SCHOLARLY PUBLICATIONS
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Journal Name: **Molecular Cancer** **IF: 27.7**

Title: Modulation of the tumor microenvironment and mechanism of immunotherapy-based drug resistance in breast cancer

Author: Kundu M., Butti R., Panda V.K., Malhotra D., Das S., Mitra T., Kapse P., Gosavi S.W., Kundu G.C.

Details: Volume 23, Issue 1, December 2024

Abstract: Breast cancer, the most frequent female malignancy, is often curable when detected at an early stage. The treatment of metastatic breast cancer is more challenging and may be unresponsive to conventional therapy. Immunotherapy is crucial for treating metastatic breast cancer, but its resistance is a major limitation. The tumor microenvironment (TME) is vital in modulating the immunotherapy response. Various tumor micro-environmental components, such as cancer-associated fibroblasts (CAFs), tumor-associated macrophages (TAMs), and myeloid-derived suppressor cells (MDSCs), are involved in TME modulation to cause immunotherapy resistance. This review highlights the role of stromal cells in modulating the breast tumor microenvironment, including the involvement of CAF-TAM interaction, alteration of tumor metabolism leading to immunotherapy failure, and other latest strategies, including high throughput genomic screening, single-cell and spatial omics techniques for identifying tumor immune genes regulating immunotherapy response. This review emphasizes the therapeutic approach to overcome breast cancer immune resistance through CAF reprogramming, modulation of TAM polarization, tumor metabolism, and genomic alterations.

URL: https://molecular-cancer.biomedcentral.com/articles/10.1186/s12943-024-01990-4

SCHOLARLY PUBLICATIONS
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Journal Name: **Renewable & Sustainable Energy Reviews** **IF: 16.3**

Title: Roles of engineered lignocellulolytic microbiota in bioaugmenting lignocellulose biomethanatio

Author: Basak, B; Kumar, R; Tanpure, RS; Mishra, A; Tripathy, SK; Chakrabortty, S; Roh, HS; Yadav, KK; Chung, WJ; Jeon, BH

Details: Volume 207, January 2025

Abstract: The recalcitrance and physiochemical complexity of lignocellulosic biomass limit its hydrolysis and subsequent anaerobic digestion to produce biomethane. Restricted lignocellulose hydrolysis reduces the substrate supply to catabolic pathways of anaerobic digestion, altering the indigenous digester microbiota by affecting the syntrophy between hydrolytic, acidogenic, and acetogenic bacterial and methanogenic archaeal communities. This can considerably impede the maximum utilization of this potential biomass resource, resulting in poor biomass-to-biomethane conversion. Bioaugmentation of anaerobic digestion with potent lignocellulolytic microbes can enhance rate-limiting hydrolytic pathways to convert lignocellulosic biomass into biomethane efficiently. Bioaugmentation can enrich lignocellulose-degrading microbiota in digesters through complementary metabolic and transcription processes. Although the positive roles of bioaugmentation in improving lignocellulose digestion have been well-established, efforts are still underway to properly attribute the role of bioaugmentation to specific microbiota compositions and their metabolic functions. Assessing the stability, dynamics, and specific metabolic roles of different microbial guilds of the bioaugmenting lignocellulolytic microbiota and their intricate interactions with the indigenous microbiota, along with deterministic process factors, is pivotal for the successful real-scale execution of bioaugmented lignocellulose digestion. To clarify, studies have adopted an integrated approach of high-throughput meta-omics to identify the unique metabolic functional niches filled by core microbial communities in bioaugmented digester microbiota. Enhanced bioconversion of lignocellulosic biomass into methane can considerably contribute to the Sustainable Development Goals by addressing affordable and clean energy production. This review emphasizes the significance of lignocellulolytic microbiotas in bioaugmentation of anaerobic digestion and the understanding of their ecological functions in the intricate interspecies nexus during biomethanation.

URL: https://www.sciencedirect.com/science/article/pii/S1364032124006397?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: Advanced Science **IF: 14.3**

Title: Inactivation of Pseudovirus Expressing the D614G Spike Protein Mutation using Nitric Oxide-Plasma Activated Water

Author: Patel P., Kaushik N., Acharya T.R., Lenka S.S., Ghosh S., Wahab R., Verma S.K., Choi E.H., Kaushik N.K.

