ALLIANCE UNIVERSITY
CENTRE for RESEARCH
DSIR RECOGNIZED SIRO
DEPARTMENT OF SCIENTIFIC & INDUSTRIAL RESEARCH GOVT. OF INDIA

ALLIANCE RESEARCH CHRONICLES

DECEMBER 2025
Volume 12



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DECEMBER 2025
Volume **12**

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ABOUT ALLIANCE UNIVERSITY

Alliance reimagines the idea of the university by creating a community that leads the charge against the complex challenges of the 21st century. The university conceives research to be the essence of all teaching and learning practices. A unity between research and teaching is promoted to extend the frontiers of knowledge in order to solve real world problems at the local, national, and global scale. For this purpose, the university seeks to be the nerve centre of interaction between the industry, the government, the civil society, and the community at large.

In times when technological and social change is transforming the very idea of employability, the university embraces the increasing diversity of specializations while retaining the impulse to unify all knowledge.

A designed convergence of the business, engineering, law and liberal arts units precipitates transdisciplinarity as the core academic philosophy.

Freely working across divergent streams of knowledge like psychology and data science, technology and law, physics and philosophy or businesses and rhetoric, transdisciplinarity nurtures a dynamic foundation for the spirit of collaboration, inquiry, and enterprise.

VISION

Alliance University's vision is to be a world-class University that nurtures talent and catalytically transforms the lives of millions through excellence in teaching, research, service and community development. To uphold a commitment to shaping lives through scholarly teaching and learning, and that which contributes to an equitable and holistic transformation of society at large.

MISSION

The mission of the University is to create and sustain a community of lifelong learners in an environment that emphasizes literacy, critical thinking, and humanistic and scientific inquiry.
The University provides a dynamic, challenging and ethical environment for pursuing high quality teaching, research, learning and service across all areas of University, where students, faculty and other key constituents can interact, collaborate and partner with the global community for creation and dissemination of knowledge and transform lives of people through innovation and excellence in higher education.



ABOUT CENTRE *for* RESEARCH

The Centre for Research of Alliance University has been established to oversee the doctoral program and promote quality research through various Centres of Excellence (COEs) and publications.

The Centre for Research will be the nodal research center for Alliance University and will be committed to facilitating and promoting all academic research related activities. The Centre seeks to focus on providing a platform to Researchers and Academicians for thought provoking research on new and emerging fields and revolves around advancing knowledge and innovation within specific fields or interdisciplinary areas.

VISION

To pioneer transformative research initiatives that propel Alliance University to the forefront of global academia, driving innovation, societal advancement, and contributing to global progress and well-being.



MISSION

1. **Knowledge and Innovation:** Conduct cutting-edge research across disciplines to expand the frontiers of knowledge and drive innovation that addresses global challenges.
2. **Foster Collaborative Partnerships:** Cultivate partnerships with academic institutions, industries, and organizations worldwide to facilitate knowledge exchange, collaboration, and impactful research outcomes.
3. **Empower Research Scholars:** Provide a supportive environment, resources, and mentorship to empower researchers to pursue ambitious research agendas, develop critical skills, and become leaders in their fields.
4. **Address Global Challenges:** Tackle pressing global challenges such as climate change, healthcare disparities, food security, and technological advancement through interdisciplinary research that generates actionable solutions.
5. **Promote Societal Impact:** Translate research findings into real-world applications and policies that positively impact society, foster sustainable development, and contribute to the betterment of humanity and the planet.

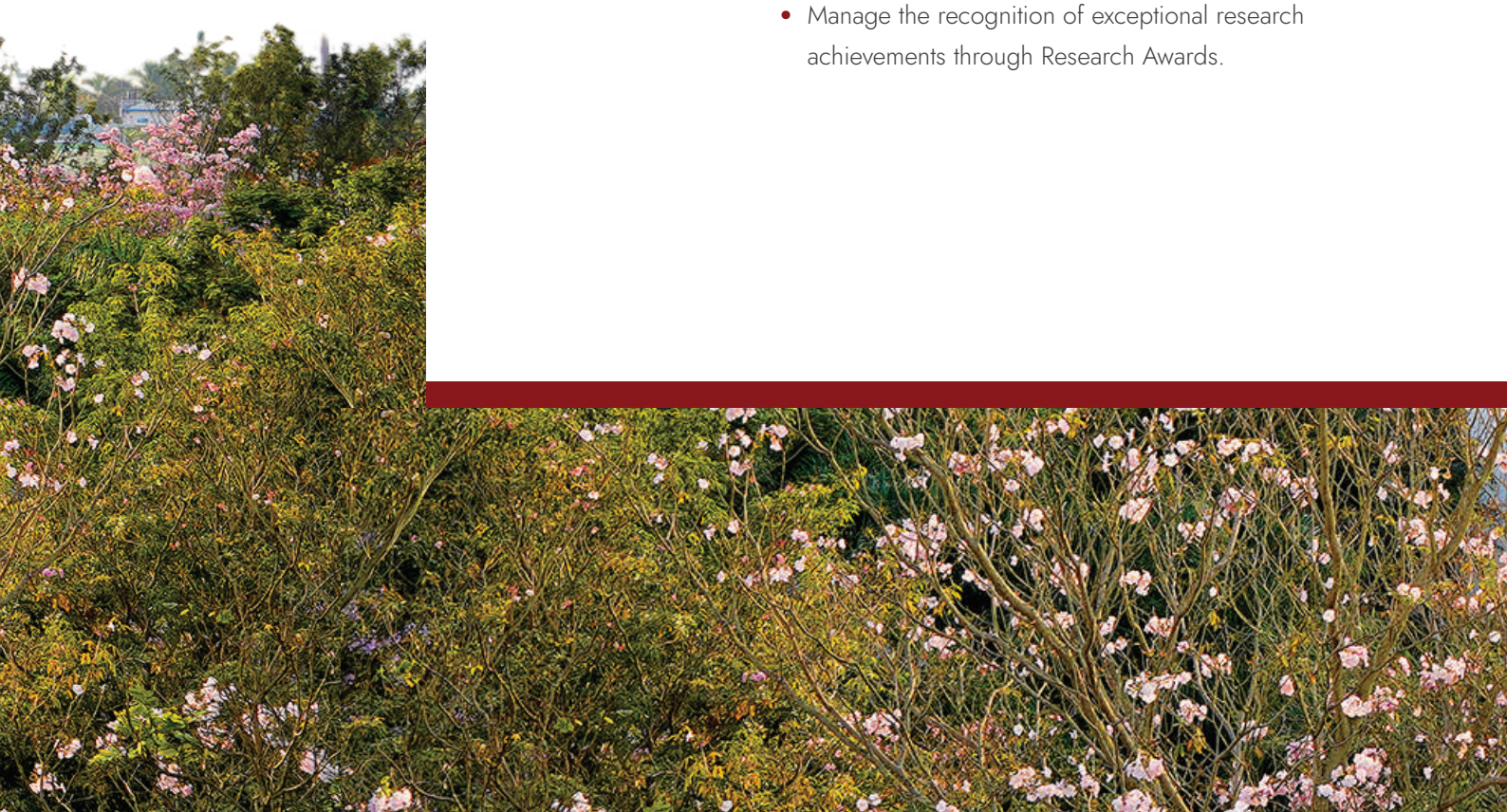
ABOUT CENTRE *for* RESEARCH (Contd.)

CORE VALUES

- **Collaboration:** Foster a culture of collaboration, inclusivity, and openness, recognizing the value of interdisciplinary teamwork and partnerships in addressing complex global challenges.
- **Innovation:** Embrace creativity, curiosity, and innovation, encouraging bold and unconventional approaches to research that lead to breakthrough discoveries and advancements.
- **Integrity:** Uphold the highest ethical standards in all research activities, demonstrating honesty, transparency, and accountability in the conduct and dissemination of research.
- **Agility:** Embrace agility and adaptability in response to evolving research landscapes and emerging challenges, fostering a culture of flexibility, innovation, and continuous improvement.
- **Diversity and Inclusion:** Value and celebrate diversity in perspectives, backgrounds, and experiences, fostering an inclusive research environment where all voices are heard, respected, and valued for their contributions.

OBJECTIVES

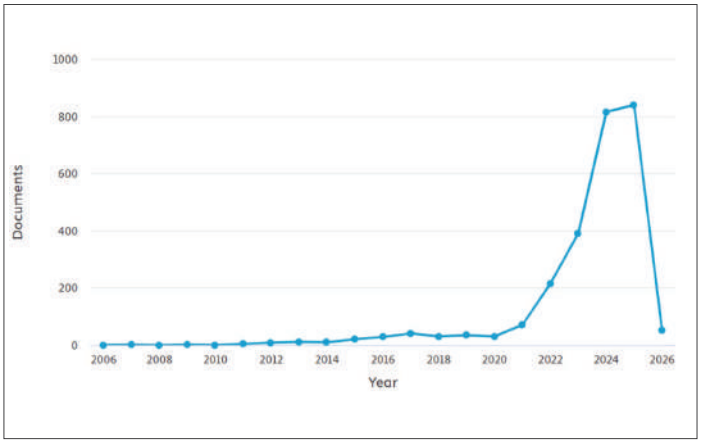
- Support the Ph.D. Admission process and facilitate the Ph.D. Program across all academic units of Alliance University.
- Providing resources and support for faculty, students, and visiting/full-time scholars engaged in research activities.
- Contributing to the advancement of knowledge through publications, presentations, and other forms of dissemination.
- Fostering collaboration among researchers within and outside the institution.
- Conducting cutting-edge research in specific fields or interdisciplinary areas.
- Addressing societal challenges and promoting solutions through research and innovation.
- Enhancing the reputation and impact of the institution through high-quality research outputs.
- Supporting the professional development of researchers and students through training, mentorship, and networking opportunities.
- Serving as a hub for intellectual exchange, seminars, workshops, and conferences to promote interdisciplinary collaboration and knowledge sharing.
- To oversee the working of Academic Integrity bodies which includes the Department Academic Integrity Panel (DAIP) and Institution Academic Integrity Panel (IAIP).
- Manage the recognition of exceptional research achievements through Research Awards.



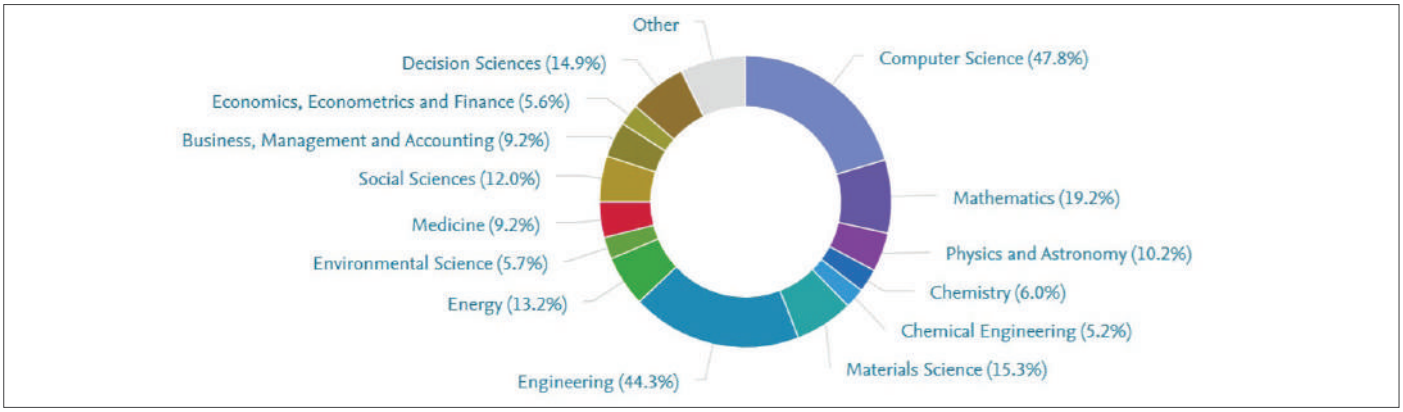


2640	1115
Documents	Authors

Documents by Year



Documents by Subject Area

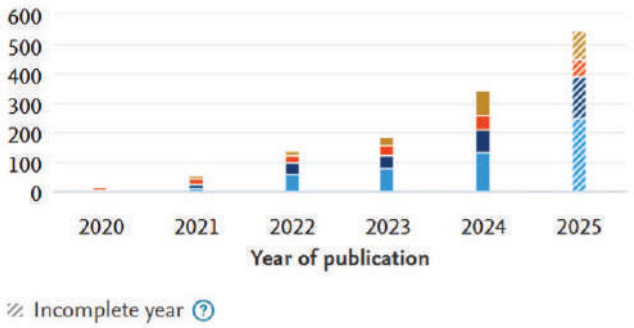


Summary

2640	1115	11809	4.4	1.65	45
Scholarly Output	Authors	Citation Count	Citations per Publication	Field-Weighted Citation Impact	H-index

Note: Scholarly output, Authors and Citation Count are Taken from SCOPUS, and other Metrics are taken from SCIVAL.

