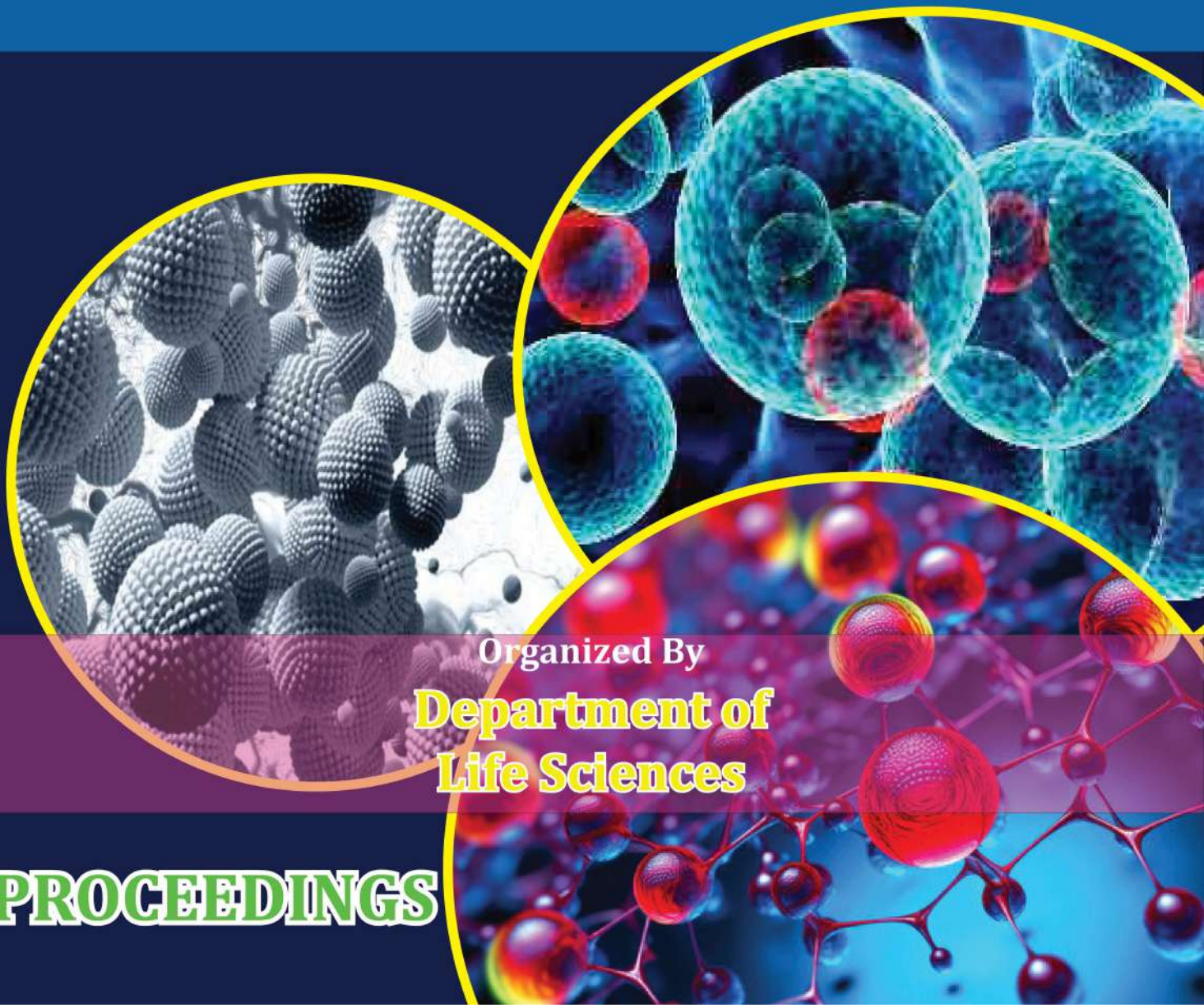
NATIONAL CONFERENCE ON ADVANCES OF NANOMATERIALS AND ITS TECHNOLOGICAL APPLICATIONS

APOLLO ARTS & SCIENCE COLLEGE

POONAMALLEE, CHENNAI -602 015

NATIONAL CONFERENCE ON

ADVANCES OF NANOMATERIALS AND ITS TECHNOLOGICAL APPLICATIONS



Organized By

Department of Life Sciences

PROCEEDINGS

APOLLO ARTS & SCIENCE COLLEGE

POONAMALLEE, CHENNAI -602 105.

NATIONAL CONFERENCE

ON

ADVANCES OF NANO MATERIALS AND ITS TECHNOLOGICAL APPLICATIONS

NBSC-2024

27TH MARCH 2024

ORGANIZED BY

DEPARTMENT OF LIFE SCIENCES

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National Conference on

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NBSC 2024

27TH MARCH 2024

Editorial Board

The abstracts in this book were submitted by participants of the National Conference. They were reviewed, evaluated by the editorial board committee and were accepted for Oral Presentations.

Organized by

Department of Life Sciences
Apollo Arts and Science College, Chennai, India

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APOLLO ARTS & SCIENCE COLLEGE

(Approved by the Government of Tamil Nadu and Affiliated to the Univerisity of Madras)
Mevaloorkuppam, Kattagaram, Valarpuram Post, Sriperumbudur (T.K.) Kanchipuram - 602 105.

PRINCIPAL MESSAGE

I am happy to note that our departments of LIFE SCIENCES are organizing a NATIONAL CONFERENCE on "ADVANCES OF NANO MATERIALS AND ITS TECHNOLOGICAL APPLICATIONS" scheduled on 27th March 2024.

I am hopeful that the deliberation of this National Conference would, in some way, serve as a vision document that would suggest solutions to the challenges faced in the fields of Nano Materials. I am happy to congratulate the respective department heads and faculties for making available yet another platform for the students, faculties and research scholars to learn and discuss about the information during the conference.

I wish the National Conference a great success!!

APOLLO ARTS AND SCIENCE COLLEGE CHENNAI 602 105 Poonamallee

PRINCIPAL

PRINCIPAL
Apollo Arts And Science College
Chennai-602 105

Admin office : Apollo Empire, # 35/16, Srinivasan Street, South Usman Road, T.Nagar, (Near Bus Stand)
Chennai - 600 017. Ph : 044-6620 1111, 044-2436 2183, 84, 85, 86. www.apollocolleges.in

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Greetings distinguished guests, esteemed colleagues, and enthusiastic students,

It is with great pleasure and excitement that I extend a warm welcome to every one of you to the conference on **"Advances of Nanomaterials and Its Technological Applications."** As a member of the advisory committee, it is an honor to be part of an event that aims to push the boundaries of knowledge and foster innovation in the dynamic field of nanotechnology.

Nanomaterials represent a realm of scientific exploration that has captivated minds and sparked imaginations with its potential to revolutionize various sectors ranging from medicine and energy to electronics and environmental sustainability. Today, we gather here not only to celebrate the progress made thus far but also to explore the cutting edge of this fascinating field.

To the students present, I offer my sincerest congratulations for your dedication to delving into the depths of nanomaterials and for your commitment to expanding the frontiers of human understanding. Your enthusiasm and curiosity are the driving forces behind the advancements we witness today, and your contributions hold the promise of shaping a brighter tomorrow.

Throughout this conference, we will have the opportunity to share insights, exchange ideas, and collaborate on novel approaches that will propel nanomaterials research and its technological applications to new heights. I hope that each session will inspire fruitful discussions, spark innovative thinking, and cultivate lasting connections among all participants.

As we embark on this journey of exploration and discovery, let us embrace the challenges that lie ahead with optimism and determination. Together, let us pave the way for groundbreaking discoveries and transformative breakthroughs that will redefine the possibilities of nanomaterials and their impact on society.

Once again, I extend my heartfelt welcome to all attendees, and I look forward to the enriching discussions and discoveries that await us in the days ahead.

Thank you.

Warm regards,

Dr. C. Sheela Sasikumar
Managing Partner - SS Clini Research LLP,
Director of Research and Education- Dr RK Diabetic Foot and Podiatry Institute & Rakesh Jhunjhunwala Amputation Prevention Centre

Dr V. Duraipandiyan, M.Sc., M. Phill., Ph.D., B.L.I.S., F.S.S.A.,
Senior Scientist
Division of Phytochemistry and Ethnopharmacology,
Entomology Research Institute
Loyola College

I am pleased to write the message on the occasion of the 'National conference on '**Advances of Nano Materials and Its Technological Applications**' during 27th March ,2024 to be organized by the Department of Life sciences, Apollo Arts & Science College, Mevalurkuppam, near Queensland, Poonamallee, Chennai.

Nanotechnology is an interdisciplinary study which allows us to develop new materials with new, interesting and useful properties. These new materials are nanomaterials made from nanoparticles. Nanostructure science and technology is a broad and interdisciplinary area of research and development activity that has been growing explosively worldwide in the past few years. Nanoparticles and nanomaterials have gained prominence in technological advancements due to their adjustable physicochemical characteristics such as melting point, wettability, electrical and thermal conductivity, catalytic activity, light absorption and scattering resulting in enhanced performance over their bulk counterparts. Consequently, with a wide range of applications available, these particles have potential to make a significant impact to the society. There is need discussion with the Nanomaterials and its advanced technology for development of preventive vaccines and antimicrobial therapies is among the greatest achievements of modern medicine or development of other departments by the nanotechnology.

I hope that the aim of this conference will provide an opportunity to exchange knowledge, expertise along with unparalleled networking opportunities between a large number of Nanotechnological and Biotechnology professionals in this sphere.

This conference will also give opportunities to the College students, faculty and other researchers to learn from the deliberations during the conference.

I wish the organizing Secretary and his team for conduct of the conference a grand success.

To

Organizing secretary

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APOLLO ARTS & SCIENCE COLLEGE

(Approved by Govt of Tamil Nadu & Affiliated to University of Madras)
Mevalurkuppam, near Queensland, Poonamallee, Chennai, Tamil Nadu 602105

DEPARTMENT OF LIFE SCIENCES

Cordially Invites you for the
National Conference on

ADVANCES OF NANO MATERIALS AND ITS TECHNOLOGICAL APPLICATIONS

27 MARCH 2024 | 9.00 am | Sakunthalamma Auditorium A/C

KEY NOTE SPEAKERS

Dr NIDHI GUPTA
DEPARTMENT OF MICROBIOLOGY AND BIOTECHNOLOGY
IIS (DEEMED TO BE UNIVERSITY)
GURUKUL MARG, SFS MANSAROVAR, JAIPUR.

DR JASTIN SAMUEL
PROFESSOR,
HEAD, WASTE VALORIZATION LAB
LOVELY PROFESSIONAL UNIVERSITY, PUNJAB.

DR B. AHILAN
JOINT CONTROLLER OF PATENTS & DESIGNS.
GOVERNMENT OF INDIA.
MINISTRY OF COMMERCE AND INDUSTRY, CHENNAI.

ISBN NO: 978-81-19821-67-9

PROGRAMME SCHEDULE

(9.30 AM): OPENING CEREMONY

TAMIL THAI VAZHTHU

(9.35 AM): INAUGURAL ADDRESS

(9.45 AM): LIGHTING OF THE LAMP

ALL THE DIGNITARIES

(9.50 AM): PRESIDENTIAL ADDRESS -DR. S. SUTHAKAR
PRINCIPAL,
APOLLO ARTS & SCIENCE COLLEGE

(9.55 AM): FELICITATION -MR. K. GANESH
VICE- PRINCIPAL,
APOLLO ARTS & SCIENCE COLLEGE

(10:00 AM): INTRODUCING THE CHAIR PERSON

(10.05 AM): INVITED KEYNOTE SPEAKER I

DR NIDHI GUPTA

(11.00 AM): INVITED KEYNOTE SPEAKER II

DR JASTIN SAMUEL

(12.00 PM): INVITED KEYNOTE SPEAKER III

DR B. AHILAN

(1.00 PM): ORAL PRESENTATION

(1.10 PM): VALEDICTORY -ALL THE DIGNITARIES

(1.20 PM): VOTE OF THANKS

(1.30 PM): NATIONAL ANTHEM

ABOUT THE COLLEGE

Apollo educational group is a prestigious group which made a significant contribution to impart education for our students. Apollo arts & Science College is affiliated to the University of Madras and offers 20 courses across of 9 streams, namely science, medical, paramedical, education, vocational, IT, commerce and Banking. The college imparts higher education with integral formation which involves academic excellence and spiritual growth. The college boasts with good infrastructural and has 3300 students guided by more than 120 faculties. Education extolled everywhere – true to this motto of our college the students of our group institutions have placed in respectable and lucrative jobs in various esteemed establishment.

ABOUT LIFE SCIENCES DEPARTMET

The departments of life sciences were established in the year 2016. It offers U.G and other programmes. It boosts of well qualified faculty, good infrastructure and well-equipped laboratories with sophisticated instruments. The departments regularly conduct symposia and workshops. In additional to this, it organizes guest lectures by eminent scientists so that student get a first knowledge of the cutting-edge research being carried out in the fields of Life Sciences. It encourages students to carry out research projects and motivates them to present and publish research outcomes.

ISBN NO: 978-81-19821-67-9

ABOUT THE CONFERENCE:

The national conference on advances in nanomaterials and its technological applications, 2024 to be organized by the department of life sciences, Apollo Arts and Science College, poonamallee, Chennai. The main intention of this conference is to reflect the pioneering state of Nanomaterials and its technological applications. The national conference aims to bring students to exchange and share their experiences, new ideas and research perspectives about all aspects of Nanomaterial's and discuss the practical challenges encountered and the solutions adopted.

ISBN NO: 978-81-19821-67-9

APOLLO ARTS & SCIENCE COLLEGE, POONAMALLEE

(NBSC 2024)

PROGRAMME SCHEDULE

(9.30 AM): **OPENING CEREMONY**

TAMIL THAI VAZHTHU

(9.35 AM): **INAUGURAL ADDRESS -DR.V.A.KINSALIN**

HEAD OF THE DEPARTMENT,
DEPT. OF BIOTECHNOLOGY,
APOLLO ARTS & SCIENCE COLLEGE

(9.45 AM): **LIGHTING OF THE LAMP**

ALL THE DIGNITARIES

(9.50 AM): **PRESIDENTIAL ADDRESS -DR. S.SUTHAKAR**

PRINCIPAL,

APOLLO ARTS & SCIENCE COLLEGE

(9.55 AM): **FELICITATION -MR. K. GANESH**

VICE- PRINCIPAL,

APOLLO ARTS & SCIENCE COLLEGE

(10:00 AM): **INTRODUCING THE CHAIR PERSON**

DR. T. SITALAKSHMI

HEAD OF THE DEPARTMENT,
DEPT OF MICROBIOLOGY,
APOLLO ARTS AND SCIENCE COLLEGE

(10.05 AM): **INVITED KEYNOTE SPEAKER I**

Dr NIDHI GUPTA

TOPIC: NANOPARTICLES MEDIATED INTERVENTIONS FOR MICROBIAL AND NON-COMMUNICABLE DISEASES

(11.00 AM): **INVITED KEYNOTE SPEAKER II**

DR JASTIN SAMUEL

TOPIC: NANOMATERIAL APPLICATIONS IN ENVIRONMENTAL SECTOR

(12.00 PM): **INVITED KEYNOTE SPEAKER III**

DR B. AHILAN

TOPIC: IDENTIFYING INTELLECTUAL PROPERTY COMPONENT AT THE EARLY STAGE OF INNOVATION

(1.00 PM): **ORAL/POSTER PRESENTATIONS**

(1.10 PM): **VALEDICTORY -ALL THE DIGNITARIES**

(1.20 PM): **VOTE OF THANKS- MR. K. MAHENDRAN**

HEAD DEPT OF PHYSICS/CHEMISTRY),

APOLLO ARTS & SCIENCE COLLEGE

(1.30 PM): **NATIONAL ANTHEM**

ISBN NO: 978-81-19821-67-9

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   Diabetic Foot and Podiatry Institute & Rakesh Jhunjhunwala Amputation Prevention Centre.

3. Dr. V. DURAIPANDIAN
   Senior Scientist,
   Dept of Phytochemistry & Ethanopharmacology,
   Entomology Research Institute,
   Loyola College, Chennai.

INVITED TALK

1. **TECHNICAL SESSION – I**
   Dr NIDHI GUPTA
   DEPARTMENT OF MICROBIOLOGY AND BIOTECHNOLOGY
   IIS (DEEMED TO BE UNIVERSITY)
   GURUKUL MARG, SFS MANSAROVAR, JAIPUR.

2. **TECHNICAL SESSION – II**
   DR JASTIN SAMUEL
   PROFESSOR,
   HEAD, WASTE VALORIZATION LAB
   LOVELY PROFESSIONAL UNIVERSITY, PUNJAB.

3. **TECHNICAL SESSION – III**
   DR B. AHILAN
   JOINT CONTROLLER OF PATENTS & DESIGNS
   GOVERNMENT OF INDIA.
   MINISTRY OF COMMERCE AND INDUSTRY, CHENNAI.

