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5th World Conference on

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CHEMISTRY AND CHEMICAL ENGINEERING

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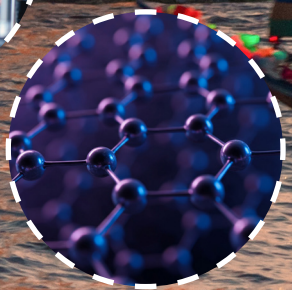
ADVANCED MATERIALS, NANOSCIENCE AND NANOTECHNOLOGY

NOVEMBER 19-20, 2026

BANGKOK, THAILAND







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November 19-20, 2026 | Bangkok, Thailand

BOOK OF ABSTRACTS

Abstracts of the 5th World Conference on Engineering, Technology and Applied Sciences & 12th World Conference on Chemistry and Chemical Engineering & 12th World Conference on Advanced Materials, Nanoscience and Nanotechnology

Conference Dates:
November 19-20, 2026

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TABLE OF CONTENTS

S.No.	Section	Page
1	**About Eurasia Conferences**	**6**
2	**Scientific Program**	**7-10**
3	**Invited Lectures**	**11**
3.1	Synthesis of Bioactive Heterocycles Using Environmentally Friendly Solvents	12
3.2	Design, Synthesis, and Advanced Characterization of Heterocyclic Compounds: Biological and Electrochemical Evaluation	13
3.3	Nucleoside Mimicking Fluorescent Probes with Photophysical Properties and Biological Applications	14
4	**Keynote Session**	**15**
4.1	Fuzzy Modeling & Decision-Making Applications	16
5	**Speaker Sessions**	**17**
5.1	Flavonoid-Functionalized Silver Nanoparticles as Selective Colorimetric Sensor of Metal Ions and Their Interactions with Bovine Serum Albumin	18
5.2	Durable and Efficient Concentrated-Solar Catalytic Methane Dry Reforming Over Ni-based Catalysts	19
5.3	Red Mud Based Geopolymers and Alkali Activated Materials for Construction and Environmental Applications	20
5.4	Cooling Rate Dependent Cementitious Property of Ladle Refining Furnace Slag	21
5.5	ZnO/rGO nanocomposites as a photo catalyst for the reduction of Cr^{6+}	22
5.6	Biogenic Cadmium-based Quantum Dots and their Therapeutic Applications	23
5.7	Development of g-C_3N_4 Based Materials Doped Oxalic Acid and Boron for Gas Sensing	24
5.8	Structural and Optical Evolution of ZnO under Thermal Treatment for Enhanced Photocatalytic Performance	25
5.9	Synthesis and Characterization of Fe_3O_4-Mn_3O_4/rGO Composites for Supercapacitor Applications	26
5.10	Development and Performance Evaluation of a Wi-Fi-Controlled Security Patrol Robot Using ESP32-CAM	27
5.11	An IoT-Enabled Smart Exhibition System Using Single-Gate Dual TF-Luna LiDAR for Bidirectional Visitor Counting and Multimedia Automation	29
5.12	Development and Evaluation of an Ultrasonic-Guided Robot Prototype for Autonomous Wheelchair Navigation in Domestic Environments	31
6	**Poster Session**	**33**
6.1	Local B–H Hysteresis Mechanism of Enhanced Deperming Performance in Discretely Arranged Coils	34
6.2	Robustness of Deperming Performance of Discretely Arranged Coils under Different Field-Decay Steps	35
6.3	Quantitative Decomposition of Mean-Field Amplitude and Coil-Configuration Effects on Deperming Performance	36
6.4	Multi-Metric Evaluation of Residual Magnetic Signature for Discretely Arranged Deperming Coils	37
7	**Participants Index**	**39**

ABOUT EURASIA CONFERENCES

Established in 2022, Eurasia Conferences has rapidly gained recognition for organizing high-quality conferences across a diverse range of fields including science, technology, social sciences, humanities, business and economics, life sciences, medicine, and healthcare. Our mission is to drive progress and innovation through dialogue and collaboration among professionals worldwide.

Since our inception, we have successfully hosted over 50 conferences, providing platforms for scholars, researchers, professionals, and students to exchange knowledge and cultivate new ideas. Our events are strategically designed to foster networking, stimulate in-depth discussions, and facilitate the sharing of cutting-edge research and practical solutions to address contemporary challenges.

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November 19-20, 2026 | Bangkok, Thailand

SCIENTIFIC PROGRAM

08:50-09:00 @
Introduction and Welcome Note
Venue: Ambassador Hotel Bangkok, Garden 1

NOVEMBER 19, 2026

Invited Lectures

09:00-09:30

Title: Synthesis of Bioactive Heterocycles Using Environmentally Friendly Solvents

Prof. Okram Mukherjee Singh, Department of Chemistry, Manipur University, Canchipur, Imphal, Manipur, India

09:30-10:00

Title: Design, Synthesis, and Advanced Characterization of Heterocyclic Compounds: Biological and Electrochemical Evaluation

Prof. Dr. Anouar Alami, Faculty of Sciences, Dhar El Mahraz, Sidi Mohammed Ben Abdellah University, (Morocco)

10:00-10:30

Title: Nucleoside Mimicking Fluorescent Probes with Photophysical Properties and Biological Applications

Dr. Jagannath Kuchlyan, Department of Chemistry, National Institute of Technology, Hamirpur, H.P. India

Group Photo & Tea and Refreshments Break 10:30-11:00

Keynote Session

Title: Fuzzy Modeling & Decision-Making Applications

11:00-11:30

Dr. Sunny Joseph Kalayathankal, Professor of Computer Science & Engineering, Rajagiri School of Engineering & Technology, Cochin, Kerala, India

Speaker Sessions

Sessions Chair: Prof. Okram Mukherjee Singh, Department of Chemistry, Manipur University, Canchipur, Imphal, Manipur, India
Sessions Co-Chair: Dr. Zeai Huang, Southwest Petroleum University, Chengdu, Sichuan, China

11:30- 11:50

Title: Flavonoid-Functionalized Silver Nanoparticles as Selective Colorimetric Sensor of Metal Ions and Their Interactions with Bovine Serum Albumin

Dr. Kalyan Sundar Ghosh, Department of Chemistry, National Institute of Technology Hamirpur, Himachal Pradesh, India

Title: Durable and Efficient Concentrated-Solar Catalytic Methane Dry Reforming Over Ni-based Catalysts

11:50- 12:10

Dr. Zeai Huang, State Key Laboratory of Oil and Gas Reservoir Geology and Exploitation, Southwest Petroleum University, Chengdu, Sichuan, China

Title: Red Mud Based Geopolymers and Alkali Activated Materials for Construction and Environmental Applications

12:10- 12:30

Prof. Mira Vukčević, Faculty of Technology, University of Montenegro, Podgorica, Montenegro

Lunch Break 12:30-13:30

Title: Cooling Rate Dependent Cementitious Property of Ladle Refining Furnace Slag

13:30-13:50

Prof. Mohammad Aminul Islam, Materials and Metallurgical Engineering (MME) Department, Bangladesh University of Engineering and Technology (BUET), Dhaka

Title: ZnO/rGO nanocomposites as a photo catalyst for the reduction of Cr^{6+}

13:50- 14:10

Prof. Sirikanjana Thongmee, Department of Physics, Faculty of Science, Kasetsart University, Bangkok, Thailand

Title: Biogenic Cadmium-based Quantum Dots and their Therapeutic Applications

14:10-14:25

Chandrima Kundu, Department of Physics, Faculty of Science, Kasetsart University, Bangkok, Thailand

Title: Development of g-C_3N_4 Based Materials Doped Oxalic Acid and Boron for Gas Sensing

14:25-14:40

Wilanda Phothong, Department of Physics, Faculty of Science, Kasetsart University, Bangkok, Thailand

Title: Structural and Optical Evolution of ZnO under Thermal Treatment for Enhanced Photocatalytic Performance