Publication by Journal Quartile



Quartiles	Publications	Publication share (%)
Q1 (top 25%)	532	41.5
Q2 (26% - 50%)	316	24.6
Q3 (51% - 75%)	190	14.8
Q4 (76% - 100%)	244	19.0

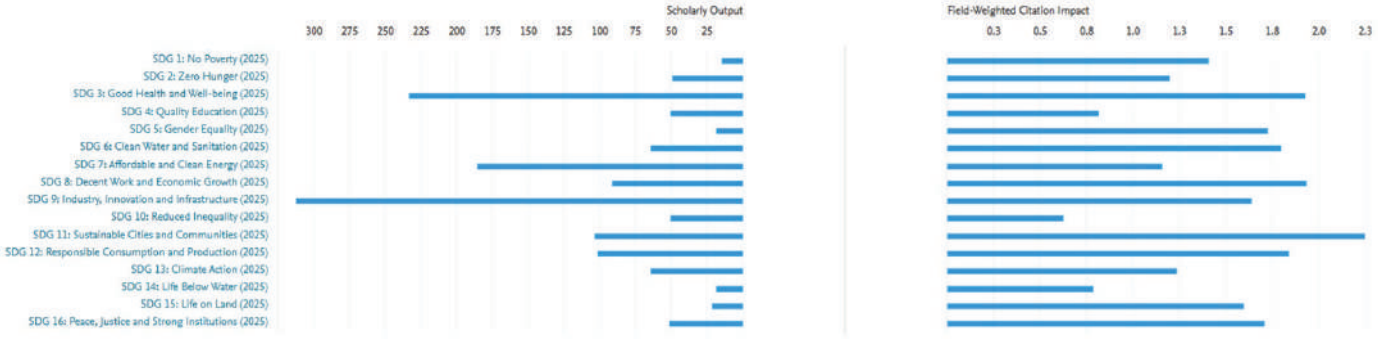
Cumulative shares	Publications	Publication share (%)
Q1 to Q2 (top 50%)	848	66.1
Q1 to Q3 (top 75%)	1,038	81.0

Geographical Collaboration Overall



Metric	Publication share	Scholarly Output	Citations	Citations per Publication	Field-Weighted Citation Impact
International collaboration	31.5%	742	6,034	8.1	1.86
Only national collaboration	48.4%	1,141	4,228	3.7	1.90
Only institutional collaboration	14.5%	343	436	1.3	0.80
Single authorship (no collaboration)	5.6%	133	186	1.4	0.50

Publication by SDG



* The Publication metrices and the author affiliations are taken from SCOPUS/SciVal as on 15/1/2026


NON SOLUS
Scopus
JOURNALS


Clarivate™
Web of Science

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**85th**	**3.9**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

MACHINE LEARNING GUIDED VIRTUAL SCREENING OF FDA APPROVED DRUGS TARGETING GSK-3β IN ALZHEIMER'S DISEASE

Kumar, B.S.; Dinesh, B.G.H.; Ganjipete, S.; Ramar, M.; Ammunje, D.N.; **Selvaraj, S.**; Chidambaram, K.; Parasuraman, P.

Scientific Reports

Dr. Selvaraj Kunjiappan
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Machine learning guided virtual screening of FDA approved drugs targeting GSK-3β in Alzheimer's disease

Bandral Sunil Kumar, Basavana Gowda Hosur Dinesh, Srinivas Ganjipete, Mohankumar Ramar, Damodar Nayak Ammunje, Selvaraj Kunjiappan, Kumarappan Chidambaram & Parasuraman Pavadai

Abstract

Alzheimer's disease (AD) remains one of the most challenging neurodegenerative disorders, with limited therapeutic options and high failure rates in clinical trials. This work developed a drug repurposing pipeline powered by a machine learning (ML) model to find possible glycogen synthase kinase-3 beta (GSK-3) inhibitors, a crucial target in AD pathogenesis. We selected, pre-processed, and optimized a dataset of 4,087 experimentally verified GSK-3 inhibitors using dimensionality reduction and descriptor creation. The most excellent prediction performance was obtained by Random Forest (100 descriptors) out of six supervised ML algorithms that were studied (R2 = 0.8178, RMSE = 0.8118, MAE = 0.6084). Following the virtual screening of 1,616 Food and Drug Administration (FDA)-approved drugs using this refined model, many compounds with projected IC_{50} < 500 nM were found. Docking experiments showed insightful interactions and high binding affinities with the active-site residues of GSK-3 . With the best docking score (−9.3 kcal/mol), stable molecular dynamics (Average RMSD values (1000 ns): protein, 2.23 ± 0.93 Å; protein−ligand complex, 1.40 ± 0.43 Å) and long-lasting contacts with crucial residues, dolutegravir stood out among the top choices. ADMET profiling validated good pharmacokinetics and safety characteristics; however, possible hepatotoxicity needs more research. A HOMO−LUMO gap of 3.07 eV was found by density functional theory (DFT) analysis, indicating robust electron transport characteristics and balanced reactivity that are favorable for protein−ligand interaction. Together, these findings show that dolutegravir is a potential repurposable option against AD and how integrative ML, docking, MD, ADMET, and quantum chemistry techniques may speed up the identification of new drugs.
© The Author(s) 2025.

Author keywords- Alzheimer's disease; GSK3-beta; Machine learning; Molecular docking; Molecular dynamics

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	79th	3.15	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 15 LIFE ON LAND

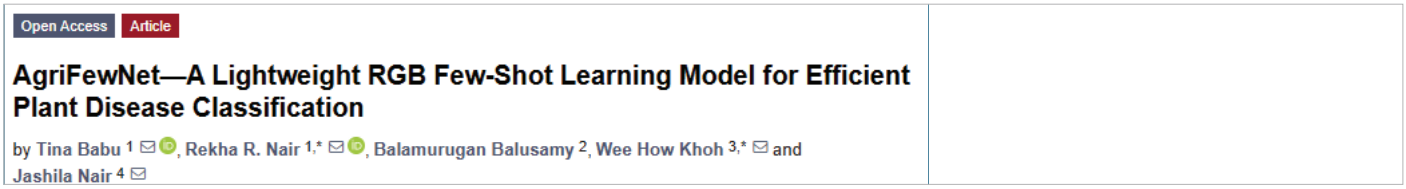
AGRIFEWNET—A LIGHTWEIGHT RGB FEW-SHOT LEARNING MODEL FOR EFFICIENT PLANT DISEASE CLASSIFICATION

Babu, T.; Nair, R.R.; Balusamy, B.; Khoh, W.H.; Nair, J.

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Open Access Article

AgriFewNet—A Lightweight RGB Few-Shot Learning Model for Efficient Plant Disease Classification

by Tina Babu [1], Rekha R. Nair [1,*], Balamurugan Balusamy [2], Wee How Khoh [3,*] and Jashila Nair [4]

Abstract

The rapid growth of artificial intelligence (AI) has enabled efficient crop disease detection even in data-scarce agricultural settings. This study proposes AgriFewNet, a few-shot learning framework designed to improve classification accuracy using RGB imagery captured from publicly available datasets. The objective is to enable fast model adaptation to new disease classes using minimal labeled samples while maintaining high reliability in real-world conditions. AgriFewNet employs a hierarchical attention-enhanced ResNet-18 backbone incorporating dual spatial and channel attention to extract discriminative RGB features. A Model-Agnostic Meta-Learning (MAML) approach facilitates quick generalization to previously unexplored illness categories, while a prototype-based classifier guarantees compact representation learning. Using only RGB images, experiments on the PlantVillage and New PlantVillage datasets produced accuracies of 87.3% (1-shot), 94.8% (5-shot), and 97.1% (10-shot), surpassing leading few-shot baselines by as much as 7.9%. The findings show that AgriFewNet offers a resource-efficient and scalable method for intelligent crop monitoring, enhancing food security and precision agriculture.
© 2025 by the authors.

Author keywords- agricultural decision support; attention mechanisms; few-shot adaptation; image-based plant diagnostics; lightweight deep networks; meta-learning; prototype-based classification

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	**43rd**	**1.74**	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

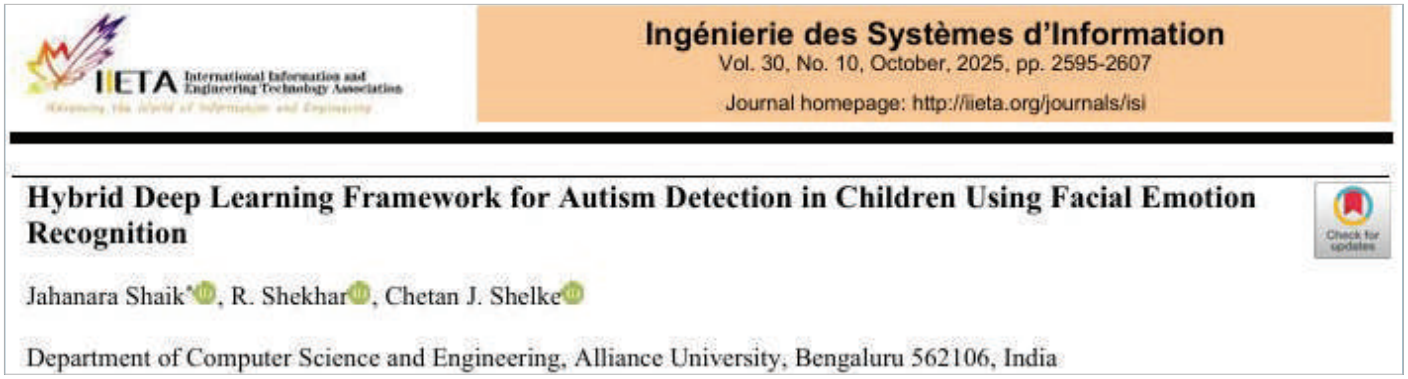
HYBRID DEEP LEARNING FRAMEWORK FOR AUTISM DETECTION IN CHILDREN USING FACIAL EMOTION RECOGNITION

Shaik, J.; **Shekhar, R.; Shelke, C.J.**

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Alliance School of Advanced Computing

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Abstract

Health care providers determine diagnosing autism to be a difficult undertaking because it mostly relies on anomalies in brain activities that could not be evident in the initial stages of a young development autism condition. An alternate and effective method to facilitate the earlier identification of autism involves facial emotion. This is because autistic children typically exhibit unique patterns that make it easier to differentiate from typical kids. some of many significant developments in enhancing the state lifestyle for those having autism is technological assistance. This study proposes a hybrid deep learning approach to detect the autism in children using deep facial features and emotional expressions. The proposed model combines the feature extraction from pre-trained CNN models like EfficientNetB0, ResNet50, and MobileNetV3Small and then classify autism and non-autism using a soft-voting ensemble model. The dataset is divided into 80% training and 20% testing. The MobileNetV2 model is used as emotion recognition that integrated on DeepFace model to enhance behavioral interpretation. The proposed model is trained and validated on two datasets: one containing images of autistic and non-autistic children, and another containing six types of emotions. The baseline classifier such as LR obtained the accuracy score of 77.57%, XGBoost of 81.00%, RF of 78.36%, SVM of 79.95%, MLP of 79.68. The proposed model obtained the accuracy score of 84.00% and a ROC-AUC score of 92.29% outperforming as compared to baseline models.

