SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

Journal Name: Journal of Alloys and Compounds **IF: 5.8**

Title: Tailoring optical properties of hydrothermally synthesized SnMnSe nanocubes for optoelectronic and dielectric applications

Author: Parida A., Senapati S., Pradhan G.K., Naik R.

Details: Volume 970, January 2024

Abstract: In the current paper, we investigate the optical and dielectric properties of the SnMnSe nanocubes. The $Sn_{0.5+x}Mn_{0.5-x}Se$ (x = 0.375, 0.250, 0.125, 0) samples are prepared by simple hydrothermal method with the variation of the Sn and Mn concentration. The X-ray diffraction study shows that all the prepared samples are polycrystalline in nature. The average crystallite size increases along with the dislocation density and the average strain value with the increase in the Mn concentration. The morphology shows the formation of nanocubes. The average size of the cubes increases with the increase of Mn content. The reflectance data demonstrate the decreasing order of absorption edges with the increase of Mn content in the sample. The variation of the absorption edges with Mn content tends to decrease the optical bandgap by creating more disorder and defects between the gap region. Broad orange-red photoluminescence emission is observed for all the samples with 532 nm excitation. The electrical study of the sample shows high resistance values. The dielectric behavior as a function of frequency and temperature is investigated, and parameters like dielectric constant, AC conductivity, impedance spectroscopy, and electric modulus are deeply analyzed. The dielectric properties are useful for energy storage applications. All the above optical and dielectric properties of the SnMnSe matrix have potential use in the field of optoelectronics and dielectric applications.

URL: https://www.sciencedirect.com/science/article/pii/S0925838823038239?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

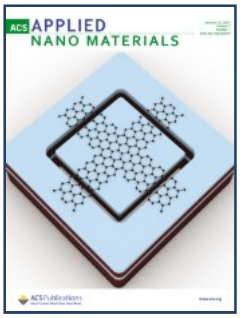
Journal Name: ACS Applied Nano Materials **IF: 5.3**

Title: No-Stirring Synthesis of sub-50 nm Hollow Silver Nanoshells with Dimethylglyoxime-Induced Plasmons in Visible and Second NIR Windows for Biomedical Applications

Author: Dadhich B.K., Gupta P., Ballav S., Bhushan B., Datta P.K., Priyam A.

Details: Volume 7, Issue 1, Pages 1212 – 1221, January 2024

Abstract: A unique no-stirring synthesis has been developed to obtain highly monodisperse hollow silver nanoshells (HAgNSs) with plasmons in the second near-IR (NIR-II) window. The method also introduces dimethylglyoxime (DMG) as a quadrupole-supporting agent. The quadrupole surface plasmon resonance (Q-SPR) was found to be highly intense and tunable from 450 to 558 nm. Two types of dipolar resonances, symmetric dipole surface plasmon resonance (SD-SPR) and antisymmetric dipole surface plasmon resonance (AD-SPR), are also observed. The AD-SPR peaks remain constant at 333 nm while the SD-SPR peaks are tuned gradually from 780 to 850 → 920 → 1000 → 1150 nm. They were accordingly named HAgNS-780, HAgNS-850, HAgNS-920, HAgNS-1000, and HAgNS-1150, and their outer diameters were found to be 53 ± 4, 49 ± 3, 54 ± 3, 62 ± 5, and 39 ± 3 nm, respectively. The corresponding aspect ratios (outer diameter/shell thickness) were 3.31, 3.37, 3.48, 4.13, and 5.2, respectively. A correlation between the tunability of SD-SPR, AD-SPR, and Q-SPR and aspect ratio has been established. The shape and size parameters were utilized for the simulation of the extinction spectra by the discrete dipole approximation (DDA) method. Second derivative FTIR analysis reveals the peculiar binding mode of DMG to the HAgNS which is the genesis of Q-SPR in such smaller-sized nanoshells. The further red shift of Q-SPR and SD-SPR was observed with the addition of folic acid (FA). It also imparts greater aqueous solubility, colloidal stability, and biocompatibility, making them suitable for biomedical applications.



