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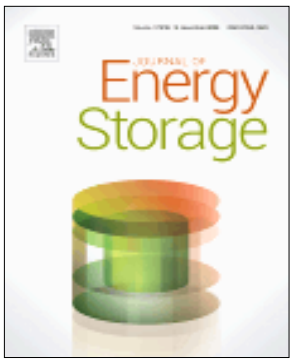
Journal Name: Journal of Energy Storage **IF: 10.7**

Title: Enhanced energy storage performance and superior thermal stability in yttrium-doped bismuth sodium titanate relaxor ferroelectrics through compositional tuning

Author: Das D.; Kerai S.; Majhi S.; Dikshit A.P.; Parashar K.; Parashar S.K.S.

Details: Volume-181, P-B, 15th December, 2026

Abstract: Environmentally friendly ferroelectrics with outstanding energy storage performance (ESP) have gained popularity in recent years due to rising need for environmental protection and pulsed power technologies. This work reports a high Wrec (0.27 J/cm3) with an excellent energy efficiency (η) of 65% in (Bi0.5Na0.5)1-xYxTiO3 (x = 0.03) ceramics at an electric field of 75 kV/cm and shows excellent thermal stability in the temperature range of 30 to 100 °C with η more than 65%, synthesized by conventional solid-state reaction route. The ESP was optimized by creating polar nano regions (PNRs) and reducing grain size to submicron scale using a composition design technique by A-site modification of BNT ceramics. Due to PNRs formation and grain size modification, (Bi0.5Na0.5)0.97Y0.03TiO3 shows improved efficiency, η = 65% (~13.5 fold) as compare to pure BNT ceramics (Wrec[jls-end-space/] = 0.11 J/cm3, η = 4.8%, and Eb[jls-end-space/] = 75 kV/cm) and exhibits high Eb value of 105 kV/cm at ambient temperature. The synergistic combination of these features implies promising use in next-generation capacitor devices, particularly in energy storage applications requiring reliable performance in extreme operational environments.



URL: https://www.sciencedirect.com/science/article/pii/S2352152X26041344?via%3Dihub

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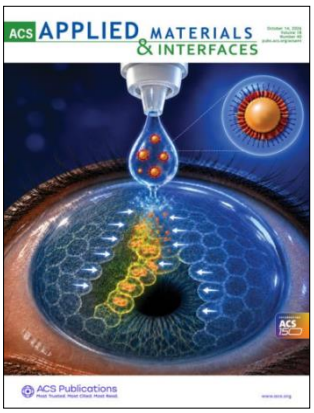
Journal Name: ACS Applied Materials and Interfaces **IF: 7.9**

Title: Programmable Artificial Hydrolase Based on Minimalistic Cross-α/Cross-β Amyloid Assemblies

Author: Dey S.; Kumar R.; Bhattacharya S.; Bera S.

Details: Volume-18, Issue-40, 14th October, 2026

Abstract: Enzymes, which catalyze nearly all biochemical processes, are delicately organized special substances composed of large proteins, specific secondary structures, distinct amino acid residues with precise positioning, and often metal cofactors. Reconstruction of enzymatic catalytic domains within fully artificial systems has become an interesting but challenging subject, largely due to limited understanding of their evolutionary processes. A long-standing opportunity in the generation of artificial or miniature enzymes has been to design building units capable of performing similar chemistry without the structural complexity of full proteins. Herein, by using a reductionist approach, we explore the sequence–structure–activity landscapes of enzyme evolution by investigating minimal amyloid-forming analogous peptides. Our results reveal that amyloid peptides without encoding canonical catalytic amino acids (like Lys, Ser, His, Glu/Asp) or metal cofactors can nevertheless catalyze ester hydrolysis through fibril-dependent substrate binding. Minor sequence variations alter supramolecular organization and reorganize solvent-exposed terminal groups, creating distinct catalytic microenvironments and activities. Combining experiments with molecular simulations, we show that these fibril surfaces present topologically different binding grooves that modulate the association of the model substrate. This sequence–structure–activity paradigm of de novo biocatalysts holds promise for predictable and robust construction of peptide-based new functional materials applicable in chemical and biochemical synthesis.



URL:https://pubs.acs.org/aamick/article-abstract/18/40/54957/5443105/Programmable-Artificial-Hydrolase-Based-on?redirectedFrom=fulltext

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Journal Name: Journal of Hydrology **IF: 7.3**

Title: Hydrology-driven transport-storage dynamics, metals interaction, and ecological risk of downstream riverine microplastics

Author: Mahapatra S.; Maity J.P.; Dey G.; Mishra T.; Singha S.; Samal A.C.; Chattopadhyay S.; Mangal S.; Bhattacharya P.

Details: Volume-678, October 2026

Abstract: The occurrence of microplastics (MPs) in monsoon-dominated rivers is influenced not only by the source inputs but also by seasonal hydrological shifts that regulate their transport to storage in downstream regions of the riverine system. The present study investigated MPs in surface water and bed sediments of the downstream riverine system during the pre-monsoon, monsoon, and post-monsoon periods to determine how discharge influences abundance, sediment–water partitioning, polymer-density sorting, metal association, and screening-level ecological risk. The results showed that MPs in surface water followed the order: monsoon (1169.8 ± 68.81 items/m^3) > pre-monsoon (951.9 ± 45.42 items/m^3) > post-monsoon (598.4 ± 69.42 items/m^3), indicating enhanced runoff-driven mobilization and downstream transport under high-discharge conditions. In contrast, sediment MPs showed the trend: post-monsoon (1251.5 ± 32.04 items/kg) > pre-monsoon (976.1 ± 30.67 items/kg) > monsoon (971.9 ± 36.09 items/kg), reflecting a transition from monsoon-driven export to post-monsoon depositional storage. This pattern was further supported by the sediment–water enrichment index, which increased from 0.83 in the monsoon to 2.09 in the post-monsoon, confirming greater sedimentary retention under reduced hydrodynamic forcing. White/transparent particles, fragments, and fibres dominated both matrices, indicating mainly secondary and weathered MPs. Raman analysis identified polymers in the order PP > PE > PET > PS > PVC, and showed density-driven sorting between water and sediment. FESEM–EDX revealed weathered surfaces and associated potentially toxic elements, suggesting that MPs may act as carriers of co-contaminants. This findings highlight that monsoon hydrology strongly regulates MPs transport, storage, and ecological risk in tropical river systems.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0022169426011881?via%3Dihub

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Journal Name: Journal of Industrial and Engineering Chemistry **IF: 7.1**

Title: Methanol sensing using UiO-66 MOF coating on laser-induced graphene electrodes

Author: Dhal B.C.; Belal M.A.; Hajra S.; Samal D.; Ghoshal S.; Dutta B.; Panigrahi B.K.; Vivekananthan V.; Kim H.J.; Sahu R.

Details: 11th September**,** 2026

Abstract: This paper presents the development of a versatile, highly sensitive room-temperature (RT) UiO-66-based gas sensor for methanol (MeOH) detection. Material characterization confirmed the successful synthesis of highly crystalline UiO-66 and the precise patterning of laser-induced graphene interdigitated electrodes (LIG-IDE). Using a spray-coating method, 500 µL of UiO-66 ink was deposited over a highly conductive LIG-IDE pattern on a flexible polyimide substrate. The gas-sensing tests indicated that the UiO-66/LIG-IDE sensor exhibits an n-type response to MeOH at RT, with high selectivity and adequate cyclability. The interaction of UiO-66 with 100 ppm MeOH at RT yields a gas response (Ra/Rg) of 2.75, along with response and recovery times of 68 s and 35 s, respectively. Further, DFT analysis reveals that MeOH sensing arises from reversible interactions, with linker-induced modulation of the electronic structure. This study introduces a promising, economical, and versatile sensing technology with potential applications in non-invasive breath analysis and environmental monitoring.



