



SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

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/m³) > pre-monsoon (951.9 ± 45.42 items/m³) > post-monsoon (598.4 ± 69.42 items/m³), 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>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: RSC Advances

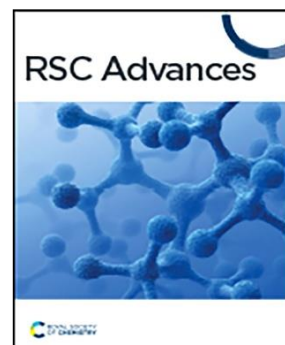
IF: 6.1

Title: Tuning visible-light-driven photocatalytic activity of PrMnO₃ perovskites for tetracycline degradation: mechanistic insights and performance analysis

Author: Nayak L.; Hati T.K.; Panda A.; Patra S.; Das N.; Banerjee S.; Parhi P.

Details: August 2026

Abstract: A praseodymium-based perovskite (PrMnO₃) was synthesised via a simple sol–gel route and investigated as a visible-light-active photocatalyst for the degradation of tetracycline. Compared to La, Ce, and Nd based systems, Pr-based materials have received relatively less attention in antibiotic removal, which forms the basis of this study. The structural and physicochemical properties were comprehensively analysed using XRD, FTIR, Raman, FESEM-EDX, XPS, BET, zeta potential, UV-vis DRS, Mott–Schottky, EIS and PL techniques. XRD confirmed the formation of an orthorhombic perovskite phase (Pnma) with an average crystallite size of ~19.8 nm, while spectroscopic analyses verified the presence of MnO₆ octahedra. The material exhibited a porous and agglomerated morphology with a relatively high surface area (70.375 m² g⁻¹). Optical characterisation indicated a band gap of ~2.23 eV, while Mott–Schottky analysis confirmed the n-type semiconducting nature of the material with a flat-band potential of 0.83 V vs. NHE. XPS results revealed mixed-valence states (Pr³⁺/Pr⁴⁺ and Mn³⁺/Mn⁴⁺) and oxygen vacancies, which are beneficial for charge separation. The photocatalytic performance of PrMnO₃ under visible light showed a maximum tetracycline degradation efficiency of 91.04% ($k = 0.016 \text{ min}^{-1}$) within 120 min at near-neutral pH (6.92) in deionised water, with slightly lower efficiency observed in real water matrices (river and tap water). Also, the catalyst maintained excellent stability and reusability, with negligible structural changes after repeated cycles, as evidenced by XRD and FTIR analyses.



URL: <https://pubs.rsc.org/ra/article/doi/10.1039/d6ra06709c/1289989/Tuning-visible-light-driven-photocatalytic>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Inorganic Chemistry Communications

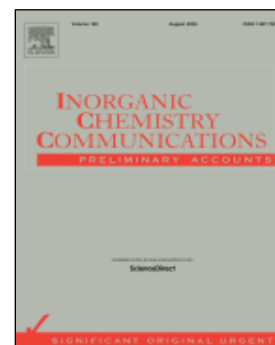
IF: 5.9

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

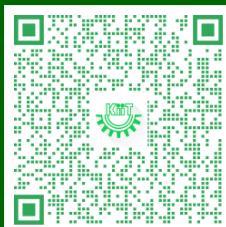
Author: Gupta P.; Dadhich B.K.; Patra S.K.; Bhushan B.; Priyam A.

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.



URL: <https://www.sciencedirect.com/science/article/pii/S1387700326008580?via%3Dihub>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: ACS Applied Nano Materials

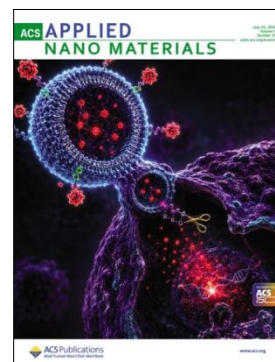
IF: 5.8

Title: Experimental and Theoretical Investigation on Ta-Doped NiTe Nanorods for Nonlinear Optical Applications

Author: Supriya S.; Wakodkar D.M.; Sahoo J.K.; Kumar J.; Pradhan M.; Naik R.