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Author keywords- autism spectrum disorder; computer vision; convolutional neural networks; deep learning; DeepFace; emotion recognition; ensemble classification; MobileNetV2

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	88th	6.6	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

FLEXURAL PERFORMANCE OF KEVLAR-REINFORCED SANDWICH COMPOSITES WITH LIGHTWEIGHT PUMICE-FILLED EPOXY CORES

Shahapurkar, K.; Kiran, M.C.; Gebremaryam, G.; Venkatesh, V.; Arunachalam, K.P.; Tirth, V.; Algahtani, A.; Hussien, M.; Petrů, J.; Bashir, M.N.; Soudagar, M.E.M.

Journal of Materials Research and Technology

Dr. Kiran Shahapurkar
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Abstract

The current investigation evaluates the flexural behavior of a novel sandwich composite with a lightweight pumice core reinforced by Kevlar fibers. Four different types of epoxy cores with varying pumice content (2.5, 5, 7.5 and 10 wt%) were prepared with constant 40 wt% of Kevlar fiber content. Open mold casting was used to prepare the core while the sandwich composites were manufactured using an in-house built closed mold. Influence of pumice content on the flexural properties of sandwich composites were evaluated by experimental and numerical approach. 3-point flexure test results indicate pumice reinforcement significantly enhances the modulus and strength of composites owing to the higher tendency to resist buckling loads. Composites with 10 wt% of pumice content reveal 31 % higher strength as compared with 2.5 wt% composites, owing to well-bonded and evenly distributed pumice particles leading to a higher interfacial shear strength and thereby mitigating core failure and delay in delamination. The correlations between the structure and property were analyzed using scanning electron micrographs. The numerical simulation results serve to reinforce the conclusions drawn from the study. These findings demonstrate a strong alignment with experimental observations, with a notable 3 % reduction in accuracy. The developed sandwich composites show potential for diverse structural and semi-structural applications, including protective panels, aerospace and automotive structures.
© 2025 The Authors.

Author keywords- Flexural; Kevlar fiber; Modulus; Pumice; Sandwich composites; Simulation

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	88th	6.6	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

THERMAL-MECHANICAL CHARACTERISTICS OF GROUNDNUT SHELL/ ATH/ SI/ SIC CERAMIC PARTICULATES REINFORCED GLASS FIBER-EPOXY HYBRID COMPOSITES

Hemath Kumar, H.; Vamsi Krishna, V.V.; Rangappa, S.M.; Siengchin, S.; AlArifi, I.M.; Alblawi, A.; Alamir, M.A.; Gapsari, F.

Journal of Materials Research and Technology

Dr. Mohit Hemanth Kumar
Assistant Professor & Associate Director - Centre of Excellence (IPR Cell),
Mechanical Engineering,
Alliance School of Applied Engineering



Abstract

The present investigation demonstrates the influences of reinforcing groundnut shell and inorganic fillers (aluminum trihydrate, silicon and silicon carbide) on the characteristics of glass fabric-reinforced epoxy laminates. The laminates were manufactured using wet layup method and characterized for mechanical, physical and thermal characteristics. The reinforcement of fillers enhanced tensile strength, flexural strength, and impact strength by 70.89 %, 62.78 %, and 232.21 %, respectively when compared with standard sample (GE). Thermogravimetric and differential scanning calorimeter analysis showed improved thermal stability with higher onset temperature. Fourier transform infrared spectra affirmed the existence of functional groups from the reinforced fillers. An artificial neural network model was generated to predict composite characteristics, attaining higher precision with R-squared values around 1.0 and select the best composite material. Statistical evaluation using one-way ANOVA affirmed significant deviation in characteristics between the laminates. The investigation illustrates the capability of natural and inorganic filler blends to improve the effectiveness of epoxy laminates for cutting-edge applications.
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Author keywords- Aluminum trihydrate; Epoxy; Glass fiber; Groundnut shell; Hybrid composites; Silicon carbide

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	88th	6.6	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

MULTI-CRITERIA AND CNN ANALYSIS OF AL2O3/TIO2/EGG SHELL/ATH CERAMIC FILLERS IN GLASS FIBER-EPOXY COMPOSITES

Hemath Kumar, H.; Vamsi Krishna, V.V.; Rangappa, S.M.; Siengchin, S.; AlArifi, I.M.; Alblawi, A.; Alamir, M.A.; Gapsari, F.

Journal of Materials Research and Technology

Dr. Mohit Hemanth Kumar
Assistant Professor & Associate Director
- Centre of Excellence (IPR Cell),
Mechanical Engineering,
Alliance School of Applied Engineering



Abstract

The increasing global demand for sustainable and high-performance composite materials has driven research into novel filler combinations that enhance thermal and mechanical properties while minimizing environmental impact. This study explores the synergistic effect of egg shell waste—a calcium-rich biofiller—combined with inorganic ceramic fillers (alumina, titania, and aluminum trihydrate) in glass fiber-reinforced epoxy hybrid composites. Unlike prior studies focusing on individual fillers, this unique blend offers multifunctional enhancements. The composites' physical, mechanical, and thermal properties were systematically analyzed across various filler proportions, revealing substantial performance improvements. The optimal composite (L7GEATAER) exhibited a density increase to 3015.84 kg/m3 and a 25.4 % reduction in water absorption. Mechanical tests demonstrated significant enhancements, with flexural and tensile strengths increasing by 2.14 and 1.57 times, respectively, while the glass transition temperature improved by 8.92 %. These enhancements are attributed to superior interfacial bonding, reduced polymer chain mobility, and uniform stress distribution. Advanced analytical techniques, including deep learning-based convolutional neural network (CNN) analysis of SEM microstructures, confirmed refined filler dispersion and improved structural integrity. This research highlights the potential of integrating biowaste with inorganic fillers to develop high-performance, sustainable composites suitable for demanding aerospace, automotive, and construction applications. The findings provide a comprehensive framework for optimizing filler combinations to meet specific industrial requirements while promoting circular economy principles. © 2025. Published by Elsevier B.V.

Author keywords- Egg shell; Epoxy; Glass fiber; Hybrid composite; Inorganic fillers

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**69th**	**2.2**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

A THEORETICAL EXTENSION OF THE GRAVITY MODEL AND ITS APPLICATION IN THE TRADE FIELD

Maitra, S.; Mishra, V.; Kundu, S.; Dwivedi, S.

Journal of Modelling in Management

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Dr. Srashti Dwivedi
Assistant Professor
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Alliance School of Sciences



Abstract

Purpose – This purpose of this study is to extend the traditional gravity framework by examining how BRICS economies with highly asymmetric growth trajectories and heterogeneous global value chain integration engage in bilateral trade under evolving geopolitical and policy conditions. While standard gravity models assume symmetric trade responses and static resistance terms, BRICS economies exhibit distinct patterns, commodity exporters (Brazil, Russia, South Africa) trade differently with manufacturing powerhouses (China, India) than traditional North-South or intra-OECD flows. By incorporating time-varying multilateral resistance terms (MRTs), GDP growth differentials and policy–macroeconomic interactions, this framework captures the nonlinear and asymmetric effects that characterize South-South trade cooperation. The model demonstrates that trade agreement effectiveness varies by economic size disparity, distance frictions decline asymmetrically for larger BRICS members, and non-tariff barriers (NTBs) exhibit hysteresis effects absent in developed economy context. Design/methodology/approach – Using panel data, the study introduces three key methodological advancements to extend the understanding of trade patterns. First, explicit modeling of MRTs as explanatory variables rather than absorbed fixed effects, enabling direct measurement of third-country competition; Second, dynamic specifications with lagged trade flows to distinguish immediate versus cumulative policy impacts. Third, threshold regression to identify structural breaks in GDP–distance–RTA relationships. Empirical validation is conducted through pooled ordinary least squares, fixed-effects modeling, and Poisson–pseudo maximum likelihood estimation to ensure robustness and statistical significance. Findings – Three BRICS-specific patterns emerge: First, GDP asymmetry amplifies trade (= 0.034, $p < 0.01$) more strongly within BRICS (elasticity 0.041) than OECD pairs (0.028), suggesting complementarity between commodity suppliers and manufacturers. Second, a threshold effect at the 75th percentile of GDP differences reveals that China-India trade with smaller BRICS members follows different dynamics than intra-giant commerce. Third, NTB persistence in BRICS economies (half-life: 4.2 years) exceeds that in OECD countries (2.8 years), indicating institutional and infrastructure deficits that prolong trade cost effects. Regional trade agreements reduce GDP-driven trade imbalances by 5.7%, but effectiveness varies: agreements benefit large BRICS exporters 40% more than smaller members. The model achieves 88.2% explanatory power, substantially outperforming standard specifications (typically 65%–75% for emerging markets). The model

demonstrates a strong explanatory power accounting for 88.2% of the variation in trade flows. Originality/value — This study contributes to the trade literature by developing a theoretically rigorous and empirically validated extension of the gravity model. It challenges the traditional symmetry assumption and highlights the critical role of GDP disparities in global trade. By integrating spatial dependence and economic complexity, the model provides enhanced predictive accuracy and deeper insights into the dynamics of international trade. The application to BRICS economies serves as a policy-relevant example, offering guidance for trade agreements and infrastructure strategies in contexts characterized by uneven economic development.
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Author keywords- Asymmetric growth; Bilateral trade deals; Gravity model; Multilateral trade resistance; Non-tariff barriers

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**55th**	**0.762**	

09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

IMPROVED TWO-COLOUR RADO NUMBERS FOR LINEAR EQUATIONS WITH CERTAIN COEFFICIENTS

Arora, I.; **Dwivedi, S.**; Tripathi, A.

Electronic Journal of Combinatorics

Dr. Srashti Dwivedi
Assistant Professor
Pure and Applied Mathematics
Alliance School of Sciences

The Electronic Journal of Combinatorics

Abstract

Let a1, ..., am be nonzero integers, c Z and r ≥ 2. The Rado number for the equation (Formula presented) in r colours is the least positive integer N such that any r-colouring of the integers in the interval [1, N] admits a monochromatic solution to the given equation. We introduce the concept of t-distributability of sets of positive integers, and determine exact values whenever possible, and upper and lower bounds otherwise, for the Rado numbers when the set {a1, ..., am−1} is 2-distributable or 3-distributable, am = −1, and r = 2. This generalizes previous works by several authors. © The authors

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q4	28th	0.8	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

REFINEMENT OF NANOFLUID COOLING STRATEGIES FOR MAXIMISING EFFICIENCY IN ROTATING DETONATION ENGINES

Ramana Murthy, G.R.; Sungeetha, D.; Maheshwari, S.; Vallikkannu, M.; Prathap, S.; Rajaram, A.

Journal of Environmental Protection and Ecology

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Journal of Environmental Protection and Ecology

International Journal edited by the Balkan Environmental Association (B.E.N.A.) for rapid scientific and other information, covering all aspects of the problems of sustainable development and ecology.

Abstract

This research examines the application of advanced coolants, which are nanofluids, to Rotating Detonation Engines (RDEs) and concerning their thermal characteristics and stability in addition to their performance. It is narrated that through the help of theoretical analysis, a series of experiments, along computational simulations, some of the nanoparticle materials including Al ,Cu, TiO2 and carbon nanotubes were developed and described. The investigation showed that thermal conductivities were increased by 20% and the heat transfer coefficients were between 800 and 1200 W m^2 K for the nanofluids as compared to conventional coolants. Stability measurements revealed that dosing above +30 mV brings about effective dispersion of nanoparticles and low sedimentation rates from long-term studies. The use of CFD in simulating flows was efficient, in enhancing the cooling channel design and leading to an increase in heat transfer coefficients to 41.67%. Cost analysis also showed the possibility of receiving an additional 50–60% of ROI (Return on Investment), which also underlined the economic rationality for utilising nanofluids. The outcomes highlight the efficiency gained from using nanofluids to cool RDE and further assert that it will transform thermal management in further-ranging propulsion systems. © 2025, Scibulcom Ltd.. All rights reserved.