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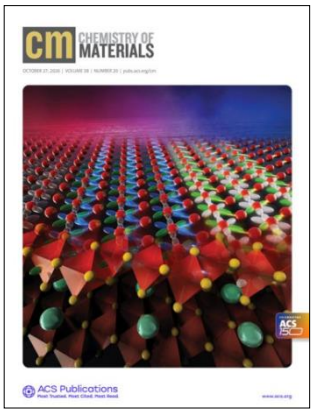
Journal Name: Chemistry of Materials **IF: 7.1**

Title: Light-Induced Self-Healing Behavior in Photosalient Coordination Polymer

Author: Kurakula U.; Datta S.; Dutta B.; Singh S.; Vempati S.; Mir M.H.; Medishetty R.

Details: Volume-38, Issue-20, 27th October, 2026

Abstract: Achieving self-healing in the photosalient (PS) crystals without compromising structural integrity is a challenge. So far, self-healing and photomechanical behaviors have predominantly been reported as independent phenomena. Systems that concurrently exhibit both properties under a single stimulus remain uncommon. Here, we report the integration of the photomechanical property with a self-healing behavior by embedding dynamic covalent disulfide (S–S) linkages into a photoreactive coordination polymer (CP). Using 2-mercaptobenzoic acid, which undergoes in situ oxidation to form S–S bonds during crystallization, we obtained two-dimensional (2D) CP. The crystal undergoes cracking followed by a pronounced PS motion under UV irradiation. Continued irradiation induces up to 95% volumetric self-healing, as confirmed by atomic force microscopy, and acts as a self-healing optical window by restoring optical transparency and single-crystal integrity, as verified by multimodal microscopic techniques and single-crystal X-ray diffraction (SXRD). Comprehensive analysis using SXRD and spectroscopy collectively disentangles both mechanisms, viz solid-state [2 + 2] cycloaddition, which is responsible for cracking, PS behavior, and dynamic covalent chemistry (DCC) (S–S) that enables subsequent self-healing. This work demonstrates a distinctive combination of cracking, PS, and self-healing behavior in a CP enabled by the synergistic interplay of light-induced irreversible [2 + 2] photocycloaddition and dynamic disulfide bond linkage within a single crystal, in addition to a 2D CP to 3D CP transformation mediated by an “SC-crack-heal-SC” (Single Crystal → Cracked Crystal → Crystal Healing → Healed Single Crystal) mechanism. This approach paves the way for advancements in soft robotics, adaptive optics, and resilient next-generation functional materials.



URL:https://pubs.acs.org/cmatex/article-abstract/38/20/10595/5447629/Light-Induced-Self-Healing-Behavior-in?redirectedFrom=fulltext

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Journal Name: Chemistry of Materials **IF: 7.1**

Title: Hydrogels for Soft Robotics and Bio-Integrated Devices: Review on Self-Healing to Intelligent Actuation

Author: Bishoyi, KC; Pradhan, AK; Sahoo, SD

Details: 2026

Abstract: Self-healing and shape memory hydrogels have emerged as a transformative class of materials poised to reform next-generation bioelectronics, soft robotics, and actuation systems. By combining biocompatibility, mechanical tunability, and autonomous repair properties, these materials offer unique advantages for designing resilient and multifunctional devices that mimic the adaptability and responsiveness of biological tissues. This review provides a comprehensive analysis of the recent progress in the molecular design, network architectures, fabrication strategies, and functional integration of self-healing hydrogels into smart devices. Emphasis is placed on understanding the dynamic bonding mechanisms involving reversible covalent and supra-molecular interactions that impart self-repair capabilities while balancing mechanical robustness, conductivity, and biocompatibility. Special attention is given to highlighting how self-healing and shape memory functionalities enhance device durability, responsiveness, and long-term performance. We further explore the role of stimuli-responsive mechanisms, such as pH, temperature, and electrical signals, in enabling adaptive actuation and signal transduction. Additionally, the key challenges such as healing speed, operational stability in physiological environments, and seamless multifunctionality have been discussed and outline future directions toward programmable, autonomous, and multifunctional hydrogel systems.

URL: https://pubs.acs.org/cmatex/article-abstract/doi/10.1021/acs.chemmater.6c01296/5430479/Hydrogels-for-Soft-Robotics-and-Bio-Integrated?redirectedFrom=fulltext

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Journal Name: Journal of Alloys and Compounds **IF: 6.7**

Title: Y2FeMnO6: A promising lead-free double perovskite for dielectric applications

Author: Parida A.K.; Biswal L.; Mangal S.; Roy N.; Hota S.S.

Details: Volume-1080, 25th September, 2026

Abstract: In the present work, Y2FeMnO6, a novel second-generation multiferroic rare-earth-based double perovskite, has been synthesised using the conventional solid-state reaction route. XRD confirms the formation of a single-phase orthorhombic phase (Pbnm/Pnma, a = 5.7209 Å; b = 7.5680 Å, c = 5.3114 Å), further supported by the characteristic vibrational modes of Raman spectroscopy. The average crystallite size was 38.68 nm. FESEM analysis reveals a well-defined grain with dense microstructure, and EDS confirms the presence of the expected constituent elements in near-stoichiometric proportions. The average grain size was calculated to be 0.805 µm. The present material is used in optoelectronic and photovoltaic applications, as evidenced by UV-Visible spectroscopy, which shows a direct band gap of 3.4197 eV. Using complex impedance spectroscopy data, the electric polarisation and relaxation phenomena of the material as a function of frequency and temperature are extensively studied. Dielectric studies revealed a strong frequency and temperature dependence, with pronounced low-frequency dispersion associated with space-charge polarisation. Impedance spectroscopy shows a bulk-dominated electrical response, negative temperature coefficient of resistance (NTCR) behaviour, and non-Debye-type relaxation. The frequency-dependent AC conductivity follows Jonscher's universal power law and is consistent with the overlapping large polaron tunnelling (OLPT) model. Overall, the study establishes Y2FeMnO6 as a promising multifunctional double perovskite for future applications in electronic, dielectric, and energy-related devices.



URL: https://www.sciencedirect.com/science/article/pii/S0925838826047067?via%3Dihub

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Journal Name: Discover Nano **IF: 6.7**

Title: Nanoengineered catalysts for sustainable pollutant removal from industrial effluents

Author: Panda J.; Sowjanya S.; Mishra B.; Avula S.K.; Rustagi S.; Wagh M.S.; Mohapatra S.; Panda A.K.; Mohanta Y.K.