14:40- 14:55

Tanawat Imboon, Department of Chemistry, Faculty of Science, Kasetsart University, Bangkok, Thailand

Title: Synthesis and Characterization of Fe_3O_4-Mn_3O_4/rGO Composites for Supercapacitor Applications

14:55-15:10

Methaporn Prasop, Department of Physics, Faculty of Science, Kasetsart University, Bangkok, Thailand

15:10-15:25	**Title: Development and Performance Evaluation of a Wi-Fi-Controlled Security Patrol Robot Using ESP32-CAM** **Ms. Jantharat Khatcharin, Ms. Siripudson Authaituam, Mr. Rattapoom Wiwekjit, Ms. Pattanan Jongchanachavawat,** Phetchaburi Rajabhat University, Phetchaburi, Thailand

Tea and Refreshments Break 15:30-16:00

16:00-16:15	**Title: An IoT-Enabled Smart Exhibition System Using Single-Gate Dual TF-Luna LiDAR for Bidirectional Visitor Counting and Multimedia Automation** **Mr. Vuttipat Yutthawareechai, Ms. Jutaphon Phimnoi, Ms. Benyapa Penkong, Mr. Polaphat Laima,** Phetchaburi Rajabhat University, Phetchaburi, Thailand
16:15-16:30	**Title: Development and Evaluation of an Ultrasonic-Guided Robot Prototype for Autonomous Wheelchair Navigation in Domestic Environments** **Ms. Kamonwan Oiumekha, Mr. Noppong Cheychuen, Mr. Sombat Sroidokmai, Mr. Polaphat Laima,** Phetchaburi Rajabhat University, Phetchaburi, Thailand

Poster Session

Poster-1	**Title: Local B–H Hysteresis Mechanism of Enhanced Deperming Performance in Discretely Arranged Coils** **Sang Hyeon Im,** Department of Electrical Engineering, Dong Eui University, Busan, Republic of Korea
Poster-2	**Title: Robustness of Deperming Performance of Discretely Arranged Coils under Different Field-Decay Steps** **Sang Hyeon Im,** Department of Electrical Engineering, Dong Eui University, Busan, Republic of Korea
Poster-3	**Title: Quantitative Decomposition of Mean-Field Amplitude and Coil-Configuration Effects on Deperming Performance** **Sang Hyeon Im,** Department of Electrical Engineering, Dong Eui University, Busan, Republic of Korea
Poster-4	**Title: Multi-Metric Evaluation of Residual Magnetic Signature for Discretely Arranged Deperming Coils** **Sang Hyeon Im,** Department of Electrical Engineering, Dong Eui University, Busan, Republic of Korea

Certificate Ceremony, Group Photo and Closing Note 16:45-17:15

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INVITED LECTURES PRESENTATIONS

https://doi.org/10.62422/978-93-47569-02-9-001

Synthesis of Bioactive Heterocycles Using Environmentally Friendly Solvents



Okram Mukherjee Singh
Department of Chemistry, Manipur University, Canchipur, Imphal, Manipur, India

Researchers are increasingly considering ionic liquids, deep eutectic solvents (DES), and, more recently, natural deep eutectic solvents (NADES) as viable options for the 21st century solvents. DES and NADES are gaining traction in initiatives aimed at promoting circularity and sustainability due to their eco-friendly properties and their capacity to enhance various chemical processes, particularly as green solvents.1 DES, composed of natural and renewable components, provide a sustainable alternative to conventional solvents. Their biodegradability, low toxicity, and customizable characteristics for specific applications contribute to a more circular and sustainable framework within industries such as food, pharmaceuticals, and cosmetics. Additionally, DES offer significant advantages such as tunability, low volatility, and the dual function of serving as both solvent and catalyst in organic reactions. Recently, our group has utilized DES in the synthesis of some heterocycles and studied their biological activities and photophysical properties. 2-3 However, their application in the green synthesis of heterocycles—biologically active molecules of considerable importance—remains largely underexplored.

Our primary objective is to explore the application of DES/NADES as reaction media, utilizing them as either solvents or catalysts in the synthesis of heterocycles, particularly through multicomponent reactions. Additionally, we aim to synthesize heterocyclic compounds as part of our commitment to advancing the repurposing of drugs for more effective treatment of infectious diseases. The global community is contending with significant challenges posed by infectious diseases, including COVID-19, malaria and tuberculosis. During the pandemic, the repurposing of existing medications has emerged as an effective therapeutic strategy across various conditions.4 Specifically, the implementation of multidrug therapy—entailing the combination of several established drugs repurposed for the treatment of bronchial tuberculosis—has proven crucial in the fight against this disease.

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3. Devi, T. L.; Devi, M. M.; Singh, O. M.; DES Mediated Regioselective and Domino Synthesis of Indole-Coumarin Hybrids with Investigations of Their Photophysical Properties. Chemistry Select, 2025, ChemistrySelect 2025, 10, e0378.
4. Devi, T. L.; Devi, M. M.; Okram, M.; Singh, O. M; Repurposed Drugs during the Outbreak of Pandemic COVID-19: A Mini-Review on Their Molecular Structures and Hit-and-Trial Results. ACS Omega, 2024, 9, 35, 36858–36864. https://doi.org/10.1021/acsomega.4c05357

https://doi.org/10.62422/978-93-47569-02-9-002

Design, Synthesis, and Advanced Characterization of Heterocyclic Compounds: Biological and Electrochemical Evaluation



Prof. Dr. Anouar Alami
Faculty of Sciences, Dhar El Mahraz, Sidi Mohammed Ben Abdellah University, (Morocco)

Given the vast richness of heterocyclic chemistry and its diverse applications, this work outlines the strategic design, synthesis, and multifaceted evaluation of novel heterocyclic compounds, emphasizing their potential in pharmacology and materials science. The research is structured around four primary axes, integrating advanced synthetic methodologies with rigorous structural characterization and performance testing:

- Spiro-isoxazolines: Synthesized via regiospecific 1,3-dipolar cycloaddition, these compounds serve as plant growth regulators and herbicides78. Biological screening revealed potent in vitro antitubercular activity (MIC < 6.25 µg/mL) and anti-HIV potential, particularly for nitro-substituted sulfur derivatives.
- Amino Acid Analogs: Various heterocyclic amino acid derivatives and polyfunctional α,α-diaminoesters were developed, demonstrating significant antibacterial properties against S. aureus and E. coli, as well as high antioxidant capacity confirmed by DPPH and FRAP assays.
- α-Aminophosphonates: Utilizing copper-catalyzed "Click Chemistry," complex mono- and bi-heterocyclic models were synthesized with total regioselectivity. These molecules are targeted as potential therapeutic agents for Alzheimer's disease and cancer.
- Corrosion Inhibition: Triazole, tetrazole, and pyrazole derivatives were evaluated as mixed-type inhibitors, achieving efficiencies up to 96%. Advanced formulations, such as the PHPT + CTAB mixture, provide triple protection against corrosion, scaling, and biofouling.

All compounds were rigorously characterized using 1D/2D NMR, HRMS, and X-ray crystallography, ensuring high structural purity6more_horiz. Experimental results were further validated through theoretical modeling, including Density Functional Theory (DFT) calculations and Monte Carlo simulations

Keywords: Heterocyclic Synthesis, Click Chemistry, Pharmacological Screening, Corrosion Inhibition, Triple Protection.

https://doi.org/10.62422/978-93-47569-02-9-003

Nucleoside Mimicking Fluorescent Probes with Photophysical Properties and Biological Applications



Jagannath Kuchlyan
Department of Chemistry, National Institute of Technology, Hamirpur-177005, H.P. India

Fluorescent nucleoside analogues (FNAs) are essential in probing the structure and dynamics of nucleic acids and interactions of protein. To minimize the perturbation in the fluorescent labeled nucleic acid sequences, FNAs perfectly meet the criteria with natural nucleobases with respect to size as well as hydrogen bonding motif. In this work, we performed the systematic photophysical characterization of isomorphic FNAs using fluorescence spectroscopy, molecular dynamics simulations, and mixed quantum mechanical/molecular mechanics calculations, yielding a comprehensive understanding of their photophysics in DNA/RNA. Engineering of different FNAs with improved fluorescence properties are powerful non-perturbing tools for finding nucleic acids structural dynamics with real time binding interaction in physiological condition. FNAs are considered as significant tools for fundamental biological research, having enormous applications such as molecular diagnostic and drug discovery.

