Sl. No.	IIT Ropar List of Recent Publications with Abstract Coverage: April, 2022
1.	A brute force methodology for automated data extraction and analysis for Finite Element Analysis V Kumar, Balendra, A Sahani - IEEE Delhi Section Conference, 2022 **Abstract**: Finite Element Analysis has emerged to be a powerful tool for modelling various daily life problems. However, with increasing complexity of the problems, analysis of generated data is exceeding beyond the capabilities of humans by manual methods. To overcome this, we have developed a brute force data methodology for automated data extraction and analysis with great efficiency. To check the efficacy of developed methodology, data generated in the process of analyzing the vibrational aspects of blood vessels with changing loading and geometric parameters of blood vessel in parallel has been extracted with great efficiency.
2.	A compact SWB MIMO antenna with 45 clock-wise square patch inclusions for polarization diversity applications S Agarwal, A Sharma, IJG Zuazola, M Kumar - International Journal of Microwave and Wireless Technologies, 2022 **Abstract**: In this paper, a compact super wideband annular ring antenna using 45° clock-wise square patch inclusions for super high frequency and polarization diversity applications is proposed. The inclusions consist of a combination of squares and circles into one another in the inner area of a main annular ring radiator. The antenna uses a partial ground plane having a stair-type defected ground structure, is designed on an FR-4 substrate, and has a total size of 25 × 26 × 1.6 mm^3 (0.17λ × 0.18λ). The design was fabricated and experimental results fairly agreed with simulations and resulted in an antenna with an operating frequency from 2.07 to 30 GHz; that is, a large fractional bandwidth of 174.2 % with a bandwidth (BW) ratio of 14.5:1 and a high BW dimension ratio, BW per unit electrical length of 5693, and a measured peak gain of 8 dBi with an average gain of 5 dBi for the overall operating frequency. For the polarization diversity, a 4 × 4 multiple input-multiple output configuration is additionally presented, offering an effective isolation of ≥ 22.5 dB between ports and corroborated by measurements.
3.	A Hermeneutical Revisit to 'Biographic Metafiction'through AS Byatt's Possession: A Romance A Shekher, A Louis - Critique: Studies in Contemporary Fiction, 2022 **Abstract**: A.S. Byatt’s novel Possession: A Romance has been confronting the critics and readers with several epistemological puzzles for more than two decades. The novel ostensibly offers antithetical views with regard to the prevalent understanding of what counts as knowledge, truth, and authorship. The present essay seeks to uncover the possible rationale behind such apparent inconsistencies, which involve the author’s seemingly deliberate attempt to guide our understanding of the narrative while maintaining a metafictional structure in it. Our essay explores the prospect of finding an atypical approach to solving this conundrum that Byatt’s acclaimed neo-Victorian novel presents to the readers.
4.	A Highly Efficient Compact High Gain RFID Tag Antenna for Millimeter Wave Applications S Jain, M Kumar, A Sharma - IEEE Indian Conference on Antennas and Propagation, 2021 **Abstract**: A planar wide beam slotted RFID tag antenna operating at 24.3 GHz is developed on a low-cost FR4 substrate with reduced dimensions (4.87×4.87 mm). The proposed tag antenna includes a slot to facilitate miniaturization and offer a wider beamwidth with a high gain (4.9 dBi). Additionally, the proposed tag antenna has a wider bandwidth (4.65 GHz) to enhance the proposed system's capacity. The suggested tag antenna has a beamwidth of 121° in the $\phi = 90°$ plane, which

	offers maximum coverage. The antenna prototype is developed on FR4 substrate, and the simulation and measurement findings for the proposed tag antenna correspond adequately.