Details: Volume-21, Issue-1, December 2026

Abstract: Our ecological balance is being disrupted by the growing population and industrial waste, which causes pollution and climate change. Our health is at risk from these toxins, which can lead to illnesses. These contaminants must degrade, but some are difficult to break down and take longer to remediate. To solve the urgent problem of environmental pollution, nanotechnology can assist in converting harmful toxins into innocuous ones or appropriately remediating them. This draws attention to the drawbacks of traditional wastewater treatment methods and the need for new technologies. Nano-engineered catalysts possess unique properties and a large surface area that provide greater reactivity and selectivity for the degradation of pollutants. This review will discuss several different categories of nano-catalysts, including metal-based nanoparticles (e.g., Fe2O3 and Ag-NPs) and polymeric nanomaterials, and examine their applications and performance in pollutant removal, with an emphasis on heavy metals, organic compounds, and dye removal. Discussing the combination of catalytic and biocatalytic processes to develop hybrid systems that are more effective in degrading and removing pollutants. Major developments in industrial wastewater treatment technologies, including hybrid, biocatalytic, and nano catalyst technologies, have been explored and investigated for their potential to improve pollutant degradation whilst preserving environmental sustainability. Long-term stability, cost-effectiveness, and scalability concerns are further addressed to open up novel opportunities for the study and use of nano-engineered catalysts in wastewater treatment.



URL: https://link.springer.com/article/10.1186/s11671-026-04970-3

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Journal Name: Nanoscale Advances **IF: 6.3**

Title: MXene-integrated quantum dots: an innovative tool for next-generation healthcare applications

Author: Chakroborty S.; Nath N.; Pati D.K.; Singh S.; Priyadarshini Biswal R.; Mantry S.P.; Kumar M.; Padhee R.; Tiwari K.; Chakraborty C.

Details: Volume-8, Issue-19, 29th September, 2026

Abstract: Due to their superior physical and chemical characteristics, MXene quantum dots (MXQDs) are regarded as outstanding zero-dimensional nanomaterials. The excitation-dependent emission properties, photostability, biocompatibility and dispersion stability of these QDs make them potential candidates for solving biomedical and environmental problems. Owing to their remarkable properties and biocompatibility, MXQDs represent a new generation of smart nanosystems used for cancer diagnostics and treatment, imaging, sensing, tissue engineering, and drug delivery. However, there are many problems related to their biodegradability, photoluminescence, long-term toxicity, and biodistribution properties, which need to be carefully considered. This review focuses on the current developments of MXQDs in healthcare applications and also on the current trends and future perspectives.



URL:https://pubs.rsc.org/na/article/8/19/5495/1355801/MXene-integrated-quantum-dots-an-innovative-tool

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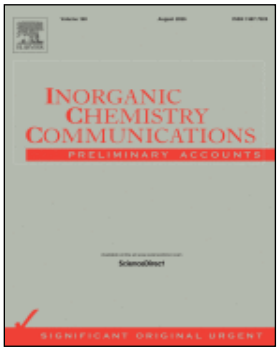
Journal Name: Inorganic Chemistry Communications **IF: 5.9**

Title: Stir-controlled differential binding of folic acid in hollow silver nanocubes and the PERS enhancement in pre- and post-saturation regimes

Author: Gupta P.; Dadhich B.K.; Patra S.K.; Bhushan B.; Priyam A.

Details: Volume 191, Issue P1, September 2026

Abstract: The chemical identity of the biomolecules on nanostructured substrates is not only defined by plasmon-enhanced Raman spectroscopy (PERS) but also by the nature of the plasmon resonance that is facilitated by the substrate. In this case, we show that the rate of the stirring in the course of the synthesis regulates the sharpness of the corners of hollow silver nanocubes (HAgNCs) that determines the excitation of either the dipolar or both the dipolar and quadrupolar surface plasmon resonances with direct and molecularly specific implications on the PERS of the adsorbed folic acid (FA) capping agent of the hollow silver nanocube.. The transmission electron microscopy proves that both samples produce hollow cubic nanoparticles with similar edge lengths (around 78–79 nm) and void diameters, and the edge of critical morphological distinction is the much sharper corners in HAgNCs-Zero. Second-derivative analysis of UV–Vis extinction spectroscopy shows that HAgNCs-Zero only supports dipolar plasmon modes. Meanwhile, HAgNCs-150, alone, has an extra quadrupolar resonance at 430 nm, the higher-order plasmon mode, which has not been reported in hollow silver nanocubes. Correlatively, PERS measurements reveal that the symmetric and asymmetric NH folic acid vibrations of folic acid at 3200 and 3400 cm−1 are present only in the spectrum of HAgNCs-Zero, the first-ever NH folic acid modes to be observed in any SERS or PERS of folic acid on any substrate. These results provide a direct mechanistic pathway between the synthesis environment to corner geometry, plasmon mode hierarchy, molecular binding orientation, and selective vibrational enhancement to provide new understanding on the rational design of morphology-controlled PERS substrate for bioanalytical applications.



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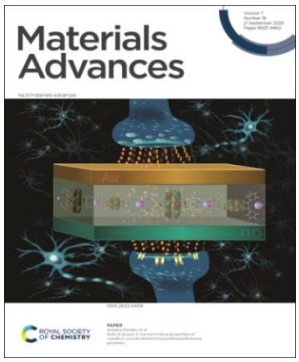
Journal Name: Materials Advances **IF: 5.8**

Title: Piezo-phototronic effect modulated enhanced photodetection in self-powered P(VDF-HFP)-MoS2 nanofiber mats

Author: S. P.; Kumar S.; S. S.; Jacob S.K.; Nanda J.; Pradhan G.K.; Mandal P.

Details: 15th September, 2026

Abstract: Multifunctional materials that convert mechanical and optical energy simultaneously into electrical signals can become crucial for the advancement of next-generation self-powered electronic devices. Devices such as piezoelectric nanogenerators and photodetectors harvest one kind of energy thereby limiting their versatility, adaptability, and overall efficiency for real-world applications. A material, integrated through the piezo-phototronic effect, can show enhanced response to both mechanical and optical stimuli through modulation of the interfacial band structure. Here, we demonstrate a dual-functional device based on electrospun ferroelectric P(VDF–HFP)–semiconductor MoS2 composite nanofibers that simultaneously enables piezoelectric energy harvesting and self-powered photodetection. MoS2 nanosheets, uniformly embedded in the ferroelectric P(VDF–HFP) matrix, enhance the polar β-phase of P(VDF–HFP) up to 93% and facilitate efficient charge-transfer processes aiding photodetection. The P(VDF–HFP)–MoS2 piezoelectric nanogenerator delivers a peak-to-peak open-circuit voltage, short-circuit current and power density of 200 V, 14 μA and 115 μW cm−2 respectively under a sinusoidal stress of 20 N. Concurrently, a self-powered photodetector based on the composite exhibits a responsivity, specific detectivity, an on/off current ratio, rapid photo response with a rise/decay time of ∼1.08 μA W−1, ∼3.81 × 107 Jones, ∼1.79 × 102, and 0.30/0.19 s, respectively under white light (300–800 nm) illumination. The photodetector exhibits a large piezo-phototronic effect with about 63% increase in the photocurrent under a longitudinal mechanical tensile strain of 0.11%. The results highlight a design strategy for the development of multi-stimuli responsive devices that integrate ambient light sensing with efficient energy harvesting.