Details: Volume-9, Issue-29, July 2026

Abstract: NiTe-based nanomaterials have attracted considerable attention for a wide range of technological applications due to their favorable physicochemical properties and compositional flexibility. In this study, a series of four Ta-incorporated NiTe (NT) nanostructures was successfully prepared using a single-step hydrothermal synthesis approach to systematically examine the effect of Ta addition on their structural, optical, and optoelectronic characteristics. X-ray diffraction (XRD) results confirmed the formation of the hexagonal NiTe crystal structure, with a noticeable increase in crystallite size from 16.062 to 21.138 nm upon Ta incorporation. Raman spectral analysis confirmed the presence of characteristic lattice vibration modes, while X-ray photoelectron spectroscopy (XPS) offered comprehensive information regarding elemental composition and oxidation states. Morphological observations from field-emission scanning electron microscopy (FESEM) demonstrated a distinct evolution from nanoparticle assemblies to nanorod-like architectures upon Ta doping. Optical absorption studies (UV-vis-NIR spectroscopy) revealed a systematic redshift in the direct band gap, decreasing from 2.91 to 2.37 eV with increasing Ta content. Moreover, nonlinear optical (NLO) investigations established the presence of reverse saturable absorption (RSA) behavior, as indicated by positive nonlinear absorption coefficients. The optical and electronic properties have also been studied theoretically. Collectively, these findings underscore the strong suitability of Ta-doped NiTe nanostructures for advanced optoelectronic applications, particularly in high-efficiency nonlinear optical devices.



URL: <https://pubs.acs.org/aanmf6/article-abstract/9/29/13879/5207693/Experimental-and-Theoretical-Investigation-on-Ta?redirectedFrom=fulltext>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Materials Chemistry and Physics

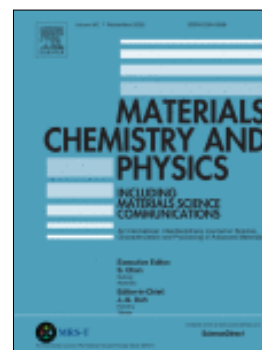
IF: 5.2

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

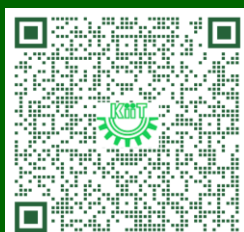
Author: Hota O.P.; Biswal L.; Mangal S.; Hota S.S.

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 ($\epsilon_r \approx 592.47$ 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 School of Applied Sciences KIIT Deemed to be University

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

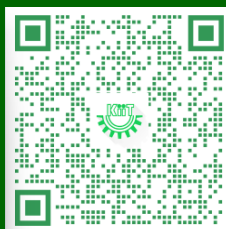
Author: Pradhan D.; Biswal S.K.; Nayak N.; Singhal R.; Salim A.; Dash S.K.

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 $g\text{-C}_3\text{N}_4/\text{TiO}_2/\text{MWCNTs}$ 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 $g\text{-C}_3\text{N}_4/\text{TiO}_2/\text{MWCNTs}$ nanocomposite was evaluated via the degradation of rhodamine B dye under solar light with various parameters, and the results revealed that the $g\text{-C}_3\text{N}_4/\text{TiO}_2/\text{MWCNTs}$ nanocomposite had 99% degradation efficiency with Z scheme mechanism and outperformed the pristine $g\text{-C}_3\text{N}_4$ 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 $g\text{-C}_3\text{N}_4$ (348 F/g). The remarkable photocatalytic performance and good electrochemical properties of the $g\text{-C}_3\text{N}_4/\text{TiO}_2/\text{MWCNTs}$ 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>





SCHOLARLY PUBLICATIONS
School of Applied Sciences
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Journal Name: Next Materials

IF: 4.7

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

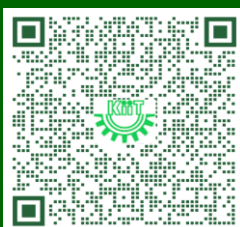
Author: Chakroborty S.; Nath N.; Yadav A.S.; Chakraborty C.; Garai S.; Alam T.; Sharma A.; Mohan M.