URL: https://pubs.acs.org/doi/10.1021/acsanm.3c05191

SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

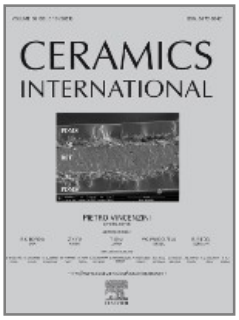
Journal Name: Ceramics International **IF: 5.1**

Title: One-pot synthesis of AC/ZnO nanocomposites for highly sensitive, repeatable and fast response humidity sensor

Author: Soren D., Kumar K., Deheri P.K., Pattojoshi P.

Details: May 2024

Abstract: A highly sensitive and repeatable humidity sensor that can measure relative humidity at room temperature (25 °C) was fabricated using activated carbon-ZnO (AC/ZnO) nanocomposites. The AC/ZnO nanocomposites with high oxygen vacancies were prepared by a facile one-pot synthesis method through carbonization of ZnCl2-impregnated biomass precursor. The sensor exhibited a better response (96 % at 0.5 V biasing), short response time (17.4 s), and recovery time (32.1 s). The same 96 % relative response at 0.5V biasing for all four consecutive cycles was observed without losing the response-recovery time, indicating excellent repeatability. On the other hand, biomass-derived single-phase activated carbon (AC) did not respond to humidity change at room temperature. The improved humidity sensing in AC/ZnO nanocomposites was ascribed to the synergistic effects of increased oxygen vacancies, increased active sites in the AC phase, and the formation of p–n heterojunction at the composite interface, substantiated with X-ray diffraction (XRD), Raman and X-ray photoelectron spectroscopy (XPS) studies. The sensing mechanism of AC/ZnO nanocomposite was discussed based on the enhanced reduction of H2O by adsorbed O2− at AC/ZnO heterojunction, leading to increasing sensor resistance.



URL: https://www.sciencedirect.com/science/article/pii/S0272884224022211?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

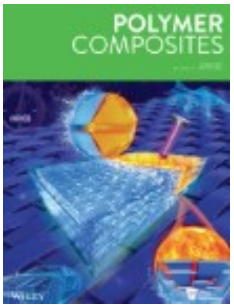
Journal Name: Polymer Composites **IF: 4.8**

Title: Fabrication of Multiwalled Carbon Nanotubes (MWCNT) and Reduced Graphene Oxide (rGO)-based thermoplastic polyurethane and polypyrrole nanocomposites for electromagnetic wave absorption application with a low reflection

Author: Acharya S., Swain L.M., Samal R.R., Parashar S.K.S., Sahoo B.P.

Details: Volume 45, Issue 4, March 2024

Abstract: Electromagnetic radiation (EMR) pollution is a serious concern in today's environment, causing problems not just for electronic gadgets but also for living society. The goal of this research is to fabricate thermoplastic polyurethane (TPU) and polypyrrole (PPy)-based 95:5 blend nanocomposites using a simple solvent casting method at such a low concentration of rGO and MWCNT (0.3, 0.4, 0.5 php) (parts per hundred polymers), for electromagnetic wave (EMW) absorption applications. The chemical interaction between the different phases and morphology of the nanocomposites is characterized by Raman spectroscopy, X-ray diffraction (XRD), and field emission scanning electron microscopy (FESEM) techniques. The material properties, such as dielectric and magnetic properties, are analyzed in X-band frequency (8.2–12.4 GHz). The total shielding effectiveness of (SETot) 0.5 rGO system is found to be 27 dB, whereas, for corresponding MWCNT nanocomposites, it is 26 dB. Interestingly, in 0.5 rGO nanocomposites, absorption shielding effectiveness (SEAbs) is approximately 25 dB, and reflection shielding effectiveness (SERef) is less than 2 dB, which indicates the absorption of 70% of the electromagnetic wave, and the rest gets reflected. Apart from that, the rGO-based nanocomposites possess a greater extent of thermal stability than the corresponding MWCNT-based nanocomposites.