URL:https://pubs.rsc.org/ma/article/doi/10.1039/d6ma00805d/1356416/Piezo-phototronic-effect-modulated-enhanced

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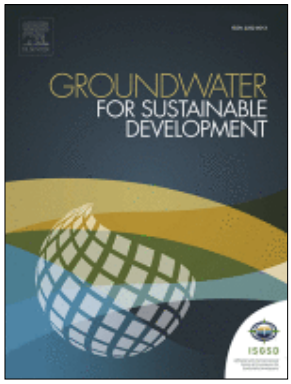
Journal Name: Groundwater for Sustainable Development **IF: 5.8**

Title: Hydrogeochemical controls on arsenic, boron, lithium, and antimony in volcanicâ€“geothermal systems: Evidence from the Central Bolivian Altiplano

Author: Chambi Tapia M.I.; Quino Lima I.; Ormachea MuÃ±oz M.; Jallurana Quispe D.; Chavez Paco N.; Sracek O.; Maity J.P.; Bhattacharya P.; Ramos Ramos O.E.

Details: Volume-35, November 2026

Abstract: Volcanic-geothermal systems exert strong hydrogeochemical controls on the mobility and accumulation of geogenic trace elements (TEs) in groundwater, surface water, and sediments. This study investigates the processes governing the mobilization and enrichment of arsenic (As), boron (B), lithium (Li), and antimony (Sb) in water and sediments of volcanic–geothermal environments in the central part of the Bolivian Cordillera Occidental from the Altiplano. The study area is characterized by Oligoce-Holocene age dacitic–andesitic volcanic rocks, ignimbrites, pyroclastic deposits, lacustrine fluvial sediment and active geothermal manifestations. Two field campaigns conducted during the rainy season (RS) and dry season (DS) evaluated spatial and seasonal variability through hydrochemical characterization, geochemical calculations, statistical analyses, and sediment contamination indices. The GW and SW hydrochemical facies are dominated by Na–Ca–HCO3, Na–Ca–Mg–HCO3, and Na–Cl–HCO3 facies, with a relative dominance of Na+ during the DS. The concentrations of As, B, Li, and Sb exceeded the Bolivian (NB-512), WHO and U.S. Health-based Screening Levels (HBSLs) guidelines, reached maximum values to 1793 µg/L for As and 28156 µg/L for B, particularly in hot springs of the Caripe and Sajama regions. The enrichment of these TEs appears to be associated with weathering of volcanic materials, interaction with hydrothermally altered deposits and geothermal precipitates, evaporation-driven solute concentration and retention-remobilization processes within sediments. The hydrogeochemical modeling suggests that Fe-oxides/hydroxides, carbonate precipitation, and silicate weathering influence TEs mobility and retention. The sediment contamination indices indicate moderate to extreme enrichment of As and B supporting predominantly geogenic origin. These findings improve the understanding of TEs behavior in volcanic–geothermal systems and provides a practical scientific basis for source-specific monitoring, risk management and mitigation strategies in regions where groundwater and surface water are directly used for drinking, livestock, and irrigation.



URL: https://www.sciencedirect.com/science/article/pii/S2352801X26001116?via%3Dihub

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Journal Name: International Journal of Molecular Sciences **IF: 5.6**

Title: Molecular Insights into Caffeine Stacking, Partitioning, and Organization in DPPC Lipid Bilayers from Microseconds-Long Molecular Dynamics Simulations

Author: Das S.; Karayiannis N.C.; Roy S.

Details: Volume-27, Issue-17, September 2026

Abstract: Caffeine (1,3,7-trimethylxanthine) is a widely consumed psychoactive drug and neurostimulant, yet its molecular organization and permeation behavior in lipid membranes are not fully understood. We employ microseconds-long, united-atom molecular dynamics simulations to investigate caffeine interactions with a solvated DPPC (1,2-dipalmitoyl-sn-glycero-3-phosphocholine) bilayer at its fluid phase. Caffeine molecules initially aggregate in the aqueous phase to form ordered stackings, which successively permeate into the membrane. The stacked assemblies gradually dissolve, reaching a stable dispersed state where caffeine molecules preferentially reside near the headgroup–acyl chain interface and orient parallel to the lipid acyl chains, consistent with previous experimental and simulation studies. Simulations initiated with caffeine in the membrane hydrophobic phase converge to the same equilibrium state, indicating a preferred localization at the interface region. Present simulation findings are further supported by free-energy calculations that demonstrate caffeine's high affinity at the headgroup–acyl chain interface. Caffeine partitioning transiently and slightly reduces bilayer thickness and increases the membrane surface area while enhancing acyl chain stiffness near the hydrophilic part of the membrane. These observed trends are reproducible over different system sizes and independent simulations. Overall, this study provides atomic-level insights into the caffeine permeation process, including its effect on the lipid bilayer structure.

URL: https://www.mdpi.com/1422-0067/27/17/7704

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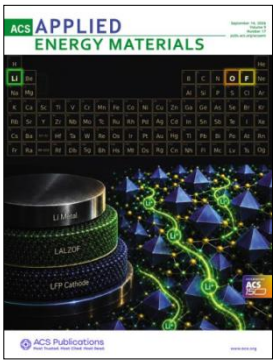
Journal Name: ACS Applied Energy Materials **IF: 5.5**

Title: Fe2(MoO4)3@Polyindole Nanocomposites for High-Performance All-Solid-State Symmetric Supercapacitors

Author: Pati B.; Rout S.K.; Praharaj S.; Rout D.

Details: Volume-9, Issue-17, 14th September, 2026

Abstract: Synergistic architectures based on binary oxides and conducting polymers address the inherent limitations of individual components, thereby providing enhanced redox kinetics and structural stability for high-performance electrodes. Here, we explore the energy storage performance of Fe2(MoO4)3@polyindole (FMO@PIN) nanocomposites synthesized via in situ oxidative polymerization. The PFM2 (indole:FMO = 2:1 weight ratio) nanocomposite features a unique 3D criss-cross FMO framework with uniformly dispersed PIN globules. This optimized structure, along with multiple oxidation states of FMO, provides efficient conducting pathways and rich redox kinetics, enhancing the overall electrochemical performance. It achieves a high specific capacitance (Cs) of 567.6 F/g (at 5 mV/s) and outstanding stability, with 93.3% retention over 15,000 cycles at 5 A/g—performance metrics that significantly surpass those of its pristine constituents. Further, a symmetric device is assembled using PFM2 as both the counter and working electrodes with a PVA/H2SO4 gel electrolyte. The resulting symmetric device exhibits a Cs value of 288 F/g and a discharge time of 1296 s at 0.1 A/g. It delivers an impressive energy density of 32.23 Wh/kg at 90 W/kg. Three identical devices connected in series successfully powered a red light-emitting diode (LED) for up to 7 min, validating their potential as a compact, efficient energy storage solution.



URL:https://pubs.acs.org/aaemcq/article-abstract/9/17/11379/5351093/Fe2-MoO4-3-Polyindole-Nanocomposites-for-High?redirectedFrom=fulltext

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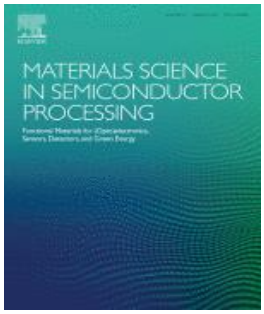
Journal Name: Materials Science in Semiconductor Processing **IF: 5.2**

Title: Ku-band microwave absorption and EMI shielding of Ni doped ZnO nanoceramics

Author: Das B.K.; Das T.; Tudu H.; Das D.; Parashar S.K.S.

