National e-Conference on Recent Advances in Engineering, Technology & Applied Sciences–2023 (RAETAS-2023)

September 05, 2023

ABSTRACT BOOK

Organized
by
Society Towards Advancement of Rural Education (STARE)
in association with
Maharana Pratap School of Pharmacy, Lucknow

प्रो० जय प्रकाश पाण्डेय
कुलपति
Prof. Jai Prakash Pandey
Vice Chancellor

डॉ० ए०पी०जे० अब्दुल कलाम प्राविधिक विश्वविद्यालय
उत्तर प्रदेश, लखनऊ
Dr. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY
Uttar Pradesh, Lucknow

Dated : 02 Sept., 2023

MESSAGE

I am pleased to learn about the Society Towards Advancement of Rural Education (STARE) is going to organize a national e-conference on **"Recent Advances in Engineering, Technology, and Applied Sciences" (RAETAS-2023)** on September 5, 2023, in an online format. The conference will bring together participants from institutes, universities, and industries around the country and the world to share their most recent research in various fields of engineering, technology, and science, as well as their applications for the benefit of society and industry.

I have no doubt that RAETAS-2023 will establish itself as a premier conference in various fields and offer a distinctive platform for all conference participants.

I hope that all participants will engage in productive and forward-thinking discussions, deliver their scientific findings efficiently and diligently, and share them widely.

I convey my best wishes for the grand success of the Conference.

(Prof. Jai Prakash Pandey)
Vice-Chancellor

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PRATAP UNIVERSITY
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Dt. 04.08.2023

MESSAGE

The Society Towards Advancement of Rural Education (ST ARE) is gearing up to host the much-anticipated national e-conference, **"Recent Advances in Engineering, Technology, and Applied Sciences" (RAETAS-2023)**, scheduled for September 5, 2023, in a virtual format.

It is evident that **RAETAS-2023** will attract a diverse array of participants, including experts from academia, practitioners from the field, and stakeholders from various industries. This convergence of minds and perspectives is sure to foster insightful discussions and the exchange of groundbreaking ideas.

I have no doubt that this conference will emerge as a hallmark event in the realm of Engineering, Technology & Applied Sciences, providing a unique platform for all attendees to showcase their research, share best practices, and explore collaborative opportunities. It is my hope that the insights generated during this conference will not only benefit rural communities but also contribute significantly to the broader goals of sustainability and environmental stewardship.

I extend my heartfelt best wishes to STARE & Maharana Pratap School of Pharmacy, Lucknow for the resounding success of **RAETAS-2023**. May this conference serve as a catalyst for positive change and inspire lasting advancements in the field of sustainable practices.

I eagerly look forward to participating in the event and contributing to the collective effort to drive innovation and progress in these critical fields.

With best wishes,

Shailendra Bhadauria

Chancellor

Rajkiya Engineering College, Ambedkar Nagar
Department of Applied Science and Humanities

Dr. Vishal Singh Chandel
Professor & Head, APSH

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Date: 04.09.2023

Message

It is a matter of great pleasure that the Society Towards Advancement of Rural Education (STARE) will organize a national e-conference on Recent Advances in Engineering, Technology, and Applied Sciences (RAETAS-2023) **on September 5, 2023**.

Modern engineering and scientific disciplines greatly benefit from computational and characterization approaches, which make it easier to develop, optimize, and test materials, devices, and systems. The research community faces many opportunities and challenges related to data acquisition, analysis, and interpretation in light of the most recent developments in computational and experimental methods, such as finite element analysis, molecular dynamics simulations, and X-ray diffraction. In addition to showcasing the usefulness and adaptability of computational and characterization techniques in practical applications, this Conference aims to provide a thorough overview of the state-of-the-art computational and characterization methods currently employed in various fields, including material science, mechanical engineering, electrical and electronics engineering, and biotechnology.

Thus, by stressing the significance of data-driven approaches and machine learning techniques for engineers and scientists, the Conference will demonstrate the potential to accelerate technological innovation and scientific discovery.

I send my warmest congratulations on the Conference's outstanding success.

(Dr. Vishal Singh Chandel)
Coordinator RAETAS-2023

National e-Conference on Recent Advances in Engineering, Technology & Applied Sciences–2023 (RAETAS-2023) September 05, 2023

Patron

Shri Shailendra Bhadauria
Chairman
Maharana Pratap Group

Conference Convener

Dr. Anup K. Sirbaiya
Professor & Principal
Maharana Pratap
School of Pharmacy
Lucknow, India

Conference Secretaries

1. Dr. S. P. Singh
   Evidhyapathsala,
   PharmaEdx
2. Dr. Ankur Srivastava
   PharmaEdx
3. Mr. Ranjan Kumar
   Pedatrix Global
   Solutions, Lucknow

Date: 02.09.2023

It is my great pleasure to present the proceedings of the National e-Conference on "Recent Advances in Engineering, Technology & Applied Sciences – 2023 (RAETAS-2023)". We were honored to have Prof. J. P. Pandey Hon'ble Vice Chancellor Dr. APJ Abdul Kalam Technical University Lucknow, as the Chief Guest and Dr. Jay Krishnan Madathil, IIT Madras, NPTEL as the Key Note Speaker on this special occasion.

We have received 159 research papers and after review 118 papers were accepted. These 118 papers were presented in different categories of 12 oral sessions, and 12 invited talks. RAETAS-2023 covered six major areas of Chemical Sciences, Computational Techniques, Mathematical Science, Nano Technology, Pharmaceutical and Biological Sciences, which are directly linked to socially useful research areas like communication systems, stealth technology, remote sensing and nanoscale devices.

As the convener of the e-conference, I extend my gratitude to Prof. Vishal Singh Chandel for their support. I would like to thank technical program committee, local organizing committee, volunteers and the staff members of the Maharana Pratap School of Pharmacy for their dedicated support.

Finally, I would like to thank all the authors, volunteers and persons who directly or indirectly contributed to the conference. Without their cooperation and full support, this conference would not have been possible.

02/09/2023

Prof. (Dr.) Anup K. Sirbaiya
Convener RAETAS-2023

Reg. No.: 940/1-180040

SOCIETY TOWARDS ADVANCEMENT OF RURAL EDUCATION

A Registered Society

Date.: 01/09/2023

Dear Participants, Delegates, and Researchers,

It is with immense joy and pride that I, on behalf of the Secretariat of the Society Towards Advancement of Rural Education (STARE), extend my heartfelt congratulations to each and every one of you for your outstanding contributions and active participation in the National e-Conference on **Recent Advances in Engineering, Technology & Applied Sciences – 2023 (RAETAS 2023)**. This conference, hosted under the esteemed banner of STARE as the umbrella body and principal host, has been an extraordinary success due to your unwavering dedication, passion, and exceptional research endeavours.

RAETAS 2023 has not only been a platform for disseminating knowledge but has also served as a crucible for innovative ideas, ground-breaking discoveries, and the spirit of interdisciplinary collaboration. The calibre of research presentations, the depth of discussions, and the global connections formed during this event have truly left an indelible mark on the academic landscape.

Your active participation and invaluable contributions reaffirm our belief in the transformative power of research and innovation to drive progress, particularly in rural education and development. Your commitment to advancing engineering, technology, and applied sciences is truly commendable, and your work serves as an inspiration to us all.

As we conclude this remarkable conference, we encourage you to carry forward the momentum and connections gained here. Continue to push the boundaries of your respective fields, foster collaborations across disciplines, and share your insights and findings with the broader academic and professional communities.

Once again, heartfelt congratulations to all participants, delegates, and researchers for your exceptional contributions towards RAETAS 2023. As the umbrella body and principal host, STARE is immensely proud to have had you as an integral part of this event. We eagerly anticipate witnessing your continued accomplishments and influence, particularly in the realm of rural education and advancement.

If you wish to provide feedback, explore further collaborations, or engage with STARE in our mission to advance rural education, please do not hesitate to reach out to us at +919452050470, +917007411092. Your perspectives and involvement are invaluable as we collectively strive to make a positive impact on rural communities.

Thank you for being instrumental to the success of RAETAS 2023. We look forward to your continued contributions to our shared mission of enhancing rural education and development.

Warm regards,

Stuti Verma
Secretary,
Society Towards Advancement of Rural Education (STARE)

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Date:1/9/2023

Message

It is a matter of great pleasure that the Society Towards Advancement of Rural Education (STARE) is organizing a national e-conference on Recent Advances in Engineering, Technology, and Applied Sciences (RAETAS-2023) on the occasion of Teachers Day i.e. September 5, 2023.

It will also bring researchers, academicians, practitioners & industrialists on to a common platform to achieve the common goal of social upliftment by using advances in Engineering Technologies. This conference will hopefully trigger interactions among researchers to exchange ideas of recent advances in Engineering, Technology, and Applied Sciences.

PharmaEdx feels proud to be associated with RAETAS – 2023 and wish all the best for the First e-conference on Recent Advances in Engineering, Technology, and Applied Sciences (RAETAS-2023).

Ankur

Team PharmaEdx

Message

It is a matter of great pleasure that the Society Towards Advancement of Rural Education (STARE) is going to organize a national e-conference on Recent Advances in Engineering, Technology, and Applied Sciences (RAETAS-2023) on the occasion of Teachers Day i.e. **September 5, 2023**. In the present scenario the advancement of technology day by day plays an important role on society. So it's necessary for academicians, researchers and students to update their knowledge on regular basis. e-Vidhyapathsala feels proud to be associated with RAETAS – 2023 and extends its wishes to STARE for successful organization of this e-conference.

Dr. S. P. Singh

Secretary

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Message from the Secretary

Dear Esteemed Participants, Delegates, and Researchers,

On behalf of the conference secretaries and organizing committee, we extend our heartfelt congratulations to each and every one of you for your invaluable contributions and participation in the National e-Conference on Recent Advances in Engineering, Technology & Applied Sciences – 2023 (RAETAS 2023).

Your unwavering dedication, pioneering research, and insightful presentations will make this conference an outstanding success. RAETAS 2023 serves as a platform for the exchange of ground-breaking ideas, innovative solutions, and interdisciplinary collaboration that will undoubtedly shape the future of engineering, technology, and applied sciences.

We are deeply impressed by the quality and diversity of the research going to be presented, the engaging discussions that shall take place, and the possible connections forged among participants from around the world. Your collective efforts will enrich the conference experience for all attendees. With this remarkable event, we want to emphasize that your work not only contributes to the advancement of knowledge but also inspires the entire community. Your commitment to pushing the boundaries of research and exploring new horizons in your respective fields is commendable.

We encourage you to continue your pursuit of excellence, to collaborate across disciplines, and to share your insights and discoveries with the broader academic and professional communities. Your work has the potential to shape a brighter, more innovative future.

Once again, congratulations to all participants, delegates, and researchers on your exceptional contributions to RAETAS 2023. We are proud to have had you as part of this conference, and we look forward to witnessing your continued successes and contributions to your fields. If you have any feedback, reflections, or would like to stay engaged with the RAETAS community, please feel free to reach out to us. We value your input and look forward to staying connected.

Thank you for being an integral part of this transformative conference experience. We hope to see you at future events as we collectively strive for excellence and progress in engineering, technology, pharmaceutical and applied sciences.

Warm regards,

Ranjan Kumar
Secretary

From the Desk of Editors

By the grace of God, the time has given us opportunity to celebrate Recent Advancements in Engineering, Technology and Sciences. With the introduction of new products and services like AI, ChatGPT etc, our country progresses dynamically in all these fields. The success of Chandrayan 3 and launching of Aditya L1 (Suryayan) shows the development and success of our country in all the fields. New understanding, novel application and an overwhelming adaptation to technology have, significantly replaced what we learned, the way we learned and how we applied our knowledge a few decades ago. The revolution in turn has succeeded in surpassing human limitations in identifying intricate pathologies and correcting previously impossible situations. To full fill this gap and acquainted with the new technologies this conference was organized under the banner of STARE, alongwith academic partners, like Maharana Pratap, School of Pharmacy, Pedatrics Global Solution, Pharmaedx and e-Vidhyapathsala.

Editor
Dr. S. P. Singh

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List of Selected Abstracts

Chemical Sciences

Synthesis of novel N-vinyl-tosylhydrazones by using bromoallyl sulfones

Bhawna Swami[1], Rajeev S. Menon[1*]
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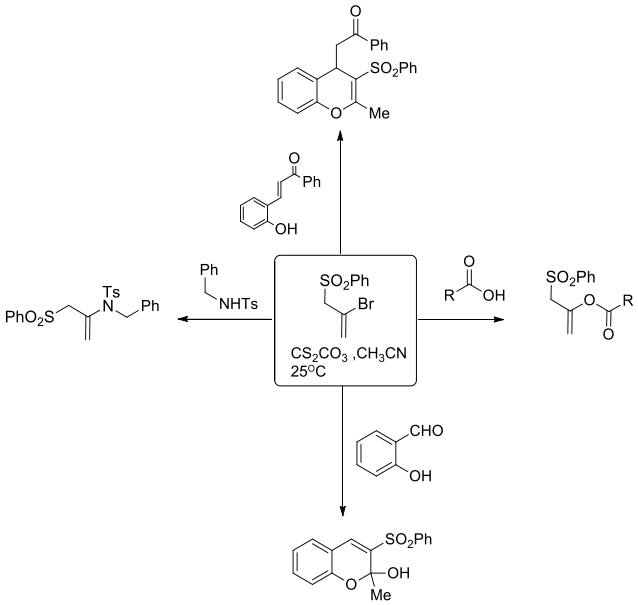
Abstract:
Natural products, especially alkaloids, are proven starting points of investigations in anticancer drug discovery. Chemical synthesis is the only option for accessing those natural products which are not abundantly available from natural sources. Investigations in our laboratory have revealed a number of useful synthetic transformations that pivot on the unique features of sulfonyl functional group. 1 The unusual stability of allylsulfones vis-à-vis vinyl sulfones is a key feature that distinguishes sulfones from other electron withdrawing functional groups. 2 We have discovered that allylbromosulfonescan act as a stable synthetic surrogate for allenylsulfone, and a number of C-N, C-O, and C-C bond formations can be easily carried out via an unusual "formal vinylic substitution reaction" (Scheme 1).



Scheme 1: Formal vinylic substitutions of allylbromosulfone.

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Synthesis and Characterization of Some Novel Pyrazole Derivatives

Pragati Yadav[1], Vinod Kumar [1*]
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Abstract:
Pyrazole chemistry has been playing an interesting role in developing the materials useful in supramolecular, polymer chemistry, food industry, cosmetic colorings and UV stabilizers. 1-2 In particular, pyrazoles having 4-carboxyphenyl group have been found to exhibit excellent antimicrobial properties. 3 In continuation of our research work related to development of novel pyrazole based biologically active compounds, a series of seven bipyrazole derivatives has been synthesized. It has been observed that reaction of 1-[1-aryl-5-hydroxy-3-methylpyrazol-4-yl]- butane-1, 3-diones with 4-hydrazinobenzoic acid hydrochloride furnished the bipyrazoles derivatives in good yield. All newly synthesized compounds were characterized on the basis of spectroscopic (1 H NMR and IR) technique. Details of the preparation and characterization of synthesized compounds will be shared during the presentation in the conference. We will further investigate these synthesized compounds for their biological activities.

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Synthesis, Characterization, Cytotoxic Evaluation and Molecular Docking Studies of Novel 1,2,3-Triazole Based Chalcones

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Abstract:
Cancer is a life threatening disease and is the major cause of mortality throughout the world and results in around 9 million deaths annually [1]. Although there has been good progress in the development in treatment and prevention of cancer, yet the successful treatment of cancer remains a challenge. 1,2,3-triazoles have drawn the attention of medicinal chemists due to their wide range of pharmacological activities, which include antibacterial, antifungal, antimalarial [2] and antitubercular. The chemistry of chalcones has generated intensive scientific studies throughout the world. Due to their simplicity in synthesis and wide range of promising biological activities, such as anti-inflammatory, antioxidant [3], cytotoxic and antimalarial, chalcones have continued to captivate researchers in the twenty-first century. Molecular docking is a computational procedure that aims to predict the favored orientation of a ligand to its macromolecular target (receptor) when these are bound to each other to form a stable complex. It is a reliable, cost-effective, and time-saving technique in the process of drug discovery. Here, we describe a new series of 1,2,3-triazole blended chalcones along with their pharmacological activities.

Key words: 1,2,3-Triazole, chalcones, cytotoxicity, molecular docking, hybrid molecules.

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Analytical studies of some new synthesized La(III) hydrazone complexes

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Abstract:
Some new La(III) hydrazone complexes were synthesized bearing the formula La(III)(DPPDH)(BF4)2 and La(III)(DCPDH)(BF4)2 where DPPDH=(2,6-diacetyl pyridine-N,N'-pyridine 2,6-dicarboxyloyl dihydrazone), DCPDH=(2,6-pyridine dicarbonyl dichloride-N,N'-pyridine-2,6-dicarboxyloyl dihydrazone) and (BF4)2= Bis tetrafluoro borate. Thesecomplexes were colored, solid having high decomposition points and high conductivity. The structure of these complexes were octahedral as confirmed by IR and UV spectral studies. The complexes were analyzed also for their antimicrobial studies which showed that these are moderately active against bacterial and fungal strains eg. S. aureus and E. coli and C. albicans and A. flavus.
Keywords: - Hydrazone, Decomposition, E. coli, Bacterial, Fungal strains.

Crystal and it's types: A review

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Abstract:
A crystal is a solid material and is said to be crystalline or crystallised if its atoms, molecules, or ions are organised in a highly ordered microscopic structure to create an all-pervasive crystal lattice.Macroscopic single crystals can also be recognised by their geometrical shape, which consists of flat faces with distinctive, distinguishing orientations. Crystallisation or solidification refers to the process of crystal development through processes. Table salt, snowflakes, and diamonds are a few examples of big crystals. The majority of inorganic solids are polycrystals instead of crystals, which are formed when numerous small crystals are fused into a single solid. The majority of metals, minerals, ceramics, and ice are polycrystals. Amorphous solids, in which the atoms have no periodic structure at all, are a third class of solids. Wax, glass, and several polymers are all examples of amorphous solids. Crystals have definite edges and fixed angles between their faces. There are various types of crystals including orthogonal, planar, trigonal etc.

Keywords: Crystallized, ordered, distinguishing

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Ferric Doped Nickel Oxide Nanoparticle Modified Carbon Paste Electrode Sensor for

Ascorbic acid: A Voltammetric Study

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Abstract:
This manuscript reveals the synthesis of ferric doped nickel oxide (Fe-NiO) nanoparticle via a co-precipitation method and is depicted by XRD, SEM and EDS analysis. It is utilized as modifier at bare CPE with analysis of ascorbic acid (AA). AA (Vitamin-C) found in citrus fruits and vegetables, it is acts as essential nutrients involved in tissue repair, making of collagen and enzymatic constructions of certain neuro transmitters. The Fe-NiO/MCPE brings the excellent selectivity and sensitivity towards AA in existence of Paracetamol (PA) by using cyclic voltammetry and differential pulse voltammetry. The experimental parameters like pH, sweep rate and concentration studied at 0.2M PBS solution for the investigation of AA and PA. The Fe-NiO/MCPE is used for the illustration of AA and PA, The limit of detection for both AA and PA is 4.47µM and 1.84µM respectively. The prepared sensor can be used for the resolve of AA in real sample investigation.

Keywords - Ascorbic acid, Paracetamol, Folic acid, Phosphate Buffer Solution (PBS), Fe-NiO/MCPE.

Isolation and structure elucidation of Pentaglycoside (Caroside) from kankrej cow milk by 2D NMR and mass spectrometry

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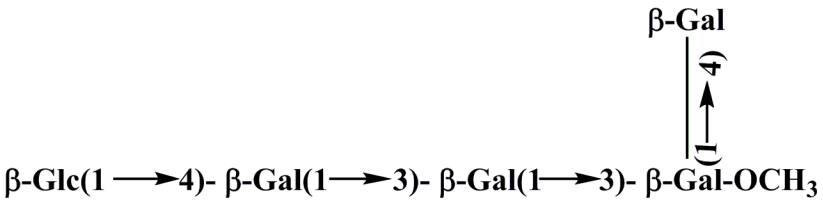
Abstract:

Milk contains a range of bioactive compounds, including free oligosaccharides (OS), which have been identified as selective prebiotics and are essential to the health and development of neonates. Monosaccharides in oligosaccharides are linked together by α or β glycosidic linkages at various positions. The importance of cow milk is well defined in ancient medicinal system of Ayurveda and which showed anti-inflammatory, anti-oxidant, immunological, brain and bone-developing properties. Keeping in mind the importance and biological activity of cow's milk oligosaccharides, the milk of Kankrej cows was collected from Rajasthan's Hanuman Garhi district and processed by the modified method of Kobata and Ginsberg, followed by gel filteration, HPLC, and column chromatography, which resulted in the isolation of a novel milk oligoglycoside, namely Caroside. The 1 H NMR of Caroside contains five anomeric proton signals at δ4.41(3H), δ5.22(1H), and δ5.71(1H) along with a methoxy group signal δ3.53 which was also supposed by 13 C NMR data, which gives signals for anomeric carbon at δ92.15(1C), δ101.38(1C) and δ102.07(3C) along with a methoxy group signal at δ57.01 suggesting it to be methyl pentaglycoside. The stereoscopic structures of Caroside were elucidated with the help of chemical degradation, chemical transformation, and spectroscopic techniques such as NMR (1 H, 13 C, COSY, TOCSY, HSQC, and HMBC experiments) and mass spectrometry as under.