URL: https://4spepublications.onlinelibrary.wiley.com/doi/10.1002/pc.28027

SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

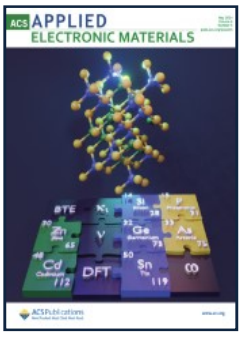
Journal Name: ACS Applied Electronic Materials **IF: 4.3**

Title: Two-Dimensional Bi2O5Te Nanosheets for Sensitive and Fast Response Broadband Visible Light Photodetectors

Author: Kumar P.C., Pradhan G.K., Senapati S., Naik R.

Details: Volume 6, Issue 5, May 2024

Abstract: 2D materials showcase numerous distinct optical and electronic characteristics that are incredibly essential for implementation in optoelectronic devices. In the past few years, photodetectors have been a significant focus because of their diverse applications. The challenge lies in developing environmentally friendly materials to fabricate cost-effective, high-performance devices. Bismuth oxychalcogenide nanosheets (Bi_2O_2X, X = S, Se, Te) in their 2D form, due to their impressive theoretical and experimental characteristics, have become promising alternatives for potential applications in optoelectronic devices. One of its most common oxide phases, i.e., Bi_2O_5Te, also possesses quite interesting nonlinear optical, photorefractive, and many other physical properties, which have yet to be explored. Here, this study reports the photodetectors based on 2D Bi_2O_5Te nanomaterials prepared using a "microwave-assisted method," an exciting choice for synthesizing such nanomaterials in bulk. The basic characterizations confirmed the sample's phase and presence of constituent elements, whereas microscopic studies demonstrated its 2D layered nature. Verification of different bonds between the atoms is observed in the Raman studies. Optical studies represent the band edges of the samples between 400 to 600 nm, which is significant as it is useful in optoelectronic devices such as solar cells, LEDs, and photodetectors. The band gaps of the materials appeared to be in the 2.72 to 2.95 eV range. Centers of the broad photoluminescence spectra are obtained around 650-700 nm, which suggests the optoelectronics applicability of the material. Figures of merits such as sensitivity, responsivity, and detectivity values are obtained from the photodetection measurements. Time-dependent photoresponse characteristics show a high I_{on}/I_{off} ratio, which is quite impressive for fabricating highly sensitive photodetectors.



URL: https://pubs.acs.org/doi/10.1021/acsaelm.4c00179

SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

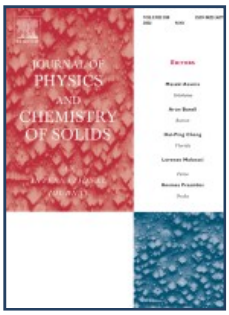
Journal Name: Journal of Physics and Chemistry of Solids **IF: 4.3**

Title: Impact of structural distortion on electronic and magnetic properties of La2MnVO6 double perovskite: An ab initio approach

Author: Priyambada A., Parida P.

Details: Volume 188, May 2024

Abstract: We have studied the detailed structural, electronic, and magnetic properties of La2MnVO6 double perovskite considering both ab initio and semi empirical parameters within the density functional formalism. We have also considered the strong electron correlation (density functional theory plus the Hubbard potential U) in our calculations to determine the ground state of the compound. Investigation of detailed structural properties with both ab initio and semi empirical parameters reveals that the structure obtained with the semiempirical parameters is more distorted, having more distorted octahedra than the theoretically optimized structure obtained with the variable-cell relaxation method. The stable magnetic phase of the compound is obtained as ferromagnetic with use of the energy minimization principle with the Hubbard potential. Study of the electronic properties shows that the compound is a half-metal with the ab initio parameters, whereas it behaves as a semimetal with the semi empirical parameters. The final ground state of the compound is concluded to be a ferromagnetic metal.



