SCHOLARLY PUBLICATIONS
School of Applied Sciences
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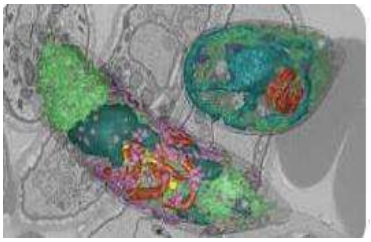
Journal Name: Nature Communications **IF: 14.7**

Title: Evidence of isospin-symmetry violation in high-energy collisions of atomic nuclei

Author: Zwaska R.; Zviagina A.; Zimmerman E.D.; Zherebtsova E.; Zaitsev A.; WyszyÅ„ski O.; WÃ³jcik K.; Witek K.; Wickremasinghe A.; Volkov V.; Vitiuk O.; Vechernin V.V.; VeberiÄ D.; Valiev F.F.; Urbaniak M.; Unger M.; Tveter I.C.; Andronov E.V.; Amin N.; Allison K.K.; Adrich P.; Adhikary H.; Giacosa F.; Gorenstein M.; Poberezhniuk R.; Samanta S.

Details: Volume 16, Issue 1, December 2025

Abstract: Strong interactions preserve an approximate isospin symmetry between up (u) and down (d) quarks, part of the more general flavor symmetry. In the case of K meson production, if this isospin symmetry were exact, it would result in equal numbers of charged (K^+ and K^-) and neutral (K^0 and K^-0) mesons produced in collisions of isospin-symmetric atomic nuclei. Here, we report results on the relative abundance of charged over neutral K meson production in argon and scandium nuclei collisions at a center-of-mass energy of 11.9 GeV per nucleon pair. We find that the production of K^+ and K^- mesons at mid-rapidity is (18.4 ± 6.1)% higher than that of the neutral K mesons. Although with large uncertainties, earlier data on nucleus-nucleus collisions in the collision center-of-mass energy range 2.6<sNN<200 GeV are consistent with the present result. Using well-established models for hadron production, we demonstrate that known isospin-symmetry breaking effects and the initial nuclei containing more neutrons than protons lead only to a small (few percent) deviation of the charged-to-neutral kaon ratio from unity at high energies. Thus, they cannot explain the measurements. The significance of the flavor-symmetry violation beyond the known effects is 4.7σ when the compilation of world data with uncertainties quoted by the experiments is used. New systematic, high-precision measurements and theoretical efforts are needed to establish the origin of the observed large isospin-symmetry breaking.



URL: https://www.nature.com/articles/s41467-025-57234-6

SCHOLARLY PUBLICATIONS
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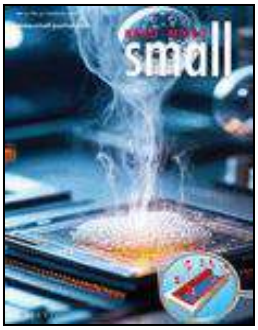
Journal Name: Small **IF: 12.1**

Title: Nucleobase Regulated Facet Engineering Enables Zinc(100) Oriented Growth for Long-Life Zinc Anode under Combined Elevated Areal Capacity and Current Density

Author: Sarkar, S.K.; Maharana, A.K.; Sarkar, R.; Rambabu, G.; Dash, B.; Pradhan, M.; Pradhan, G.K.; Jhaa, G.; Thakuria, S.; Paul, S.; Das, S.

Details: 8 October 2025

Abstract: The extremely short cycling life of Zn-anode under combined high areal capacity and current density remains a key barrier to the large-scale AZIB deployment. Herein, it is experimentally and theoretically demonstrated that adenine, a multirole zincophilic biomolecular electrolyte additive, outperforms other nucleobases, promoting Zn deposition toward (100) plane, notably enhancing cycling stability under simultaneous ultrahigh areal capacity and current density. Owing to its multiple nitrogen atoms with varying basicity, adenine engages in multifaceted interactions, including coordination with solvated Zn^{2+} ions, adsorption on the Zn(002) plane, and H-bonding with both solvated and bulk water molecules. These synergistic interactions passivate the thermodynamically stable Zn(002) plane, suppress interfacial water-induced HER and byproduct formation, and promote dendrite-free Zn deposition along the high-energy (100) plane. The resulting crystallographic regulation results in long-cycle-life Zn stripping/plating even under practically demanding harsh conditions of ultrahigh areal capacity and current density. In an adenine-boosted Zn||Zn symmetric cell achieves a cycle-life of 1060 h under combined conditions of 40 mA cm^{-2} and 40 mAh cm^{-2} and a record cumulative capacity of 42400 mAh cm^{-2}. Current findings highlight the potential of zincophilic biomolecular additive design principles in overcoming key interfacial challenges, enabling a distinctive, environmentally benign pathway toward realizing large-scale AZIB development.



URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/smll.202508779

SCHOLARLY PUBLICATIONS
School of Applied Sciences
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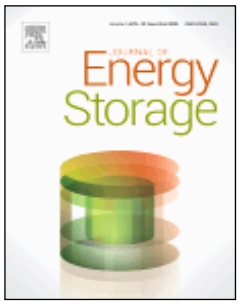
Journal Name: Journal of Energy Storage **IF: 9.8**

Title: Synergistic effect of MoO3@polyindole nanocomposite for high-performance and long-cycle life supercapacitors

Author: Pati, B.; Samal, P.K.; Panigrahy, J.; Praharaj, S.; Rout, D.

Details: Volume 141, Issue 21, January 2026

Abstract: Conducting polymer-based materials have garnered significant attention in energy storage for their wide potential window, high conductivity, substantial capacitance, low cost, and environmental friendliness. This work reports the charge storage performance of MoO_3@PIN nanocomposites (PIN refers to polyindole) for the first time in the literature. The FESEM micrographs of the composites suggest the anchoring of irregular PIN globules on/within the orthorhombic MoO_3 nanobelts, particularly for PM2 (MoO_3:indole::1:2 weight ratio). XPS analysis reveals weak covalent bonds in PM2 via Lewis acidic sites of MoO_3 and nitrogen atoms/ π electrons of pyrrole aromatic rings, facilitating better electron transport pathways within the composite. The above factors contribute to the superior specific capacitance of 631.8 F/g at 1 mV/s over a working potential window of 1.5 V for PM2. It can also deliver an energy density of 103.76 Wh/kg at a power density of 752.28 W/kg, and an impressive cyclic life of 115.5 %, after 14,000 cycles. The PM2//PM2 symmetric cell could achieve an energy density of 28.46 Wh/kg at 600 W/kg and power a red LED for 12 mins. The outstanding cyclic stability, wide potential window, and appropriately balanced energy and power densities of PM2 highlight its potential for supercapacitor electrodes.



URL: https://www.sciencedirect.com/science/article/pii/S2352152X25039003?via%3Dihub

SCHOLARLY PUBLICATIONS
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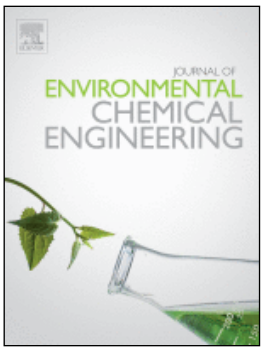
Journal Name: Journal of Environmental Chemical Engineering **IF: 7.2**

Title: A comprehensive review on biogenic synthesis and environmental - applications of precious metal nanoparticles

Author: Kar, P; Muduli, S; Nayak, S; Nayak, RK; Parhi, PK

Details: Volume 13, Issue 6, December 2025

Abstract: Water pollution from inorganic and organic contaminants poses a severe environmental and health risk, necessitating the development of sustainable remediation technologies. In recent years, precious metal-based nanoparticles (NPs) have emerged as highly effective materials for pollutant removal from aqueous environments due to their unique physicochemical properties. This review presents a comprehensive overview of the synthesis strategies for precious metal NPs, including physical; laser ablation, ball milling), biological; plant extracts, bacteria, fungi, and chemical; reduction, sol–gel, co-precipitation methods. Unlike previous reviews, this work introduces a comparative framework that systematically links synthesis parameters to na noparticle characteristics and environmental performance. The environmental applications of these NPs—such as adsorption, photocatalytic degradation, catalytic reduction, and antibacterial activity—are critically discussed, with practical examples. For instance, biologically synthesized silver NPs exhibit excellent antibacterial properties and high dye adsorption capacity (up to 161.3 mg/g for Congo red), while gold NPs effectively catalyze the reduction of 4-nitrophenol in pharmaceutical wastewater. The optimization of synthesis conditions and their direct influence on nanoparticle stability, reactivity, and selectivity are thoroughly examined. A variety of advanced characterization techniques used to assess the structural, morphological, and functional attributes of the NPs are also discussed. The influence of synthesis conditions on NP stability, reactivity, and selectivity is examined alongside commonly employed characterization techniques. This review highlights the potential of precious metal NPs as next-generation materials for water treatment, offering insights into their optimization for real-world environmental applications. It also outlines current challenges and future prospects for integrating these nano-materials into scalable and eco-friendly remediation systems.



