are selected.

Result: The results indicated that the maximum accuracy is RF sfs, KNN sves, SVC rbf and SVC sfs, which is 97.66 per cent. They are successful and can forecast the development of CML disease.

Conclusion: For the classification of benign and CML disease, some information mining approaches are used.

Keywords: Leukemia, Chronic, myeloid, Machine Learning, blood, etc.

1. INTRODUCTION

The term "chronic" signifies a slower progression of cancer than acute forms of leukaemia in chronic myelogen leukaemia. The term "myelogenous" in chronic myelogenous leukaemia refers to the cell type affected. The term "myelogenous" refers to the cell type of the cell. Chronic myelogenous leukaemia (CML) is unusual types of bone marrow cancer – a spongy tissue within the bones in which blood cells are produced. The number of white blood cell in the blood increased because of CML. Chronic myelogenous leukaemia may also be referred to as chronic, granulocytic, and myeloid leukaemia. It mainly affects older persons and seldom happens in youngsters, but can take place at any age [1]. The CML is an illness that is characterised by the growth in the propagation of granulocytic cell line without the loss of its potential to distinguish.There are thus an increased numbers of granulocytes and their immature precursors, including occasional blast cells, seen in the peripheral cell profile. CML accounts about 20 percent of all adult leukemias. CML, also known as chronica myeloid leukaemia is a myeloproliferative disorder.
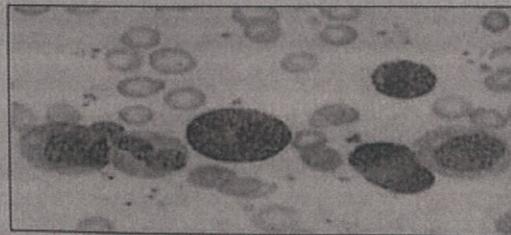

Figure 1: CML. The full granulocytic lineage containing an eosinophil and Basophil show blood film in 1000X magnification.

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Usefulness of herbal medicines in the prevention and management of coronavirus disease-2019 (COVID-19) and its symptoms: A review

Ogechukwu L Nwankwo, Samuel J Bunu, Oyeintonbara Miediegha, Erhona S Iloh, Nnamdi Markben Adiene, Nonso Onwuzuligbo, Alok Kumar Dash, Festus BC Okoye

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Abstract
Background: Various studies have been conducted to identify drug candidates to combat the virus, meanwhile some persons believe that consuming herbal medicines or medicinal plants that act as immunomodulators can prevent or even cure COVID-19. It was reported that about 85% of COVID-19 patients in China received combined treatment with Traditional and Complementary Medicine and regular medicines. Recent systematic review has shown that herbal medicines can be significantly effective in alleviating different disease symptoms, including COVID-19.
Objectives: The study was conducted to identify different herbal preparations and medicinal plants used in the prevention of COVID-19 and its symptoms.
Methods: About twenty-five (25) different journal articles obtained from Pubmed, Elsevier, Hindawi, PLOS ONE, African Journals Online (AJOL), Lancet, Research gate, Google scholar and other journal hubs, relating to the use of herbal medicines and medicinal plants on prevention management of COVID-19 and related infections and its symptoms were reviewed and summarized to generate useful data and document the various herbs and medicinal plants employed in managing COVID-19.
Results: From the results obtained, various plants have been tested across the globe as possible candidate in the prevention and management of COVID-19 symptoms. Some of the notable medicinal plants reported to have such properties include *Artemisia annua*, neem tree (*Azadirachta indica*), Garlic (*Allium sativum*), Lime or Lemon (*Citrus limonum*), Ginger (*Zingiber officinale*), Xanthorhizal (*Curcuma xanthorrhiza*), Cinchona bark (*Cinchona sp.*), purple coneflower (*Echinacea purpurea*), among others.
Conclusion: Herbal medicines might have the capabilities to regulate the production and release of proinflammatory cytokines, interfere with the development of the virus in host cells, and modify certain molecular pathways related to the RAA system; hence many herbal agents might be useful in the prevention and possible treatment of COVID-19.

Keywords: Herbal medicine, coronavirus, COVID-19, pandemic, medicinal plants, traditional medicine

Introduction
Significant interest and attention has been given to traditional, complementary and integrative medicine (TCIM) over past few decades, and a growing body of evidence indicates the usefulness of such approaches in combating emerging infectious diseases (Arora *et al.*, 2011; Liu *et al.*, 2012) [1, 2]. Coronavirus disease 2019 (COVID-19) is a new infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that belongs to the coronavirus family (Hayat *et al.* 2020) [3]. Impaired immune regulation is one of the factors that play a role in its pathogenesis and results in poor outcomes of COVID-19 patients (Nugraha *et al.*, 2020) [5]. In patients with Coronavirus disease 2019 (COVID-19), the most common clinical symptoms are fever and cough, shortness of breath, and other breathing difficulties in addition to other nonspecific symptoms, including headache, dyspnea, fatigue, and muscle pain (Mo, Xing & Xiao, 2020; Wang *et al.*, 2020) [6,8]. Also, some patients also report digestive symptoms such as diarrhea and vomiting (Huang, Wang, & Li, 2019; Wang *et al.*, 2020). Fever occurred in 98-100% of patients with SARS or MERS, compared to 83.3% of patients with COVID-19 (Assiri, al-Tawfiq, & al Raheeji, 2013; Yin & Wunderink, 2018, Mo *et al.*, 2020). 18.7% of patients had no fever at admission, suggesting that the absence of fever could not rule out the possibility of COVID-19 (Mo *et al.* 2020). Although patients initially have fever with or without respiratory symptoms, various degrees of lung abnormalities develop later in all patients, and these can be seen on chest CT (CT) (Huang *et al.*, 2019).

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EFFECT OF MAGNETIC FIELD ON NEWTONIAN FLUID SANDWICHED BETWEEN NON-NEWTONIAN FLUIDS THROUGH POROUS CYLINDRICAL SHELLS

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The present work deals with the influence of magnetic field on Newtonian fluid sandwiched between two porous cylindrical pipes which are filled with micropolar fluids. Fluid motion is occurring along the z^*-axis and an applied magnetic field is taken in the direction perpendicular to the direction of fluid motion. On applying appropriate boundary conditions, velocity profiles, microrotations, flow rate, and shear stresses are obtained for the corresponding fluid regions. The graphs for volumetric flow rate and fluid velocity are plotted and discussed for different values of micropolar parameter, couple stress parameter, porosity, viscosity ratio parameter, Hartmann number, conductivity ratio parameters, and Darcy numbers.

KEY WORDS: *micropolar fluids, couple stress, Hartmann number, flow rate*

1. INTRODUCTION

Micropolar fluids consist of rigid, randomly oriented cylindrical/spherical particles, having microstructure and belong to a class of fluids with nonsymmetric stress tensor (Lukaszewicz, 1999). Eringen (1966) developed theories on micropolar fluids consisting of the effects of couple stresses and microstructure, systematically. Equations of motion are derived from the laws of conservation of linear and angular momenta, described in the classic book by Nowacki (1970). Flows of micropolar liquids can exhibit many effects that are not possible in nonpolar Stokesian fluids (Stokes, 1984). Creeping flow of a rotating porous cylinder through a micropolar fluid is reported by Moosaie and Atefi (2008). Sherief et al. (2014) investigated the micropolar fluid flows (both parallel and perpendicular) between slip cylinder and coaxial cylindrical shell. Mathematical models for flows of a non-Newtonian liquid have been reviewed by Khanukaeva and Filippov (2018). The micropolar fluid flow through a swarm of cylindrical particles with a porous layer were reported by Khanukaeva et al. (2019). Sharma and Yadav (2017) investigated the two-phase fluid flow problem of blood that occurs through arteries (stenosed) and reported some applications of such a two-phase flow model that can be helpful in handling "cardiovascular disease."

In the presence of a magnetic field, the micropolar fluid flow through the membrane was studied by Yadav et al. (2019). Yadav and Verma (2020) investigated the fluid motion of two immiscible fluids through a porous cylindrical pipe. Husnain and Abbas (2019) reported the convective flow of electrically conducting fluids (non-Newtonian fluid and nanofluid) through an inclined channel. Deo et al. (2020) studied the micropolar fluid flowing through a cylindrical tube enclosing an impermeable core coated with a porous layer in the presence of a magnetic field. Yadav et al. (2020) formulated the mathematical model for Newtonian/micropolar fluids through concentric pipes having a porous space of different permeability. Yadav et al. (2018) investigated the flow of two immiscible fluids through

Certain recursion formulas for new hypergeometric functions of four variables

A. Verma, A. Younis, H. Aydi and M.A. Abd El Salam

Communicated by T. Abdeljawad

Abstract Inspired by certain study of recursion formulas involving multivariable hypergeometric functions [14, 15, 16, 17, 18, 22, 23]. In this article, we introduce five new quadruple hypergeometric functions together with their regions of convergence and then we establish certain recursion relations for these new functions. This enriches the theory of special functions. The quadruple hypergeometric functions and results listed here are believed to be new.