References: [1] S. K. Bhatia, E. Manna, and J. Kuchlyan. Discov. chem. 2026, 3: 417, 1-28. [2] HN Le, J. Kuchlyan, T Baladi, B Albinsson, A Dahlén, and LM Wilhelmsson. Chem. Eur. J. 2024, 30, e202303539. [3] J. Kuchlyan, L. Martinez-Fernandez, M. Mori, K. Gavvala, S. Ciaco, C. Boudier, L. Richert, P. Didier, Y. Tor, R. Improta, and Y. Mely. J. Am. Chem. Soc. 2020, 142, 16999-17014.

Biography:

Jagannath Kuchlyan is an assistant professor in the Department of Chemistry, National Institute of Technology, India. His research interests are focused on structure, function and dynamics of various biomolecules. He designs fluorescent biomolecules with complex properties, enhanced tuneability which are used in cutting edge biomedical applications. He has received several national and international scientific awards including Marie Curie Individual Fellowship from European Commission, IASc-INSA-NASI Summer Research Fellowship, and INSPIRE Scholarship. Dr. Kuchlyan served as an associated member of Royal Society of Chemistry and member of American Chemical Society. He has published 45 research articles in international scientific peer reviewed journals.

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KEYNOTE PRESENTATIONS

https://doi.org/10.62422/978-93-47569-02-9-004

Fuzzy Modeling & Decision-Making Applications



Dr. Sunny Joseph Kalayathankal
MSc., BEd, MPhil, CIC, PGDCA, ADCA, MCA, M.Tech
Ph.D (Mathematics), Ph.D (Computer Science)
Professor of Computer Science & Engineering Rajagiri School of Engineering & Technology
Cochin, Kerala, India.

The thought process involved in the act of decision making is a complex array of streaming possibilities in which a person selects or discards information made available from diverse sources. In doing so one is led by a meaningful analysis of available information and optimal selection out of several apparently equi-efficient decisions. Since Zadeh (1965) published the fuzzy set theory as an extension of classic set theory, it has been widely used in many fields of application, such as pattern recognition, data analysis, system control, management etc. The unique characteristic of this theory, in contrast to classic mathematics, is its operation on various membership functions (MF) instead of the crisp real values of the variables. Molodtsov (1999) initiated the concept of soft set theory as a new mathematical tool for dealing with uncertainties. Pabitra Kumar Maji et al. (2001) introduced fuzzy soft set theory which also deals with uncertainties.

Out of the several higher order fuzzy sets, intuitionistic fuzzy sets by Atanassov (1985) and Ordered intuitionistic fuzzy sets proposed by Kalayathanal et al. (2010) have been found to be highly useful to deal with vagueness. Intuitionistic fuzzy set is described by two functions: a membership function and a non - membership function. We develop and apply similarity measures between ordered intuitionistic fuzzy sets to multiple attribute decision making (MADM) under fuzzy environment.

Biography:

Prof. Dr. Sunny Joseph Kalayathankal received the MSc. degree from Kerala University, Kerala, India in 1986, B.Ed from Calicut University, Kerala in 1987, MPhil from Kerala University in 1993 and Ph.D (Mathematics) degree in 2010 from Kerala University, MCA from Indira Gandhi National Open University, New Delhi, India in 2002, M.Tech IT from Karnataka State Open University in 2013 and Ph.D. in Computer Science under Bharathiar University, Coimbatore, India in 2018. He was the Head of the Department of Mathematics, K.E.College, Mannanam, Kottayam, Former Principal of Jyothi Engineering College Cheruthuruthy, Trissur , Former Director of Research in Jyothi Engineering College Affiliated to APJ Abdul Kalam Technological University, Kerala India. He is currently working as Professor of Computer Science & Engineering in Rajagiri School of Engineering & Technology, Kerala , India and has 40 years of teaching and 22 years of research experience. He has published more than 117 papers in the area of Fuzzy Modelling and Decision Making, Graph Theory and Applied Mathematics. He has produced 5 Ph.Ds in the area of Graph Theory and Fuzzy Modelling. He has served as 68 Keynote and Invited Speaker in various National and International Conferences. He is the Research guide of APJ Abdul Kalam Technological University, M.G.university Kottayam and Bharathiar University Coimbatore. He is the reviewer of Iranian Journal of Fuzzy System, International Journal of Fuzzy System and Journal of Mathematical Modeling and Computer Simulation.

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November 19-20, 2026 | Bangkok, Thailand

SPEAKER PRESENTATIONS

https://doi.org/10.62422/978-93-47569-02-9-005

Flavonoid-Functionalized Silver Nanoparticles as Selective Colorimetric Sensor of Metal Ions and Their Interactions with Bovine Serum Albumin



Kalyan Sundar Ghosh, Sushma and Deepti Chauhan
Department of Chemistry, National Institute of Technology Hamirpur, Himachal Pradesh, India

Flavonoid-functionalized silver nanoparticles were synthesized using quercetin (QC-AgNPs) and hesperetin (HSP-AgNPs). The flavonoid molecules acted as reducing and stabilizing agent during the synthesis of nanoparticles. UV-Vis, FTIR spectroscopy, dynamic light scattering, XPS, XRD and transmission electron microscopy (HRTEM) were used to confirm the fabrication of functional nanoparticles. QC-AgNPs and HSP-AgNPs demonstrated remarkable sensitivity and selectivity in the detection of Hg2+ and Fe3+ respectively in water. Both the nanoprobes exhibited strong anti-interference performance against other metal ions. The detection limit (LOD) of 0.2 and 0.41 μM for QC-AgNPs and HSP-AgNPs respectively indicated their potential applications in environmental sensing of Hg2+ and Fe3+. Further, to explore the potential of the nanoparticles in biosensing of these metal ions, the biodistribution of nanoparticles was checked by studying their interactions with bovine serum albumin (BSA), a model career protein. Interactions between BSA and the nanoparticles were explored using UV-Vis, steady-state, time-resolved and synchronous fluorescence spectroscopy. Both the nanoparticles caused static quenching of the tryptophan fluorescence of BSA. The thermodynamic parameters (ΔH and ΔS) suggested predominant involvement of hydrophobic interactions in the binding process of nanoparticles with BSA.

Biography:

Dr. Kalyan Sundar Ghosh is presently serving as an Associate Professor at Department of Chemistry, NIT Hamirpur, India, since 2012. His current research interest is focused on design and development of chemo and biosensors. He has authored around 70 publications in international journals of repute with h-index of 30. He was awarded PhD by IIT Kharagpur, India and he had further worked as Postdoctoral Associate in State University of New York, Albany and University of Maryland, College Park. Six students have already completed their doctoral dissertation under his supervision and few more are working presently.

https://doi.org/10.62422/978-93-47569-02-9-006

Durable and efficient concentrated-solar catalytic methane dry reforming over Ni-based catalysts



Zeai Huang[1,2,*], Zhiqiang Rao[2], Junbu Wang[2], and Ying Zhou[1,2,*]
[1]State Key Laboratory of Oil and Gas Reservoir Geology and Exploitation, Southwest Petroleum University, Chengdu, Sichuan, China;
[2]School of New Energy and Materials, Southwest Petroleum University, Chengdu, Sichuan, China

Dry reforming of methane (DRM) converts CH4 and CO2 into syngas but requires high temperatures and suffers carbon deposition. We integrate Ni active-site engineering and photothermal catalysis to regulate electron transfer, intermediate chemistry, and oxygen migration. On Ni/Ga2O3, light suppresses the reverse water-gas shift reaction and tunes the H2/CO ratio toward unity. Single-atom Ni/CeO2 stabilizes the anti-coking CH3O* intermediate and operates for more than 230 h at 472 °C. Pr-modified Ni/CeO2 promotes direct carbonate cleavage under light, while Mo-stabilized nickel–oxo sites enable low-temperature dry reforming. Concentrated-solar Ni–O4/CeO2 achieves CH4 and CO2 conversions above 90% at 580 °C for more than 800 h. Operando evidence links localized solar heating to intermediate migration and oxygen cycling, balancing methane activation with carbon removal. Together, these results establish a route to durable and efficient solar-driven syngas production.

