SCHOLARLY PUBLICATIONS
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Journal Name: Results in Engineering **IF: 9.4**

Title: Physics-guided machine learning framework for smartphone GNSS multipath detection under real-world class imbalance conditions

Author: Agarwal K.; Ainapure B.; Shukla A.; Jadhav R.; Sawant T.; Bizon N.; MazÄƒfre A.G.; Appasani B.

Details: Volume-32, December 2026

Abstract: Smartphone-based GNSS positioning is highly susceptible to multipath interference, a major source of positioning errors of approximately 20–30 m in challenging environments. Unlike high-end GNSS receivers equipped with choke ring antennas and advanced correlators, smartphones lack specialised hardware for multipath mitigation, making software-based detection essential. This study proposes a physics-informed machine learning framework for multipath detection using raw GNSS measurements from the Google Smartphone Decimeter Challenge dataset, collected from multiple Android devices in real-world environments. Ground-truth labels were generated and validated using NovAtel SPAN RTK residual anchors, ensuring physically meaningful supervision without circular feature dependency. The resulting labels achieved a precision of 1.000, recall of 0.912, F1-score of 0.954, and an overall agreement of 92.2%. Five supervised classifiers—Random Forest (RF), Logistic Regression, Support Vector Machine, Gradient Boosting, and Naive Bayes—were evaluated under imbalanced (90:10), moderately balanced (60:40), and fully balanced (50:50) class distributions. RF achieved the best performance in the balanced setting, with an MCC of 0.645, ROC-AUC of 88.57%, and F1-score of 81.47%, outperforming a C/N_0-only baseline by 0.611 MCC points. SHAP analysis identified device encoding, carrier phase smoothness, and Doppler rate anomaly as the most influential features. Leave-one-device-out validation across 20 devices produced a median RF F1-score of approximately 83%, while a physics-only ablation improved generalization to unseen hardware. Integrating predicted multipath probabilities into soft weighted least-squares positioning reduced the median positioning error from 3.71 m to 2.50 m and increased solution availability from 66.2% to 99.2%, demonstrating the practical value of probabilistic multipath mitigation.

URL: https://www.sciencedirect.com/science/article/pii/S2590123026032159?via%3Dihub

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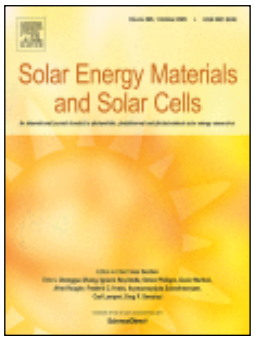
Journal Name: Solar Energy Materials and Solar Cell **IF: 6.6**

Title: Beyond lead halide perovskites: visible light photovoltaics with phase engineered bismuth-based oxide double-perovskites, Bi2MCrO6 (M = Fe, Mn)

Author: Vikas N.P.; Pradhan R.K.; Mukherjee S.; Singh U.P.; Patra B.K.; Srivastava R.P.; Roy A.

Details: Volume 306, October 2026

Abstract: Lead poisoning and notorious ambient instability in lead-based halide perovskites pave the way for the exploration of alternative materials for affordable and efficient solar cell fabrication. An important prerequisite to this end is the optoelectronic evaluation of the proposed material. Here we report, optoelectronic characterization of Bi_2FeCrO_6 (BFCO) and Bi_2MnCrO_6 (BMCO) thin films vis-à-vis performance of photovoltaic cells. Solution-deposited thin films (350-450 nm) of the above compositions demonstrate a double-perovskite structure with monoclinic P 2_1/ c symmetry, albeit with mixed cation valences and deep-level defects. A thorough optoelectronic evaluation exhibits large optical absorption in the visible range ($\alpha \sim 10^4$ -$10^5 cm^{-1}$), and high carrier density, $\sim 10^{17-20}$ cm^{-3}. Ultraviolet photoelectron spectroscopy measurement allowed determination of the positions of the band-edges (valence band maximum and conduction band minimum), required for the selection of carrier transport layers. In its first, BMCO-based FTO/SnO_2/BMCO/Spiro-OMeTAD/Ag solar cell produced a maximum 3.56% conversion efficiency. Using numerical simulation, we predict that with suitable defect control, the above conversion efficiency can increase significantly.



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SCHOLARLY PUBLICATIONS
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Journal Name: Discover Sustainability **IF: 5.2**

Title: Mapping the evolution of artificial intelligence from automation to augmentation in smart employee management using bibliometric and altmetric analysis

Author: Pattepu S.; Dulla N.; Priyadarshini S.; Panda S.; Appasani B.; Nsengiyumva P.