Details: November 2024

Abstract: Variants of concern (VOCs) of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) exhibit high infectivity due to mutations, particularly in the spike protein, that facilitate enhanced binding of virus to human angiotensin-converting enzyme 2 (hACE2). The D614G mutation, situated in S1-domain, promotes the open conformation of spike protein, augmenting its interaction with hACE2. Activated water neutralizes pathogens by damaging biological molecules; however, its effect on mutated SARS-CoV-2 or VOCs requires further exploration. Here, the efficacy of nitric oxide (NO_x)-plasma activated water (PAW) in inhibiting infections by SARS-CoV-2 pseudovirus expressing D614G-mutated spike protein is investigated, which serves as a model for mutated SARS-CoV-2. Results demonstrated high prevalence of D614G mutation in SARS-CoV-2 and its VOCs. NO_x-PAW is non-toxic to cells at high concentration, inhibiting infection by 71%. Moreover, NO_x-PAW induced structural changes in S1-domain of spike protein, reducing its binding affinity and lowering clathrin-mediated endocytosis-related gene expression. Additionally, in silico analysis revealed NO_x species in NO_x-PAW played key role in impairing S1-domain function of the mutated SARS-CoV-2 pseudovirus by interacting directly with it. Collectively, these findings reveal the potent inactivation ability of PAW against mutated SARS-CoV-2 and suggest its potential application in combating emerging variants of SARS-CoV-2 and other viral threats.

URL: https://onlinelibrary.wiley.com/doi/10.1002/advs.202411515

SCHOLARLY PUBLICATIONS
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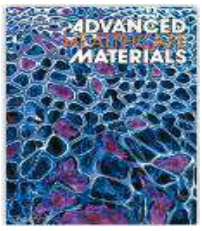
Journal Name: Advanced Healthcare Materials **IF: 10.0**

Title: Molecular Engineering of Ultrabright Biomimetic NanoGhost for Site-Selective Tumor Imaging and Biodistribution

Author: Prasad R.; Prerna K.; Temgire M.; Banerjee P.; Kumari R.; Kundu G.C.; Hattila D.; Mangannavar C.V.; Meena A.S.; Gorain M.; Bellare J.; Chandra P.; Dubey V.K.

Details: December, 2024

Abstract: Optically active ultrabright imaging agents are shown to delineate tumor location with deep tissue visualization in pre noclinical tumor models. NanoGhosts (NGs) particles are reconstructed from the cell membrane and integrated with organic fluorophores to attain ultra-brightness for solid tumor imaging. Moreover, the integration of amphiphilic and lipophilic molecules reveals structural characteristics of NGs (≈70 nm), which also alter their brightness. Upon intravenous administration (10 mg kg^{-1} single dose), these ultrabright NGs (778 MESF) enable the high-resolution of tumor site and real-time tracking of vital organs with high-contrast fluorescence signals. Engineered biomimetic NGs demonstrates better resolution and tissue penetration as compared to the clinically approved indocyanine green (ICG). High precision in tumor detection (0.5 h) and strong tumor retention (24 h which is further up to 30^{th} day) without affecting healthy tissues ensure the future scope of NGs in early-stage cancer imaging. These findings suggest that these NGs mimic the biological characteristics of native cells, enabling them to evade immune clearance and target the solid tumor naturally.



URL: https://onlinelibrary.wiley.com/doi/10.1002/adhm.202401233

SCHOLARLY PUBLICATIONS
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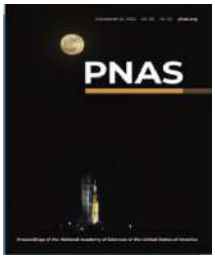
Journal Name: PNAS **IF: 9.4**

Title: Metagenomic study of lake microbial mats reveals protease-inhibiting antiviral peptides from a core microbiome member

Author: Padhi C.; Field C.M.; Forneris C.C.; Olszewski D.; Fraley A.E.; Sandu I.; Scott T.A.; Farnung J.; Ruscheweyh H.-J.; Panda A.N.; Oxenius A.; Greber U.F.; Bode J.W.; Sunagawa S.; Raina V.; Suar M.; Piel J.

Details: Volume 121, Issue 49, December, 2024

Abstract: In contrast to the large body of work on bioactive natural products from individually cultivated bacteria, the chemistry of environmental microbial communities remains largely elusive. Here, we present a comprehensive bioinformatic and functional study on a complex and interaction-rich ecosystem, algal-bacterial (microbial) mats of Lake Chilika in India, Asia's largest brackish water body. We report the bacterial compositional dynamics over the mat life cycle, >1,300 reconstructed environmental genomes harboring >2,200 biosynthetic gene clusters (BGCs), the successful cultivation of a widespread core microbiome member belonging to the genus Rheinheimera, heterologous reconstitution of two silent Rheinheimera biosynthetic pathways, and new compounds with potent protease inhibitory and antiviral activities. The identified substances, posttranslationally modified peptides from the graspetide and spliceotide families, were targeted among the large BGC diversity by applying a strategy focusing on recurring multi-BGC loci identified in diverse samples, suggesting their presence in successful colonizers. In addition to providing broad insights into the biosynthetic potential of a poorly studied community from sampling to bioactive substances, the study highlights the potential of ribosomally synthesized and posttranslationally modified peptides as a large, underexplored resource for antiviral drug discovery.