Caroside

Keywords: Kobata and Ginsberg, Caroside, Chemical degradation, physicochemical.

Sources of food contamination & possible ill effects on health

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Abstract:
Food contamination is a global food safety issue in present society. There are lots of toxic substances in the environment that may contaminate foods consumed by humans. They include many inorganic and organic substances. Food contamination can be intentional or accidental or even natural. Sometimes, contamination can be due to microbial toxins produced by bacteria, parasites and virus. Food contamination from chemicals is a major concern for consumers. Common sources of chemical contamination include heavy metal/metalloids, agrochemicals, veterinary drugs, mycotoxins, polynuclear aromatic hydrocarbons, kitchen utensils, and food containers made from non-safe plastics. It can cause terrible health problems such as cardiovascular diseases, cancer, diabetes, birth defects, weak immunity and defective reproductive system. This paper discusses about the food contamination and its various sources along with possible ill effects on human health.
KEYWORDS: Food Contamination, Contaminants, Sources of contamination, human health.

Mukaiyama's reagent promoted mild protocol for one-pot metal-free synthesis of dihydro quinazolinones

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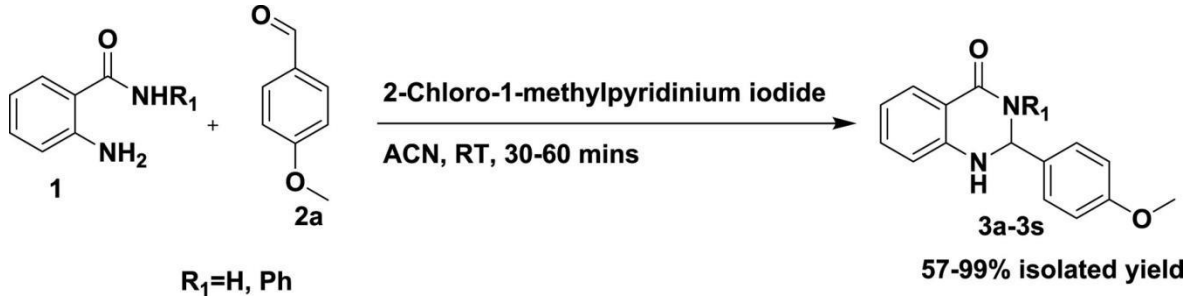
Email id: ashishkumar1282@gmail.com

ABSTRACT:

We have developed a fast and convenient method to prepare dihydroquinazolin-4(1H)-ones from anthranilamide and different aromatic aldehydes by using the Mukaiyama's reagent. The reactions proceeded smoothly with a broad scope of substrates providing the expected products in good to excellent yields under with a low environmental factor and high atom economy. The metal-free condition and the ease of product isolation are the highlighted advantages in solving the issue of trace metal contamination in synthesized pharmaceuticals.



Keywords: Mukaiyama's reagent, Dihydroquinazolin-4(1H)-ones, 3-Phenyl-dihydroquinazolin-4(1H)-one, Anthranilamide

Synthesis of Novel Pyrazoline Derivatives from Chalcone Derivatives and Their Various Bioactive Compounds

Chandra Shekhar Yadav [1,2*], Iqbal Azad[1], Abdul Rahman Khan[1], Naseem Ahmad[1], Malik Nasibullah[1], Lohani Minaxi B.[1], Zaheeb rashid wani[2], Guha Rajdeep[2], D. Hansda[2], and Verma Vijay Kumar[2]
[1]Department of Chemistry, Integral University, Lucknow, India
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Abstract:
Pyrazoline is a frequently used cyclic chemical that is a member of the class of bioactive compounds. Chalcone is a widely distributed phenolic compound belonging to the bioactive flavonoid family. It has been studied extensively in the field of pharmaceutical sciences due to its significant role in drug discovery. Due to its crucial significance in the development of new drugs, it has received much research in the field of pharmaceutical sciences. Pyrazoline compounds with therapeutic potential have been studied for their range of therapeutic capabilities, such as their antibacterial, anti-inflammatory, analgesic, cytotoxic, and anti-tumor effects [1-3]. They also offer a special chemical framework that has encouraged the development of numerous pyrazoline derivative compounds that are stronger and less toxic than their native analogues. Learn about several Pyrazoline synthesis techniques, as well as its prospective bio-evaluation and most current developments. Additionally, highlighted are the bioavailability of pyrazoline derivatives as well as prospective difficulties and advancements in employing these substances in pharmaceutical and synthetic chemistry.

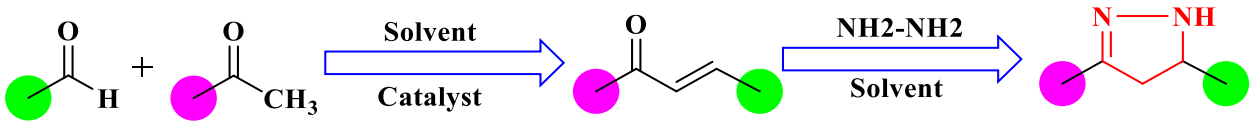

Fig. General scheme synthesis of pyrazoline from chalcone

Keywords: chalcone derivatives, pyrazoline derivatives, pharmaceutical sciences, analgesic, cytotoxic

References:

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Preparation and study of thermal analysis of Random Polypropylene based composite by using Basalt Fiber

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Abstract:
This study focuses on developing and evaluating a Polypropylene-Random-Basalt (PPR-Basalt) fiber composite to enhance its thermal stability. The composite was tested for heat deflection temperature (HDT) using ASTM standard test methods. The results demonstrated notable improvements in Polypropylene-Random. The incorporation of Basalt fibers significantly enhanced making the material suitable for thermal applications. Additionally, the composite exhibited higher flexural strength, ensuring structural integrity under bending stresses. The HDT test revealed increased thermal stability, expanding potential applications in high-temperature environments. These research findings provide valuable insights into the material's performance, presenting new opportunities in the automotive, aerospace, and protective gear industries.

Keywords: Basalt Fiber, Polypropylene, Composite, Thermal Stability, Reinforcement Material.

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Revolutionizing Separation Processes: Acid-Quaternary Ammonium Salt Deep Eutectic Solvents as Solvent Systems

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Abstract:

Novel solvent systems that potentially transform current practices have emerged as a result of the search for efficient and sustainable separation methods. The deep eutectic acid-quaternary ammonium salt solvents (AQAS-DES) are a novel class of solvents with remarkable potential in a wide range of separation applications. The revolutionary role of AQAS-DES as solvent systems in contemporary separation processes is examined in this research. Deep eutectic solvents' special ability to combine an acid and a quaternary ammonium salt results in specialized physicochemical features that can be fine-tuned to meet various separation needs. In terms of selectivity, efficiency, and environmental effects.[1]AQAS-DES outperforms conventional solvents thanks to its versatility. In-depth examination of the basic interactions and mechanisms underpinning AQAS-DES-based separations is done in this work, along with an explanation of their benefits in various industries. This study emphasizes the wide range of separation processes that AQAS-DES can improve or alter by emphasizing current developments, case studies, and experimental discoveries. AQAS-DES show outstanding potential in extractive separations and valuable compound purification. Furthermore, the search for greener separation techniques is aided by the environmentally favorable nature of these solvent systems. The paper also analyzes potential and problems related to AQAS-DES integration into current separation protocols, highlighting their scalability and practical viability. [2]

Keywords: Acid-quaternary ammonium salt deep eutectic solvents (AQAS-DES), Separation processes, Extraction and purification, greener separation methodologies, Scalability, Environmental sustainability.

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Trichloroisocyanuric acid & Carboxamide interactions in TCCA/$NaNO_2$ triggered Nitration of Pyrrole and Indole in aqueous aprotic media: A kinetic correlation of solvent properties with reactivity

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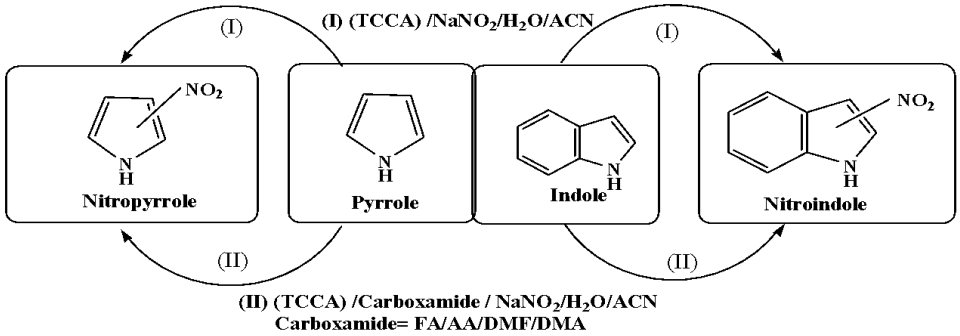
Abstract:
It is well known since 1927 that both DMF and FA have been explored as essential additives to oxychlorides to obtain Vilsmeier – Haack (VH) reagents [1]. Encouraged by the extraordinary green features of TCCA, and carboxamides like DMF, DMA, we have reported the kinetics of (TCCA/$NaNO_2$), and (TCCA-Carboxyl amide) adducts/ $NaNO_2$) triggered nitration of aromatic and hetero aromatic compounds in acid – free reaction media [2, 3].



Nitration of Pyrrole and Indole using TCCA/ $NaNO_2$ in presence and absence of carboxamides

Keywords: Carboxamides, Linear solvent energy relationships, Nitration, Kinetics.

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Selective Doping in the Perovskites for the Oxy-Carbon dioxide Reforming of Methane to produce Syngas

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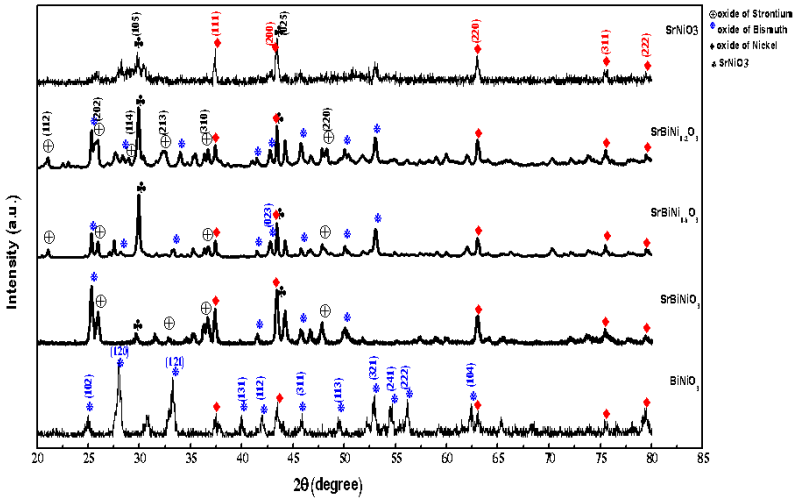
Abstract:

Coke formation always been a major challenge in reforming reactions, thus, to overcome these, selective studies on substitution in perovskite catalyst have been carried out. The substitution is clearly evident from the characterization studies and activity of the as-synthesized catalysts has to be performed for the Oxy-Carbon dioxide reforming of Methane to produce syngas.



Keywords: Reforming, Perovskites, Oxygen, Methane, Carbon dioxide.

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Preparation and study of mechanical and thermal properties of Random Polypropylene based composite by using Kevlar fiber.

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Abstract:

Plastics now a days are made thermally and mechanically strong to prevent earlier heat degradation and prevention of mechanical degradation. Kevlar fibres received much attention due to its high mechanical property high melting point, high thermal stability and cost compare to nano fibres such as CNT or Graphene. In this research we analyse the effect of Kevlar fibres reinforced with Random Polypropylene (PPR) using twin screw extruder. Concentration of Kevlar fibres are taken as 0.5, 1.0%, 1.5% and 3.0%. Specimens for characterisation are prepared by injection moulding machine. Different mechanical and thermal tests are performed like HDT, VST. Thermal analysis of the samples is done using DSC and TGA, Rheological test MFI/MVR and mechanical tests like Tensile strength, impact strength, flexural strength is also done to study the change in the properties of the samples. All the tests are compared with respect to reference sample of Pure PPR without Kevlar loading.

Theoretical Study of Substituents Effect on the Photophysical Properties of Manganese Complexes

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Abstract:

Porphyrin-based compounds offer distinct advantages because they can significantly increase the functions of porphyrin and results in broadening their range of applications**.** It is the functionalization of their peripheries that enables the multifaceted applications of porphyrin macrocycles**.** The electron-donating or electron-withdrawing substituents at a periphery of porphyrin can change the characteristics of porphyrin such as the basicity of the inner nitrogen atoms and the redox potentials. In this presentation, we'll discuss about the molecular level studies; such as electronic structures, FMOs, MEP surfaces, NBO analysis, energetics and photophysical properties of porphyrin based manganese complexes with five different substituents (like Cl, NH_3, SH, NO_2, and OCH_3) coordinated on apical position by using DFT and TDDFT calculations. Frontier molecular orbital (FMO) analysis was carried out by mapping HOMO-LUMO diagrams to theoretically assess the reactivity behaviour of all five species. For the purpose of studying the charge energy distribution over species, electrostatic potential maps are also drawn. Further, in order to identify any stabilizing interactions that may be present in the given species, an NBO analysis was conducted. Our DFT calculations show that the high spin (S = 5/2) is found as the ground state in the complexes containing NH_3, Cl, SH, and OCH_3 substituents whereas the intermediate spin (S = 3/2) in the complexes containing NO_2. HOMO-LUMO gap is found to be the highest in [Mn(TPP)(1,3-Me_2Imd)(NH_3)] whereas the lowest in [Mn(TPP)(1,3-Me_2Imd)(OCH_3)] complex. Chemical potential the highest in the [Mn(TPP)(1,3Me_2Imd)(OCH_3)] and the lowest in [Mn(TPP)(1,3-Me_2Imd)(NH_3)] complex. Our computed results are important to understand photophysical properties of biomimetic complexes.

Assessment of Physical and Chemical Parameters of Ground Water Quality in Nahar Block of District Rewari, Haryana, (India)

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Abstract:

The Ground water is a very important resource for irrigation and drinking purposes. Therefore, it is necessary that the quality of drinking water should be checked at regular intervals like during pre-monsoon and post-monsoon. In the present research paper, the ground water samples were collected during pre-monsoon season from 10 selected locations of Nahar block of district Rewari, Haryana (India). The ground water quality was assessed by different Physical and Chemical parameters such as Total Dissolved Solids (TDS), Total Hardness ($CaCO_3$), Calcium (Ca), Magnesium (Mg), Iron (Fe), Chloride, Sulphate, Fluoride, Nitrate, PH and Alkalinity. The results were compared with drinking water standards of Indian and World Health Organization (WHO). It was found that the quality of ground water varied spatially.

Key Words:- Ground water, pH, $CaCO_3$, TDS, Physical and Chemical parameters.

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An overview of Plant Gum based Hydrogel and their Nanocomposite and its Applications

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Abstract:

The plant gum-based hydrogel nanocomposite has attracted more attention day by day due to properties like biodegradability, cost effective, easy availability and non-toxic nature. [1] Plant gum-based hydrogel nanocomposite have maximum adsorption power due to presence of hydrophilic group like carboxylic acid, hydroxyl and their adsorption capacity can be increased by simply adding nanoparticles to the hydrogels. It increases the surface area of the composites, making them susceptible to adsorption. [2,3] In this article we are focusing on plant gum-based hydrogel nanocomposite and their applications.

Keywords: Hydrogel, Hydrogel Nanocomposite, Classification, Applications.

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2. Bhattacharya S, Samanta SK. *Chem Rev*, **116 (19)** (2016) 11967-12028.
3. Gaharwar AK, Patel A, Dolatshahi-Pirouz A, Zhang H, Rangarajan K, Iviglia G, et al. *Biomater Sci*, **3(1)** (2015) 46-58.

Design and study on N-arylimidazole derivative

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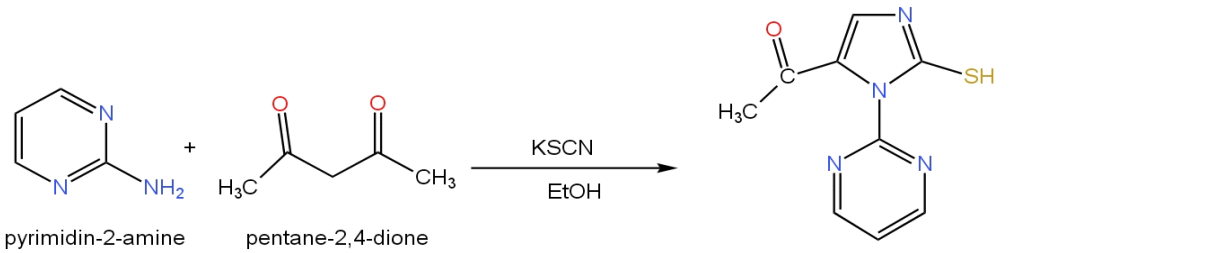
Abstract:

N- arylimidazole derivations are motes that have natural exertion and have an important place in scientific studies in recent Times. The scientists concentrated on the conflation of natural and unnatural N- arylimidazole derivations to examine the intercourse between natural exertion and molecular structure. This study reveals the synthetic system for medication of the N- arylimidazole derivations. The anticipated products were achieved with high yields. The system developed for the conflation of N- arylimidazole derivations; is an environmentally friendly, provident and largely available system [1-2].



pyrimidin-2-amine pentane-2,4-dione

1-[1-(pyrimidin-2-yl)-2-sulfanyl-1H-imidazol-5-yl]ethan-1-one

Keywords: medication, scientific studies, N- arylimidazole, environmentally friendly

References:

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Design and study on thiadiazoles derivative; computational & experimental activity.

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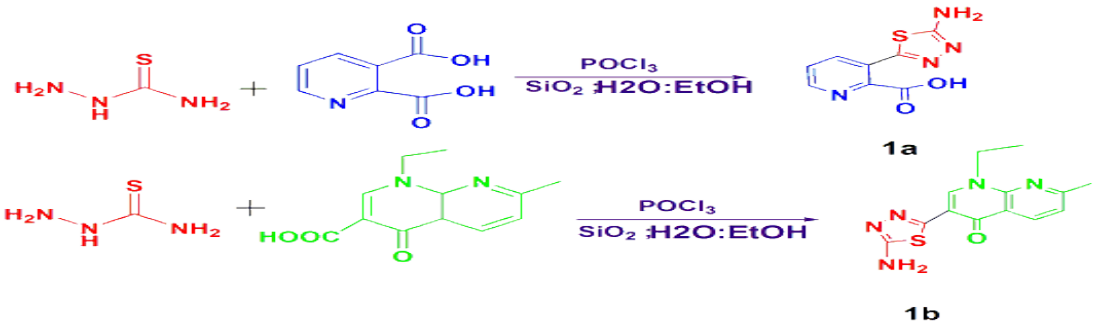
Abstract:

Heterocyclic compounds are always shows great versatile role in pharmaceutical industries. The derivatives of thiadiazoles always shows potent and promising role in drug industries. These characteristics of thiadiazoles encourage us to synthesis drugs which contains thiadiazoles as chemical moiety. In order to follow that we have synthesis two drugs 3-(5-amino-1,3,4-thiadiazol-2-yl)-1-ethyl-2,3-dihydro-7-methyl-1,8-naphthyridin-4(1H)-one and 2-(5-amino-1,3,4-thiadiazol-2-yl)pyridine-3-carboxylic acid. Spectroscopy techniques such as 1H-NMR, 13C-NMR, and FT-IR are employed in order to characterize the synthesized molecules. All the quantum chemical calculations have been carried out using DFT level of theory, B3LYP functional and 6-311g(d,p) & 6-31g(d,p)(1b) basis set respectively (1a & 1b). We also concluded docking activity of syntheses compounds. The calculated data corroborate well with the experimental data. For 1a and 1b, the 13C-NMR peak was observed at 137.4ppm and 134.69ppm, respectively which confirmed the formation of thiadiazoles ring.



Keywords: Thiadiazoles, quantum chemical calculations, docking.

References:

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2. Synthesis of some Transition Metal Complexes with New Heterocyclic. Thiazolyl Azo Dye and their Uses as Sensitizers in Photo Reactions.d.o.i https://doi.org/10.1016/j.molstruc.2015.11.038.