Biography:

Zeai Huang received his BSc and MSc from South-Central University for Nationalities in 2011 and 2014, respectively, and his PhD in Molecular Engineering from Kyoto University in 2018. He subsequently conducted postdoctoral research at the National Institute of Advanced Industrial Science and Technology (AIST), Japan, and joined Southwest Petroleum University in 2018, where he is a Researcher in the School of New Energy and Materials. He was a visiting professor at Kyushu University from December 2025 to April 2026. His research focuses on solar-driven conversion of natural gas and CO2, photothermal catalysis, methane dry reforming, anti-coking catalysts, and operando characterization.

https://doi.org/10.62422/978-93-47569-02-9-007

Red Mud Based Geopolymers and Alkali Activated Materials for Construction and Environmental Applications



Mira Vukčević, Ivana Bošković, Veselinka Grudić
Faculty of Technology, University of Montenegro, Podgorica, Montenegro

This contribution reviews a series of investigations on the valorization of red mud and other industrial residues through geopolymerization and alkali activation for construction and environmental applications. The research explored complementary reactive and waste-derived components to overcome the relatively low activation potential of red mud and tailor the properties of the resulting materials. Earlier studies examined red mud/metakaolin geopolymers modified with calcium hydroxide, metakaolin-based systems containing an organic phase, and alkali-activated red mud composites incorporating blast-furnace slag or construction and demolition waste. Together, these investigations demonstrated the adaptability of the approach in developing materials with different structural, mechanical and environmental characteristics. Further studies addressed low-carbon geopolymer formulations and the immobilization of Pb and Cu from wastewater using red mud/fly ash geopolymers, extending their potential use to environmental remediation. Assessment of End-of-Waste criteria for red mud also formed part of the broader valorization strategy where are the methodology and standards defined for bred mud to obtain the status of secondary raw material. More recent work extended this research to spent pot lining (SPL), the discarded lining material from aluminium electrolysis cells, using its aluminosilicate-rich refractory fraction after hydrometallurgical purification and detoxification. NaOH-activated red mud/SPL mixtures achieved compressive strengths up to 19.95 MPa, while adding 20 wt% metakaolin increased the maximum strength to 49.79 MPa in a formulation containing 40 wt% red mud and 40 wt% SPL. FTIR/DRIFT results supported the formation of new aluminosilicate bonds during geopolymerization. All the findings show that appropriate combinations of red mud, reactive precursors and industrial residues can produce functional geopolymer and alkali-activated materials, supporting waste reduction, resource recovery and circular-economy strategies.

Biography:

Prof. Dr. Mira Vukčević is a Full Professor at the Faculty of Metallurgy and Technology, University of Montenegro, and former Vice-Rector for International Cooperation and Dean of the Faculty. She received her PhD in technical sciences from the University of Montenegro in 1993. Her research focuses on the valorization of red mud and other industrial residues, geopolymerization, alkali-activated materials, powder metallurgy and sustainable construction materials, and she has coordinated numerous international projects on red mud utilization, including EIT Raw Materials RIS RESTORE. She has published more than 60 scientific papers and serves on several international editorial boards.

https://doi.org/10.62422/978-93-47569-02-9-008

Cooling Rate Dependent Cementitious Property of Ladle Refining Furnace Slag



M.A. Islam[1] and M.S. Haque[2]
[1]Professor, Materials and Metallurgical Engineering (MME) Department, Bangladesh University of Engineering and Technology (BUET), Dhaka-1000
[2]Ph.D Student, University of Pennsylvania, USA

Concrete is the most commonly used building material, consisting of coarse aggregates (such as brick or stone chips), fine aggregates (like sand), cement, and water. Due to its inherent weakness in tensile load-bearing capacity, concrete is often reinforced with steel bars. The production of steel generates a significant amount of slag as a byproduct. One type of the byproduct is the ladle refining furnace (LRF) slag produced during the steel refining process. The goals of this study are to investigate the possible variations in the chemical compositions of ladle refining furnace slag and how this affects the binding properties of ordinary Portland cement (OPC) by different cooling rates (air and water cooling). Both types of slag were initially processed in a ball mill and then characterized through grain size measurements, elemental microanalysis using EDX (Energy Dispersive X-ray), and loss on ignition tests. To understand the structural morphological change XRD (X-ray Diffractometry) analysis was also conducted. For test sample preparation, various proportions of ladle refining furnace slag were mixed with regular Portland cement. The concrete cylinders were cured in tap water for 28 days, after which their compressive strengths and harness values were determined. Experimental results suggest that small proportions (5-10%) of air-cooled slag additions do not decrease the hardness or compressive strength values of the OPC containing concrete. Details of the experimental results thus obtained are discussed in this paper.

Biography:

After completing Bachelor and Masters in MME from BUET, Mr. Islam went to England and completed Ph.D. from Birmingham University in 2001. He also finished Post Doc from Ibaraki University (2005-2007), Japan and appointed as visiting Professor in 2010. Now, he is Professor at BUET. He received the best research paper awards from Bangladesh, Turkey and Malaysia, respectively in 2010, 2015 and 2016. He also received the University Grant Commission Gold Medal for the best research paper in engineering in 2007. So far, he has published more than 200 research papers in different national and international journals and proceedings.

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ZnO/rGO nanocomposites as a photo catalyst for the reduction of Cr^{6+}



Sasithorn Srirattanapibul[1], Tanawat Imboon[1] and Sirikanjana Thongmee[1]
[1]Department of Physics, Faculty of Science, Kasetsart University, Bangkok 10400, Thailand

ZnO decorated rGO nanocomposites were fabricated using hydrothermal method. The samples were characterized by SEM, UV-visible, Raman and FTIR. The result from SEM showed that ZnO nanoparticles have agglomerated into micron size clusters. While EDX measurements were used to determine the exact chemical content of nanocomposites. The Elemental mapping of Zn ions on the surface of ZnO·rGO were distributed over the surface. FTIR spectra indicated that GO had been reduced to rGO by hydrothermal fabrication process used. The shifts of G band in Raman spectra indicate the presence of interfacial Zn-O-C bonds. UV–vis absorption studies were used to monitor the amount of Cr6+ ions in solutions after their exposure to light. Photocatalytic reduction of toxic Cr6+ was observed by time change in the absorption of light at two wave lengths, 273 nm and 373 nm. The enhancement of photo reduction rate increased, reaching a maximum at x = 10 % and then decreased.

Biography:

Dr. Sirikanjana Thongmee is now Professor in Department of Physics, Faculty of Science, Kasetsart University, Bangkok. She got her B.Sc in Physics at Prince of Songkla University, M. Sc. in Chemical Physics at Mahidol University and Ph.D. (Materials Science) at National University of Singapore. Currently Dr. Sirikanjana Thongmee's research focuses on metal oxide decorated reduced graphene oxide for photocatalysts and gas sensor. Also, Dr. Sirikanjana Thongmee had done research on activated carbon from agricultural wasted for adsorbing the heavy metals, different type of poison gases, waste water and using in supercapacitor. Moreover, Dr. Sirikanjana Thongmee has been focus on Green synthesis herbal extract quantum dot decorated rGO for improvement of the anticancer activity.