URL: https://www.sciencedirect.com/science/article/pii/S0022369724000271?via%3Dihub

SCHOLARLY PUBLICATIONS
School of Applied Sciences
KIIT Deemed to be University

Journal Name: Scientific Reports **IF: 3.8**

Title: Impact of warranty and green level of the product with nonlinear demand via optimal control theory and Artificial Hummingbird Algorithm

Author: Ali H., Akhtar F., Manna A.K., Alrasheedi A.F., Shaikh A.A.

Details: Volume 14, Issue 1, May 2024

Abstract: Due to the current environmental situation and human health, a green manufacturing system is very essential in the manufacturing world. Several researchers have developed various types of green manufacturing models by considering green products, green investments, carbon emission taxes, etc. Motivated by this topic, a green production model is formulated by considering selling price, time, warranty period and green level dependent demand with a carbon emission tax policy. Also, the production rate of the system is an unknown function of time. Per unit production cost of the products is taken as increasing function of production rate and green level of the products. In our proposed model, carbon emission rate is taken as linear function of time. Then, an optimization problem of the production model is constructed. To validate of our proposed model, a numerical example is considered and solved it by AHA. Further, other five metaheuristics algorithms (AEFA, FA, GWOA, WOA and EOA) are taken to compare the results obtained from AHA. Also, concavity of the average profit function and convergence graph of different metaheuristics algorithms are presented. Finally, a sensitivity analysis is carried out to investigate the impact of different system parameters on our optimal policy and reach a fruitful conclusion from this study.

URL: https://www.nature.com/articles/s41598-024-61453-0

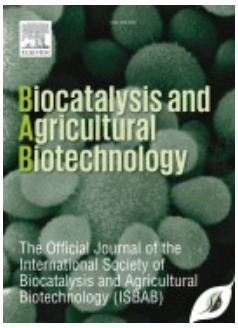
Journal Name: Biocatalysis and Agricultural Biotechnology **IF: 3.4**

Title: Characterization of halotolerant phosphate-solubilizing rhizospheric bacteria from mangrove (Avicennia sp.) with biotechnological potential in agriculture and pollution mitigation

Author: Dey G., Maity J.P., Banerjee P., Sharma R.K., Etesami H., Bastia T.K., Rath P., Sukul U., Huang H.-B., Huang K.-W., Chen C.-Y.

Details: Volume 55, January 2024

Abstract: Mangroves represent intricate and ever-changing ecosystems, exhibiting fluctuations in water level, salinity, and nutrient (such as NPK) availability as well as a wide array of unique bacterial communities. Microbial interactions in different components (e.g., tree roots) of the mangrove ecosystem are crucial to understand the ecosystem functioning for potential application in pollution mitigation and agricultural production. This study aimed to isolate phosphate-solubilizing bacteria (PSB) from the rhizosphere sediment of mangrove (*Avicennia* sp.) in terms of heavy metals (HMs) and salinity tolerance as well as plant growth promoting (PGP) traits, where the effective PSB were used on *Brassica chinensis* for their seed priming and growth under salinity stress. The effective two PSB isolates were identified by 16S rRNA, where JKD01 and JKD02 were closely related (99%) to *Enterobacter cloacae* (OQ271412) and *Kocuria rhizophila* (OQ271413), respectively. Both the strains exhibited phosphate solubilization, IAA, NH_3, and EPS production ability as well as HMs resistant ability where, *E. cloacae* (OQ271412) and *K. rhizophila* (OQ271413), are effectively remove the Cu from the water with 33.23% and 27.54%, respectively. The FTIR results showed functional group shifts (carboxyl, phosphate, and amino) in Cu-treated bacterial biomass and intracellular Cu presence, indicating the involvement of Cu in the bio-sorption and intracellular bioaccumulation process, respectively. The findings suggested PSB tolerance to salinity and HMs are present in mangroves, making them a valuable source for isolating effective bacteria to reduce stress in plants, lower HMs accumulation in mangroves, and aid in the bioremediation of HMs-contaminated environments.



URL: https://www.sciencedirect.com/science/article/abs/pii/S1878818123003614