Allocation of sources and health risk assessment of Phthalates esters(PAEs) and Polycyclic aromatic compounds (PAHs) in fine ambient aerosols ($PM_{2.5}$): A summer and monsoon season study over Capital Region of Utter Pradesh

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Abstract:

Phthalates, also known as phthalates esters or PAEs, are common toxins in environments that are indoors as well as outdoors. Human health specially women health is negatively influenced by PAE exposure because 90% of their time spent in indoor. Rarely are both outdoor and indoor air phthalate levels combined with summer and monsoon season fluctuations in phthalate concentrations observed. In the present investigation, three outdoor and indoor sites (a residential area with low traffic, a residential area with high traffic, a residential flat) in Lucknow, India throughout the course of two seasons (May 2023 to September 2023) were examined for the presence of four essential phthalates DEP (diethyl phthalate), DMP (dimethyl phthalate), BBP (benzyl butyl phthalate), DEHP (diethyl hexyl phthalate) in PM2.5. At the same time, PM2.5 samples were taken from the indoor and outdoor environments. In comparison to the location with little traffic, the regions with a variety of activities and heavy traffic showed larger concentrations of both particle fractions. Total PAEs in outdoor and indoor were 3008.67 ng/m3, 221 ng/m3, 307.67 ng/m3, 170.34 ng/m3, 1421.67 ng/m3, 61.34 ng/m3, 134.34 ng/m3, respectively, at the different sites. DEP made up the majority of the PAEs in outdoor and indoor at the sampling sites, making up between 82.13% in outdoor and 77.61% indoor of all the PAEs that were PM2.5-bound. The concentration of phthalates esters in PM2.5 were higher in summer season as compare to the monsoon and total PAEs showed clear seasonal variations. There was little correlation between PAEs concentrations and PM2.5 levels. The relevance of indoor DEP sources is shown by the fact that indoor DEP concentrations were significantly higher than other. According to principal component analysis, cooking oil, plasticizer, PVC, and cosmetic and personal care goods may be significant sources of indoor PM2.5-bound PAEs.

Keywords: Indoor air pollution, derivative of phthalate, fine coarse particle, health risk assessment

Palladium-catalyzed facile synthesis of imidazo[1,2-*a*] pyridine-flavone hybrids and evaluation of their antiplasmodial activity

Jasmine Panda,[1] Bishnu Prasad Raiguru,[1] Seetaram Mohapatra,[1*] and Sabita Nayak[1]
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Abstract:

An efficient cross-coupling reaction between imidazo[1,2-*a*]pyridine derivatives and 6-bromoflavones has been well established. This reaction proceeds through a Palladium-catalyzed cross-coupling reaction to provide imidazo[1,2-*a*]pyridine-flavone hybrids in good to excellent yield. Short reaction time, high yield, and wide substrate scope are the major advantages. Using SYBR Green I assay, these hybrid molecules were examined for anti-plasmodial activity against CQ-sensitive 3D7 and CQ-resistant K1 strains of *Plasmodium falciparum*. The compounds **9o** {IC_{50}s (µM) 1.98^{3D7}, 1.98^{K1}} and **9p** {IC_{50}s (µM) 1.92^{3D7}, 5.45^{K1}} were found to be the most potent anti-plasmodial compounds. Also, all compounds were found to be non-cytotoxic towards Vero cells with their CC_{50}s > 100 µM. Microscopic examination experiments on compounds **9o** and **9p** resulted in a drastic impact on parasite growth of the malaria parasite. The interaction of these two potent hybrids was also examined in the binding site of wild-type *Pf*-DHFR-TS using molecular docking studies. The computational ADME studies confirmed these hybrids as a new oral antimalarial agent.

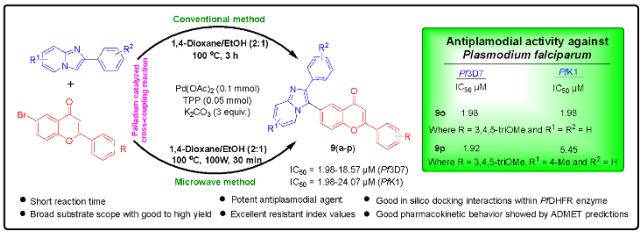

Fig 1: Synthesis of imidazo[1,2-*a*]pyridine-flavone hybrids and evaluation of their antiplasmodial activity

Keywords: Antiplasmodial, hybrid molecule, flavone, imidazo[1,2-*a*]pyridine, *Plasmodium falciparum*

References:

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Water Promoted One Pot Synthesis of Sesamol Derivatives as Potent Antioxidants

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Abstract:

A one pot water mediated synthesis of sesamol [1] analogous using Betti Base synthetic approach. The reaction was optimized with various solvents and catalysts, but the product formed with a high yield in aqueous ethanol condition. The examined strategy offers many advantages such as green solvent, purification without column chromatography, and catalyst-free synthesis. The synthesized molecules were investigated for molecular docking and DFT studies. In silico parameter showed that the target compound has the lowest affinity score as well as high charge transformations. From the result of theoretical approaches, we evaluate compounds for in vitro antioxidant assay toward the DPPH, H_2O_2 and NO method with 50 mg/mL concentration. In vitro bioassay [2] revealed that the target compound had excellent inhibition capacity.

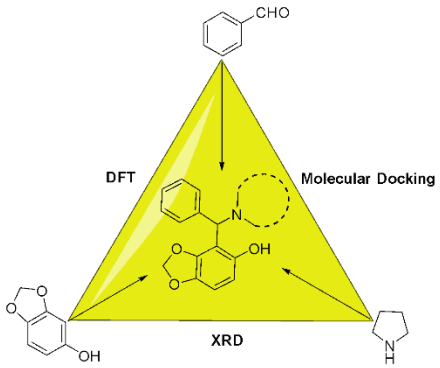

Fig. Water promoted three-component reaction for the synthesis of Sesamol Derivatives.

References:

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Determination of Point of Impact and Spatter Pattern Analysis of Blood: A Review

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Abstract:

BPA (Bloodstain Pattern Analysis) is a scientific method that aids in the investigation of events that lead to a bloodshed at a crime scene. Indeed, BPA assists international law enforcement organizations in understanding the shape and distribution of bloodspots at a crime scene in order to allow for a potentially comprehensive reconstruction of the dynamics of the violent act, as well as the identification of possible suspects. Despite its importance, this Forensic discipline still relies entirely on manual methods, making crime scene investigation time-consuming, laborious, and sometimes inaccurate.

Keywords: Blood, Crime Scene, Forensic, Investigation, Point of Impact, Suspect.

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Tranexamic Acid: A Breakthrough in Inhibition of Hyperpigmentation

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Abstract:

The use of dietary tranexamic acid enhances the treatment of melasma quickly and effectively tranexamic acid decrease the synthesis of the mechanistic target of rapamycin complex while increasing the synthesis of autophagy-related proteins. Tranexamic acid (TXA) decreases hyperpigmentation in melasma patient. Tyrosinase, a crucial enzyme in the production of melanin, was not decreased by TXA in melanocyte cultures without keratinocyte conditions medium (KCM), but it was decreased in cultures with KCM. Results show that TXA reduces melanin formation in melanocytes via preventing melanocytes from interacting with keratinocytes by inhibiting the plasminogen or plasmin system. Compared to the placebo, tranexamic acid was efficacious in 50% of patients according to four methods of evaluation. A few minor adverse effects were noticed that the Melasma Area Severity Index score significantly decreased on both the side of the face treated with the fractional CO2 laser alone as well as the side treated with the fractional CO2 laser in conjunction with TXA. In order to lessen the increased inflammatory response elicited when both modalities are used together, which in turn results in decreased effectiveness in the treatment of melasma, tranexamic acid usage intradermally should be alternated with fractional CO2 laser and not used in the same setting. Those who suffer from moderate to severe melasma they used TAX and Only a small number of patients had oligomenorrhoea, palpitations, and gastrointestinal discomfort; none experienced major systemic adverse effects. Therefore, TXA is a safe and efficient treatment for melasma sufferers. Micro-needling, nicotinamide, and tranexamic acid cream combined therapy reduced melanin index as effectively as the modified Kligman recipe. The use of TXA may help to prevent and treat PIH, which helps to lower the risk associated with aesthetic laser/procedural therapy. Melasma can be securely and effectively treated with oral tranexamic acid. The review is based on use and application of tranexamic acid.

Key words: Tranexamic acid, melasma, laser.

Synthesis of *N*-acyl-benzotriazole using Mukaiyama reagent

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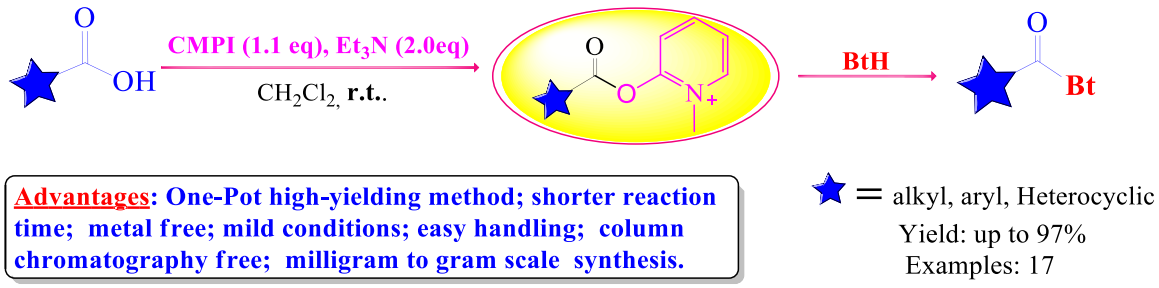
Abstract:

An unprecedented use of Mukaiyama reagent in the conversion of carboxylic acids into corresponding *N*-acyl benzotriazoles has been established with reliable and reproducible outcomes. Advantages associated with the developed method are easy handling, shorter reaction time, wide substrate scope and one-pot high-yielding reaction under mild conditions. Moreover, elimination of the column chromatography and use of green solvent make this procedure immensely useful for facile synthesis of *N*-acyl benzotriazole.



Keywords: *N*-acyl benzotriazole, benzotriazole, Mukaiyama reagent, coupling reaction.

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Computational Techniques

Noises in Recommender System

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Abstract:

Recommender systems are ubiquitous. Noise in the recommender system is the inherent property. Some noise has a positive effect while other degrades the outcome, generating a negative curve of efficiency. A real time recommender system learns from the noises using deep learning techniques and improves the recommendation graph. External inputs are the chief source of noise while the natural noise least affects the performance parameters. Noises are either positive or negative sentiments which may make recommendations accurate or inappropriate. This article explores the natural and external noise that affects the recommender system.

Keywords: Deep Learning, Sentiment Analysis, Artificial Intelligence, Machine Learning, Auto encoders.

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An Advance Vision Transformer based Deep Neural Network Model for Classification of Insect Pests in Castor Crops

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Abstract:

Castor (Ricinus communis L.) is a cash crop having economic importance in India for its non-edible oil. India is the leading country having the largest production of castor beans. In castor crop cultivation insect pests are one of the main biotic factors that lead to 35-40% losses of yield. The sign of insect pests in crops are random and make it difficult to predict actual species with naked-eye observation. In the last few decades, the advancement of computer vision technologies utilized in the agricultural sector for smart pest management. It uses a convolution and pooling process to perform feature extraction and matching, where the occurrence of the same features may occur in different parts of the image. To detect the actual position and encode the feature orientation is very difficult for regular computer vision models. In this paper, the authors introduce an attention based vision transformer. The model is designed to extract the initial features of the pest with discrete wavelet transformation. The low-frequency band with the highest possibility of features is treated as an input for the transformer. The second portion of the model extract feature follows fine-tuning on the extracted dataset. The final proposed discrete wavelet transformation-based vision transformer has been trained. The proposed model also replaces the Multilayer Perceptron head with a Support Vector classifier for better prediction. The results of the proposed model are compared with six different computer vision models. The proposed model outperforms different models and achieved 97.60% validation accuracy.

Keywords: Computer Vision, Vision Transformer(ViT), Smart Agriculture, Pest Detection & Classification.

Translucent Enigma: Advancing Watermark Analysis using Enhanced Transparency

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Abstract:

Steganography serves as a means of secure data transmission through the concealment of confidential information within innocuous files or messages. This technique ensures that unauthorized parties cannot detect the hidden data. The concealed data can only be extracted by an authorized recipient at the intended destination. Steganography offers various benefits, including watermarking, secure information transfer, and enhanced security. The primary types of steganography encompass text, image, audio, video, and network/protocol-based methods. Image steganography, particularly in watermarking, involves the use of two types of images: the original cover image and the cover image combined with stego data (watermark), resulting in the stego image. The stego image should minimally deviate from the cover image. This study employs the Discrete Cosine Transform technique for watermarking, adjusting the watermark intensity to achieve perceptual transparency in the image, making the watermark visible to the human visual system. The research uses a Binary Mask for Watermarking to gradually increase the coefficient of watermark strength (g), beginning with lower values, until reaching the maximum g value that doesn't cause visible distortion. The investigation identifies that beyond a g value of 3.5, slight distortion occurs along the image's borders. As a result, the study establishes 3.5 as the optimal watermarking strength that maximizes g without introducing noticeable distortion.

Keywords: Watermarking, Cover image, Stego image, Discrete Cosine Transform, Perceptual transparency, Binary Mask.

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A Critical Investigation of Least Significant Bit Steganography method

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Abstract

In this study, the PSNR and MSE of the LSB data concealment approach are analysed in the spatial domain using a variety of grayscale pictures and different message sizes The analysis is based on the spatial domain. The message is encoded into the original picture using the LSB technique that was presented. This strategy uses the first LSB bit of the grayscale image as well as the first message bit from the message matrix. After the first message bit has been inserted, the pixel position of both the picture and the message will be increased by one. This operation will continue to repeat itself until the length of the message is greater than zero. After inserting data with sizes of 2KB, 4KB, and 8KB into a variety of grayscale photographs, their PSNR and MSE were acquired and analysed. The results showed that the PSNR is greater for messages with a smaller size, while it is lower for messages with a larger size. When the message size is small, the MSE is lower, but it is higher when the data size is larger.

Keywords: Image Steganography, Cover image, Stego image, PSNR, MSE.

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Sustainability Nexus: Evaluating the Environmental Impact and Sustainable Integration of Emerging Technologies in a Circular Economy

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ABSTRACT

In an era marked by an ever-accelerating pace of technological innovation, the emergence of cutting-edge technologies has the potential to revolutionize industries and reshape the world as we know it. From artificial intelligence and renewable energy solutions to advanced materials and biotechnology, these innovations hold promises of increased efficiency, enhanced convenience, and improved quality of life. Yet, as we celebrate the transformative power of emerging technologies, it becomes increasingly evident that this progress is not without its environmental repercussions.

The environmental impact of technology adoption has become a central concern in the 21st century. As the world navigates the era of rapid technological advancement, the convergence of emerging technologies with sustainability imperatives is at the forefront of global concern. This paper delves into the complex interplay between cutting-edge innovations and environmental sustainability within the context of a circular economy. By employing a multidisciplinary approach, it systematically assesses the environmental footprint and potential benefits of integrating emerging technologies across various industries. Through a comprehensive review of case studies, life cycle analyses and regulatory frameworks, this research not only highlights the potential environmental risks but also the transformative potential of these technologies in achieving circularity, resource efficiency, and reduced environmental impacts.

The study places emphasis on the critical role of Environmental Impact Assessment (EIA) in guiding sustainable technology development. It explores EIA methodologies and tools customized to address the unique challenges posed by emerging technologies, promoting responsible innovation. Furthermore, the paper examines how circular economy principles can be harnessed to mitigate environmental consequences and foster eco-friendly design, production, and end-of-life management of emerging technology products.

This research is geared towards policymakers, industry leaders, and environmental scientists alike, offering insights into a holistic approach for assessing and integrating emerging technologies in a sustainable and circular manner. By embracing the sustainability nexus, society can unlock the full potential of innovations while safeguarding the environment, moving towards a future where technological advancement and environmental preservation are mutually reinforcing goals.

Keywords: Environmental Impact Assessment (EIA), Emerging Technologies, Sustainability, Circular Economy, Innovation, Technology Integration, Environmental Footprint, Sustainable Development

A Novel Hand Based Gesture Identification System using ANN

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Abstract:
Human languages of the deaf, sign languages are used by those who are unable to hear spoken speech. One of the fastest expanding industries is sign language recognition. Many novel methods have recently emerged in these areas. The goal is to construct a means of expression through the use of one's hands and then to categorize this expression. Some researchers have utilized various methods to achieve the identification of hand gestures in a variety of settings. Visual perception based methods, cyber glove methods, colored marking pen methods, and electromyogram methods were only a few of the many areas explored. Overall, the method may be broken down into four classes: collection of data, processing of images, extraction of features and recognition of gestures. This paper presents a novel system for Real Time Hand Gesture Identification System using ANN and making use of fifty features drawn out from black and white images for identifying the numerals from ranging from 1-10 in the Kurdish Sign Language (KurdSL) which uses the single hand motion. It is compared with the traditional methods and it was found that the study has the highest accuracy rate, surpassing the others, and it uses real-time digital camera. Utilizing a real-time digital camera for a laptop is not only cheaper than using an EMG and data glove, but it also makes programming simpler than using a complex device with convoluted wiring and extra input distortion.
Keywords: Artificial Neural Network (ANN), sign language, Electromyogram (EMG), digital camera, gesture recognition.

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Progressive Collapse Assessment of High-Rise Building Framed Structure Using E-TABS

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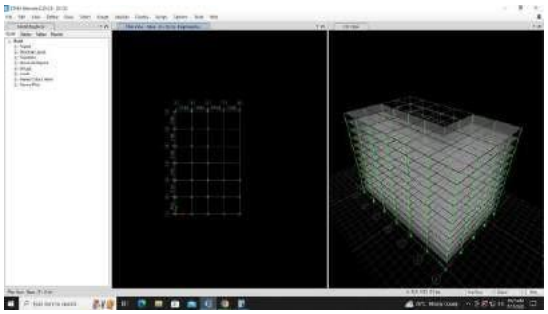
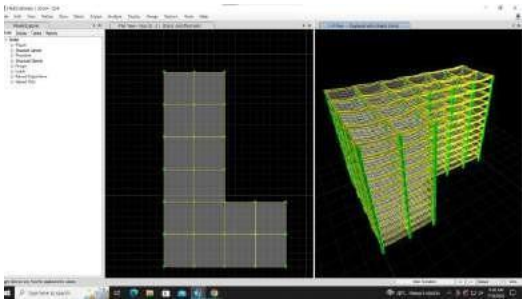
Abstract:

The growing prominence of high-rise buildings in modern urban landscapes underscores the imperative for robust structural design to ensure occupant safety and structural integrity. This research paper delves into the critical realm of progressive collapse assessment in high-rise building framed structures, employing the advanced computational tool E-TABS. Progressive collapse, a catastrophic structural failure initiated by localized damage, demands meticulous evaluation methods to mitigate potential risks. The study commences by establishing a comprehensive literature review of progressive collapse phenomena, investigating historical instances, underlying mechanisms, and global design standards. Subsequently, the paper introduces the utilization of E-TABS, a cutting-edge finite element analysis software, as a versatile tool for assessing and enhancing the resilience of high-rise structures against progressive collapse.

To facilitate accurate and insightful analysis, a representative high-rise building framed structure is modeled within the E-TABS environment. Various load scenarios, encompassing blast, column removal, and catenary action, are simulated to gauge the structural behavior under extreme conditions. The analysis encompasses key parameters such as displacement profiles, member forces, and deformation patterns, all of which contribute to a comprehensive understanding of the structure's response to progressive collapse triggers.

Key words: Progressive Collapse, GSA, Demand capacity ratio, Robustness indicator, ETABS, PMM ratio.





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Comparison of Various Machine Learning Models to Detect Parkinson's Disease

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Abstract:

Parkinson's disease (PD) is a neurological ailment that causes the degradation of motor function due to the death of dopamine-producing neurons. PD is characterized by tremors, rigidity, movement sluggishness, shaking, and impaired balance. Voice is a useful tool for the recognition and diagnosis of PD due to the characteristic reduction in motor control that is a hallmark of the disease. With technological improvements and the abundance of audio-collecting equipment in everyday life, reliable models that can convert this auditory data into a screening tool for healthcare providers could lead to more affordable and precise diagnoses. We utilized the "Parkinson Disease Detection" dataset from Kaggle, which has 24 characteristics and over 192 entries. This study investigates the efficacy of supervised classification algorithms like Decision Tree, Logistic Regression, Random Forest, and Boosting algorithms. In last this study offers a comprehensive comparison between all supervised models.

Keywords: Parkinson's Disease, Machine Learning.