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Biogenic Cadmium-based Quantum Dots and their Therapeutic Applications



Chandrima Kundu[1,2] Sirikanjana Thongmee[2*] Sougata Ghosh[1,3*]
[1]Department of Microbiology, School of Science, RK University, Rajkot-360020, Gujarat, India;
[2]Department of Physics, Faculty of Science, Kasetsart University, Bangkok-10900, Thailand;
[3]Adjunct Professor, University of Bengkulu, Bengkulu-38122, Indonesia

Nanotechnology involves the design, fabrication, and manipulation of materials at the nanoscale level (1–100 nm) for their size-dependent physicochemical properties, leading to their diversified applications in medicine, electronics, energy, environmental remediation, and biotechnology. The integration of nanotechnology and biological synthesis, nanobiotechnology is an interdisciplinary field with significant potential for studying biological systems at an advanced level in diagnostic techniques, targeted drug delivery, molecular imaging, and other biomedical applications. Among various nanomaterials, quantum dots (QDs) are semiconductor materials with distinctive optical and electronic properties and the ability to show fluorescence at specific wavelengths depending on their size and composition. Conventional physical and chemical methods for QD synthesis are energy-intensive, costly, hazardous, and toxic. In contrast, green synthesis approaches use biological resources like bacteria, fungi, algae, and plants to facilitate QDs formation in a more sustainable way. The conventional therapeutic approaches pose different limitations like adverse effects, high costing, and the antimicrobial resistance. Hence, to alleviate these issues, plant-mediated synthesis has become the most attractive resource for the synthesis of low-cost, non-toxic, and eco-friendly phytogenic, stable QDs. QDs, the small sized NPs with 1 to 15 nm size possess unique optical characteristics that make them potentially useful for live-cell imaging, cellular tracking, fluorescent labelling, drug delivery, and inhibition of tumor. Among different tyoes of QDs, cadmium(Cd)-based QDs like cadmium sulfide QDs (CdSQDs), cadmium oxide QDs (CdOQDs), cadmium selenide QDs (CdSeQDs), and cadmium telluride QDs (CdTeQDs) have exhibited significant biomedical applications involving antibacterial, antifungal, and anticancer activities. In view of these developments, future investigations can be done for Cd-based QDs as a potential candidate for various therapeutic applications to treat different diseases.

Keywords: Green synthesis, cadmium-quantum dots, therapeutic applications, antimicrobial, anticancer, nanomedicine.

Acknowledgement: Ms. Chandrima Kundu acknowledges the KU-GLIDE Project of Kasetsart University, Bangkok, Thailand (Ref. No. 6501.34/9483 dated August 14, 2026).

Biography:

Ms. Chandrima Kundu is now a Ph.D. scholar under Dr. Sougata Ghosh in the Department of Microbiology, School of Science, RK University, Rajkot, Gujarat, India. She has done her B.Sc. in Microbiology at Hooghly Women's College, West Bengal, India, and M.Sc. in Microbiology at Lovely Professional University, Punjab, India. Currently, her research focuses on the therapeutic application of phytogenic QDs. She has attended multiple workshops, conferences, and hands-on training programmes. She authored two book chapters published by Springer in 2026 and Elsevier in 2026, which are: 'Kundu, C., Ghosh, S. (2026) Metal nanoparticles incorporated antimicrobial hydrogels for pathogen control. In: Bardhan, S., Shah, M.P. (Eds.) Applications of hydrogels in modern wastewater treatment. Advances in Wastewater Research. Springer, Singapore. Pp. 227-268. Online ISBN: 978-981-95-1598-1; Print ISBN: 978-981-95-1597-4' and 'Kundu C, Parihar VS, Kellomaki M, Ghosh S (2026) Dendrimer-based approaches in breast cancer management. In: Rajput, A., Mandlik, S., Subbappa, P., Singh, S. (Eds.) Exploring Nanocarriers in Breast Cancer Management. Academic Press, Elsevier, United Kingdom. pp 223-246. eBook ISBN: 9780443438271; Paperback ISBN: 9780443438264'. She is now working in guidance of Prof. Sirikanjana Thongmee under the KU-GLIDE Fellowship Program at Kasetsart University, Bangkok, Thailand.

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Development of g-C_3N_4 Based Materials Doped Oxalic Acid and Boron for Gas Sensing



Wilanda Phothong[1], Sirikanjana Thongmee[1]
[1]Department of Physics, Faculty of Science, Kasetsart University, Bangkok, Thailand

Graphitic carbon nitride (g-C3N4) is a two-dimensional carbon-based material with excellent electronic properties, such as a suitable band gap and high chemical stability. Additionally, doping with other elements can further enhance its electrical and structural properties. This study focuses on the synthesis of oxalic acid and boron-doped graphitic carbon nitride (Oxalic/ g-C3N4/Boron) using the pyrolysis process to investigate the structure, morphology, and composition of the material. The characterization techniques employed include Scanning Electron Microscopy , Energy Dispersive X-ray Spectroscopy , UV-visible Spectroscopy, X-ray Diffraction, and Fourier Transform Infrared Spectroscopy.

SEM results indicated that boron incorporation changes the surface morphology and structural properties of the material, resulting in a rough and porous surface. Furthermore, the modification of the electronic structure and band gap may contribute to changes in the electrical properties of the material. The energy band gaps for g-C3N4 , Oxalic/ g-C3N4 , and Oxalic/g-C3N4/Boron are 2.84, 3.31, and 3.79 eV, respectively. The XRD results indicate that the incorporation of boron into g-C3N4 leads to changes in the crystalline structure, as evidenced by shifts in the positions of the main peaks, variations in peak intensity and width, and the emergence of new peaks—signifying the formation of new phases or boron-containing compounds. Moreover, the porous surface, available surface sites, and tunable electronic properties suggest that Oxalic/g-C3N4/Boron has potential for further development as a gas-sensing material. The interaction between gas molecules and the material's surface may influence its electrical conductivity or resistance, which can be used as a basis for gas detection. Therefore, this material offers an interesting opportunity for future development of gas sensors.

Biography:

Wilanda Phothong is currently pursuing a Master's degree at Kasetsart University. She also received her Bachelor's degree from Kasetsart University. Currently, her research focuses on metal oxide decorated reduced graphene oxide for photocatalysts and gas sensor.

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Structural and Optical Evolution of ZnO under Thermal Treatment for Enhanced Photocatalytic Performance



Tanawat Imboon[1,3], Jeerawan Khumphon[2,3], Pontagarn Chanpuang[2,3], Vellaisamy A. L. Roy[4], Sirikanjana Thongmee[2,3*], and Sutasinee Kityakarn[1*]

[1]Department of Chemistry, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand.
[2]Department of Physics, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand.
[3]Research Unit of Applied Physics for Agriculture and Medicine (APAM), Department of Physics, Faculty of Science, Kasetsart University, Bangkok 10900, Thailand.
[4]School of Science and Technology, Hong Kong Metropolitan University, Ho Man Tin 00000, Hong Kong.

This study investigates the effects of thermal treatment on the structural, optical, and electronic properties of zinc oxide (ZnO) and their relationship with photocatalytic performance. ZnO was synthesized using a reflux method and subsequently calcined at 400, 600, and 800 °C for 2 h. X-ray diffraction analysis confirmed the hexagonal wurtzite structure, with increasing calcination temperature promoting crystallite growth and reducing lattice microstrain. The crystallite size increased from 12.53 to 34.39 nm, while microstrain decreased from 15.77 × 10-3 to 2.20 × 10-3. UV–Vis spectroscopy revealed temperature-dependent variations in optical band gap energies, ranging from 3.01 to 3.24 eV. Mott–Schottky analysis demonstrated shifts in flat-band potentials, indicating modifications in the electronic properties and estimated band edge positions. Photocatalytic performance was evaluated through methylene blue (MB) degradation under UVA irradiation. Among the investigated samples, ZnO calcined at 600 °C exhibited the highest MB removal efficiency of 98.22% after 240 min, with an apparent pseudo-first-order rate constant of 1.705 × 10-2 min-1, approximately 14.8 times higher than that of untreated ZnO. Reactive species trapping experiments suggested that hydroxyl radicals and photogenerated holes play important roles in MB degradation, with possible contributions from superoxide radicals. The enhanced photocatalytic performance of ZnO-600 is attributed to the combined effects of structural evolution and favorable band edge positions. These findings highlight the importance of optimizing thermal treatment conditions to improve ZnO photocatalytic performance.