Details: Volume-7, Issue-1, December 2026

Abstract: The integration of employee engagement with artificial intelligence (AI) has become essential in recent years, driven by the demand for advanced technologies, data-driven-decision-making, and predictive analytics to improve Human Resource (HR) management and performance. This study employs bibliometric, thematic, and content analysis to explore key trends, emerging technologies, and their impact on smart employee management (SEM). Data were extracted from two reputed academic databases Scopus (N = 920) and Web of Science (N = 363) covering the period from 1984- August, 2025. After removing 240 duplicate records, a total of 1,043 articles were analyzed using bibliometric and altmetric tools such as VOSviewer, Biblioshiny, Altmetric Bookmarklet, and Dimensions. The study found that 2021 marked the peak year for a noticeable increase in literature pertaining to SEM with 129 publications and 4,912 citations. From 2019 to 2023, research trends shifted from general subjects such as employment, manufacturing, and business processes to more specialized applications, with a particular emphasis on the role of AI in employee performance, trust and decision-making. Further, the study incorporated altmetric analysis, providing complementary insights by capturing real-time attention and societal impact of globally cited documents. The findings highlighted that while automating repetitive work, building trust, and addressing ethical issues like prejudice and transparency, managers should integrate AI with human skills, placing an equal emphasis on creativity and human-touch. The uniqueness of study stands at triangulating bibliometric, thematic, content and altmetric insights to map scholarly evolution and societal attention to SEM and provide a set of future research directions to advance theory and practice in AI-augmented HR systems.

URL: https://link.springer.com/article/10.1007/s43621-026-03368-6

SCHOLARLY PUBLICATIONS
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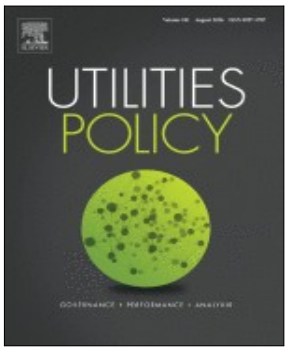
Journal Name: Utilities Policy **IF: 4.9**

Title: Analyzing the evolution of India's electricity market: A systematic review of drivers, barriers, and regulatory instruments

Author: Sahoo, S; Mishra, S; Mishra, DK

Details: Volume-102, 26th October, 2026

Abstract: The global transition toward sustainable power systems, energy security, and economic growth has increased the importance of modern electricity markets worldwide. In India, the electricity sector has undergone a significant transformation since the implementation of the Electricity Act, 2003, shifting from a vertically integrated structure to a more competitive, market-oriented framework. The increasing penetration of renewable energy, rising electricity demand, and continuous regulatory reforms have accelerated the development of short-term electricity markets and market-based mechanisms. This study presents a systematic review of the evolution of India's electricity market, focusing on the major drivers, barriers, and regulatory instruments influencing the sector. The review examines the development of key market segments, including long-term power purchase agreements, power exchanges, the Day-Ahead Market (DAM), Term-Ahead Market (TAM), Real-Time Market (RTM), and emerging green market mechanisms such as the Green Day-Ahead Market (GDAM). The study also analyzes the role of Renewable Energy Certificates (RECs), Energy Saving Certificates (ESCerts), Market-Based Ancillary Services (MBAS), and the Carbon Credit Trading Scheme (CCTS) in supporting renewable energy integration and enhancing market flexibility. The findings indicate that, despite considerable progress in electricity market development, challenges such as DISCOM financial stress, transmission congestion, dependence on long-term contracts, and regulatory uncertainties continue to affect market efficiency and liquidity. However, ongoing reforms related to ancillary services, energy storage integration, market coupling, and digital grid modernization are expected to improve the transparency, flexibility, and sustainability of India's future electricity market.



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SCHOLARLY PUBLICATIONS
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Journal Name: IEEE Access **IF: 4.2**

Title: Investigating Pocket-Engineered Tree-Based NSFETs with Asymmetric Spacers

Author: Mandal A.; Saha A.; Saha R.; Singh U.P.; Maity S.K.; Prasad R.