1 Introduction

The multivariable multiple hypergeometric functions are highly significant in special functions theory, used in a wide range of applications, such as integral representations, generating functions, recurrence relations, finite and infinite sums, analytic continuation, asymptotic behaviour and some special formulas (linear transformation, quadratic transformation, decomposition, reduction, limit and differentiation (see, e.g., [1, 2, 3, 4, 5, 6, 7, 11, 20, 21, 25] and elsewhere). Besides from these studies, they are also utilized in theories such as perturbation theory (in numerical analysis) and quantum theory (in modern physic) [10, 13]. In [5], Exton presented twenty one complete hypergeometric functions in four variables denoted by the symbols K_1, K_2, ..., K_{21}. In [11], Sharma and Parihar defined eighty three complete quadruple hypergeometric functions, namely $F_1^{(4)}$, $F_2^{(4)}$, ..., $F_{83}^{(4)}$. Bin-Saad and Younis [4] presented thirty new quadruple hypergeometric functions given by $X_1^{(4)}$, $X_2^{(4)}$, ..., $X_{30}^{(4)}$. In [15], the authors discovered the existence of twenty additional complete hypergeometric functions in four variables $X_{31}^{(4)}$, $X_{32}^{(4)}$, ..., $X_{50}^{(4)}$. Each quadruple hypergeometric function in [4, 5, 13, 17] is of the form

$$X^{(4)}(\cdot) = \sum_{m,n,p,q=0}^{\infty} \Omega(m,n,p,q) \frac{z^m}{m!} \frac{\zeta^n}{n!} \frac{x^p}{p!} \frac{u^q}{q!}$$

where $\Omega(m,n,p,q)$ is a certain sequence of complex parameters and there are twelve parameters in each series $X^{(4)}(\cdot)$ (eight a's and four c's). The 1st, 2nd, 3rd and 4th parameters in $X^{(4)}(\cdot)$ are connected with the integers m, n, p and q, respectively. Each repeated parameter in the series $X^{(4)}(\cdot)$ points out a term with double parameters in $\Omega(m,n,p,q)$.

For example,

$$X^{(4)}[a_1, a_1, a_2, a_3, a_4, a_4, a_5, a_5],$$

means that $(a_1)_m (a_2)_n (a_3)_p (a_4)_q (a_5)_q$ includes the term.
Similarly,

$$X^{(4)}[a_1, a_1, a_2, a_3, a_4, a_4, a_2, a_3],$$

points out the term to $(a_1)_{m+p} (a_2)_n (a_3)_q (a_4)_p$
and

$$X^{(4)}[a_1, a_1, a_2, a_2, a_3, a_1, a_2, a_4],$$

shows the existence of the term $(a_1)_{m+p} (a_2)_{n+q} (a_3)_p (a_4)_q$. Thus, it is possible to form various combinations of indices. There seems to be no way of establishing independently the number of distinct Gaussian hypergeometric series for any given integer $n \geq 2$ without stating explicitly all

On the recursion formulas of Lauricella matrix functions

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Abstract. In this paper, we find the recursion formulas for generalized Lauricella matrix function. We also give the recursion formulas for the three variable Lauricella matrix functions.

1 Introduction

The theory of matrix special functions has attracted considerable attention in the last two decades. Special matrix functions appear in the literature related to statistics [4], Lie theory [9] and in connection with the second order matrix differential equations satisfied by matrix polynomials as well as matrix functions, for more detail see [5]-[8], [11]-[15]. Recursion formulas for the Appell functions have been studied in the literature, see Saad and Srivastava [16] and Wang [20]. Authors carried out a systematic study of recursion formulas for the multivariable hypergeometric functions, [12]-[13].

Abd-Elmageed et. al. [1] have obtained various investigations and recursion formulas satisfied by the first Appell matrix function, namely F_1. Recently, Sahai and Verma obtain recursion formulas for one and two variable hypergeometric matrix functions in [18]. In the present paper, we study recursion formulas for Lauricella matrix function of three variables as well as k-variables. The paper is organized as follows.

In Section 2, we give a brief review of basic definitions that are needed in the sequel. In Section 3, we obtain the recursion formulas for generalized Lauricella matrix function of k-variables. Finally, in Section 4, the recursion formulas for three variable Lauricella matrix functions are given.

TRIBAL CULTURE AND LIVELIHOOD OF ATTAPPADY

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ABSTRACT

Attappady is a tribal block in the Mannarkkad taluk of Palakkad, Kerala, containing one of
the state's largest tribal communities. Attappady is near the Nilgiri Hills and the Western
Ghats, on the boundary between Kerala and Tamil Nadu. The reserve region is home to
Irulas, Mudugas, and Kurumbas each with their unique lifestyle, culture, and dietary
habits. This research adopted a Participatory Action Research Method which includes
qualitative methodologies and techniques such as interviews and participant and non-
participant observation. Tribals are a component of Indian culture, and they practise a variety
of rituals aimed at preserving the environment. The tribal culture is primarily made up of
natural elements. The study shed light on the tribes' primary cultural features, such as their
culture, tradition, sociocultural values, rituals, the current state of tribal life, and government
initiatives.

Keywords: Tribal Culture, Livelihood of Attappady, Tribal Community

INTRODUCTION

Attappady is a tribal block in Palakkad's Mannarkkad taluk, with one of Kerala's largest tribal communities. Attappady is located on the border of Kerala and Tamil Nadu, near to the Nilgiri Hills and the Western Ghats. Irulas, Mudugas, and Kurumbas live in the reserve region, each with their own lifestyle, culture, and eating habits. They dwell in Oorus, which are
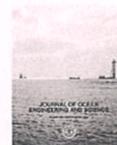
Dynamics of some new solutions to the coupled DSW equations traveling horizontally on the seabed

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ARTICLE INFO

ABSTRACT

The system of $(1+1)$-coupled Drinfel'd–Sokolov–Wilson equations describes the surface gravity waves travelling horizontally on the seabed. The objective of the present research is to construct a new variety of analytical solutions for the system. The invariants are derived with the aid of Killing form by using the optimal algebra classification *via* Lie symmetry approach. The invariant solutions involve time, space variables, and arbitrary constants. Imposing adequate constraints on arbitrary constants, solutions are represented graphically to make them more applicable in designing sea models. The behavior of solutions shows asymptotic, bell-shaped, bright and dark soliton, bright soliton, parabolic, bright and kink, kink, and periodic nature. The constructed results are novel as the reported results [26,28,29,30,33,38,42,49] can be deduced from the results derived in this study. The remaining solutions derived in this study, are absolutely different from the earlier findings. In this study, the physical character of analytical solutions of the system could aid coastal engineers in creating models of beaches and ports.

1. Introduction

1.1. Scope

In the physical sciences, nonlinear partial differential equations (NPDEs) are frequently employed to describe complicated processes. Thus, the problems/models arising in ocean science [1–23], oceanography [24], mathematical physics [25], complex fluid flows [26,27], plasma physics [28], electromagnetic theory, fluid dynamics [29,30], nuclear physics, chemical physics, to name a few [31–69] are not easily solvable and finding their analytical solutions is critical. Reviewing the existing literature [25–50], the authors are motivated to solve the following $(1+1)$-coupled Drinfel'd–Sokolov–Wilson equations (CDSWEs) system analytically. The system is governed by

$$u_t + a\,v v_x = 0,$$
$$v_t + b\,v_{xxx} + c\,u\,v_x + d\,v\,u_x = 0, \qquad (1)$$

where a, b, c and d are non-zero parameters, x, t are space and time variables, respectively, while u and v depict the components

of nonlinear surface gravity waves travelling horizontally on the seabed.

Gravity waves are formed in a fluid medium or at the interface of two media when gravity or buoyancy trying to restore equilibrium. The contact between the atmosphere and the ocean, which causes wind waves, is an example of such an interaction. In deeper water, a long water wave moves faster. In deeper water, gravity waves have a faster phase speed than in shallow water. Shallow water waves (SWW) are helpful to classify the marine environment, investigate ocean dynamics, and model equatorial tsunami waves. During their propagation, SWW are influenced by the ocean floor, causing the orbital motion of water to be disrupted. As a result, they may cause underwater earthquakes, and unimaginable damage to the coastal ecology. On the other hands, the heights, wave lengths, and time durations of gravity waves frequently vary as they advance in different directions [1]. Gravity waves in shallow water are dispersion (water waves) and non-dispersive as the depth is substantially smaller than the wavelength. Nonlinear interactions between triads of wave components with frequencies (ω) and vector wave numbers (k) satisfying following conditions which affect ocean surface gravity waves [2].

$$|\omega_1 \pm \omega_2 \pm \omega_3| = \delta\omega,$$
$$|k_1 \pm k_2 \pm k_3| = \delta k. \qquad (2)$$

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ORIGINAL PAPER

Dynamics of invariant solutions of mKdV-ZK arising in a homogeneous magnetised plasma

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Abstract Classical Lie symmetry analysis is proposed to get a new variety of similarity solutions to a nonlinear (3+1)-modified Korteweg de Vries-Zakharov–Kuznetsov equation. The equation is often used to control the type of weakly nonlinear ion-acoustic waves in a homogeneous magnetised electron-positron plasma. In a magnetised plasma, including some hot and cold ions, such waves exist. By comparing the results reported earlier, new variety of analytical solutions are created and validated. Trigonometric, hyperbolic, rational, and exponential solutions of various types are derived. To prove their physical significance, animation profiles are plotted using MATLAB. Dominated dynamical behaviour of the animation profile is represented in each case. Electrostatic potential dynamics reveal elastic single solitons to multi solitons, elastic multi solitons, kink to stationary, and bell-shaped to asymptotic behaviour. Equations (13) and (21) in this study that were solved trivially can lead to more research in this area.