Biography:

Tanawat Imboon received his Ph.D. in Physics from Kasetsart University, Thailand, in 2025. He is currently a postdoctoral researcher in the Department of Chemistry, Faculty of Science, Kasetsart University. His research focuses on metal oxide nanomaterials, graphene-based composites, photocatalysis, and electrochemical energy storage, with particular interest in the relationships between material structure, electronic properties, and functional performance.

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Synthesis and Characterization of Fe_3O_4-Mn_3O_4/rGO Composites for Supercapacitor Applications



Methaporn Prasop[1], Tanawat Imboon[1] and Sirikanjana Thongmee[1]
[1]Department of Physics, Faculty of Science, Kasetsart University, Bangkok, Thailand

A ternary composite of iron-manganese oxides anchored on reduced graphene oxide The Fe3O4-Mn3O4/rGO was successfully synthesized via a hydrothermal method for supercapacitor electrodes. The samples were characterized by XRD, SEM, EDX, FTIR, and Raman spectroscopy. The XRD analysis confirmed the phase formation of the composite. SEM and EDX revealed that nanoparticles agglomerated into micron-sized clusters with uniform elemental distribution. FTIR confirmed the reduction of graphene oxide (GO) to rGO, while the shifts of the G band in Raman spectra indicated the presence of interfacial metal-oxygen-carbon (Fe-O-C / Mn-O-C) bonds. Electrochemical properties were investigated using cyclic voltammetry (CV) in a 1.0 M KOH electrolyte. The Fe3O4-Mn3O4/rGO composite exhibited prominent pseudocapacitive behavior originating from reversible redox reactions. It demonstrated superior electrochemical performance and cyclic stability compared to bare iron oxide electrodes. The conductive rGO network significantly enhanced electrical conductivity, facilitated rapid charge transfer, and reduced internal resistance, highlighting its potential for energy storage applications.

Biography:

Methaporn Prasop is an undergraduate student in the Department of Physics, Faculty of Science, Kasetsart University, Bangkok. Under the supervision of Prof. Dr. Sirikanjana Thongmee, her current research focuses on the synthesis and characterization of metal oxide-decorated reduced graphene oxide (such as Fe-Mn-rGO) nanocomposites. She is particularly interested in evaluating their electrochemical properties and performance as high-efficiency electrode materials for supercapacitor applications.

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Development and Performance Evaluation of a Wi-Fi-Controlled Security Patrol Robot Using ESP32-CAM



Wirote Jongchanachavawat[1], Noppon Mingmuang[2], Chayut Ployjirapas[3], Kwanchai Nanan4, Thanapasit Phonyiam[5], Bureerak Sungkongmueng[6*], Jantharat Khatcharin [7], Siripudson Authaituam [8], Rattapoom Wiwekjit [9], Vuttipat Yuttawareechai[10], Benyapa Penkong[11], Jutaphon Phimnoi[12], Polaphat Laima[13], Pattanan Jongchanachavawat[14], Suphat Bunyarittikit[15]

[1-12]Faculty of Engineering and Industrial Technology, Phetchaburi Rajabhat University, Phetchaburi

[1-12]Frontier Engineering Research and Innovation Center(FERIC), Phetchaburi Rajabhat University, Phetchaburi 76000, Thailand

[13]Srinakharinwirot University Prasarnmit Demonstration School, Bangkok

[14]Satrinonthaburi School, Nonthaburi

[15]School of Architecture, King Mongkut's Institute of Technology Ladkrabang, Bangkok

Robotic security systems play an increasingly vital role in modern surveillance by reducing human risk and enabling remote area inspection. This paper presents the design, implementation, and multi-aspect evaluation of a compact, Wi-Fi-enabled security robot prototype developed as a foundational testbed for a future human-scale security robot. The prototype integrates an ESP32-CAM microcontroller with an external antenna for real-time video streaming and wireless control, an L298N motor driver for differential drive locomotion, and dual 7.4V batteries. Users can remotely control the robot's trajectory, speed, and onboard LED illumination via a web-based user interface accessible on mobile devices or computers. The system was rigorously evaluated across five key performance metrics: (1) video transmission latency at 5, 10, and 15 meters (20 trials per distance), yielding average delays of 0.108, 0.112, and 0.118 ms, respectively; (2) straight-line trajectory accuracy over a 5-meter course, resulting in a minimal lateral deviation of 0.5 cm to the left; (3) low-light visibility, achieving clear visual identification up to 2 meters using the onboard LED; (4) operational endurance of approximately 4 hours; and (5) a full battery recharge cycle of 18 hours. The experimental results confirm the prototype's viability for practical surveillance operations. Future developments will focus on scaling the hardware to human-like dimensions and integrating Artificial Intelligence (AI) for automated intruder detection and real-time alert generation.

Keywords: Security Robot, Teleoperation, ESP32-CAM, Wireless Surveillance, Mobile Robotics, Artificial Intelligence

Biography:

Assoc. Prof. Dr. Wirote Jongchanachavawat received his B.Sc. (Solid State Electronics) from King Mongkut 's Institute of Technology Ladkrabang in 1994, B.Eng. from South-East Asia University from 2014, MBA. from National Institute of Development Administration in 1999, M.Eng. from King Mongkut's Institute of Technology Ladkrabang in 2000 and D.Eng. from King Mongkut's Institute of Technology Ladkrabang from2009. He had more than 20 years in information system and management from many company. He is an associate professor in Faculty of Engineering and Industrial Technology, Phetchaburi Rajabhat University, Thailand since 2025. His main research interests are analog circuit design, management information system (MIS), Operation Management, technology management, Big Data, IoT and automation.

Jantharat Khatcharin graduated from the Department of Learning Encouragement (formerly the Office of the Non-Formal and Informal Education) in 2024. She is currently pursuing a degree in Electrical Engineering at Phetchaburi Rajabhat University. Her primary research interests include Smart Security systems, AI, Embedded system and Automation.

Siripudson Authaituam graduated from Banlat Wittaya School in 2025. She is currently pursuing a degree in Electrical Engineering at Phetchaburi Rajabhat University. Her primary research interests include Smart Security systems AI, Embedded system and Automation.

Rattapoom Wiwekjit graduated from Banlat Wittaya School in 2025. He is currently pursuing a degree in Electrical Engineering at Phetchaburi Rajabhat University. His primary research interests include Smart Security systems AI, Embedded system and Automation.

Pattanan Jongchanachavawat graduated from junior high school at Satrinonthaburi School in 2025 after studying on the Science Mathematics Technology and Environment Program (SMTEP). Currently, she is studying at Satrinonthaburi School on the Enrichment Program of Science Mathematics Technology and Environment (SMTE). Her main research interests are in medicine, new technology, innovative technology, AI, and automation in medicine. (patjongmilk@gmail.com).