URL: https://www.sciencedirect.com/science/article/abs/pii/S2213343725038606

SCHOLARLY PUBLICATIONS
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Journal Name: Journal of Alloys and Compounds **IF: 6.3**

Title: Correlating dielectric constant and electrical conductivity in NaFeO2: Implications for high- É› electronic device performance

Author: Hota, S.S.; Panda, D.; Choudhary, R.N.P.; Mishra, S.; Biswal, L.

Details: Volume 1047, December 2025

Abstract: $NaFeO_2$ layered oxide was synthesized through the high-temperature solid-state method. The XRD diffraction shows that it has an orthorhombic structure (a = 5.6719 Å, b = 7.1375 Å, and c = 5.3829 Å). The W–H plot was used to obtain the crystallite size, which is determined as 97.9 nm and microstrain is ∼0.0004. Cross-section FESEM image exhibited the uniformity of the grain structure, and the mean grain size can be determined as 1.0457 µm. Temperature and frequency response dielectric studies demonstrated Maxwell-interfacial Wagner's polarization and observed with high dielectric (ε_r∼1218.69) & low dielectric loss (∼4.2) at low frequency. AC conductivity also reinforces low-frequency loss obeying Jonscher's power law. It suggests that the conduction is occurring by a long-range hopping mechanism, and the activation energies were in the range of 0.144–0.259. A change in the power law exponent indicated that OLPT and CBH models may explain the conduction mechanism. Temperature-dependent impedance spectroscopy demonstrated a non-Debye-type relaxation process involving a negative temperature coefficient of resistance (NTCR) behavior having sensitivity 2838.78 and temperature coefficient −1.2 %. The activation energies from both methods indicated different charge carriers involved in the conduction and relaxation processes. This multifunctional material provides a thorough approach to engineering high-performance and promising avenues into future technologies, such as non-volatile memory and spintronic devices.

URL: https://www.sciencedirect.com/science/article/pii/S0925838825065582?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: Environmental DNA **IF: 6.2**

Title: Harnessing Environmental DNA to Explore Frugivorous Interactions: A Case Study in Papaya (Carica papaya) and Pineapple (Ananas comosus)

Author: Banerjee, P.; Maity, J.P.; Chatterjee, N.; Weber, S.; Dey, G.; Sharma, R.K.; Chen, C.-Y.

Details: Volume 7, Issue 5, 10 October 2025

Abstract: Plant–animal interactions (PAIs) are critical in natural and agricultural ecosystems, mediating energy flow with both positive and negative interactions. Traditional methods of tracking PAIs, such as morphological identification and camera trapping, are limited in speed and scalability, posing challenges for comprehensive biodiversity monitoring. Recently, environmental DNA (eDNA) metabarcoding has emerged as a promising technique for detecting species interactions non-destructively. This pilot study explores the application of eDNA metabarcoding to investigate frugivorous interactions involving 18 partially consumed and three intact fruits of each *C arica papaya* and *Ananas comosus*. Metabarcoding of mitochondrial COI gene fragments generated 796,234 paired-end reads representing 117 ASVs spanning diverse taxonomic groups, including Metazoans, Protozoans, Algae, Fungi, and Bacteria. After filtering for animal taxa, 41 ASVs were retained, dominated by Arthropoda (~97%). Major frugivores included *Drosophila*, *Zaprionus*, and *Bactrocera* species. Additional detections included beetles, ants, parasitoid wasps, and vertebrates such as *Acridotheres javanicus*, *Callosciurus erythraeus*, and *Bandicota indica*. Moreover, consumed fruits showed high insect (~90%–95%) and mammal (~4%–5%) DNA, while intact fruits were dominated by rotifers (~75%–80%). Distinct communities were found between pineapple and papaya, with 15 and 11 unique ASVs, respectively, and only one ASV was unique to intact fruits. Alpha and beta diversity analyses confirmed the differences in community structure between fruit types. Despite the limited sample size, our findings demonstrate the potential of fruit-surface eDNA to monitor frugivory and species interactions. Future studies should scale this approach across seasons and crop types to assess its potential in long-term biodiversity and pest management monitoring.