Author keywords- heat transfer efficiency and stability assessment; nanofluids; Rotating Detonation Engines (RDEs); thermal management

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	**92nd**	**0.5**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

THE PHARMACEUTICAL INDUSTRY IN SOUTH AFRICA AND NIGERIA: A STRATEGIC ANALYSIS OF INDUSTRY AND REGULATORY FRAMEWORKS

Shede, S.

The African Review

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Abstract

In 2025, the pharmaceutical sector in South Africa and Nigeria was still a net importer of finished dosage drug products and active pharmaceutical ingredients, primarily from multinational corporations in the European Union, India and China. Both countries have local manufacturing capabilities for finished dosage drugs and active pharmaceutical ingredients, but the local companies lack generic off-patent research and development innovation, new-molecule discovery capability, innovative differentiated product portfolio growth, allied local support industries, sales and marketing innovation, established local and international distribution, and supply chain networks. This article explores the South Africa and Nigeria pharmaceutical industry's adoption of government policy frameworks (such as patent Acts, foreign direct investment policy and pricing policy) and the additional support that is needed to improve local manufacturing and international export. It examines the weaknesses that hinder the growth of the pharmaceutical industry in these two countries in effective medicine manufacture, and how streamlining the supply chain could improve drug affordability, accessibility and quality.
© 2025 Sandeep Shede.

Author keywords- local manufacture; manufacturing; Nigeria; patents; pharmaceuticals; South Africa

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	97th	4.2	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DUAL-ORGANIC PHASE CHANGE MATERIAL: A SUSTAINABILITY-ORIENTED APPROACH FOR HIGH-PERFORMANCE SOLAR STILLS

Dhivagar, R.; Omara, A.A.M.; **Kannan, K.G**.; Prabakaran, R.; Kim, S.C.

International Journal of Energy Research

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International Journal of
Energy Research

Editor-in-Chief: Akshay Kumar Saha
Online ISSN: 1099-114X
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Abstract

The individual use of organic phase change materials (PCMs) in solar stills has been shown to result in the need for large masses for performance improvements. This paper proposed a novel approach by integrating both paraffin wax and beeswax onto the basin to form a modified solar still (BP-PCMSS), aiming to enhance the performance of a conventional solar still (CSS). A comparative analysis was conducted between the two models, evaluating thermodynamic, economic, environmental, enviroeconomic, and sustainability characteristics. The results revealed that BP-PCMSS provided a yield of 3.1 kg/m2 relative to 2.35 kg/m2 for CSS, reflecting 31.91% improvement. Thermodynamically, BP-PCMSS improved the energy and exergy efficiency of CSS by 32.14% and 28.57%, respectively. From an economic perspective, BP-PCMSS and CSS had production costs of $0.022/L and $0.027/L, respectively, indicating an 18.52% reduction for BP-PCMSS. The environmental parameter for BP-PCMSS was 7.82 tons of CO<inf>2</inf> mitigation compared to 5.81 tons for CSS, while the enviroeconomic parameter was $113.39 for BP-PCMSS and $84.25 for CSS, reflecting 34.59% improvement in both parameters for BP-PCMSS. Additionally, BP-PCMSS achieved a sustainability index (SI) of 1.028, reflecting a 0.69% improvement compared to CSS (1.021). In conclusion, the proposed dual-PCM approach integrated into the basin offers a more energy-efficient, economical, environmentally sustainable, and overall superior method for improving solar still performance, outperforming the individual application of each PCM. © 2025 Ramasamy Dhivagar et al. International Journal of Energy Research published by John Wiley & Sons Ltd.

Author keywords- beeswax; desalination; paraffin wax; phase change material; solar still

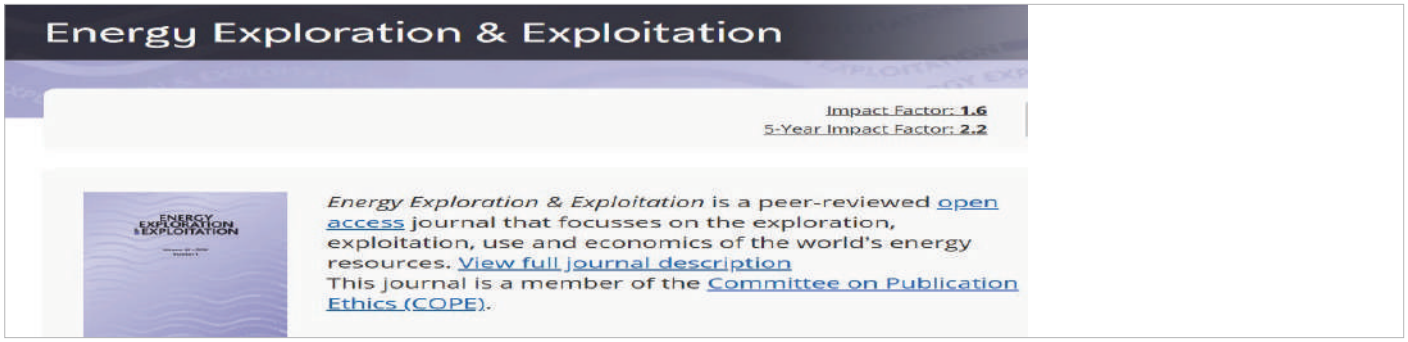
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	**50th**	**2.2**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DRIVING ENERGY TRANSITION IN INDIA: THE ROLE OF ECONOMIC GROWTH, ENVIRONMENTAL GOVERNANCE, FDI AND GREEN INNOVATION

Sah, H.K.; **Kumar, S.**; Sisodia, G.S.; Kratou, H.

Energy Exploration and Exploitation

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Abstract

This study empirically examines the effect of economic growth, environmental governance (EVG), foreign direct investment (FDI) and green innovation on energy transition in India during 1990 to 2022. Auto Regressive Distributed Lag (ARDL) model is applied to find out the cointegration among the variables. Finding from the bound test confirms the cointegration among our variables and the short run influence of economic growth, EVG, FDI and green innovation on energy transition is observed. Additionally, the long run impact of economic growth and FDI on energy transition is noted. Granger causality result confirms unidirectional causality from EVG to economic growth, FDI and energy transition. Similarly, economic growth causes FDI and energy transition in unidirectional ways. Moreover, unidirectional causality from energy transition to FDI is observed through the causality test. Based on our findings, the study recommends policy towards energy transition having a long-term impact on environmental pollution mitigation and economic growth to support Sustainable Development Goals in the targeted period. © The Author(s) 2025. This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (https://creativecommons.org/licenses/by-nc/4.0/) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access page (https://us.sagepub.com/en-us/nam/open-access-at-sage).

Author keywords- ARDL; Energy transition; environmental governance; GDP; innovation; SDGs

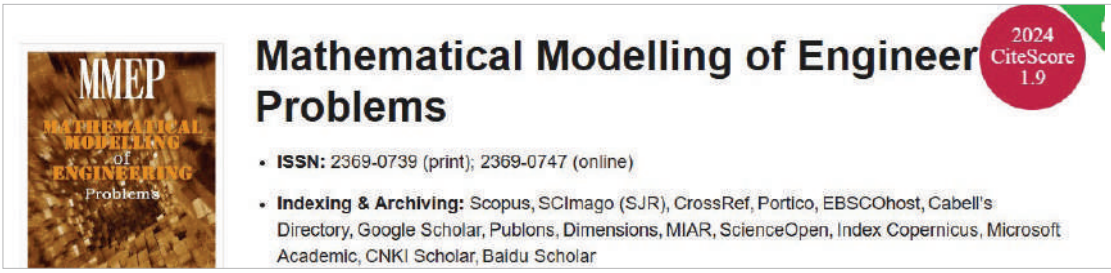
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	43rd	0.56	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DUAL-ORGANIC PHASE CHANGE MATERIAL: A SUSTAINABILITY-ORIENTED APPROACH FOR HIGH-PERFORMANCE SOLAR STILLS

Manoharan, S.; **Palanisamy, S.**; Jagadesh, J.; Nallusamy, S.; Manivannan, S.; Guizani, S.; Hamam, H.

Mathematical Modelling of Engineering Problems

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Abstract

The densification of 5G networks has amplified electromagnetic interference (EMI), undermining communication reliability and raising concerns related to public health and environmental safety. This study proposes a dual-band frequency-selective surface (FSS) tailored for broadband EMI shielding within the 1–6 GHz range. The design demonstrates improved angular stability and leverages a hybrid absorption–reflection mechanism to achieve efficient EMI suppression. The proposed FSS, fabricated using copper on an FR-4 substrate, exhibits two primary resonances at 1.75 GHz and 4.09 GHz, ensuring optimal impedance matching and minimal signal reflection. Transmission analysis reveals high attenuation zones (S_{21} < -30 dB) below 2 GHz and near 6 GHz, with moderate shielding efficiency (S_{21} between –15 dB and –20 dB) in the 2–5 GHz operational band, while maintaining essential 5G throughput. Angular stability tests demonstrate consistent performance up to ±60° incidence for TE polarization, surpassing prior FSS designs. Comparative benchmarking against state-of- the-art models indicates a wider operational bandwidth (5.4 GHz) and improved shielding effectiveness without compromising compactness. © (2025), (International Information and Engineering Technology Association). All rights reserved.

Author keywords- 5G; angular stability; dual band; EMI; FSS; radio frequency exposure; return loss; shielding

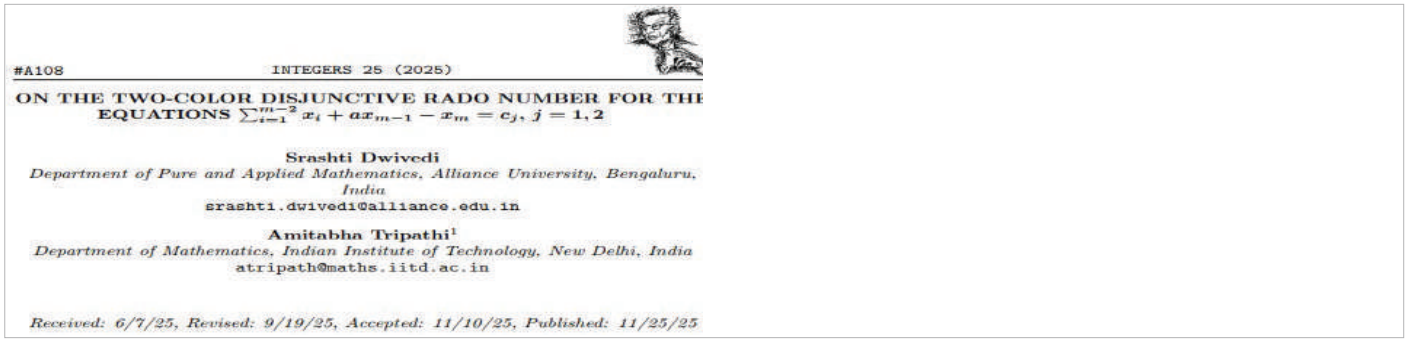
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q4	**16th**	**0.29**	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

ON THE TWO-COLOR DISJUNCTIVE RADO NUMBER FOR THE EQUATIONS (FORMULA PRESENT)

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Integers

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#A108 INTEGERS 25 (2025)

ON THE TWO-COLOR DISJUNCTIVE RADO NUMBER FOR THE EQUATIONS $\sum_{i=1}^{m-2} x_i + ax_{m-1} - x_m = c_j$, $j = 1, 2$

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Received: 6/7/25, Revised: 9/19/25, Accepted: 11/10/25, Published: 11/25/25

Abstract

Given a system of linear equations S, the disjunctive Rado number for the system S is the least positive integer R = R(S), if it exists, such that every 2-coloring of the integers in [1, R] admits a monochromatic solution to at least one equation in S . We determine R(S) when S is the pair of equations (Formula Present).

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Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	80th	2.0	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

REVOLUTIONIZING GREEN TRIBOLOGY THROUGH SILICON OIL-ENHANCED BAMBOO FIBER COMPOSITES FOR ECO-FRIENDLY BRAKE PAD APPLICATIONS

N, J.; Sasidharan, I.; K, B.K.; **Senthamaraikannan, P.**; Kumar, R.