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List of symbols

u_x	Potential derivative of u $i.\,e.$ potential gradient
a	Dispersion coefficient
b, c	Real constants
D_t^α	Riemann-Liouville derivative of order α
(χ, t)	(x, y, z, t, u)
$\xi^i(\chi, t)$	Infinitesimal for x_i, where $x_1 = x$, $x_2 = y$, and $x_3 = z$
$\tau(\chi, t)$	Infinitesimal for t
$\eta(\chi, t)$	Infinitesimal for u
P_r^3	Third order prolongation
F_{XYZ}	$\frac{\partial^3 F}{\partial X \partial Y \partial Z}$
u_i	ith solutions of mKdV-ZK
$C_i, 1 \le i \le 42$	Integration constant

1 Introduction

1.1 Scope and objective

Fully ionised gases with particles of equal and opposite charge and mass are referred to as "pair plasmas". Such paired (electron-positron) plasmas play a significant role in the cooling process and creation of elements of the early universe [1].

The slow cooling of the early universe was influenced by the Big Bang, active galactic nuclei, gamma ray bursts, pulsar magneto-spheres, and the solar atmo-

On similarity solutions to (2+1)-dispersive long-wave equations

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ABSTRACT

This work is devoted to get a new family of analytical solutions of the (2+1)-coupled dispersive long wave equations propagating in an infinitely long channel with constant depth, and can be observed in an open sea or in wide channels. The solutions are obtained by using the invariance property of the similarity transformations method via one-parameter Lie group theory. The repeated use of the similarity transformations method can transform the system of PDEs into system of ODEs. Under adequate restrictions, the reduced system of ODEs is solved. Numerical simulation is performed to describe the solutions in a physically meaningful way. The profiles of the solutions are simulated by taking an appropriate choice of functions and constants involved therein. In each animation, a frame for dominated behavior is captured. They exhibit elastic multisolitons, single soliton, doubly solitons, stationary, kink and parabolic nature. The results are significant since these have confirmed some of the established results of S. Kumar et al. (2020) and K. Sharma et al. (2020). Some of their solutions can be deduced from the results derived in this work. Other results in the existing literature are different from those in this work.

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1. Introduction

1.1. Aims, scope and origin of the problem

It is worth remembering that nonlinear partial differential equations (NPDEs) have stirred up researchers' interest because NPDEs are used to govern a number of complex phenomena in applied and mathematical physics, which include ocean science [1–4], heat flow in nano-fluids flows [5–14], magnetohydrodynamics [15–21], plasma physics, fluid dynamics [22–31], biomedical engineering [32], oceanography [33,34], and cosmology etc.

In this research, analytical solutions of the following form of the system of (2+1)-coupled dispersive long wave equations (DLWEs) are obtained, which is governed by

$$u_{yt} + h_{xx} + u_x u_y + u u_{xy} = 0,$$
$$h_t + u_x + h u_x + u h_x + u_{xxy} = 0. \tag{1}$$

One of the nonlinear evolution equations (NEEs) is the DLWE system. Inverse spectral transform (IST) in two spatial dimensions successfully solves NEEs [35]. The deviation height of the surface water wave transmitting along the x-axis is h in this system [35], with u being the horizontal wave velocity. System (1) represents dispersive water waves transmitting in an infinitely long channels with constant depth. These equations can be observed in open seas or in wide channels [36,37].

Besides above, it is important to mention here that external and internal impulsive disturbances in an open ocean causes a wave motion. In such a motion, a water column from bottom to water surface propagates in the direction of wave motion. These waves are the result of interaction between resonance and shearing forces which occur in oceans due to the action of wind in water. Its impact can be observed on the water surface [4]. Such surface waves usually have a very longer wavelength than that of the depth of the propagating ocean basis. One can call them as long water waves. If depth-averaged approximations [33] of Navier-Stokes equation (NSEs) is performed, then NSEs are termed as shallow water wave equations (SWWEs). Long water waves are an approximation of the Boussinesq type and such equations are stable with respect to short perturbations [38]. The long water wave travels faster in the deep water. Gravity waves have a faster phase speed in deeper water than they do in shallower water. Such waves usually have differences in heights, wave lengths and time durations advancing in different directions [35].

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Optimal Subalgebra of GKP by Using Killing Form, Conservation Law and Some More Solutions

Raj Kumar & Avneesh Kumar

Abstract

The (2+1)-dimensional Gardner–Kadomtsov–Petviashvili (GKP) is an internal shallow water wave. Optimal subalgebra and invariants for the GKP are generated with the help of Killing form. This process yield some more explicit solutions of (2+1)-dimensional GKP by using similarity reduction *via* Lie-group theory. The solutions so obtained are different from the existing literature (Shahadat Ali et al. in NTMSCI 8(1): 26–41, 2020; Boateng et al. in Math Meth Appl Sci 43(6): 3457–3472, 2012; Tariq et al. in

Digital Entrepreneurship Competency And Digital Entrepreneurial Intention: Role Of Entrepreneurial Motivation

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Abstract

Purpose-The present study aim is to analyze the association between digital entrepreneurship competencies and digital entrepreneurial intention. In addition, to investigate the mediating role of entrepreneurial motivation between digital entrepreneurship competencies and digital entrepreneurial intention.

Design/methodology/approach-A survey of 423 students of different academic and professional courses was carried out near the Capital Region of India. The data has been collected with a structured questionnaire and analyzed using multiple regression analysis.

Findings-The result confirms that digital entrepreneurship competence (DEC) significantly impacts digital entrepreneurial intention (DEI) and entrepreneurial motivation (EM) mediates the relationship between DEC and DEI.

Research limitations/implications-DEC and EM are vital to prepare students and build their intention to become DE. The core outcome primarily consolidates the importance of DEC and EM for students to become entrepreneurs in the future. So, Academician should club the various digital competency skills in their curriculum, which are essential drivers of student's motivation and building their DEI. The policymakers and government should provide the platform to encourage the students to present their business model where they get recognition.

Originality/value-The technological advancement and rapid growth of digital technologies are renovating the market and society across the globe. The novelty of this study is to develop the significant impact of DEC on DEI and EM to mediate the relationship between DEC and DEI.

Keywords:- Digital entrepreneurship Competency, Entrepreneurial motivation, Digital Entrepreneurial Intention, and Mediation

1. Introduction

The feature of digital entrepreneurship (DE), digital transformation and how they are related is complex and essential to understanding (i.e., understanding of DE considered an essential pillar of growth, job creation, and innovation in the economic system). Entrepreneurship is one of the most critical and most emphasized fields of human characteristics and skills today. The traditional definition of entrepreneurship is expanded by DE because it involves a continually changing and highly diverse group of participants (Autio et al., 2018). DE can be defined as a new business model is taken the

Decision Threshold Based Hybrid FSO-RF Model Performance Evaluation under Scintillation and Misalignment Aperture Effect

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Abstract: A novel hybrid Free Space optics (FSO)/Radio Frequency (RF) model is proposed which is based on the single decision threshold feedback bit switching technique. The FSO and proposed hybrid FSO-RF links performance are investigated under strong turbulence and misalignment aperture error in terms of the average symbol error rate (ASER) and outage probability. The FSO-RF link is preferred in this work over the normal FSO link due to ease in switching among the link established with the help of decision threshold during failure of FSO link. In this proposed hybrid model, Gamma-Gamma distribution is considered as free-space optical turbulence channel and Nakagami-m model is for RF link. The analytical expressions for the outage probability and ASER have been derived for various Intensity Modulation - M-phase shift keying (PSK) schemes. A performance comparative study is reported for FSO link and hybrid FSO-RF link. The obtained result indicates the enhanced system performance with the hybrid model whereas the obtained results are validated through Monte-Carlo simulations and results are found in good agreement.

Index Terms - Average Symbol Error Rate (ASER), Decision Threshold, Free-Space Optical (FSO) Communication, Misalignment Error.