Details: Volume-217, January 2027

Abstract: In this study, Zn1-xNixO (x = 0, 0.01, 0.02) nanoceramics samples were prepared using the high energy ball milling (HEBM) technique. The phase analysis of the synthesized samples was carried out using X-ray diffraction (XRD). The synthesized sample shows single phase hexagonal wurtzite structure indicating successful doping of Ni in ZnO lattice. The Field Emission Scanning Electron Microscopy (FESEM) micrograph shows a decrease in particle size with Ni2+ doping. AFM analysis shows a heterogeneous and rough surface of the synthesized sample. A decrease in the band gap energy was observed for the Ni doped ZnO sample. Raman spectroscopy was used to investigate the various structural vibrational modes of the synthesized samples. The electromagnetic shielding behaviour was investigated using a Vector Network Analyzer (VNA) in the Ku-band frequency range. The composition x = 0.01 shows maximum SET value of 29.35 dB at 18 GHz shows the effective EMI shielding behaviour in the Ku-band.



URL: https://www.sciencedirect.com/science/article/pii/S1369800126007584?via%3Dihub

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Journal Name: Materials Chemistry and Physics **IF: 5.2**

Title: Electrical transport and dielectric relaxation mechanisms of NaLaSnO4: Implications for NTCR thermistor applications

Author: Hota O.P.; Biswal L.; Mangal S.; Hota S.S.

Details: Volume-367, November 2026

Abstract: In the current study, we developed a cubic crystalline material, NaLaSnO4 (NLSO), via a high-temperature solid-state method. The crystallite size of the sample was determined by the W–H graph to be 5.3 nm. FESEM micrographs show that the obtained solid has a fine microstructure with an average grain size of approximately 1.6 µm. FTIR and Raman studies confirmed the presence of related vibrational bonds. The temperature and frequency-dependent dielectric analysis indicates the presence of Maxwell–Wagner interfacial polarisation, with the material exhibiting a high dielectric constant (εr ≈ 592.47 at 25 °C) and a low dielectric loss (≈0.4) at 100 Hz. Nyquist plots provided information on the separation between resistive and capacitive properties of the ceramic material, as well as the contributions from both the grain and grain boundary. The decrease of activation energy for the conduction process of the compound, corresponding to the frequency range, suggests the involvement of oxygen vacancies in the conduction mechanism. The conductivity behaviour of the compound was modelled according to Jonscher's Power Law, indicating a negative temperature coefficient of resistance (NTCR) behaviour, making it suitable for thermistor use, with a sensitivity of 19744.64 and a temperature coefficient of −2.9%/K. This multifunctional material provides a comprehensive platform for developing high-performance systems and presents promising prospects for next-generation technologies, including non-volatile memory and spintronic devices.



URL: https://www.sciencedirect.com/science/article/pii/S0254058426009880?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: Scientific Reports **IF: 4.9**

Title: Design of a MWCNT integrated advanced ternary composite with dual functionality in energy storage and photo catalytic dye detoxification

Author: Pradhan D.; Biswal S.K.; Nayak N.; Singhal R.; Salim A.; Dash S.K.

Details: Volume 16, Issue 1, December 2026

Abstract: Polluted water harms human health and the planet's wellbeing alike. Tackling the global energy crisis driven by rapid economic expansion and our reliance on power hungry gadgets demands innovative clean energy storage solutions. This study developed a ternary heterojunction photocatalyst based on g-C_3N_4/TiO_2/MWCNTs studied their structural, optical, and morphological properties, the produced materials were thoroughly evaluated via XRD, FTIR, BET, UV-Vis DRS, PL, SEM, TEM, Raman, and XPS studies. The photocatalytic activity of the g-C_3N_4/TiO_2/MWCNTs nanocomposite was evaluated via the degradation of rhodamine B dye under solar light with various parameters, and the results revealed that the g-C_3N_4/TiO_2/MWCNTs nanocomposite had 99% degradation efficiency with Z scheme mechanism and outperformed the pristine g-C_3N_4 sheet and TiO_2, with approximately 1.3 and 1.4 folds higher degradation rates, respectively. The photodegradation process was followed by pseudo first-order kinetics with a rate constant of 0.0922 min^{-1}, resulting in a 2.36 and 3.16 fold increase compared to pristine catalysts. Electrochemical impedance spectroscopy revealed improved electrical conductivity, and cyclic voltammetry investigations revealed an outstanding specific capacitance of 1860 F/g at 30 mV/s nearly six times greater than that of pristine g-C_3N_4 (348 F/g).The remarkable photocatalytic performance and good electrochemical properties of the g-C_3N_4/TiO_2/MWCNTs heterojunction highlight its promise as a multifunctional material for environmental purification and energy storage applications.

URL: https://www.nature.com/articles/s41598-026-47268-1

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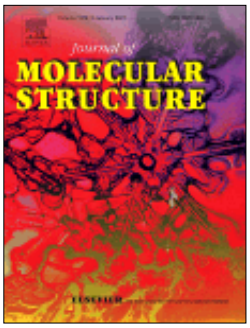
Journal Name: Journal of Molecular Structure **IF: 4.9**

Title: Fabrication of Schottky device using 9-anthracenecarboxylate based binuclear Cd(II) compound

Author: Sk R.; Hossain E.; Sil S.; Pramanik S.; Dutta B.; Ray P.P.; Mir M.H.; Mukhopadhyay S.

Details: Volume-1381, P1, 5th February, 2027

Abstract: Here, we report the synthesis of a binuclear Cd(II) coordination compound, [Cd2(9-aca)4(pyz)(MeOH)3] (1), constructed from the π-conjugated ligand 9-anthracenecarboxylic acid (H-9-aca) and the N-heterocyclic ligand pyrazine (pyz). The compound assembles into a one-dimensional (1D) supramolecular chain through strong π···π stacking interactions. Electrical measurements of 1reveal semiconducting behavior with Schottky diode characteristics, where the enhanced conductivity is attributed to through-space charge transport facilitated by the π···π interactions. The experimental results are further corroborated by density functional theory (DFT) calculations with HOMO–LUMO band gap and density of states (DOS) analyses.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0022286026021228?via%3Dihub

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Journal Name: Next Materials **IF: 4.7**

Title: Theoretical advances in CH3NH3SnI3-based perovskite solar cells: A comprehensive review

Author: Mohanty I.; Muduli S.; Singh U.P.; Mangal S.

Details: Volume-13, October 2026

Abstract: Methylammonium tin iodide (MASnI3) has emerged as one of the most promising lead-free perovskite absorbers for next-generation photovoltaic devices owing to its suitable direct band gap, high absorption coefficient, excellent charge-carrier mobility, and environmentally benign composition. Over the past decade, extensive theoretical investigations have been conducted to understand and optimize the performance of MASnI3 based perovskite solar cells (PSCs) using computational approaches such as density functional theory (DFT), SCAPS-1D, SILVACO-TCAD, COMSOL, SETFOS, MATLAB-based simulations, and machine learning techniques. This review provides a comprehensive overview of these theoretical advancements, focusing on the intrinsic properties of MASnI3, simulation methodologies, device optimization strategies, and the evolution of predicted power conversion efficiencies (PCEs). Analysis of the reported studies reveals that improvements in absorber thickness, defect density, interface quality, energy-level alignment, and charge-transport layer selection are the primary factors driving enhanced device performance, with several optimized device architectures theoretically achieving PCEs exceeding 30%. However, the review also identifies important limitations in current modeling frameworks, including simplified defect assumptions, inadequate representation of Sn^{2+} oxidation and self-doping effects, limited consideration of degradation pathways, and insufficient validation against experimental observations. Based on these findings, future research should prioritize the development of realistic multiscale models that incorporate defect evolution, stability-related phenomena, and stronger simulation–experiment correlations. By synthesizing the current theoretical landscape, this review highlights both the opportunities and challenges associated with MASnI3 and provides guidance for the design of efficient, stable, and environmentally sustainable lead-free PSCs.