Journal of Industrial Textiles

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Abstract

A novel eco-friendly friction composite has been developed using non-toxic, biodegradable materials, incorporating benzoylated Pseudoxytenanthera stocksii (P. stocksii) bamboo fibers as reinforcement, along with natural fillers and a chemically modified binder matrix. To enhance thermal and tribological performance, thermally stable silicon oil, recognized for its superior oxidative resistance and lubricant efficiency, was employed in place of conventional graphene additives. Silicon oil exhibited a high coefficient of friction (COF) of 2.22, making it an ideal lubricant additive for frictional applications. The developed composites demonstrated remarkable thermal stability, with degradation temperatures ranging from 615°C to 700°C. Raman spectroscopic analysis confirmed the uniform dispersion of silicon oil throughout the matrix. Rockwell hardness measurements indicated a surface hardness of 93 HRL, while pin-on-disc tribological testing revealed the influence of varying weight percentages of modified matrix and lubricant on composite performance. Taguchi L16 orthogonal array design, validated through ANOVA analysis, identified the C10S8 formulation as optimal, exhibiting a consistent COF of 0.53–0.55, frictional stability between 96% and 98%, and a specific wear rate (SWR) of 1–1.7 × 10–5 mm3/Nm. SEM analysis further confirmed the improved surface morphology and integrity of the worn surfaces. The synergistic effect of silicon oil and modified resin enhanced the physical, mechanical, and tribological characteristics of the composite, making it a strong candidate for eco-efficient brake pad applications in the automotive sector.

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Author keywords- bamboo fibres; friction and wear; friction composite; silicon oil; Taguchi optimization

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q3	**50th**	**0.23**	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

A SYSTEMATIC REVIEW WITH BIBLIOMETRIC ANALYSIS OF FOOD WASTE RESEARCH IN CONTEMPORARY HOSPITALITY

Elkhwesky, Z.; **Gumbo, A.R.**; Abuelhassan, A.E.; Hassan, H.; Elkhwesky, F.F.Y.; El Manzani, Y.

Journal of Culinary Science and Technology

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Journal of Culinary Science & Technology

Open Select: choose to publish open access

Addresses the vital issues, developments and science and technology behind meal planning preparation, processing and service for a global consuming public.

Abstract

This study maps patterns, outlets, theories, and directions in hospitality food-waste research from 2002 to March 2023. Drawing on a systematic and bibliometric review of 681 Web of Science articles, we combine performance and thematic analyses to chart trends and structure the field. Cluster analysis reveals five pillars: (1) operational prevention and management in food service; (2) consumer behavior and household waste; (3) resource recovery, including recycling and bioenergy; (4) environmental impact assessment; and (5) sustainable development and policy integration. We propose ten research questions and offer recommendations for consumers, hospitality operators, and policymakers. The synthesis traces the field's evolution and identifies persistent gaps: over-reliance on behavioral models, limited uptake of holistic sustainability frameworks, geographical skew, scarce systematic evaluations of reduction strategies, and insufficient attention to governance. We explicitly align these gaps with the proposed questions, producing an agenda that targets both scholarly limitations and the practical needs of the hospitality sector.
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Author keywords- bibliometric analysis; food outlets; Food waste; hospitality; sustainability

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q1	88th	2.7	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

BACTERIAL FORAGING WITH KRILL HERD OPTIMIZATION FOR SECURED WSN WITH EIGEN TRICK-BASED HYPERGRAPH STABLE CLUSTERING

Karpagalakshmi, R.C.; A, A.; Shanmugam, S.

Arabian Journal for Science and Engineering

Dr. R. C. Karpagalakshmi
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Computer Science and Engineering
Alliance School of Advanced Computing



Abstract

The use of dynamic topological communication by wireless sensor networks (WSNs) renders them susceptible to a number of attacks. Wireless sensor network (WSN) development is a promising technology with low installation costs for a variety of applications. However, WSN nodes operate in hostile surroundings, leaving them open to a range of security risks. Obtaining secure data transfer while consuming the least amount of energy was one of the main objectives of this study. We suggest an Eigen trick-based Hypergraph Stable Clustering-based combination of Bacterial Foraging along with Krill Herd Optimization technique (EtHgSC-BFKHO). A new and effective Eigen trick-based hypergraph stable clustering method is used for clustering and selecting cluster heads (CH) with high residual energy. The best path was identified using the Bacterial Foraging Optimization Algorithm with the Krill Swarm Optimization Algorithm (BFKHO), and the fitness of each bacterium was assessed using features such as internode distance, energy, trust, and link stability. For safe data transfer, a globally optimal path was chosen using the BFKHO selection procedure. Finally, route maintenance processing is performed to determine a different path when a link failure occurs between nodes. Several performance parameters including energy consumption, packet transmission rate, packet loss rate, throughput, and delay were used in the experimental evaluations. The performance of the suggested method, EtHgSC-BFKHO, is enhanced by a 5% packet forwarding rate, a 29% throughput, a 2% packet loss rate, a 13% energy consumption, and a 12% delay when compared to conventional procedures.

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Author keywords- Cluster heads (CH); Eigen trick-based Hypergraph Stable Clustering-based combination of Bacterial Foraging along with Krill Herd Optimization technique (EtHgSC-BFKHO); Energy consumption; Secure data transfer; Wireless sensor network (WSN)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/WOS/Q2	57th	1.3	16 PEACE, JUSTICE AND STRONG INSTITUTIONS

DEBT AND DESPAIR: EXPLORING THE FACTORS PUSHING FROM DEBT TO SUICIDE DURING THE COVID-19 PANDEMIC IN INDIA

Kumar, S.

Omega: Journal of Death and Dying

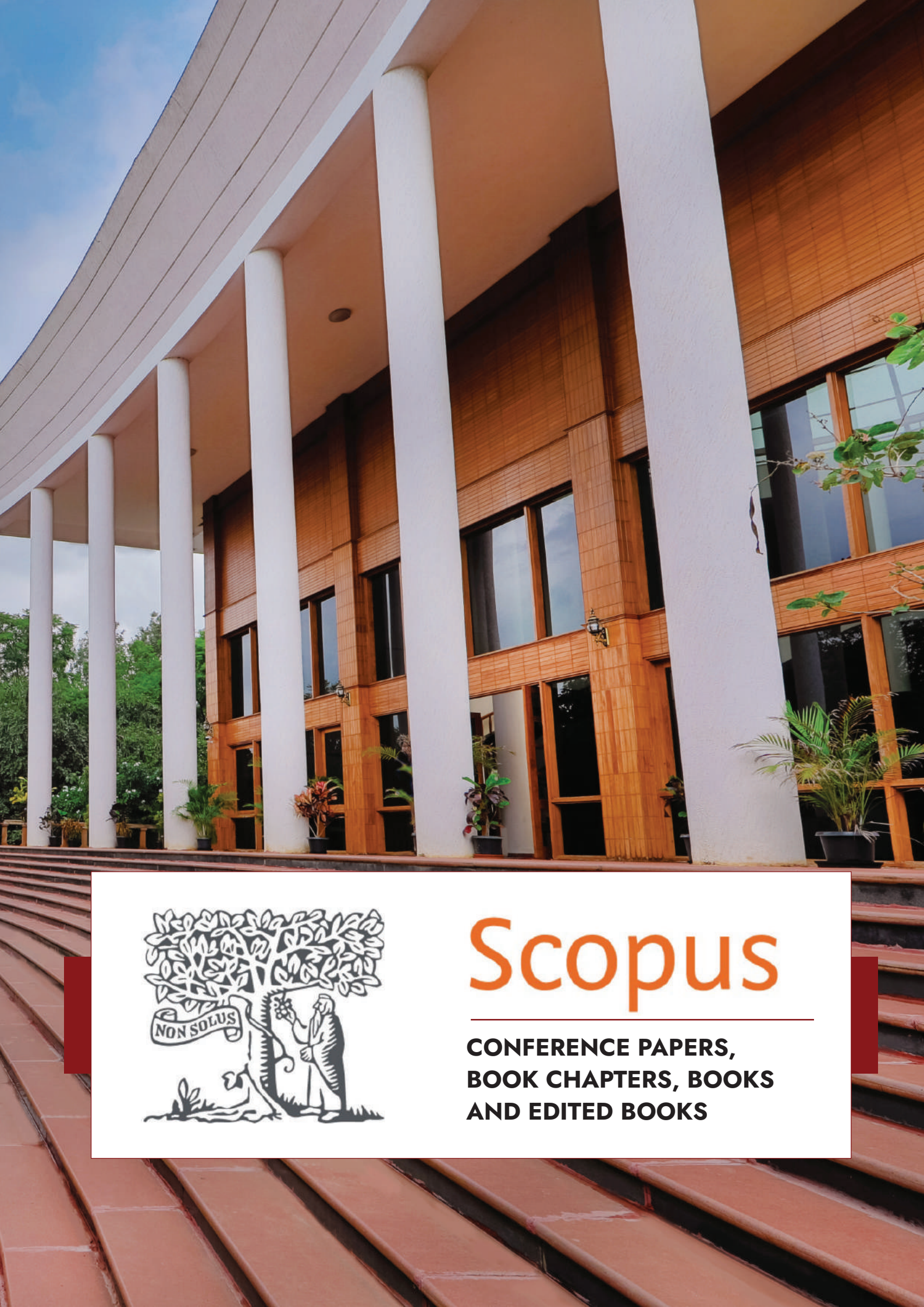
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Alliance School of Liberal Arts



Abstract

The COVID-19 pandemic has had far-reaching effects on the economies and societies of countries worldwide. In India, debt levels among individuals have risen due to job losses, reduced income, financial loss and the burden of COVID-19 treatment. This paper has examined the relationship between debt and despair which turns into suicide during the COVID-19 pandemic in India. Researcher applied 'stress theory' to explore various factors which increased stress and despair during the first and second waves of COVID-19 in India. This paper is a qualitative study and has applied content analysis as a method and has collected 75 cases of COVID-19-related debt and suicide between March 2020 and December 2022, including reports from government agencies, academic articles, media coverage, etc. Finding of this study reveals that during COVID-19 in India many people committed suicide due to job losses, reduced income, financial loss and COVID-19 treatment which increased debt among them.
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Author keywords- COVID-19; debt; India; stress theory; suicide



Scopus

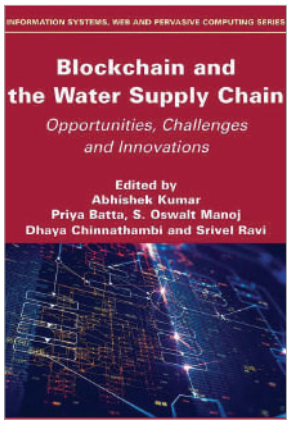
CONFERENCE PAPERS, BOOK CHAPTERS, BOOKS AND EDITED BOOKS

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

BLOCKCHAIN AND THE WATER SUPPLY CHAIN: OPPORTUNITIES, CHALLENGES AND INNOVATIONS

Kumar, A.; Batta, P.; Manoj, **S.O.**; Dhaya, D.; Srivel, S.

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Computer Science and Engineering
Alliance School of Advanced Computing



Abstract

Blockchain and the Water Supply Chain explores the transformative potential of blockchain technology in ensuring sustainable, transparent and efficient water governance. Placing water at the center of smart infrastructure innovation, the book addresses the urgent need for trustworthy and traceable systems in the distribution and management of water resources. This book also delves into how blockchain can revolutionize the water supply chain through decentralized monitoring, smart contracts and immutable data records to reduce losses, enhance accountability and enable real-time decision making. It analyzes key challenges such as interoperability, scalability and regulatory hurdles, while also showcasing innovative use cases and pilot projects across the globe. With contributions from experts in water management, blockchain and environmental policy, this book bridges the gap between digital innovation and sustainable resource management, and is an essential guide for researchers, policymakers and technologists aiming to reshape the future of water systems.
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Indexed keywords:

Engineering controlled terms

Environmental protection; Sustainable development; Water management

Engineering uncontrolled terms

Block-chain; Decentralized monitoring; Environmental policy; Pilot programs; Real time decision-making; Real-time decision making; Smart infrastructures; Water governance; Water management policy; Waters resources

Engineering main heading

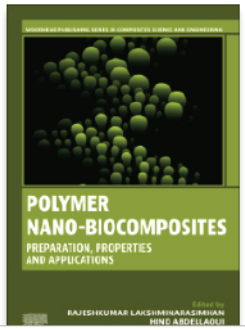
Decision making

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

POLYMER NANO-BIOCOMPOSITES

Lakshminarasimhan, R.; Abdellaoui, H.; Rangappa, S.M.; Siengchin, S.