I. INTRODUCTION

To mitigate the technical challenges like higher bandwidth services where wireline (fiber copper cable) solutions and last-mile connectivity problems are difficult to deploy and fulfill the requirement of high speed and large bandwidth applications. Optical Wireless Communication (OWC) is the most suited [1]. OWC systems (indoor and outdoor) covering a wide unlicensed spectral range of 700-10,000 nm has the potential to offer a cost-effective protocol-free link at data rates exceeding 2.5 Gbps per wavelength up to 5 km range. OWC is a more sensible solution because of its multiple user-sized cells, reduced interference, and improved carrier reuse capabilities due to its intrinsically abrupt boundary [2]. OWC is broadly categorized mainly in three forms, Visible Light Communication (VLC) for indoor applications, Ultra- Violet Non-line of sight (UV-NLOS) operating at UV frequency for outdoor applications, and Free Space Optical (FSO) Communication operating above 100 GHz near Infra-red (IR) frequency range in EM spectrum. In the case of FSO Communication, the transmitter aperture and receiver aperture must be aligned, i.e., point to point communication link, mainly for outdoor applications, so it is a short distance and LOS communication. Since the FSO wavelength range is 700 – 1600 nm, so bandwidth will be from 100 GHz to a few THz [2].
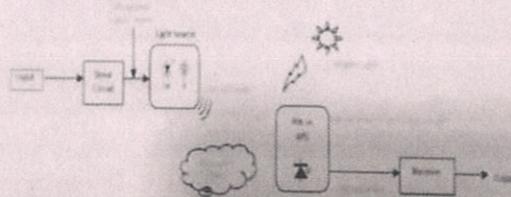

Figure 1 Concept of Optical Wireless Communication (OWC)

FSO communication has recently gained a growing interest for both commercial and military applications. Similar to fiber, FSO transmits data in the form of a small conical-shaped beam by means of a low-powered laser or light-emitting diode (LED) in the THz spectrum. Instead of enclosing the data stream in a glass fiber, it is transmitted through the air and operates in a near-infrared (IR) band. FSO becomes attractive technology where fiber installation and RF wireless and wireline solutions are expensive. FSO addresses applications like higher bandwidth services where wireline solutions are difficult, metropolitan networks, inter-building communication, backhaul wireless systems, indoor links, fiber backup, service acceleration, higher security, military purpose, smaller size of transmitting and receiving antennas, higher transmission efficiency , satellite communications, etc FSO communication is also an emerging alternative to RF communication due to its worldwide

An Empirical Study on the Impact of the Corporate Social Responsibility of the Indian Corporate Sectors

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[1]*Department of Business Economics, Faculty of Management Studies, Veer Bahadur Singh Purvanchal University, India*

Abstract India, has traditionally been involved in various corporate socially responsible (CSR) activities. This paper presents an empirical analysis of CSR activities of some selected public and private organization in India. The key objective of this analysis is to review the companies' CSR investment in sustainability, disclosure, governance, and CSR stakeholders. The Hypotheses development explains the positive significant relationship between CSR and firm performance. Then the methodology section explains sample selection and data source. Using these data, the CSR practices in selected public and private companies are evaluated based on the Global Reporting Initiative guidelines, and a comparative study of the impact of CSR practices on companies' profitability is conducted. The study also focuses on how CSR influences these companies' gross margins, as well as the correlation between environmental concerns and return on investment. The result of this study are appropriate for India's present scenario demonstrating that all companies are conducting CSR operations, but there is a substantial difference in the CSR disclosure practices of the selected firms. The private companies in India invests more in CSR but spend less on the environmental aspects whereas the public companies invest less in CSR but almost spend their entire CSR expenditure on the social and environmental aspects.

Keywords: Indian corporate sectors, FMCG companies, corporate social responsibility, management, economics

I. Introduction

Corporate social responsibility (CSR) is business practices that go beyond the requirements of an organization, its shareholders, and law to advance societal goals. Traditionally, firms focus on actions and plans that create competencies, capabilities, and resources with superior performance. However, CSR has become an important part of the activities of an organization that influence financial performance (FP) which is a complex and modern technique. Organizations benefit from engaging in activities that benefit the community (Rani & Sarala, 2013; Sehgal & Mir, 2014; Ris, 2015). CSR has widened the scope of companies' activities from stockholders

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ORIGINAL PAPER

Heavy metal contamination in river water, sediment, groundwater and human blood, from Kanpur, Uttar Pradesh, India

Varsha Gupta · Dinesh Kumar · Anamika Dwivedi · Umesh Vishwakarma · D. S. Malik · Seema Paroha · Narendra Mohan · Seema Gupta

Abstract Exponential industrialization and anthropogenic activities have resulted in water contamination by various heavy metals in Kanpur city, India. Heavy metal pollution, an issue of great concern, is not only affecting river water, but contamination of groundwater is creating health issues and worries. In the present investigation, blood samples were collected from selected volunteers, water and sediment samples from four sites of river Ganga and drinking groundwater samples from 23 locations of Kanpur city. Heavy metals analysis in river water, sediment, and human blood, was done by inductively coupled plasma optical emission spectroscopy (ICP-OES)

and atomic absorption spectroscopy (AAS) was used for groundwater samples. Human blood showed a high concentration of arsenic (As) (66.6 ± 0.00 and 76.9 ± 0.01 µg L^{-1} in males and female subjects, respectively) and thallium (Tl) (13.4 ± 0.004 and 16.6 ± 0.005 µg L^{-1} in males and female subjects, respectively) with higher concentrations in females than males. Other heavy metals (Nickle, Beryllium, Cadmium, Cobalt, Chromium, Lithium, Molybdenum, Lead) were not observed in any of the tested human blood samples. However, in groundwater sampling, iron (Fe), copper (Cu), and arsenic (As) were detected, one sample had the presence of chromium (Cr), and two samples showed lead (Pb) contamination. River water [Cu (32–125 µg L^{-1}), Cr (19–725 µg L^{-1}), Cd (1–59 µg L^{-1}), Pb (37–163 µg L^{-1}), As (32–153 µg L^{-1}), Th (26.75 µg L^{-1})] showed a high level of the heavy metals, as compared to reference values of BIS, CPCB (2016a), WHO, EPA and USEPA. River sediment [Cu (4168–34,470 µg Kg^{-1}), Cr (4040–145,650 µg Kg^{-1}), Cd (326–5340 µg Kg^{-1}), Pb (1840–19,350 µg Kg^{-1}), As (103–188 µg Kg^{-1})] also showed high concentration when compared to reference values of USEPA and PASS. River site 4, with high Cr (725 µg L^{-1}), also showed Cr levels (19.8 µg L^{-1}) in the groundwater samples, indicating Cr contamination in groundwater while Pb was observed at groundwater samples close to two industrial sites. Drinking water might be the primary exposure pathway for As and Tl to enter the human body. The study recommends periodic monitoring of river

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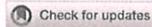S. Paroha · N. Mohan
National Sugar Institute, Kanpur, India

N. Gupta
Doctor Harisingh Gour Sagar University, Sagar, MP, India

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Vaccine hesitancy for coronavirus SARS-CoV-2 in Varanasi India

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With the rollout of the world's largest vaccine drive for SARS-CoV-2 by the Government of India on January 16 2021, India had targeted to vaccinate its entire population by the end of 2021. Struggling with vaccine procurement and production earlier, India overcome these hurdles, but the Indian population still did not seem to be mobilizing swiftly toward vaccination centers. The severe second wave has slowed the vaccination pace and was also one of the major contributing factors to vaccine hesitancy. To understand the nature of vaccine hesitancy and its underlying factors, we conducted extensive online and offline surveys in Varanasi and adjoining regions using structured questions. Most respondents were students (0.633). However, respondents from other occupations, such as government officials (0.10), have also participated in the study. Interestingly, most people (0.75) relied on fake news and did not take COVID-19 seriously. Most importantly, we noticed that a substantial proportion of respondents (relative frequency 0.151; mean age 24.8 years) reported that they were still not interested in vaccination. We observed a significant association between vaccine hesitancy and socioeconomic status ($\chi^2 = 307.6$, $p < 0.001$). However, we failed to detect any association between vaccine hesitancy and gender ($\chi^2 = 0.007$, $p > 0.5$). People who have neither been vaccinated nor have ever been infected may become the medium for spreading the virus and creating new variants, which may lead to the vaccine-resistant variant. We expect this extensive survey to help the Government upgrade their vaccination policies for COVID-19 in North India.

KEYWORDS

vaccine hesitancy, SARS-CoV-2, coronavirus, North India, Varanasi

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RESEARCH   **Open Access**

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Phishing website prediction using base and ensemble classifier techniques with cross-validation

Anjaneya Awasthi* and Noopur Goel

Abstract

Internet or public internetwork has become a vulnerable place nowadays as there are so many threats available for the novice or careless users because there exist many types of tools and techniques being used by notorious people on it to victimize people somehow and gain access to their precious and personal data resulting in sometimes smaller. However, these victims suffer considerable losses in many instances due to their entrapment in such traps as hacking, cracking, data diddling, Trojan attacks, web jacking, salami attacks, and phishing. Therefore, despite the web users and the software and application developer's continuous effort to make and keep the IT infrastructure safe and secure using many techniques, including encryption, digital signatures, digital certificates, etc. this paper focuses on the problem of phishing to detect and predict phishing websites URLs, primary machine learning classifiers and new ensemble-based techniques are used on 2 distinct datasets. Again on a merged dataset, this study is conducted in 3 phases. First, they include classification using base classifiers, Ensemble classifiers, and then ensemble classifiers are tested with and without cross-validation. Finally, their performance is analyzed, and the results are presented at last to help others use this study for their upcoming research.