Details: Volume-14, August 2026

Abstract: This work investigates the impact of pocket doping concentration variation from 1 × 1017to 5 × 1018 cm−3 on the DC, analog, and RF performance of a proposed FET device, demonstratingthat tailored pocket engineering effectively mitigates short-channel effects in nanoscale technology. Higherpocket doping shifts the threshold voltage positively, suppresses subthreshold leakage, and enhances thesubthreshold swing, yielding an on-current window of 12–23 µA with a five-order-of-magnitude ID span.The device exhibits improved analog figures of merit, including peak transconductance gm rising from∼30 to 60 µA/V,transconductance efficiency gm/ID exceeding 50 V−1at subthreshold biases, outputconductance gds below 35 µS, and intrinsic gain gm/gds surpassing 8 × 106, indicating strong suitabilityfor analog/RF amplification. AC analysis reveals beneficial trade-offs: increased capacitances Cgs and Cggreflect better gate control, while reduced Cds and Cgd minimize parasitic feedback and Miller effects, withthe lowest pocket doping (1 × 1017 cm−3) achieving peak cutoff frequency fT = 120 GHz and maximumoscillation frequency fmax = 140 GHz, highlighting its potential for high-speed RF nanoelectronic circuits.

URL: https://ieeexplore.ieee.org/document/11664404

SCHOLARLY PUBLICATIONS
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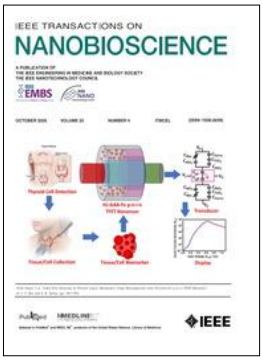
Journal Name: IEEE Transactions on Nanobioscience **IF: 4.2**

Title: Machine Learningâ€“Assisted Terahertz Metasurface Sensing for Diabetes Progression

Author: Panda N.K.; Kumar S.

Details: September 2026

Abstract: A polarization-insensitive terahertz (THz) metasurface refractive index sensor is proposed for plasma amino acid–based detection of type 2 diabetes progression stages. The unloaded sensor exhibits a resonance frequency of 0.6638 THz at maximum absorptivity, with a high quality factor(Q) of 41.4, a figure of merit(FoM) of 4.17 and maximum refractive index sensitivity(S) of 66.67 GHz/RIU, enabling precise refractive index sensing. The combined effect of six clinically accepted plasma amino acid biomarkers is considered to model diabetes progression. Five progressive stages—Normal (N), Intermediate-1 (I-1), Intermediate-2 (I-2), Diabetic (D), and High-Diabetic (HD)—are characterized by variations in amino acid concentrations that alter the effective refractive index of blood plasma. The Lorenz–Lorentz formulation is employed to estimate stage-dependent refractive indices from molecular composition and density variations. The corresponding resonance shifts and absorptivity responses are obtained through parametric simulations and used to train multiple machine learning models. The proposed framework Ensemble Bagged Trees classifier achieves a classification accuracy of 94% in accurately identifying the precise stage of diabetes on the simulated test datasets. The results demonstrate the potential of integrating THz metasurface sensing with data-driven modeling for minimally invasive, stage-specific diabetes diagnostics.



URL: https://ieeexplore.ieee.org/document/11690683

SCHOLARLY PUBLICATIONS
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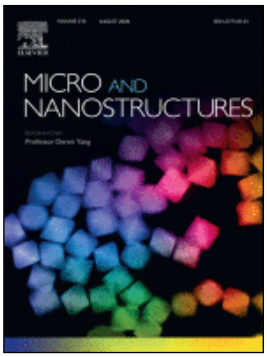
Journal Name: Micro and Nanostructures **IF: 3.1**

Title: Layer-dependent DC, RF, and linearity trade-offs in black phosphorus TFETs

Author: Pahari P.; Mohapatra S.K.; Dastidar A.; Das J.K.; Acharya O.P.; Ray K.

Details: Volume 217, September 2026

Abstract: Black phosphorus (BP) has attracted significant interest for next-generation nano-electronic devices due to its tunable bandgap, high sensitivity to surface charge variations, and strong in-plane anisotropy. Field-effect transistors made of tunnel structures (TFETs) with highly promising channel material have been proposed. The sub-60 mV/dec subthreshold slope operation is highly promising; however, practical deployment in real-world circuits has been hindered by insufficient on-state current and limited RF performance. In this article, a thorough analysis of BP-DG-TFET behaviour as a function of BP thickness from monolayers to five layers has been performed by calibrated TCAD simulations. The analysis has been conducted in terms of DC, transport, RF, and linearity characteristics. It has been found that as BP thickness increases, the bandgap and tunneling barrier width decrease significantly, resulting in marked on-state current, transconductance, gain-bandwidth product, and cut-off frequency improvement from 150 GHz (L4) to ∼210 GHz (L5) and up to ∼260–280 GHz (bulk) of BP layers. Higher order transconductance, harmonic, and compression ratios have pinpointed that there exists an optimal compromise between gain and linearity within TFETs; in this case, the optimal trade-off is attained by the BP layer TFET. This method also shows that the BP thickness engineering method can be successfully applied as a design technique for the optimal trade-off of DC, RF, and linearity performance, and therefore, BP-DG-TFETs are promising for next-generation low-power analog RF application.