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Nanomaterials Revolutionizing Environmental Bio-remediation: Opportunities and Challenges

Hindhu Priya. R[1]., Sripavithra.S[2]*

1. Student, Department of Biotechnology
2. Assistant professor, Department of Biotechnology

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Abstract:

This abstract explores the transformative role of nanomaterials in environmental bio-remediation, highlighting their diverse applications and inherent advantages. Nano materials, with their unique properties including high surface area-to-volume ratio, customizable surface chemistry, and enhanced reactivity, offer unparalleled efficiency in addressing environmental pollution. By targeting various pollutants and contaminants, Nano materials enable tailored solutions for a wide range of environmental challenges, promising increased efficacy and reduced treatment times compared to conventional methods. However, the deployment of Nano materials in bio-remediation necessitates careful consideration of their interactions with biological systems, potential toxicity risks, and long-term environmental implications. Through meticulous design and characterization, Nano materials can be engineered to minimize environmental impact while maximizing remediation efficacy, paving the way for sustainable solutions to environmental degradation.

Keywords: *Nano materials, bio-remediation, environmental pollution, pollutants, contaminants, reactivity, surface chemistry, toxicity, environmental implications, sustainable remediation.*

The Transformative Role of Nanomaterials in Advancing Medical Technologies

Sivakumar. P[1]., Sri Pavithra.S[2]*

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2. Assistant professor, Department of Biotechnology

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Abstract:

Nanomaterials, with their unique properties and applications, have emerged as transformative tools in the medical field, revolutionizing diagnostics, drug delivery, imaging, and therapeutics. Engineered at the nanoscale, these materials offer advantages such as high surface area-to-volume ratios, tenable surface chemistry, and enhanced reactivity. In diagnostics, nanomaterials enable the development of highly sensitive biosensors and imaging agents, facilitating early disease detection and personalized medicine. Moreover, they play a pivotal role in targeted drug delivery systems, improving drug efficacy while minimizing side effects. Nanoparticles designed for therapeutics exhibit controlled release properties, enhancing treatment outcomes and patient compliance. Additionally, nanomaterial-based platforms facilitate precise tissue engineering and regenerative medicine applications, offering promising solutions for tissue repair and organ transplantation. Despite their immense potential, challenges related to biocompatibility, toxicity, and scalability remain, necessitating rigorous evaluation and optimization. Overall, nanomaterials hold great promise in addressing critical healthcare needs, ushering in a new era of advanced medical technologies with profound implications for patient care and treatment outcomes.

Keywords: *Nanomaterials, medical field, diagnostics, drug delivery, imaging, therapeutics, biosensors, targeted therapy, tissue engineering, regenerative medicine, biocompatibility, toxicity, scalability.*

APPLICATION OF NANOTECHNOLOGY IN TREATMENT OF VARIOUS DISEASES AND ITS FUTURE ADVANCES IN MEDICINES

Sandhiya. B[1]., Sri Pavithra. S[2]*

1. Student Department of Biotechnology
2. Assistant professor Department of Biotechnology

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Abstract:

This abstract mainly focus on the development of nanotechnology in the field of medicine to treat the diseases that have been challenge to humans since so many years. Nanotechnology is the field of science and engineering that focuses on the design and manufacture of extremely small devices and structures in the nanoscale level. The advancement in nanotechnology helps in the treatment of neuro degenerative disorders such as Parkinson's disease and Alzheimer's disease. In addition, it also helps to treat tuberculosis treatment, ophthalmology, surgery visualization, tissue engineering, antibiotic resistance, cancer, immune response. One of the advancements in nanotechnology is nanorobotics and bio sensors. nanorobotics can perform tasks such as delivering drugs, removing tumours. Bio sensors are designed to detect specific biomarkers in a patient's blood or other body fluids. These bio sensors can be indicative of cancer and could be used to detect cancer at an early stage. Nanotechnology is now regarded as the most promising technology of the twenty first century, and researchers have investigated it as a novel technique in medical industry. Our major role is to improve health by enhancing the efficacy and safety of nanodevices. In future many nanoparticles and nanodevices are expected to be used, with enormous positive impact on human health.

Keywords: *nanodevices, biosensors, treatment, research, biomarkers, nanorobots.*

Harnessing Nanomaterials for Sustainable Agriculture: Pioneering the Green Revolution

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Abstract:

The Green Revolution of the 20th century revolutionized agriculture, but its environmental costs have raised concerns for the sustainability of modern farming practices. Nanotechnology presents a promising avenue for addressing these challenges by offering innovative solutions to enhance agricultural productivity while minimizing environmental impact. This abstract explores the role of nanomaterials in catalysing the next phase of the Green Revolution. Nanomaterials, with their unique physicochemical properties and high surface area-to-volume ratios, offer unprecedented opportunities for improving crop yield, nutrient management, and pest control. Nano fertilizers enable precise nutrient delivery, reducing wastage and environmental pollution. Nanoencapsulation techniques enhance the efficacy of agrochemicals while minimizing their adverse effects on non-target organisms and ecosystems. Furthermore, nano sensors provide real-time monitoring of soil health, crop growth, and environmental conditions, enabling precision agriculture and resource optimization. However, the widespread adoption of nanotechnology in agriculture necessitates careful consideration of its potential risks and ethical implications. Concerns regarding nanoparticle toxicity, environmental persistence, and regulatory oversight must be addressed through rigorous research, responsible innovation, and stakeholder engagement. abstract highlights the transformative potential of nanomaterials in fostering a sustainable agricultural future, where productivity, environmental stewardship, and socioeconomic equity converge to shape a truly green revolution.

Keywords: *Nanomaterials, green revolution, sustainable agriculture, crop yield, nutrient management, pest control, nanoencapsulation, agrochemicals, nano sensors, precision agriculture, environmental impact, risk assessment, regulatory oversight.*

Nanostructured Materials: Revolutionizing Medicine Through Innovative Applications

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Abstract:

Nanostructured materials have emerged as transformative tools in medicine, offering groundbreaking solutions for diagnostics, therapeutics, and regenerative medicine. This abstract provides a concise overview of the key advancements and applications of nanostructured materials in medicine, focusing on their unique properties and capabilities. Nanostructured materials play a pivotal role in drug delivery systems, enabling precise and targeted delivery of therapeutic agents. Their high surface area-to-volume ratio and tenable surface chemistry allow for tailored drug release kinetics, enhancing bioavailability while minimizing side effects. These nanomaterial-based carriers can traverse biological barriers, delivering drugs to specific cellular and tissue targets with remarkable efficiency. In medical imaging, nanostructured materials serve as advanced contrast agents, enhancing the sensitivity and resolution of imaging modalities such as fluorescence imaging, magnetic resonance imaging (MRI), and computed tomography (CT) scans. Quantum dots, carbon nanotubes, and gold nanoparticles offer superior imaging capabilities, enabling early disease detection and precise localization of pathological lesions. Moreover, nanostructured materials hold immense promise in regenerative medicine and tissue engineering. Scaffold materials with nanoarchitectures resembling the native extracellular matrix provide a conducive microenvironment for cell adhesion, proliferation, and differentiation. These nanomaterial-based scaffolds promote tissue regeneration and repair, offering solutions for organ transplantation and tissue engineering applications.

Key Words: *Nanostructured materials, Medicine, Drug delivery systems, Targeted drug delivery, High surface area-to-volume ratio, Biocompatibility, Medical imaging, Contrast agents, Quantum dots, Carbon nanotubes, gold nanoparticles, Regenerative medicine, Tissue engineering, Scaffold materials, Nanoarchitectures*

Harnessing Nano Materials for Green Innovations: A Path Towards Sustainable Future

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Abstract:

In the quest for sustainable solutions, Nano materials emerge as a pivotal force driving green revolutions across diverse sectors. This abstract explores the transformative potential of Nano materials in catalyzing environmental sustainability and fostering a greener tomorrow. Nano materials, characterized by their unique properties at the nanoscale, offer unparalleled opportunities for innovation in renewable energy, pollution mitigation, and resource conservation. One key application area lies in renewable energy generation, where Nano materials enhance the efficiency and affordability of solar cells, fuel cells, and energy storage devices. By enabling more efficient energy conversion and storage processes, Nano materials contribute to reducing reliance on fossil fuels and mitigating climate change. Moreover, Nano materials play a crucial role in environmental remediation by facilitating the removal of pollutants from air, water, and soil. Their high surface area-to-volume ratio and unique chemical properties enable effective adsorption, catalysis, and degradation of contaminants, thus addressing pressing environmental challenges. Furthermore, Nano materials promote resource efficiency through lightweight and durable materials, advanced coatings, and efficient catalysts, thereby minimizing waste and enhancing the sustainability of industrial processes.

Keywords: *Nano materials, Renewable energy, Pollution mitigation, Environmental remediation, Sustainability, Resource efficiency.*

APPLICIATION OF NANOTECHNOLOGY IN SENSORS BASED DETECTION OF FOOD BORNE PATHOGENS

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Abstract:

The manipulation of matter on a near atomic scale to produce new structures and devices. Biosensors can be used to monitor environmental pollution in air, soil, water, etc; toxic elements in food and quality control; biohazardous bacteria or virus, and biomolecules for clinical diagnostics, etc; and to necessitate sensitive, fast, and selective equipment's or tools due to their low cost, fast analysis, and miniaturization, as well as easy handling. The intake of microbial-contaminated food poses severe health issue due to the outbreak of stern food-borne diseases. Therefore, there is a need for precise detection and identification of pathogenic microbes and toxins in food to prevent the concerns. Nanomaterials are used for the manufacturing of nano-biosensors and the nanomaterials commonly used include nanoparticles, nanowires, carbon nanotubes, nanorods, and quantum dots. Nanomaterials possess various advantages such as colour tunability, high detection sensitivity, a large surface area, high carrier capacity, high stability, and high thermal and electrical conductivity**.** Biosensor devices for pathogen detection generally consist of several elements, including a biological capture molecule (affinity probes or antibodies), a labelled antibody interacting with the bacteria captured from the solution (in the case of beads, a double label is already present on each different bead type) and a signal detection system. Biosensors have the potential to produce an analytical revolution to resolve the challenges in the agricultural and the food industries. This review focuses on the application of biosensors for contaminants in food system.

Keywords: *nanotechnology, borne disease, biosensors, pathogens, food, nanoparticle.*

Navigating Environmental Challenges through Nano-Scale Processes: A Paradigm Shift in Remediation Strategies

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Abstract:

Nano-scale processes offer unprecedented opportunities for addressing environmental challenges, providing innovative solutions across various domains. This abstract explores the significance of nano-scale processes in environmental remediation, highlighting their potential to revolutionize pollution mitigation strategies. Nano-scale processes, leveraging the unique properties of nanoparticles, hold immense promise in tackling environmental pollutants. Engineered nanoparticles exhibit enhanced reactivity and surface area-to-volume ratios, enabling efficient removal of contaminants from air, water, and soil matrices. By harnessing principles of nanotechnology, researchers develop tailored materials and methodologies for targeted pollutant remediation. In water treatment, nano-scale processes offer novel approaches for removing organic and inorganic pollutants, pathogens, and heavy metals. Functionalized nanoparticles act as adsorbents, catalysts, or membrane materials, facilitating efficient water purification with reduced energy and resource consumption. Additionally, nanomaterial-based sensors enable real-time monitoring of water quality, enhancing environmental surveillance and management efforts. Similarly, nano-scale processes hold promise for soil remediation, where contaminants such as hydrocarbons, pesticides, and heavy metals pose significant challenges. Nano-enabled remediation techniques, including nanoparticle-enhanced bioremediation and phytoremediation, expedite contaminant degradation and immobilization, restoring soil health and fertility while minimizing environmental impact. Furthermore, the integration of nano-scale processes with sustainable practices fosters the development of eco-friendly remediation technologies.

Keywords: *Nano-scale processes, environmental remediation, nanoparticles, nanotechnology, pollution mitigation, water treatment, soil remediation.*

Nanomedicine: A Transformative Tool for Advancing Biological Sciences

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Abstract:

Nanomedicine has emerged as a transformative tool driving significant advancements in biological sciences, revolutionizing drug delivery, diagnostics, and therapeutics. At the forefront of this paradigm shift are nanoparticles, engineered with precision to exploit unique properties at the nanoscale. These nanocarriers offer unprecedented opportunities for targeted drug delivery, enhancing therapeutic efficacy while minimizing systemic toxicity. Moreover, their versatile surface chemistry enables functionalization for specific cellular interactions, paving the way for personalized medicine approaches. In diagnostics, nanotechnology-enabled platforms facilitate ultra-sensitive detection of biomarkers, enabling early disease diagnosis and monitoring with unparalleled accuracy. Nanoparticles also serve as theragnostic agents, combining diagnostic and therapeutic functionalities within a single nanostructure, thereby revolutionizing patient care pathways. However, challenges such as biocompatibility, scalability, and regulatory considerations underscore the need for interdisciplinary collaborations and rigorous translational research efforts. Integrating nanomedicine with biological sciences necessitates a comprehensive understanding of nanoparticle-biological interactions, unravel complex mechanisms underlying therapeutic efficacy and toxicity. Furthermore, exploring novel nanomaterials and fabrication techniques expands the toolkit for biomedical applications, fostering innovation and addressing unmet clinical needs. This abstract provides a concise overview of the transformative role of nanomedicine in biological sciences, highlighting its potential to redefine healthcare paradigms and drive precision medicine forward.

Keywords: *Nanomedicine, biological sciences, drug delivery, diagnostics, therapeutics, nanoparticles, nanotechnology*.

Exploring the Versatile Applications of Nano Materials in Biomedicine: Drug Delivery, Imaging, Bio Sensing, and Tissue Engineering

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Abstract:

Nano materials have emerged as promising candidates for various biological applications due to their unique properties and versatile functionalities. This abstract provides an overview of the recent advancements and potential of Nano materials in the realm of biology, highlighting their applications in drug delivery, imaging, bio sensing, and tissue engineering. The utilization of Nano materials in drug delivery systems offers significant advantages such as improved drug solubility, enhanced bioavailability, and targeted delivery to specific sites within the body. In biomedical imaging, Nano materials exhibit exceptional contrast enhancement and multimodal imaging capabilities, enabling precise visualization of biological structures at the cellular and molecular levels. Keywords: imaging contrast agents, multimodal imaging, cellular imaging, molecular probes. Moreover, Nano materials serve as sensitive bio sensing platforms for the detection of biomolecules, pathogens, and environmental pollutants with high specificity and sensitivity, revolutionizing diagnostics and monitoring applications. Keywords: biosensors, diagnostic nanotechnology, point-of-care testing, environmental monitoring. In tissue engineering and regenerative medicine, Nano materials play a pivotal role in scaffold design, providing mechanical support and biochemical cues for cell growth, differentiation, and tissue regeneration. However, the integration of Nano materials into biological systems raises concerns regarding their biocompatibility, toxicity, and long-term effects, necessitating thorough evaluation and optimization for safe and effective applications.

Keywords: *Nano materials, biological applications, drug delivery, imaging, bio sensing, tissue engineering, biocompatibility, toxicity assessment, safety profiling, risk assessment.*

Advancements in Nanomaterial-Based Applications for Medicine: A Gateway to Precision Healthcare

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Abstract:

In recent years, nanomaterials have emerged as promising tools in medicine, revolutionizing diagnostics, therapeutics, and drug delivery systems. This abstract explores the multifaceted applications of nanomaterials in medicine and their potential to redefine healthcare paradigms. Nanomaterials, characterized by their unique physical and chemical properties at the nanoscale, offer unprecedented opportunities for targeted and personalized medicine. Keywords such as "Nano medicine," "drug delivery," and "biomedical applications" underscore the breadth of their impact on medical science. One of the most significant contributions of nanomaterials to medicine lies in drug delivery systems. Through precise engineering and functionalization, Nano carriers enable controlled release and targeted delivery of therapeutic agents to specific cells or tissues, minimizing off-target effects and enhancing efficacy. Moreover, nanomaterials play a pivotal role in diagnostic imaging, enabling high-resolution imaging modalities such as magnetic resonance imaging (MRI), computed tomography (CT), and fluorescence imaging. Functionalized nanoparticles serve as contrast agents, enhancing the sensitivity and specificity of diagnostic techniques for early disease detection and monitoring. Furthermore, nanomaterials hold immense potential in regenerative medicine and tissue engineering. Scaffold materials composed of biocompatible nanoparticles provide structural support and promote cellular adhesion, proliferation, and differentiation, facilitating tissue regeneration and repair. Additionally, nanotechnology has paved the way for novel therapeutic strategies, including photo thermal and photodynamic therapies, wherein light-responsive nanoparticles selectively target and destroy cancer cells while sparing healthy tissue.

Keywords*: Nanomaterials, Nano medicine, Drug delivery, Diagnostic imaging, Regenerative medicine, Precision healthcare.*

Nano Drugs: Revolutionizing Medicine through Precision Delivery

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Abstract:

Nano drugs, a burgeoning field in medicinal science, represent a paradigm shift in drug delivery strategies. By harnessing the unique properties of nanoparticles, Nano drugs offer precise targeting, enhanced efficacy, and reduced side effects compared to traditional drug formulations. The remarkable versatility of Nano drugs lies in their ability to encapsulate various therapeutic agents, including small molecules, proteins, nucleic acids, and peptides, within nanoscale carriers. These carriers can be tailored in terms of size, shape, surface chemistry, and functionalization to achieve specific pharmacokinetic and pharmacodynamics profiles. In the realm of cancer therapy, Nano drugs have emerged as powerful tools for overcoming multidrug resistance, improving drug solubility, and minimizing off-target effects. Additionally, they enable combination therapy approaches by co-delivering multiple drugs or therapeutic agents simultaneously. Moreover, Nano drugs hold promise for the treatment of neurodegenerative disorders, infectious diseases, and inflammatory conditions. Their ability to cross biological barriers, such as the blood-brain barrier, and target specific cell types within complex physiological environments, opens up new avenues for tackling challenging medical conditions. Despite the tremendous progress in Nano drug development, several challenges remain, including scale-up production, long-term safety evaluation, and regulatory considerations. Addressing these hurdles will be crucial for translating the potential of Nano drugs from bench to bedside and realizing their full impact on improving patient outcomes in the future of medicine.