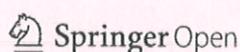**Keywords:** Phishing, Hacking, Data diddling, Machine learning, Ensemble

Introduction

The use of the internet is proliferating in our lives, and we are becoming so very dependent on the services provided online. From online shopping banking to intelligent home solutions, the working culture of people has also been affected, and as a result, the number of threats is also growing at a comparable pace. There exist so many kinds of threats on these globally operated network platforms. Apart from the well-known terms like hacking, cracking, web jacking, online terrorist organizations, one of the prevalent threats is phishing. Phishing is a way of committing crime online, but unfortunately, the victims of such attacks are either unaware of these attacks or do not pay ample attention to them. Such attacks target two

types of users, first who are newbies that, means, they are not aware of the underlying technical aspects of the internet, and the others are those who are careless enough so they may understand the associated risks, but as they are careless, they don't even pay attention.

As per the 2020 Phishing Attack Landscape Report from Great horn (2020 Phishing Attack Landscape 2020), about 53 percent of cyber security professionals have stated that they have witnessed a spike in these attacks during COVID 19 Pandemic, and enterprises are facing about 1185 phishing attacks every month. It takes enterprise security teams to spend 1–4 days remediation a cyber-attack. According to the same report, about 30 percent of cyber security experts, phishing attacks gained tremendous success during this pandemic (2020 Phishing Attack Landscape 2020). Their study revealed the number of phishing emails targeting organizations worldwide (2020 Phishing Attack Landscape 2020). A large portion

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Self-esteem and Work Engagement influencing Teaching skill among Indian Higher Education Teachers

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Abstract

Purpose – The study is an attempt to address the concern of education quality in higher education in the region of eastern Uttar Pradesh in India. The study aims to find ways of improving teaching skill of higher education teachers. Self-determination theory has been adapted and teaching skill has been identified as basic psychological need for competence of teachers. The study further tests how internalized motivation namely work engagement and self-esteem could be helpful in achieving psychological need for competence among teachers by proposing a model.

Design/methodology/approach – Study is based on student's feedback so sample includes higher education teacher and students. The sample was taken from five different types of leading higher education institutes of the region. The sample consists of 401 respondents from varied discipline and subjects. Structured questionnaires were distributed among teachers and their respective students. Analysis includes reliability analysis, correlation analysis Confirmatory factor analysis (CFA) followed by structural equation modeling (SEM) to propose the model for establishing the relationships.

Findings – The study proposed three hypotheses out of which two were approved. The finding revealed that self esteem has significant influence on work engagement and teaching skill, whereas, the work engagement and teaching skill was found negatively related. Teacher with self-esteem will be engaged and may show better teaching skills, but it is not necessary that engaging teacher will enhance their skill.

Practical Implications – Study revealed that practitioners and policy maker should make efforts to make teachers feel valued. The policy governing the teachers should have scope of making teachers feel good about themselves, as the finding suggests teachers with self-esteem will have good teaching skills. Secondly excess engagement of teachers may have adverse effect on their teaching skill.

Originality/value – The study is unique as it is based on student's response and most of the studies available are based on self-reported measure. There are very limited studies on teaching skill in Indian context. There are no studies which observes teaching skill in the frame of self-determination theory and identifies it as psychological need for competence.

Keywords: Self-determination theory, Self-esteem, Work engagement, Teaching Skill

Introduction

This has been established that education level of any country contributes significantly in economic well being of the nation. Developing nation like India has shown its acceptance of this fact by expanding its higher education system. The higher education system in India has grown significantly by 400 percent since 2001. India is home to more than 1000 universities and 42000 colleges with gross enrollment rate of 27.1 % (All India Survey of Higher Education AISHE 2019–20).

Procedural justice influencing affective commitment: mediating role of organizational trust and job satisfaction

Avinash D. Pathardikar, Praveen Kumar Mishra and Sangeeta Sahu

Abstract

Purpose – This paper aims to examine the effect of procedural justice on affective commitment, through the mediating of organizational trust and job satisfaction.

Design/methodology/approach – Data were collected from 305 executives working in eight large cement organizations through a standardized questionnaire. Confirmatory factor analysis, structural equation modelling and mediation analysis were performed to examine the relationship.

Findings – Procedural justice significantly influenced job satisfaction and organizational trust directly. Organizational trust and job satisfaction are partially mediated by organizational justice and affective commitment. Interestingly, procedural justice does not influence affective commitment directly.

Originality/value – Procedural justice and affective commitment are crucial aspects of an organization. Limited research has been conducted linking procedural justice, organizational trust, job satisfaction and affective commitment. This study was conducted in the South Asian country of India, where power-distance prevails

Keywords India, Affective commitment, Job satisfaction, Mediation, Procedural justice, Organizational trust, Procedural justice, Mediation

Paper type Research paper

Avinash D. Pathardikar and Praveen Kumar Mishra are both based at the Department of Human Resource Development, VBS Purvanchal University, Jaunpur, India. Sangeeta Sahu is based at the Department of Business Administration, University of Lucknow, Lucknow, India.

1. Introduction

Organizational justice and its administration are one of the most fundamental needs of every organization. It gives a strong foundation for efficient functioning, goal achievement and developing loyalty among the employees in an organization (Karam et al., 2019). Ideas of justice have developed in unison with the evolution and growth of society. The focus on justice has become important to the administration of justice in society at large. Initially, organizational justice was focused on organizational outcomes, which were referred to as distributive justice (Adams, 1965). Later, it was expanded and included procedural justice (Leventhal, 1980). People seeking procedural justice look for consistency, accuracy, correctness, representativeness, ethics and bias suppression in the workplace (Roberson and Stewart, 2006).

Procedural justice is an essential component of business organizations. It ensures fair norms of procedure such as voice, accuracy and timeliness in the decision-making process for employees (Leventhal, 1980; Tyler, 1988). The procedural justice system is valued by employees because it is viewed as a moral imperative (Folger, 2001) that serves the core objectives of an organization and indicates that employees are collectively respected in an organization (De Cremer and Tyler, 2005). Therefore, procedural justice affects employee well-being, job satisfaction and supervisor trust positively (Colquitt et al., 2001). Organization's value procedural justice for a variety of reasons influences organizational

ORGANIZATIONAL JUSTICE AFFECTING COMMITMENT:
MEDIATION OF JOB SATISFACTION

Praveen Kumar Mishra*
Dr. Avinash D. Pathardikar**

ABSTRACT

The purpose of this study is to analyze the effect of organizational justice on organizational commitment through the mediating influence of job satisfaction. In addition, the study wants to look at two types of organizational justice (procedural and distributive) to see how the model works in a developing country. The study addressed executives at the middle and lower levels of management working for cement organizations in the central part of the Indian subcontinent. A total of 305 questionnaires were analyzed. The hypotheses were tested using multiple regression analysis. Job satisfaction acted as a mediator in the link between organizational justice and organizational commitment. Furthermore, job satisfaction fully mediated the association between procedural justice and organizational commitment and partially mediated the relationship between distributive justice and organizational commitment. The study addressed the mediation effect of job satisfaction, which went beyond the simple linear models commonly employed in the existing literature. Furthermore, this study extended their model to a developing country context.

KEYWORDS: Organizational Justice, Job Satisfaction, Organizational Commitment, India.

Introduction

Organizations are social systems in which employees are the most valued assets (Mayo, 2016). In the age of globalization, an organization cannot thrive without the dedication and hard work of its employees (Jang, Lee, & Kwon, 2021). Each member of the organization has a critical role to play in achieving the organization's goals and objectives, giving its people a sense of accomplishment and motivating them to work harder (Pang & Lu, 2018). As a consequence, they perform better (Swalhi, Zgoulli, & Hofaidhllaoui, 2017) and work hard to fulfill the organization's goals, which are implicitly dependent on the solid and strong foundational pillar of organizational justice (Diehl, Richter, & Sarnecki, 2018).

According to the personal outcomes model, organizational justice is the most important factor in determining workplace attitudes (McFarlin & Sweeney, 1992). It is a good moral for improving people's lives (Graso, Camps, Strah, & Brebels, 2020), organizational growth, development, and satisfaction (López-Cabarcos, Pinho, & Vázquez-Rodríguez, 2015), and human wisdom (Imamoglu, Ince, Turkcan, & Atakay, 2019). Employees perform better and are more pleased when they are treated equitably in the workplace (Yu, Lee, Han, & Kim, 2020). On the other hand, unfairly treated employees are dissatisfied

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** Dean, Faculty of Management Studies, Veer Bahadur Singh Purvanchal University, Jaunpur, India.

