



Dear Readers,

Greetings from Mapana Journal of Sciences

The path to knowledge and innovation forms the cornerstone for a change in terms of academic growth and innovation. Further, journals play a key role in bringing together diverse strands of research under one platform. The Mapana Journal of Sciences strives to continue this mission, offering a space for ideas, critical thinking and discoveries across multiple disciplines. The Editorial team of Mapana, presents to you the second Edition of the year, serving as a bridge between discoveries and applications.

This issue of MJS opens with an article by Mukherjee and Mitra who investigated the kinetics and mechanism of the redox reaction between L-tryptophan and oxo-bridged diiron(III, III) complex ion $[Fe_2(\mu-O)(phen)_4(H_2O)_2]^{4+}$ in an aqueous acid solution, showing that the reaction proceeds with a 1:1 stoichiometry and first-order dependence on both the reactants. Computational methods play a vital role in structural analysis, based on which Saravanan et al., reported the synthesis and detailed characterization of the novel thiosemicarbazone derivative, (E)-2-(1-(4-bromophenyl) ethylidene) hydrazinecarbothioamide (EBEHC), combining experimental and computational approaches to explore its structural and biological potential. Molecular docking and ADMET profiling reveal promising anti-cholesterol activities. This is followed by a study by Sivadharani et al., who report the green synthesis of (E)-5-amino-3-styryl-1H-pyrazole-4-carbonitrile derivatives via tandem Michael addition. This paper elucidates an eco-friendly approach, reporting high yields, with structural confirmation through computational profiling.

Indole derivatives are well-known for their structural versatility and applications, making them candidates for the photophysical studies. Mallayya et al. examined the solvatochromic behaviour of the Indole derivative CPIC, showing that its excited-state dipole moments are significantly larger than the ground state, indicating increased polarity upon excitation. Experimental results supported by DFT calculations reveal solvent-dependent redshifts, a smaller theoretical HOMO-LUMO gap compared to experimental values, and MEP mapping that highlights reactive sites. An interesting finding is made by Kesavan et al., in designing and developing a capacitance-based sensor for detecting void fractions in a range of liquids and gases, which forms a critical parameter in industries like petrochemicals, chemical processing, and oil production. The study confirms the sensor's reliability for real-time monitoring of two-phase flow systems, thereby offering a low-cost, effective alternative to the conventional techniques.

Under graph theory, Lincy et al., showed that the distance difference dominating energy is determined, which is a refined spectral measure that captures the structural efficiency of a graph's dominating set. They further highlighted both mathematical properties and practical applications, particularly in network design.

In the field of Computer Science and Information Technology, Yashaswini et al., presented a blockchain-based framework for secure access control and data protection in Industrial IoT systems, integrating IIoT, blockchain, and cloud layers with smart contracts for dynamic role management. Their approach enhanced accuracy, resilience, and auditability compared to centralized systems, laying a foundation for trustworthy and scalable IIoT infrastructures.

The review done by Halder et al., highlights the potential of microalgae as renewable and sustainable feedstock for biofuel production, offering advantages such as high photosynthetic efficiency, rapid growth, and carbon dioxide fixation. The paper comprehensively describes the four generations of biofuels, alongside technologies such as hydrothermal liquefaction and biochemical conversion pathways

Agin et al., based on the development of potential applications of Nano-structured Thermites and Explosives (NSTEX) as environmentally friendly alternatives to traditional lead-based explosives, which are toxic. This review focuses on a major advancement namely, the Spray Flash Evaporation (SFE) method, which enables large-scale synthesis and produces ultrafine powders with controlled morphology.

The last article with the field of Forensic science, the advancement of molecular fingerprinting methods for estimating the age of fingerprint donors was reviewed by Ajayakumar et al. against conventional morphological methods. Lately, AI and deep learning have been at the forefront, and this paper inculcates them for accuracy in innovative sampling methods and non-invasive sweat analysis.

As we present this issue of our journal, we extend our heartfelt appreciation to all the authors, reviewers, editorial board members, and assistant editors whose contributions have made this publication possible. We gladly welcome you to connect with this issue, to engage and discover beyond this summary.

Dr Manoj Balachandran

Editor