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Journal Name: Next Materials **IF: 4.7**

Title: Borophene in energy storage technologies: Structural insights, functional performance, and future directions

Author: Chakroborty S.; Nath N.; Yadav A.S.; Chakraborty C.; Garai S.; Alam T.; Sharma A.; Mohan M.

Details: Volume-13, October 2026

Abstract: Borophene, a novel two-dimensional (2D) allotrope of boron, has rapidly emerged as a promising material for next-generation energy storage technologies owing to its exceptional physicochemical, mechanical, electronic, and thermal properties. This review provides a comprehensive outline of current advances in the synthesis, structural characteristics, and functional capabilities of borophene and its derivatives. Key synthesis routes, including both top-down and bottom-up approaches, are discussed in the context of material quality, scalability, and substrate interactions. The unique polymorphic nature and anisotropic behavior of borophene are examined through a structural understanding, supported by density functional theory and experimental findings. Particular attention is given to the application of borophene in energy storage systems such as lithium-ion and sodium-ion batteries, supercapacitors, and hydrogen storage devices. Functional enhancements through heterostructure formation, elemental doping, and surface modifications are critically analyzed. The paper concludes with a discussion on the challenges and future directions for leveraging full potential of borophene in sustainable and high-performance energy storage applications.



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SCHOLARLY PUBLICATIONS
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Journal Name: Next Materials **IF: 4.7**

Title: Design-driven plasmonics: Insights into advanced gold nanostructures and surface engineering for enhanced photothermal therapy

Author: Panda R.; Mishra A.; Fatma K.; Tripathy J.

Details: Volume-13, October 2026

Abstract: Photothermal therapy (PTT) based on gold nanostructures with tunable localized surface plasmon resonance (LSPR), high biocompatibility, and effective near-infrared irradiation-induced photothermal conversion is a highly promising strategy for cancer treatment. In the era of nanofabrication techniques, many different morphologies of gold nanoparticles have been developed, such as gold nanospheres, nanorods, nanoshells, nanocages, nanostars, and nanobipyramids, which exhibit diverse properties in optics, heat, and biological domains. Nevertheless, the knowledge regarding the effect of the nanostructure morphology on photothermal properties and clinical application is still far from complete. Herein, a comparative review of the most common gold nanostructures for plasmonic PTT is presented with respect to LSPR tunability, key photothermal characteristics, colloidal stability, tumor targeting ability, and therapeutic effects. The mechanisms underlying light absorption, heat generation, and surface functionalization, as influenced by nanoparticle morphology, are elucidated to explain differences in therapeutic efficacy and potential for multifunctional theranostic applications. Furthermore, the current challenges and future perspectives for the rational design of next-generation gold photothermal nanoagents are provided. The Authors This is an open access article under the CC BY-NC-ND license.



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SCHOLARLY PUBLICATIONS
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Journal Name: Physics and Chemistry of the Earth **IF: 4.6**

Title: Hidden particles: Abundance, chemical characteristics, metal binding properties, and environmental risk of microplastics in the downstream of riverine sediment-water ecosystems

Author: Mahapatra S.; Maity J.P.; Singha S.; Mishra T.; Mangal S.; Dey G.; Sharma R.K.; Banerjee P.; Bhattacharya P.

Details: Volume 144, October 2026

Abstract: Microplastics (MPs) pollution is a global problem in the current decade due to its contamination, persistence, and risks to ecosystems. The present study aims to investigate the 'occurrence and distribution', physiochemical characteristics, metal binding with MPs, and their environmental risk in the downstream of the riverine ecosystem (water and sediment/soil). The MPs were observed in the range of 50-5000 µm, with a higher abundance in sediment (1356 ± 13 particles/kg) compared to water (582 ± 12 particles/m^3), where the sediments have the potential to act as long-term sinks for MPs. The 'transparent/white color' and 'fragments/fibers' MPs were dominant in both water and sediment. Chemically, the polypropylene (PP) had the highest abundance (Water: 55.56 ± 2%, Sediment: 57.45 ± 3%) compared to polyethylene (PE) polyethylene terephthalate (PET), and polystyrene (PS) in the riverine ecosystem. All MPs are partially weathered (surface roughness/cracks and degradation), and several elements (e.g., As, Cd, Al, etc.) are attached to the MPs surface, suggesting anthropogenic activities as significant contributors. The overall study provides a comprehensive baseline of MPs pollution and risk in the river system, as well as MPs-metal interactions in the aquatic ecosystem, which can help to take proper monitoring strategies and mitigation of plastic-related ecological threats at both regional and global scales, particularly in riverine ecosystems as per SDG-3, 6, 12, and 14.



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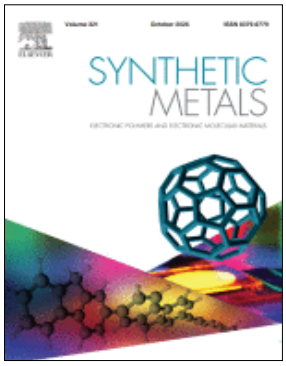
Journal Name: Synthetic Metals **IF: 4.5**

Title: Mechanistic and thermodynamic evaluation of H2O2-assisted methylene blue degradation with green-synthesized CuO/rGO nanocomposites

Author: Deo R.; Apta D.; Devi M.

Details: Volume-321, October 2026

Abstract: In the present study, a cost-effective ultrasonication method was employed for the green-synthesized CuO/rGO nanocomposites and used as a photocatalyst for MB dye degradation. The crystal structure, morphology, optical response and stability of the nanocomposites were analyzed using XRD, FESEM, EDS, XPS, FT-IR, UV-Vis, PL and TGA, respectively. The effects of catalyst dosage and reaction temperature on dye degradation were examined. At room temperature, 93.97 ± 0.27% dye degradation occurred in 35 min of visible light irradiation with an optimum dosage (0.2 g/L) of the catalyst in the presence of H2O2 as a synergistic oxidant. The dye degradation efficiency increased with rising reaction temperature. From the thermodynamic analysis, the activation energy (E_a) was determined to be 101.60 kJ/mol. The positive value of activation enthalpy 95.71 kJ/mol indicates the endothermic nature of the reaction. The positive activation entropy confirms the process to be entropy-driven, and Gibbs free energy confirms the spontaneity of the reaction. The role of reactive species involved in dye degradation was validated from scavenger studies. The stability and regeneration of the photocatalyst were analyzed from the zeta potential and recyclability studies, which show 88% dye degradation efficiency even after five cycles, confirming the sustainability of the photocatalyst for MB dye degradation.



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Journal Name: Next Nanotechnology **IF: 3.7**

Title: Exploring the effect of graphene@Fe3O4 hybrid filler with TPU/PPy nanocomposites for microwave absorption in C, X, Ku bands with minimum reflection

Author: Acharya S.; Rout S.R.; Samal R.R.; Parashar S.K.S.; Sahoo B.P.