URL: https://biosignaling.biomedcentral.com/articles/10.1186/s12964-024-01898-y

SCHOLARLY PUBLICATIONS
School of Biotechnology
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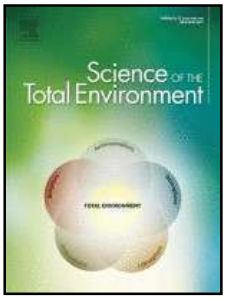
Journal Name: Science of the Total Environment **IF: 8.2**

Title: Controlled in vivo intrinsic detrimental effect of D-Limonene channelized by influential proximal interaction through apoptosis and steatosis in embryonic zebrafish (Danio rerio).

Author: Choudhury A.; Lenka S.S.; Gupta A.; Mandal D.; Sinha A.; Saha U.; Naser S.S.; Singh D.; Simnani F.Z.; Ghosh A.; Kumari S.; Kirti A.; Parija T.; Chauhan R.S.; Kaushik N.K.; Suar M.; Verma S.K.

Details: Volume 949, 1 November 2024, Article No. 175243.

Abstract: Bioaccumulation of d-Limonene in environment due to the aggrandised usage of their natural sources like citrus food wastes and industrial day to day life products has raised concern to their biotoxicity to environment biotic health. Moreover, their after-usage discharge to aquatic system has enhanced the distress of posing threat and needs attention. This study entails mechanistic and molecular evaluation of in-vivo biotoxicity of d-Limonene in zebrafish embryo models. Experimental analysis excavated the controlled concentration-dependent morphological, physiological and cellular in-vivo impact of d-Limonene in zebrafish embryos through significant changes in oxidative stress, steatosis and apoptosis regulated via 6-fold and 5-fold mRNA expression change in p53 and Sod1 genes. Computational evaluation deduced the cellular mechanism of d-limonene biotoxicity as irregularities in oxidative stress, apoptosis and steatosis due of their intrinsic interaction with metabolic proteins like Zhe1a (−4.8 Kcal/mol), Sod1(−5.3 Kcal/mol), p53, caspase3 and apoa1 leading to influential change in structural and functional integrity of the metabolic proteins. The study unravelled the measured in-vivo biotoxicity of d-Limonene at cellular and molecular level to advocate the controlled usage of d-Limonene related natural and industrial product for a sustainable environmental health.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0048969724053932?via%3Dihub

SCHOLARLY PUBLICATIONS
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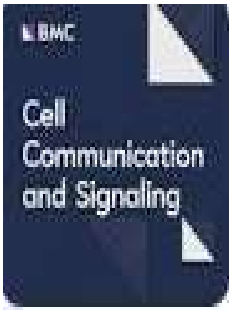
Journal Name: **Cell Communication and Signaling** **IF: 8.2**

Title: The role of Aquaporins in tumorigenesis: implications for therapeutic development

Author: Bhattacharjee A., Jana A., Bhattacharjee S., Mitra S., De S., Alghamdi B.S., Alam M.Z., Mahmoud A.B., Al Shareef Z., Abdel-Rahman W.M., Woon-Khiong C., Alexiou A., Papadakis M., Ashraf G.M.

Details: Volume 22 , Issue 1, December 2024

Abstract: Aquaporins (AQPs) are ubiquitous channel proteins that play a critical role in the homeostasis of the cellular environment by allowing the transit of water, chemicals, and ions. They can be found in many different types of cells and organs, including the lungs, eyes, brain, glands, and blood vessels. By controlling the osmotic water flux in processes like cell growth, energy metabolism, migration, adhesion, and proliferation, AQPs are capable of exerting their regulatory influence over a wide range of cellular processes. Tumour cells of varying sources express AQPs significantly, especially in malignant tumours with a high propensity for metastasis. New insights into the roles of AQPs in cell migration and proliferation reinforce the notion that AQPs are crucial players in tumour biology. AQPs have recently been shown to be a powerful tool in the fight against pathogenic antibodies and metastatic cell migration, despite the fact that the molecular processes of aquaporins in pathology are not entirely established. In this review, we shall discuss the several ways in which AQPs are expressed in the body, the unique roles they play in tumorigenesis, and the novel therapeutic approaches that could be adopted to treat carcinoma.



URL: https://biosignaling.biomedcentral.com/articles/10.1186/s12964-023-01459-9

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: Cell Communication and Signaling **IF: 8.2**

Title: PIM1 kinase and its diverse substrate in solid tumors

Author: Choudhury R.; Bahadi C.K.; Ray I.P.; Dash P.; Pattanaik I.; Mishra S.; Mohapatra S.R.; Patnaik S.; Nikhil K.