Identification of 1, 2, 4-Triazine and Its Derivatives Against Lanosterol 14-Demethylase (CYP51) Property of *Candida albicans:* Influence on the Development of New Antifungal Therapeutic Strategies

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This research aims to find out whether the 1, 2, 4-triazine and its derivatives have antifungal effects and can protect humans from infection with *Candida albicans*. Molecular docking and molecular dynamic simulation are widely used in modern drug design to target a particular protein with a ligand. We are interested in using molecular docking and molecular dynamics modeling to investigate the interaction between the derivatives of 1, 2, 4-triazine with enzyme Lanosterol 14-demethylase (CYP51) of *Candida albicans*. The inhibition of *Candida albicans* CYP51 is the main goal of our research. The 1, 2, 4-triazine and its derivatives have been docked to the CYP51 enzyme, which is involved in *Candida albicans* Multidrug Drug Resistance (MDR). Autodock tools were used to identify the binding affinities of molecules against the target proteins. Compared to conventional fluconazole, the molecular docking results indicated that each drug has a high binding affinity for CYP51 proteins and forms unbound interactions and hydrogen bonds with their active residues and surrounding allosteric residues. The docking contacts were made using a 10 ns MD simulation with nine molecules. RMSD, RMSF, hydrogen bonds, and the Rg all confirm these conclusions. In addition, these compounds were expected to have a favorable pharmacological profile and low toxicity. The compounds are being offered as scaffolds for the development of new antifungal drugs and as candidates for future *in vitro* testing.

Keywords: 1, 2, 4-triazine, Lanosterol 14-demethylase (CYP51), drug resistance, molecular docking, molecular dynamic simulation

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Root Exudates: Mechanistic Insight of Plant Growth Promoting Rhizobacteria for Sustainable Crop Production

Sudhir K. Upadhyay [1*], Abhishek K. Srivastava [2], Vishnu D. Rajput [3], Prabhat K. Chauhan [1], Ali Asger Bhojiya [4], Devendra Jain [5], Gyaneshwer Chaubey [6], Padmanabh Dwivedi [7*], Bechan Sharma [8] and Tatiana Minkina [3]

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The breaking silence between the plant roots and microorganisms in the rhizosphere affects plant growth and physiology by impacting biochemical, molecular, nutritional, and edaphic factors. The components of the root exudates are associated with the microbial population, notably, plant growth-promoting rhizobacteria (PGPR). The information accessible to date demonstrates that PGPR is specific to the plant's roots. However, inadequate information is accessible for developing bio-inoculation/bio-fertilizers for the crop in concern, with satisfactory results at the field level. There is a need to explore the perfect candidate PGPR to meet the need for plant growth and yield. The functions of PGPR and their chemotaxis mobility toward the plant root are triggered by the cluster of genes induced by the components of root exudates. Some reports have indicated the benefit of root exudates in plant growth and productivity, yet a methodical examination of rhizosecretion and its consequences in phytoremediation have not been made. In the light of the afore-mentioned facts, in the present review, the mechanistic insight and recent updates on the specific PGPR recruitment to improve crop production at the field level are methodically addressed.

Keywords: chemoattractant, PGPR recruitment, plant-microbes interaction, root-exudate, rhizosphere

INTRODUCTION

According to the World Health Organization (WHO), the food shortage for sustaining the human population is on a steep upward trajectory, mainly owing to the quickly booming human population that is expected to cross the 10 billion mark by 2050 (DESA UN, 2015). Both WHO and the United Nations have proposed to intensify global food production by 50% in the near future. The agriculturally important microorganisms (AIMs) can play a pivotal role in realizing this colossal target considering the fact that fertile lands are sharply shrinking owing to urbanization and industrialization.

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Article

Unraveling Nitrogen Fixing Potential of Endophytic Diazotrophs of Different *Saccharum* Species for Sustainable Sugarcane Growth

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Abstract: Sugarcane (*Saccharum officinarum* L.) is one of the world's highly significant commercial crops. The amounts of synthetic nitrogen (N_2) fertilizer required to grow the sugarcane plant at its initial growth stages are higher, which increases the production costs and adverse environmental consequences globally. To combat this issue, sustainable environmental and economic concerns among researchers are necessary. The endophytic diazotrophs can offer significant amounts of nitrogen to crops through the biological nitrogen fixation mediated *nif* gene. The *nifH* gene is the most extensively utilized molecular marker in nature for studying N_2 fixing microbiomes. The present research intended to determine the existence of novel endophytic diazotrophs through culturable and unculturable bacterial communities (EDBCs). The EDBCs of different tissues (root, stem, and leaf) of five sugarcane cultivars (*Saccharum officinarum* L. cv. Badila, *S. barberi* Jesw.cv Pansahi, *S. robustum*, *S. spontaneum*, and *S. sinense* Roxb.cv Uba) were isolated and molecularly characterized to evaluate N_2 fixation ability. The diversity of EDBCs was observed based on *nifH* gene Illumina MiSeq sequencing and a culturable approach. In this study, 319766 operational taxonomic units (OTUs) were identified from 15 samples. The minimum number of OTUs was recorded in leaf tissues of *S. robustum* and maximum reads in root tissues of *S. spontaneum*. These data were assessed to ascertain the structure, diversity, abundance, and relationship between the microbial community. A total of 40 bacterial families with 58 genera were detected in different sugarcane species. Bacterial communities exhibited substantially different alpha and beta diversity. In total, 16 out of 20 genera showed potent N_2-fixation in sugarcane and other crops. According to principal component analysis (PCA) and hierarchical clustering (Bray–Curtis dis) evaluation of OTUs, bacterial microbiomes associated with root tissues differed significantly from stem and leaf tissues of sugarcane. Significant differences often were observed in EDBCs among the sugarcane tissues. We tracked and validated the plethora of individual phylum strains and assessed their nitrogenase activity with a culture-dependent technique. The current work illustrated the significant and novel results of many uncharted endophytic microbial

" *In silico* identification of ethoxy phthalimide pyrazole derivatives as IL-17A and IL-18 targeted gouty arthritis agents"

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Affiliations
PMID: 35532103   DOI: 10.1080/07391102.2022.2071338

Abstract

Two proinflammatory cytokines, IL17A and IL18, are observed to be elevated in the serum of gout patients and they play a crucial role in the development and worsening of inflammation, which has severe effects. In present study, we have combined molecular docking, molecular dynamics studies and MM-PBSA analysis to study the effectiveness of ethoxy phthalimide pyrazole derivatives (series 3a to 3e) as potential inhibitors against cytokines IL17A and IL18 as a druggable targets. The binding energy of the docked series ranges from -13.5 to -10.0 kcal/mol and extensively interacts with the amino acids in the active pocket of IL17A and IL18. Compound 3e had the lowest binding energy with IL17A at -12.6 kcal/mol compared to control allopurinol (3.32 kcal/mol). With IL18, compound 3a seems to have the lowest binding energy of -9.6 kcal/mol compared to control allopurinol (3.18 kcal/mol). In MD simulation studies, compound 3a forms a stable and energetically stabilized complex with the target protein. Depending on properties of the bound IL17A-3a and IL18-3a complexes was compared by means of MM-PBSA analysis. These derivatives can be used as a scaffold to develop promising IL17A and IL18 inhibitors to assess their potential for gouty arthritis and other related diseases.

Keywords: IL17; IL18; MD simulation; Molecular docking; chronic arthritis; polymer compounds.

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Seed Priming and Foliar Application of Chitosan Ameliorate Drought Stress Responses in Mungbean Genotypes Through Modulation of Morpho-physiological Attributes and Increased Antioxidative Defense Mechanism

Akash Hidangmayum, Padmanabh Dwivedi ✉, Prasann Kumar & Sudhir Kumar Upadhyay

328 Accesses │ **3** Citations │ Metrics

Abstract

Drought is one of the important abiotic stress factors that affect crop productivity worldwide. In recent years, applications of biopolymer chitosan on plants have received attention due to their biostimulant activity and ability to elicit a defense response to stress. The current study investigates the effect of seed priming and foliar application, or both, under drought stress in pot experiments. The optimal concentration of chitosan was determined through morpho-physiological attributes and carried forward for seed priming and foliar application under drought stress in pot experiments for two consecutive years.