URL: https://onlinelibrary.wiley.com/doi/10.1002/edn3.70196

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

Title: Sustainable biochar production from shrimp pond algal waste: Optimization of pyrolysis parameters using the L9 Taguchi method

Author: S.P., Palai, Shusree Prachi; S., Senapati, Soumyaranjan; S., Muduli, Sthitiprajna; A.K., Panda, Alok Kumar; T.K., Bastia, Tapan Kumar; P.K., Parhi, Pankaj Kumar

Details: Volume 204, Jan 2026

Abstract: Algal blooms *(Spirogyra)*, a common environmental challenge in shrimp farming, offer a valuable opportunity for sustainable waste conversion into biochar. This study evaluates the feasibility of producing biochar from algal biomass through pyrolysis, focusing on optimizing three key process parameters: temperature, residence time, and heating rate. An L9 Taguchi orthogonal array was used to design the experiments. Biochar yield and quality were analyzed using advanced characterization techniques, including PXRD, FESEM, EDAX, CHNS, RAMAN, FTIR, BET, XPS, analysis, particle density, and pH measurement, to understand the physicochemical properties of the resulting biochar. From the characterization data, the optimization of biochar yield in the context of the functional group's perspective and surface area is 70.5 % and 66.1 %, respectively. The pyrolyzed product, pristine biochar, demonstrated that processing conditions significantly influence biochar structure and properties quantitatively and qualitatively. These findings provide insight into optimal pyrolysis parameters for enhancing biochar quality, with potential applications in environmental remediation and agricultural sustainability.

URL: https://www.sciencedirect.com/science/article/pii/S0961953425008128?via%3Dihub

SCHOLARLY PUBLICATIONS
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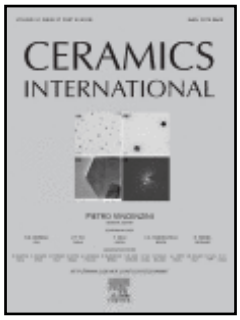
Journal Name: Ceramics International **IF: 5.6**

Title: Unraveling the functional behavior of K0.5Bi0.5BaTi2O6ceramic: Structural, optical, dielectric, and electrical aspects for industrial applications

Author: Rout, S.; Priyadarshini, L.; Moharana, K.; Parida, A.K.; Choudhary, R.N.P.; Biswal, L.

Details: Volume 51, Issue 27, November 2025

Abstract: Introducing controlled A-site disorder in double perovskites offers a promising route to tune their physical properties. In this work, Ba^{2+}, $K^{+}$and Bi^{3+}were incorporated at the A-site to modify the structural, optical, dielectric and electrical behaviors. An alkali based disordered novel perovskite solid solution $K_{0.5}Bi_{0.5}BaTi_2O_6$is synthesized using high temperature solid state reaction kinetics. Structural analysis using X-ray diffraction (XRD) and Raman analysis confirmed the solid solution adopt a tetragonal system with a non-centro-symmetric space group P4mm, while energy-dispersive X-ray spectroscopy (EDX) verified the presence and proportion of constituent elements. Optical characterization by UV–Vis spectroscopy established a direct band gap of 3.14 eV, Urbach energy 0.26 eV and a static refractive index of 1.04 endorsing its potential for optoelectronic, photovoltaic and photocatalytic applications. Complex impedance spectroscopy (CIS) demonstrated a high, stable dielectric constant with minimal loss up to 300 °C, while temperature-dependent dielectric analysis indicated a diffuse phase transition (γ = 1.72), confirming the relaxor ferroelectric nature of the material. The material exhibits a high dielectric constant (ε_r∼1467) with a low loss factor (∼0.8) near room temperature (1 kHz). Polarization hysteresis (P–E) loops recorded at ambient temperature yielded a recoverable energy storage density of ∼518.2 J/cm^{3}with an efficiency of ∼43 %. Impedance and conductivity analysis revealed negative temperature coefficient of resistance (NTCR) behavior with intra-grain conduction, applicable for thermistors. AC conductivity followed Jonscher's power law, with charge transport governed by the overlapping large polaron tunneling (OLPT) model. Overall, comprehensive structural, optical, dielectric and electrical characterization demonstrate its multifunctional potential in the field of high-frequency and high-temperature electronics, energy storage and thermistor applications.



URL: https://www.sciencedirect.com/science/article/pii/S0272884225044189?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: Materials Research Bulletin **IF: 5.3**

Title: In situ Raman and electric modulus study of NBT-ST-KNN ceramics: An insight into temperature evolution of relaxor dynamics

Author: Singha A.; Praharaj S.; Rout D.