Keywords: *Nano drugs, Nanoscale carriers, Neurodegenerative disorders, Inflammatory conditions, Scale-up production, Safety evaluation, Regulatory considerations.*

Nanomaterials for bio-remediation: Approach for remedying in marine ecosystem/industrial waste water

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Abstract:

Nano-bioremediation, a combination of bioremediation and nanotechnology is a competent way to remove contaminants from marine systems as it is a non-toxic, cost-effective, and less time-consuming approach. The recent advanced technology, nanomaterials have attracted the attention for wastewater treatment. Nanoscale properties of nanomaterials such as catalysis, adsorption, reactivity, greater surface area makes them effectively useful for the treatment of wastewater. Various types of nanomaterials are being used for the removal of different contaminants from wastewater. First, nano-adsorbents such as activated carbon, carbon nanotubes that are usually applied for removal of heavy metals from the wastewater. Second, nano-catalysts such as photocatalyst, electrocatalyst for removing both organic and inorganic contaminants. Third, nano-membranes have been used for effective removal of dyes, heavy metals. Finally, the integration of nanotechnology with biological processes such as algal membrane bioreactor, anaerobic digestion and microbial fuel cell is discussed with respect to its potential for wastewater purification. This review summarizes how various nanomaterials have the potential to degrade contaminants and how it can be used in the form of adsorbents, sensors, membranes, nano-catalysts, and nano-filters to remediate contaminants from marine ecosystem and industrial waste water.

Keywords: *Nano materials, Bioremediation, Carbon nanotubes, Photocatalyst, Heavy metals, Contaminants, Nano technology.*

Optical and Structural properties Zinc Oxide, Zinc Sulphide Nanoparticles synthesized by simple Precipitation methods

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Abstract:

The Zinc Sulfide and Zinc oxide Nanoparticles are synthesized in different ratio by simple precipitation methods. The synthesized particles were optical studies like UV-Visible spectroscopy, FTIR Spectroscopy and structural studies like powder XRD, Scanning electron microscope, Transmission electron microscopy, Energy dispersive analysis of X-rays and also cyclic Voltammetry studies for supercapacitor properties. The ZnS Nanoparticles are small about 3.6nm in size and ZnO Nanoparticles size is 36nm. ZnS is non toxic nature and energygap greater than 3.4 eV. The ZnS and ZnO Nanoparticles are useful in different fields.

Keywords: FTIR Fourier Transform Infrared Spectroscopy, UV-Ultra Violet, XRD- X Ray Diffraction, ZNS - Zinc Sulfide, ZnO - Zinc oxide.

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ROLE OF NANOPARTICLES IN ENVIRONMENTAL REMEDIATION [TITANIUM DIOXIDE (TiO2)]

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Abstract:

Environmental damage is a significant cause of disease throughout the globe, without a doubt one of the most serious issues confronting society today. Using nanoscale and size control, nanotechnology may be able to offer solutions to environmental problems. Nanoparticles play a significant role in environmental remediation by offering highly efficient and versatile tools for various applications. This study investigates the potential of titanium dioxide (TiO2) nanoparticles for environmental remediation purposes. The unique properties of TiO2 nanoparticles, such as their high surface area, photocatalytic activity, and chemical stability, make them promising candidates for various environmental applications. This paper reviews recent research on the use of TiO2 nanoparticles in the remediation of air, water, and soil pollution. Additionally, the mechanisms underlying the photocatalytic degradation of organic pollutants and the factors influencing the efficiency of TiO2 nanoparticles in remediation processes are discussed. Furthermore, the potential risks associated with the use of TiO2 nanoparticles in environmental remediation are examined, including their ecotoxicological effects and potential for unintended environmental impacts. Finally, future research directions and challenges in the application of TiO2 nanoparticles for environmental remediation are outlined, highlighting the need for comprehensive risk assessments and sustainable approaches to ensure the safe and effective utilization of these nanomaterials in environmental cleanup efforts.

Keywords: *Nanoparticles, Nanoscale, Environmental problem, Remediation, titanium dioxide, photocatalytic, pollution, efficiency, unintended, utilization, nanomaterials.*

Polymer Nanocomposites

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Abstract:

Polymer Nanocomposites (PNCs) are the combination of polymer continues phase and nanoparticles as discontinuous phase that show several advantages in medical, electrical and optical properties. Polymer Nanocomposites (PNCs) for electrical energy storage, polymer in Nanocomposites in medicine, it comprises the process of diagnosing injury, reliving for pain and preserving / improving human health by using nanomaterials in medical field. Optical properties of polymer, these materials in light emitting diodes, solar cells polarized light stable colour filter, optical sensors optical data communication and optical data storage. Polymer Nanocomposites (PNCs) have attached greater attention world-wide from both academic and industrial point of view. These characteristics have been transformed into numerous commercial successes, including automotive part coating and flame retardants. The current status and future directions of polymer Nanocomposites science and technology and their potential to more beyond actives concept to designed material and devices with prescribed Nano scale composition and morphology.

Keywords: *polymer Nanocomposites (PNCs)in medicine, electrical energy storage, optical properties, nanomaterials, point of industrial view, etc.*

Materials for Biological Applications: Advancements and Perspectives.

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Abstract:

Materials designed for biological applications have witnessed remarkable advancements, revolutionizing fields such as tissue engineering, drug delivery, and biosensing. This concise abstract provides an overview of key developments and future prospects in the realm of biomaterials. Engineered with precise properties, biomaterials offer tailored solutions to address complex challenges in biomedical and biotechnological applications. Key areas of focus include biocompatibility, mechanical properties, and bio functionality, crucial for ensuring compatibility with biological systems. Various classes of biomaterials such as polymers, ceramics, metals, and composites exhibit unique characteristics suitable for specific biological applications. Surface modification techniques, including surface functionalization and nano structuring, further enhance biomaterial performance and bio interactions. Moreover, the integration of biomaterials with advanced technologies like 3D printing and nanotechnology opens new avenues for personalized medicine and regenerative therapies. Interdisciplinary collaboration between materials scientists, biologists, and clinicians drives innovation in this field, facilitating the translation of research findings into clinical practice. Looking ahead, the continued exploration of novel biomaterials and their interactions with biological systems holds promise for addressing emerging healthcare challenges and advancing human health and well-being.

Keywords: *Materials, biological applications, biomaterials, tissue engineering, drug delivery, biosensing, biocompatibility, surface modification, nanotechnology, interdisciplinary collaboration.*

Exploring the Potential of Semiconducting Materials in Modern Technology

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Abstract:

Semiconducting materials stand at the forefront of modern technology, offering a unique blend of electrical conductivity and tuneable properties. This abstract delves into the pivotal role of semiconductors in diverse applications, from electronics to renewable energy. Semiconductor devices have revolutionized communication, computing, and sensing, serving as the building blocks of modern electronics. Through precise control of doping and fabrication processes, semiconductors enable the creation of transistors, diodes, and integrated circuits, driving innovation in data processing and telecommunications. Beyond electronics, semiconducting materials hold promise in renewable energy technologies, particularly photovoltaics. By harnessing the photovoltaic effect, semiconductor-based solar cells convert sunlight into electricity with increasing efficiency, offering a sustainable solution to meet the world's energy demands. The versatility and adaptability of semiconductors continue to inspire breakthroughs in fields such as optoelectronics, sensing, and quantum computing. As researchers push the boundaries of material science and device engineering, semiconducting materials remain central to the ongoing technological revolution, shaping the future of innovation and progress.

Keywords: *Semiconducting materials, Electrical conductivity, Tuneable properties, Electronics, Renewable energy, Semiconductor devices, Transistors, Diodes, Integrated circuits, Photovoltaics, Solar cells, Optoelectronics, Sensing, Quantum computing, Material science, Technological revolution, Innovation, Progress*

Harnessing Nanomaterials for Effective Bio-Remediation: A Sustainable Approach to Environmental Cleanup

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Abstract:

Environmental contamination poses significant threats to ecosystems and human health, necessitating innovative strategies for remediation. Nanotechnology has emerged as a promising avenue for addressing these challenges by offering novel tools and materials tailored for efficient bio-remediation. This abstract explores the multifaceted role of nanomaterials in revolutionizing bio-remediation techniques. Nanomaterials exhibit unique physicochemical properties, such as high surface area-to-volume ratios, tuneable surface chemistry, and enhanced reactivity, which make them ideal candidates for environmental remediation applications. These materials can be engineered to target specific pollutants, facilitating their adsorption, degradation, or immobilization through interactions at the nanoscale. Nanoparticles, including metal oxides, carbon-based nanomaterials, and nanocomposites, demonstrate exceptional efficacy in removing a wide range of contaminants from soil, water, and air. Their versatility allows for the development of tailored solutions for diverse pollutants, including heavy metals, organic pollutants, and emerging contaminants such as pharmaceuticals and microplastics. Moreover, nanomaterials enable the encapsulation and controlled release of bioactive compounds, including enzymes, microbes, and biomolecules, enhancing their stability and activity in harsh environmental conditions. This targeted delivery approach maximizes the efficiency of bio-remediation processes while minimizing unintended ecological impacts.

Keywords: *Nanomaterials, Bio-remediation, Environmental contamination, Nanoparticles, Targeted delivery, Pollutant removal, Environmental cleanup, Sustainable remediation, Nanocomposites, Risk assessment, Regulatory oversight*

NANOMATERIALS FOR BIO-REMEDIATION

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ABSTRACT:

Bioremediation is the use of biological systems for the reduction of pollutants from air, aquatic or terrestrial systems. Nano + Bio + Remediation. The use of nanoparticles and nanotechnology to enhance the microbial activity to pollutants, they also enhance bioremediation. Nano-bioremediation has the potential not only to reduce the overall costs of cleaning up large-scale contaminated sides, but it can also reduce clean up time. organic or inorganic, represent a threat for the environment and human health and in recent years their presence and persistence has increased rapidly. There are different types of nanoparticles which involved in pollutants removal like zeolites, aluminium, zinc and iron oxide NPs, silicon, titanium, silver, and gold. Nano- phytoremediation, an emerging bioremediation approach in the field of nanotechnology, uses biosynthesized nanoparticles and plant species for the removal of toxic heavy metals from the environment. Understanding the interaction between the contaminant, the microorganism, and the nanomaterials (NMs) is of crucial importance since positive and negative effects may be produced. For example, the usage of nanometals and nanomembranes can aid in the development of desalination processes that can be used to tackle problems with water such as the removal of toxic metals biofouling, and aquatic infections. Some nanomaterials are stimulated for microorganisms, while others are toxic. Every year around 10 million tons of toxic chemical compounds are released by industry. After release, these compounds may further react to form chemicals, for instance, polychlorinated dibenzo-p-dioxins or polychlorinated dibenzofurans, which as by-products of certain chemical processes involving chlorine.

Key words: Nanotechnology, Microorganisms, Nanoparticles, Contaminant

Nano-Scale Processes in Environmental Dynamics: A Contemporary Overview

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Abstract:

The advent of nano-scale processes has revolutionized environmental dynamics, presenting both unprecedented opportunities and challenges. Nanoparticles, at the forefront of this paradigm shift, exhibit unique properties that redefine conventional understandings of environmental interactions. In remediation efforts, nano-materials offer enhanced capabilities for contaminant removal, exploiting their high surface area-to-volume ratio and reactivity. However, their unintended ecological impacts necessitate rigorous monitoring and assessment frameworks. Understanding the intricate dynamics of nanoparticles in environmental matrices is crucial for designing sustainable technologies that mitigate adverse effects while maximizing benefits. Integrating nanotechnology with traditional remediation strategies holds promise for addressing complex pollution scenarios with greater efficacy and efficiency. Furthermore, nano-scale processes extend beyond remediation, influencing biogeochemical cycles, microbial ecology, and ecosystem functioning. This necessitates interdisciplinary collaboration to unravel the intricacies of nano-environmental interactions. While nano-materials offer innovative solutions, their potential risks demand careful consideration to ensure environmental safety and regulatory compliance. Bridging knowledge gaps in nano-scale processes fosters the development of predictive models and decision-support tools for sustainable environmental management. Embracing this transformative era requires a holistic approach that balances innovation with precaution, fostering a resilient environment for current and future generations.

Keywords: *Nano-scale processes, environment, dynamics, nanoparticles, remediation, monitoring, ecological impacts, sustainable technologies.*

Impact of Pharmaceutical Biotechnology on the Future of Medicine

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Abstract:

Pharmaceutical biotechnology is poised to transform the landscape of medicine by leveraging cutting-edge advancements in molecular biology, genetics, and bioengineering. This abstract delves into the profound impact of biotechnology on healthcare, highlighting the development of innovative biologics such as monoclonal antibodies, vaccines, and gene therapies. These therapies offer targeted approaches for treating complex diseases, resulting in improved efficacy and reduced adverse effects compared to traditional small-molecule drugs. Furthermore, the rise of personalized medicine facilitated by biotechnology enables tailored treatments based on individual genetic profiles, leading to better patient outcomes and enhanced healthcare efficiency. However, the integration of biotechnological innovations into clinical practice poses challenges such as regulatory complexities, affordability, and ethical considerations surrounding genetic manipulation and data privacy. Despite these challenges, the continuous advancements in pharmaceutical biotechnology hold the potential to revolutionize disease management, paving the way for more effective, precise, and accessible therapies that address unmet medical needs and improve quality of life for patients worldwide.

Keywords: *pharmaceutical, leveraging cutting edge advance, efficacy, adverse effect, small _ molecule drugs, genetic profile, unmet medical, patient Worldwide.*

Materials for Biological Applications: Advancements and Challenges

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Abstract:

The exploration of materials for biological applications has witnessed remarkable progress, driven by the quest for innovative solutions in healthcare and biotechnology. Biomaterials play a pivotal role in advancing biomedical technologies, offering tailored properties to interface seamlessly with biological systems. Biocompatibility, a cornerstone in material design, ensures compatibility and minimizes adverse reactions, enabling diverse applications ranging from tissue engineering to drug delivery systems. Tissue engineering, a burgeoning field, leverages biomaterials to create functional substitutes for damaged tissues and organs, promising transformative therapies for regenerative medicine. Controlled release platforms, facilitated by engineered materials, revolutionize drug delivery, enhancing therapeutic efficacy while minimizing side effects. However, challenges persist, including achieving optimal biocompatibility, controlling degradation rates, and ensuring long-term stability. Additionally, the dynamic interplay between materials and biological environments necessitates comprehensive understanding and tailored design strategies. Integrating advanced characterization techniques and computational modelling facilitates the rational design of materials with enhanced performance and biocompatibility profiles. Furthermore, regulatory considerations and ethical implications underscore the importance of safety and efficacy assessments in translational research. Collaborative efforts across disciplines foster innovation and address multifaceted challenges in materials science for biological applications. Embracing emerging technologies such as nanomaterials and bioinspired designs holds promise for unlocking new frontiers in healthcare and biotechnology. This abstract provides an overview of recent advancements, challenges, and future prospects in materials tailored for biological applications, emphasizing the interdisciplinary nature and transformative potential of this dynamic field.

Keywords: Materials, biological applications, biocompatibility, biomaterials, tissue engineering, drug delivery, regenerative medicine.

Advancing Technologies through Polymer Nanocomposites: A Comprehensive Overview

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Abstract:

Polymer nanocomposites have emerged as a cornerstone in materials science, offering unprecedented opportunities for enhancing mechanical, thermal, and electrical properties through the incorporation of nanoscale fillers. This abstract provides a holistic perspective on polymer nanocomposites, encompassing synthesis techniques, characterization methods, and diverse applications across various industries. Synthesis methodologies for polymer nanocomposites encompass a spectrum of approaches, including solution blending, melt mixing, in situ polymerization, and electrospinning. Each technique offers unique advantages in tailoring the dispersion, interfacial interactions, and morphology of nanofillers within the polymer matrix, thereby influencing the resultant properties of the composite material. Characterization techniques play a pivotal role in elucidating the structure-property relationships of polymer nanocomposites. Advanced analytical tools such as transmission electron microscopy (TEM), scanning electron microscopy (SEM), X-ray diffraction (XRD), and thermal analysis enable precise assessment of nanofiller dispersion, crystallinity, and thermal stability. Polymer nanocomposites find applications across a myriad of sectors, including automotive, aerospace, electronics, packaging, and biomedicine. Reinforcing polymers with nanofillers such as carbon nanotubes, graphene, clay nanoparticles, and metal oxides enhances mechanical strength, flame retardancy, barrier properties, and conductivity, thus unlocking novel functionalities and performance improvements in end-use products. Continued research endeavours in polymer nanocomposites hold promise for addressing contemporary challenges and driving innovation across diverse industries.