Leveraging Artificial Intelligence in Chemical Process Industries

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Abstract:
The chemical process industry has major impact on the overall ecosystem; it includes the living standards, environmental parameters; that creates the day to day life impact. The process industries deal with the conversion of the desired raw material into useful product along with few undesired entities. The impactful assessment of the process is carried out using mass, momentum and energy balance. The conventional processes were accompanied with the significance loss of the material, leading to the reduced efficiency of the system. In order to maintain the financial stability of the system the focus had shifted on the improved process systems. The process intensification is one of the tools that are created to enhance the product quality along with plant economics. In addition to the process intensification, now Artificial Intelligence (AI) has created a meaningful impact not only on the static but also dynamic processes. The chemical engineering processes are nonlinear in nature, it needs a careful observation for appropriate design and development. The artificial intelligence is a powerful tool that can be used for fault diagnosis, prediction, analysis etc. The AI also help to visualize the actual flow simulations that is quite impossible to observe the actual flow processes in real time situations. The nonlinear behavior of the liquid-solid circulating fluididzed bed is predicted using artificial neural network [1], the process modeling and simulation creates a positive impact on the process industries [2]. The present work depicts the influence of artificial intelligence in the different process industries and its impact on the safety as well as environment.

Keywords: Process Intensification, Chemical Process Industries, Artificial Intelligence, Industry 4.0

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Imperceptibility Analysis of Semi Pixel Difference Method

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Data is most valuable asset of today world. A person can lose billions of dollars if confidential data is stolen. Steganography is the solution for these data security problems in present scenario. Steganography have many types on the basis of cover media. Image steganography is most famous steganography type in today scenario. Semi Pixel Difference method is famous technique of image steganography which uses difference of pixel parts for insertion and retrieval of message. In this paper, we have done the imperceptible analysis of semi pixel difference method. 10 KB data insertion has been done for testing purpose in MATLAB. Histogram based analysis on various test images have been done to test imperceptibility. The experimental analysis shows that semi pixel difference technique is highly imperceptible.

Keywords: Steganography; Data Hiding; Image; Histogram.

Smart Traffic Management and Optimization System

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Abstract:

Traffic congestion is a major problem in many cities of India along with other countries. Failure of signals, poor law enforcement and bad traffic management has lead to traffic congestion. One of the major problems with Indian cities is that the existing infrastructure cannot be expanded more, and thus the only option available is better management of the traffic. Over the years, the modern society has faced increased traffic, increased fuel cost and increased rate of pollutants. Development of sustainable intelligent transportation management system needs integration and the capability of cooperation with emerging technologies such as internet-connected vehicles, cloud computing and internet of things (IoT). We have also evaluated scalability and performance of our proposed framework using parallelization of a critical pre-analysis in transportation applications. The results show that proposed framework achieves considerable performance and efficiency in traffic management applications. Traffic lights linked to cameras in metropolitan areas can be upgraded by connecting to IoT. During a pandemic, this approach is precious. The police can easily regulate traffic from their homes using their cell phones and identify defaulters. The suggested technique aids in the separation of ambulance and rescue engines from ordinary traffic. The results of this study suggest an appropriate control and cloud based solutions for the management of Traffic related problems more accurately and efficiently.

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Machine Learning Model for Diabetes Prediction

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Abstract:

Diabetes is a major and chronic disease which is affecting individuals across globe. According to research 382 million people are suffering with diabetes. If the disease detected early people can lead their lives longer and healthier. It is caused due to increase level of blood glucose. Different Supervised machine learning models trained with accurate datasets can use in diagnosing diabetes at initial stages. The goal is to find effective machine learning based model classifier for detecting diabetes in people using clinical data. The algorithms to be trained with several datasets in article including Decision tree, Support Vector Machine and Random Forest. We need to apply pre-processing techniques which includes label encoding and normalization which leads to accuracy of model improvement. The accuracy of model using each algorithm is calculated. At last, the aim is to predict diabetes in early stages and the one with good accuracy taken as the model for predicting the diabetes.

Keywords: Diabetes prediction, Machine learning, Flask, Accuracy, Random Forest (RF), Support Vector Machines (SVM), Logistic regression (LR), Gradient boosting (GB), k-nearest neighbor.

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Identifying the Applicability of Data Mining Techniques to predict Cardiovascular Health Issues

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Abstract:

The world is witnessing the rapidly increasing health issues today and the majority of the alarming health ailments are due to cardiovascular disease. In India, about 45 million people suffer from cardiovascular disease, specifically coronary artery disease. In India, about 45 million people suffer from cardiovascular disease, specifically coronary artery disease. It is projected that it will contribute to 35.9% of deaths by 2030. Therefore, it is the need of the hour to address these issues at early stage until it's too late. This study highlights the applicability and importance of data mining to analyze medical datasets for early prediction of CVD (Cardiovascular Disease). Cardiovascular health issues can be predicted using various data mining algorithms and techniques viz. Decision Tree, ID3, J48 and KNN (K. Nearest Neighbor Naïve Bayes, Jelinek Merger smoothing, classification and clustering techniques etc. Recent studies illustrate that Coronary artery calcium (CAC) score also claims to be a key indicator and predictor of early signs of cardiac health issues. Data mining effectively takes into account all such important predictors and indicators to predict the occurrence of these cardiac ailments much before they actually affect the human body.

Keywords: Data Mining (DM) techniques, Cardiovascular Disease (CVD), Coronary Artery Calcium (CAC) Score, Decision Tree

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Identification of objects and defects by optical inspection system using computer vision and artificial intelligence

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Abstract:

This innovative system, which is an integration of various advanced technologies such as sensors, motors, artificial intelligence, camaras, etc. The main objective of this innovative technology is to improve inspection processes. The key elements of this system are computer vision and artificial intelligence (AI). These are used to achieve accurate and efficient control of various objects and defects. This system is based on cameras and optical sensors such as LIDAR (light detection and ranging), photodiodes, infrared sensors, etc. These are used to capture accurate, high-resolution images of the object or defects under investigation. By providing multiple machining degrees of freedom, it can create a 3D image of an object.

Artificial intelligence is used to process these captured images to identify defects or quality issues. AI plays an important role in data analysis and allows the system to adapt to different situations over time. With this system, the identification of defects such as dimensional errors, welding errors, etc. can be overcome. For mass production industries, it can help to make the process accurate and efficient.

An optical inspection system using computer vision is like providing eyes and a self-learning brain (AI). This system represents accurate, efficient and adaptive control for various industries. The potential of this system lies in increasing quality control and streamlining the production process, which is a significant measure.

Keywords: Sensors, Defects, AI, Accuracy, Vision, Motors, Images, Quality.

Advancing Concealed Data Integration via Enhanced Huffman Coding

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Abstract:

The practice of discretely embedding information or data within a host entity, designed to elude detection by unauthorized users, is recognized as information hiding, also referred to as data hiding. This technique is applied to various forms of digital content, including images, audio files, videos, text documents, and network protocols [1-3]. This study introduces a novel approach for concealing data using Huffman coding, thereby amplifying the payload capacity. The experimental outcomes reveal a commendable average Peak Signal-to-Noise Ratio (PSNR) of 57.23, signifying the high quality of the stego images. This quality ensures their imperceptibility to the human visual system (HVS), highlighting the effectiveness of the proposed method in achieving inconspicuous integration of data within textual content. Different images of MISC dataset are taken into consideration, an average of PSNR = 57.47, WPSNR = 55.45, SSIM = 0.99456, and MSE = 0.126743, which proves the credibility of the proposed method [4-6].

Keywords: Steganography, Huffman encoding, PSNR, MSE, SSIM

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Implementation of AI and IoT Techniques for Smart Agriculture

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ABSTRACT;

Agriculture serves to be the spine of our country, India and contributes a major share to our economy. Population growth rate is considerably high; therefore, conventional farming does not include the competent farming techniques to meet the demand. “Artificial Intelligence” and “Internet of Things” plays a key role in smart agriculture. “Internet of Things”, serves as the epicenter for the convergence of several technologies like real-time analytics, machine learning, commodity sensors, and embedded systems. Implementation of AI can be seen as optimizing resources, reducing human labor, crop monitoring, crop disease analysis and cure, harvesting etc. A smart agriculture monitoring system has been proposed with the help of IOT, Agriculture Drones and AI driven technologies which are discussed in order to meet the increased demand of productivity. Implementation of these technologies with challenges, limitations and future scope is also discussed in this paper.

Keywords- *Artificial Intelligence, Internet of Things, Real-Time Analytics, Commodity Sensors, Embedded Systems, Agriculture Drones, etc.*

Mathematical Science

A mathematical model on COVID-19 studying the efficacy of testing to control the epidemic

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Abstract:

This study models the efficacy of testing in controlling the global outbreak in the presence of two preventative strategies. A thorough investigation of the impacts of testing, that assists in the control of the epidemic, is done using the non-linear mathematical model of COVID-19 and optimal control theory. We demonstrate the existence of an optimal control set and examine the optimality, transversality, and necessary and sufficient requirements. The system's optimality is determined analytically and resolved numerically.

Keywords: Efficacy, Optimal control, Sensitivity analysis, Stability analysis, Numerical simulation.

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Generalized η -Duals Of Some New Double Sequence Space

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Abstract:

B.C. Tripathy and B. Sharma [1] have introduced the notion of η - dual of order $r \geq 1$ of double sequence space. Ansari and Gupta [2] have generalized the notion of Köthe-Toeplitz dual of sequence spaces on introducing the concept of η -dual of order $0 < r \leq 1$ of sequence space. In this paper, we have determined the η -dual of some double sequence spaces and have studied their perfectness in relation to η -duals for for $r > 0$.

Keywords: dual, η -dual, double sequence, perfect space.

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Screen Bi-Slant Lightlike Submersions

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Abstract:

We introduce the notion of screen bi-slant lightlike submersions from an indefinite Kaehler manifold onto a lightlike manifold as a generalization of screen semi-slant and screen pseudo slant lightlike submersions. We study some properties of proper screen bi-slant lightlike submersions, give characterization theorem with non-trivial examples and obtain integrability conditions of distributions involved in the definition of such submersions.

Keywords: submersion, slant manifold, lightlike manifold, lightlike submersion Kaehler manifold.

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Different Spectra Calibration for a Galaxy Merger: How Abundance Averaging Takes Place

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Abstract:

In this cosmos, matters are classified and cumulated in different galaxies. Many of such galaxies are observed to interact with each other. Interactions in the dark matter part is observed as well via agitated states of nearly matter contents. We opt the case of NGC 800 and NGC 799. We study the flux vs wavelength profiles. Different metals are calibrated and is followed that many of them are possessing moderately differentiated values. We predict the averaging of this values during the merging process.

Keywords: Bullet Clusters, Gaussian Curve, Star Formation Rate.

Thermodynamic Study of a Magnetic Charged Black Hole with Modification of Entropy and Hawking Temperature

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Abstract:
In this paper, heat energy and Gibbs free energy are investigated for a black hole which possesses electric charge. The metric of the static nonlinear magnetic charged black hole in the background of perfect fluid type dark matter has been considered here. The concept of event horizon has been used to find Hawking temperature. Also the surface gravity Concept has been used to find uncorrected entropy. Exponential and Logarithmic correction of entropy have been taken. Also heat capacity and Gibbs free energy have been calculated for above mentioned corrected entropies. Different phase transitions have been pointed and analysed graphically for all the cases.

Cluster wise variations of metallicity indices: Variation with Star Formation Rate.

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Abstract:

Spectra coming out of a galaxy way get redshifted via three process: Relativistic redshift, cosmological redshift and gravitational redshift. We accent the cosmological redshift due to the precession speeds of different galaxies. Standard values of the flux for the jump from third to second orbit of a hydrogen atom, i.e. H wavelength helps us to determine the redshift easily. Henceforth other metals' wavelength and the related flux can be evaluated easily. These abundances predict the metallicity. We plot these indices for metallicity cluster wise to show how do they depend on respective Star Formation Rate.

Keywords: Cosmological Redshift, Star Formation Rate, Metallicity.

Destroying a Rotating Black Hole using Charged Test Particles: Importances of Newman-Unti-Tamburino (NUT) Parameter

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Abstract:

A Kerr Newman type rotating black hole is chosen with a Newman-Unti-Tamburino (NUT) parameter. The Gedanken experiment to destroy the black hole's event horizon is followed. If the test particle dropped possesses a large charge or angular momentum, destruction of the near-extremal black hole is observed to take place. The same method has been applied to justify the validity of the weak cosmic censorship conjecture for the Kerr Newman Taub Newman-Unti-Tamburino (NUT) black hole. This is done by shooting a test particle in the equatorial plane of the black hole and via different inequality checks it may be commented that a particle with energy δE, angular momentum δJ and charge δQ may exist which can destroy a near-extremal rotating black hole with a small NUT parameter.

Keywords: Black Hole, Kerr Newman Black Hole, NUT Parameter, Angular Momentum, Destroying an Event Horizon

Applications in Unbalanced Food Supply Chain Management in Uncertain Conditions

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Abstract:

The present scenario is the age of next generation which is very modern. In all the aspects like fashion, education, science, technology, information and research it requires modification timely. We can call the present scenario as a 'computer age' due to the involvement of artificial intelligence. The modernization fails due to the natural calamities like pandemic, disaster, flood, earthquake and other environmental issues. In pandemic situation and natural disaster there arises the condition of uncertainty. So that the basic need of food supply chain management affected. To handle this problem of food supply chain in various fields we need to apply the mathematical application. There is also need to make sure the top priority of food in market so that we need to apply here the Analytical Hierarchy Process (AHP) for Food Supply Chain Management (FSCM). The random data and the data from expertise of various fields in the market has to be taken for Analysis. So that the suppliers from various fields can provide the product by prioritization.

Keywords: Modern, Supply chain management, Calamities, Food.

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Local First Law of Reissner-Nordstrom Black Hole

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Abstract:
In this article, the local first law of the Reissner-Nordstrom black hole is imagined to be investigated by an observer from a finite distance from the black hole. For simplicity, the Eddington-Finkelstein coordinates are used. The choice of Killing vectors is led to the surface gravity and tangent vector to the path of the observer. The proper distance from the black hole to the observer along the path of the observer is obtained. The distance in terms of the proper distance is described. Hence, the local temperature of the black hole is found to solely depend on the proper distance between the observer and the black hole.

Keywords: black hole, charged black hole, Killing vectors, Local temperature of a black hole.

Dirac Equation and Hawking Temperature: A Lyra Manifold Black Hole

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Abstract:

Tunneling process on a non-Riemannian geometry's singularity is tested. Particular geometry theory is chosen where the electromagnetic field is geometrized alongside gravity. Black hole solution is found using the modified field equation. General covariant Dirac equation is applied on a massless spinor. As a solution, two different temperature expressions are constructed. Temperature, however, is noted to fall with increasing radii of horizons. These results are physically analysed.

Keywords: Lyra geometry, Black hole, Dirac equation, Massless spinors, Hawking Temperature.

A Four-parametrized Redshift Dependent Dark Energy Model in Lyra Geometry

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Abstract:

Throughout the last twenty-five years, several observational sources are unanimously pointing towards a late time cosmic acceleration. While finding the cause behind this, in standard cosmology, "dark energy" is a name which served well to dissolve the question. The leading model in this trend is, however, followed to face theoretical discrepancies like cosmic coincidence, fine tuning etc. Alternative gravity theories come into the field therein. Combining modified forms of Weyl's geometry and the idea of Riemannian manifold, one such modified gravity theory is constructed which is coined as Lyra geometry after the name of the modifier. A parametric representation of dark energy is chosen in the background of Lyra geometry. The free parameters of the model is constrained under a set of Hubble parameter data. Depending on the results found, efficiency of the dark energy model is concluded.

Keywords: Lyra geometry, cosmological redshift, dark energy, Hubble parameter.

η-Dual of Some Geometric Difference Sequence Spaces

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Abstract:
The nation for duals for sequence spaces introduced by Köthe and Toeplitz. Cengin Turkmen and F. Basar [2] have some basic results on the sets of sequences with geometric calculus. K. Boruah, Bipan Hazarika and Mikail Et [3] have generalized geometric difference sequence spaces and its dual. Soubhagya Laxi Singh have new generalized geometric difference sequence spaces. In this paper we have introduce concept of -dual, determine -dual of some new geometric difference sequence spaces and discuss the perfectness of geometric difference sequence spaces relative to -dual.

Keywords: Dual space, Perfect space, α-and η-duals.

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Fixed Point Approximation of Convex Contraction Mappings in CAT(0) Spaces

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Abstract

The three-step iterative technique created by Thakur et al. (2016) was used in this research paper. In this paper, we offer delta - convergence and strong convergence findings using the same iterative approach for a convex contraction mapping of order in CAT(0) spaces. Our research adds to some of the findings in the existing literature.

Keywords: CAT(0) spaces, Convex Contraction mapping of order , Strong convergence, Thakur's – iterative process.

A Cosmological Model of Accelerating Universe with a Simple Parametrization of Hubble Parameter H

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Abstract:

In this paper, a dark energy cosmological model is examined in light of the recent cosmic acceleration in the background of Friedmann-Lemaitre-Robertson-Walker (FLRW) space-time, wherein Einstein's cosmological constant is proposed as a potential dark energy source. The precise solution of Einstein field equations (EFEs) is obtained in a model-independent manner (or the cosmological parametrization) in classical general relativity by considering a simple form of the Hubbel parameter, which produces a linear type of evolution of the scale factor by some particular choice of model parameter and also reveals a constant value for the deceleration parameter throughout the evolution. For the presented model, the evolution of various cosmological parameters is illustrated graphically for flat, closed and open cases, constrained with some suitable value of model parameter.

Keywords: Cosmic acceleration, FLRW, Dark energy, Parametrization.

References:

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Thermal Stress Evaluation On Spherical Region with Cyclic Temperature

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Abstract:

The present problem Evaluates the thermal stress on the sphere by using cyclic temperature. The heat source is applied within a spherical region. To investigate temperature and solve the heat conduction equation, the Bessel-Legendre Integral transform method is utilized. In examining the displacements and stress components, Goodier's displacement potential of thermoelasticity includes Navier's equations, while Boussiesq's harmonic function of spherical coordinates is applied within the sphere. Using Mathematica software, we conducted numerical and graphical analyses of the variations in temperature, displacements, and stress components.

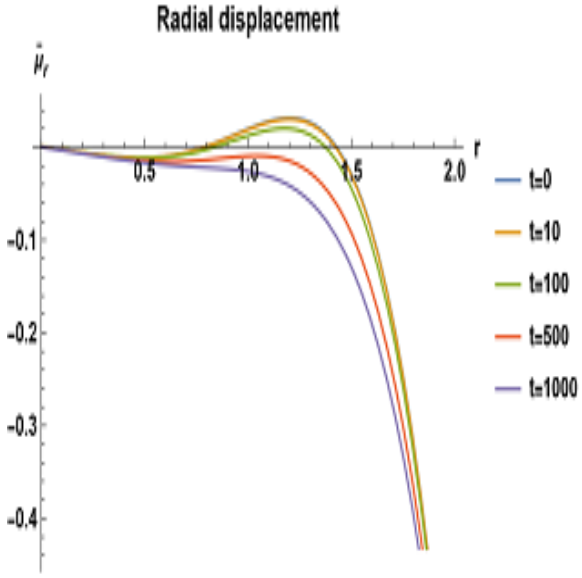

Fig. 1 Radial displacement over r with different time periods

Keywords: Thermal Stress, Bessel- Legendre transform, Cyclic temperature

References:

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Local First Law of Kerr Black Hole

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Abstract:

In this article, for Kerr Black hole in standard Boyer-Lindquist coordinates, the implication of local first law is investigated by an observer from a finite distance from the black hole horizon. First, the killing vectors and event horizon are determined and surface gravity and norm of the tangent vector along the path of the observer is obtained by using above results. Then the proper distance from the observer to the black hole is obtained and describes the path in terms of the proper distance. Hence the local temperature of the black hole solely depends on the proper distance between the observer and the black hole.

Keywords: rotating black hole, Killing vectors, Local temperature of a black hole.

Some Results on Relative Lie Ideals of Prime Rings

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Abstract :
In this paper, relative Lie ideals and relative Lie Jordan ideals in Prime Rings have been introduced. Khan, N. M., et al. [7] introduced relative ideals in ordered semigroups. The author, et al [3, 4, 5] have studied relative ideals in some algebraic structures. Ahmad, M. [1] studied Lie and Jordan Ideals in Prime Rings with Derivations. Generalized derivation in Nearrings was studied by Khan, M. R., et al [8]. Herstein [6] showed that a Jordan derivation of a prime ring with characteristic not equal to 2 is found to be a derivation of . Thereafter, Awtar [2] extended this result on Lie ideals. The main purpose of this paper is to further extend and generalize this result and other related results for relative Lie ideals and relative Jordan Lie ideals. 2010 Mathematics Subject Classification: Primary 16A66, 16A72; Secondary 16A48.

Keywords : Prime Rings, Lie Ideals, Derivation, Jordan Lie Ideals, Jordan Derivation, Relative Lie Ideals, Characteristic.