Details: Volume 190, October 2025, 113534

Abstract: Polar nanoregions (PNRs) are often argued to be the key factor in enhancing the functional properties of relaxor-based ferroelectrics. The creation and relaxation of these polar entities are believed to be strongly temperature-dependent, but the explanation is still unclear. In this investigation we have chosen a well-established relaxor system $(0.8\text{-}x)(Na_{0.5}Bi_{0.5})TiO_3\text{-}0.2SrTiO_3\text{-}x(K_{0.5}Na_{0.5})NbO_3$; (x = 0.005, 0.01, 0.04 and 0.1) to probe into the thermal dynamics of PNRs using in-situ Raman and electric modulus formalism. The Raman spectra segregate into different temperature zones corresponding to ferroelectric-relaxor transition ($T_{F\text{-}R}$), maximum dielectric constant (T_m) and Burn's temperature (T_B). A closer introspection of width and position of peak peaks around these temperatures depicts the existence of local structural heterogeneities. Further, the frequency-dependent electric modulus, M"(f) study demarcates high-frequency shoulder (related to PNR relaxation) from intermediate frequency peak corresponding to bulk response. Analysis of Z"(f) and M"(f) predict temperature evolution of long-range ordered regions to localized relaxations.

URL: https://www.sciencedirect.com/science/article/pii/S0025540825002429?via%3Dihub

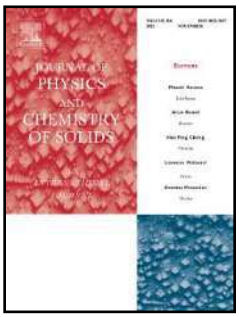
Journal Name: Journal of Physics and Chemistry of Solids **IF: 4.9**

Title: Unveiling the metal-insulator-transition in NaIrO3: The role of spin-orbit coupling and strong electron correlation using ab initio method

Author: Behera, SS; Parida, P

Details: Volume 208, Jan 2026

Abstract: Motivated by the unsuccessful attempts using the density functional theory (DFT) alone to study the insulating behavior of NaIrO post-perovskite compound, employing the interplay between the spin–orbit coupling (SOC) and strong electron correlation (U) effect, we have studied the structural, elastic, and electronic properties of this compound. Here, we have compared the effects of weak Jahn-Teller distortion, strong electron correlation at the transition metal and ligand sites, as well as the spin–orbit effect of the Ir atom to explore the insulating behavior of NaIrO. This post-perovskite compound is associated with the tilting of octahedra in alternate layers, and the ab initio parameters are obtained to carry out this work. We employ the GGA+PBE approximation with full relativistic pseudopotentials to perform calculations including U and spin–orbit interactions within the Quantum Espresso package. From the elastic properties we have investigated that this compound is mechanically stable and ductile in nature. The compound also show anisotropic behavior at different plane.



URL: https://www.sciencedirect.com/science/article/pii/S0022369725004615?via%3Dihub

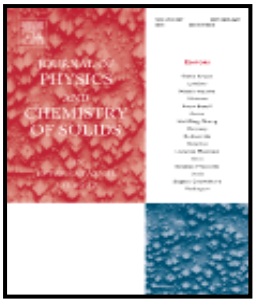
Journal Name: Journal of Physics and Chemistry of Solids **IF: 4.9**

Title: Enhanced magnetic properties and room temperature magnetodielectric response in (1-x) Bi2Fe4O9 - (x) La067Sr033MnO3 (x=0.1-0.3) composites

Author: Pati, A; Mohapatra, SR; Kaushik, SD; Dhara, S; Sahu, DP; Singh, AK; Nanda, J; Tripathy, SN

Details: Volume 208, Issue 2, January 2026

Abstract: We report an enhanced magnetic and magnetodielectric (MD) coupling in antiferromagnetic (AFM) spin frustrated Bi2Fe4O9 (BFO) turned composite with substantial variation of La067Sr033MnO3 (LSMO). Phase formation is confirmed from room temperature Rietveld refinement of X-ray diffraction data. The composite shows orthorhombic crystal structure with space-group 'Pbam + Pbnm' which is also well supported from Raman spectra. XPS analysis confirmed the existence of multiple valence states of magnetic ions such as Fe2+:Fe3+:Fe4+ = 41:45:14 and Mn3+:Mn4+ = 88:12, within experimental limit. This triggers super-exchange and double-exchange interactions thereby contributing significantly to the dielectric and magnetic order parameters. At the same time, with increase in LSMO content an increase in AFM transition temperature (T-N) close to room temperature is observed. An irreversibility in ZFC-FC data is evidenced for T < 350 K along with an opening in M - H plot, indicating spin-glass behaviour and an onset of weak ferromagnetism in the composites. The latter is found to get enhanced significantly with increase in LSMO content and is also verified from Arrott plots. Further, confirmation to the intrinsic MD coupling is assisted by temperature and magnetic field variation of magnetodielectric effect (MD%) which shows enhanced MD effect effective at room temperature. This intriguing MD coupling could be attributed to inverse Dzyalonshinskii-Moriya interactions between magnetic ions present in the composite due to strong cross coupling. Lastly, from Landau free energy expression, the existence of biquadratic nature of magnetoelectric coupling ((PM2)-M-2) emerging from the coupling term 'gamma(PM2)-M-2' is established. At 300 K, gamma is similar to 1.6 x 10(-2) (emu/g)(-2) for BL70-30 and shows similar to 2 % MD response - a nearly eight-fold increase as compared to parent BFO. Hence, the above outcomes highlight the significance of the composite as a viable candidate for multifunctional applications