Keywords: *Polymer nanocomposites, synthesis techniques, characterization methods, nanoscale fillers, dispersion, interfacial interactions, morphology, structure-property relationships, transmission electron microscopy (TEM).*

Nanofabrication Techniques: Advancements and Applications

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Abstract:

Nanofabrication techniques have revolutionized the field of nanotechnology, enabling precise manipulation and control of matter at the nanoscale. This abstract offers a comprehensive overview of recent advancements and applications in nanofabrication. Key techniques such as photolithography, electron beam lithography, and nanoimprint lithography are explored for their ability to fabricate nanostructures with high resolution and scalability. Additionally, bottom-up approaches including self-assembly, molecular beam epitaxy, and atomic layer deposition are discussed for their capacity to engineer materials at the atomic and molecular level. The integration of top-down and bottom-up strategies has led to the development of hybrid nanofabrication methods, offering unprecedented control over nanoscale architectures. Applications of nanofabrication span a wide range of fields including electronics, photonics, biomedical engineering, and energy storage. Nanofabricated devices such as nano sensors, nanoelectronics, and nano photonics hold promise for enhancing sensing capabilities, computing power, and energy efficiency. Furthermore, the emergence of novel materials such as two-dimensional materials and quantum dots has expanded the possibilities for nanofabrication and device functionality. Collaborative efforts between researchers from multidisciplinary backgrounds continue to drive innovation in nanofabrication techniques and applications. Future directions include advancements in nanolithography, development of novel materials, and exploration of nanofabrication for emerging technologies such as quantum computing and nanomedicine.

Keywords: *Nanofabrication, photolithography, electron beam lithography, nanoimprint lithography, bottom-up approaches, self-assembly, molecular beam epitaxy, atomic layer deposition, nano sensors, nanoelectronics, nano photonics, two-dimensional materials, quantum dots, interdisciplinary collaboration.*

Unveiling the Intricacies of Crystalline Materials: From Structure to Functionality

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Abstract:

Crystalline materials, with their ordered atomic arrangements, stand as pillars in the realm of materials science, offering a rich tapestry of structural diversity and functional versatility. This abstract embarks on a journey through the captivating world of crystalline materials, exploring their fundamental attributes and transformative applications across various disciplines. At the heart of crystalline materials lies their inherent structural coherence, where atoms assemble in repetitive patterns, imbuing them with distinctive properties. The precise arrangement of atoms dictates the material's behaviours, influencing phenomena such as conductivity, optical response, and mechanical strength. Synthesis and characterization techniques have played instrumental roles in unravelling the intricate structures of crystalline materials, enabling scientists to tailor their properties for specific applications. From X-ray diffraction to electron microscopy, a suite of analytical tools facilitates the elucidation of atomic arrangements with unprecedented precision, paving the way for innovative advancements in fields ranging from electronics to renewable energy. In electronics, crystalline semiconductors serve as the backbone of modern technology, underpinning devices that revolutionize communication, computation, and sensing. Moreover, in the realm of renewable energy, crystalline materials play vital roles in photovoltaic cells, catalyzing the conversion of sunlight into clean electricity with remarkable efficiency.

Keywords: *Crystalline materials, Materials science, Structural coherence, atomic arrangements, Conductivity, Optical response, Mechanical strength, Synthesis, Characterization techniques, X-ray diffraction.*

Unveiling the Enigmatic Realm of Single Crystals: A Journey into Structural Brilliance

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Abstract:

Single crystals, epitomizing structural perfection in material science, stand as quintessential embodiments of order and precision. This abstract delves into the captivating world of single crystals, elucidating their profound significance, structural intricacies, and manifold applications. These crystals, characterized by a homogeneous lattice extending flawlessly in all directions, serve as paramount entities for probing fundamental properties of matter. At the heart of single crystals lies their remarkable structural uniformity, offering unparalleled insight into the intrinsic behaviours of materials. Their atomic arrangements, devoid of boundaries and defects, unveil a symphonic interplay between form and function, shaping their optical, electronic, and mechanical properties with exquisite finesse. The synthesis and manipulation of single crystals have emerged as pivotal pursuits in various scientific domains, ranging from semiconductor physics to biomolecular research. Their inherent purity and coherence render them indispensable in elucidating complex phenomena, facilitating advancements in diverse fields including photonics, catalysis, and quantum computing. Moreover, single crystals serve as veritable canvases for innovative exploration, enabling the realization of novel functionalities through tailored engineering and manipulation. Their versatility, coupled with advancements in fabrication techniques, continues to inspire groundbreaking discoveries and technological innovations with far-reaching implications. In conclusion, this abstract underscore the profound impact of single crystals in shaping our understanding of the material world and driving forward the frontiers of science and technology. As we unravel the mysteries encoded within their pristine structures, we unlock boundless

Keywords: *Single crystals, Structural perfection, Material science, Order, Precision.*

NANOPARTICLES IN GREEN REVOLUTION AND ENVIRONMENTAL HYGIENE

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Abstract:

Globally challenge at present is to attain food availability for the increasing population. Conventionally, agriculture practices depend on the extensive application of agrochemicals, however, irreparable damage to the ecosystem as well as health issues have led to the research of eco-friendly alternatives. Nanotechnology is a novel and promising alternative that can help to improve yield and food protection. In this sense, several advantages of Nanotechnology make the need of crops with high yield so that the availability of food will doesn't matter as a challenge. In the era of climate change, global agricultural systems are facing numerous, unprecedented challenges. In order to achieve food security, advanced nano engineering is a handy tool for boosting crop production and assuring sustainability. Nanotechnology helps to improve agricultural production by increasing the efficiency of inputs and minimizing relevant losses. Nanomaterials offer a wider specific surface area to fertilizers and pesticides. The integration of biology and nanotechnology into has greatly increased their potential to sense and identify the environmental conditions or impairments. Recent attempts at innovative uses of nanotechnologies in agriculture that may help to meet the rising demand for food and environmental sustainability. Nanoparticles contains the atoms of, potassium, and carbon chains were employed in the production of high yield crop varieties, soil enrichment (through the fertilizer that contains typically required nanoparticles) and reagents.

Keywords: *nanotechnology, Nano agrochemicals, Nano sensors, nano bionics, sustainable agriculture, food security*

APPLICATION OF NANOFABRICATION AND ITS FUTURE CHALLENGES

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Abstract:

Nanofabrication is the manufacture of materials with nanometre dimension .The purpose of nanofabrication is to produce nanoscale structures that form part of a system ,device, or component in large quantities and at a very low cost .Industry sectors that are targets for the use of these products include electronics and semiconductors ,computing, and information technology ,communication ,defence, automotive ,chemical and medical industries .The techniques used in Nano-Fabrication include lithography, self-assembly ,molecular beam epitaxy, and sol – gel synthesis. Nanofabrication technique used to create features at the nanoscale level on a material. Great progress has been achieved in recent years for the fabrication of Nano structured based devices by using different imprinting techniques. This review summarizes the recent developments in these areas with an emphasis on established techniques for the micro/Nano-fabrication of 3-dimensional structured devices on large-scale. Moreover, numerous potential applications and innovative products based on the large-scale are also demonstrated. Nanofabrication methodologies for the fabrication of micro/Nano-features have gained great importance in many applications of our daily life. In the last 2 decades, the potential advancement has been made in nanofabrication methodologies (bottom and top-down) for optical applications. Other than the fabrication of optical devices, these techniques can be applied for the further developments in any kind of products related to medical and materials science.

Keywords: *Nanofabrication, methodologies, nanoscale, lithography, technology, techniques.*

Nanoparticles in DNA technology

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Abstract:

DNA nanotechnology is the design and manufacture of artificial nucleic acid structures for technological uses. In this field, nucleic acids are used as non-biological engineering materials for nanotechnology rather than as the carriers of genetic information in living cells. The basic working principle behind DNA nanotechnology is the fabrication of specifically shaped nano-architects in the one-, two, and three-dimensional (1D, 2D, and 3D, respectively) geometries through simple self-assembly of various DNA strands. DNA transport through the cell membrane is an essential requirement for gene therapy, which utilizes oligonucleotides and plasmid DNA. However, membrane transport of DNA is an inefficient process, and the mechanism(s) by which this process occurs is not clear. Although viral vectors are effective in gene therapy, The rapid development of DNA nanotechnology has led to wide-ranging applications of DNA nanomaterials in the field of biomedicine, including sensing, diagnosis, treatment, and imaging (Fig. 1). They can be employed as highly sensitive sensors for detecting biomarkers. Gene editing using CRISPR/Cas9 nanotechnology is a new dawn in the field of cancer therapy. The continuous optimization and improvement of CRISPR/Cas9 delivery non-viral vectors show its great potential for research and application in the field of oncology therapy. Nanoparticles are spherical, polymeric particles composed of natural or artificial polymers. They range in size between 10 and 500 NM. Nanoparticles are polymeric particles composed of natural polymers. They range in size between 10 and 500 nmhe most important role of nanotechnology for plant genetic engineering is the ability to control the delivery of goods to different plant species and tissues.

Keywords: *Gene therapy, Plasmid DNA, Cas9, Oncology Therapy, Genetics.*

NANOFABRICATION TECHNOLOGY

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Abstract:

Nanofabrication involves the production of materials with dimensions in the nano meter range. It facilitates the efficient processing of materials on a significant scale. The primary objective of nanofabrication is to generate a substantial quantity of nanoscale structures that are integral to a system, device, or component, while keeping the production cost extremely low. The development of flexible electronics has made significant strides in recent years due to the growing interest in this field. Flexible electronics have the potential to be utilized in a wide range of applications, not only in traditional electronic devices but also in bio/eco-electronic devices. These applications include flexible displays, power storages, solar cells, wearable electronics, and healthcare monitoring devices. In fact, flexible electronics have even been attached to the skin and implanted into the human body for monitoring bio signals and medical treatments. Innovative nanomaterials are essential for nanoscale fabrications to improve the electrical and mechanical characteristics of flexible electronics. The advancements in nanoscale fabrication techniques enable the creation of active materials that can be integrated with ultrathin soft substrates, resulting in flexible electronics with superior performance and reliability. This review presents a comprehensive overview of various nanoscale fabrication methods for flexible electronics, categorized as either top-down or bottom-up approaches. These methods include conventional photolithography, soft lithography, nanoimprint lithography, growth, assembly, and chemical vapor deposition (CVD). The review also highlights specific fabrication processes and their corresponding outcomes.

Keywords: *Nanofabrication, Flexible electronics, Bottom-up approaches.*

Material for biological Application

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Abstract:

The human body undergoes wear with their age, and it subjected to various diseases and disorders throughout their lifespan. The administration of medical agents does not give complete recovery from the ailments external agents or material are required to support normal functioning of the body. the materials that are engineered to interact with biological systems for the purpose of diagnosis or treatment of diseases and ailments are known as biomaterials. some of the resources to be engineered and used as a biomaterial. Some of the resource to be engineered and used as a biomaterial must possess the qualities of biocompatibility, inertness, mechanical stability and fabricated. the site of application of the biomaterials may be demand specific properties. biomaterials may be of natural or synthetic origin. The chapter discusses the various applications of biomaterials in the medicals and pharmaceutical industry. Highlights the type of biomaterials and discusses their properties specific to each application in the recent years, the Nano structured magnetic materials and their use in biomedical and biotechnology application has received a lot of attention

Keywords: biomaterials, biocompatibility, pharmaceutical industry

Nanotechnology and Sensors

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Abstract:

Nanotechnology is the science to understand the matter at a nanoscale dimension, generally ranging between 1 and 100nm. This technology involves the fabrication, manipulation, study of techniques, material, modes and use of nano-devices in various applications. Nowadays, nanotechnology is extensively used in developing biosensors using different types of nanocomposites. By using nanotechnology-based methods in complex food products can be detected with high sensitivity and specificity as compared to the conventional methods. Nano-sensors have the potential to meet both the demand of miniaturization and low-cost analytical devices. IN the past few years, application of e-nose technologies has come through advances in sensor design, material, software innovations, progress in micro-circuitry design and systems integration. A high advantage of establishing a small automated system was worked out for the use in field with rapid and cost-effective microbial detection, and sensitive stick tests were developed by using gold nanoparticles with high specificities for the same. This review highlights the effectiveness of nanomaterials for developing biosensors, especially for detecting the microbial pathogens present in contaminated food. The first section of this review describes the various properties of the nanomaterials used for sensing applications, and the safety issues and guidelines issued by various organizations for use at workplace or in laboratories. Nano sensors are generally used for the measurement of biological response output quantity as well as for conversion of biological response into output signals for further interpretation and analysis. Nanomaterial-based sensors are highly sensitive and specific in their nature as compared to the traditional material-based sensors.

Keywords: *nano sensors, cost effective, e-nose technologies, software innovations, gold nanoparticles, safety issues, highly sensitive.*

MATERIAL FOR BIOMEDICAL APPLICATIONS

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Abstract:

Biomedical materials science is an established field of science since the last few decades. New fabricating methodologies have changed conventional treatment methods as applications of new dental and biomedical materials give better outcomes. Current research is forced on biomimetic approach, a new paradigm regarding expected standards for state -of-the- art patient care. Within the field of dentistry, improvements in dental materials research have led to the current availability of bioactive materials with improved mechanical and physical properties. This chapter provides an in-depth information including properties and applications about dental and biomedical materials based on bioactive components specifically bioactive glass and glass fibres. As a result of current development in this area and with the advancement, the future prospects of bioactive glass fibres are encouraging.

Key words: Biomedical material, bioactive glass, physical properties, glass fibres etc.

Exploring the Potential of Semiconducting Materials in Modern Technology

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Abstract:

Semiconducting materials stand at the forefront of modern technology, offering a unique blend of electrical conductivity and tuneable properties. This abstract delves into the pivotal role of semiconductors in diverse applications, from electronics to renewable energy. Semiconductor devices have revolutionized communication, computing, and sensing, serving as the building blocks of modern electronics. Through precise control of doping and fabrication processes, semiconductors enable the creation of transistors, diodes, and integrated circuits, driving innovation in data processing and telecommunications. Beyond electronics, semiconducting materials hold promise in renewable energy technologies, particularly photovoltaics. By harnessing the photovoltaic effect, semiconductor-based solar cells convert sunlight into electricity with increasing efficiency, offering a sustainable solution to meet the world's energy demands. The versatility and adaptability of semiconductors continue to inspire breakthroughs in fields such as optoelectronics, sensing, and quantum computing. As researchers push the boundaries of material science and device engineering, semiconducting materials remain central to the ongoing technological revolution, shaping the future of innovation and progress.

Keywords: *Semiconducting materials, Electrical conductivity, Tuneable properties, Electronics, Renewable energy, Semiconductor devices, Transistors.*

Polymer Nanocomposites: Advances in Synthesis, Characterization, and Applications.

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Abstract:

Polymer nanocomposites have emerged as a versatile class of materials with wide-ranging applications in various fields. This abstract provides an overview of recent advancements in the synthesis, characterization, and applications of polymer nanocomposites. Synthesis methods such as solution blending, in-situ polymerization, and melt mixing are discussed for their ability to incorporate nanofillers, including nanoparticles, nanotubes, and nanosheets, into polymer matrices. The resulting nanocomposites exhibit enhanced mechanical, thermal, and electrical properties compared to pure polymers, making them attractive for diverse applications. Characterization techniques such as transmission electron microscopy (TEM), scanning electron microscopy (SEM), and X-ray diffraction (XRD) are employed to analyse the morphology, dispersion, and interfacial interactions within polymer nanocomposites. Applications of polymer nanocomposites span a wide range of industries, including automotive, aerospace, electronics, and biomedical engineering. In automotive and aerospace applications, polymer nanocomposites offer lightweight and high-strength materials for structural components and coatings. In electronics, nanocomposites are utilized for flexible displays, printed circuit boards, and electromagnetic shielding. Moreover, in biomedical engineering, polymer nanocomposites find utility in drug delivery systems, tissue engineering scaffolds, and medical implants. Interdisciplinary collaboration between materials scientists, chemists, engineers, and physicists continues to drive innovation in polymer nanocomposite research.

Keywords: *Polymer nanocomposites, synthesis methods, characterization techniques, nanoparticles, nanotubes, nanosheets, mechanical properties, thermal properties, electrical properties, applications, interdisciplinary collaboration, sustainable synthesis, emerging technologies.*

Nanomedicine: Revolutionizing Biological Sciences

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Abstract:

Nanomedicine represents a transformative paradigm in the realm of biological sciences, harnessing the unique properties of nanomaterials to revolutionize diagnostics, therapeutics, and drug delivery systems. This abstract presents a comprehensive overview of nanomedicine's role as a pioneering tool in advancing biological research and clinical applications. Key to the efficacy of nanomedicine is its ability to precisely target and interact with biological entities at the molecular level. Nanoparticles, liposomes, and dendrimers serve as versatile platforms for encapsulating therapeutic agents, enabling controlled release and enhanced bioavailability. Furthermore, surface modifications with ligands facilitate targeted delivery to specific tissues or cells, minimizing off-target effects and optimizing therapeutic outcomes. In diagnostics, nanomedicine offers unparalleled sensitivity and specificity through nanoparticle-based imaging agents and biosensors. Quantum dots, gold nanoparticles, and magnetic nanoparticles exhibit unique optical, plasmonic, and magnetic properties, enabling multimodal imaging and real-time monitoring of biological processes with unprecedented resolution and accuracy. Moreover, nanomedicine plays a pivotal role in elucidating fundamental biological mechanisms and enabling breakthroughs in disease understanding and treatment. Nanotechnology-enabled platforms facilitate the study of cellular interactions, biomolecular dynamics, and intracellular signalling pathways, shedding light on disease progression and identifying novel therapeutic targets.