5.	A Novel Analytical Approach for Nondestructive Testing and Evaluation of Bone Implants Using Frequency Modulated Thermal Wave Imaging A Sharma, G Dua, V Arora, N Kumar, R Mulaveesala - Advances in Non Destructive Evaluation: Part of the Lecture Notes in Mechanical Engineering book series, 2022 **Abstract**: In the recent decade, infrared thermography has gained its importance in nondestructive testing and the evaluation of solid materials due to its whole field, fast, noncontact, and in-service testing abilities. In infrared thermography, active infrared thermography has been widely adopted as the most promising technique for the structural health monitoring of various solid materials. The most frequently used active infrared techniques for nondestructive testing and evaluation of various solid structures are pulse thermography and lock-in thermography. But due to the innate limitations of these techniques, their usage for health monitoring of solid materials is limited. To overcome all these limitations of existing techniques, this work proposes an aperiodic pulse compression favorable thermal wave imaging approach for subsurface features detection in bone implants. An analytical model has been developed with the help of Green's Function method for linear frequency modulated thermal wave imaging for the detection of subsurface features in the bone implant. Titanium alloys are commonly used materials for the manufacturing of bone implants. In this study, a bone implant is considered of Titanium-based alloys because of its biocompatibility, mechanical strength, corrosion resistance, non-toxicity, greater fracture resistance, and high strength to weight ratio. Further, the quantitative analysis of obtained results with the help of an analytical solution is then processed with a pulse compression favorable data processing approach in which the coefficient of correlation has been taken as a figure of merit. Then to support the analytical model studies, numerical simulation studies are performed with the help of commercially available simulation software COMSOL Multiphysics.
6.	A Novel Control-Independent Online Fault Diagnosis of Inter-turn Short Circuits in SRMs using Signal Injection Technique M Alam, S Payami - IEEE Transactions on Industrial Electronics, 2022 **Abstract**: Most of the existing diagnosis techniques for inter-turn short circuits (ITSC) in switched reluctance motors (SRMs) suffers from three major issues. Firstly, the problem of lower sensitivity where the system cannot detect ITSC if a lower number of turns are short-circuited. Secondly, interference of load variation on the detection reliability in which the fault index might initiate false alarm without any fault. And lastly, the dependency of the diagnosis system on the control strategy on which the motor is operating. This paper proposes a novel method to diagnose ITSC in SRMs independent of control schemes with better sensitivity and reliability using signal injection technique. In SRM, not all the phases take part in the torque production at any instant. The idle or inactive phase is injected with a high-frequency (HF) voltage signal for a pre-selected injection ratio within an electrical cycle. Any change in the winding parameters owing to ITSC fault is deciphered by monitoring the high-frequency currents generated in the phase windings. The results are validated experimentally for a four-phase 8/6 SRM employing two control strategies: chopped current control (CCC) and angle position control (APC).
7.	A Preliminary Study of Butterfly Diversity in Hilly Terrains of Ghatsila, Jharkhand, India D Patra, S Roy, S Chowdhury, A Hossain, PK Shit… - Proceedings of the Zoological Society, 2022 **Abstract**: A survey in and around Ghatsila in East Singhbhum district of Jharkhand revealed the record of 72 butterfly species belonging to 6 families and 55 genera. Nymphalidae family dominated the recorded species (37.5%) followed by Lycaenidae (30.5%), Papilionidae (12.5%),

	Hesperiidae (9.72%), Pieridae (8.33%) and Riodinidae (1.38%). Different diversity indices showed high diversity in community structure. This study is likely to contribute towards the conservation of butterfly fauna in the area.