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SCHOLARLY PUBLICATIONS
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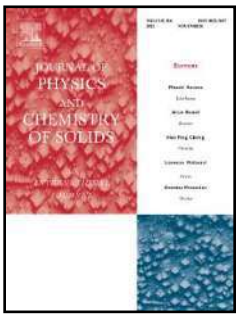
Journal Name: Journal of Physics and Chemistry of Solids **IF: 4.9**

Title: Probing lattice anharmonicity and thermal transport in nanocrystalline CoSb3 using Raman scattering

Author: A., Mohanty, Abhipsa; A., Das, Arpita; P.K., Deheri, Pratap Kumar; J., Khatei, Jayakrishna; D., Rout, Dibyaranjan; G.K., Pradhan, Gopal K.

Details: Volume 208, January 2026

Abstract: Understanding and controlling thermal conductivity is central to the development of high-performance thermoelectric materials. In this work, we investigate the lattice dynamics and thermal transport in nanocrystalline $CoSb_3$ using non-contact, optothermal Raman spectroscopy. Temperature- and laser power-dependent Raman measurements are employed to analyze phonon dynamics and extract anharmonic contributions from both three-phonon and four-phonon scattering processes. The temperature-induced redshifts of Raman-active phonon modes are modelled quantitatively using the Klemens-Balkanski formalism, incorporating both quasiharmonic thermal expansion and intrinsic anharmonicity. By evaluating the shift in Raman mode positions with respect to laser power and temperature, we estimate the lattice thermal conductivity of nanocrystalline $CoSb_3$ yielding a value of 2.65 ± 0.08 W/mK highlighting strong phonon scattering and thermal boundary resistance at grain interfaces. Our findings underscore the effectiveness of Raman spectroscopy as an analytical technique for probing localized phonon-mediated heat conduction in nanostructured thermoelectrics and offer valuable insights into the role of anharmonic phonon dynamics in determining thermal transport in skutterudites.



URL: https://www.sciencedirect.com/science/article/pii/S0022369725005815?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Applied Sciences
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Journal Name: Journal of Physics and Chemistry of Solids **IF: 4.9**

Title: Unlocking the potential of NiO@BiFeO3 nanocomposite for high-performance supercapacitor electrodes

Author: Rout, S.K.; Samal, P.K.; Panigrahy, J.; Nanda, P.; Pati, B.; Praharaj, S.; Rout, D.

Details: Volume 210, March, 2026

Abstract: The pursuit of electrochemical supercapacitors offering superior energy and power densities has necessitated intensive research into efficient electrode materials. This study explores the potential of NiO@$BiFeO_3$ nanocomposite series as an electrode material. X-ray diffraction confirms the formation of nanocomposites with $Bi_2Fe_4O_9$ as a minor phase, and Rietveld refinement determines their phase percentages. In a three-electrode setup, BN50 (50 wt% $BiFeO_3$ + 50 wt% NiO) demonstrates an excellent specific capacitance of 772 F g^{-1} (at 1 mV/s) and a discharge time of 1080 s (at 0.5 A g^{-1}) from −0.3 to +0.8 V. It is related to the abundance of oxygen vacancies and the existence of multiple oxidation states (XPS), well-interconnected network of irregular particles with minimal agglomerations (FESEM) and synergistic effect of the components in BN50 compared to $BiFeO_3$. A remarkable capacity retention of 120 % is sustained over 20,000 cycles in BN50. Moreover, BN50//BN50 symmetric device exhibits a specific capacitance of 141.68 F g^{-1} at 5 mV/s and delivers an energy density of 28 W h/kg at a power density of 375 W/kg. Two such symmetric cells (series) could power a red LED (1.8 V) up to 10 min. Overall, this work highlights the suitability of NiO@$BiFeO_3$ as a highly redox-active electrode material for charge storage.