Key words: *Nanomedicine, biological sciences, diagnostics, therapeutics, drug delivery systems, nanoparticles, liposomes, dendrimers, targeted delivery, surface modifications, imaging agents, biosensors, quantum dots, gold nanoparticles.*

Advancing Biomedical Frontiers through Innovative Materials: A Nexus of Bio-applications

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Abstract:

Materials designed for biological applications serve as the cornerstone of biomedical engineering, facilitating breakthroughs in diagnostics, therapeutics, and tissue engineering. This abstract explores the pivotal role of advanced materials in addressing challenges and unlocking opportunities in various biomedical domains. Biomaterials, tailored to interact seamlessly with biological systems, underpin a myriad of biomedical applications. From synthetic polymers to natural biopolymers and nanostructured materials, the quest for novel biomaterials continues to drive innovation in regenerative medicine, drug delivery, and medical device design. Biocompatibility, a fundamental characteristic of biomaterials, ensures compatibility with living tissues and organisms, minimizing adverse reactions and promoting integration. Surface modification techniques and biomimetic design principles enable the development of biocompatible materials with enhanced functionality and performance, paving the way for safe and efficacious biomedical interventions. In drug delivery, advanced materials play a pivotal role in optimizing therapeutic efficacy while minimizing side effects. Nanoparticle-based drug carriers, hydrogels, and microneedle arrays offer precise control over drug release kinetics and targeting, revolutionizing the treatment of various diseases, including cancer, infectious diseases, and chronic conditions. Furthermore, materials innovation drives the development of cutting-edge biosensors for rapid and sensitive detection of biological analytes. Functionalized nanomaterials, microfluidic devices, and molecularly imprinted polymers enable point-of-care diagnostics, environmental monitoring, and personalized healthcare, empowering clinicians and researchers with real-time insights into physiological processes.

Keywords: *Materials, biomedical applications, biomaterials, biocompatibility, tissue engineering, drug delivery, biosensors, regenerative medicine, nanotechnology.*

Illuminating Perspectives: Luminescent Materials in Modern Science

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Abstract:

Luminescent materials have emerged as indispensable tools across various scientific disciplines, offering unique optical properties that illuminate new avenues of exploration and innovation. Fluorescence and phosphorescence, the hallmark phenomena of luminescence, underpin diverse applications in sensing, imaging, and optoelectronics. Quantum dots, nanoscale semiconductor particles, exhibit size-dependent luminescence, enabling tunable emission across the visible spectrum with exceptional brightness and photostability. These nanomaterials find widespread use in biological imaging, where their precise control over emission properties facilitates high-resolution visualization of cellular processes. Beyond biology, luminescent materials play pivotal roles in environmental monitoring, with applications ranging from pollutant detection to remote sensing of atmospheric constituents. In optoelectronics, organic and inorganic luminescent compounds serve as key components in light-emitting diodes (LEDs) and displays, driving advancements in energy-efficient lighting and display technologies. Furthermore, their integration into photonic devices enhances signal processing capabilities and enables novel functionalities in telecommunications and data storage. Despite remarkable progress, challenges such as material stability, synthesis scalability, and cost-effectiveness persist, necessitating ongoing research efforts to address these limitations. Bridging fundamental understanding with practical applications, interdisciplinary collaborations drive innovation in luminescent materials, unlocking their full potential for addressing societal challenges and advancing scientific frontiers. This abstract provides an overview of the multifaceted roles of luminescent materials in modern science, emphasizing their significance in diverse fields and highlighting opportunities for future exploration and development.

Keywords: *Luminescent materials, fluorescence, phosphorescence, quantum dots, applications, sensing, imaging, optoelectronics.*

Nano-Enabled Remediation: Advancing Bioremediation through Nanodrugs

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Abstract:

Bioremediation, the use of biological agents to remove or neutralize pollutants, holds great promise for addressing environmental contamination. However, its efficacy is often hindered by challenges such as limited substrate availability, slow reaction rates, and incomplete degradation of pollutants. Nano-enabled remediation emerges as a groundbreaking approach to overcome these limitations by leveraging the unique properties of nanodrugs. This abstract explores the transformative potential of nanodrugs in enhancing bioremediation processes. Nanodrugs, engineered at the nanoscale, offer unparalleled advantages including enhanced surface area, increased reactivity, and improved stability. These properties facilitate targeted delivery of biological agents, such as enzymes, microorganisms, or biomolecules, to contaminated sites, thereby accelerating pollutant degradation and remediation kinetics. Furthermore, nanodrugs enable precise control over environmental conditions within remediation zones, optimizing microbial activity and facilitating the breakdown of recalcitrant pollutants. Moreover, their tunable properties allow for customization based on specific contaminants and environmental matrices, ensuring compatibility and efficiency in diverse remediation scenarios. Despite their immense potential, the deployment of nanodrugs for bioremediation necessitates careful consideration of potential risks, including nanoparticle toxicity, ecological impacts, and long-term fate in the environment.

Keywords: *Nanodrugs, Bioremediation, Environmental contamination, Nanotechnology, Pollutant degradation, Nano-enabled remediation, Targeted delivery, Microbial activity, Contaminant specificity, Risk assessment, Regulatory measures*

Advancements in Nano-fabrication: Enabling Novel Materials and Devices at the Nano-meter Scale

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Abstract:

Nano-fabrication, involving the creation of structures and devices at the nano meter scale, has revolutionized various fields such as electronics, medicine, and material science. Techniques like lithography, deposition, etching, and assembly are utilized to fabricate nano-scale structures with tailored properties and functionalities. This abstract explores the significance of nano-fabrication in enabling the development of novel materials with specific properties and functionalities. It highlights the importance of recognizing and examining nano-fabrication compounds in molecular adsorption, catalysis, magnetism, luminescence, nonlinear optics, and molecular sensing, as they offer the possibility of reproducible mass production. The development of devices with special characteristics stems from integrating low-cost and high-quality nano-features into 3D designs. Recent progress in nano-structured device fabrication has been remarkable, facilitated by various imprinting techniques. This abstract underscore the transformative impact of nano-fabrication on diverse fields and emphasizes the need for continued research and innovation in this rapidly advancing area.

Keywords: *Nano-fabrication, Nano meter scale, Lithography, Deposition, Etching, Assembly, Novel materials, Molecular adsorption, Catalysis, Magnetism, Luminescence, Nonlinear optics, Molecular sensing, Reproducible mass production, 3D designs, Imprinting techniques*

Nano drugs for medicine field

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Abstract:

Nano medicine is a branch of medicine using nanotechnology to prevent and treat diseases. Nanotechnology represents one of the most effective approaches in elevating a drugs treatment efficacy and reducing toxicity by improving drug solubility altering biodistribution and controlling the release. Nano medicine as experienced explosive growth in the past few years. Traditional drugs still occupy a dominant position in formation development, but increasingly active drugs have adopted nanoscale forms to limit side effects and improve efficacy. Nano medicine uses nanoparticles such as polymeric micelles, liposomes, and lipid nanoparticles in living for diseases prevention and treatment. Nano medicine improves the pharmacokinetic behaviour of drugs and reduce toxicity by improving drug solubility altering biodistribution, and controlling the release. The main types of NCDs are cardiovascular diseases and cancer. Some of therapeutics treatments for NCDs induce severe cytotoxicity. MNPs can induce cell death through various processes, including reactive oxygen species (ROS) generation and DNA damage, among others.

Keywords: *Nanomedicine, biodistribution, nanoscale, nanoparticles, pharmacokinetic, cardiovascular, therapeutics, CDs.*

Nanomedicine: A Transformative Tool for Advancing Biological Sciences

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Abstract:

Nanomedicine has emerged as a transformative tool driving significant advancements in biological sciences, revolutionizing drug delivery, diagnostics, and therapeutics. At the forefront of this paradigm shift are nanoparticles, engineered with precision to exploit unique properties at the nanoscale. These nanocarriers offer unprecedented opportunities for targeted drug delivery, enhancing therapeutic efficacy while minimizing systemic toxicity. Moreover, their versatile surface chemistry enables functionalization for specific cellular interactions, paving the way for personalized medicine approaches. In diagnostics, nanotechnology-enabled platforms facilitate ultra-sensitive detection of biomarkers, enabling early disease diagnosis and monitoring with unparalleled accuracy. Nanoparticles also serve as theranostic agents, combining diagnostic and therapeutic functionalities within a single nanostructure, thereby revolutionizing patient care pathways. However, challenges such as biocompatibility, scalability, and regulatory considerations underscore the need for interdisciplinary collaborations and rigorous translational research efforts. Integrating nanomedicine with biological sciences necessitates a comprehensive understanding of nanoparticle-biological interactions, unravel complex mechanisms underlying therapeutic efficacy and toxicity. Furthermore, exploring novel nanomaterials and fabrication techniques expands the toolkit for biomedical applications, fostering innovation and addressing unmet clinical needs. This abstract provides a concise overview of the transformative role of nanomedicine in biological sciences, highlighting its potential to redefine healthcare paradigms and drive precision medicine forward.

Keywords: *Nanomedicine, biological sciences, drug delivery, diagnostics, therapeutics, nanoparticles, nanotechnology.*

NANOFABRICATION:

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Abstract:

Nanofabrication is the process of designing and manufacturing structures and devices with dimensions on the nanometer scale, typically ranging from 1 to 100 nanometres. This field merges principles from physics, chemistry, biology, and engineering to create novel materials and devices with unique properties and functionalities. Key to nanofabrication is the precise control over material properties and structures at the nanoscale. Techniques such as electron beam lithography, photolithography, Nano imprint lithography, and self-assembly enable researchers to manipulate atoms and molecules to create nanoscale patterns and structures with high precision. One significant application of nanofabrication is in the development of Nano electronic devices, where smaller components lead to faster speeds, lower power consumption, and increased functionality. For example, nanofabrication techniques are crucial for the production of semiconductor devices such as transistors and memory cells, enabling the continued miniaturization of electronic devices. Furthermore, nanofabrication plays a vital role in fields like medicine, where nanoparticles can be engineered to deliver drugs directly to target cells, improving efficacy while minimizing side effects. Additionally, nanofabricated materials are utilized in sensors for detecting pollutants, pathogens, and other environmental contaminants with high sensitivity and specificity. Overall, nanofabrication is a rapidly evolving field with broad implications across various industries, from electronics and medicine to energy and environmental monitoring. Its continued advancement holds promise for the development of innovative technologies that could revolutionize numerous aspects of modern life.

Keywords: *Nanotechnology, Electron beam lithography, Photolithography, Nanoimprint lithography, Self-assembly, Semiconductor devices, Transistors.*

Advancements in Nanotechnology-Enabled Sensors: Revolutionizing Sensing Technologies

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Abstract:

Nanotechnology has emerged as a transformative force in the development of sensor technologies, offering unprecedented capabilities in detection, monitoring, and analysis across various fields. By leveraging the unique properties of nanomaterials, such as quantum dots, carbon nanotubes, and nanoparticles, sensors have been miniaturized, enhanced in sensitivity, and empowered with multifunctionality. This abstract explores the convergence of nanotechnology and sensors, elucidating their pivotal role in shaping the future of sensing applications. Nanotechnology-enabled sensors exhibit exceptional sensitivity, allowing for the detection of minute quantities of analytes with high precision. Functionalized nanomaterials enable specific binding interactions, facilitating the recognition of target molecules, pathogens, and pollutants in diverse environments. Additionally, the miniaturization of sensors through nanofabrication techniques has enabled their integration into wearable devices, implantable biomedical systems, and Internet of Things (IoT) platforms, fostering real-time monitoring and personalized healthcare solutions. Furthermore, nanotechnology has revolutionized sensor design by enabling the development of flexible, transparent, and biocompatible sensor substrates. These advancements have led to the creation of flexible electronics and biosensors capable of conforming to complex surfaces and biological tissues, paving the way for applications in wearable health monitors, environmental monitoring patches, and smart prosthetics. Moreover, nanotechnology has enabled the enhancement of sensor selectivity through the precise engineering of surface properties and the incorporation of molecular recognition elements.

Keywords: *Detection, Implantable biomedical systems, Internet of Things (IoT), Smart prosthetics, Sensor selectivity*

Nano-Scale Processes in Environmental Systems: Key Insights and Future Perspectives

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Abstract:

Understanding nano-scale processes in environmental systems is crucial for comprehensively addressing contemporary environmental challenges. Nanoparticles, with their unique properties, profoundly influence environmental processes, including transport, transformation, and fate. This abstract examines the key insights and future perspectives on nano-scale processes in environmental systems. At the nano-scale, nanoparticles exhibit distinct behaviours compared to bulk materials, impacting their mobility and reactivity in environmental matrices. Transport mechanisms such as diffusion, advection, and sedimentation are governed by nanoparticle size, shape, surface charge, and environmental conditions. Moreover, interactions with environmental components, such as organic matter and mineral surfaces, influence nanoparticle stability and aggregation kinetics, further shaping their fate in ecosystems. Nano-scale processes play a pivotal role in pollutant transformation pathways, facilitating both degradation and persistence of contaminants. Nanoparticles serve as catalysts in redox reactions, promoting the degradation of pollutants through advanced oxidation processes. Conversely, nanoparticle surface interactions can lead to pollutant sorption and sequestration, affecting their bioavailability and environmental mobility. The environmental fate of nanoparticles is intricately linked to their interactions with biota and ecosystem compartments. Bioaccumulation and biomagnification of nanoparticles in food webs raise concerns about their ecological impacts and human health risks.

Keywords: *Nano-Scale Processes, Environmental Systems, Nanoparticles, Transport Mechanisms, Transformation Pathways, Environmental Fate.*

Nanotechnology for the treatment of Multiple myeloma

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Abstract

Cancer is a disease with limited therapeutic options, even though tremendous improvements in medical research and technology. Multiple myeloma is one of cancer that affects plasma cells. These cells are part of immune system which producing antibodies that fights off infection. In multiple myeloma these plasma cells grow out of control in the bone marrow, crowding out healthy cells. Multiple myeloma (MM) is an age-related haematological malignancy with an estimated 30,000 new cases and 13,000 deaths per year. Although treatments exist, only about 50 percent of patients with the disease survive five years past diagnosis. Traditional therapeutic approaches such as radiation, chemotherapy, surgery, and combinational treatment are generally acknowledged to cure malignancies. Although Chemotherapy is still a highly effective cancer treatment but which is connected with severe side effects. In recent years, novel biomolecule-stabilized nanomaterials have emerged as prominent next-generation materials. Traditional cancer treatments have many limitations, prompting nanotechnology innovation for more precise and less harmful cancer treatment, which also known as cancer nanomedicine. Nanoparticle-based drug delivery systems offer enhanced drug targeting, reduced systemic toxicity, and improved therapeutic efficacy. Nanoparticles are amenable to modification and they can be designed to target and control the dose of drug that enters the target region. Advances in nanotechnology have provided novel avenues for the diagnosis and treatment of multiple myeloma (MM), a haematological malignancy characterized by the clonal proliferation of plasma cells in the bone marrow. Nanocarriers, such as liposomes, polymeric nanoparticles, and inorganic nanoparticles, used for the delivery of chemotherapeutic agents, siRNA, and miRNA in MM treatment. Therefore, nanotechnology is advanced nanoparticle-based treatment for the multiple myeloma.

Keywords: Cancer, Multiple myeloma, Chemotherapeutic, Nanotechnology, Nanoparticle.

Nano Materials Based Application for Medicine

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Abstract:

Nanotechnology is the study of extremely small structures, having size of 0.1 to 100 nm. The Nanotechnology is the treatment of individual atoms, molecules, or compounds into structures to produce materials and devices with special properties. Nanomaterials-natural, accidental, or engineered-occur in the air, water, or soil. Natural nanoparticles are generally found in a wide range of environments, such as natural water, sediments, weathered minerals and rocks, and volcanic ash. Nano medicine is a relatively new field of science and technology. Classification of nano materials based on their dimensions. An application of Nanotechnology in various fields such as health and medicine, electronics, energy and environment. Applications of nano particles in drug delivery, protein and peptide delivery, cancer. Applications of various nano systems in cancer therapy such as carbon nano tube, dendrimers, nano crystal, nano wire, nano shells etc. are used by nanotechnology. The advancement in nano technology helping in the treatment of neuro disorders such as Parkinson's disease and Alzheimer's disease. Applications of nano technology in tuberculosis treatment, the clinical application of nanotechnology in operative dentistry, in ophthalmology, in surgery, visualization, tissue engineering, antibiotic resistance, immune response are used here. Nano pharmaceuticals can be used to find the diseases earlier. Advancement in the field of nanotechnology and its applications to the field of medicines and pharmaceuticals has revolutionized in the twentieth century. Nanomaterials are playing crucial role in medicinal field.