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.



URL: <https://www.sciencedirect.com/science/article/pii/S294982282601347X?via%3Dihub>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

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

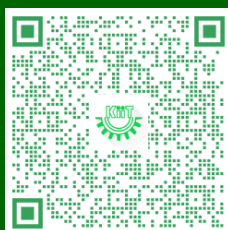
Author: Mahapatra S.; Maity J.P.; Singha S.; Mishra T.; Mangal S.; Dey G.; Sharma R.K.; Banerjee P.; Bhattacharya P.

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: $55.56 \pm 2\%$, Sediment: $57.45 \pm 3\%$) 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.



URL: <https://www.sciencedirect.com/science/article/abs/pii/S1474706526002627?via%3Dihub>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Journal of Materials Science

IF: 4.4

Title: Machine learning-guided design and electrochemical performance of bamboo-derived activated carbon/SrFeO composite as high-performance supercapacitor electrode

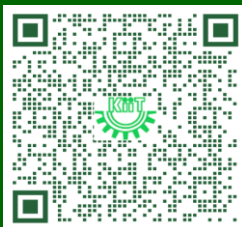
Author: Samantaray S.; Mohanty D.; Manjunatha C.; Hung I.-M.; Hsu X.C.; Bahumanya R.G.; Biswal L.; Satpathy S.K.

Details: August 2026

Abstract: The advancement of supercapacitor technology is contingent upon the creation of robust and effective electrode materials. This study used activated carbon (AC) made from bamboo leaves by high-temperature carbonization at 800 °C to create a novel SrFe₁₂O₁₉-activated carbon (SFO-AC) composite by reflux method. The composite was assessed as cathode material in supercapacitors, which electrochemical performance was significantly improved due to synergistic interaction between AC and SrFe₁₂O₁₉. The conductivity of the composite is 2.78 Ω⁻¹ m⁻¹ with an elevated specific capacitance of 453.3 F g⁻¹. In comparison with bare SFO, the electrochemical properties of composite were greatly affected by addition of AC to the SFO matrix making it appealing supercapacitor electrode material. Machine learning (ML) models were further developed to predict the electrochemical response of SFO-AC supercapacitor electrode as a function of time. Among the evaluated algorithms, random forest model tends to yield the precise agreement between the ML-predicted and measured current responses.



URL: <https://link.springer.com/article/10.1007/s10853-026-13465-6>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Radiation Physics and Chemistry

IF: 4.3

Title: Elemental, morphological and radiation-protective nature of selected low-cost construction materials: Experimental, theoretical and PHITS simulation

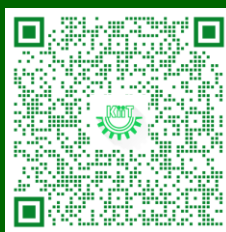
Author: Upadhyay D.R.; Khatiwada L.N.; Sunar R.; Praharaj S.; Rout D.; Khanal R.

Details: Volume 244, July 2026

Abstract: The ionizing radiation protective nature at different ranges of energy becomes important in materials. The prime objectives of this work are to investigate density, porosity, elemental, mineralogical, morphological and radiation shielding properties of low cost construction materials (CM). For this seven varieties of CM are experimentally analyzed using Archimedes principle, energy dispersive X-ray fluorescence, FESEM-EDS, powder X-ray diffraction, theoretical and simulation methods. Comprehensive elemental analysis and mapping demonstrated that Si, Ca, Al, O, and Fe constitute the predominant elemental components of the samples. FESEM analysis revealed well-defined crystalline morphologies and the development of microstructural porosity in selected specimens, while XRD patterns confirmed their crystalline nature. Phase assemblage analysis identified quartz (SiO_2), calcite (CaCO_3), alumina (Al_2O_3), and hematite (Fe_2O_3) as the dominant mineralogical constituents. Furthermore, the Particle and Heavy Ion Transport code system (PHITS) was used to determine and evaluate the protective nature, such as attenuation coefficients, radiation protection efficiency, transfer factors, and lead equivalent thickness. Moreover, shielding properties are compared with Phy-X/PSD database. Using Phy-X/PSD, the parameters such as linear, mass attenuation, half and tenth value layers, mean free path, effective conductivities, atomic number, and electron densities were estimated. Furthermore, the neutron shielding is also evaluated using both techniques. indicating significant radiation shielding potential. These findings support their suitability as low-cost, environmentally sustainable materials for radiation shielding applications.