Reference

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Analysis of Mechanical Characteristics of Various Type of Steel Alloy Through Powder Metallurgy Approach

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Abstract:

In this era the development of steel classes is innovative, in this the steel classes are such as structure steel, speed steel, tool steel. The new innovations related to steel alloy continue to meet the needs. The steels are manufactured in various specifications according to the purpose of application in industry. In this paper the mechanical characteristics of steel-based alloy are analyzed in various contexts via powder metallurgy route and application for different needs. The powder metallurgy methodology of manufacturing complex structures is discussed. The steel property varies due to the variation of heat treatment and the amalgamation of different materials. Due to sintering of the steel-based alloy are responsible for the change of mechanical property such as microstructure, grain morphology, grain size, tensile strength, wear strength etc. The various conventional methodologies were used for the elimination of porosity, casting defects but the powder metallurgy proved to be highly efficient for elimination of the problems.

Keywords: Steel alloy, Powder Metallurgy, Microstructure, Mechanical properties, Heat treatment.

Nano Technology

A Novel approach to Bandgap analysis of PMMA doped Zn Co Nano ferrites thin films

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Abstract:

Band Gap Technology plays a crucial role in modulating the energy band gap of wide band gap semiconductors such as Zn Co nano ferrites. These materials hold great potential for diverse practical applications in optoelectronic devices, photo detectors, EM shielding, sensors, and more. In this paper we highlight a successful approach to reduce the optical energy band gap (Eg) of Zn Co nanoparticles synthesized through the sol-gel method. These nanoparticles are then doped in PMMA thin films using the solution casting technique, with varying weight percentages of nano ferrites. The evaluation of these thin films is conducted through standard methods, including X-ray diffraction (XRD), UV-VIS spectrophotometer, and Fourier transform infrared (FTIR) spectroscopy. The results indicate a direct decrease in the optical energy band gap as the weight percentage of nano ferrites increases. Moreover, there is a noticeable enhancement in absorbance within the 200-350 nm range, which holds promising implications for future applications in UV shielding.

Keywords- Nano ferrites, PMMA, Absorbance, Bandgap

Adsorption of Heavy Metals from Indusial Waste Water using Nanomaterial: Mechanism and Kinetic study

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Abstract:

Rapid growth in population and urbanization including industries causes increase in concentration of heavy metals in surrounding environment. Heavy metals show harmful effects not only on living organisms but also on ecosystems. Heavy metals biologically accumulate in the food chain and collected in wastewater, require advanced techniques for remediation. This study present ZnO and Fe doped ZnO nanomaterials developed using SILAR method to remove heavy metals from industrial wastewater. Briefly focusing on synthesis, removal mechanisms and kinetics. Nanomaterial-based adsorbents include ZnO and Fe doped ZnO nanomaterials. Nanomaterial synthesis can be done by various methods such as co-precipitation, sol-gel, spinning, chemical vapour deposition, pyrolysis and sputtering but this study shows as compare to other methods SILAR method is a promising method for synthesis. Various mechanisms have been used to remove heavy metals such as adsorption, chemical precipitation, membrane filtration, coagulation and ion exchange. Among the all available heavy metal removal methods, adsorption found to be very effective and cheap method. This study reveals factors monitoring the adsorption processes, such as pH, temperature, contact period and dosage. Present study concludes that heavy metals removal using SILAR synthesized ZnO and Fe doped ZnO adsorbents is a promising area.

Keywords: wastewater; adsorbent; SILAR; heavy metal; nanomaterial

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A simulation study on optoelectronic transitions in metallic nanoparticles

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Abstract:

The utilization of metallic nanoparticles in the field of biomedicine has generated significant attention in recent times. The regulated particle size in conjunction with the incorporation of stealth ligands on their surface facilitates immune system evasion, hence prolonging their circulation inside the bloodstream. The investigation of optoelectronic-transition has significant importance in the development of efficacious biological sensors employing silver nanoparticles. The current investigation focused on analyzing the changes in extinction spectra and electric field intensity, as well as the effects of light polarization, semiconductor medium, and particle size on silver and gold nanoparticles. This analysis was conducted utilizing the Nanosphere Optics Lab Field Simulator. The wavelength at which extinction is maximized exhibits a notable augmentation in conjunction with the size, accompanied by a corresponding rise in the bandwidth. The outcomes exhibited notable variations as a result of alterations in the embedding media. Therefore, it can be inferred that the use of metallic nanoparticles has the potential to be applied in diverse domains such as medicine, healthcare, industrial catalysts, and consumer items, owing to their distinctive and adjustable electro-optical characteristics.

Keywords: Metallic nanoparticles, electric field variations, extinction coefficient, solid medium dependences.

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A review on dual functional role of sodium oleate for the synthesis gold nanospheres

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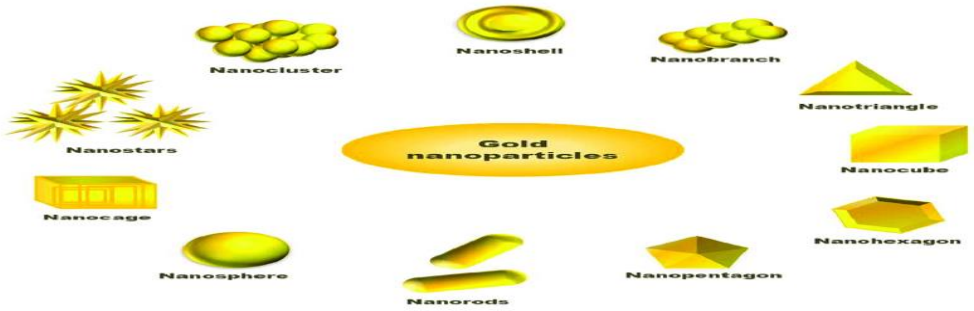
Abstract:

This abstract presents a comprehensive review of the dual functional role of sodium oleate in the synthesis of gold nanospheres. Gold nanospheres have gained significant attention due to their unique properties and versatile applications in various fields, such as catalysis, imaging, drug delivery, and sensing. Sodium oleate, a surfactant and reducing agent, has emerged as a crucial player in the synthesis process, showcasing its remarkable ability to simultaneously control the size and shape of gold nanospheres while also acting as a stabilizing agent to prevent agglomeration. This review systematically examines the mechanisms through which sodium oleate influences nucleation, growth, and stabilization during gold nanosphere synthesis. Furthermore, the influence of reaction parameters, such as temperature, concentration, and pH, on the dual functionality of sodium oleate is critically analyzed. The diverse strategies and methodologies that leverage the unique properties of sodium oleate for tailoring the properties of gold nanospheres are discussed. Overall, this review sheds light on the intricate interplay between sodium oleate and gold nanoparticles, offering valuable insights for researchers and practitioners in the field of nanomaterial synthesis and applications.

Keywords- Sodium Oleate, Gold nanoparticles, drug delivery, nanospheres.



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Process Optimization for Treatment of Pulp & Paper Mill Waste Water Using Iron Nanoparticles

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Abstract:

Due to its black colour, offensive stench, high organic content, severe levels of COD, BOD, and chlorinated chemicals, pulp & paper mill waste water is extremely contaminated. Iron nanoparticles and ferrous sulphate heptahydrate are used in different amounts to chemically precipitate these hazardous contaminants out of the solution. Metals, nutrients, and chlorinated organic compounds are among the chemicals and biological entities that iron nanoparticles are employed to identify and remove today. Due to their large surface area, iron nanoparticles were much more effective at treating distillery effluent than any other chemical methods. Iron nanoparticles are widely used in contaminated chlorinated organic compounds.

In the current study samples Iron nanoparticles and ferrous sulphate hepta hydrate were added to distillery effluent samples at varying concentrations under the same processing conditions. and The treatment was found to be less effective even at high ferrous sulphate heptahydrate concentrations, but more successful at low iron nanoparticle concentrations. Optimization of parameters study was also being conducted to establish ideal condition for treatment.

KEYWORDS: Iron nanoparticle, distillery, water treatment, effluent, chemical treatment, chlorinated organic compounds.

The surface modification of MXene nanosheets through polythiophene for the removal of of 4-Chlorophenol from wastewater

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Abstract:

This work summarizes the synthesis of novel MXene and polythiophene (MX/PTh) nanocomposite for the photocatalytic degradation of noxious phenolic 4-chlorophenol (4-CP) pollutant from wastewater. The synthesized nanocomposite exhibits an outstanding performance for the degradation of 4-CP, which is 4-fold greater than the pristine MXene nanosheets and ~3 times higher than the pristine polythiophene nanoparticles. The Field emission scanning electron microscopy (FESEM) studies confirms nanosheets of MXene having 1.3nm interplanar spacing and delamination of sheets in nanocomposite sample can also be revealed with High Resolution Transmission electron microscopy (HRTEM). Structural analysis, optical features and functional group analysis of the synthesized samples was carried out using X-ray diffraction (XRD), UV-Visible spectrophotometer and Fourier transform infrared (FTIR) spectroscopy. The obtained results demonstrate, that degradation follows pseudo-second order rate kinetics model. The reusability experiment provides a clear shred that the synthesized nanocomposite can be recycled and reused upto four cycles with almost same efficiency. This work will offer more significant and scientific contributions for the researchers working towards the photocatalytic degradation of pollutants from wastewater.

Keywords: MXene, MXene/Polythiophene nanocomposite, 4-chlorophenol, Trapping study.

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Synthesis and characterization of polypyrrole polymer

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Abstract:

Polypyrrole (PPy) a conducting polymer has been successfully and effectively synthesized via oxidative polymerization method using pyrrole as a main precursor and $FeCl_3$ as a oxidising agent. The synthesized sample was characterized by X-ray diffraction (XRD) and Fourier transforms infrared (FTIR) for structure and functional group analysis. Scanning electron microscopy (SEM) and EDAX was used for the morphology details and elemental analysis of synthesized material. The optical properties were analyzed using U-V visible spectroscopy which shows the absorption peak and using Tauc's plot band gap of PPy was determined which lies in the range of 2.19 ev.

Keywords: Polypyrrole, Oxidative Polymerization, functional applications

Zinc Oxide Nanoparticle Modified Carbon Paste Electrode Sensor for Amaranth: A Voltammetric Study

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Abstract:
In this study, co-precipitation method was used to synthesize the ZnO nanoparticles (ZnO/NPs) which were characterized by using a XRD (X-ray diffraction), SEM (scanning electron microscopy), and EDS (energy dispersive spectroscopy) techniques. [1] An antimicrobial activity was performed on synthesized ZnO/NPs against evaluated pathogenic bacterial strains, which shows great significant zone of inhibition. [2-3] The detailed electrochemical investigation of amaranth was studied, with carbon paste electrode modified at ZnO/NPs using the cyclic voltammetric technique. The good electrocatalytic activity towards the reduction of amaranth was shown in modified carbon paste electrode. Obtained LOD and LOQ were found to be 3µM and 10.2µM respectively. The consequence of interference study was examined, the modified electrode displays accomplished stability, reusability and reproducibility. Real sample analysis was performed with the recovery rate of about 85% - 95% using various food samples.

Keywords - Amaranth, Zinc oxide nanoparticles, Modified carbon paste electrode, antimicrobial activity

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g-C_3N_4/TiO_2 Composite for efficient Photocatalytic Degradation of Organic Pollutants under visible light illumination

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Abstract:
A novel pathway for effective environmental remediations has recently been opened by the combination of TiO2 and graphitic carbon nitride (g-C_3N_4). With varying g-C_3N_4 compositions, TiO_2 ' s characteristics, namely its optical band gap energy and ability to collect visible light irradiations while being unable to do so on its own, fluctuate dramatically. In addition, the g-C_3N_4/TiO_2 composite improves stability, porosity, and electron mobility. The purity and crystallinity of the composite are analyzed using several analytical techniques such as X-ray diffraction, Energy dispersive spectroscopy, and Fourier transform infrared spectroscopy, while the shape of the composite is revealed by SEM and TEM. The fabrication of the g-C_3N_4/TiO_2 composite, which may simplify the transfer process of photo-excited carriers and hence delay their recombination rate, can significantly increase the photocatalytic degradation of organic contaminants from the environment.
Keywords: Graphitic carbon nitride, Titanium Dioxide, g-C_3N_4/TiO_2 composite.

Acknowledgements
Authors thank Department of Chemistry, Integral University Lucknow.

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Green Synthesis of Silver Nitrate Nanoparticle Using *Ficus Auriculata* Bark Extract, Characterization and Their Anticancer Activity

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Abstract:

In this paper we presented a biogenic method for the synthesis of silver nitrate nanoparticles ($AgNO_3$) *Ficus auriculata* bark part extract. Currently, green synthesis route is most promising route for the synthesis of metallic nanoparticles in which various plant parts are being used. Nanomedicine utilizes biocompatible nanomaterials for diagnostic and therapeutic purpose. The synthesized silver nitrate nanoparticles were initially noticed through visual colour change from light yellow to dark grey and further confirmed by surface plasmonic resonance by TEM, XRD analysis revealed the crystalline nature and cubic shape with less than 30 nm average size of synthesized $AgNO_3$ NPs. The stability of $AgNO_3$ NPs was due to capping of oxidised polyphenols which was established by FTIR study. It could be concluded that *Ficus auriculata* can be used efficiently in the production of potential anticancer $AgNO_3$ NPs for commercial application. The anticancer activity of silver nitrate nanoparticles was determined using MTT assay. Results indicated that synthesized silver nitrate nanoparticles of Ficus *auriculata* bark part could effectively which shows effective anticancer activity.

Keywords: Silver nitrate; Ficus auriculata; cubic shape; anticancer activity; MTT assay

Design and Development of Terbium Doped ZnO Nanoparticles to Enhance the Optical and Photocatalytic application

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Abstract:
In the present work, demonstrate an effectual and facile synthesis of ZnO nanoparticles and investigation of structural, optical, photocatalytic performance were established with Tb doped nanoparticles have been synthesized by chemical co-precipitation process with general formula $Zn_{1-x}Tb_xO$ (x=0-0.075). The XRD pattern appearance of undoped and doped ZnO nanoparticles conserve in a hexagonal wurtzite structure. FTIR spectra agrees that analysis of presenting a functional group of synthesized samples. The SEM images confirm that ZnO and Tb doped ZnO nanoparticles have smooth surface in their morphologies and the presence of elements has been confirmed by EDX analysis. Using a UV-vis spectrophotometer, the optical characterisation of ZnO and Tb doped ZnO samples were investigated. Optical absorption spectra demonstrate that the band gap narrows as Tb concentration rises. At room temperature the photoluminescence spectra were studied and their band appear 538nm, while green emission suggests zinc vacancy. In the synthesized, 7.5% Tb doped ZnO exhibits the highest photocatalytic activity for the degradation of the Rose Bengal dye when compared to other photocatalyst. The increased photocatalytic activity demonstrate how Tb ions incorporation into ZnO lattice has improved the material capacity to absorb visible light.
Keywords: ZnO, Tb doped ZnO, Nanoparticles Optical properties. Photoluminescence and Photocatalytic.

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Synthesis and characterization of Sr doped MnO nanoparticles for photocatalytic applications

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Abstract:

In the present research work, we have synthesized Sr doped MnO nanoparticles $Sr_xMn_{1-x}O$ (x=0, 0.2, 0.4, 0.6, 0.8, 1), using chemical co-precipitation method, for photocatalytic applications. Characterization of the synthesized powders were done using X-ray diffraction (XRD), Fourier transmission infrared spectroscopy (FTIR), energy dispersive spectroscopy (EDX), scanning electron microscopy (SEM), UV Visible spectroscopy (UV-Vis), and Photoluminescence spectroscopy. The XRD results revealed successful doping of Sr in MnO and nanoparticles average crystalline size. FTIR spectra of synthesized samples confirm the presence of functional groups. EDX (energy-dispersive X-ray) spectroscopy confirmed the presence of strontium (Sr) in the host lattice. The band gap decreases as the concentration of Sr increases; this was confirmed by UV-Visible spectroscopy. The PL spectrum reveals surface defects and oxygen vacancies. Then the prepared nanoparticles were used to remove the pollutants from the wastewater by degrading Methylene blue dye (MB).

Keywords: Nanoparticles, Sr doped MnO, X-ray diffraction, Fourier transmission infrared spectroscopy, Scanning electron microscopy, Photoluminescence spectroscopy.

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Design NiAl LDH/ NiO doped Co nanocomposites with enhanced photocatalytic performance of Malachite Green under visible light

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Abstract:

Magnetic composites of NiAl layered double hydroxide (LDH)/NiO doped Co were effectively created through hydrothermal procedure. Comprehensive characterization of these newly samples was conducted using X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), field emission scanning electron microscopy (FE-SEM), and transmission electron microscopy (TEM). The size nanoplatelets of NiAl LDH and NiO doped Co nanoparticles around 20 nm. These composites, specifically the NiAl LDH/ NiO doped Co photocatalyst, were used to break down Malachite Green in a water solution under visible light exposure. The results demonstrated that this photocatalyst outperformed the pure NiAl LDH, with the degradation rate of the NiAl LDH/ NiO doped Co composite being 4 to 7.2 times faster than that of the NiAl LDH/NiO and pure NiAl LDH, respectively. The enhancement in photocatalytic activity was attributed to the introduction of NiO doped Co nanoparticles. These nanoparticles effectively expedite the separation of charge carriers and augment the optical absorption attributes, thereby enhancing the photocatalytic process. Moreover, the NiAl LDH/ NiO doped Co photocatalyst exhibited magnetic separation capability and stable catalytic activity, making it well-suited for practical applications.

Pharmaceutical Sciences and Biological Sciences

A Short Analysis of the Latest Trends, Impending Obstacles, Modern Synthetic Approach, Structure Activity Relationship, And Biological Activities of Benzimetazole

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Abstract:

Formic acid and o-phenylenediamine are combined to yield the benzimidazole, which is available for purchase. N-riosyldimethylbenzimidazole, which serves as an axial ligand for cobalt in vitamin B12, is the most prevalent benzimidazole compound in nature. It is essential that benzimidazole and its derivatives, which can be found in anthelmintic and antiulcer medicines, have therapeutic qualities. Additional pharmacological effects of the benzimidazole derivatives include antibacterial, antiviral, anticancer, anti-inflammatory, and analgesic activities. To educate readers on the chemistry and pharmacological characteristics of the substituted benzimidazoles, this article provides a summary of those compounds.

KEY WORDS: O-phenylenethiourea, benzimidazoles, anti-inflammatory drugs, and anticoagulants**.**

Neuronal remodeling due to chronic mild stress and after stress removal in hippocampal of chicks

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Abstract:

Several studies reported that the avian hippocampal complex plays an important role in learning, memory, and cognitive functions. The dorsomedial surface of the cerebral hemisphere is occupied by the hippocampal complex, it comprises two main subfields, the hippocampus proper and the parahippocampal area. The main objective of the present study was to evaluate the neuronal remodeling due to chronic mild stress and after chronic stress removal in 8-week-old chicks (*Gallus gallus domesticus)* through the Golgi-Cox technique. In this study, we observed three main neuronal cells such as multipolar, pyramidal, and stellate neurons with dendritic spines (i.e., filopodia, stubby, thin, and mushroom-shaped spines). The dendritic field of the multipolar, pyramidal, and stellate neurons depict significant decrease due to chronic mild stress, whereas, after chronic stress removal in all neurons shows significant increase was observed. The spine density of all neuronal cells depicts significant decrease due to chronic mild stress, but after CSR significant increase in 8-week-old chick was observed. The present study concludes that the environmental changes and even slight modifications in the natural stimuli encountered by the animal must affect their hippocampal region which continuously shows neuronal plasticity/ remodeling such as increased dendritic arborization, spine density, and dendritic branching.

Keywords: Neurons, Chronic mild stress, spines, Dendrites, Golgi-Cox

Medicinal Plant Aloe vera: A Review

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Abstract:

A thin, short-stemmed shrub called aloe vera holds water in its leaves, is a medicinal plant.It is the most used and oldest known medicinal plant. Aloe vera extracts are known for treating skin damage. Aloe vera's antibacterial effects ease itching and skin swellings, and it helps to cure burns, skin irritations, wounds, and insect bites. It is well recognized to actively repair the damaged skin cells that create visible signs of aging and can help slow down the growth of wrinkles. Aloe vera is a natural detoxifier, antibacterial, antiviral and nervous system tonic,by improving the immune system. Aloe vera helps digestion, based on research, when added to a healthy diet, it acts as a booster for general health. A wide variety of vitamins are present in aloe vera gel, including vitamin A, B-complex, C, and E. 19 of the 20 amino acids required by the human body and seven of the eight essential ones that are simply not accessible are present in aloe vera gel, which is an important component. Due to presence of huge number of bioactive components it is used to treat a wide range of diseases like: disordered related to digestive system, injuries including burns, wounds, and skin disorders, inflammatory bowel disease, non-ulcer dyspepsia, gastric and duodenal ulcers, pre- and postmenopausal women, as well as in cases of osteoporosis and post-operative patients, it is a healthy supplement. Pharmacologically, it improves immunity and clean the body. Drug-induced gastritis is an inflammation of the stomach lining that can be caused by certain medications, such as nonsteroidal anti-inflammatory drugs (NSAIDs), antibiotics, and chemotherapy. Aloe vera treated symptoms such as nausea, vomiting, stomach pain, and loss of appetite with NSAIDs.

Keywords: Anti-inflammatory, anti-microbial**,** gastro-intestinal.