Keywords: *Nanoscale, bioremediation, Nanoparticle, Photocatalytic, Nanoscience.*

NANOPARTICLES IN LUMINESCENCE AND ENERGY REDUCTION

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Abstract:

Luminescent Nanomaterials for Energy-Efficient Display is the evolutionary research which leads the world for the efficient use of energy. Luminescence nanoparticles helps us to replace the regular LED and amOLED displays with energy efficient displays. Luminescent quantum dots and perovskite nanocrystals (PNCs) are trustworthy, efficient energy converters for advanced day to day using displays and light sources. Their applications in the photoluminescence (PL)-based displays have been achieved through color enhancement films and patterned color-converters. Moreover, electroluminescence devices based on QDs and PNCs are still under active development, but emerging applications in the healthcare domains could accelerate their adoption. Herein, we first analyze the quantum dots color-conversion displays guided by state-of-the-art research and then summarize the evolution of in situ strategies to fabricate efficient and stable PNC–polymer composites. Subsequently, we introduce the application of flexible quantum dots light-emitting devices for the commercial replacing of regular displays. Remaining challenges and future perspectives of QDs and PNCs as light-converters for photoluminescence displays, and of quantum dots for electroluminescence's applications in further fields are analyzed.

keywords: *Nanoparticles, luminescence, efficiency, quantum dots, photoluminescence, perovskite nanocrystal (PNC), light converters*

NANOTECHNOLOGY IN EYE DISEASE.

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ABSTRACT:

Humans are exposed to cadmium and lead in various regions of the world daily due to industrial development and climate change. Increasing numbers of paraclinical and clinical studies indicate that heavy metals, such as cadmium and lead, play a role in the pathogenesis of eye diseases. Excessive exposure to heavy metals such as cadmium and lead can increase the risk of impaired vision. Therefore, it is essential to better characterize the role of these non-essential metals in disease etiology and progression. This article discusses the potential role of cadmium and lead in the development of age-related eye diseases, including age-related oracular degeneration, cataracts, and glaucoma. Furthermore, we discuss how cadmium and lead affect ocular cells and provide an overview of putative pathological mechanisms associated with their propensity to damage the eye. The prevalence of hearing loss increases rapidly with aging. Hearing loss is common in all age groups, even in young adults and adolescents. A growing body of evidence has suggested that heavy metals have toxic effects, yet few epidemiological studies have investigated the association between heavy metals and hearing loss in a general population that includes adults and adolescents. We examined the association between environmental exposures to lead, mercury, and cadmium and the risk of hearing loss in adults and adolescents while controlling for potential confounding factors, including noise exposures and a clinical factor is an area of health that is directly affected by access to medical core.

keywords: *Age-related oracular degeneration; Cataracts; Environmental pollution; Glaucoma; Safe environment.*

Applications of Nano particles: Exploring Diverse Frontiers

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Abstract:

Applications of Nanoparticles: Exploring Diverse Frontiers Abstract: Nanoparticles, with their unique properties and versatile applications, have revolutionized numerous fields across science and technology. This abstract provides an overview of the diverse applications of nanoparticles, spanning biomedical, electronics, energy, environmental, catalysis, and materials sectors. In biomedicine, nanoparticles serve as drug delivery carriers, imaging agents, and diagnostic to Ing targeted and personalized triCTURIES. In electronics. Spanning biomedical, electronics, energy, environmental, catalysis, and materials sectors. In biomedicine, nanoparticles serve as drug delivery carriers, imaging agents, and diagnostic tools, offering targeted and personalized therapies. In electronics, nanoparticles enable miniaturization, improved performance, and novel functionalities in devices such as transistors, sensors, and displays. In energy, nanoparticles enhance efficiency and sustainability in areas including solar cells, batteries, and fuel cells, driving progress towards renewable energy solutions. In environmental applications, nanoparticles facilitate pollutant removal, water purification, and soil remediation, addressing pressing environmental challenges.

Key points: *Nanoparticles, Applications, Nanotechnology, Biomedical, Electronics, Energy, Environmental, Materials.*

PHARMACOKINETICS OF NANOPARTICLES: CURRENT UNDERSTANDING, FUTURE PROSPECTS, AND IMPLICTIONS IN DRUG DELIVERY.

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ABSTRACT:

Nanoparticles have emerged as promising candidates for drug delivery, offering distinct advantages over conventional formulations. Understanding their pharmacokinetics is crucial for optimizing therapeutic efficacy and minimizing adverse effects. This review comprehensively examines the current knowledge and future directions of nanoparticle pharmacokinetics, focusing on absorption, distribution, metabolism, and excretion in vivo. Nanoparticles size, surface properties, and targeting strategies profoundly influence pharmacokinetic behavior. Smaller nanoparticles often exhibit enhanced tissue penetration and prolonged circulation times, while surface modifications can facilitate specific cellular targeting and evasion of immune advancements in nanotechnology have enabled the development of multifunctional Nanoparticles capable of controlled drug release and simultaneous imaging. Future research directions in Nanoparticles pharmacokinetics encompass personalized medicine initiatives and Innovative formulations tailored to specific diseases targets. Personalized approaches aim to account for inter-individual variability in pharmacokinetics parameters, allowing for optimized dosing regimens and improved therapeutic outcomes. Additionally, novel nanoparticles formulations hold promise for overcoming biological barriers and delivering therapeutics to previously inaccessible sites, such as the blood-brain barrier and tumor microenvironment. The implications of nanoparticles pharmacokinetics in drug delivery are profound, with potential applications across a wide range of disease, including Cancer, infectious diseases, and neurological disorders. Optimizing Nanoparticles pharmacokinetics offers opportunities to enhance therapeutic efficacy, minimize side effects, and ultimately improve patient outcomes.

Keywords: Pharmacokinetics, Drug delivery, Absorption, Distribution, Metabolism, Excretion, Nanotechnology, Personalized medicine, Targeting strategies, Multifunctional nanoparticles, biological barriers, Therapeutic efficacy, Side effects, Clinical implications.

Nanoparticles in Nanomedicine: Unveiling Novel Cellular Uptake Mechanisms and Innovative Drug Delivery Strategies

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Abstract:

Nanoparticles (NPs) play a pivotal role in the field of nanomedicine, particularly in their intricate interactions with cellular systems. While the precise mechanisms governing their uptake by cells remain elusive, traditional endocytotic pathways have been implicated. However, recent studies have unveiled a novel pathway known as microvillus-mediated adhesion (MMA), providing a potential alternative route for NP internalization. This intriguing mechanism has been observed in experiments utilizing ceria and magnetite NPs, particularly those with dimensions less than 40 nm and functionalized with polyacrylic acid. Notably, the surface functionalization of these NPs appears to significantly influence the efficacy of MMA, suggesting a nuanced interplay between NP properties and cellular uptake mechanisms. Moreover, investigations into NP interactions with phospholipid membranes have underscored the size-dependent nature of these interactions, emphasizing their relevance not only in nanomedicine but also in the burgeoning field of nanotoxicology. Understanding how NPs engage with model membranes serves as a crucial foundation for extrapolating their behaviour within the complex milieu of biological membranes. Furthermore, addressing the challenge of delivering particulate systems to specific cell populations, such as macrophages implicated in various diseases like HIV, tuberculosis, and cystic fibrosis, remains a pressing concern. To overcome this hurdle, innovative strategies have been devised, including the development of hybrid nanoparticle-in-microparticle structures. By combining poly(lactic-co-glycolic) acid (PLGA) nanoparticles with lipid nanoparticles via spray drying techniques, researchers have created hybrid structures capable of enhancing particle uptake into target cells, such as RAW 267.4 macrophages. In essence, the exploration of NP-cell interactions represents a dynamic and multifaceted area of research with far-reaching implications for both basic science and clinical applications.

Keywords: *Nanomedicine, Endocytotic pathways, Microvillus-mediated adhesion, Nanotoxicology, Drug delivery, Biomedicine ,PLGA nanoparticles.*

Nanoparticles in medical field

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ABSTRACT:

Nanoparticles are microparticles which can penetrate into cell walls and blood brain barrier (BBB), helps to deliver drugs to the particular diseased cell without disturbing the other healthy cells like, Treatment of cancer, Chronic Heart Failure, Neurodegenerative diseases, Bone regeneration, Dentistry, gene therapy etc..... Nanoparticles are found to be antimicrobial and antibacterial activities by themselves. Nano-silver acts as an effective bactericide in bacteria than antibiotics it can interact with the bacterial cell surface without penetration. Nano-gold particles shows minimum bactericidal against gram negative bacteria such as E. coli. Nano-silver, Nano-copper, Nano-Zinc plays an interesting role in the field of biomedicine. Quantum dots, Superparamagnetic iron oxide nanoparticles, Polymer- and liposome-based nanoparticles are these NP types that majorly used In vivo applications in the medical field. Comminution, pyrolysis, and sol-gel synthesis based on these three methodologies NP are synthesized in medical field. The focus of this study is to diagnose and to treat medically challenged diseases with the help of nanoparticles in order to save the humans from diseases and increase their life span also prevent hereditary disorders, in order to live a healthy life in this planet.

Keywords: Nanoparticles, Medicinal uses, Diagnosis of diseases, Treatment of cancer, Types of NP, Manufacturing of NP, Nano-metals.

Exploring the application of silver Nanoparticles in antimicrobial activity

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Abstract

In ancient times metals have been used to combat infectious disease. With introduction of nanotechnology, due to the broad inhibitory spectrum against bacteria, fungi, virus, Metal nanoparticles especially Silver Nanoparticles has gaining increased attention in the field of medicine. Silver nanoparticles are cost-effective, it acts as an alternative to traditional antibiotic therapy. Numerous amounts of studies suggested that silver nanoparticles have been exhibited significant antimicrobial actions, especially against the bacterial infection as antibacterial agent. Nanoparticles acts as an alternative to antibiotics and is widely used to target bacteria. It helps in preventing bacterial infection and promote wound healing. Ag based nanoparticles particles has been exhibited helpful in antibacterial application, because of the remarkable activities of nanotechnology-based materials has given immense support to improve the activities of silver. Emerging infection with virus is creating severe hazards to worldwide public health, recently COVID 19 has caused mass human hazards with significant economic impacts. The drug designing of target virus is complicated. As the virus use host cells for replication, they Do not harm the host cell while targeting. Silver nanoparticles adhere to gp120 in such a way that it inhibits CD4-dependent virion binding, infectivity and fusion, acting as an effective virucidal agent against cell-free virus (clinical isolates, laboratory strains, T and M tropic strains and resistant strains) and cell associated virus. The strongest antifungal properties were detected for negatively charged EGCGAg nanoparticles (-) epigallocatechin gallate (EGCG). It was concluded that, by introducing a specific stabilizing agent, one can obtain the selectivity of silver (Ag) nanoparticle toxicity towards desired pathogens.

Keywords: *nanotechnology, nanoparticles, antimicrobial, antibacterial, virucidal, antifungal*

NANOPARTICLES TOXICOLOGY

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ABSTRACT:

Nanoparticle toxicology investigates the potential health risks associated with exposure to nanoparticles, which are particles with dimensions ranging from 1 to 100 nanometers. These particles exhibit unique physical and chemical properties compared to their bulk counterparts, leading to diverse applications across industries like medicine, electronics, and manufacturing. However, their small size also raises concerns about potential adverse effects on human health and the environment. Research in nanoparticle toxicology aims to understand how nanoparticles interact with biological systems at the molecular, cellular, and organismal levels. Studies have shown that nanoparticles can enter the body through various routes, including inhalation, ingestion, and dermal absorption. Once inside the body, nanoparticles may interact with cells, tissues, and organs, potentially leading to toxicity. The mechanisms of nanoparticle toxicity are complex and can vary depending on factors such as nanoparticle size, shape, surface chemistry, and dosage. Common mechanisms include oxidative stress, inflammation, genotoxicity, and disruption of cellular processes. Moreover, certain nanoparticles have been found to cross biological barriers such as the blood-brain barrier and the placental barrier, raising concerns about their potential to affect vulnerable populations like fetuses and infants.

Keywords: *Chemical composition, Cellular uptake and distribution, Genotoxicity and mutagenicity: Interactions with biomolecules, Long-term effects and chronic exposure, Inflammatory response*

A review of Bio synthesis of Nano particles -Harnessing Nature's Nano factories

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Abstract

The bio synthesis of Nano particles represents a burgeoning field at the intersection of biology, chemistry, and nanotechnology. By harnessing the inherent capabilities of living organisms, researchers have unlocked sustainable and eco-friendly methods for nano particle production. This abstract explores the principles, mechanisms, and recent advancements in biosynthesis, emphasizing the utilization of nature's nano factories to propel green nanotechnology forward. Key aspects covered include diverse biogenetic synthesis is pathways mediated by microorganisms, plants, and biomolecules, alongside mechanistic insights into enzymatic reduction, metabolic pathways, and bio molecular interactions governing nanoparticle synthesis. The advantages of biosynthesis, such as biocompatibility, scalability and standardization are also addressed, underscoring the need for interdisciplinary collaborations and regulatory frame works.

Key points: *Bio synthesis, Nano particles, Nano Technology, Bio compatibility, green nano technology, Nano factories, Mechanisms*.

Nanoparticle– zinc oxide

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Abstract

Compared to conventional physical and chemical approaches, nanobiotechnology and plant-based green amalgamation methods offer noteworthy preferences, as well as having a more noteworthy run of therapeutic and biotechnological applications. Nanoparticles of zinc oxide (ZnO NPs) have as of late been recognized as a promising alternative for numerous businesses, counting optics, electrics, bundled nourishments, and medication, due to their biocompatibility, cytotoxicity, and cost-effectiveness. A few ponders have appeared that zinc particles are critical in activating cell apoptosis by advancing the era of responsive oxygen species (ROSs) and discharging zinc particles (Zn2+), which are harmful to cells. The poisonous nature of the chemicals utilized in the amalgamation of ZnO nanoparticles limits their clinical utility. An outline of later advancements in green ZnO NP blend is displayed in this audit, emphasizing plant parts as lessening specialists and their therapeutic applications, counting their antimicrobial, anticancer, antioxidant, and anti-inflammatory properties, as well as key instruments of activity for these applications to encourage encourage inquire about on the biomedical areas in the future.

Keywords: *nanobiotechnology, nanoparticles, zinc particles, amalgamation*

The Revolution of Nano particles: A comprehensive Review

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Abstract:

Nano particles have emerged as a pivotal frontier in various fields, revolutionizing industries ranging from healthcare to electronics. This review provides a comprehensive analysis of the recent advancements, applications, challenges and future prospects of Nano particles. The synthesis techniques, including bottom-up and top-down approaches are discussed, highlighting their efficiency and scalability.Moreover,the multifaceted applications of nano particles in drug delivery,imaging,catalysis and environmental remediation are elucidated, showcasing their versatility and impact on society.However,challenges such as toxicity, stability and regulatory hurdles are addressed, emphasising the need for further research and development.Additionally,future directions, including the integration of nano particles with emerging technologies like artificial intelligence and biotechnology are explored underscoring their potential to reshape the scientific landscape.Overall,this review underscores the transformative role of nano particles and provides insights into their promising future.

Key Points:

- Pivotal frontier.
- Health care to electronics.
- Highlighting efficiency and scalability.
- Multifaceted applications.
- Versatility and impact on society.
- Challenges – toxicity, stability and regulatory hurdles.
- Integration of Nano particles.
- Artificial intelligence and biotechnology – explored.

Nanofabrication

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Abstract

Smaller scale- and nanofabrication procedures have revolutionized the pharmaceutical and restorative areas as they offer the plausibility for profoundly reproducible mass-fabrication of frameworks with complex geometries and functionalities, counting novel sedate conveyance frameworks and biosensors. The central smaller scale- and nanofabrication strategies are portrayed, counting photolithography, delicate lithography, film testimony, carving, holding, atomic self gets together, electrically actuated nanopatterning, agile prototyping, and electron, an X-ray, colloidal monolayer, and centered particle pillar lithography. Application of these strategies for the creation of medicate conveyance and biosensing frameworks counting injectable, implantable, transdermal, and mucoadhesive gadgets is depicted.

Key words: *nano fabrication, pharmaceutical, photolithography, plausibility, nano patterning*

Nano technology in forensic science: Extensive applications and New perspective.

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Abstract:

Nanotechnology has promising application in forensic science, such as improving fingerprint analysis, DNA sequencing and detecting trace evidence like fibres or chemicals. Nano particles can enhance sensitivity and specificity in detecting minute quantity of substances, aiding crime scene investigation and analysis. Additionally, Nano structures could advance forensic imaging techniques for better visualization of evidence. Nanotechnology plays a crucial role in forensic science by promoting various aspects of crime scene investigation, evidence analysis and forensic techniques. Some key roles are sensitive detecting, DNA sequencing, finger print analysis, forensic imaging, drug analysis, crime scene investigation tools, security features, forensic toxicolons. Overall Nanotechnology offers a wide range of tools and techniques to improve the efficiency, accuracy and sensitivity of forensic science thereby aiding laws enforcement agencies in solving crimes and delivering justice.