URL: <https://www.sciencedirect.com/science/article/abs/pii/S0969806X26002112?via%3Dihub>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Transactions on Electrical and Electronic Materials

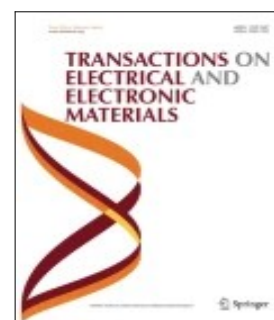
IF: 4.2

Title: High Dielectric Constant Observation in Cerium Site Substitution on $\text{La}_{0.67}\text{Ca}_{0.33}\text{MnO}_3$

Author: Subudhi D.K.; Biswal B.; Jena S.; Pattanaik P.; Das J.; Mishra D.K.

Details: Volume-27, Issue-4, August 2026

Abstract: $\text{La}_{0.67}\text{Ca}_{0.33}\text{MnO}_3$ (LCMO), $\text{La}_{0.67}\text{Ca}_{0.32}\text{Ce}_{0.01}\text{MnO}_3$ (LCMO@1Ce) and $\text{La}_{0.67}\text{Ca}_{0.23}\text{Ce}_{0.1}\text{MnO}_3$ (LCMO@10Ce) samples were synthesized successfully by solid state reaction technique at a sintering temperature of 1300 °C. A mixed phases of orthorhombic LaMn_2O_5 and $\text{La}_{0.67}\text{Ca}_{0.33}\text{MnO}_3$ with space group pbam and pnma, respectively have been observed in both LCMO and LCMO@10Ce. Only single phasic compound has been observed in LCMO@1Ce which suggest that 1% Ce substitute at Ca site plays role in forming stable single phasic LCMO. High dielectric constant value in the order of 10^{10} is observed in LCMO@10Ce at a frequency of 1 kHz and 40 °C. However, high dielectric loss and low impedance value is observed in LCMO@10Ce because of the presence of defects and impurity phases in the sample. Even LCMO@1Ce shows the dielectric constant value in the order of 10^7 at a frequency of 1 kHz and 40 °C, the low dielectric loss and single phasic nature proves this material appropriate for dielectric applications in the field of data storage. With increase in temperature, the magnitude of impedance gradually decreases which suggests the negative temperature coefficient of resistance (NTCR) behavior in undoped LCMO and Ce substituted samples.



URL: <https://link.springer.com/article/10.1007/s42341-025-00663-3>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

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 SRef of less than 3 dB. The 95:5:1(1:3) composite exhibited $SE_{t\ ot} > 30$ dB across 6.0–12.0 GHz (6.0 GHz effective bandwidth) and maintained $SE_{t\ ot} > 25$ 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 School of Applied Sciences KIIT Deemed to be University

Journal Name: Chemistry - A European Journal

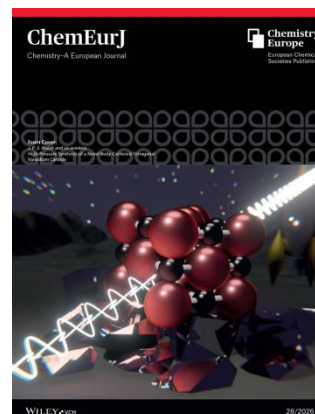
IF: 3.6

Title: Developing High-Rate Aqueous Zinc-Ion Batteries with Zn-Doped V₁₀O₂₄·12H₂O Cathode

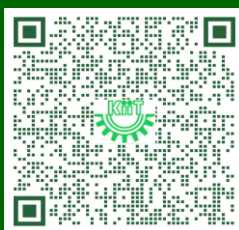
Author: Thippeswamy P.; Sahoo S.K.; Hemavathi N.J.; Giri S.; Ghosh D.