Dr. Rajeshkumar L
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Polymer Nano-Biocomposites
Preparation, Properties and Applications

1st Edition - October 22, 2025 • Latest edition • Imprint: Woodhead Publishing

Editors: Rajeshkumar Lakshminarasimhan, Hind Abdellaoui, Sanjay Mavinkere Rangappa, Suchart Siengchin

Language: English • Paperback ISBN: 9780443239229 • eBook ISBN: 9780443239212

Abstract

Polymer Nano-Biocomposites Preparation, Properties, and Applications is a comprehensive guide that delves into the latest advancements in this field. The book provides a concise overview of the polymer bio-nanocomposites, their processing and properties. Furthermore, it features case studies that spotlight specific industrial and technological applications. The book will be a valuable reference resource for academic and industrial researchers who are involved in the research and development of advanced green materials and polymeric nanocomposites.
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Indexed keywords:

Engineering controlled terms

Composite materials; Data mining; Green manufacturing; Nanocomposites; Polymeric materials

Engineering uncontrolled terms

Bio-nanocomposite; Case-studies; Green materials; Nano bio composites; Nano-biocomposites; Polymeric nanocomposites; Processing and properties; Property; Research and development; Technological applications

Engineering main heading

Industrial research

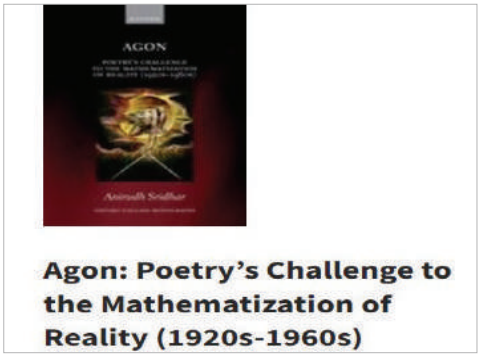
Indexing/Quartile		
SCOPUS/NA	**NA**	**NA**



AGON: POETRY'S CHALLENGE TO THE MATHEMATIZATION OF REALITY (1920S-1960S)

Sridhar, A.

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Dean - Thought Leadership
Language & Literature
Alliance University



Abstract

Agon narrates the battle for truth-telling authority between poetry and mathematics in the modernist period (between the 1920s and 1960s). Analysing its subversive uses of mathematical metaphors, this book argues that modernism posed the last serious challenge to the Empire of Mathematics, whose authority to determine for all the nature of reality had steadily grown from Newton to Einstein. The book's protagonists are William Empson, Laura Riding, Charles Olson, W.B. Yeats, and Michael Roberts, though many others will play smaller roles in the contest. Agon introduces a new paradigm of criticism to interdisciplinary studies in the humanities. It casts the different faculties as not co-existing peacefully but rather as engaged in a perpetual struggle for supremacy. The book traces the rise of mathematics, supplanting philosophy, poetry, and the other arts, as the language in which reality would be described from the seventeenth century onwards, looking at the role of calculus, quaternions, Riemannian manifolds, non-Euclidean geometry, analysis, mathematical logic, and more. The book performs close readings of mathematical poems that bring to the fore a lack in the mathematical picture of reality. The poems will in turn prosecute a reflexive argument about poetry's role in filling those gaps and presenting a richer version of reality. Rather than posing poetry as passive receptacle of mathematical ideas, as the influence-tracing method in literary criticism demands, the agon allows for an intense contestation of poetic and mathematical modes and their claims to truth through careful attention to the playfulness and subversiveness animating cross-disciplinary interaction.
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Author keywords- close reading; mathematics; modernist mathematics; modernist poetry; Newton; non-Euclidean geometry; philosophy of science; physics; William Blake; William Empson

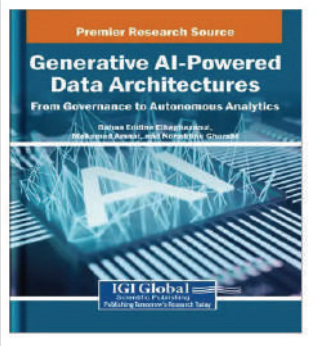
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

GENERATIVE AI AS AN ACCELERATOR FOR DATA ENGINEERING

Rajkumar, N.; Viji, C.; Nachiappan, B.; Mohanraj, A.; Judeson Antony Kovilpillai, J.A.; Manoj, S.

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Abstract

The exponential growth of data in the digital era has heightened the importance of efficient data engineering practices. Traditional approaches to data ingestion, cleaning, transformation, and governance often require significant manual intervention, domain expertise, and development time, leading to bottlenecks in analytics and decision-making. By leveraging natural language prompts, contextual learning, and synthetic data generation capabilities, GenAI can facilitate code generation for data pipelines, improve data quality, enhance metadata documentation, and support intelligent decision-making in real-time environments. This chapter explores the integration of Generative AI into data engineering workflows, providing a comprehensive review of relevant technologies, conceptual frameworks, industrial applications, and challenges. Several case studies highlight the tangible benefits of this synergy, including improved productivity, reduced operational costs, and higher data accuracy.
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Indexed keywords:

Engineering controlled terms

Sentiment analysis

Engineering uncontrolled terms

Human like; Language processing; Marketing campaign; Material-based; Neural-networks; Performance; Personalized marketings; Text-processing; Textual content; Work-flows

Engineering main heading

Marketing

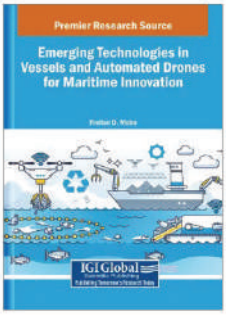
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 14 LIFE BELOW WATER

AI- ENABLED MULTI-SENSOR DRONES FOR REAL- TIME MARITIME SEARCH AND RESCUE

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AI-Enabled Multi-Sensor Drones for Real-Time Maritime Search and Rescue

Jayabhaduri Radhakrishnan (Alliance School of Advanced Computing, Alliance University, Bengaluru, India) and R. Shekhar (Alliance School of Advanced Computing, Alliance University, Bengaluru, India)

Abstract

Maritime Search and rescue (MSAR) solutions must be intelligent, nimble, and autonomous due to the growing frequency and complexity of maritime emergencies, which are caused by climate change, growing coastal populations, and increased marine traffic. This study introduces a multi- sensor, AI- enabled unmanned aerial vehicle (UAV) system intended to improve maritime SAR operations in real time. To provide synchronized data collection, in- situ processing, and quick decisionmaking, the suggested framework combines thermal, RGB, and LiDAR sensors with a Pixhawk 4 flight controller and a Jetson Xavier NX edge computing module. The domain-specific AI4SAR dataset is used to train YOLOv5s, a compact deep learning architecture that is enhanced with both synthetic and real marine scenes to guarantee resilience in a range of environmental circumstances. Transfer learning, ONNX export, and TensorRT acceleration are used to optimize the model, allowing for inference speeds exceeding 30 frames per second with 92.1% precision, 88.7% recall, and 90.3% mAP@ 0.5. The outcomes highlight the system's applicability for use in actual SAR situations, where operational resilience and real- time item detection are essential for saving lives in hazardous maritime environments.

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Indexed keywords:

Engineering controlled terms

Antennas; Climate change; Deep learning; Fighter aircraft; In situ processing; Transfer learning

Engineering uncontrolled terms

Coastal population; Data collection; In-situ processing; Marine traffic; Multi sensor; Real- time; Search and rescue; Synchronized data; Thermal; Unmanned aerial vehicle systems

Engineering main heading

Drones

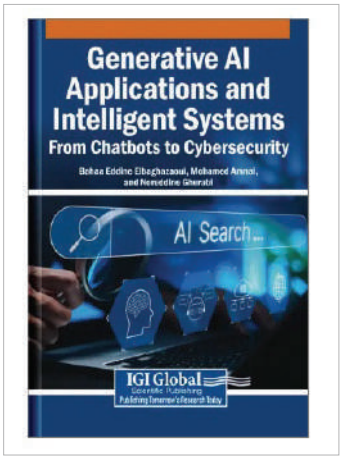
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

GENERATIVE AI IN TEXT AND LANGUAGE PROCESSING FOR DIGITAL MEDIA

Rajkumar, N.; Viji, C.; Nachiappan, B.; Nagarajan, G.; Mohanraj, A.; Judeson Antony Kovilpillai, J.A.; Prabhu Shankar, B.

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Abstract

Generative AI has revolutionized text and language processing, offering transformative competencies that redefine how virtual media is created, personalized, and ate up. This period employs advanced neural networks, along with transformers and generative pre-educated fashions, to deliver coherent, contextually relevant, and human-like textual content. Within the realm of digital media, generative AI allows numerous programs, along with computerized content material advent, sentiment evaluation, actual-time translation, conversational dealers, and personalized marketing campaigns. The mixing of generative AI into digital media workflows has brought about improved performance and creativity, allowing content material creators to generate amazing outputs with minimal attempt. Moreover, it empowers corporations to deliver hyper-customized man or woman tales with the aid of tailoring content material material based totally on individual possibilities and consumption styles.
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Indexed keywords:

Engineering controlled terms

Carbon; Carbon Economy; Environmental regulations; Sustainable development; Sustainable development goals

Engineering uncontrolled terms

Behavioral economics; Business practices; Carbon production; Comparative analyzes; Corporates; Fiscal policies; Legal frameworks; Low carbon; Sustainable business; Tax laws

Engineering main heading

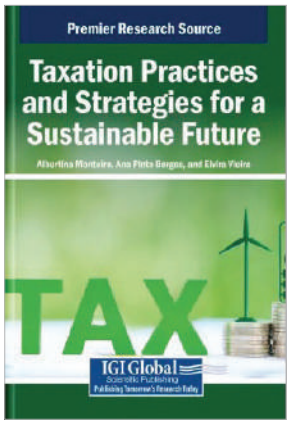
Taxation

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	

BEHAVIOURAL TAXATION AND LAW: ENCOURAGING SUSTAINABLE BUSINESS PRACTICES

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Dr. Mukul Saxena
Professor & Director - Center for PG and Legal Studies &
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Alliance School of Law



Abstract

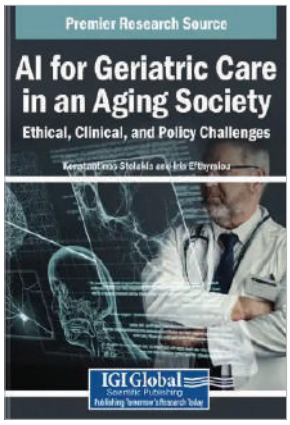
This chapter examines how Behavioural taxation, supported by legal frameworks, promotes sustainable business practices globally. It integrates Behavioural economics, nudge theory, tax law, and sustainability governance to demonstrate how fiscal policies drive corporate actions like low-carbon production and Environmental, Social and Governance (ESG)compliance. A comparative analysis of policies-such as the EU's Carbon Border Adjustment Mechanism, India's Perform, Achieve and Trade (PAT) scheme, and Canada's carbon tax-reveals diverse impacts on firms like ArcelorMittal and UltraTech Cement. Challenges including tax avoidance, enforcement gaps, and political resistance are addressed, with solutions like tiered taxes and technology integration proposed. By offering a unified model, the chapter advances discourse on aligning corporate strategies with sustainability goals. © 2026, IGI Global Scientific Publishing. All rights reserved.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES

EDUCATIONAL, TECHNOLOGICAL, EPISTEMIC, AND PEDAGOGICAL ARCHITECTURES FOR AN AGEING WORLD: HUMAN-AI SYNERGIES IN GERIATRIC CARE AND ECOLOGIES

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Abstract

This chapter critically interrogates the integration of AI in geriatric care through the lens of education, positioning learning ecosystems as the foundational infrastructure for ethical, inclusive, and context-sensitive AI deployment. Drawing on global policy frameworks, cross-sectoral case studies, and pedagogical theory, it constructs a multi-tiered roadmap encompassing awareness, skill-building, and professionalisation across stakeholders. The chapter challenges technological determinism by reframing AI not as a neutral tool but as a socially contingent artefact shaped by educational design, equity concerns, and moral responsibility. Case studies from Japan, Finland, India, and South Korea demonstrate that successful AI implementation hinges less on technical sophistication than on educational imagination. It concludes by proposing lifelong, interdisciplinary, and justice-oriented learning strategies as prerequisites for meaningful AI adoption in ageing societies, asserting that without robust education, even the most advanced AI cannot ensure dignified and humane eldercare. © 2026, IGI Global Scientific Publishing. All rights reserved.