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An IoT-Enabled Smart Exhibition System Using Single-Gate Dual TF-Luna LiDAR for Bidirectional Visitor Counting and Multimedia Automation



Wirote Jongchanachavawat[1], Noppon Mingmuang[2], Chayut Ployjirapas[3], Kwanchai Nanan[4], Thanapasit Phonyiam[5], Bureerak Sungkongmueng[6*], Jantharat Khatcharin[7], Siripudson Authaituam[8], Rattapoom Wiwekjit[9], Vuttipat Yuttawareechai[10], Benyapa Penkong[11], Jutaphon Phimnoi[12], Polaphat Laima[13], Pattanan Jongchanachavawat[14], Suphat Bunyarittikit[15]

[1-12]Faculty of Engineering and Industrial Technology, Phetchaburi Rajabhat University, Phetchaburi

[1-12]Frontier Engineering Research and Innovation Center(FERIC), Phetchaburi Rajabhat University, Phetchaburi 76000, Thailand

[13]Srinakharinwirot University Prasarnmit Demonstration School, Bangkok

[14]Satrinonthaburi School, Nonthaburi

[15]School of Architecture, King Mongkut's Institute of Technology Ladkrabang, Bangkok

The growing emphasis on sustainable and interactive public spaces necessitates intelligent systems capable of real-time occupancy monitoring and automated resource management. This study proposes an Internet of Things (IoT)-enabled smart exhibition system that leverages Light Detection and Ranging (LiDAR) technology for precise bidirectional visitor counting and threshold-based multimedia automation. Unlike traditional systems that require separate entrance and exit gates using infrared sensors, the proposed architecture consolidates the process into a single doorway using dual TF-Luna LiDAR sensors connected to an ESP32 microcontroller. This optimization significantly reduces hardware redundancy while improving detection reliability. By analyzing the sequence of sensor triggers, the system determines movement direction to accurately track ingress and egress. Multimedia presentations are autonomously activated via an Arduino Leonardo interface when room occupancy reaches a programmable threshold and terminated upon meeting a designated egress condition. Empirical results indicate that the system achieves 100% detection accuracy within an 80 cm operational range when the two LiDAR sensors are spaced 24 cm apart. Specifically, accurate counting is maintained at an optimal separation distance of 20 cm for single-file movement and 25 cm for visitors passing each other. Furthermore, the system demonstrates low-latency performance, achieving mean latencies of 0.2220 s for multimedia activation, 0.1870 s for deactivation, and 0.1835 s for real-time status rendering on a local LCD interface. These results validate the proposed single-gate LiDAR system as a highly responsive, cost-effective, and reliable solution for enhancing operational efficiency in smart exhibition environments.

Keywords— Internet of Things (IoT), Smart Exhibition, LiDAR Sensor, Bidirectional Counting, ESP32, Multimedia Automation.

Biography:

Assoc. Prof. Dr. Wirote Jongchanachavawat received his B.Sc. (Solid State Electronics) from King Mongkut 's Institute of Technology Ladkrabang in 1994, B.Eng. from South-East Asia University from 2014, MBA. from National Institute of Development Administration in 1999, M.Eng. from King Mongkut's Institute of Technology Ladkrabang in 2000 and D.Eng. from King Mongkut's Institute of Technology Ladkrabang from2009. He had more than 20 years in information system and management from many company. He is an associate professor in Faculty of Engineering and Industrial Technology, Phetchaburi Rajabhat University, Thailand since 2025. His main research interests are analog circuit design, management information system (MIS), Operation Management, technology management, Big Data, IoT and automation.

Vuttipat Yutthawareechai graduated from Wang Klai Kangwon Vocational College in 2025.He she is studying for a Bachelor's degree at Phetchaburi Rajabhat University, Faculty of Engineering and Industrial Technology, majoring in Electrical Engineering. His main interests are AI, Embedded systems, and Automation.

Jutaphon Phimnoi graduated from Samroiyod Wittayakom School in 2025. Currently, she is studying for a Bachelor's degree at Phetchaburi Rajabhat University, Faculty of Engineering and Industrial Technology, majoring in Electrical Engineering. Her main research interests are the sensor systems, AI, Embedded system and Automation.

Benyapa Pankong graduated from Samroiyod Wittayakom School in 2025. Currently, she is studying for a Bachelor's degree at Phetchaburi Rajabhat University, Faculty of Engineering and Industrial Technology, majoring in Electrical Engineering. Her main interests are AI, the operation of sensor systems, AI, Automation systems, Embedded system and Programming.

Polaphat Laima is currently studying in high school at Srinakharinwirot University Prasarnmit Demonstraion School, Bangkok. His research interests focus on medicine and dentistry, with a particular emphasis on the application of AI and automation systems in medical and dental practices.

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Development and Evaluation of an Ultrasonic-Guided Robot Prototype for Autonomous Wheelchair Navigation in Domestic Environments



Wirote Jongchanachavawat[1], Noppon Mingmuang[2], Chayut Ployjirapas[3], Kwanchai Nanan[4], Thanapasit Phonyiam[5*], Bureerak Sungkongmueng[6], Kamonwan Oiumekha[7], Sombat Sroidokmai[8], Noppong Cheychuen[9], Polaphat Laima[10], Pattanan Jongchanachavawat[11], Suphat Bunyarittikit[12]

[1-9]Faculty of Engineering and Industrial Technology, Phetchaburi Rajabhat University, Phetchaburi

[1-9]Frontier Engineering Research and Innovation Center(FERIC), Phetchaburi Rajabhat University, Phetchaburi 76000, Thailand

[10]Srinakharinwirot University Prasarnmit Demonstration School, Bangkok

[11]Satrinonthaburi School, Nonthaburi

[12]School of Architecture, King Mongkut's Institute of Technology Ladkrabang, Bangkok

Autonomous navigation in indoor environments is a critical technology for assistive robotics, particularly for smart wheelchairs designed to aid the elderly and individuals with mobility impairments. This paper presents the design, implementation, and experimental evaluation of a low-cost autonomous robot prototype utilizing ultrasonic sensor-based navigation. The prototype is constructed using an Arduino UNO microcontroller, an L298N motor driver, and an HC-SR04 ultrasonic sensor to detect obstacles and measure distances in real-time. To evaluate its feasibility for domestic applications, the robot was tested in a predefined 4.5-meter indoor corridor featuring multiple 90-degree turns. Across 20 experimental trials, the prototype achieved a 100% success rate in reaching the destination. Performance analysis revealed an average traversal time of 0.67 minutes during collision-free runs, whereas trials involving minor wall collisions required an average of 1.50 minutes due to corrective maneuvering. The experimental results confirm that this navigation system is highly reliable and demonstrates strong potential for integration into full-scale autonomous wheelchairs operating within standard household environments.

Keywords: Autonomous Wheelchair, Obstacle Avoidance, Ultrasonic Sensor, Indoor Navigation, Assistive Robotics, Arduino

Biography:

Assoc. Prof. Dr. Wirote Jongchanachavawat received his B.Sc. (Solid State Electronics) from King Mongkut 's Institute of Technology Ladkrabang in 1994, B.Eng. from South-East Asia University from 2014, MBA. from National Institute of Development Administration in 1999, M.Eng. from King Mongkut's Institute of Technology Ladkrabang in 2000 and D.Eng. from King Mongkut's Institute of Technology Ladkrabang from2009. He had more than 20 years in information system and management from many company. He is an associate professor in Faculty of Engineering and Industrial Technology, Phetchaburi Rajabhat University, Thailand since 2025. His main research interests are analog circuit design, management information system (MIS), Operation Management, technology management, Big Data, IoT and automation.

Ms. Kamonwan Oiumekha Graduated from Kaeng Krachan Wittaya School in the 2024. Currently, she is studying an electrical engineering at Phetchaburi Rajabhat University. Her main research interests are AI, Embedded System and Automation.

Mr. Noppong Cheychuen graduated from Phetchaburi Technical College in2021. Currently, he is studying an electrical engineering at Phetchaburi Rajabhat University. His main research interests are AI, Embedded System and Automation.

Mr. Sombat Sroidokmai graduated from Kaeng Krachan Wittaya School in 2024. Currently, he is studying an electrical engineering at Phetchaburi Rajabhat University. His main research interests are AI, Embedded System and Automation

Mr.Polaphat Laima is currently studying in high school at Srinakharinwirot University Prasarnmit Demonstraion School, Bangkok. His research interests focus on medicine and dentistry, with a particular emphasis on the application of AI and automation systems in medical and dental practices.