Details: Volume-32, Issue-28, July 2026

Abstract: Aqueous zinc-ion batteries (AZIBs) have garnered attention as a cost-effective and safer alternative to lithium-ion batteries (LIBs). However, developing suitable cathode materials which can reversibly host Zn²⁺ ions remains a challenge. Herein we explore the effect of zinc doping into hydrothermally synthesized V₁₀O₂₄·12H₂O (ZVO) and demonstrate that such doping enhances electronic conductivity and structural stability, leading to improved rate capability and cycling performance of ZVO as a cathode material for AZIBs. The effect of zinc doping in the V₁₀O₂₄·12H₂O as a ZIB cathode has not been previously explored. The ZVO materials had a bundled rod-like morphology with a zinc content of 1.3% and an average oxidation state of 4.86 for the vanadium. DFT calculations further validate that Zn doping to the pristine V₁₀O₂₄ is thermodynamically favorable, which also improves the electronic conductivity of the ZVO. As a result, the Zn//ZVO cell exhibited superior specific capacity and improved rate performance over the pristine V₁₀O₂₄·12H₂O (VO) electrode, with a high specific capacity of 359 mAh/g at 0.1 A/g and sustained 121 mAh/g at 5 A/g. The Zn//ZVO cell also showed commendable cycle stability with 90 mAh/g capacity retention over 1110 cycles, which was equivalent to the starting capacity of the pristine VO cathode.



URL: <https://chemistry-europe.onlinelibrary.wiley.com/doi/10.1002/chem.202502204>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Food and Humanity

IF: 3.5

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

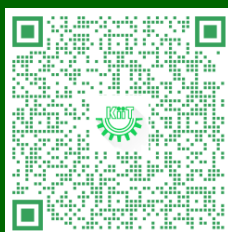
Author: Nayak L.; Biswal M.; Das J.; Panda S.; Lal M.K.; Ngangkham U.; Kumar S.; Kumar A.

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.



URL: <https://www.sciencedirect.com/science/article/abs/pii/S2949824426002673?via%3Dihub>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Dalton Transactions

IF: 3.3

Title: Synthesis and characterization of honeycomb-like carboxylate-bridged dimeric Cu(ii) and Zn(ii)-based coordination polymers with a pyridyl Schiff base linker: dye sorption and Schottky device applications

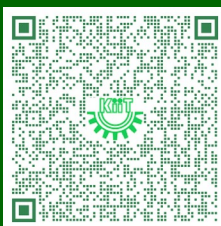
Author: Saha K.; Jana S.R.; Das P.; Dutta B.; Banerjee M.; Naskar S.; Jana N.C.; Hossain S.S.; Bera B.; Sinha C.

Details: Volume -55, Issue-26, 7th July 2026

Abstract: The coordination polymers (CPs)/metal–organic frameworks (MOFs) incorporating hetero-bridging ligands have remarkable efficiency and versatility towards fulfilling the objectives of the Sustainable Development Goals (SDGs). In this aspect, two CPs, $[\text{Cu}_2(3\text{-bph})_2(\text{adc})_4]_n$ (CP1) and $[\text{Zn}_2(3\text{-bph})_2(\text{adc})_4]_n$ (CP2) (3-bph = (1E,2E)-1,2-bis(pyridin-3-ylmethylene)hydrazine and adc^- = 1-adamantanecarboxylate), are characterised, and their significant semiconducting property and selective dye sorption activity are explored. The CPs comprise a secondary building unit (SBU) of a carboxylate-bridging adc^- paddle-wheel, $[\text{M}_2(\text{adc})_4]$ (M = Cu(ii), Zn(ii)), which undergoes pyridyl-N linking by 3-bph to form a 1D chain, where the pyridyl rings undergo π - π interaction to construct a 2D honeycomb-supramolecular network. Interestingly, CP1 demonstrates the selective sorption of methyl red (MR) dye out of four dyes (methylene blue, rhodamine B, methyl red, and methyl orange) with a removal efficiency of 95.37% from aqueous solution within 1 h, whereas CP2 does not show measurable sorption activity. The sorption of CP1 fits the Langmuir isotherm ($R^2 = 0.9875$) and follows pseudo-second-order kinetics, indicating chemisorption on a heterogeneous surface. The DFT calculations using crystallographic parameters determined the band gaps in the semiconducting region (2.39 eV (cal.) and 3.68 eV (exp.) for CP1 and 2.32 eV (cal.) and 3.65 eV (exp.) for CP2). This inspired the measurement of the electrical conductivity from a fabricated Schottky device with thin film electrodes, ITO/CPs/Al. The experiments show that CP2 ($5.27 \times 10^{-3} \text{ S m}^{-1}$) has higher electrical conductivity than CP1 ($2.72 \times 10^{-3} \text{ S m}^{-1}$) under identical conditions, which explains the superior charge-transport features of CP2 in comparison with CP1.