Haemoglobin value and RBC count observed in rural and urban community of District Srinagar, U.T. J & K

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Abstract:

The present cross-sectional study was undertaken among the Rural and Urban community of District Srinagar. The study was used to analyse the Haemoglobin value and RBC count in both males and females of different age groups. In this study 315 males and 419 females were examined with age group of 10 years to >60. The demographic results of Haemoglobin value showed mean 14.2 to 12.3 in males and 9.8 to 12.2 in females while as mean of RBC Count was 4.75 to 6.0 in males and 4.03 to 5.6 in females. The haemoglobin value and RBC count was less in females as compared to males due to factors such as lifestyle, work culture, diet, and access to healthcare. This study helps us to indicate the prevalence of Anemia and Polycythaemia in the region.

Keywords: Haemoglobin, RBC Count, healthcare, Anemia, Polycythaemia

Role of Artificial Intelligence in Combating Mental Health

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Abstract:

Artificial Intelligence can be defined as the ability of machines such as computers to fulfill a task which is usually done by humans because they require human intelligence such as analytical thinking and problem-solving. AI is increasingly used in healthcare field at its peak such as oncology, dermatology and many more. However, the use of AI in mental healthcare and neurobiological research has been the modest. Mental health is the person's psychological and emotional wellbeing in order to attain healthy life. The global burden of mental illnesses accounts for 32% of years lived with disability, making mental illnesses the first in global burden of disease [1] Mental health challenges have increased in recent decades with a rise in deaths, suicides, substance addictions. AI-driven tools can use digitized health-care data – available in a range of formats including electronic health records, medical images and hand-written clinical notes–to automate tasks, support clinicians and deepen understanding of the causes of complex disorders. [2] The Following Paper Mainly focuses on the mental issues that are resolved with the help of AI

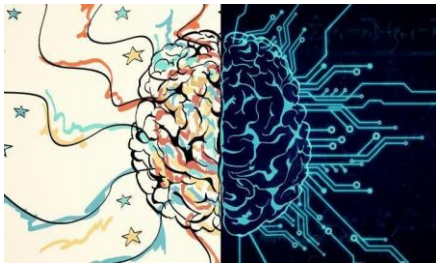

Fig. Technology with Mental Health

Keywords: Problems Solving, Disability, suicides, Addiction

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Determination of Myxozoan parasites in *Schizothorax richardsonii* (Gray) from Bhilangana River system, Uttarakhand.

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Abstract:

Fish provide a significant contribution to the economic growth of rural communities in addition to being an excellent source of protein, vitamins, minerals, and unsaturated fat. (1) The production of fish, both in the wild and in aquaculture, is significantly affected by a wide variety of environmental and biological conditions, such as water pollution, the occurrence of natural catastrophes, the building of dams, and pathogens. Fish are susceptible to a wide variety of illnesses brought on by a wide variety of pathogens, such as bacteria, viruses, fungi, and parasites, that co-exist and live simultaneously with the fish. (2) The aquatic environment is home to a wide variety of parasitic pathogens, one of which is the myxozoan, which has been identified as a potential threat to the growth of fish, which in turn can have a negative impact on fish health and even result in the fish's death. The fish are infected with this parasite, which leads to extensive damage to their gill epithelium, skin, and other organs. The severity of the harm caused by this parasite is proportional to the level of infection; a fish that is just mildly infected would display few symptoms, while a fish that is severely infected may develop physiological impairments or even pass away. (3) The morphological features will be measured using a calibrated ocular micrometer. The results of the current research reveal the presence of the parasite *Myxobolus* sp. in the gills of *Schizothorax richardsonii* (Gray) in Uttarakhand.

Keywords: Schizothorax richardsonii, Myxozoans, Myxobolus sp, Uttarakhand

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Impact of 14-3-3β protein in ovarian function during normal and PCOS Pathogenesis

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Abstract:

The molecular mechanism through which anovulatory condition develops in polycystic ovary syndrome (PCOS) patient remain largely speculative. A recent proteomic study showed altered 14-3-3 protein expression in the ovary of bat showing PCOS like features [1]; however, the potential role of 14-3-3β in inducing PCOS like features have not so for been studied. Thus, the objective of the present study was to evaluate the potential role of 14-3-3β in letrozole induced PCOS mice. This study showed a significant increase in the concentration of 14-3-3β in serum and ovarian tissue in letrozole induced PCOS mice. The circulating concentration of 14-3-3β showed a positive correlation with circulating testosterone, which indicate the role of 14-3-3β in the altered testosterone synthesis. In order to evaluate the direct effect of 14-3-3β treatment on ovarian function an *in-vitro* study was performed. The 14-3-3β treatment leads to a significant increase in expression of StAR, 3-βHSD, and 17β-HSD while decreasing the expression of aromatase, leading to increased androgen production. *In-vivo* study showed a positive correlation between circulating level of 14-3-3β with the circulating level of insulin in letrozole induced PCOS mice. In relation to that, *in-vitro* treatment of 14-3-3β inhibits insulin receptors expression in a dose-dependent manner, indicating their possible insulin resistance involvement [1, 2]. Further, adult mice ovary treated with different dose of 14-3-3β protein showed a significant increase in cell proliferation (PCNA), survival (Bcl2), and decrease in apoptosis. This finding supports the involvement of 14-3-3β in prolonging cell survival and developing anovulatory condition along with other factors [1]. Thus, it is hypothesised that 14-3-3β as a novel biomarker of PCOS pathogenesis and molecular intervention may be a promising therapeutic strategy for PCOS treatment.

Keywords: PCOS, Testosterone, Insulin, Aromatase, Steroids

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A Review: Indian Medicinal Herbs with Potential Wound Healing Activity

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Abstract:

Mending is component that is endurance speaks to an endeavor to keep up typical anatomical structure and capacity. In most recent couple of decades, there has been an advancement that is extraordinary understanding the biochemical and cell occasions of typical injury mending. Wounds are certain occasions throughout everyday life. Wounds may emerge because of physical substance or specialists that are microbial. All the Traditional frameworks of medication, Ayurveda, Siddha and Unani depict utilizations of medications of plant, mineral and creature point that is starting treat and mend wounds. Home grown medications instigate recuperating and recovery of lost tissue by number of instruments. Because of their conventional appropriateness, moderateness and security plants increased a presumed position in the realm of wound administration and fix proof that is however logical their injury recuperating possibilities are not many. Plants and their concentrates have tremendous potential for the treatment and administration of wounds. The phyto-prescriptions for wound recuperating are not just cheap and affordable but are also purportedly safe as hyper reactions that are sensitive rarely encountered with the use of these agents. The review that is present an attempt to highlight various Indian ethno-medicinal plants which are to be scientifically proved for the treatment of wounds. Beside this review also emphasis on normal wound healing process, pharmacological activities and role of plants in wound management and parameters used to assess wound healing.

Keywords: Wounds healing, Phytoconstituents, Natural Herbs, Active Constituents.

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Recent Progress In Cancer Treatment: Insights Into Tumor Microenvironment Modulation Strategies

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Abstract:

This comprehensive review delves into diverse modalities of cancer treatments, with a primary focus on a meticulous analysis of the intricate tumor microenvironment and its recent therapeutic implications across various malignancies. Historically, oncological interventions primarily centred on neoplastic cells, encompassing approaches such as surgical resection, radiation therapy, chemotherapeutics, and immunomodulation, all directed towards the highly proliferative mutant tumor cell population. However, contemporary research has progressively shed light on the pivotal role of the tumor microenvironment, encompassing non-neoplastic constituents within the tumor milieu. This dynamic interplay has provided profound insights into the behaviour and responsiveness of cancer cells to therapeutic interventions. The tumor microenvironment, comprised of a complex milieu including fibroblasts, immune cells, and vascular elements, as well as the panoply of proteins emanating from these cellular participants, profoundly influences the growth trajectory of malignant cells. Monitoring the evolving molecular and cellular landscape of the tumor microenvironment during disease progression assumes paramount importance in delineating potential targets for therapeutic intervention and cancer prevention strategies. The intricacies of this interplay hold the key to unlocking novel avenues for efficacious therapeutic interventions and prognostic assessments.
KEYWORDS: Cancer, Tumor, Tissue microenvironment, Therapeutic applications.

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Population Dynamics and Histopathological Infestation due to Helminths parasite in some Fresh Water Edible Fishes

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Abstract:

Fishes make up a sizable group of creatures that are frequently cold-blooded and proliferate in freshwater and saltwater. Most individuals get their jobs and most of their money from fishing. Humans rely heavily on fish as a resource. Being a great source of proteins, they are used widely, notably as food. Bacteria, viruses, fungus, and parasites are the root of several diseases that affect fish. The parasitic diseases in fishes are caused by protozoans (ichthyophthiriusiasis and trichodinasis), flukes (Diplostomid and black spot disease,); cestodes (Bothriocephally disease, and eubothriosis) and parasitic nematodes (Ascaridatoses andspiruratoses). The parasite Helminths has a distinctive globular scolex with 36–38 single circular hooks that are utilised to attach the worm to the intestine and gills of the host Clarius batrachus. It has been noted that the Helminth parasite attached to the mucosal, sub-mucosal, and muscularis mucosa of the intestine in Clarius batrachus' intestine and gills, invaded deeply, formed a cyst-like structure, and formed a pad for invading and sucking the content in the region of villi. This parasite slowly damaged the host's intestinal villi.

Keywords: Parasite, Infestation, Gills, Intestine, Histopathological

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A Toxicological Study on Seed Extracts of *Asparagus Racemosus* Linn (Ethanolic and Water) in Experimental Animals

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Abstract:

The study investigated the in-vivo oral acute toxicity and in-vitro cytotoxicity (Neutral red assay (NRU) by Aqueous and Ethanol extract of Asparagus racemosus Linn seed. In this in-vivo study, water extract was found to be more toxic to zebrafish. The medium lethal concentration (LD50) values of water and ethanol extract were 1070.8 mg/L and 1822.4 mg/L respectively for 96 hours of exposure. The correlation coefficient of water and ethanol extract were 0.972 and 0.9829 for linear regression curves between extract concentration and death percentage. In the study also 50% to 100 % mortality was observed with 968mg/L and 2129.6 mg/L water extract, whereas only 28.57% and 57.14% mortality were observed for ethanol extract in the same concentration range. The lower concentrations, such as 90.90 mg/L, 200mg/L and 440 mg/L having no mortality, were considered safe for zebrafish. In in vitro study (NRU assay) on the SH-SY5Y cell line, the same trend was observed where water extract was found to be more toxic to the cell line. The results indicate that 43% of cell death was caused by Ethanolic extract at 500 µg/ml concentration. Hence, the IC50 value was found to be 562.1 µg/ml, whereas approximately 52% cell inhibition was recorded at only 100 µg/mL of aqueous extract. Hence, the IC50 value was found to be 114.7 µg/ml for aqueous extract. Both studies showed that the ethanol extract was less toxic, hence more effective compared to the water extract.

Keywords: Neutral red assay, *Asparagus racemosus*, SH-SY5Y cell line, Aqueous and Ethanol extract.

Nanoparticles based drug delivery system in cancer therapy

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Abstract:

Nanotechnology has been extensively studied and exploited for cancer treatment as nanoparticles can play a significant role as a drug delivery system. Compared to conventional drugs, nanoparticle-based drug delivery has specific advantages, such as improved stability, enhanced permeability, biocompatibility, high retention time, greater bioavailability of chemotherapeutic, protect from harsh gastric environment and precise targeting with surface modification, controlled release as well as overcoming cancer-related drug resistance. Variety of nanoparticulate drug delivery system has been explored, extensively used in cancer therapy.

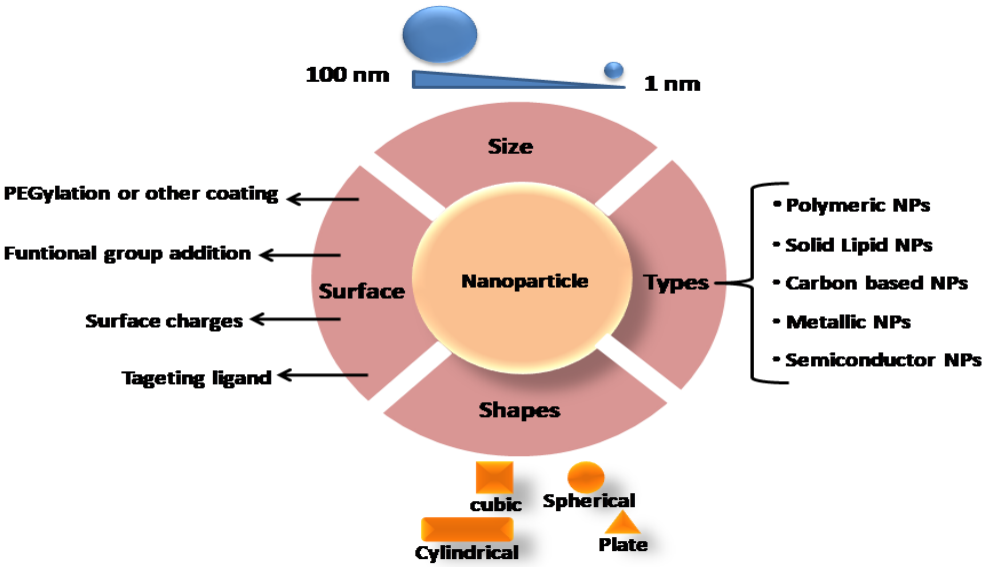

Figure: Representation of nanoparticle drug delivery system

Keywords: Nanoparticles, cancer therapy, drug delivery, controlled release.

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Nanotechnological Approach to Combat Microbial Biofilms

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Abstract:

In microbiology and medicine, targeting microbial biofilms is a crucial field of study and application because biofilms aid in the development of antimicrobial resistance providing microorganisms with a protected environment that makes them less sensitive to conventional antibiotics. In order to effectively targeting microbial biofilms research in this area is ongoing, and novel tactics are being investigated such as: Biofilm-Targeted Antibiotics, Enzymes and Biofilm Dispersal, Quorum Sensing Inhibition, Physical Disruption, Surface Modification, Bacteriophages, Biological Approaches. These approaches have shown promise *in vitro*, their effectiveness *in vivo* is still uncertain. Various challenges, including the potential interactions with host proteins, the persistence of functionality in biological fluids, and the unintended consequences of bacterial killing, must be considered. Additionally, issues related to the stability, deterioration, dissolution of coatings and ensuring a non-adverse host response to the coatings are critical for their successful clinical application. This study discussed advancements in nano- and chemical engineering to create innovative materials and strategies for preventing, disrupting, and treating microbial biofilms. These approaches hold the potential to address the persistent challenges posed by biofilm-related infections and improve the efficacy of treatments.

Keywords: Microbial Biofilms, Antimicrobial resistance, Nanotechnology, Extracellular polymeric substance (EPS), Nanoparticles

Clinical Trials

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Abstract:

Clinical trials are research studies that aim to determine whether a medical strategy, treatment or device is safe for use or consumption by humans. In ancient time. The first clinical trial of a novel therapy was conducted accidently by the famous surgeon Ambroise Pare in 1537. Generally, first controlled clinical trial in modern era was done by James Lind. In India the first clinical trial was performed in 1995. India agreed to comply with the TRIPS Agreement in 2005. In 2019, the passage of the new drugs and clinical trials transformed the clinical trials ecosystem in India. There are four phases in clinical trials. Clinical trials are a type of research that studies new test & treatment & evaluate their effects on human health outcomes.

Keywords: Clinical Trial, History, Phases, Medical strategy.

Investigation of ethnopharmacological, phytochemical and pharmacological aspects of Thymus vulgaris Linn.

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Abstract:

Thymus vulgaris Linn., an herb originating from Southern Europe, has been valued for its medicinal and culinary uses for centuries. It has been recognized since ancient Egyptian times for its numerous health benefits, including its ability to combat infections, protect the heart, support gastrointestinal health, reduce inflammation, and modulate the immune system. T. vulgaris L. has been reported to exhibit various pharmacological effects such as antibacterial, antioxidant, anti-inflammatory, antiviral, and anti-cancer properties. Aim of this abstract is examined and present the existing information on the plant's phytochemistry, ethnopharmacology, pharmacology, and toxicology. The evaluation of different plant extracts and essential oils derived from T. vulgaris L. has revealed their potential in treating conditions such as microbial infections, inflammation, non-communicable diseases like cancer, as well as sexually transmitted diseases like HIV-1 and Herpes. The review of literature has also highlighted the utilization of volatile oils, phenolic acids, terpenoids, flavonoids, saponins, steroids, tannins, alkaloids, and polysaccharides in the field of pharmacotherapy. These compounds have shown promising applications in various therapeutic areas, including diabetes management, Alzheimer's prevention, cardiovascular protection, neuroprotection, hepatoprotection, osteoporosis prevention, sedation, immune modulation, antioxidant support, skin lightening, muscle relaxation, pain relief, gastrointestinal protection, seizure control, blood pressure regulation, mood enhancement, memory improvement, and treatment of parasitic infections. Moreover, considering the existing research gaps, recommendations have been made to systematically investigate T. vulgaris L., with the goal of developing plant-based medications and nutraceuticals, as well as assessing their clinical efficacy and safety.

Keywords: Thymus vulgaris, Antioxidants, Anti-cancer.

"Boon plant Calendula officinalis Linn. (CO): An Investigation, Ethnopharmacological, phytoconstituent review''

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Abstract:

Calendula officinalis, also known as English Marigold or Pot Marigold, is a renowned medicinal plant from the Asteraceae family, used for millennia. It is an aromatic herb widely used in Ayurveda; a traditional medicine system due to its ethnomedicinal significance. Calendula officinalis extract has various therapeutic properties, including antihyperlipidemic, cardiovascular, antidiabetic, hepatoprotective, anthelmintic, antioxidant, anti-inflammatory, wound healing, anticancer, hepatoprotective, antibacterial, and anti-HIV activities. It has been traditionally used in herbal remedies for treating skin tumours, dermatological lesions, ulcers, swellings, and nervous disorders. This abstract explores phytochemistry, ethnopharmacology, pharmacology, and toxicology, including its morphology, microscopy, phytoconstituents, pharmacological reports, phytochemistry and toxicology. of the prominent species of *Calendula*. Calendula officinalis extract, C officinalis flower, extract, flower oil, and seed oil are cosmetic ingredients derived from the plant. These ingredients contain minerals, carbohydrates, lipids, phenolic acids, flavonoids, tannins, coumarins, sterols, steroids, monoterpenes, sesquiterpenes, triterpenes, tocopherols, quinones, amino acids, and resins. Chemical analysis reveals a vast range of chemicals, including amino acids, triterpenoids, quinones, flavonoids, volatile oils, and carotenoids. Some Calendula officinalis species have medicinal value, and a literature review highlights their utilization. Calendula officinalis is a valuable medicinal plant with numerous therapeutic effects, including antibacterial, antifungal, anthelmintic, antiviral, antioxidant, hepatoprotective, cardioprotective, wound healing, and treating gastrointestinal, eye, and skin diseases. The plant has the potential to be a significant medicinal resource for mankind. It exhibits anti-HIV, cytotoxic, anti-inflammatory, hepatoprotective and spasmolytics properties. The plant is used in almost 200 cosmetic formulations and has potential for further research. This review emphasizes the future scope of Calendula species, focusing on their multifarious biological activities and potential applications as medicinal agents. It fills gaps in existing research and provides opportunities for researchers to validate traditional claims and advance safe and effective use of CO in treating various ailments.

Keywords:

Calendula officinalis, Pot Marigold traditional medicine, Asteraceae, Phytochemical constituents, Pharmacological activities.

Emulgel: A New Approach For Enhanced Topical Drug Delivery

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Abstract:

Emulgel is topical preparation prepared by the combination of emulsion and gel. Emulgel is considered as one of the most important topical delivery systems because it consists of two release control system i.e., gel and emulsion. Emulgel usually have no side effects. Emulgel is used to treat pain caused by colds, headaches, muscle aches, back pain, arthritis and other diseases and injuries. The patient adherence to topical formulations is significant in relation to chronic skin diseases, like fungal infections, acne, psoriasis. Emulgel is a recent technology in Novel Drug Delivery System (NDDS) used topically having characteristics of dual control release i.e. emulsion as well as gel. There are various useful properties such as thixotropic, emollient, greaseless, easily spreadable, easily removable, water-soluble, longer shelf life, non-staining, bio-friendly, transparent and pleasing appearance. Several penetration enhancers can potentiate the effect of emulgel. Therefore, emulgel is considered as the most conventional systems available in market over other topical drug delivery systems.

Keywords: Emulgel, Gelling agents, Topical drug delivery.

Formulation And Evaluation Of Diethylcarbamazine Citrate Dispersible Film

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Abstract:

Objective: In this investigation, the primary objective is the formulation and evaluation of an oral dispersible film containing diethylcarbamazine citrate. This particular anthelmintic drug is well-known for its role as an inhibitor of arachidonic acid metabolism in microfilariae.