8.	A Review on Spatial, Temporal and Magnitude prediction of Landslide Hazard A Tyagi, RK Tiwari, N James - Journal of Asian Earth Sciences: X, 2022 **Abstract**: Over the last few decades, several landslide susceptibility and hazard mapping (LSHM) techniques have been developed. Maps for the same region have also been generated by different individuals following dissimilar approaches, which can be grouped into qualitative, semi-quantitative and quantitative approaches. As all these techniques have their pros and cons, hence no one technique is standardized for effective analysis of landslide hazards. One issue is the inconsistency in adopting common terminologies for LSHM, that has unavoidably led to many misperceptions. Many authors use susceptibility as a synonym of hazard in landslide zonation. However, Landslide Susceptibility Mapping (LSM) or spatial prediction is just one of the three components of Landslide Hazard Mapping (LHM). The other two components are temporal and magnitude prediction. Many authors have shown their concern regarding the use of hazard and susceptibility terms as synonyms, but none has reviewed those articles and classified them. We reviewed 367 articles from 1972 to 2021, out of which 236 articles were reviewed in detail to prepare a literature database. From the analysis and graphical visualizations of the database, we found the most commonly used techniques for LSHM. We identified a clear geographical biasness in susceptibility analysis. Also, we have found that about 15% of the articles have mistakenly considered susceptibility and hazard terms as synonyms of each other. It constitutes a guideline for future studies and applications, particularly for LSHM. The paper also aims at addressing the gaps in the conversion of susceptibility maps into true hazard and risk maps.
9.	A Rindler road to Carrollian worldsheets A Bagchi, A Banerjee, S Chakrabortty, R Chatterjee - Journal of High Energy Physics, 2022 **Abstract**: The tensionless limit of string theory has recently been formulated in terms of worldsheet Rindler physics. In this paper, by considering closed strings moving in background Rindler spacetimes, we provide a concrete exemplification of this phenomenon. We first show that strings probing the near-horizon region of a generic non-extremal blackhole become tensionless thereby linking a spacetime Carroll limit to a worldsheet Carroll limit. Then, considering strings in d-dimensional Rindler spacetime we find a Rindler structure induced on the worldsheet. Novelties, including folds, appear on the closed string worldsheet pertaining to the formation of the worldsheet horizon. The closed string becomes segmented at these folding points and different segments go into the formation of closed strings in the different Rindler wedges. The Bondi-Metzner-Sachs (BMS) or the Conformal Carroll algebra emerges from the closed string Virasoro algebra as the horizon is hit. Quantum states on these accelerated worldsheets are discussed and we show the formation of boundary states from gluing conditions of the different segments of the accelerated closed string.
10.	An IoT-Based Intelligent Irrigation Management System M Sahi, N Auluck - Edge Analytics, 2022 **Abstract**: Recently, rainfall and climate change have been observed to be erratic. Hence, proper irrigation of fields has become extremely important. Inappropriate management of irrigation leads to poor quality and quantity of crops. If we irrigate the fields properly, the yield can increase significantly. This paper proposes a smart irrigation system using artificial intelligence, ICT,

	embedded systems and IoT. The proposed system takes into consideration external factors like soil condition and climatic conditions before suggesting any action. Our experiments show that the performance of the proposed method is quite encouraging. The accuracy recorded for the trained model while testing is 75%. This helps in using water resources efficiently and thus reducing water wastage significantly.
11.	Application of Frequency Modulated Thermal Wave Imaging for Bone Diagnostics A Sharma, A Rani, R Mulaveesala - Advances in Non Destructive Evaluation: Part of the Lecture Notes in Mechanical Engineering book series, 2022 **Abstract**: In recent years, non-invasive imaging methodologies have been demonstrated as reliable, quantitative and remote inspection methods for the characterization of biological samples. The present work incorporates frequency modulated thermal wave imaging (FMTWI) followed by matched filtering-based post-processing analysis for bone diagnostics, especially bone with tissue, skin and muscle over layers. In order to find the characterization capabilities of the proposed method to detect the bone density variations, a multilayer skin-fat-muscle-bone structure is considered. The results obtained from the proposed scheme clearly show improved evaluation capabilities in terms of the test resolution and sensitivity.