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	

THE THERMAL PROPERTIES OF ECO-FRIENDLY FIBERS AND POLYMERS FOR THE SUSTAINABLE ENVIRONMENT

Muthu Chozha Rajan, B.; **Suyambulingam, I.**; Prasath, K.; Shanawaz, A.M.; Manikandaraja, G.; Pradeep, R.; Pradeep, M.

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Abstract

In the pursuit of a sustainable future, eco-friendly fibers and polymers are receiving considerable attention for their minimal environmental effect and capacity to substitute traditional synthetic materials. This chapter examines the thermal characteristics of natural fibers, including jute, hemp, flax, and bamboo, as well as biodegradable polymers such as polylactic acid, polyhydroxyalkanoates, and starch-based polymers. These materials exhibit distinctive thermal properties, including thermal conductivity, thermal stability, and specific heat capacity, which affect their use in sectors such as textiles, packaging, and construction. We examine the structure-property links of these environmentally sustainable materials, investigating how their molecular arrangement influences heat transmission processes and their efficacy as thermal insulators. This chapter includes the thermal breakdown and stability of biodegradable polymers and their influence on usage in high-temperature applications. The incorporation of nanoparticles and biocomposites is examined as a method to improve the thermal performance of these environmentally sustainable alternatives, hence increasing their suitability for rigorous applications. Additionally, the environmental advantages of utilizing eco-friendly fibers and polymers, including diminished carbon emissions, recyclability, and biodegradability, are comprehensively analyzed.
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Author keywords- biodegradable polymers; Eco-friendly fibers; environmental impact; sustainable development; thermal conductivity; thermal properties; thermal stability

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

RECYCLING ASPECTS OF ECO-FRIENDLY NATURAL FIBERS AND POLYMERS FOR THE SUSTAINABLE ENVIRONMENT

Ajithkumar, S.; Arulmurugan, B.; Sivalingam, S.; **Rajeshkumar, L.**; Ramesh, M.

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Abstract

The growing environmental crisis caused by plastic waste and resource depletion has intensified the need for sustainable materials and effective recycling systems. Eco-friendly fibers and polymers, which include natural, biodegradable, bio-based, and recyclable materials, are emerging as key solutions for reducing the environmental footprint of various industries. This chapter explores the recycling aspects of these materials, focusing on their types, properties, and applications, as well as the challenges and advancements in their recycling processes. Mechanical and chemical recycling techniques for polymers and fibers are examined, highlighting the benefits and limitations of each method. Mechanical recycling remains a widely adopted process for natural and synthetic fibers, though it faces quality degradation over time. Chemical recycling offers higher quality outputs by breaking down materials into their monomers but is energy-intensive and costly. Pyrolysis and depolymerization processes are increasingly used for materials that are difficult to recycle mechanically, while advanced technologies such as enzymatic recycling show promise for future innovations. This chapter also discusses the challenges of recycling biodegradable and bio-based polymers, which require dedicated infrastructure for composting and processing. Recycling natural fibers presents obstacles such as contamination and mixed material waste, limiting recyclability. Nevertheless, new technologies, including closed-loop systems and innovations in material design, are paving the way for more sustainable practices.
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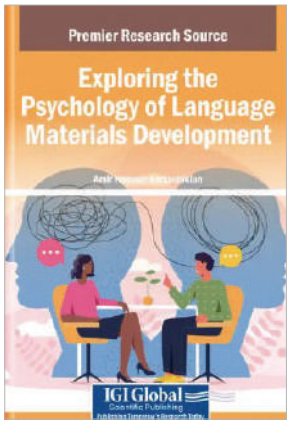
Author keywords- biodegradable; natural fibers; polymer; Recycling process; sustainable environment

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	03 GOOD HEALTH AND WELL-BEING; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

CREATING SAFE SPACES FOR LANGUAGE ACQUISITION: REDUCING ANXIETY AND FEAR THROUGH TARGETED MATERIALS DESIGN

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Abstract

This chapter explores the pivotal yet underexamined role of instructional materials design in reducing foreign language anxiety (FLA) in second language acquisition (SLA). Drawing on interdisciplinary frameworks, such as, affective filter hypothesis, cognitive load theory, growth mindset, self-determination theory, sociocultural theory, and universal design for learning, the chapter outlines how content, layout, and emotional cues in learning materials can mitigate anxiety and enhance learner confidence. It examines strategies such as scaffolded task design, culturally responsive content, visual supports, emotional regulation techniques, and gamified activities. The chapter also reviews global empirical studies and case-based evidence to demonstrate the impact of anxiety-sensitive materials. By shifting the locus of intervention from teacher behaviour to instructional content, the chapter offers practical, research-informed recommendations for educators, curriculum designers, and EdTech developers aiming to create inclusive, emotionally supportive language learning environments.
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Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

FIBER REINFORCEMENTS USED FOR VITRIMER MATRIX COMPOSITES

Rajeshkumar, L.; Aravindh, M.; Sivalingam, S.; Srinivasan, N.

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ELSEVIER

Biobased Epoxy Vitrimer Composites

Design, Manufacture, Properties, Applications, and Environmental Impacts

Woodhead Publishing in Materials

2026, Pages 129-153



Abstract

The extensive application of thermoset epoxy resins (ERs) across numerous sectors is attributed to their exceptional mechanical strength, heat resistance, and stability. Nevertheless, these materials present major environmental difficulties due to their nonbiodegradable and nonrecyclable features, which begin from their permanently cross-linked structures. Additionally, ERs are often manufactured from fossil fuel–derived and toxic precursors, causing additional environmental harm. This chapter examines the possibility of vitrimers as a sustainable substitute for standard epoxy resins, particularly in tackling the recyclability difficulties associated with synthetic fibers such as glass and carbon fiber composites. Vitrimers possess the beneficial characteristics of thermosets while being recyclable like thermoplastics, therefore presenting a potential alternative for waste management. Furthermore, vitrimers can be generated from natural materials such as flax, hemp, and ramie fibers, which helps to limit toxicity and dependence on fossil resources. The discussion emphasizes the problems and prospects of adopting vitrimer-based composites—including synthetic, natural, and filler materials—as alternatives to commercial epoxy resins. Although current vitrimer formulations still involve a small fraction of epoxy resin (ER) to fulfill the required mechanical qualities, they represent a pioneering method for recycling and sustainability within the polymer sector. This work demonstrates the potential of vitrimers to alter composite materials by combining recyclability with excellent performance, thus paving the way for more ecologically friendly and sustainable industrial practices.
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Author keywords- Carbon fibers; Fillers; Natural fibers; Reinforcements; Synthetic fibers; Vitrimer epoxy composites

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	07 AFFORDABLE AND CLEAN ENERGY; 11 SUSTAINABLE CITIES AND COMMUNITIES

BEYOND BORDERS: UNDERSTANDING GLOBALIZATION, DIASPORA AND SUSTAINABLE DEVELOPMENT

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Abstract

In the year 2023, remarkable economic growth has been noticed at the global level, as Gross Domestic Product reached $105 trillion across 193 nations. Yet, a harsh reality is that a mere seven countries, United States, Japan, Germany, the United Kingdom, France, Italy, and Canada, comprised 62.09 percent of global wealth. This disproportionate division of economic growth created a huge economic inequality between the Global North and the Global South countries. This chapter delves into the complex relationship between globalization and the socioeconomic conditions of developing countries, scrutinizing how globalization has impacted poverty and inequality. The aim and objective of this study is to highlight how globalization has increased the gap between global north and global south countries including how negative impact of globalization in developing countries has increased diaspora into the developed countries. This research will examine how globalization affects wealth and resource allocation, which has impacted poverty and inequality in less developed countries. Moreover, the chapter intends to elucidate how diaspora groups can either alleviate or intensify these outcomes via financial support back home, cultural interactions, and social advocacy. The findings of the study reveal that globalization has had a two-faced impact on developing countries. On the one hand, globalization of trade and investments has promoted economic growth, expanded people's access to contemporary technologies and knowledge, created new job opportunities, and lifted many people out of poverty. On the other hand, globalization is associated with income inequalities, exploitation of workers, and the environment, and most of these effects are felt by vulnerable workers. Thus, the study raises diaspora communities as strategic agents within the homeland's socio-economic context. Money that is sent by family members living in other countries is normally a vital source of funds for most households in developing countries, and this can reduce poverty levels. Nonetheless, this dependence on remittances may foster reliance issues and amplify talent exodus challenges, further entangling globalization's effects.
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Author keywords- Diaspora; Globalization; Inequality; Poverty; Third World

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

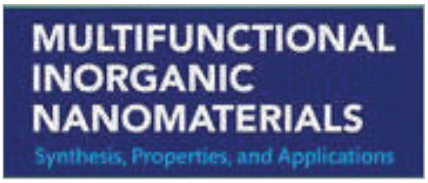
POROUS SILICON NANOMATERIALS FOR BIOMEDICAL APPLICATIONS

Mishra, V.; Rashmi, n.

Multifunctional Inorganic Nanomaterials: Synthesis, Properties, and Applications

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Dr. Rashmi
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Alliance School of Sciences



Abstract

This chapter presents the synthesis and investigation of one-dimensional nanoscale porous silicon photonic crystals (1D-PSPC), achieved through the electrochemical anodization of p-type crystalline silicon wafers, with adjustments in current densities. Structures, namely, PSPC1 and PSPC2, were prepared using current densities of 25 and 35 mA/c https://www.w3.org/1998/Math/MathML" display="inline"> m 2 , respectively, with an etching time of 10 min. Scanning electron microscopy (SEM), photoluminescence (PL), reflectance, and transmittance measurements were used to examine the structural and optical characteristics of manufactured structures. SEM characterization confirmed a porous structure with average pore sizes of 56.6 and 73.9 nm, and thicknesses of 22.5 and 23.9 μm for PSPC1 and PSPC2, respectively. Photoluminescence studies showed that by varying the anodization current density and keeping the electrolyte content and etching time constant, the electronic band gap could be adjusted from 1.87 to 1.93 eV. The engineering facts presented here are essential for the development and manufacturing of nanoscale optical devices and applications related to sensing. These sensors have opened avenues for flexible application areas, such as the internet of things, point-of-care testing, and information and communication technology, due to their potential for integration with various photonic or electronic devices for on-chip signal processing and communication. This article reviews PSi sensors, delving into their basic principles, applications, recent advancements, and performance constraints. PL studies showed that by varying the anodization current density and keeping the electrolyte content and etching time constant, the electronic band gap could be adjusted from 1.87 to 1.93 eV. The engineering facts presented here are essential for the development and manufacturing of nanoscale optical devices and applications related to sensing. The focus of this article is on discussing the basic principles of the introduced techniques, their newest progresses, performance limitations, and the myriad of technologies supporting this field, including key components such as light sources and biomass. We conclude this review by comparing various PSi sensor techniques based on data collected over the past decade.
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Indexed keywords:

Engineering controlled terms

Crystals; Current density; Electrolytes; Energy gap; Etching; Nanostructured materials; Photonic devices; Photonic integration technology; Pore size; Porous silicon; Silicon photonics; Silicon wafers