Introduction: Oral films are gaining popularity as a delivery system for active pharmaceutical ingredients. Among them, Fast-dissolving films offer advantages such as no risk of choking, and a pleasant mouth feel and can be administered orally, buccally, sublingually, and ocularly, providing fast as well as systemic effects.

Materials & Methods: These formulations consist of solubility enhancers, surfactants, polymers, film-forming agents, and other excipients, that help to increase the dissolution and solubility parameters of the drug. Hydrophilic polymers that rapidly dissolve in the tongue or buccal cavity facilitate the systemic circulation of drugs through contact with saliva. This allows the medication to bypass first-pass metabolism, resulting in increased bioavailability. The film's diethylcarbamazine citrate can effectively dissolve by the surfactant, allowing for buccal and sublingual absorption. The mouth-dissolving film of diethylcarbamazine citrate was prepared using the solvent-casting method in this study.

Results and Conclusion: The developed film is specifically designed for individuals who have difficulty swallowing, such as paediatric and geriatric patients. Various formulations were prepared by adjusting the quantity of the polymer (HPMC) and plasticizer. The fabricated films exhibited appropriate thickness, folding endurance, weight variation, tensile strength, and disintegration time. In vitro release studies indicated rapid drug release following first-order kinetics. The results demonstrated the anthelmintic potential of the diethylcarbamazine citrate-loaded films.

Development of Novel Drugs from Marine Surface Associated Microorganisms

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Abstract:

As marine covers more than 70% of earth surface though marine derived microbial natural products are still unexplored. These unique microorganisms from marine environment produces biologically active compounds (Bioactives). For example, marine surface associated microorganisms proven to be a rich source of novel bioactives used for human wellbeing like Cytarabine, Vidarabine, Ziconotide etc. Because of its necessety to evolve allelochemicals capable of protecting the producer from fierce competition between microorganisms chemical derived interactions are also important for the establishment of cross relationship between microbes and their eukaryotic hosts, where organism produces antimicrobial products that protects the host surface against over colonisation in return for nutrient rich environment. In general discovery, detection and characterization of marine microbial bioactives has been limited by number of obstacles like unsuitable culture conditions, lack of dereplication and tedious purification process however these limitations can be overcome by improved microbial cultivation techniques, microbial genomic analysis and novel sensitive analytical tools for structure elucidation. But here we discuss how these methods or technologies together with better understanding of microbial and chemical ecology are helpful to discover and to develop Novel drugs from marine microbial sources in future.

Keywords: Bioactives, Antimicrobial, Natural products, Allelochemicals

Physical Sciences, Renewable and Sustainable Energy

Solar Selective Absorber Surfaces for Solar Thermal Technology

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Abstract:

Solar energy is one of the most abundant renewable energy sources, which can be converted (i) directly into electricity using solar photovoltaic, and/or (ii) into thermal energy, which later can be used for numerous applications including electricity generation. The latter one is called as solar thermal technology, where Sun energy is concentrated onto a receiver for its maximum absorption with minimum thermal emission in the desired spectral range simultaneously for efficient conversion into thermal energy. An ideal spectrally selective absorber surface exhibits absorptivity "$\alpha \sim 1$" in the solar wavelength range and emissivity "$\varepsilon \sim 0$" in the infrared wavelength range to convert the entire incident solar irradiation into thermal energy, without any thermal loss. Thus, the development of such spectrally selective coatings is essential to meet the requirement. In addition, these coatings should withstand high operating temperatures and large thermal cycling, without any significant degradation in their solar thermal performance. In this conference I would talk about the design and development of reflector-absorber tandem spectrally selective coating structures for high temperature applications. These are based on Zr refractory material as a reflector in conjunction with ZrC-ZrN absorbers. The developed ZrO_x/ZrC-ZrN/Zr/substrates structures suggest that these coatings can be used upto 700ºC in vacuum on SS substrates and upto 200ºC in ambient conditions without any significant degradation in their solar thermal performance. The corrosion studies on these structures are carried out in 3.5 wt.% NaCl electrolyte solution and observed that these structures are highly corrosion resistance. The corrosion rate is ~ 0.000054 (mm/y), which is much lower, as compared to both stainless steel and copper substrates. These studies suggest that the developed ZrO_x/ZrC-ZrN/Zr structures may be used for high temperature applications under the adverse conditions such as saline environments [1-11].

Keywords: Solar Thermal Technology, Solar Selective Absorber Surfaces, Absorptance, Emittance

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Heterogenous Photo-Fenton activity of cadmium substituted copper Ferrites for the degradation of textile dyes

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Abstract:

The degradation of dyes from wastewater requires urgent consideration due to their potential hazards as pollutants. Advanced oxidation processes (AOPs) are highly effective methods for the degradation of pollutants and should be given considerable attention. In the present work, $Cu_{1-x}Cd_xFe_2O_4$ (x = 0.0, 0.50, 1.0) ferrite nanoparticles were synthesized by a facile sol-gel self-combustion method and were used as catalysts for toxic dye degradation by the photo Fenton process. The XRD was employed for phase analysis which revealed the cubic symmetry of the prepared samples. The surface morphology of $Cu_{1-x}Cd_xFe_2O_4$ ferrite powder was investigated by a field emission scanning electron microscope (FESEM). The optical bandgap of the material was calculated by UV-Vis spectroscopy and was found in the range of (2.7-3.5 eV). Magnetic measurements have been performed using Vibrating Sample Magnetometer (VSM) at ambient temperature under the applied field of +20kOe to -20KOe which showed the ferromagnetic behavior of the prepared samples. The charge carrier concentration of the prepared samples was calculated from the Mott-Schottky measurement. TRPL (Time-resolved photo luminescence) study was performed to calculate the recombination time (e^- and h^+) of the photocatalyst. The photo-Fenton degradation reaction on $Cu_{1-x}Cd_xFe_2O_4$ was performed excellently in the removal of Malachite Green and Crystal violet dyes. The $CdFe_2O_4$ showed a maximum degradation efficiency of 97% for malachite green and 90% for Crystal violet efficiency. Thus, the material is found to have the potential for the degradation of toxic dyes. The effect of scavenger and reusability was also investigated.

Keywords: Ferrites, Photo-fenton and VSM.

A study on generation of whistler wave instability by a gyrating electron beam in a plasma

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Abstract:

In the present paper, a new conceptual approach has been presented to investigate the phenomena of excitation of whistler waves with the help of gyrating electron beam in a plasma. The expression of growth rate and unstable wave frequency is derived using first order perturbation theory. For whistler wave propagating parallel to the magnetic field, only cyclotron resonance appeared, while for whistler waves propagating at an angle to the magnetic field both cyclotron and Cerenkov resonance appeared. The unstable wave frequency and growth rate is found to increase with increasing value of wave number and beam density. Also, it can be seen that a rise in growth rate is reported with increasing beam velocity. However, the growth rate declines with the increase in obliqueness of wave. The growth rate increases with increase in the value of the applied magnetic field in both Cerenkov and cyclotron interactions. The results presented in this manuscript may be applied to explain the mechanisms of the whistler wave excitation in space plasma.

Keywords: whistler wave, gyrating electron beam and Growth rate.

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Removal of Dyes using Iron Oxide (Fe_2O_3) under Visible light/UV light by Photocatalytic Activity: A Review

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Abstract:

Dyes are used for various applications ranging from the colouring of fabrics, texturing and colouring of food items and in the healthcare sector. Dyes and pigments are an integral part of the textile industry. Suppose the water containing dyes and pigments used in the industry is discharged into water bodies without proper treatment. In that case, some dyes and pigments which are toxic may deteriorate the environment. The present paper reports the removal of various dyes (rhodamine B, aniline blue, and methylene blue etc.) from water bodies, wastewater and other surface water sources with the help of iron oxide (Fe_2O_3) in its bulk and nano forms. The photocatalytic degradation of dyes such as rhodamine B, aniline blue, and methylene blue under visible light and UV radiation has been analyzed. It has been found that iron oxide in its nano form, irrespective of the process of synthesis, viz. green synthesis, sol-gel, solid-state reaction method etc., is more effective than its bulk form [1-3].

Keywords: Photocatalytic, Rhodamine B, Aniline Blue, Iron Oxide, Nanoparticle.

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An Exploratory Attunement on UVCs of $Al_{0.30}Ga_{0.70}N/GaN$ under Nanotechnological Science

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Abstract:

This foundational research letter's salient emphasis has been remained on an exploratory attunement of UVCs (Ultraviolet-gain Characteristics) of $Al_{0.30}Ga_{0.70}N/GaN$ nanoscale heterogeneous structure under nanotechnology and nanoscience. Taking into account effective mass theory, an enhanced k.p theory has been used to compute the different types of emerging ultraviolet gain parameters. Further, in the present research, the intensity performance of UV-gain spectra with UV-photon's wavelength of $Al_{0.30}Ga_{0.70}N/GaN$ has been studied at neutron irradiation fluence of ($5.72\times10^{11}cm^{-2}$). On account of neutron irradiation fluence of (5.72×1011 cm-2) the potential height of barrier nanoscale layers is gradually extended, hence the occurrence of leakage loss of electrons is obtained in diminished order as a consequence intensity of UV-gain is obtained in enhanced order. Thus this enhancement of intensities of spectra of UV-gain (in cm-1) has been obtained in the wavelength range 185 nm to 383 nm. However, in the exploratory observations, the value of UV gain intensity (~ 3650 cm-1) has been achieved at the UV-photn's wavelength ~ 254 nm. This UV light of wavelength ~ 254 nm has not only played a crucial role for disinfection applications in today's life but this UV-wavelength ~ 254 nm can also be utilized in the advanced purification to disinfect the surfaces, air and water by eliminating the typical viruses, bacteria and harmful contaminants. Moreover, UV-light of wavelength ~ 254 nm can also be used in recent life for various processes like Biochemical-Testing, Mercury-Detectors and DNA-Analysis etc.

KEYWORDS: UV-gain, Peak UV-gain, k.p theory, Nanoscaled heterogeneous structures, BT, MDs, AlGaN, GaN.

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Catalyst free Synthesis of Compact and Uniform Hexagonal Zinc Oxide (ZnO) Nanorods

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Abstract:

The optoelectronics' last decade is a witness of the Importance role of nanorods and nanowires of ZnO, as it has high exciton binding energy generally prerequisite for the growth of nanowires. In the present work the Compact and Uniform ZnO nanorods were grown using nontoxic, catalyst-free method. Zinc acetate based precursor was prepared at room temperature and followed by annealing at 200°C, 400°C and 600°C in air for one hour. We had optimized Annealing time to grow well oriented nanorods of ZnO. Visual inspection suggests the complete non-stickiness and well crunched appearances. Internal crystal structure observed by X-ray diffraction, that reveals the complete (002) oriented growth at 600°C. At and below 400°C elaborated the traces of mixed (ZnO and Precursor) and precursor, respectively. Surface morphology by Scanning Electron Microscopy agrees well with the diffraction data. Sample annealed at 600°C clearly reveals the uniform Zinc Oxide hexagonal (c-axis oriented) nano-rods of the size of ~ 0.25-3.0 μm. Below 400°C, the morphology contains the no uniform and spiky morphology. Raman spectra also confirms the emerging of ZnO phase, having100 cm^{-1}, 331 cm^{-1} and 436 cm^{-1} vibrations, from and after 400°C. The intensity of these vibrations were improved significantly at 600°C. Fourier transform infrared spectroscopy (FTIR) also confirms the formation of pure and stress free nanorods of ZnO. Ultimately, uniform and compactness growth of the hexagonal ZnO nanorods may be utilize in the fabrication of optoelectronics devices.

KEYWORDS: X-ray diffraction, Scanning Electron Microscopy, Nano-rods, Raman Spectroscopy.

Structural evolution of binary Neutron Stars embedded in $f(R, T) $ gravity under accelerated Universe

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Abstract:

The gravitational wave detection [1, 2] and recent discovery of some highly massive neutron stars [3, 4], has given us opportunity to culture the equation of state of the core nuclear matter of the compact stars in a new way. At the same time, it has imposed constraints on several macroscopic parameters related to the compact stars, like its mass, radius, tidal deformability etc. True knowledge and proper study on these macroscopic parameters, are very much needed to realize the microscopic properties and behavior of the core nuclear matter at very high density and pressure [5, 6].

In this work, we have studied various crucial parameters of highly massive neutron stars using $ f (R, T) $ gravity under the accelerated phase of the universe. We have chosen a few massive binary pulsars and investigated on maximum attainable mass and lowest possible radius before their collapse. We have considered Einstein-Hilbert action as $f(R, T) = R +\alpha T$, where R is the Ricci scalar and T, the trace of energy-momentum tensor with α as the coupling parameter. The $M-R$ curve has given the maximum allowable mass and lowest possible radius for the massive compact stars under stable equilibrium. We have got a clear picture of structural evolution of massive neutron stars through accelerating space-time. It is depicted from our present investigation that all the derived outcomes are compatible with physically adopted regimes which reveals the viability of our current model in the context of $f(R, T) $ modified gravity.

Keywords: Modified $ f (R, T) $ Gravity, Massive Compact Stars.

Subject Classification: 98.80.-k, 04.50.Gh, 04.50.Kd.

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Dark Energy Accretion Study: A Three-Dimensional Dynamical System Approach

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Abstract:

To assess the dynamic evolution of an accretion disc surrounding a supermassive black hole, accretion scenarios resulting from the two distinct fluids, adiabatic and dark energy are considered. The dynamical structure of an accretion model is built using the components Navier-Stokes equation and the equations of state for these accreting fluids. This created accretion model is subjected to a dynamical system analysis. For two-dimensional examples, centre type equilibrium points are sketched out, and for analyses of three-dimensional dynamical systems, a curve of equilibrium points is found. To comprehend the appropriate dynamics of the accretion model, many zones are divided. Recognising the inner disc activity may also be useful with this sort of study.

KEYWORDS: Accretion disc, Dynamical Systems, Equilibrium points.

Risk assessment due to heavy metal contamination in drinking water of the Chakrata Region, Uttarakhand, India

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Abstract:

Understanding the contamination of groundwater by heavy metals is of paramount importance due to their resistance to biodegradation, propensity to accumulate in the food chain, and detrimental health effects. The detection of heavy metals in water bodies in India has raised significant concerns, primarily due to its radioactive nature and radiological risk. Prolonged exposure to uranium can result in the development of chronic lung diseases and nephrotoxic damage. This study endeavours to comprehensively assess the extent of groundwater contamination in Uttarakhand's Chakrata region, specifically addressing the presence of both heavy metals and uranium in the region. Atomic Absorption Spectrum (AAS) was used in the present research work. The mean concentration among selected heavy metals is obtained lowest for iron (-0.001 ppm) and highest was for chromium (0.71 ppm) respectively. In the present study, the risk quantities are well below the WHO guidelines.

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Metal Dopant Effects on Titanium Dioxide (TiO_2) Thin Films: An Overview

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Abstract:

Titanium dioxide (TiO_2) thin films have become a subject of intense research in recent years [1]. These films play a crucial role in sensitive devices, where their structural, optical, and electrical characteristics are of utmost importance [2]. To better understand the properties and applications of TiO2, relevant information from earlier studies has been presented [3]. The study investigates the impact of chromium doping on titanium dioxide (TiO_2) thin films [4]. The research reveals that as the doping content increases the band gap energy decreases [5]. The observed behaviors of the chromium-doped TiO_2 thin films holds potential for a wide range of sensitivity applications [6]. In conclusion, the study highlights promising indications for utilizing these materials in optoelectronic devices, photocatalytic systems, gas sensors, and solar cell passivation.

Keywords: Chromium-doped titanium dioxide, thin film coatings, Crystal structure, Nanostructure, Energy band gap.

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A Review of the Progress of CeO_2-Based Catalysts Applied for Air Pollution Abatement

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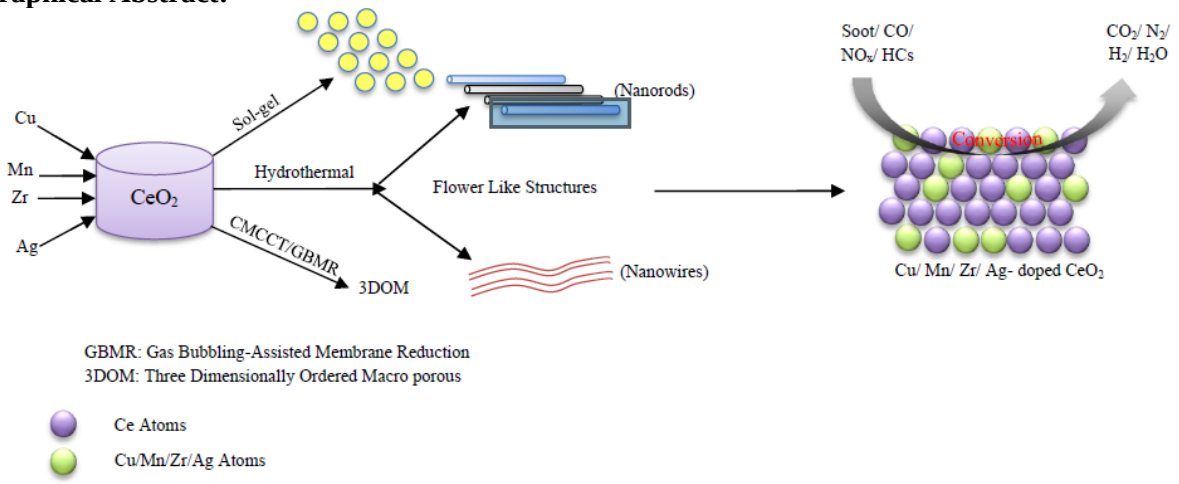
Abstract:
Massive emissions of gaseous pollutants have been produced due to the widespread use of fossil fuels in residential and commercial settings, posing a severe threat to the environment and public health. As a result, it is essential to create technology for cheap air purification; catalytic oxidation is one of the most promising options. Because of their superior redox ability, high environmental friendliness, surface binding flaws, and significant oxygen storage capacity, CeO_2-based catalysts with unique morphologies have drawn much attention. The valence state of the element, defect sites, and acid-base characteristics are also modulated by the morphologies of these catalysts. As a result, they have been widely used to cut air pollution. This review focuses on the creation and use of CeO_2-based catalysts with unique morphologies, including hollow, cubic, rod-like, and others outlined in this review. This has been followed by a thorough analysis of the benefits and workings of these catalysts in removing air pollutants. Finally, the difficulties in creating and using CeO_2-based catalysts with unique morphologies are discussed. We intend to serve as a resource for the design and synthesis of innovative CeO_2-based catalysts that will be used to reduce gas emissions.

Keywords: CeO2, Pollutants, Microstructure, Environment.

Graphical Abstract:



Schematic representation of synthesis of CeO_2 based materials and their activity towards pollution abatement. (Source: Mishra et al. https://link.springer.com/article/10.1007/s42247-021-00295-2)

CeO_2-based catalysts used as sunscreens: A Review

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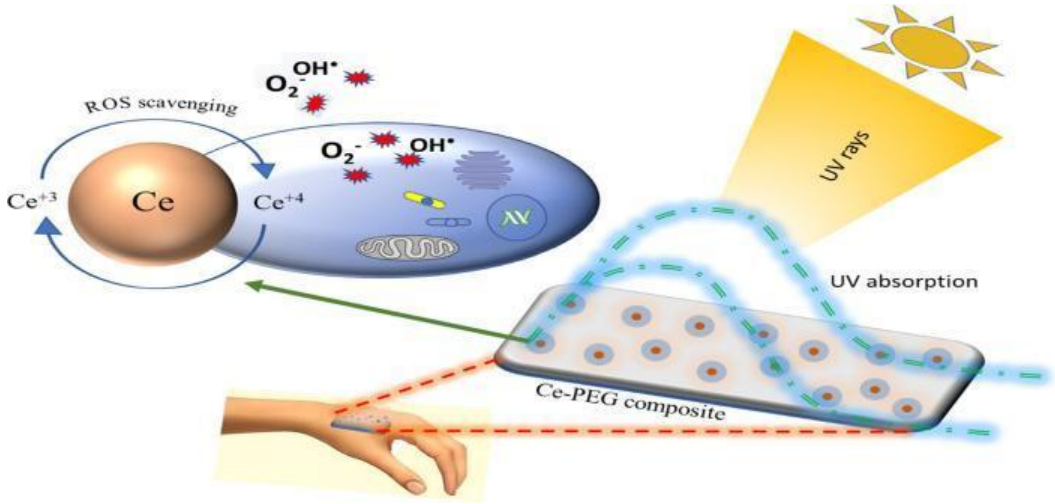
Abstract:
Researchers are working hard to improve the current sunscreen materials used in cosmetics to combat the rising danger of melanoma, sunburns, and premature ageing. Researchers are working to create appropriate substitutes based on inorganic oxides such as titanium dioxide (TiO_2) and zinc oxide (ZnO) because of skin irritability and photoinstability problems with organic filters. Despite the widespread usage of these inorganic oxide-based U.V. filters in sunscreens, their intense oxidation catalytic activity, photocatalytic ability, toxicity, and unsightly formulations have led researchers to hunt for alternate inorganic substitutes. Cerium oxide (CeO_2) based nanocomposites that contain CeO_2 are thought to be appealing in this direction. However, catalytic oxidation is the main factor preventing such composites from being used in commercial sunscreens. It is, therefore, crucial to conduct a detailed analysis of the efforts made by researchers to comprehend this CeO_2-based nanocomposite bottleneck. The primary focus of this review study is on the U.V. shielding properties of CeO_2-based nanocomposites and CeO_2. In particular, the methods used to date to maximise the usefulness of CeO_2-based nanocomposites as potential inorganic U.V. filters in commercial sunscreens over their most prevalent inorganic counterparts, namely TiO_2 and ZnO, are highlighted and stressed.
KEYWORDS: CeO_2, Cosmetic, Microstructure, UV-filter.