12.	Atomic scale characterization of carbon partitioning and transition carbide precipitation in a medium carbon steel during quenching and partitioning process S Ghosh, K Rakha, S Reza, M Somani, J Kömi - Materials Today: Proceedings, 2022 **Abstract**: Transmission electron microscopy (TEM) and 3D Atom probe tomography (APT) were used to investigate the elemental partitioning, carbon (C) redistribution and carbide precipitation associated with quenching and partitioning (Q&P) treatment of medium C steels (0.4 wt% C) alloyed with three levels of silicon (Si) (0.25, 0.75 and 1.5 wt%). Different types of carbides resulting mainly from tempering of martensite (M) and/or partial decomposition of C-enriched austenite have been characterized. The results reveal formation of transition carbides η (Fe_2C) in High (H)-Si (1.5 wt% Si) steel that are stable even at high partitioning temperatures (300 °C). However, these η carbides formed in Medium (M)-Si (0.75 wt% Si) steel were only partially stable, where a fraction of η carbides decomposed to cementite. In Low (L)-Si (0.25 wt% Si) steel, only the presence of cementite precipitates was evident. In addition, the cementite precipitates were found to be relatively coarse in size compared to η carbides, suggesting that cementite grew during the partitioning process at 300 °C. Apart from carbides, segregation of C clusters in M lath boundaries was clearly revealed by APT. In addition, the possible formation of a metastable, hexagonal (ω) phase between the thin nano-twinned high C martensite has been explored.
13.	Barker-Coded Thermal Wave Imaging for Testing and Evaluation of Mild Steel A Rani, A Sharma, R Mulaveesala - Advances in Non Destructive Evaluation: Part of the Lecture Notes in Mechanical Engineering book series, 2022 **Abstract**: The estimation of defect depth is a crucial parameter in the field of non-destructive testing. The paper presents the simulation aspects for three-dimensional heat transfer equation for a finite thickness steel sample having six blind holes as defects located at different locations using a promising Barker-coded thermal wave imaging technique (BCTWI). The surface of the test sample is subjected to Barker-coded modulated thermal excitation, and the analysis has been carried out using the time domain phase and correlation analysis post-processing approach on the captured data during the active heating. Finally, various adopted processing approaches have been compared to evaluate defect detection capabilities.

14.	Bifurcation in flows of wormlike micellar solutions past three vertically aligned microcylinders in a channel MB Khan, C Sasmal - Physics of Fluids, 2022 **Abstract**: This study presents a numerical investigation of the path switching and selection phenomena in flows of wormlike micellar solutions (WLMs) past three vertically aligned microcylinders in a channel in the creeping flow regime. The flow characteristics of the wormlike micellar solution are examined with the help of the two-species Vasquez-Cook-McKinley (VCM) constitutive model, which considers both the breakage and re-formation dynamics of wormlike micelles. At low Weissenberg numbers (ratio of the elastic to that of the viscous forces, Wi), the flow field in the present system is found to be steady and symmetric. Furthermore, the WLM solution passes through all the passages present between the microcylinders and channel walls. However, as the Weissenberg number reaches a critical value Wi_cri, a transition in the flow field from steady to unsteady occurs. Furthermore, the flow field is found to be bifurcated (a transition from symmetric to asymmetric flow field) also occurs as the Weissenberg number gradually increases. However, we observe that all these transitions are strongly dependent on the micelle breakage rate, (i.e., how it is easy or hard to break a micelle) and intercylinder gap. This study is an extension of our earlier studies on the flow of WLMs past a single and two vertically aligned microcylinders, which are often considered as model porous media for studying the flow dynamics of various complex fluids. The results presented in this work will be relevant for understanding the path switching phenomena of complex fluids during their flow through a porous media.