URL: <https://pubs.rsc.org/dt/article-abstract/55/26/10000/1265828/Synthesis-and-characterization-of-honeycomb-like?redirectedFrom=fulltext>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Journal of Materials Science: Materials in Electronics

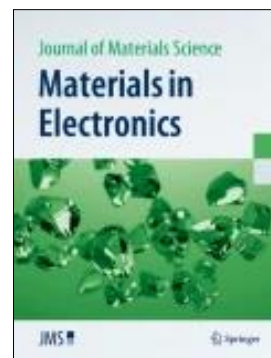
IF: 3.2

Title: Understanding of dynamic scaling behavior, pyroelectric energy storage and electrocaloric performance of MnO-modified BaCaZrTiO ceramics

Author: Nanda S.; Badapanda T.; Joardar H.; Sumit; Arockiarajan A.; Rout S.K.

Details: Volume-37, Issue-22, August 2026

Abstract: This work involved the dynamic scaling hysteresis behavior of MnO₂-doped BCZT (Ba_{0.85}Ca_{0.15}Zr_{0.1}Ti_{0.9}O₃) perovskite compounds synthesized by a traditional solid-state reaction technique. The single-phase perovskite symmetry is observed at all dopant concentrations, as authenticated by X-ray diffraction. A small deviation in the transition temperature and electrical permittivity with rising dopant value was indicated by temperature-driven dielectric measurements. The temperature-driven ferroelectric hysteresis measurement was carried out and the correlation of remanent polarization (Pr), coercive field (Ec), and the mean hysteresis loop area (A) with temperature was analyzed. The exponents associated with the temperature-driven hysteresis quantities were obtained using a standard power-law relationship. The storage performance of the compositions was measured using conventional formula. An Olsen electrothermal cycle was utilized to assess the energy harvesting (thermal) capabilities of all compositions. The electrocaloric performance of the doped compositions was estimated using the indirect method. These results indicate that integrating MnO₂ into BCZT ceramics is an effective method for improving energy storage capacity and pyroelectric and electrocaloric properties.



URL: <https://link.springer.com/article/10.1007/s10854-026-18031-z>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: International Journal of Phytoremediation

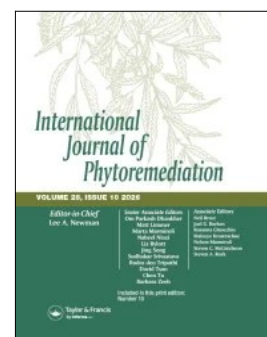
IF: 3.1

Title: Stoichiometric insights into heavy metal phytoremediation by two aquatic macrophytes: Comparative evaluation of *Pontederia crassipes* and *Actinoscirpus grossus*

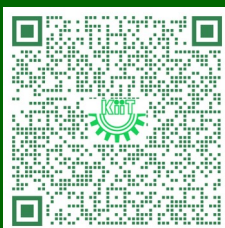
Author: Sarangi B.S.; Maity J.P.; Pradhan A.A.; Rout A.P.