URL: https://www.sciencedirect.com/science/article/pii/S2773012326002487?via%3Dihub

Journal Name: AEU - International Journal of Electronics and Communication **IF: 3.1**

Title: Spatially efficient metasurface arrayed MIMO antenna with circular polarization effectiveness for higher U-NII Wi-Fi 6/6E/7 GHz band applications

Author: Ramesh K.; Mohanty A.; Bhowmik W.; Panda J.R.

Details: Volume-217, December 2026

Abstract: This article proposes a spatially efficient metasurface arrayed multiple-input multiple-output (MIMO) antenna with effective circular polarization. The performance parameters and design aesthetics are mainly examined on a single element, demonstrating the potential efficacy of wideband response in top loading of metasurface-unit cell clusters and replicating circular polarization (CP) with sequentially rotational symmetric feeding network (SRSFN). The arrayed design configuration assisted with stacked embodiments, of the first layer functioning as a linked ground reflector (at the bottom) and the top layer asserting SRSFN connected via four coaxial feeds. The second layer is a metasurface array designed to increase overall performance. The densely packed meta-array configuration asserts an absolute minimum inter-element spacing (IES) of 0.07λ0 (λ0 = lowest operating wavelength at 5.28 GHz) with >20 dB isolation making it spatially efficient. A prototype antenna has been fabricated and experimentally validated to operate from (5.28 – 8.25) GHz with 44% 10-dB IBW and the CP traces from (5.45 – 8.25) GHz with 40.87% 3-dB ARBW. The co-polarization radiation properties reveal dominating Left-handed circular-polarization (LHCP) radiation of (7.69 – 9.66) dBic boresight gain, potent cross-polarization discrimination and minimal ECC. The anticipated functional parameters and performance outcomes of the proposed MIMO antenna array design finds its suitability for U-NII Wi-Fi 6/6E/7 GHz applications.

URL: https://www.sciencedirect.com/science/article/pii/S1434841126003523?via%3Dihub

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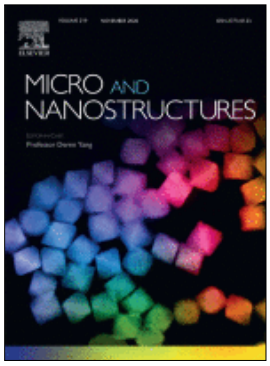
Journal Name: Micro and Nanostructures **IF: 3.1**

Title: Random Forest-assisted performance optimization of TreeFET devices

Author: Balasubrahmanyam M.; Goel E.; Tripathy M.R.; Kumar N.

Details: Volume-220, December 2026

Abstract: TreeFET structures have arisen as viable options for sub-nanometer technology nodes owing to their greater electrostatic control and improved current drive relative to traditional FinFETs. However, enhancing TreeFET performance across an extensive design space that encompasses geometric parameters, material selections, and operational conditions is still computationally intensive when exclusively utilizing TCAD simulations. This study introduces a Random Forest Regression (RFR)-based device modeling framework aimed at enhancing the prediction and optimization of TreeFET performance with increased accuracy and diminished processing demands. The proposed model is trained on an extensive TCAD-generated dataset that includes variations in width and hight of the interbridge, channel doping concentration, gate length, nanosheet dimensions, and temperature. RFR models are designed to forecast essential DC and RF performance measures, such as ON current (ION), ION/IOFF ratio, subthreshold swing (SS), drain induced barrier lowering (DIBL), transconductance (gm), cutoff frequency (fT), gain bandwidth product (GBP), and transconductance frequency product (TFP). The findings exhibit near-TCAD fidelity, with determination coefficients surpassing 0.99 and minimal prediction errors across all parameters. Feature importance analysis indicates that channel doping and gate geometry significantly affect TreeFET performance, facilitating focused design optimization. The suggested RFR technique demonstrates enhanced resilience, scalability, and generalization capabilities compared to traditional analytical models. This study emphasizes the promise of machine learning-assisted device modeling as an effective substitute for comprehensive TCAD simulations, facilitating swift performance improvement and design space exploration of next-generation TreeFET technologies.



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