Details: Volume 12, Issue 1, December, 2024

Abstract: The PIM kinase family, consisting of PIM1, PIM2, and PIM3, is a group of serine/threonine protein kinases crucial for cellular growth, immunoregulation, and oncogenesis. PIM1 kinase is often overexpressed in solid and hematopoietic malignancies, promoting cell survival, proliferation, migration, and senescence by activating key genes. In vitro and in vivo studies have established the oncogenic potential of PIM1 kinases. These kinases have been implicated in tumor progression, metastasis, and resistance to chemotherapy, underscoring their potential as a therapeutic target for cancer therapy. This review delves into the intricate molecular mechanisms through which PIM1 interacts with specific substrates in different tumor tissues, leading to diverse outcomes in various human cancers. Over the past decade, the inhibition of PIM1 in cancers has garnered significant attention as a potential standalone treatment. Various in vitro, in vivo, and early clinical trial data have provided support for this approach to varying extents. Novel compounds that inhibit PIM1 kinase have shown effectiveness and a favorable toxicity profile in preclinical studies. Several of these substances are now being studied in clinical trials due to their promising outcomes. This article provides a thorough examination of the PIM1 kinase pathways and the recent advancements in producing PIM1 kinase inhibitors for the treatment of cancer.

URL: https://biosignaling.biomedcentral.com/articles/10.1186/s12964-024-01898-y

SCHOLARLY PUBLICATIONS
School of Biotechnology
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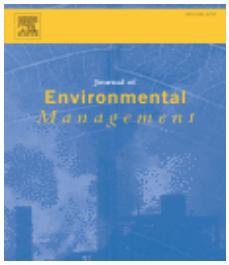
Journal Name: Journal of Environmental Management **IF: 8.0**

Title: Microplastics: The imperative influencer in blueprint of blue economy

Author: Gupta A, Ghosh A, Yadav A, Kirti A, Lenka SS, Jena S, Saha U, Naser SS, Nandi A, Sinha A, Suar M, Kaushik NK, Raina V, Verma SK.

Details: Volume 372, December, 2024

Abstract: The burgeoning issue of microplastic pollution in marine ecosystems has emerged as a significant concern, presently multifaceted difficulty to the sustainability and prosperity of the blue economy. This review examines the intricate link between microplastics (MPs) and the blue economy (BE), exploring how microplastics infiltrate marine environments, their persistence, and their impacts on economic activities reliant on healthy oceans in a global scenario. Diminished seafood quality and quantity, degraded coastal aesthetics affecting tourism revenues, and increased operational costs due to fouling and contamination are among the economic repercussions identified. Additionally, the review discusses the potential long-term consequences on human health and food security, emphasizing the urgency for proactive mitigation measures and policy interventions in the global scenario. The study highlights the interconnectedness of the blue economy and environmental health, prompting a comprehensive strategy to mitigate microplastic pollution. It calls for collaborative efforts among stakeholders, including policymakers, industries, academia, and civil society, to develop innovative strategies for combating microplastic pollution and promoting sustainable blue economic practices. In conclusion, the review stresses the pressing need for concerted action to address microplastic threats to the blue economy, recommending science-based policies, technological innovations, and public awareness campaigns to protect marine ecosystems and ensure the resilience and prosperity of ocean-dependent economic activities.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0301479724032869?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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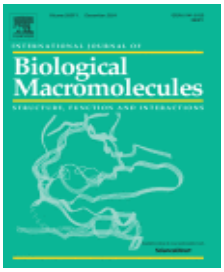
Journal Name: International Journal of Biological Macromolecules **IF: 7.7**

Title: Innovations in poly(3-hydroxybutyrate-co-3-hydroxyvalerate) and nanocomposites for sustainable food packaging via biochemical biorefinery platforms: A comprehensive review

Author: Dey P, Haldar D, Sharma C, Chopra J, Chakrabortty S, Dilip KJ.

Details: Volume 283, December, 2024

Abstract: The substantial build-up of non-biodegradable plastic waste from packaging sector not only poses severe environmental threats but also hastens the depletion of natural petroleum-based resources. Presently, poly (3-hydroxybutyrate-co-3-hydroxy valerate) (PHBV), received enormous attention as ideal alternatives for such traditional petroleum-derived plastics based on their biocompatibility and superior mechanical properties. However, high cost of such copolymer, due to expensive nature of feedstock, inefficient microbial processes and unfavorable downstream processing strategies restricts its large-scale commercial feasibility in the packaging sector. This review explores merits and challenges associated with using potent agricultural and industrial waste biomasses as sustainable feedstocks alongside improved fermentation and downstream processing strategies for the biopolymer in terms of biorefinery concept. Despite PHBV's attractive properties, its inherent shortcomings like weak thermal stability, poor mechanical properties, processability difficulty, substantial hydrophobicity and comparatively higher water vapor permeability (WVP) demand the development of its composites based on the application. Based on this fact, the review assessed properties and potential applications of PHBV-based composite materials having natural raw materials, nanomaterials and synthetic biodegradable polymers. Besides, the review also enlightens sustainability, future prospects, and challenges associated with PHBV-based composites in the field of food packaging while considering insights about economic evaluation and life cycle assessment.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0141813024083843?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **International Journal of Biological Macromolecules** **IF: 7.7**