Key words: *fingerprint analysis, visualization evidence, crime scene, forensic technique tools, DNA sequencing.*

Single crystals

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Abstract:

Single valuable stones of a potential nonlinear optical texture, l-arginine maleate, were successfully created by direct vanishing of the submerged liquid course of action at room temperature (30°C) and pearls up to 20×6×3 mm3 were created. The created diamonds were characterized by X-ray diffraction (single valuable stone and powder) to choose the unit cell parameters. The created pearls were additionally subjected to FT-NMR and FT-IR strategies to assert the closeness of the valuable bunches appear in the compound. Thermogravimetric and differential warm examinations reveal the awesome warm relentlessness of the texture. UV-Vis-NIR transmittance shows up a lower cutoff at 300 nm and powder SHG considers almost layout the arrange planning characteristics of the fabric. Single valuable stones, either common or inorganic, have as of presently been utilized in a wide run of biomedical applications (transducers, sensors, scintillators, wavelength shifters, etc.). Their curiously properties have been associated or suggested for utilize in a colossal amplify of restorative modalities. In microbiology, single-crystal X-ray diffraction can be utilized to choose the diamond structure of compounds. For case, one think approximately utilized single-crystal X-ray diffraction to choose the valuable stone structure of four compounds. In natural tests, two of the compounds appeared essential antibacterial activity against Escherichia coli and Staphylococcus aureus.

Keywords: *single crystals, optical fabric, FT-IR, gem development.*

NANOPARTICLES AND ITS CLASSIFICATION

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ABSTRACT:

Nanoparticles are spherical, polymeric particles composed of natural or artificial polymers. They range in size between 10 and 500nm. The concept of nanotechnology was first introduced in 1959 when physicist Richard Feynman presented a presentation on making things at the atomic and molecular levels. Nanoparticle technology is rapidly advancing, providing novel and effective treatments for various disease. The principle of nanoparticles is the high surface area of a material in nanoparticles form allows heat, molecules, and ions to diffuse into or out of the particles at very large rates. The small particle diameter, on the other hand, allows the whole materials to reach homogeneous equilibrium with respect to diffusion in a very short time. Nanoparticles can be classified into any of various types, according to their size, shape and material properties. Some classifications distinguish between organic and inorganic nanoparticles, the first group includes dendrimers, liposomes, and polymeric nanoparticles, while the latter includes fullerenes, quantum dots, and gold. Other classifications divide nanoparticles according to whether they are carbon-based, ceramic, semiconducting, or polymeric. In addition, nanoparticles can be classified as hard (eg: titania - titania dioxide, silica - silica dioxide, fullerenes) or as soft (eg: liposomers, vesicles, and nanodroplets). The classification typically depends on their applications such as in diagnosis or therapy versus basic research, or may be related to the way in which they were produced. The major physical properties of nanoparticles and all are interrelated: 1) They are highly mobile in the Free State. 2) They have enormous specific surface areas. 3) They may exhibit what are known as quantum effects. The applications of nanotechnology in medicine are detection (molecular imaging), monitoring (biomarker mapping), targeted therapy (cancer), theragnostic (see and treat), drug screening (labelling), gene delivery (therapeutics), bone tissue engineering, nano implants (orho), disease diagnosis (devices and labelling), immunotherapy.

Keywords: *Nanoparticles, principle, classifications, physical properties, applications.*

Insight into the world of nanoparticles used in the Cosmetic industry

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Abstract:

It's been more than 30 years where nanoparticles used in the cosmetic industry. Where it's main role of nanoparticles in cosmetics is it easily gets penetrated into our skin for the delivery of ingredients of the products. The long-term stability is the ultimate goal of NM in this industry. These nanoparticles are of different types with different characteristics such as inorganic nanoparticles, silica, Carbon black, nano organic materials, nano – hydroxyapatite and mainly gold and silver nanoparticles. Where this practice provides us sun protection factor (SPF), inflammation, and altered phagocytosis in human monocytes, enamel remineralisation. The European commission gives the guidance on the safety of the NMs in cosmetics. Famous companies are started to induced the nanoparticles in their products. Since the applications of nanotechnology are larger and the risk related to the larger applications are uncleared. Further developers are should be made so that we will he aware of this massive technology.

Keywords: *nano – hydroxyapatite, sun protection factor (SPF), long term stability, enamel remineralisation.*

Nano Materials in chemical properties: surface chemistry, Reactivity, stability, applications and safety considerations

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Abstract:

Nanoparticles have emerged as versatile materials with unique chemical properties, attracting widespread interest across scientific disciplines. Their small size and large surface area-to-volume ratio render them highly reactive and adaptable, making them indispensable in numerous applications ranging from medicine to environmental remediation. However, understanding the intricacies of nanoparticle chemistry is essential for harnessing their full potential while ensuring safe and responsible usage. This comprehensive review aims to unravel the complex world of nanoparticle chemistry, offering insights into surface chemistry, reactivity, stability, and diverse applications This comprehensive review delves into the intriguing world of nanoparticle chemistry, providing a nuanced understanding suitable for students and researchers alike. Beginning with an exploration of surface chemistry, the article elucidates the pivotal role of surface functionalization in tailoring nanoparticle properties. It further investigates the enhanced reactivity of nanoparticles stemming from their high surface-to-volume ratio, highlighting applications in catalysis, sensing, and environmental remediation. The discussion extends to the stability of nanoparticles, elucidating factors influencing their durability and performance. Moreover, the review delineates diverse applications spanning medicine, electronics, and energy, showcasing the versatility of nanoparticles in addressing contemporary challenges. Importantly, safety considerations surrounding nanoparticle usage are underscored, emphasizing responsible research practices. Through this review, readers gain a comprehensive overview of nanoparticle chemistry, laying the groundwork for further exploration and innovation in this burgeoning field.

Keywords: Nanoparticles, Chemical properties, Surface chemistry, Reactivity, Catalysis, Sensing, Environmental, Stability, Applications, Medicines, safety considerations.

Insight into the world of nanoparticles used in the Cosmetic industry

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Abstract:

It's been more than 30 years where nanoparticles used in the cosmetic industry. Where it's main role of nanoparticles in cosmetics is it easily gets penetrated into our skin for the delivery of ingredients of the products. The long-term stability is the ultimate goal of NM in this industry. These nanoparticles are of different types with different characteristics such as inorganic nanoparticles, silica, Carbon black, nano organic materials, nano – hydroxyapatite and mainly gold and silver nanoparticles. Where this practice provides us sun protection factor (SPF), inflammation, and altered phagocytosis in human monocytes, enamel remineralisation. The European commission gives the guidance on the safety of the NMs in cosmetics.
Famous companies are started to induced the nanoparticles in their products.

Keywords: *nano – hydroxyapatite, sun protection factor (SPF), long term stability, enamel remineralisation*

Exploring the Metallic Nanoparticles in the Food Sector

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Abstract

Nanoparticles are spherical, polymeric particles composed of natural or artificial polymers. A nano particle is a particle of matter 1 to 100 nanometres (nm) in diameter. Nanomaterials and in particular metallic nano particles (MNPs) that have significantly contributed to the production of healthier safer and higher – quality foods and food packaging with special property. Then it increased the water repellency and ability to inhibit the microbial contamination and ensuring the high quality and longer product in self-life. MNPs can also incorporated into the chemical and biological sensors, sensitive monitoring devices to assess food quality from freshness to detect the allergens, and food borne pathogens or toxins. This MNPs develop antimicrobial agents with the potential to improve the shelf life of foods and prevent microbial growth. Nanoparticles used in food sector such as titanium dioxide (TiO2), silicium dioxide (SiO2), Zinc oxide (ZnO), gold nanoparticles (Au NPs), Silver nanoparticles (Ag NPs) …, etc These NPs are the stable, advantageous as well as eco-friendly. And it provides positive feedback to food industries and in packaging markets. This review summarized the recent developments in the use of MNPs in the field of food science and their technology. In overview the MNPs synthesis and characterization techniques that is provided as well as biosafety, toxicity and regulatory issues of MNPs in the agricultural feed and in the food sectors.

Keywords: - *Metallic nanoparticles (MNPs), food, food industries, food qualities, food packaging and food analysis.*

NANOPARTICLES

Title: introduction to nanoparticles, formation of nanoparticles and application of nanotechnology

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Abstract:

A nanoparticle or ultrafine particle is a particle of matter 1 to 100 nanometers(nm) in diameter. Nanoparticles are naturally produced by many cosmological, geological, meteorological and biological processes. Nanoparticles occur in a great variety of shapes which have been given many informal names such as nanospheres, nanorods, nanochains, Nano stars, nanoflowers, Nano reefs, nano whiskers, nanofibers and nanoforest properties of a material in nanoparticle form are unusually different from those of the bulk one when divided into micrometer size particles. Many of them arise from spatial confinement of sub atomic particles which are (photons, electrons and photons) and electric fields around these particles. The large surface to volume ratio is also significant factor at this scale. They composed of natural or artificial polymers. Nanoparticle technology is rapidly advancing, providing novel and effective treatment for various diseases including neurodegenerative diseases such as Alzheimer's and Parkinson's diseases. Nanoparticles have made major contributions to clinical medicine in the areas of medical imaging and drug / gene delivery. While several innovations such as iron oxide contrast agents and many drug delivery system are by now well established, newer technologies continue to emerge following the same basic concepts of design. As these innovations advance to clinical applications, attention must be paid to environmental and social implications, particularly in areas such as quantum dots.

KEYWORDS: *nanoparticles, Alzheimer's and Parkinson's diseases, polymers, quantum dots*

Biophysical and chemical properties of nanoparticles: A comprehensive Review

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Abstract:

Biophysical properties: Nano particles possess distinctive biophysical properties owing to their small size and high surface area-to-volume ratio. These properties enable nanoparticle to interact with biological systems in unique ways, facilitating applications such as drug delivery, imaging, and sensing. Their small size allows for efficient cellular uptake and transport, while their large surface area provides sample opportunity for interactions with biomolecules. Additionally, nanoparticles can be tailored in terms of size, shape, and surface chemistry to modulate their biophysical behaviour and optimize their performance in specific applications. Understanding these biophysical properties in crucial for harnessing the full potential of nanoparticles in biomedicine, environmental remediation, and beyond. Chemical properties: Chemical properties of nanoparticles can vary depending on their composition,size,shape,and surface characteristics. Some common chemical properties

Include: 1. surface reactivity: Nanoparticles often exhibit higher surface area -to -volume ratios, leading to increased surface reactivity compared to bulk materials.

2.catalytic activity: certain nanoparticles serve as catalysts for various chemical reactions due to their unique surface properties

Key words: *Nanoparticles, Optimize, Efficient cellular uptake, Crucial for harnessing, Quantum confinement effects*

Engineering Nano Materials for Microbial Control and Remediation Strategies

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Abstract:

The utilization of engineered nanomaterials (ENMs) has emerged as a promising approach for addressing microbial challenges in various environmental and industrial contexts. This abstract delves into the key aspects of engineering Nano materials for microbial control and remediation Strategies. Firstly, ENMs possess unique physicochemical properties such as high surface area, reactivity, and tunable surface chemistry, making them highly effective in interacting with microorganisms. These properties enable targeted interactions with microbial cells, leading to microbial inhibition or eradication. Additionally, ENMs can serve as carriers for antimicrobial agents, enhancing their delivery and efficacy. In the realm of microbial control, ENMs have demonstrated significant potential in combating microbial infections in medical settings. Nanoparticles such as silver, zinc oxide, and titanium dioxide have exhibited strong antimicrobial activity against a wide range of pathogens, including bacteria, viruses, and fungi. Furthermore, the development of antimicrobial coatings and surfaces incorporating ENMs has shown promise in preventing microbial adhesion and biofilm formation on medical devices and surfaces. In environmental remediation, ENMs play a pivotal role in mitigating microbial pollution and enhancing remediation processes. Nanostructured materials like carbon nanotubes, graphene oxide, and metal nanoparticles have been employed for the removal of contaminants such as heavy metals, pesticides, and organic pollutants. Their high adsorption capacity, catalytic activity, and ability to facilitate microbial degradation processes contribute to efficient remediation strategies. However, alongside their immense potential, the environmental and health implications of ENMs must be thoroughly evaluated to ensure their safe and sustainable use. Research efforts are ongoing to understand the fate, transport, and toxicity of ENMs in natural systems and biological organisms.

Keywords: Microbial Control, Remediation Strategies, Engineered nanomaterials, Physico chemical properties antimicrobial agent, Anti-microbial coatings, Environmental remediation, Heavy metals organic pollutants, Toxicity.

Graphene Oxide/n-Hydroxyapatite decorated on Ti6Al4V for Biomedical Applications

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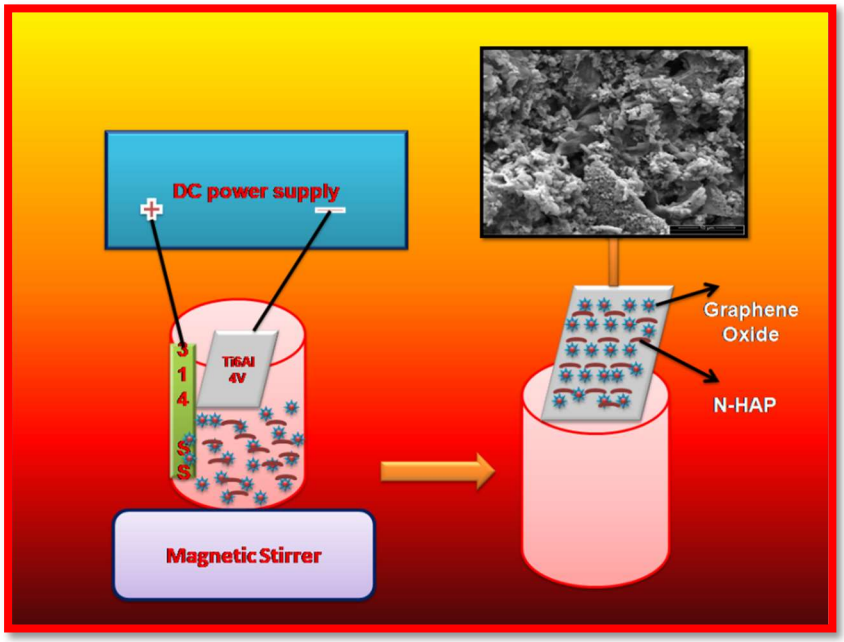
Abstract



In present work, Graphene oxide (GO) was firstly employed as nano scale reinforcement fillers in Nano- Hydroxyapatite (n-HAP) coatings by a electrophoretic deposition process, and GO/n-HAP coatings were deposited on Ti6Al4V using Isopropanol suspension. GO was successfully synthesized using the modified Hummer's method. Moreover, the EPD layer was characterized by FT-IR spectroscopy, FE-SEM. Mainly the corrosion resistance of the coated Ti6Al4V was evaluated by Open Circuit Potential (OCP) time measurement and Electrochemical impedance spectroscopic studies and Polarization resistance in Ringer solution. The application of GO/n-HAP EPD layer improved the corrosion resistance of coated Ti6Al4V due to the superior barrier property of GO.

Keywords: *Graphene Oxide (GO), Nano-Hydroxyapatite (n-HAP), Metals and Alloys, XRD, FT-IR, FESEM, Electrochemical studies.*

FABRICATION OF GO/HAP/PEG NANOCOMPOSITE COATINGS ON Ti6Al4V SUBSTRATE

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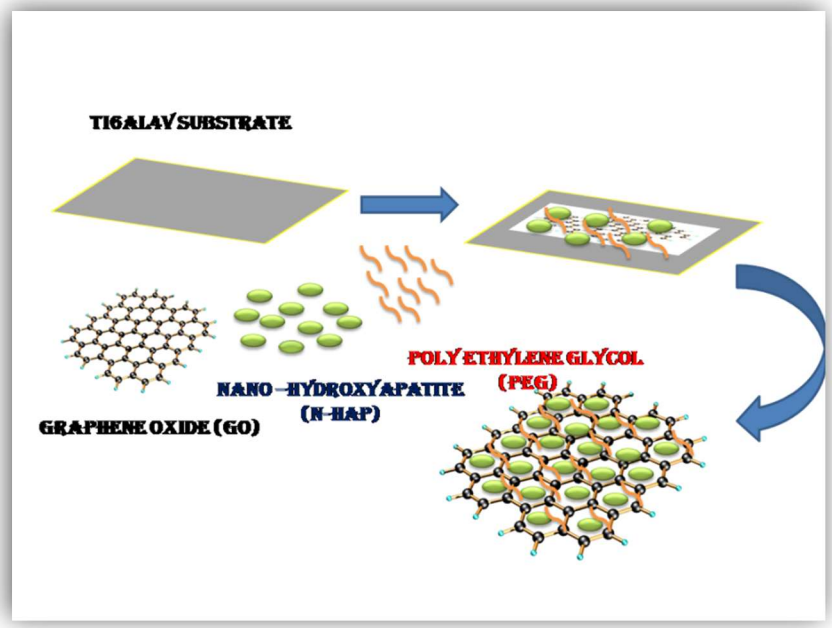
Abstract



The novelty of this study is to produce a high surface area, homogeneous and adhesive Graphene Oxide (GO)/Hydroxyapatite (HAP)/Poly Ethylene Glycol (PEG) composite coatings on Ti6Al4V substrate were prepared as gel, coated by Dip coating method in chloroform ($CHCl_3$). The crystallinity and phase composition of the metal surface, surface morphology and their functional groups of GO/HAP/PEG dip coating layers were confirmed by XRD, RAMAN, UV-DRS, FESEM, OPTICAL MICROSCOPIC IMAGES and FT-IR studies respectively. The surface wettability of the coating metal surface was characterized by Contact angle. Open circuit potential (OCP), Potentiodynamic polarization and Electrochemical Impedance Spectroscopy (EIS) studies indicate that the GO/HAP/PEG composite coatings exhibited high corrosion resistance in comparison with Bare Ti6Al4V in Simulated body fluid.