Engineering uncontrolled terms

Current; Anodization current; Basic principles; Biomedical applications; Electronic band gaps; Etching time; Nano scale; Optical-; Scanning electrons; Time-constants

Engineering main heading

Medical applications

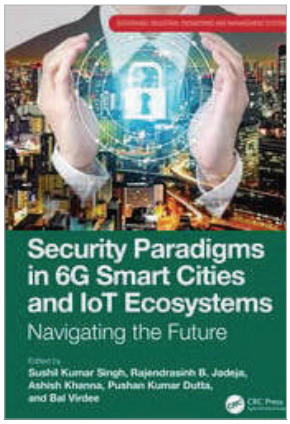
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

THE BENEFITS OF WEB AND BLOCKCHAIN IN DECISION-MAKING INDUSTRY 4.0

Kanabar, K.; Dey, R.; Mahajan, R.; Jadhav, P.V.; Khan, M.; **Pradeep Ghantasala, G.S.P.**

Security Paradigms in 6G Smart Cities and IoT Ecosystems: Navigating the Future

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Abstract

Industry 4.0 is greatly benefitted by web and blockchain especially for decision-making, which is characterized by the integration of digital technology into the manufacturing and industrial processes, thus helping in creating smart factories and increasing productivity, flexibility, and efficiency with the use of technologies such as Internet of Things (IoT), artificial intelligence (AI), big data, robotics, and automation. A worldwide network of linked computers, the web enables people to access and exchange data, while blockchain is a distributed, decentralized ledger technology that securely and openly records transactions. It is a series of blocks that are encrypted, and each one holds a record of data. Huge amounts of real-time data from multiple sources are accessible, and it can all be assessed and analyzed at the web interface, enabling organizations to make data-driven decisions. Blockchain enhances confidence and accountability by providing data security, transparency, and traceability. Smart contracts support automation of workflows, accelerating decision-making and improving productivity. In addition, both technologies enable stakeholder participation and knowledge sharing, enhancing decision-making processes.
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Indexed keywords:

Engineering controlled terms

Artificial intelligence; Big data; Decision making; Electronic document exchange; Factory automation; Internet of things; Knowledge management; Smart manufacturing

Engineering uncontrolled terms

Block-chain; Decentralised; Decisions makings; Digital technologies; Industrial process; Manufacturing process; Multiple source; Real-time data; Web interface; World-wide networks

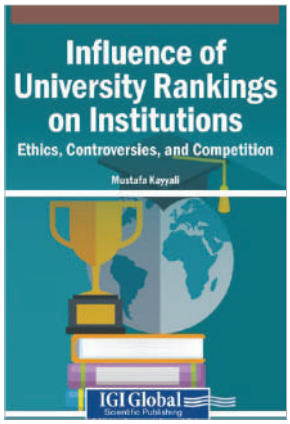
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	04 QUALITY EDUCATION

WHEN NUMBERS REPLACE KNOWLEDGE: THE WEST, THE REST, AND THE RANKING IN GLOBAL HIGHER EDUCATION

Keerthiraj, n.; **Misra, A.**

Influence of University Rankings on Institutions: Ethics, Controversies, and Competition

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Abstract

The contemporary belief in global university rankings rests on an unnoticed presupposition:that institutions of higher learning can be evaluated, compared, and ordered according to universally applicable criteria. This chapter sets out to show that such a presupposition is not a neutral or objective truth, but the product of a specifically European experience of knowledge and education. Ranking-as a practice-presupposes that knowledge is measurable, institutions are comparable, and excellence is a position on a scale. These assumptions, however, are not shared across civilizations. The chapter argues that the logic of ranking is intelligible only within the cognitive framework that emerged in Europe, one that equated knowledge with textuality, formality, and institutional hierarchy. This chapter interrogates the very idea that academic value can be captured by metrics. In doing so, it points toward the possibility of alternative modes of valuing knowledge, rooted not in universal standards, but in the plural experiences of learning across cultures.

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Author keywords- Cognitive frameworks; High educations; Higher learning

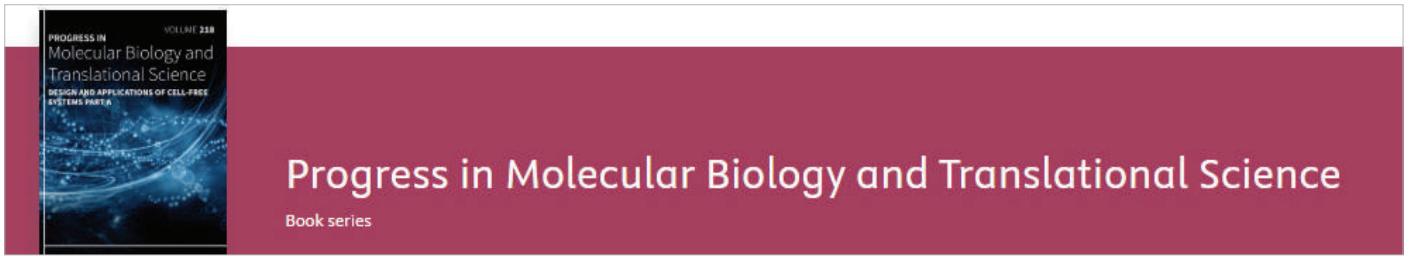
Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	07 AFFORDABLE AND CLEAN ENERGY; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES

NEW FRONTIERS AND APPLICATIONS OF CELL-FREE SYSTEMS

Panchal, K.; Khambhati, K.; **Matam, V.**; Ramakrishna, S.; Singh, V.

Progress in Molecular Biology and Translational Science

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Registrar
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Abstract

Cell-free systems (CFS) have emerged as a key platform in the field of synthetic biology. This is used to understand natural biological systems outside living cells. It contains cell extracts from procaryotes, eucaryotes, which provides a controlled environment for complex biological processes that leads to the synthesis of valuable biomolecules. It lacks natural mechanisms, yet it contains all the necessary components, which are required for the synthesis of desired biomolecules. It is specifically designed for the elimination of barriers to molecular transport across cell membranes. This chapter highlights a basic CFS and its various applications, such as high-throughput protein synthesis and expression, non-canonical amino acids incorporation in proteins, biosensors, drug discovery and in the metabolic engineering. This chapter also focuses on the various case studies and recent advancements to study how these systems are used for the transformation of biotechnology and provides rapid, more adaptable, and affordable solutions in the field of research as well as industrial levels. Altogether, CFS emerged as promising platform in the field of biotechnology, biomedicine, and environmental sustainability.
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Author keywords- Cell extracts; CFS; Drug discovery; High-throughput proteins; Metabolic engineering; Synthetic biology

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

GENERATIVE AI IN BUSINESS DECISION: AN EXPLORATORY STUDY

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3rd IEEE International Conference on Artificial Intelligence and Mechatronics Systems, AIMS 2025

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Abstract

This study provides empirical evidence on the direct impact of Generative Artificial Intelligence (GenAI) on business decision-making and organizational performance. To accomplish this, this study adopts an integrated framework, drawing from Decision Theory, Technology Acceptance Model, Information Processing Theory, Organizational Learning Theory, and Complexity Theory. This multi-dimensional methodological approach offers a deeper and comprehensive understanding of how GenAI is influencing the transformation process of business decision-making. The findings reveal that GenAI is not merely a technological tool but a strategic asset with the potential to fundamentally reshape business decisions. By addressing both ethical and practical considerations, organizations can harness the power of GenAI responsibly and effectively, driving enhanced decision-making and improved overall performance.
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Author keywords- Business decisions; Generative AI; Multifaced approach; Organizational performance; Technological innovation

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	06 CLEAN WATER AND SANITATION; 09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

WATERBORNE DISEASE DETECTION USING MACHINE LEARNING

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Abstract

Waterborne diseases, such as cholera, typhoid, and dysentery, are an ongoing threat to public health in developing countries, due in part to inadequate sanitation infrastructure and repeated episodes of water supply contamination. This study proposes a novel machine learning architecture to anticipate and notify stakeholders of a potential waterborne disease outbreak in at-risk communities. Our framework merges K-means clustering with Random Forest classification to forecast waterborne disease outbreaks before they spread. Environmental relationships that are frequently overlooked by conventional techniques are detected using Kmeans clustering; Random Forest classification distinguishes between normal and elevated risk environmental contexts. During the process of model development, we prioritised recall to guarantee that the system picks up on all possible signals of extreme concern, which is vital for an effective public health response. The data preparation process included variable conversion, standardization, and cleaning of partial entries. This platform may integrate information into the usual reaction frame by automatically notifying medical authorities when danger indicators exceed the predetermined level. Implementing quarantine regulations, disseminating public counseling, or altering water purification techniques are a few examples of such measures. This work showcases how artificial intelligence can be effectively employed to reduce both human suffering and financial cost associated with waterborne diseases through their proactive detection and resolution. By using environmental data analytics and predictive algorithms, this cutting-edge solution empowers public health officials to take preventive action against potential outbreaks of waterborne diseases, rather than being a reactive response after an outbreak has been detected.
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Author keywords- Environmental Data; K-means Clustering; Machine Learning; Random Forest; Waterborne Disease

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE

LEVERAGING AI AND BIG DATA FOR TRANSFORMATIVE EDUCATIONAL INSIGHTS AND INNOVATIONS

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2025 International Conference on Technology Enabled Economic Changes, InTech 2025

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Abstract

This paper focuses on how Artificial intelligence and big data can transform education through the application of natural language processing that will define the system's ability to auto-grade the works. Currently, natural language processing models can understand the student responses in a way that was not possible before and provides feedback on grammar and comprehension instantly with the help of Microsoft Azure AI hence a logical step to develop grading consistency and scalability. Teachers can now dedicate their time to Alabama teachers specifically on giving attention to students that may require special cares due to their learning disability. The paper also discusses how change in curriculum that is based on data and the flexibly delivered learning may be facilitated by analysing big data concerning the performance of students. Education is transformed with the integration of the multiple artificial intelligence that enhances system's effectiveness, flexibility and fairness. Teachers can direct their attention to engaging the students by minimising on score assignments and providing feedback as they take the test. It also makes some useful information which can help to improve the programme and help students more.
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Author keywords- AI in Education; Automated Assessment; Big Data Analytics; Educational Insights and Innovations; Microsoft Azure AI; Natural Language Processing (NLP)

Indexing/Quartile	Percentile	Impact Factor	SDG
SCOPUS/NA	NA	NA	09 INDUSTRY, INNOVATION AND INFRASTRUCTURE; 11 SUSTAINABLE CITIES AND COMMUNITIES

INTELLIGENT SPATIOTEMPORAL TRAFFIC OPTIMIZATION USING FEDERATED MODEL-BASED REINFORCEMENT LEARNING FOR SMART CITIES

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Abstract

Traffic congestion remains a critical challenge in urban mobility, increasing travel time, fuel consumption, and environmental impact. Traditional static timing traffic signal systems lack adaptability to dynamic traffic conditions. To address this, we propose DMFLADPPRL, a novel traffic signal control framework that combines three core innovations: (i) a multilevel deep federated learning architecture that enables decentralized training across edge, fog and cloud layers; (ii) AutoDeepCABAC, a custom autoencoder-based entropy compression technique that significantly reduces communication overhead; and (iii) a modified Proximal Policy Optimization (PPO) algorithm tailored for adaptive traffic control. Unlike previous approaches, our framework tightly integrates these components to achieve privacy-preserving, energy-efficient, and real-time decision-making. AutoDeepCABAC enables seamless deployment in consumer electronics based on the Internet of Things (IoT), such as smart cameras and roadside sensors, while the hierarchical FL design ensures scalability in large urban networks. Evaluations of benchmark datasets (SIND, PeMS, Bosch Small Traffic Lights) under IID and non-IID conditions show that DMFLADPPRL outperforms baseline methods in reducing vehicle waiting time, improving throughput, and minimizing congestion. This work demonstrates the potential of intelligent and cooperative learning systems to power the next generation of smart city traffic infrastructure. © 1975-2011 IEEE.

Author keywords- consumer electronics in traffic management; IoT; reinforcement learning; smart cities; Traffic signal optimizatio



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