Title: Mitigating CYP3A4-mediated aflatoxin toxicity with algal-derived Sodium Copper Chlorophyllin: Production and In-silico insights

Author: Mishra M.; Gupta D.; Preeti; Deb D.

Details: Volume 280, Issue 1, November 2024

Abstract: The present research explores the cytotoxic mechanism of protein Cytochrome P450 (CYP3A4) with aflatoxin (AFB1), a potent carcinogen. Cytochrome P450 is an essential enzyme involved in drug metabolism, however epoxide formation due to the binding event of AFB1 leads to cell cytotoxicity. In this direction, our study elucidates the scavenging effect of algal-derived Sodium Copper Chlorophyllin (SCC) over AFB1 cytotoxicity. Cyanobacteria/ microalgae-derived SCC have garnered attention due to its diverse applications in pharmacological and food industries. This work began with the production of SCC from *Spirulina* and *Chlorella* sp. over a stipulated period of growth. Subsequently, the study delved into the interplay between SCC and the carcinogenic impact of AFB1 on the CYP3A4 enzyme. Computational studies demonstrated SCC binding and blocking mechanisms against AFB1. Our research intended to determine whether CYP3A4 can bind to SCC that, in turn, act as an interceptor for AFB1 or influence the metabolism of bound AFB1. Current results support that SCC is an effective AFB1 trap as it shows interactions with AFB1. These findings would open up new avenues in clinical biology/pharmacology to further explore the mechanisms of action of CYP3A4 with AFB1 and SCC, offering promising prospects for abating cell cytotoxicity.

URL: https://www.sciencedirect.com/science/article/abs/pii/S014181302406402X

SCHOLARLY PUBLICATIONS
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Journal Name: International Journal of Biological Macromolecules **IF: 7.7**

Title: In silico analysis shows slc1a4 as a potential target of hsa-mir-133a for regulating glutamine metabolism in gastric cancer

Author: Chakraborty A., Patnaik J., Sinha A., Parida N., Parija T., Patnaik S.

Details: Volume 282, December, 2024

Abstract: Cutting-edge research has spotlighted glutamine metabolism as a promising therapeutic target in managing gastric cancer. This investigation highlights the upregulated glutamine transporters by leveraging clinical data from the TCGA Database and the expression analysis of the transcriptome profile of stomach adenocarcinoma (STAD) patients. Notably, it identifies SLC1A4 as a potential glutamine transporter in STAD. The screening of human miRNAs conducted using the TargetScan database, and the subsequent docking analysis present multiple miRNAs with the potential of being explored as therapeutic agents. By integrating transcriptome profiling, miRNA screening, and molecular docking, this study reveals, for the first time, the potential of hsa-mir-133a-1 in targeting slc1a4, along with its known target mTOR, in stomach cancer. The myriad interactions that can be regulated by this silencing mechanism are anticipated to ultimately reduce glutamine uptake in STAD. This study provides compelling evidence of glutamine transport via SLC1A4 in stomach cancer and delves into how it might impact mTOR and some of its pivotal downstream molecules. Considering these findings, novel therapeutic strategies can be devised to further enhance existing methods for combating gastric cancer.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0141813024077833?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Journal of Industrial and Engineering Chemistry **IF: 5.9**

Title: A multi-approach study on CO2 absorption in packed beds: Theoretical, experimental, and CFD perspectives on gas phase pulsation

Author: Pattnaik C.; Kumar R.; Khan M.A.; Pahari P.; Banik A.; Jeon B.-H.; Banerjee S.; Chakrabortty S.; Tripathy S.K.

Details: November, 2024

Abstract: This work seeks to improve CO_2 absorption efficiency in packed bed columns by substituting amine-based solvents with sodium hydroxide and implementing gas phase pulsation to enhance mass transfer coefficients. Experimental analysis and computational fluid dynamics modeling were employed to investigate the impact of pulsation on absorption efficiency under various conditions. Essential parameters comprised superficial liquid velocity (1.2–4.6 cm/s), pulsation frequency (0–10 Hz), amplitude (0–20 mm), and NaOH concentration (0.25 N to 2 N), while maintaining a constant superficial gas velocity of 120 cm/s and a solute gas concentration of 13 %. Three packing materials—glass spheres, ceramic Raschig rings, and ceramic Pall rings—were evaluated. The results demonstrated that ceramic Pall rings exhibited the greatest efficiency. Pulsation, namely at 9.06 Hz and 20 mm amplitude, enhanced the volumetric mass transfer coefficient by as much as 4.53 times for Pall rings. Increased column diameters (from 7.00 cm to 11.5 cm) enhanced performance. The findings show advancement of more efficient CO_2 absorption (by switching from chemical absorption using amine based solvents to classical chemical absorption using aqueous NaOH solution) for industrial applications, aiding climate change mitigation initiatives.