Key words: *Graphene Oxide (GO), Hydroxyapatite (HAP), Poly Ethylene Glycol (PEG), Ti6Al4V metal, Dip coating, Composite layers, Corrosion studies.*

Applications of Nanotechnology in sensor-based and detection of foodborne pathogens.

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Abstract

The intake of microbial-contaminated food poses severe health issues due to the outbreaks of stern food-borne diseases. Therefore, there is a need for precise detection and identification of pathogenic microbes and toxins in food to prevent these concerns. Thus, understanding the concept of biosensing has enabled researchers to develop Nano biosensors with different nanomaterials and composites to improve the sensitivity as well as the specificity of pathogen detection. The application of nanomaterials has enabled researchers to use advanced technologies in biosensors for the transfer of signals to enhance their efficiency and sensitivity. Nanomaterials like carbon nanotubes, magnetic and gold, dendrimers, graphene nanomaterials and quantum dots are predominantly used for developing biosensors with improved specificity and sensitivity of detection due to their exclusive chemical, magnetic, mechanical, optical and physical properties. All nanoparticles and new composites used in biosensors need to be classified and categorized for their enhanced performance, quick detection, and unobtrusive and effective use in foodborne analysis. Hence, this review intends to summarize the different sensing methods used in foodborne pathogen detection, their design, working principle and advances in sensing systems.

Keywords: *nanotechnology, sensor, foodborne pathogens.*

Electrochemical Behaviour of Novel GO/HAP/PVA Nanocomposite Coatings on Ti6Al6V for Biomedical Applications

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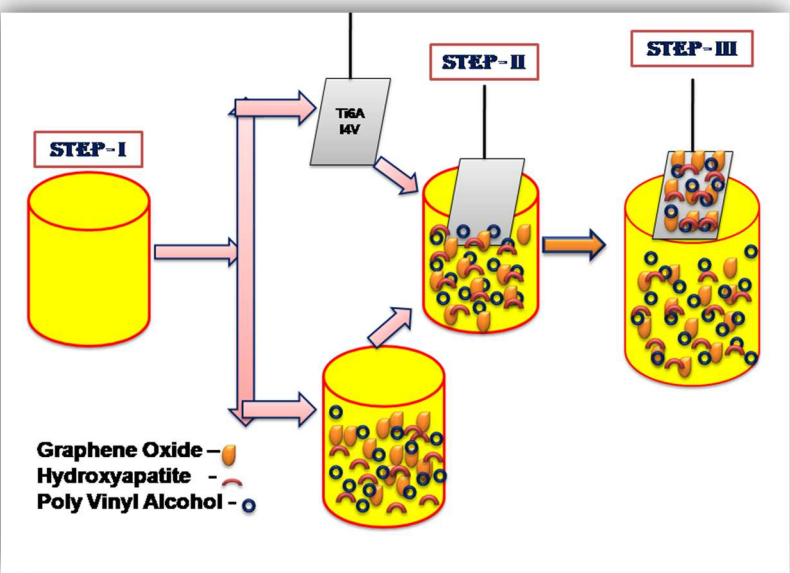
Abstract



Titanium and its alloys are currently in use as implant materials for orthopaedic surgery. These materials possess outstanding corrosion resistance due to a dense and passive oxide film on the surface. Here, the corrosion behaviour of GO/HAP/PVA coated on Ti6Al4V immersed in Ringer's solution as an of corrosion resistant in GO/HAP/PVA coated Ti6Al4V considerably improved with formation of a passive layer to offshore environment was studied using polarization and electrochemical impedance (EIS) tests. Different parameters were obtained from the fitting EIS data by an equivalent circuit model to indicate the corrosion resistance of Ti6Al4V in the offshore environment. The polarization results indicate that the performance restrain both the anodic and cathodic corrosion reaction. It was concluded that the GO/HAP/PVA layer fabricated on Ti6Al4V surfaces shows good corrosion inhibition property than that of bare Ti6Al4V.

Keywords: *Graphene Oxide (GO), Hydroxyapatite (HAP), Poly Vinyl Alcohol (PVA), Ti6Al4V, Electrochemical studies.*

Analysing The Multi-purpose of Polymeric Nanocomposites (PNCs): Stimuli-responsive, water treatment and sensor devices.

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Abstract

Nanomaterials have been extensively studied over the last few decades owing to their unique physicochemical properties. Polymeric Nanocomposites PNCs have an outstanding potential for various applications. Polymeric nanocomposites (PNCs) consist of a polymer or copolymer having nanoparticles a nanofillers dispersed in the polymer matrix to get better physicochemical properties, which are apt for various applications and thus offer significant as well as industrial interest. Moreover, fabricated PNCs which enable controlling their properties like surface area, optical properties and catalytic activity. Polymeric nanocomposites PNCs are multiphase hybrid material that shows better properties like thermal, mechanical barrier and flammability. Preparation of polymeric nanocomposites by In-situ methods: Solution mixing, melt blending and electro spinning. The low cost and light weight of PNCs have further contribution in various environment and industrial application. Polymeric nanocomposites PNCs are applied in food packaging application due to their capability to display tailored properties that could outperform the existing packing solutions. Industrial application of polymeric nanocomposites -Water treatment, electro shielding in aerospace, sensor devices and food packaging.

Keywords: Composites, physicochemical, nanofillers, Electro shielding, melt blending, electro spinning, aerospace, tailored properties, mechanical barrier

Biosynthesis of Copper Nanoparticles with plant Extracts by using Parkinsonia Aculeata

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Abstract

Copper nanoparticles (CuNPs) can be synthesized by green methods using plant extracts. These methods are more environmentally friendly and offer improved properties of the synthesized NPs in terms of biocompatibility and functional capabilities. The use of biomaterials in the synthesis of nanoparticles is one of the most up-to-date focuses in modern nanotechnologies and nanoscience. More and more research on green methods of producing metal oxide nanoparticles (NP) is taking place. In this study, we synthesized copper nanoparticles using PARKINSONIA ACULEATA extract, which reflects its novelty in the field of nanoscience. The visual observation of a color change from dark green to bluish green clearly shows the instant and spontaneous formation of PARKINSONIA ACULEATA. To select the best plant for green synthesis, one should know about its detoxification, potential in heavy metal accumulation and reaction conditions should also be known. Other synthesis conditions, such as salt precursor concentration, temperature, time synthesis, and pH, have a significant effect on the characteristics of the NPs. The synthesized copper nano particles have been characterized by pXRD, SEM and IR spectroscopy.

Keywords: *Copper nanoparticles, plant extracts, powder XRD, SEM*

Crystallographic, BVS, computational and spectroscopic studies on synthesized homoleptic and heteroleptic complexes involving dithiocarbamates, triphenylphosphine and nickel (II)

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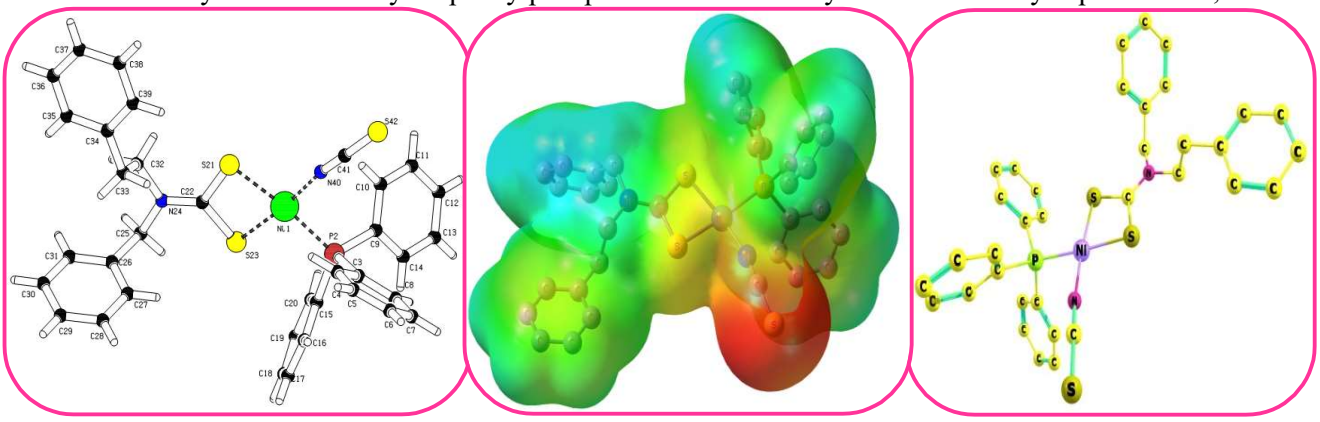
$[Ni(bpedtc)_2]$ **1** and $[Ni(bpedtc)(NCS)(PPh_3)]$ **2,** (where bpedtc = n-benzyl-2-phenethylamine dithiocarbamate) have been synthesized and characterized by elemental analysis, electronic, IR and NMR (^1H, ^{13}C, and ^{31}P) spectra. Both the complexes are diamagnetic and planar. The structure of complex **2** was studied by single crystal X-ray crystallography and it shows that nickel is in a distorted square planar arrangement. Complex **1** and **2** show bands due to $dz^2 \rightarrow dx^2\text{-}y^2$ and $dxy \rightarrow dx^2\text{-}y^2$ respectively in electronic spectra. In IR spectra, shift in υC-N of the heteroleptic complex **2** to higher frequency compared with the parent complex **1,** is due to mesomeric drift of electron density from the dithiocarbamate ligand to the metal atom. In ^{13}C NMR, the thioureide carbon ($^{13}NCS_2$) signal for **2** appears significantly in the upfield region compared to parent complex **1** due to the alleviation of electron density on nickel by triphenylphosphine and isothiocyanate. Geometry optimization,



geometrical parameters, molecular electrostatic potential maps (MEPs) and FMO analysis of the both the complexes was carried out by DFT method and the geometrical parameters of **2** are compared with the experimental X-ray diffraction data.

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Harnessing Nano Materials for Green Innovations: A Path Towards Sustainable Future

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Abstract:

In a world where environmental challenges loom large, a group of visionary scientists embarked on a journey to harness the power of nano materials for green innovations, charting a path towards a sustainable future. Their quest began with a deep dive into the microscopic realm, where nano materials revealed their extraordinary potential to revolutionize industries across the globe. The bustling laboratories and buzzing research facilities, the scientists uncovered the remarkable properties of nano materials at the nanoscale. With determination and ingenuity, they crafted nano-sized particles capable of catalyzing clean energy production, creating lightweight and biodegradable materials for eco-friendly packaging, and developing advanced sensors for monitoring environmental pollutants. As their discoveries unfolded, the scientists realized the transformative impact nano materials could have on renewable energy technologies, such as solar cells and fuel cells, driving the healthier planet. Armed with their newfound knowledge and unwavering resolve, the scientists emerged as champions of change, inspiring industries and governments alike to embrace nano materials as a catalyst for green innovations. And thus, their story became a beacon of hope, illuminating the path towards a brighter, more sustainable future for generations to come.

Keywords: *Nano materials, green innovations, Sustainable future, microscopic realm, clean energy production, Eco-friendly packaging, Advanced sensors, Renewable energy technologies, Ethical dilemmas, Environmental impacts, Health impacts, Collaboration, Responsible innovation, Champions of change, Beacon of hope.*

The Role of Nano Drugs of Medical Field

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Abstract

In the last four decades, nanotechnology has gained thrust with no sign of slowing down .The application of concoction or errotic from nanotechnology has revolutionized all aspects of imaging and drug delivery for ordinary life ranging from medical applications to impact on popularity in several (health care) to the food industry and raging that made it possible to significantly expand the shelf lives of food products , impure intracellular dispensation of hydrophobic drugs and improve their efficacy of specific precision natural physical function smart drug and therapeutics such as immunisolation cardiovascular diseases, organ fibrosis and anti-cancer agents. As an effect, nanotechnology, Nano materials and as well as nanoparticles has not only impacted the global standard of living but has also impacted the better built and smaller product for global economy. In these exploitations the characteristics of nanoparticles. That confers them with connection and potentially toxic biological effects, targeting solutions technology translation the circular economy. These include the elopement of inhalation drug delivery system implantable drug delivery and oral drug delivery systems. They have successfully launched several nanotechnologies _based drug delivery systems such as Nano carries for targeted drug delivery and nanoscale drug formulations, they have developed a nanoscale drug delivery system that can be selectively target cancer cells while sparing healthy cells. Nano health is a leading nanotechnology health care strart up based in India. Their nanotechnology enabled sensors offer highly sensitive and accurate detection. Their reactivity durability and different properties are additionally reliant upon their novel size shape and construction, there is appropriate possibility for different business and homegrown application. Which incorporates catalysis, imaging, clinical applications, energy-based examination, and ecological applications, the current research is exploring the fabrication of designed nanostructures along with the means to assemble them into larger system, economically and in great valves. The techniques ultimately improving patient out come over all.

Key words: *Nanotechnology, nanoparticles drug delivery systems, nanoscale, Nano motors*

Nanodrugs for Medical Fields
Nano drugs, also known as nanomedicines, are pharmaceutical drugs engineered at the nanoscale level. They offer numerous benefits in the field of medicine

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Abstract:

1.Targeted Delivery: Nano drugs can be designed to target specific cells, tissues, or organs in the body, minimizing side effects and enhancing therapeutic efficacy.

2.Improved Bioavailability: Their small size allows for better absorption and distribution in the body, increasing the drug's bioavailability.

3.Controlled Release: Nano drugs can be formulated to release the active pharmaceutical ingredient in a controlled manner, providing sustained therapeutic effects.

4.Crossing Biological Barriers: Nanoparticles can penetrate biological barriers such as the blood-brain barrier, allowing drugs to reach previously inaccessible areas of the body.

5.Combination Therapy: Nanotechnology enables the incorporation of multiple drugs or therapeutic agents into a single Nano formulation, facilitating combination therapy and synergistic effects.

6.Imaging and Diagnostics: Nanoparticles can be functionalized with imaging agents, allowing for simultaneous diagnosis and treatment monitoring.

7.Personalized Medicine: Nano drugs hold promise for personalized medicine by enabling tailored drug delivery systems based on individual patient characteristics.

Nano drugs have the potential to revolutionize the field of medicine by offering more precise and effective treatments for various diseases and conditions.

Keywords: *Targeted delivery, improved bioavailability, controlled release, crossing biological barriers.*

Silver Nanotechnology in Anti-cancer activity

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Abstract

Nano materials play a vital and crucial role in science as well as technology and major important in medicine. The word Nano is a Greek word that refers to a 'very small'. The size of nanoparticles ranges from 10-100nm. Silver particles had a wide range of healthcare products, cosmetics and textiles etc., In this review, we discuss about the silvernanoparticles (AgNPs) are synthesized by a physical, chemical, biological properties. In AgNPs we studied that the biological activity like antibacterial, antiviral, antiparasitic, anti-inflammatory, anti-cancer etc., Applications of silver nanoparticles (AgNPs) in anti- cancer biological activity are synthesized as a diagnostic use, treatment, multidrug resistant, drug delivery and especially in tumour therapy. AgNPs has a feature of non-toxicity. AgNPs has a property to kill the microbes. Silver nanoparticles may cause a skinallergen so we can use AgNPs mixed with green synthesis. Green synthesis as *Andrographis paniculata* is a traditionally medicinal plant with a constituent of diterpenoids, flavonoids, polyphenol. A World Health Organization (WHO) showed that *Andrographis paniculata* extracts have a potential of anti-cancer, anti-inflammatory,antibacterial, antioxidant. The researchers were concluded that *Andrographis paniculata* may entered into nanotechnology world. In this review paper we discussed that the Silver Nanotechnology combination of *Andrographis paniculata.* In my perspective it has a future pursue in anti-cancer due to the need of precise treatment. However, the future developments will improve the patients care and reduce the death rate.

Keyword: *Anti-cancer, diagnostic, tumor therapy, polyphenols, Andrographis paniculata.*

Exploring Nanoscale Processes in Environmental implications and Applications

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Abstract:

Understanding nanoscale processes in environmental systems has become imperative in elucidating their impact on ecosystems and human health. This abstract delves into the intricate interplay of nano materials and environmental matrices, highlighting their roles in natural processes, pollution remediation, and risk assessment. Nanoparticles, engineered nanomaterials and naturally occurring nano scale particles influence various environmental phenomena, including nutrient cycling, contaminant transport and ecological interactions. Additionally, nanotechnology-based approaches offer promising solutions for environmental remediation ranging from nanoparticle enhanced filtration systems to photocatalytic degradation of pollutants. However, the potential environmental risks associated with nanomaterials necessitate comprehensive risk assessment frame works to ensure their safe deployment. Furthermore, the characterization and detection of nanomaterials in environmental matrices pose significant challenges requiring advanced analytical techniques and monitoring strategies. This abstract underscore the importance of integrating nano-science with environmental research to unravel complex processes and develop sustainable solutions for environmental challenges. By elucidating nanoscale processes in environmental systems researchers can pave the way for informed decision making and the development of innovative technologies aimed at preserving and restoring environmental quality.

Key Words: *Nanoscale, bioremediation, Nanoparticle, Photocatalytic*.

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