Details: 16th July, 2026

Abstract: Aquatic macrophytes are increasingly explored for their potential in remediating wetlands contaminated with heavy metals (potentially toxic elements: PTEs), yet the biochemical determinants of their adsorption efficiency remain poorly understood. Present study investigates the phytoremediation potential of *Actinoscirpus grossus* and *Pontederia crassipes* by linking organ-specific distributions of total organic carbon (TOC) and total nitrogen (TN) with PTEs uptake. The sediment and plant samples were collected from polluted aquatic environments, followed by elemental analysis using WD-XRF and inductively coupled plasma mass spectrometry (ICP-MS). Plant organs (roots, stems, leaves, and flowers) were analyzed for TOC and TN using high-temperature combustion methods. Statistical analysis, including paired t-test, Wilcoxon's signed-rank test, and Pearson's correlation, were used to compare species differences and method agreement. Roots acted as the primary accumulation sites, accounting for approximately 20–30% higher concentrations of Zn, Cu, Pb, and Cd compared to aerial tissues. The *Pontederia crassipes* favored phytostabilization, particularly for Pb and Cu, whereas *Actinoscirpus grossus* showed enhanced uptake of Cr, Ni, and Co, indicating stronger phytoextraction potential. *Actinoscirpus grossus* also exhibited consistently higher TOC and TN across plant organs, suggesting greater metabolic flexibility and biosorption capacity. The C/N ratio demonstrated clear organ-level differentiation, with highest values in flowers (≈ 21 – 28) and lowest in roots (≈ 7 – 10), reflecting structural versus metabolic allocation strategies. Bland–Altman's analysis confirmed good agreement between TOC and TN estimation approaches. Overall findings suggest that stoichiometric balance (TOC-TN) is closely associated with PTE uptake behavior, and that combining species with complementary functional traits can enhance the efficiency of phytoremediation systems in contaminated aquatic environments.



URL: <https://www.tandfonline.com/doi/full/10.1080/15226514.2026.2699883>





SCHOLARLY PUBLICATIONS School of Applied Sciences KIIT Deemed to be University

Journal Name: Journal of Physical Chemistry A

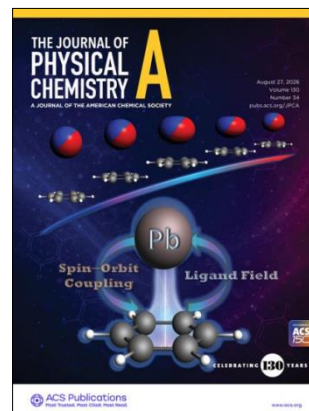
IF: 3.0

Title: Predictive Molecular-Level Recognition of Pesticides by Co(II)-Based Coordination Polymer: A Theoretical Study of Host-Guest Interactions

Author: Hasan, MN; Dutta, B; Bhowmick, R; Mahapatra, M; Halder, S

Details: Volume-130, Issue-34, August 2026

Abstract: The strategic design of advanced sensing materials for pesticides is increasingly challenged by regulatory restrictions and limited experimental accessibility to several hazardous agrochemicals. This work reports a comprehensive theoretical investigation of a well-characterized Co(II)-based coordination polymer (CP), synthesized using a slow diffusion process, as a potential sensing platform for pesticide recognition. The CP has been thoroughly characterized by X-ray single-crystal diffraction analysis, and its interaction with nine representative pesticides has been systematically explored using density functional theory (DFT) and time-dependent DFT. Optimized host-guest geometries reveal favorable binding affinities driven by a combination of hydrogen bonding, electrostatic interactions, π -interactions, etc., depending on the chemical nature and molecular structure of the pesticide. Optical response, chemical reactivities, charge transfer characteristics, frontier molecular orbital analysis, and noncovalent interaction (NCI) analyses provide molecular-level insights into the recognition mechanism and relative selectivity of the CP toward different pesticides. The results demonstrate that the electronic structure of the Co(II) coordination framework is sensitively modulated upon guest binding, highlighting its potential as a sensing material. This study establishes a predictive computational sensing strategy for environmentally relevant pesticides that are difficult to access experimentally (sometimes banned) and offers valuable guidelines for the future design of CP-based sensors targeting emerging and regulated contaminants.



URL: <https://pubs.acs.org/jpcafh/article-abstract/130/34/6794/5254000/Predictive-Molecular-Level-Recognition-of?redirectedFrom=fulltext>