URL: https://www.sciencedirect.com/science/article/abs/pii/S1226086X24007858?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

Journal Name: Biomass and Bioenergy **IF: 5.8**

Title: Advancing biorefineries with ultrasonically assisted ionic liquid-based delignification: Optimizing biomass processing for enhanced bio-based product yields

Author: Chakraborty P.; Kumar R.; Banerjee A.; Chakrabortty S.; Pal M.; Upadhyaya A.; Chowdhury S.; Khan M.A.; Jeon B.-H.; Tripathy S.K.; Ghosh A.K.

Details: Volume 192, January, 2024

Abstract: Encouraging sustainable business needs utilization of bio-based substrate for green manufacturing of chemicals and fuels to achieve sustainable development goals set by the United Nations. One of the abundantly available bio-based substrates is lignocellulosic (LC) biomass, which requires effective pretreatment to fractionate into its structural biocomponents to maximize biorefinery potential. This study addresses the use of an inexpensive ionic liquid (triethylammonium hydrogen sulfate) [T2220][HSO_4] in an ultrasound-assisted process as an environmentally acceptable pretreatment method for the delignification of LC biomass, specifically rice straw (RS). Using ionic liquid (IL)-assisted (IL, acid-IL, and alkali-IL) pretreatment procedures, the effects of IL volume, sonication time, and temperature were methodically examined for RS delignification. To evaluate the compositional changes in pretreated and raw RS, instrumental analyses were carried out. The maximum rates of 47 %, 55 %, and 64 % for the only IL, acid-IL, and alkali-IL treatments demonstrated the effect of temperature, operating time, and IL concentration on the delignification efficiency. The alkali-IL pretreatment was noteworthy for achieving a 64 % delignification rate under optimum values of IL volume (8.65 mL), sonication time (123 min), and temperature (82 °C). Artificial neural networks (ANN) and response surface methodology (RSM) were used for process modeling and optimization. With an accuracy of 0.989 in correlation coefficient, the ANN model outperformed the RSM regression model regarding forecasting delignification performance. Biorefinery of renewable biomass resources ensures the sustainable supply of materials, chemicals, and fuels. The delignification and downstream product recovery technologies are major limiting factors in the commercialization of biomass processing. The suggested [T2220][HSO_4]-based ultrasonic approach provides a viable way to boost biomass valorization efficiency, which in turn improves economical and sustainable biorefinery and aids in the shift to green bio-based production.

URL: https://www.sciencedirect.com/science/article/pii/S0961953424004483?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

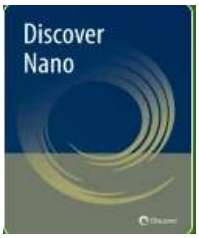
Journal Name: Discover Nano **IF: 5.5**

Title: Prospects and challenges of nanomaterials in sustainable food preservation and packaging: a review

Author: Kumar S.

Details: Volume 19, Issue 1, December, 2024

Abstract: Nanomaterials play a pivotal role in food preservation and its safety, offering ingenious solutions for sustainable food packaging. Nanomaterials enable the creation of packaging materials having unique functional properties. It not only extends the shelf life of the foods by releasing preservatives but also enhances food safety by preventing microbial contamination or food spoilage. In this review, we aim to provide an overview of the various applications of nanotechnology in food packaging, highlighting its key advantages. We also delve into the safety considerations and regulatory issues involved in developing nanotechnology-based food packaging materials. Additionally, advancements in the field of nanotechnology-based packaging have the potential to create safer, more sustainable, and high-quality packaging with greater functionality that delivers essential benefits to manufacturers and consumers.



URL: https://link.springer.com/article/10.1186/s11671-024-04142-1

SCHOLARLY PUBLICATIONS
School of Biotechnology
KIIT Deemed to be University

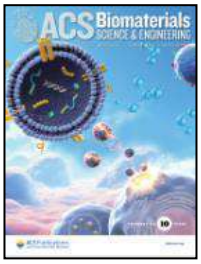
Journal Name: **ACS Biomaterials Science and Engineering** **IF: 5.5**

Title: Engineered PLGA Core-Lipid Shell Hybrid Nanocarriers Improve the Efficacy and Safety of Irinotecan to Combat Colon Cancer

Author: Giram P.S.; Nimma R.; Bulbule A.; Yadav A.S.; Gorain M.; Venkata Radharani N.N.; Kundu G.C.; Garnaik B.