URL: https://www.sciencedirect.com/science/article/pii/S0022369725007838?via%3Dihub

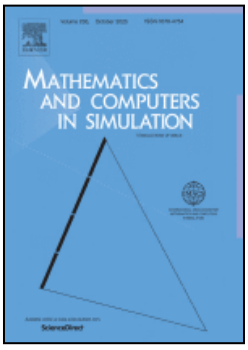
Journal Name: Mathematics and Computers in Simulation **IF: 4.4**

Title: Optimization of a price break policy and advertisement effort based non-instantaneous deteriorating inventory problem with partial backlogged via metaheuristic algorithms

Author: Mondal R.; Manna A.K.; Akhtar M.; Bhunia A.K.

Details: Volume 236, October 2025, Pages 221-247

Abstract: Repeated advertisements of an item in different media, displayed stock in a decorated showroom, and also price break policies play a vital role in an inventory control system. Also, the relationship between products' selling price and market demand is conflicting when all other factors are fixed. Thus, the incorporation of advertisement policy and price break facility in a business is more realistic. This work investigates an inventory problem for non-instantaneous deteriorating items with advertisement and displayed inventory level dependent demand under price break facility. Moreover, partially backlogged shortages and transportation cost for replenishing items are considered in the proposed inventory model. Based on the customer's demand and storage space of the shop, several cases and sub-cases are considered. In this study, different metaheuristic algorithms are considered for maximizing the average profit in each scenario. Then, considering one numerical example, the proposed model is justified. Finally, the sensitivity analysis is carried out to investigate the impact of model parameters on the policy of optimality and a fruitful conclusion is drawn.



URL: https://www.sciencedirect.com/science/article/pii/S0378475425001375?via%3Dihub

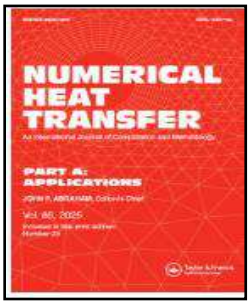
Journal Name: Numerical Heat Transfer; Part A: Applications **IF: 3.5**

Title: Implications of homogeneous-heterogeneous reactions, Hall current, and dissipative radiative heat transfer on MHD Casson fluid flow over a bi-directional stretching sheet

Author: Nandkeolyar, M.; Sarkar, A.; Sahu, B.; Nandkeolyar, R.

Details: Volume 86, Issue 23, 2025

Abstract: This consideration highlights a numerical analysis of the unsteady three-dimensional flow of a Casson fluid over a stretching surface extending in its plane considering the effects of Hall current, thermal radiation, homogeneous–heterogeneous reactions, viscous dissipations, and an external magnetic field. The fluid flow in the region is developed due to the stretching of the sheet along the two directions in its plane. Two different species are present in the flow regions which are taking part in homogeneous and heterogeneous reactions. Fluid velocity, thermal, and mass transportation are expressed mathematically using a set of nonlinear partial differential equations (Formula presented.) along with suitable boundary conditions. By using the appropriate similarity transformations, these equations (Formula presented.) that reflect the mathematical model are transformed into a set of nonlinear ordinary differential equations (Formula presented.) The transformed equations (Formula presented.) were further solved numerically utilizing the (Formula presented.) solver. The comprehensive study regarding the impacts of flow parameters on velocities, temperature, and concentration is also presented with graphs. It is observed that the thermal boundary layer is enhanced with an increment in the Hall current parameter, magnetic parameter, and thermal radiation. Moreover, with an increase in homogeneous-heterogeneous reaction parameters, mass transportation decreases. The physical quantities such as the coefficient of skin friction and coefficient of heat and mass transfer are also obtained numerically. Moreover, an appropriate agreement is obtained on comparing the current results with previously published results.



URL: https://www.tandfonline.com/doi/full/10.1080/10407782.2024.2360660

SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

Journal Name: Numerical Heat Transfer; Part A: Applications **IF: 3.5**

Title: Magnetohydrodynamic Casson SWCNT-MWCNT/EG hybrid nanofluid flow over a stretching cylinder with Cattaneo-Christov double diffusion model

Author: Rath, C.; Nayak, A.