15.	Combined electromechanically driven pulsating flow of nonlinear viscoelastic fluids in narrow confinements V Kumar, J Mukherjee, SK Sinha, U Ghosh - Journal of the Royal Society Interface, 2022 **Abstract**: Controlled microscale transport is at the core of many scientific and technological advancements, including medical diagnostics, separation of biomolecules, etc., and often involves complex fluids. One of the challenges in this regard is to actuate flows at small scales in an energy efficient manner, given the strong viscous forces opposing fluid motion. We try to address this issue here by probing a combined time-periodic pressure and electrokinetically driven flow of a viscoelastic fluid obeying the simplified linear Phan-Thien–Tanner model, using numerical as well as asymptotic tools, in view of the fact that oscillatory fields are less energy intensive. We establish that the interplay between oscillatory electrical and mechanical forces can lead to complex temporal mass flow rate variations with short-term bursts and peaks in the flow rate. We further demonstrate that an oscillatory pressure gradient or an electric field, in tandem with another steady actuating force can indeed change the net throughput significantly—a paradigm that is not realized in Newtonian or other simpler polymeric liquids. Our results reveal that the extent of augmentation in the flow rate strongly depends on the frequency of the imposed actuating forces along with their waveforms. We also evaluate the streaming potential resulting from an oscillatory pressure-driven flow and illustrate that akin to the volume throughput, the streaming potential also shows complex temporal variations, while its time average gets augmented in the presence of a time-periodic pressure gradient in a nonlinear viscoelastic medium.
16.	Combustion Instability Analysis of Dual-Fuel Stationary Compression Ignition Engine Using Statistical Method and Wavelet Transform MR Saxena, RK Maurya – SAE Technical Papers, 2022 **Abstract**: This study examines the cycle-to-cycle variations (combustion instability) in the dual-fuel stationary compression ignition engine. The variations in the consecutive engine cycles are characterized under different load, gasoline/methanol-diesel premixing ratio (rp) and diesel

	injection timing (SOI). To investigate the combustion instability in dual-fuel CI-engine, gasoline and methanol are used as a low reactivity fuel (LRF) and is fed in the modified intake manifold during the suction stroke. The tests are performed for different fuel rp using developed port-fuel injector controller in the laboratory. The combustion instability is analyzed using the statistical method and Wavelet Transform (WT). Results indicate that combustion instability is more prone to lower and medium engine load, and variations are significantly higher for the high substitution fraction of LRF. The upper limit of fuel rp is restricted by higher variations in the combustion parameters. WT analysis shows that the peak power in global wavelet spectrum (GWS) increases with an increase in the LRF substitution fraction, which indicates higher cyclic variations. When the engine operation is shifted from conventional diesel to dual-fuel mode, the peak power in GWS shifted from higher to lower periodicity, which depicts the frequency of cyclic combustion variations increases in dual-fuel combustion mode. The cyclic combustion variations in dual-fuel CI-engine is possibly due to the variations in the start of combustion, which are susceptible to variations in fuel flow characteristics in the stationary engine.
17.	Corrosion behavior of plain carbon steels under different heat treatment conditions in freely aerated 3.5% NaCl solution PK Katiyar, R Maurya, PK Singh – Interanational Journal of Sustainable Building Technology and Urban Development, 2022 **Abstract**: The present work discusses the effect of the role of interlamellar spacing, % pearlite and pearlite colony size on corrosion behaviour of plain carbon steels (0.002%C, 0.17%C, 0.43%C, and 0.7%C) under different heat treatment conditions using the electrochemical tests in freely aerated 3.5% NaCl solution. Hence, ultra-low carbon (~100% ferrite), low and medium carbon (ferrite-pearlite steels having ~ 32.74% and ~ 52.34% pearlite, respectively) and high carbon steels (~100% pearlite) have been used in annealed conditions. In addition, four different variants (coarse, medium, fine, and very fine) of pearlite steels have also been developed by suitable heat treatment (annealing, as-received, normalizing and force normalizing, respectively) processes using the 0.7% carbon steels to understand the role of interlamellar spacing and pearlite colony size on corrosion mechanisms of pearlitic steels. The corrosion rate of the steel was increased as the carbon content increased. However, the corrosion susceptibility of high carbon pearlite steels was increased in the following sequence: air-cooled - forced air-cooled - as-received - furnace annealed steel since variations in the finesse of the pearlite microstructure significantly alter the corrosion behaviour of pearlite steels. The normalized steel has shown the lowest corrosion susceptibility as compared to the force normalized steel due to the entanglement of cementite causing short-circuiting of the galvanic couples. The FE-SEM was used to examine the corroded specimens after polarization tests and found that the corrosion performance of the steels has mainly been guided by the joint effect of fraction of pearlite, interlamellar spacing, and pearlite colony size.