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POSTER PRESENTATIONS

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Local B–H Hysteresis Mechanism of Enhanced Deperming Performance in Discretely Arranged Coils



Sang Hyeon Im
Department of Electrical Engineering, Dong Eui University, Busan, Republic of Korea

Residual magnetization after deperming cannot always be explained solely by the magnitude of the externally applied magnetic field. This study investigates the local hysteresis mechanism responsible for the improved deperming performance of a discretely arranged coil configuration. A one-dimensional Preisach-based numerical model was used to compare a densely wound reference coil and the C15 discrete coil under a 36-step deperming protocol. Local Bx–HxB_x-H_x trajectories were evaluated at the center of an SM45C ferromagnetic specimen throughout the entire alternating-field decay process.

The local peak magnetic field decreased from 2,277.6 A/m for the dense coil to 1,522.3 A/m for C15, while the corresponding peak magnetic flux density decreased from 1.244 T to 1.146 T. At Hx=0H_x=0, the positive residual flux density decreased from 42.86 mT to 39.41 mT, and the magnitude of the negative residual flux density decreased from 26.12 mT to 23.75 mT. More importantly, the normalized area of the final complete minor loop decreased from 1.000 to 0.873, corresponding to a 12.7% reduction. Although the terminal magnetic fields of the two configurations differed by only 2.7%, the terminal magnetic flux density of C15 was 8.3% lower.

The results demonstrate that the final residual state is influenced by the entire local hysteresis trajectory rather than only by the terminal field amplitude. Discrete winding spacing can therefore modify the magnetic history experienced by the ferromagnetic material and improve deperming effectiveness.

Biography:

Sang Hyeon Im received the Ph.D degree in electrical engineering from Pusan National University, Busan, South Korea in 2020. From 2021 to now, he is an Assistant Professor with Dong Eui University, Busan

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Robustness of Deperming Performance of Discretely Arranged Coils under Different Field-Decay Steps



Sang Hyeon Im
Department of Electrical Engineering, Dong Eui University, Busan, Republic of Korea

Deperming performance is strongly affected not only by the spatial arrangement of external coils but also by the attenuation sequence of the applied magnetic field. This study investigates the robustness of discretely arranged deperming coils under different field-decay step conditions. A one-dimensional Preisach-based numerical analysis was performed using an SM45C ferromagnetic specimen. Nine discrete coil configurations with different winding spacings were compared with a densely wound reference coil. Five deperming protocols consisting of 36, 32, 28, 24, and 20 attenuation intervals were applied while maintaining the same initial magnetic field of 5,000 A/m.

The peak residual magnetic flux density after deperming was used as the primary performance index. All 45 combinations of discrete coil configuration and deperming protocol produced lower peak residual magnetic flux densities than the densely wound reference coil. The average reduction over all discrete configurations and protocols was 6.22%. Among the investigated configurations, the C15 coil exhibited an average reduction of 9.50% and showed the best performance in four of the five deperming protocols. Only under the 28-step condition did another configuration slightly outperform C15. The ranking consistency among different protocols was also high, with a Kendall concordance coefficient of 0.833.

These results indicate that the performance advantage of appropriately spaced deperming coils is not limited to a particular attenuation sequence. The findings suggest that winding spacing can provide a robust design parameter for deperming systems operated under different field-decay conditions.

Biography:

Sang Hyeon Im received the Ph.D degree in electrical engineering from Pusan National University, Busan, South Korea in 2020. From 2021 to now, he is an Assistant Professor with Dong Eui University, Busan

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Quantitative Decomposition of Mean-Field Amplitude and Coil-Configuration Effects on Deperming Performance



Sang Hyeon Im
Department of Electrical Engineering, Dong Eui University, Busan, Republic of Korea

Deperming performance is strongly affected not only by the spatial arrangement of external coils but also by the attenuation sequence of the applied magnetic field. This study investigates the robustness of discretely arranged deperming coils under different field-decay step conditions. A one-dimensional Preisach-based numerical analysis was performed using an SM45C ferromagnetic specimen. Nine discrete coil configurations with different winding spacings were compared with a densely wound reference coil. Five deperming protocols consisting of 36, 32, 28, 24, and 20 attenuation intervals were applied while maintaining the same initial magnetic field of 5,000 A/m.

The peak residual magnetic flux density after deperming was used as the primary performance index. All 45 combinations of discrete coil configuration and deperming protocol produced lower peak residual magnetic flux densities than the densely wound reference coil. The average reduction over all discrete configurations and protocols was 6.22%. Among the investigated configurations, the C15 coil exhibited an average reduction of 9.50% and showed the best performance in four of the five deperming protocols. Only under the 28-step condition did another configuration slightly outperform C15. The ranking consistency among different protocols was also high, with a Kendall concordance coefficient of 0.833.

These results indicate that the performance advantage of appropriately spaced deperming coils is not limited to a particular attenuation sequence. The findings suggest that winding spacing can provide a robust design parameter for deperming systems operated under different field-decay conditions.

Biography:

Sang Hyeon Im received the Ph.D degree in electrical engineering from Pusan National University, Busan, South Korea in 2020. From 2021 to now, he is an Assistant Professor with Dong Eui University, Busan

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Multi-Metric Evaluation of Residual Magnetic Signature for Discretely Arranged Deperming Coils



Sang Hyeon Im
Department of Electrical Engineering, Dong Eui University, Busan, Republic of Korea

Selecting the winding spacing of a deperming coil requires consideration of multiple performance indices because a configuration that performs well according to one residual-field metric may not necessarily be optimal according to another. This study presents a multi-criteria evaluation of discretely arranged deperming coils using residual magnetization indices obtained from a one-dimensional Preisach-based numerical analysis. Nine discrete winding configurations, ranging from closely spaced to widely spaced arrangements, were compared with a densely wound reference coil using an SM45C ferromagnetic specimen.

The evaluation considered peak residual magnetic flux density, maximum longitudinal residual component, maximum transverse residual component, and residual-field root-mean-square value. Among the tested configurations, C15, corresponding to a normalized winding-spacing ratio of approximately 5.99%, showed consistently favorable performance. Averaged over the investigated deperming protocols, C15 reduced the peak residual magnetic flux density by 9.50% relative to the dense reference coil. The average reductions in maximum longitudinal component, maximum transverse component, and residual-field RMS were 9.78%, 10.20%, and 11.26%, respectively. The configuration also remained among the highest-performing candidates across different field-decay step conditions.

The results indicate that excessively dense winding is not necessarily required to obtain the lowest residual magnetic signature. Instead, an intermediate discrete winding spacing can provide favorable performance simultaneously across several residual-field criteria. The proposed multi-index approach provides a more reliable basis for selecting candidate winding configurations than optimization based on a single residual-field parameter.

Biography:

Sang Hyeon Im received the Ph.D degree in electrical engineering from Pusan National University, Busan, South Korea in 2020. From 2021 to now, he is an Assistant Professor with Dong Eui University, Busan

Participants Index

Anouar Alami	13
Chandrima Kundu	23
Jagannath Kuchlyan	14
Kalyan Sundar Ghosh	18
M.A. Islam	21
Methaporn Prasop	26
Mira Vukčević	20
Okram Mukherjee Singh	12
Sang Hyeon Im	34
Sang Hyeon Im	35
Sang Hyeon Im	36
Sang Hyeon Im	37
Sirikanjana Thongmee	22
Sunny Joseph Kalayathankal	16
Tanawat Imboon	25
Wilanda Phothong	24
Wirote Jongchanachavawat	27
Wirote Jongchanachavawat	29
Wirote Jongchanachavawat	31
Zeai Huang	19



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Eurasia Conferences
124 City Road, London, EC1V 2NX
United Kingdom
Website: www.eurasiaconferences.com
Email: info@eurasiaconferences.com

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