Details: Volume-10, December 2026

Abstract: The issue of electromagnetic (EM) radiation pollution is a significant concern in modern society, as it has negative impacts not only on electronic devices but also on the environment. The goal of this research is to fabricate TPU/PPy/gra@Fe nanocomposites via cost-effective solvent casting. The fabricated nanocomposites undergo structural and morphological characterization using FTIR, Raman, XRD, FESEM, HRTEM, and XPS. The dielectric, magnetic, and microwave absorption properties are investigated in the C, X, and Ku bands, i.e., 5–18 GHz. The dielectric and magnetic properties of nanocomposites are significantly enhanced by combining dielectric and magnetic fillers, such as gra@Fe, at appropriate weight ratios, as confirmed by the Cole-Cole plot. The total effectiveness (SETot) of all nanocomposites across the microwave spectrum ranges from 22 to 37 dB. The SETot for TPU/PPy at a 1:3 gra@Fe ratio is 37 dB, accompanied by a SEAbs of 34 dB and a low SERef of less than 3 dB. The 95:5:1(1:3) composite exhibited SE_{tot} > 30 dB across 6.0–12.0 GHz (6.0 GHz effective bandwidth) and maintained SE_{tot} > 25 dB within the Ku band (12–17 GHz), corresponding to an effective bandwidth of approximately 5 GHz. All microwave nanocomposites exhibit a reflection rate below 20%. Importantly, the reflection rate of TPU/PPy 1:3 gra@Fe nanocomposite is less than 10% in the X and Ku bands. The TPU/PPy/gra@Fe nanocomposite exhibits a low reflection rate and broadband performance, rendering it suitable for microwave and radar-absorption applications, especially in the military field.



URL: https://www.sciencedirect.com/science/article/pii/S2949829526003074?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: Food and Humanity **IF: 3.5**

Title: Biochemical insights of alpha-amylase activity in determining starch digestibility and glycaemic response in rice

Author: Nayak L.; Biswal M.; Das J.; Panda S.; Lal M.K.; Ngangkham U.; Kumar S.; Kumar A.

Details: Volume 7, December 2026

Abstract: Rice's impact on blood sugar is significant, particularly for those with diabetes. This study looks at the function of alpha (α)-amylase, a main starch-hydrolyzing enzyme, and its relationship to glycaemic index (GI), glycaemic load (GL), amylose content (AC), and resistant starch (RS) in the selected rice genotypes. Sixteen genotypes, comprising high-protein, scented, general, and pigmented rice, were tested for α-amylase activity during seed germination, and in mature grain eGI, GL, AC, and RS were also carried out. All four traits showed significant genotypic differences ($p < 0.05$) with the ranges of AC (4.42–25.5%); RS (0.4–1.86%); α-amylase (1.8–7.51U/100seeds) and eGI (54.46–72.15). Amylose content ($r = -0.53$) and RS ($r = –0.90$) were negatively correlated with GI; while α-amylase ($r = 0.94$) and GL ($r = 0.83$) were positively associated with eGI. Regression analysis confirmed a strong relationship of α-amylase with eGI ($R^2=0.88$), while a moderate relationship to GL ($R^2=0.62$). Principal Component Analysis and hierarchical clustering grouped genotypes into distinct clusters, with pigmented rice often exhibiting a desirable combination of high AC, high RS, and low eGI. This study proposes seed α-amylase activity as an exploratory correlation study proposing a potential screening marker for identifying rice genotypes with altered starch digestibility and suggesting its use helps screening in rice breeding programs for developing health-oriented rice cultivars.



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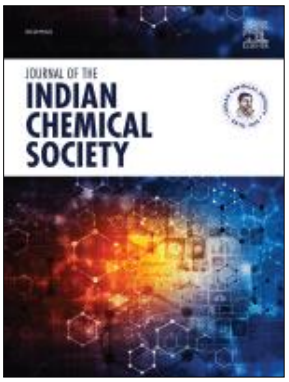
Journal Name: Journal of the Indian Chemical Society **IF: 3.4**

Title: Essential oil-based phytochemicals as antibiofilm agents against methicillin-resistant Staphylococcus aureus: From in silico screening to in vitro validation

Author: Pattnaik S.; Behera S.K.; Mishra S.; Rath B.P.; Kumar S.; Mohanty C.

Details: Volume-103, Issue-10, October 2026

Abstract: Methicillin-resistant Staphylococcus aureus (MRSA) is a significant human pathogen which causes life threatening and recurrent infections. This is largely attributed to its biofilm formation, which promotes bacterial persistence and resistance to antimicrobial therapy. The present study investigated essential oil-based phytochemicals as potential antibiofilm agents against MRSA using combined in silico and in vitro approaches. In silico screening identified two phytochemicals (α-Terpineol and Phthalic Acid) as suitable candidates based on their predicted interactions with the MRSA biofilm regulators SarA and AgrA. Disc diffusion and minimum inhibitory concentration (MIC) assays confirmed measurable antibacterial activity of α-Terpineol and Phthalic Acid against MRSA, with MICs of 900 and 1800 µg/mL, respectively. The treatment with α-Terpineol reduced MRSA biofilm formation by 79.02% at MIC/2 (450 µg/mL), whereas Phthalic Acid produced a 56.26% reduction at MIC/2 (900 µg/mL). Microscopic analysis showed that α-Terpineol disrupted biofilm structure and prevented aggregation at sub-MICs, while Phthalic Acid treated samples resembled the untreated control. The Alamar Blue assay indicated that both the compounds exhibited a non-bactericidal effect on MRSA at the tested concentrations. Furthermore, α-Terpineol significantly reduced slime production compared to Phthalic Acid. Overall, the study identifies α-Terpineol as an effective antibacterial and antibiofilm agent against MRSA, capable of significantly reducing biofilm formation at sub-inhibitory concentrations. These findings support the potential of α-Terpineol for the development of formulation-based strategies against MRSA biofilm-associated infections.



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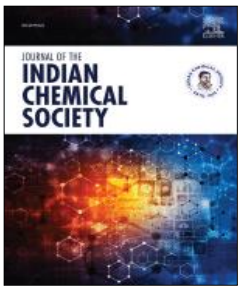
Journal Name: Journal of the Indian Chemical Society **IF: 3.4**

Title: Exploration of titanocene(III) chloride in deiodination reaction of benzyl iodide

Author: Panigrahi R.K.; Jana S.

Details: Volume-103, Issue-10, October 2026

Abstract: Titanocene (III) chloride mediated deiodination reaction of benzyl iodide has been reported. The reaction proceeds through the formation of benzyl radical. The benzyl radical reacts with another benzyl radical to afford a bibenzyl product. Also, the radical can be trapped using one electron deficient double bond. Titanocene (III) chloride has been generated by reduction of titanocene dichloride using activated zinc dust in deoxygenated THF under argon condition. As Ti(III) is a single electron donor, it can readily reduce the active iodo compound to form the corresponding carbon radical, which further reacts with appropriate functionality to obtain the desired product.



URL: https://www.sciencedirect.com/science/article/abs/pii/S0019452226006084?via%3Dihub

SCHOLARLY PUBLICATIONS
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Journal Name: Dalton Transactios **IF: 3.3**

Title: Computational modelling of host-guest interactions between a Ni(ii) coordination complex and persistent organic pollutants

Author: Hasan M.N.; Dutta B.; Mahapatra M.; Halder S.