18.	Cost and Efficiency Analysis of Steganography in the IEEE 802.11ah IoT Protocol AA Almohammedi1, V Shepelev, S Darshi, M Balfaqih, F Ghawbar - Computers, Materials and Continua, 2022 **Abstract**: The widespread use of the Internet of Things (IoT) applications has enormously increased the danger level of data leakage and theft in IoT as data transmission occurs through a public channel. As a result, the security of the IoT has become a serious challenge in the field of information security. Steganography on the network is a critical tool for preventing the leakage of private information and enabling secure and encrypted communication. The primary purpose of steganography is to conceal sensitive information in any form of media such as audio, video, text, or photos, and securely transfer it through wireless networks. In this paper, we analyse the performance characteristics of one of the steganography techniques called Hidden Communication

	System for Corrupted Networks (HCCNETs) for hiding sensitive data. This performance analysis includes the efficiency and the cost of the system in Wireless Local Area Networks (WLANs), specifically in the IEEE 802.11ah IoT protocol. The analysis is mainly based on a two-dimensional Markov chain model in the presence of an error channel. Additionally, the model considers packet arrival rate, back-off timer freezing, back-off stages, and short retry limit to ensure compliance with IEEE 802.11ah requirements. It stresses the importance of taking these elements into consideration while modeling the efficiency and cost of the steganographic channel system. These parameters often result in a high precise channel access estimation, a more accurate and efficient accuracy measurements system, efficient channel utilisation, avoidance of throughput saturation overestimation, and ensuring that no packet is served endlessly. Evaluated results demonstrate that HCCNETs is an effective approach at low cost.
19.	Daily-Life Candidates as Flexible SERS Substrates for Pesticide Detection: a Comparative Study Shinki, S Sarkar - Plasmonics, 2022 **Abstract**: Flexible surface-enhanced Raman scattering (SERS) substrates possess additional advantages over conventional solid substrates because of their capability to conform to real surfaces having arbitrary shapes which consequently improves the trace collection efficiency. However, the high-cost and cumbersome pre-requisite template preparation method is a major bottleneck for their use in real-world applications. In this study, we systematically explore cheaper and commonly available daily-routine materials like A4 printing paper, sandpaper, Al foil, crumbled Al foil, and carbon and scotch tapes directly utilizing them as SERS pre-templates. Inherent roughness of the deployed material directly serves the purpose of reducing the patterning fabrication cost by a considerable amount. However, SERS behaviors of all the above templates are investigated by depositing a requisite plasmonic active Au-Ag alloy nanolayer of identical thickness over them. By using Rh6G dye and methylene blue as detecting molecules, Raman responses of all the samples are compared. Interestingly, crumbled Al foil exhibits a significantly higher and sharp Raman response for both the analytes among all templates. In addition, pesticide detection with varying concentrations was performed on this proposed substrate. An enhancement factor of 6.36×107 is observed over crumbled Al foil in comparison with conventional bare Si. We believe this study facilitates the way of designing cheaper and ready-to-use SERS substrates for on-field detection application and will help in bringing out laboratory-like results for industrial applications without the need of any cost-intensive fabrication methods.