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Review Article

Understanding the salinity stress on plant and developing sustainable management strategies mediated salt-tolerant plant growth-promoting rhizobacteria and CRISPR/Cas9

Prabhat K. Chauhan, Sudhir K. Upadhyay ✉ ⓘ, Manikant Tripathi, Rajesh Singh, Deeksha Krishna, Sushil K. Singh & …show all

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ABSTRACT

Soil salinity is a worldwide concern that decreases plant growth performance in agricultural fields and contributes to food scarcity. Salt stressors have adverse impacts on the plant's ionic, osmotic, and oxidative balance, as well as numerous physiological functions. Plants have a variety of coping strategies to deal with salt stress, including osmosensing, osmoregulation, ion-homeostasis, increased antioxidant synthesis, and

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Effect of ZSB with Graded Levels of Zinc Fertilizer on Yield and Zinc Uptake Under Maize Cultivation

Deepa Verma, Ram Hari Meena, Aradhana Sukhwal, Gajanand Jat, Subhash Chandra Meena, Sudhir K. Upadhyay & Devendra Jain ✉

Abstract

Zinc is a crucial micronutrient required for healthy plant growth, and a substantial amount of applied zinc in the soil has get fixed into insoluble forms. Zinc-solubilizing bacteria (ZSB) have potential alternates for enhancing the bioavailability of zinc in soil. The field experiment was carried out to evaluate the influence of *Pantoea agglomerans* strain ZTB17, NCBI accession number: MK773870 with graded levels of zinc fertilizer on maize. Results indicate that the application of 100% $ZnSO_4$ + ZSB showed higher grain, stover and biological yield; however, it did not significantly differ from the treatment of 75% $ZnSO_4$ + ZSB. These results demonstrated a 25% saving of

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Arsenic Contamination in Rice Agro-ecosystems: Mitigation Strategies for Safer Crop Production

<u>Shraddha Singh</u> ✉, <u>Vishnu D. Rajput</u>, <u>Sudhir K. Upadhyay</u> & <u>Tatiana Minkina</u>

Abstract

Arsenic (As) poses a significant concern to the environment and human health due to its toxicity and carcinogenic properties. Arsenic contamination of water and soil has significantly increased recently in India and other Asian countries via both man-made and natural sources. Along with drinking water, rice intake, which is a key staple meal for a huge population worldwide, is another common way to be exposed to arsenic. Arsenic contamination leads to negative impact on growth and yield of cultivated crops and also puts the consuming population at risk. Exploring different methods to effectively reduce As from water, soil, and rice plants is urgently needed to maintain the safety of food and a healthy environment. To ensure food safety and healthy

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Plant growth-promoting rhizobacteria: a potential bio-asset for restoration of degraded soil and crop productivity with sustainable emerging techniques

Sudhir K. Upadhyay, Vishnu D. Rajput ✉, Arpna Kumari, Daniel Espinosa-Saiz, Esther Menendez, Tatiana Minkina, Padmanabh Dwivedi & Saglara Mandzhieva

Abstract

The rapid expansion of degraded soil puts pressure on agricultural crop yield while also increasing the likelihood of food scarcity in the near future at the global level. The degraded soil does not suit plants growth owing to the alteration in biogeochemical cycles of nutrients, soil microbial diversity, soil organic matter, and increasing concentration of heavy metals and organic chemicals. Therefore, it is imperative that a solution should be found for such emerging issues in order to establish a sustainable future. In this context, the importance of plant growth-promoting rhizobacteria (PGPR) for their ability to reduce plant stress has been recognized. A

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Comparison of diversity and zinc solubilizing efficiency of rhizobacteria obtained from solanaceous crops under polyhouse and open field conditions

Nitu Rani, Gurparteek Kaur, **Sukhminderjit Kaur** ✉ ⓘ, Vishal Mutreja,
Sudhir K. Upadhyay ⓘ & Manikant Tripathi

❝ Download citation　📝 https://doi.org/10.1080/02648725.2022.2157949　　⟳ Check for updates

ABSTRACT

Zinc-solubilizing bacteria (Zn-SB) play a crucial role in regulating soil fertility and plant health by maintaining Zn availability in the rhizosphere. It is uncertain how the Zn-SB population fluctuates across various cultivation systems since varied land-use patterns for agricultural aims may affect microbial activity and plant development effectiveness.

The current study aims to examine the Zn-SB potential of various farming systems using *Solanum lycopersicum*, *Solanum melongena*, and *Capsicum annuum* grown in

Hindawi

Review Article

Boosting Sustainable Agriculture by Arbuscular Mycorrhiza under Stress Condition: Mechanism and Future Prospective

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Global agriculture is frequently subjected to stresses from increased salt content, drought, heavy metals, and other factors, which limit plant growth and production, deteriorate soil health, and constitute a severe danger to global food security. Development of environmentally acceptable mitigation techniques against stresses and restrictions on the use of chemical fertilizers in agricultural fields is essential. Therefore, eco-friendly practises must be kept to prevent the detrimental impacts of stress on agricultural regions. The advanced metabolic machinery needed to handle this issue is not now existent in plants to deal against the stresses. Research has shown that the key role and mechanisms of arbuscular mycorrhiza fungi (AMF) to enhance plant nutrient uptake, immobilisation and translocation of heavy metals, and plant growth-promoting attributes may be suitable agents for plant growth under diversed stressed condition. The successful symbiosis and the functional relationship between the plant and AMF may build the protective regulatory mechansm against the key challenge in particular stress. AMF's compatibility with hyperaccumulator plants has also been supported by studies on gene regulation and theoretical arguments. In order to address this account, the present review included reducing the impacts of biotic and abiotic stress through AMF, the mechanisms of AMF to improve the host plant's capacity to endure stress, and the strategies employed by AM fungus to support plant survival in stressful conditions.

1. Introduction

Mycorrhiza is the type of fungus which forms mutualistic relationship with more than 80% plants on earth. Mycorrhiza was firstly described by Frank [1] and name derived from the Greek "*mukes*" (fungus) and "*rhiza*" (root). Principally, mycorrhiza establishes the association with plant roots. Mycorrhiza has four orders such as *Glomerales*, *Diversisporales*, *Archaeosporales*, and *Paraglomerales* and consists of ten families [2]. Mycorrhiza was futher divided into two broad groups, i.e., ectomycorrhiza and endomycorrhiza, and among them, the most common association is endomycorrhiza also called AMF. The AMF principally colonize the root cortex region of the plant and develops an extramatrical mycelium that laterally used for mineral nutrients acquisition (mainly phosphorus) from the soil [3]. The extramatrical hyphae are the unit of AMF used for nutrient transportation into the fungus. However, another branch-like structure

A review of Impact of Intrinsic and Extrinsic Rewards Female Field worker's Job Satisfaction in Health Sector

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ABSTRACT

The purpose of this research is to learn how teachers' motivation affects their happiness at work. Middle school educators in the Greater Accra area served as the study's subjects. Two hundred teachers from Accra's Junior High Schools, representing a wide range of socioeconomic and cultural backgrounds, were used to compile the sample. Teachers were chosen using a sample method of the respondents' choosing. Participants' ages vary from 20 to 60 years old, and over half are credentialed educators. The results of the research support the hypothesis that high levels of intrinsic motivation are associated with high levels of work satisfaction among educators. But the research finds no statistically significant difference between the satisfaction levels of intrinsically driven and extrinsically motivated educators. Lastly, contrary to expectations, there was no evidence to support the prediction that women would be more driven by external rewards than men. There is a discussion of the study's ramifications.

Key words: "Motivation, job satisfaction, teachers, Public Health, Work Performance, Public Sector"

INTRODUCTION

Many teachers have to endure appalling working and living circumstances, despite the fact that they are a crucial part of any nation's progress. To provide just one example, the majority of the country's educational institutions, particularly those in rural regions, are dangerously close to closing their doors. The academic progress of pupils and the level of motivation of

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Leadership style affecting employee performance

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Abstract

Quality education is crucial for a country's people resources. This involves teaching pupils' information, skills, and values. The key source and tool are faculty. As engineering and management colleges have grown in the previous two decades, a demand-supply mismatch has formed. In this context, faculty recruitment and retention are key. Demand exceeds supply, causing substantial teacher turnover in recent years. This research explores professor retention variables. Existing literature has been analysed to discover faculty retention factors. A questionnaire was devised and evaluated based on these characteristics.

Key words: Leadership, job satisfaction, banking sector

Introduction

Organization theory emphasises productivity. Managers use resources efficiently to achieve goals. Human ability is a variable resource. Human potential may be the greatest untapped resource. If so, we must understand individual work behaviour. Productivity depends on job performance and resources used. Material and technology are shown. Technology improvements—plant, equipment, and process knowledge—can boost system productivity. Raw material changes can also affect efficiency. Technology's impact on productivity varies by situation. Humans aren't crucial in automated systems. In most organizations, employee performance trumps equipment and raw materials. Strategic and coordinative subsystems depend on human performance even in automated operations.

Banking sector

Among the world's major economies, India's is particularly noteworthy because of the breadth of its base and the importance of its many sectors, including those related to textiles, sports products, agriculture, services, and more. The banking industry maintains its dominant position within the service sector, and the Indian private banking sector in particular is expanding at a remarkable rate. After the liberalization measures of 1991, India's banking industry went from being stagnant and unproductive to dynamic and competitive. The banking industry is expanding and creating many new job openings, but it has not paid much attention to its workers' emotional intelligence or their psychological issues including stress, strain, and anxiety. Empirical research shows that many people in the banking industry struggle with issues such as workload overload, severe time pressure to complete tasks, working more than

A review study on Employee engagement affecting employee performance

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Abstract:

An employee's engagement in the workplace is how they act while working. It reveals several aspects of the company that affect its development and the happiness of its workers. As a result of globalisation and advances in technology, today's workplace has undergone significant transformation, presenting workers with novel options on a regular basis. Job satisfaction relates to how an individual feels about their work and how they see their organisation as a whole. The mentality of the educator is the single most crucial factor in the success or failure of any given classroom.