Details: Volume 23, Issue 1, December 2024

Abstract: Breast cancer, the most frequent female malignancy, is often curable when detected at an early stage. The treatment of metastatic breast cancer is more challenging and may be unresponsive to conventional therapy. Immunotherapy is crucial for treating metastatic breast cancer, but its resistance is a major limitation. The tumor microenvironment (TME) is vital in modulating the immunotherapy response. Various tumor microenvironmental components, such as cancer-associated fibroblasts (CAFs), tumor-associated macrophages (TAMs), and myeloid-derived suppressor cells (MDSCs), are involved in TME modulation to cause immunotherapy resistance. This review highlights the role of stromal cells in modulating the breast tumor microenvironment, including the involvement of CAF-TAM interaction, alteration of tumor metabolism leading to immunotherapy failure, and other latest strategies, including high throughput genomic screening, single-cell and spatial omics techniques for identifying tumor immune genes regulating immunotherapy response. This review emphasizes the therapeutic approach to overcome breast cancer immune resistance through CAF reprogramming, modulation of TAM polarization, tumor metabolism, and genomic alterations.



URL: https://pubs.acs.org/doi/10.1021/acsbiomaterials.4c01260

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **Life Sciences** **IF: 5.2**

Title: ALDH and cancer stem cells: Pathways, challenges, and future directions in targeted therapy

Author: Lavudi K, Nuguri SM, Pandey P, Kokkanti RR, Wang QE.

Details: Volume 356, 1 November 2024, Article Number 123033

Abstract: Human ALDH comprise 19 subfamilies in which ALDH1A1, ALDH1A3, ALDH3A1, ALDH5A1, ALDH7A1, and ALDH18A1 are implicated in CSC. Studies have shown that ALDH can also be involved in drug resistance and standard chemotherapy regimens are ineffective in treating patients at the stage of disease recurrence. Existing chemotherapeutic drugs eliminate the bulk of tumors but are usually not effective against CSC which express ALDH+ population. Henceforth, targeting ALDH is convincing to treat the patient's post-relapse. Combination therapies that interlink signaling mechanisms seem promising to increase the overall disease-free survival rate. Therefore, targeting ALDH through ALDH inhibitors along with immunotherapies may create a novel platform for translational research. This review aims to fill in the gap between ALDH1 family members in relation to its cell signaling mechanisms, highlighting their potential as molecular targets to sensitize recurrent tumors and bring forward the future development concerning the current progress and draw backs. This review summarizes the role of cancer stem cells and their upregulation by maintaining the tumor microenvironment in which ALDH is specifically highlighted. It discusses the regulation of ALDH family proteins and the crosstalk between ALDH and CSC in relation to cancer metabolism. Furthermore, it establishes the correlation between ALDH involved signaling mechanisms and their specific targeted inhibitors, as well as their functional modularity, bioavailability, and mechanistic role in various cancers.

URL: https://www.sciencedirect.com/science/article/pii/S0024320524006234?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: Food Bioscience **IF: 4.8**

Title: Simultaneous folate fortification and pesticide residue degradation in finger millet (Eleusine coracana) via malting and Lactiplantibacillus plantarum-mediated fermentation

Author: Nayak P.P., Das R.P., Mahanta S.K., Singh A., Dhal A.K., Mahapatra R.K., Goswami L., Ray L., Behera S.K., Buys E.M., Panda S.K.

Details: Volume 62, December, 2024

Abstract: In the current study, finger millets (Eleusine coracana) served as the raw material to assess the impacts of malting and Lactiplantibacillus plantarum-mediated fermentation. Post-fermentation analysis revealed a substantial elevation in the concentration of 5-methyltetrahdrofolate (5-MTHF) (bioactive form of folate) in the fermented samples, UM-F (unmalted and fermented) and M-F (malted and fermented) with 137.28 and 147.84 μg/100g, respectively. Furthermore, malting followed by fermentation collectively reduced the spiked pesticides, lindane, and chlorpyrifos from the original concentration of 330.83 ppb and 295.12 ppb in the UM-UF (unmalted and unfermented) samples to 44.44 ppb (86.53% decrease) and 12.13 ppb (95.88% decrease), respectively. In silico investigation envisaged the role of two enzymes, alcohol dehydrogenase and alkaline phosphatase of L. plantarum in the disintegration of lindane and chlorpyrifos, respectively which was subsequently validated by quantifying the enzymes in the fermentation medium (alkaline phosphatase obtained in M-F was 1.60 U/mL and the alcohol dehydrogenase produced was 44.02 U/mg protein). Biochemical analyses, thermal gravimetric analysis, infrared spectroscopy, and X-ray diffraction studies reported significant transformations among the samples, UM-UF, UM-F, M-UF (malted and unfermented millet), and M-F, which indicates the role of malting and fermentation and the enzymes involved in the processes.