Details: Volume- 55, Issue-41, 27th October, 2026

Abstract: Regulatory restrictions and controlled experimental access to numerous hazardous agrochemicals pose a growing challenge to the strategic design of advanced sensing materials for persistent organic pollutants (POPs). This study presents a comprehensive theoretical analysis of a well-characterized Ni(ii)-based coordination complex, prepared by a slow diffusion process, as a possible sensing platform for the identification of several POPs. Density functional theory (DFT), time-dependent DFT, reduced density gradient, and electron localization function analyses were utilized to systematically investigate the Ni complex's interaction with representative POPs, their optical responses, non-covalent interactions, and electron localization. Depending on the molecular structure of the POPs, optimized host–guest geometries exhibit favourable binding affinities driven by a combination of van der Waals interactions, electrostatic interactions, π-interactions, etc. The recognition mechanism and relative selectivity of the Ni(ii) complex towards different POPs can be observed at the molecular level through binding energies, charge transfer characteristics, frontier molecular orbital analyses, independent gradient model and non-covalent interaction studies. The outcome highlights the Ni(ii) complex's potential as a sensing material via alterations in optical responses. Its electronic structure is found to be sensitively modulated upon guest binding. This study establishes a predictive computational sensing strategy for hazardous POPs that are difficult to access experimentally (sometimes banned), providing useful guidelines for the future design of coordination complex-based sensors targeting hazardous and highly regulated contaminants.



URL:https://pubs.rsc.org/dt/article-abstract/55/41/14934/1369496/Computational-modelling-of-host-guest-interactions?redirectedFrom=fulltext

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Journal Name: Biochemistry and Biophysics Reports **IF: 3.3**

Title: Evaluation of carvacrol and quercetin against surgical site infection pathogen Escherichia coli: In silico target identification, anti-biofilm efficacy, and cellular safety

Author: Kanungo A.; Kumar R.; Acharya S.

Details: Volume-48, December 2026

Abstract: Surgical site infections (SSIs) are postoperative complications driven by biofilm development on surgical wounds or implanted medical equipment. SSIs create a risk in terms of morbidity, extended hospitalization, and in extreme cases may cause mortality. The multi-drug-resistant bacteria, which frequently exist as poly-microbial communities in biofilms, present multiple tolerance mechanisms that render SSIs extremely difficult to treat with standard antibiotics. Besides, biofilm development relies on genes/proteins which act as master regulators governing biofilm assembly. Thus, targeting these regulatory switches can effectively curb biofilm development. Phytochemicals have come up as a likely option that can be effective against biofilm-forming multi drug-resistant bacteria by interacting with biofilm forming master regulators. In this study, in silico approaches were implemented to compare the interacting efficiency of different phytochemicals on a master biofilm regulator protein in Escherichia coli (E. coli), a common SSI pathogen . Validation of the most potent phytochemicals after analyzing the in silico results were carried out under in vitro settings to confirm their antibacterial and antibiofilm potential against biofilm-forming bacteria. Furthermore, in vitro safety assessments on human embryonic kidney cells (HEK-293) demonstrated minimal cytotoxicity, confirming the bio-compatibility of the phytochemicals at the therapeutic concentrations. Thus, targeting central biofilm regulators with non-toxic phytochemicals may to reduce the incidence of biofilm associated infections in post-surgery patients.



URL: https://www.sciencedirect.com/science/article/pii/S2405580826003973?via%3Dihub

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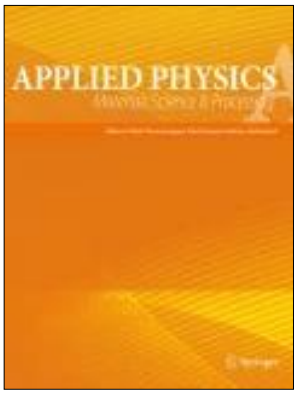
Journal Name: Applied Physics A: Materials Science and Processing **IF: 3.0**

Title: Understanding the impact of various silane-based functionalized nanostructured silica thin films on the wettability and optical properties

Author: Pradhan K.; Ghosh S.P.; Badapanda T.; Pani D.M.; Ray J.

Details: Volume-132, Issue-11, November 2026

Abstract: This research develops a simple and systematic approach to improve the wettability of Stöber-synthesized silica thin films by enhancing their surface properties using eco-friendly, non-fluorinated functionalization agents. To better understand the role of different functionalizing agents, several non-fluorinated organosilanes with varying chain lengths were chosen as eco-friendly alternatives to harmful fluorinated chemicals. X-ray diffraction results showed that the films maintained their amorphous silica nature after modification. In addition to a noticeable increase in surface roughness, this was observed from 76 nm in pristine films to 88–110 nm following functionalization. FESEM and AFM analyses showed uniformly dispersed spherical particles (409–437 nm). FTIR and EDX studies confirmed the successful attachment of organosilane molecules through the reduction of silanol groups and the appearance of characteristic organic signatures. A remarkable improvement in water repellence was achieved, with an impressive water contact angle of nearly 140°, indicating strong hydrophobicity. Optical analysis showed only a slight reduction in transmittance after modification. Unlike previous studies focusing primarily on smooth silica, this work investigates how organosilane chemistry interacts with a nanoparticulate silica surface to establish structure–property relationships relevant to self-cleaning surfaces and next-generation functional coating technologies.



URL: https://link.springer.com/article/10.1007/s00339-026-10291-0

SCHOLARLY PUBLICATIONS
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Journal Name: European Physical Journal A **IF: 3.0**

Title: Isospin-symmetry violation - kaons and beyond

Author: Gazdzicki M.; Giacosa F.; Grebieszkow K.; Blaschke D.; Bleicher M.; Brandt B.; BryliÅ„ski W.; Czopowicz T.; Drachenberg J.; Dutta D.; Ercolessi F.; Gorenstein M.; Huang L.; Ivanytskyi O.; Jacazio N.; Kapusta J.; Kowalski S.; Piotr Lewicki M.; Lorenz M.; MrÃ³wczyÅ„ski S.; Ozvenchuk V.; Panova O.; PÅ‚aneta R.; Piasecki K.; Piotrowska M.; Pisarski R.; Pszczel D.; Rafelski J.; Rohrmoser M.; Rybicki A.; RybczyÅ„ski M.; Ryblewski R.; Samanta S.; Singh M.; Stepaniak J.M.; Stefanek G.; StrÃ¶bele H.; Å uÅ¡a T.; Tinti L.; Turko L.; Vitiuk O.; Werner K.; Zbroszczyk H.

Details: Volume-62, Issue-10, October 2026

Abstract: This report summarizes the presentations and discussions during the ISO-BREAK 25 Workshop “Isospin symmetry violation: kaons and beyond”, which was held at Jan Kochanowski University in Kielce on October 23–25, 2025. We address the current status of the isospin-symmetry breaking discovered by NA61/SHINE in nucleus–nucleus collisions at the CERN SPS, its confirmation by other experiments and studies in e++e- and deep inelastic scattering. In addition, we discuss the theoretical status as well as we outline experimental and theoretical priorities towards understanding this currently unexplained phenomenon.



URL: https://link.springer.com/article/10.1140/epja/s10050-026-01965-7