Graphical Abstract:



Schematic representation of antibacterial activity of CeO_2 nanoparticles on human skin (Source: Rehman et al. https://link.springer.com/article/10.1007/s10853-022-07437-9)

Molybdenum Disulphides for supercapacitor application: A mini review

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Abstract:
Supercapacitors has attracted the attention of scientific community towards alternative energy storage devices and technologies. It paves the way for a solution to the problem imposed by increase in global population accompanied by the global energy crisis. MoS_2 have been actively used as 2D electrode materials in supercapacitors (SCs), due to their layered structure or sheet like morphology, large surface area, tunable band gaps and variable oxidation states. We review the influence of structural and morphological characterization on the performance of supercapacitors based on MoS_2 as electrode material to unravels its further potential for energy storage application [1-3].

Keywords: storage devices, supercapacitors, 2D electrode materials

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Thermoelectric Properties of Metal Oxide Thin Film

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Abstract:

In this paper nickel oxide and aluminum doped zinc oxide thin films have been successfully deposited by using pulsed laser deposition technique and sol- gel method respectively. Two nickel oxide thin films have been grown at deposition pressures of 10 mTorr and 20 mTorr. Aluminum doped zinc oxide thin films have been prepared by doping 3% of aluminum in zinc oxide using Sol–gel method. The characterization of the prepared NiO_2 and Al: ZnO thin films have been successfully carried out by using X-ray diffraction (XRD) technique, UV Spectroscopy, and hall measurement.

The thermoelectric measurements have been carried out using in-house developed thermoelectric set-up. The seebeck coefficient for 20 mTorr and 10 mTorr nickel oxide thin films have been found to be the same as 0.018 mV/K [1-2]. The value of power factor 20 mTorr and 10 mTorr nickel oxide thin films have been estimated to be 0.00008424 $mWcm^{-1}K^{-2}$ and 0.0000312 $mWcm^{-1}K^{-2}$ and figure of merit has also been evaluated as 0.125 and 0.046 respectively. The value for seebeck3w coefficient has also been calculated for AZO thin film as 0.063 mV/K.

Keywords: Thermoelectric, aniline blue, nickel oxide, X-ray diffraction (XRD) technique.

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A Review of Theoretical Studies On One Dimensional Photonic Crystals

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Abstract:

The study of light-matter interaction has been one of the richest treasures of scientific discoveries. The study has provided newer insights into the properties of the materials, newer tools for investigating the material, novel insight into the nature of the light and hence of entire spectrum of physical world. One such tool of investigation is periodic multi-layer stack of dielectric materials. These stacks have been studied extensively since late nineteenth century and five decades ago, these investigations were given a fresh impetus and a new dimension by Yablonovitch and John who introduced the idea of multidimensional photonic crystal in 1987. Photonic crystals are a novel form of optical medium that may be represented by natural or manufactured structures that alter their refractive index frequently. These optical mediums have shown some remarkable characteristics and existence of a tunable band gap is one of them. It has been found that the photonic crystals have many applications in optical computing, integrated photonic circuits, and ultrahigh-speed information processing.

It has been observed that there are only a few examples of photonic crystals in nature. For research and practical applications, photonic crystals are to to fabricated artificially which is a challenge for material engineers. In such a situation, theoretical investigation of the properties of the photonic crystal structures becomes a tool of choice to predict and fine-tune the properties of the crystals so that material resources are optimally used in fabrication. This has made the theoretical investigation of the properties of the photonic crystals a thriving area of research. This chapter will investigate the present state and directions of theoretical investigation in the properties of the photonic crystals. Focus will be on the various mathematical techniques employed in various structures and their relative advantages, the areas of application of photonic crystals, types of photonic crystals which are in prominence in research.

Graphene -coated Surface Plasmon Resonance (SPR)- based sensor for Detection of Preservatives in Milk: A Theoretical Investigation

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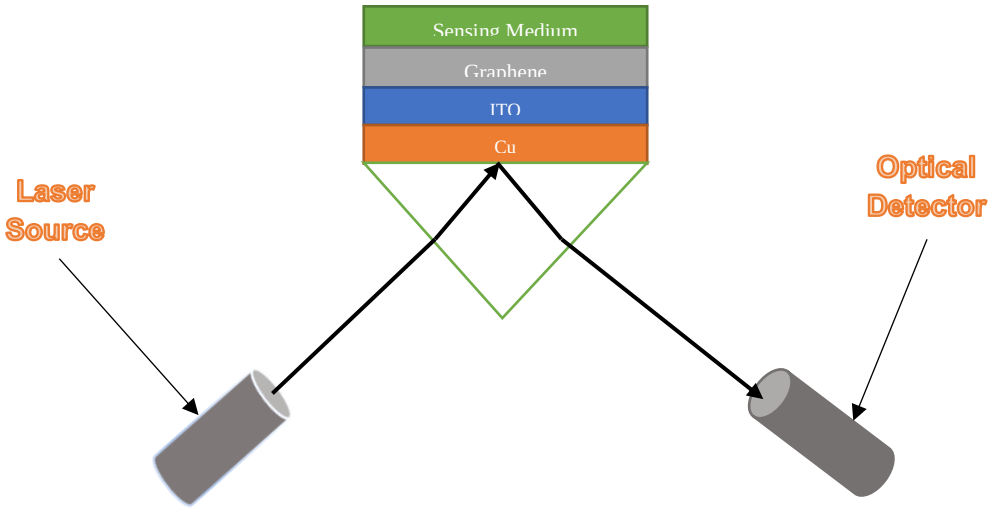
Abstract:

Milk is a necessary need for human life. Different types of pollutants and impurities, such as preservatives that exist in milk may cause serious health issues, and affect the body. Monitoring pollutants and impurities, such as preservatives, in natural and everyday foods has been a key focus to assure safety and thus boost food quality. In this study, the SPR technique is utilized to theoretically investigate preservatives such as hydrogen peroxide, formaldehyde, and sodium carbonate in milk. The concentration of the preservatives in the milk change between 0% to 14.3% while the refractive indices occur between 1.34550 to 1.35093 for the minimum (0%) and maximum (14.286%) concentrations of hydrogen peroxide, formaldehyde, and sodium carbonate. To validate the proposed sensor, performance parameters including Sensitivity, FWHM, Figure of Merit (FOM), and Detection Accuracy (DA) are also calculated for each case.

Keywords: Surface Plasmon Resonance, Copper, Indium Tin Oxide (ITO), Graphene, Sensitivity



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Study of strain-induced electronic band structures in MoS2 monolayer using DFT and DFT+U

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Abstract:

In this study, we examine the electronic band structures, structural characteristics, and elastic properties of monolayer MoS_2 subjected to biaxial stresses. To do this, we employ both Density Functional Theory (DFT) and DFT+U techniques. Observation of biaxial strain leads to notable alterations in bond lengths, bond angles, electronic structures, and the effective mass of both electrons (m_e^*) and holes (m_h^*). The bulk modulus is subject to variation as the tensile (compressive) biaxial strain is increased. The calculated band-gap values of unstrained 1L-MoS_2 are 1.78 (1.81) eV within the GGA (GGA+U) approximations, respectively. However, under the influence of strain, the direct band gap of 1L-MoS_2 ranges from 1.74 (1.76) to 1.92 (1.95) eV within a strain range of 0.3 (0.4) % tensile to 1.13 (1.11) % compressive stresses. Upon beyond the strain zone, the band gap's direct nature transitions into an indirect one, and subsequent increments result in a transition from a semiconductor to a metal. The manipulation of direct bandgap and the observation of reduced effective mass values for both electrons and hole carriers in strained monolayer MoS_2 suggest an augmentation of optoelectronic characteristics.

The Electrochemical Behavior of Metal Organic Framework

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Abstract:
Metal-organic frameworks (MOFs) have proven to be excellent templates to synthesize functional materials to be employed in the preparation of electrodes for supercapacitors. MOFs have emerged as a class of crystalline materials with a versatile range of applications due to their tunable porosity, high surface area, and diverse metal-ligand combinations. In this paper author explores the electrochemical behavior of MOFs and highlighting their potential in catalysis, drug delivery, and sensing. The unique structural properties of MOFs, coupled with their ability to be tailored at the atomic level, make them promising candidates for addressing challenges in areas such as energy storage and environmental remediation. There is lot of scope and future prospects of MOFs as multifunctional materials at the forefront of materials science.

Keywords: MOFs, Supercapacitor, Tunable porosity, Electrochemical behavior.

Enhancing Photodetector Performance by Suppressing Interface Charge Recombination in Solution-Processed Bulk Heterojunction Perovskite Photodetectors with PCBM Nanoparticles.

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Abstract:

Perovskite-based photodetectors have received a lot of interest in recent years because of their remarkable optoelectronic characteristics and prospective applications in integrated photonics, such as their long carrier diffusion length, dynamic band gap, and excellent crystallinity. But still, inherent unbalanced charge carrier transport in hybrid perovskite material limits device performance [1]. In this work, we discuss about solution-processed bulk heterojunction perovskite photodetectors. Nanoparticles of fullerene materials (PCBM) were introduced in $FAPbBr_3$ to form a perovskite bulk heterojunction, which is the active layer in bulk heterojunction photodetectors (PDs). When PCBM NPs are introduced to the perovskite precursor solution, the crystalline grains are distributed more uniformly and compactly throughout the film also we show that treatments with PCBM- $FAPbBr_3$ can leads an enhancement in photocurrent and a reduction in dark current in bulk heterojunction perovskite photodetectors. All of these findings indicate the feasibility of producing high- performance bulk heterojunction perovskite photodetectors [2]. Morphology; Formamidinium lead iodide; and Electrical properties. However, fast charge recombination at the perovskite interface, which leads in lower device performance, is one of the main obstacles impeding their practical application. analysis on reducing interface charge recombination to improve the efficiency of integrated perovskite bulk-heterojunction photodetectors in this paper.

Keywords: Bulk heterojunction; PCBM nanoparticles; Photo-response.

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Material characterization using Python based toolkit

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Abstract:

MAST-ML (Materials Simulation Toolkit for Machine Learning) is an open source Python-based software package designed to expand and accelerate the use of machine learning in materials science research. A simplified workflow for executing a multi-step machine learning model workflow is provided by MAST-ML, which provides predefined routines for many input setup, model fitting, and post-analysis tasks. We explain in this paper, MAST-ML streamlines and accelerates machine learning operations. Using a customized input file, we demonstrate how to execute different components of a supervised machine learning workflow, and showcase several features and analyses that are automatically collected during a MAST-ML run. Furthermore, we present examples of recent materials informatics studies which used MAST-ML to evaluate and formulate various machine learning models for a wide range of materials applications [1-3]. As a final note, we present a vision of how MAST-ML, along with complementary software packages and emerging cyber infrastructure, can help advance materials informatics, focusing on the production of machine learning models that are easy to develop, reproducible, and can be improved over time.

Keywords: Material characterization, Machine learning, toolkit, Google-colab, MAST-ML.

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Effect of High-energy Ball milling on density and microhardness of Al-FA-nanoCeO_2 hybrid composite

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Abstract:

Al-FA-nano CeO_2 hybrid composite were prepared by powder metallurgy process. pure aluminum powder (Al) with stoichiometric amount of CeO_2 nano powder (0.5, 1 and 1.5wt%) was subjected to high energy milling to achieve nanocrystalline aluminum particles. Milling was performed for 3 h. The high-energy milled Al-nanoCeO_2 powder was characterized using XRD and SEM. Subsequently, a hybrid composite powder consisting of Al-FA-nanoCeO_2 was prepared by ultrasonically combining a stoichiometric amount of FA (5 and 10 wt%) with high-energy milled nanocrystalline Al-CeO_2 powder using a sonicated bath. The powder was air dried and then compressed at a pressure of 200 MPa. It was subsequently sintered in vacuum furnace at two different temperature 500°C and 550°C for 60 min, and the green density and sintered density of the compacts were measured and compared with the theoretical density calculated using the rule of mixtures. The microhardness of the compacts was determined using the Vickers microhardness test. It was observed that aluminum matrix hybrid composite solid compacts prepared by powder metallurgy showed improved microhardness with the addition of FA and CeO_2 nanopowder as the reinforcing phases.

Keywords: Pure Al, nanoCeO_2, Powder Metallurgy, Hybrid composites, Microhardness.

First Principal Investigation of Half Metallicity in Double Perovskites with Cs_2GeXCl_6(X=Cr and Mn) for spintronics applications

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Abstract:

In this paper I have explored the electronic structure and half metallic properties in Double Perovskites with Cs_2GeXCl_6(X=Cr and Mn) type of structure using Density Functional theory (DFT). For the exchange -correlation energy, Perdew, Burke and Ernzerhof GGA (PBE- GGA) scheme is used. Most of the structural parameters like lattice constant, unit cell energy and optimized volume are calculated for the first time by using PBE-GGA Scheme. lattice constant is optimized with utmost accuracy to analyze the density of states and band structure with convergence criterion less than 10^{-4} Ry. The electronic band structure and density of states for both spin -up and spin -down was studied to predict the half metallic properties in these compounds. It was observed that the compound shows half-metallic nature with overlapping bands in one of the spin directions while the other spin direction shows semiconducting nature. This characteristic of these materials makes them a potential candidate for various spintronics applications such as multiple- state memory devices, microprocessors etc.

Keywords: Double perovskites, Density functional theory, Half metallic, Spin polarised calculations.

Fuel Cell Technologies: State-of-the-Art and Future Perspectives

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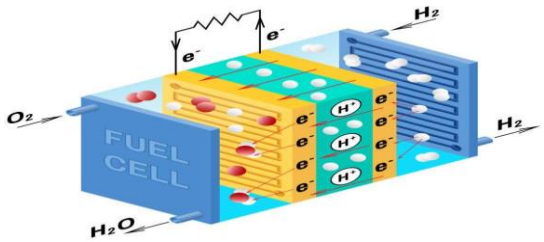
Abstract:

Fuel cell technology has captured significant attention due to its remarkable efficiency, eco-friendly characteristics, potential for generating cleaner energy, and capacity to replace traditional energy sources. These devices are created to turn chemicals into electricity in a clean and efficient way[1]. They now work better, last longer, and cost less. This paper gives a complete overview of the latest advancements in fuel cell technology[2]. It also highlights the significant developments in fuel cell architecture, materials, and how they are integrated into systems. It also discusses emerging trends and challenges in fuel cell technology, including advancements in electrocatalysis, system integration, fuel cell hybridization, and infrastructure requirements for commercialization.



Keywords: clean energy, electrocatalysis, fuel cell hybridization, commercialization.

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Edible Film Formation in Response to Increased Earth Pollution

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Abstract:

This abstract presents the concept of edible film formation as a response to the growing concern of pollution caused by plastic waste. Edible films offer a promising solution to enhance food quality and preservation in response to consumer demands. The films are formed from proteins, polysaccharides (chitaran, starch, and pectin), and lipids (such as Palm wax and fatty acids), which serve as abundant biodegradable resources. The research aims to develop edible films fortified with polyphenols for food packaging applications. The proteins undergo a maillard reaction, leading to crosslinks and interactions with polyphenols, resulting in the formation of Melanzidins that protect food from spoilage. This innovative approach finds application in various food products like cookies, bread, and roasted marshmallows [1].

Keywords: edible film, food packaging, pollution, maillard reaction, polyphenols.

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Redefining Renewable Source of Energy- Hydrogen Fuel – A Modeling and Simulation Approach

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Abstract:

One of the important challenges today is finding a clean energy, sustainable alternative to fossil fuels. Hydrogen can potentially become a vital component of a carbon free, climate future. Hydrogen is the most abundant element in the universe and is all around us, mainly in the form of water (H_2O) and fossil fuels, otherwise known as hydrocarbons. Today the focus has shifted towards a green and clean fuel that can be an alternative for the depleting fuels. Furthermore, hydrogen fuel can be promoted as a fuel for most of the transportation devices. One of the major advantages is reduction in the emission of the pollutants due to burning of the fuel. Thus, in near future one can observe engines, gas turbines, boilers and fuel cells, the creation of power and heat can be operated without with less CO_2 emissions. The proposed method emphasis the switching from fossil fuels to hydrogen using simulation approach. The present study deals with the hydrogen production methods with the help of modeling and simulation approach. The modeling and simulation facilitate the production methods with desired optimization of the parameters. A detailed study is performed using DWSIM software, that is open-source software. The objective of the proposed simulations is to perform the operations at low cost, eco-friendly approach.

Keywords: Renewable energy, Hydrogen, Fuel Cell.

Effects of site dilution on Compensation in Ising Spin-1/2 trilayered triangular Ferrimagnet with non-equivalent planes

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Abstract:

Using Monte Carlo simulations with the Metropolis algorithm, the magnetic and thermodynamic behaviours of a spin-1/2, trilayered ferrimagnetic system on triangular monolayers with quenched nonmagnetic impurities are studied [1]. Two different theoretical atoms, A and B, make up the ABA type of distinct configuration. Like atoms (A-A and B-B) interact ferromagnetically, while unlike atoms (A-B) interact antiferromagnetically. Only the A-layers are randomly site-diluted with dilution percentages ranging from 5% to 45%. Such diluted magnetic thin systems exhibit magnetic compensation which depends sensitively on the concentration of impurities. The phase diagram in the Hamiltonian parameter space related to the occurrence of magnetic compensation phenomenon and the effect of site dilution is discussed in detail. Special attention is given to the mathematical dependencies of compensation temperature on the concentration of nonmagnetic impurities. Depending upon the concentration of nonmagnetic impurities, the compensation and critical points shift with the equilibrium magnetic behaviors changing between distinct ferromagnetic behaviors. For each combination of the coupling strengths, with values of the impurity concentration above a threshold, compensation appears where previously was absent. Suggested mathematical formulae show how threshold impurity concentration relies on Hamiltonian parameters.

Keywords: Spin-1/2 Ising triangular trilayer, Quenched nonmagnetic impurities, Metropolis Monte Carlo simulation, Compensation temperature, Threshold concentration of impurities.

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Effect of Temperature on Dielectric Permittivity of Linseed

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Abstract:

In this study, the dielectric permittivity of Linseed was determined for the frequency ranging from 5 kHz to 5 MHz of applied electric field and temperature from 40°C to 60°C with a step size of 5°C by using a cylindrical capacitor sample holder. It was found that the relative permittivity- Dielectric constant and Dielectric loss factor were greatly influenced by temperature, affecting the dielectric properties of Linseed. When frequency increases, a decreasing trend was obtained for the Dielectric constant and Dielectric loss factor. A significant result was also found that on rising temperature, the value of the Dielectric constant and Dielectric loss also increases.

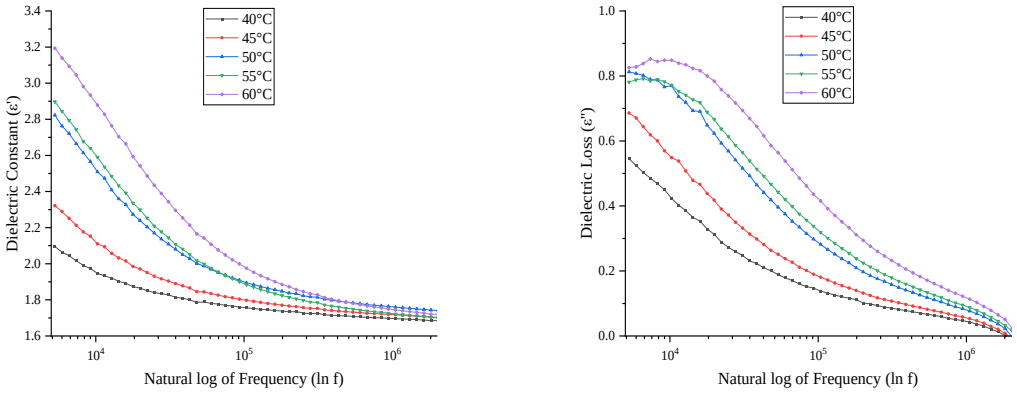

Fig (1,2): Variation of Dielectric constant and Dielectric Loss Factor at indicated temperature of linseed.

Keywords: linseed, dielectric permittivity, radio frequency, temperature.

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