Keywords: Employee engagement, Job Satisfaction, performance, Bank

Introduction:

A person's attitude in the workplace describes how they feel about their work and the activities they engage in while at work. Workplace satisfaction is a multifaceted concept that includes an individual's mental, emotional, and social reactions to his or her job and the extent to which such reactions are justified. How satisfied an employee feels with his or her work depends on how effectively their expectations were met. Environmental elements (such as job content, occupational level, pay and promotion, work group and supervision, and supervisory style), and individual factors (such as motivation, personality type, and values), can each play a role (like Age, Sex, Educational level, marital status and Experience). Attitude at work is influenced by both environmental and psychological variables (outlook of an employee, thinking pattern, reacting behavior). "Employee's attitude is very important to the management for achieving the desired goal for the welfare of organization:

1. Provides the determinants of work place attitude and effect of these determinants on work place attitude of individual.

Employee Engagement Affecting Employee Performance

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Abstract

Present situation and organisational environment are unpredictable and unclear, which hinders individual and organisational objectives. After demonetization, private banking industry is under significant work pressure and an uncertain work environment. To expand efficiently, effectively, and productively, companies require confident, devoted, and engaged people who deliver the greatest outcomes. Committed and confident workers are the backbone of every firm, and it takes a lot of work to determine which elements impact commitment, engagement, and confidence the most. This research examines how self-efficacy, organisational commitment, and work participation affect private bank employees in Uttarakhand and Uttar Pradesh. Exploratory Factor Analysis retrieved self-efficacy, organisational commitment, work participation, and job performance. Multiple regression study shows self-efficacy affects work performance more than organisational commitment and job participation. Although several research have been done utilising the above criteria, there is little literature on private banking in India. Several studies say this kind of research may advance related work. The researcher tried to verify measures that would enable academics, researchers, and others with a stake in this study design organisational success methods.

Key words: employee engagement, private sector banks,

Introduction

Banking is crucial to the national and worldwide economy via global commerce, finance and economic planning, agriculture, and linked operations including "pension, insurance, education loan, public health promotion, and protection. Private banks concentrate more on commercial banking and less on social banking, whereas public sector banks, including cooperative banks,

A Study of Various Aspects of Job Satisfaction among Nursing Staff in Health Sector

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Abstract

One of the most studied topics in HRM and business effectiveness is how to maximize workers' happiness at work. As the healthcare industry continues to develop and expand internationally, professionals in this field will have enough opportunities to further their careers and find meaningful work. The health care industry has been growing at a rapid rate in recent years because it is increasingly focused on patients. Maintaining a happy and productive workforce is essential to the smooth operation of any hospital and the provision of quality healthcare to patients. The purpose of this study is to investigate how satisfied nursing staff members generally are with their jobs. The purpose of this study is to examine the relationship between employee work satisfaction and non-financial elements such as social recognition, autonomy, success, and professional development chances in a large, multi-specialty hospital. Using a secondary data like publish article, magazines, journals etc we were able to collect and analyze some data for this study. In addition to the total benefits and package, the research found that the hospital's first training had a substantial impact on nursingstaff satisfaction.

Keywords: Nursing staff, job satisfaction, benefits and packages, employee training

Introduction

Research on hospital female workers' levels of job satisfaction has recently risen in priority. Nurses deserve respect and fair treatment. Job contentment is a leading indicator of positive therapy and psychological health. As unsatisfied workers become more irritable, they deliver lower quality work, managers should prioritize improving workers' contentment with their jobs. Having a job is crucial to having a comfortable lifestyle and providing for one's family. Job consumes much of an employee's time and energy and also affects a person's social

The Effect of Job Satisfaction and Organizational Commitment to Employee Retention in the Workplace

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Dr. Rashikesh
Sr. Assistant Professor, Dept. of HRD, IBM, VBS Purvanchal University, Jaunpur

Abstract

The purpose behind this research is to evaluate the link between the job satisfaction and organizational commitment. Job Satisfaction is the primary responsibility of an organization to find out that employees feel satisfied with their jobs or not whether at the same time Organizational Commitment is a commitment that an employee has towards their roles and responsibilities for the organization. This research is used to identify the role of job satisfaction and organizational commitment among the employees. The findings of this research discovered three significant findings. These are job satisfaction is significantly associated with affective commitment, job satisfaction is significantly associated with continuance commitment, job satisfaction is significantly associate with normative commitment. The findings confirms that when employees satisfied with affective commitment, continuance commitment and normative commitment from his or her job condition then it may lead to organizational commitment as well as employee retention in the organization.

Keywords: Organizational Commitment, Affective Commitment, Continuance Commitment, Normative Commitment, Job Satisfaction, Employee Retention.

Introduction

Organizational Commitment is very beneficial for the organization because as the word "commitment" itself shows being prepared to give a lot of your time and attention to organization because you believe it is right or important. It shows low absenteeism rate and increases the organization productivity.

Commitment is a very important element in an organization. It depends on the activities, roles performed by the employees in the organizations. The more committed employees, the more efficient and the more productive it will be and the less absenteeism rate they produced because of their internal feeling of commitment as well as the strong desire to do the task and desire to stay in the organizations. In contrast, Satisfied employees will provide a high commitment towards them, feels less pressurize because they love the work they do.

However, unsatisfied employees will contribute to absenteeism rate, perform poorly at work and other negative factors that may contribute to the organizations.

As the word suggests "employees" are an important asset of the organizations because employees are the only one which give organizations their profit what they need because if employees are happy and satisfied they give more positive results which in contrast benefitted to the organizations as well.

Job Satisfaction is an important employee attitude that defines attitudinal behavior of employees at the workplace because more the satisfaction is the more will be productivity of the organizations.

The increase in the job satisfaction the increase in the organizational commitment (affective, normative and continuance commitment).

Organizational Commitment is the relative degree with which the individual identifies oneself with the organization, participants and gets involved in an organization and this degree is measured through three elements of defining identify job participation and involvement and loyalty to the organization. There are various studies in respect to the organizational commitment in which the three dimensions of affective commitment includes the:

Affective commitment to be identified with the organization and get involved in the organizational activities.

Highly sensitive hierarchical MoS₂ nanoflowers for *in-situ* soil moisture sensing

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ABSTRACT

In this work, we explored hierarchical MoS₂ nanomaterials for soil moisture sensing (SMS) and tested their efficacy considering the operational aspects of the sensor. Carnation and marigold flower-like MoS₂ nanostructures were prepared via facile hydrothermal processes with varying synthesis temperatures. The synthesized MoS₂ nanostructures were well characterized by XRD, FTIR, FESEM, EDS, and HRTEM and it is evident that the variation in the hydrothermal temperatures has a significant impact on the crystallinity, morphology, stoichiometry, dimensions, and lattice spacing. We found that hierarchical MoS₂ marigold flower-like nanostructures offer the highest sensitivity of about 2000 %, when gravimetric water content (GWC) is varied from 1 % to 20 % GWC, which is one of the highest reported SMS. The sensors exhibit hysteresis of about ± 4 % and response times of about 500 s. They were highly selective to moisture compared to the other salts like Na, K, Cd, and Cu present in the soil. The sensors were also unaffected by changing temperatures with a small 2–4 % between 20 °C and 65 °C.

1. Introduction

Feeding the entirety of more than 6 billion world population makes it critical to abate crop loss and increase productivity. For a high crop yield, soil moisture plays a pivotal role and thus it is important to maintain optimum water content in the soil between the field capacity and permeant wilting point so that plants can intake the requisite amount of water in a gradual process [1,2]. High concentration of soil moisture content (SMC) affects the root respiration of the crops whereas relatively low soil moisture content leads to leakage of fertilizers and minerals resulting in groundwater pollution. In addition, several mechanical properties of soil e.g., compatibility, crackling, swelling,

shrinkage, etc. also depend on the SMC [2]. Thus, it is of paramount importance to measure the SMC in various fields related but not limited to agricultural and environmental engineering. Soil moisture sensors (SMS) have been widely deployed for the aforementioned purpose and have been delineated in detail by various researchers [2]. For *in-situ* soil moisture measurements, some of the explored methodologies include frequency domain reflectometry (FDR), neutron probe, time-domain reflectometry (TDR), heat-pulse, tensiometer, and micro-electro-mechanical-systems (MEMS), etc. [2]. Out of these, MEMS-based methods are usually preferred over other techniques, mainly due to their affordability, sensitivity, and selectivity [3].

The performance of these MEMS-based SMSs depends on the