URL: https://www.sciencedirect.com/science/article/abs/pii/S2212429224018601?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Biotechnology
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Journal Name: **Bioorganic Chemistry** **IF: 4.5**

Title: Scaffold overlay of flavonoid-inspired molecules: Discovery of 2,3-diaryl-pyridopyrimidin-4-imine/ones as dual hTopo-II and tubulin targeting anticancer agents

Author: Saini M.; Paul S.; Acharya A.; Acharya S.S.; Kundu C.N.; Guchhait S.K.

Details: Volume 152, November 2024

Abstract: Almost half of all medicines approved by the U.S. Food and Drug Administration have been found to be developed based on inspiration from natural products (NPs). Here, we report a novel strategy of scaffold overlaying of scaffold-hopped analogs of bioactive flavones and isoflavones and installation of drug-privileged motifs, which has led to discovery of anticancer agents that surpass the functional efficiency of the original NPs. The analogs, 2,3-diaryl-pyridopyrimidin-4-imine/ones were efficiently synthesized by an approach of a nitrile-stabilized quaternary ammonium ylide as masked synthon and Pd-catalyzed activation–arylation methods. Compared to the NPs, these NP-analogs exhibited differentiated functions; dual inhibition of human topoisomerase-II (hTopo-II) enzyme and tubulin polymerization, and pronounced antiproliferative effect against various cancer cell lines, including numerous drug-resistant cancer cells. The most active compound 5l displayed significant inhibition of migration ability of cancer cells and blocked G1/S phase transition in cell cycle. Compound 5l caused pronounced effect in expression patterns of various key cell cycle regulatory proteins; up-regulation of apoptotic proteins, Bax, Caspase 3 and p53, and down-regulation of apoptosis-inhibiting proteins, BcL-xL, Cyclin D1, Cyclin E1 and NF-κB, which indicates high efficiency of the molecule 5l in apoptosis-signal axis interfering potential. Cheminformatics analysis revealed that 2,3-diaryl-pyridopyrimidin-4-imine/ones occupy a distinctive drug-relevant chemical space that is seldom represented by natural products and good physicochemical, ADMET and pharmacokinetic-relevant profile. Together, the anticancer potential of the investigated analogs was found to be much more efficient compared to the original natural products and two anticancer drugs, Etoposide (hTopo-II inhibitor) and 5-Flurouracile (5-FU).

URL: https://www.sciencedirect.com/science/article/abs/pii/S0045206824006436?via%3Dihub

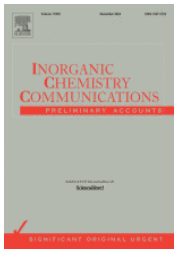
Journal Name: Inorganic Chemistry Communications **IF: 4.4**

Title: Green-synthesized BiFeO3 nanoparticles for efficient photocatalytic degradation of organic dyes, antibiotic and catalytic reduction of 4-nitrophenol

Author: Parida S., Sarangi B., Nanda J., Pany B.

Details: Volume 170, December 2024, Article number 113344

Abstract: Green-synthesized nanoparticles have recently emerged as promising catalysts for the removal of toxic dyes from water bodies. In this article, Bismuth ferrite nanoparticles were synthesized by a simple and low-cost method using Couroupita guianensis plant leaf extract. The particles were used as photocatalysts for degrading RhB, MO dyes, and TC antibiotics, as well as for reducing toxic 4-NP to useful 4-AP. The synthesized nanoparticles were characterized using several state-of-the-art tools. The formation of perovskite structure and the presence of biomolecules on the surface of $BiFeO_3$ nanoparticles were confirmed by FTIR analysis. Raman spectrum revealed a rhombohedral structure of $BiFeO_3$ nanoparticles, corroborating the XRD findings. FESEM micrograph demonstrated irregularly shaped agglomerated nanoparticles. The average hydrodynamic diameter was estimated to be 51 nm using the DLS technique. The optical energy bandgap of the bismuth ferrite was estimated using Tauc's relation for direct bandgap semiconductors. SQUID measurements revealed that these nanoparticles exhibit a weak ferromagnetic ordering. Furthermore, these nanomaterials degraded the cationic and anionic dyes effectively because of the formation of hydroxyl radicals, confirmed by the scavenger test. The photocatalytic degradation pathway of RhB dye was investigated through LC-MS analysis, and the intermediate degradation products were identified. The prepared material also exhibited excellent catalytic reduction efficiency in a short duration of time. This study proclaims that these nanoparticles can be used as potential catalysts for the purification of water bodies.



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