Details: Volume 86, Issue 21, 2025

Abstract: The present problem examines the flow features of a two-dimensional time-independent Casson hybrid nanofluid on a stretching cylinder with dual stratification and MHD effects. Heat and mass transfer effects are analyzed by utilizing the Cattaneo-Christov double diffusion scheme with entropy generation. Further, the energy losses due to viscous and Joulian dissipation are also considered in the problem. Due to the high thermal conductivity nature of the carbon nanotubes, which plays a crucial role in cooling systems, material sciences, electrical components and treatment of cancer cells, single and multi-walled carbon nanotube particles (*SWCNT*, *MWCNT*) are considered in the hybrid nanofluid. The carbon nanotubes are mixed with base fluid et hylene glycol (*EG*) to form the required hybrid nanofluid. Suitable transformations are adopted for transforming the non-linear PDEs to non-linear ODEs of the mathematical model. Then, the system of ODEs are resolved by utilizing bvp4c numerical approach in MATLAB software. The impact of the various flow pertinent parameters on the flow model are disclosed through graphs and tables and then explained elaborately. The important findings of the study reveal a reduction in the absolute value of coefficient of surface friction with the Casson and velocity slip parameters. The entropy generation rate (N_G) is diminished due to slip parameters, whereas the opposite effect is observed due to the *SWCNT* nanoparticle volume fraction. The thermal and mass relaxation parameters induce a significant amplification in the rates of heat and mass transport, respectively. Furthermore, it is observed that the heat and mass transfer rates of *EG*-based *SWCNT* – *MWCNT* hybrid nanofluid perform better than those of *EG*-based *SWCNT* nanofluid. The outcomes of the investigation exhibit an excellent agreement with the previously published results. The present analysis has applications in cancer therapy, microelectronics cooling, industrial heat generators, nuclear reactor maintenance, electrolytic condensers, and many more.

URL: https://www.tandfonline.com/doi/full/10.1080/10407782.2024.2353355#abstract

SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

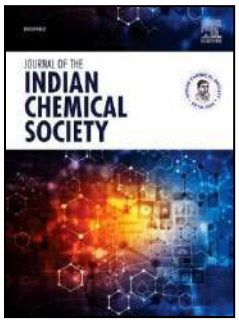
Journal Name: Journal of the Indian Chemical Society **IF: 3.4**

Title: Computational screening and experimental evaluation of potent polyphenols as anti-virulence agents against key proteins SrtA and CrtM of methicillin-resistant Staphylococcus aureus

Author: S., Mohanty, Sweta; S., Patnaik, Saswati; S., Mishra, Sweta; B.P., Rath, Bibhu Prasad; C.K., Mohanty, C. K.

Details: Volume 102, Issue 10, October 2025

Abstract: The rise of methicillin-resistant *Staphylococcus aureus* (MRSA) as a multidrug-resistant pathogen underscores the urgent need for alternative therapeutic strategies that go beyond traditional antibiotics. The pathogenicity of MRSA is largely attributed to its ability to form biofilms and produce the antioxidant pigment staphyloxanthin. Therefore, targeting essential virulence factors such as SortaseA (SrtA) and 4,4′-diapophytoene synthase (CrtM) offers a promising anti-virulence strategy that could mitigate pathogenicity while reducing resistance development. In this study, we evaluated the potential of plant-derived polyphenols as anti-virulence agents against MRSA using an integrated computational and experimental approach. *In silico* results confirmed that compounds like Naringin (NAR), Flavone (FLV) and Baicalein (BAI) demonstrated strong binding affinities and stable interactions with both targets. Further the *in vitro* results indicate that NAR exhibited potential antimicrobial activity, significantly disrupted MRSA biofilms and inhibited pigment production. Our findings support the potential of NAR as an effective anti-virulence agent targeting both SrtA and CrtM, offering a novel therapeutic avenue for managing MRSA infections.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0019452225004650?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Applied Sciences
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Journal Name: Icarus **IF: 3.0**

Title: Influence of albedo, radiation pressure, oblateness, and dust belt on the stability in the generalized elliptic restricted three-body problem

Author: Prasadu, B.R.; Mia, R.

Details: Volume 446, March 2026

Abstract: In this paper, we investigate the motion of an infinitesimal body in the framework of the modified elliptic restricted three-body problem by taking into account additional forces due to albedo, radiation pressure, the oblateness of the primaries' and the dust belt. We obtain semi-analytical solutions of locations for non-collinear equilibrium points. The positions of non-collinear equilibrium points are shown graphically for different values of perturbation parameters. To investigate the motion of the infinitesimal body, we have chosen three real astronomical systems: the Sun–Mars, Proxima Centauri, and Sun–Saturn. The effects of different perturbation parameters on the position of non-collinear equilibrium points are analysed. The linear stability analysis of equilibrium points is performed by computing the critical mass ratio. Our findings indicate that the stability and instability of non-collinear equilibrium points are influenced by the mass ratio and specific perturbation parameters associated with each system.

URL: https://www.sciencedirect.com/science/article/abs/pii/S0019103525004336?via%3Dihub