20.	Design and Simulation of Vertical Bi-Directional Fringe Field Tuning of New Improved MEMS Accelerometer Using SOI Technology for Stress Compensation MK Dounkal, RK Bhan, N Kumar - Silicon, 2022 **Abstract**: A new conceptual utilization of Silicon on Insulator (SOI) wafer is reported for bi-directional vertical electrostatic fringe field tuning of the Micro Electro Mechnical Systems (MEMS) micro accelerometer for compensating stress induced curling (up and down), sensitivity and mechanical dynamic response. The buried oxide (BOX) layer-based SOI wafer provides bi-directional electrodes for applying bias voltages independently. Residual stress induced curved deflection due to stress gradient is targeted for tuning and reducing its effects using fringe field electrode configuration in SOI wafer technology. Movable silicon structure is electrostatically (utilizing fringe field) brought back near to original mean position with softened stiffness (increase in sensitivity) and reducing drastically the effects of stress gradients. The simulations are carried out using COVENTORWARE and COMSOL Multiphysics software. The deflection results obtained by both software agree within 7.69% for maximum deviation. There is a deviation in change in capacitance (del C) of 5.89% when stress gradient of 0.1 MPa/μm and 17.62% when stress gradient of 4 MPa/μm is applied on the structure at 30 g. This deviation can be tuned by

	above mentioned Bi directional tuning. Additionally, non-linearity induced by stress gradient in sensitivity can also be tuned by electrostatic fringe field effectively upto 18.64% when higher stress gradient (4 MPa/μm) was affecting the structure. Maximum disagreement of 4.72% between analytical and simulated results promises the design of proposed tuning concept. The proposed tuning concept can be utilized for other MEMS devices suffering from stress gradient issues.
21.	Does Bank Efficiency Enhance Bank Performance? Empirical Evidence from Indian Banking B Rakshit, S Bardhan - Buletin Ekonomi Moneter Dan Perbankan, 2022 **Abstract**: This paper examines the effects of cost, revenue, profit efficiency, and stability inefficiency on bank profitability in India over the period 1997 to 2017. Additionally, this study examines the effect of efficiency on profitability for banks according to their ownership and for periods with (and without) the global financial crisis. The cost, revenue, and profit efficiency scores for 70 banks in India are estimated using stochastic frontier analysis. Our key findings are as follows. First, we find that cost, revenue and profit efficiencies positively influence the profitability conditions of Indian banks. Second, banks that are inefficient adversely influence bank performance, although the global financial crisis did not seem to impact the efficiency-profitability relationship. Finally, we find that bank ownership matters for the association between its efficiency and performance.
22.	Effect of linewidth enhancement factor on the generation of optical vortices in a class-A degenerate cavity semiconductor laser Y Bouchereau, S Karuseichyk, R Guitter, V Pal… - Optics Express, 2022 **Abstract**: The dynamical behavior of a one-dimensional ring array of lasers generated in a class-A degenerate cavity semiconductor laser is numerically investigated. The class-A behavior of the laser is obtained by considering a low-loss vertical external cavity surface emitting laser (VECSEL), in which a telescope and a mask allow us to control the geometry and the linear nearest-neighbour coupling between the lasers. The behavior of the lasers is simulated using coupled rate equations, taking the influence of the Henry factor into account. It is shown that the ring array of lasers exhibits multistability. Moreover, by comparison with a class-B semiconductor laser, it is proved that the class-A nature of the laser makes it more robust to the increase of the Henry factor when it comes to generating topological charge carrying arrays of lasers, thus opening new perspectives of application for such lasers.
23.	Effects of type 2 diabetes on the viscoelastic behavior of human trabecular bone RN Yadav, P Sihota, D Neradi, JC Bose, V Dhiman…N Kumar - Medical Engineering & Physics, 2022 **Abstract**: Summary Type 2 diabetes (T2D) is a well-known disease that impaired bone mechanical properties and increases the risk of fragility fracture. The bone tissue is a viscoelastic material that means the loading rate determines its mechanical properties. This study investigates the impact of T2D on the viscoelastic properties of human bone and its association with microstructure and biochemical properties. Introduction Viscoelasticity is an important mechanical property of bone and for this the interaction of individual constituents of bone plays an important role. The viscoelastic nature of bone can be affected by aging and diseases, which can further influence its deformation and damage behavior.

	Methods The present study investigated the effects of T2D on the viscoelastic behavior of trabecular bone. The femoral heads of T2D (n = 26) and non-T2D (n = 40) individuals with hip fragility fractures were collected for this investigation. Following the micro-CT scanning of all bone samples, the stress relaxation and dynamic mechanical analysis (DMA) tests were performed to quantify the viscoelasticity of bone. Further, a correlation analysis was performed to investigate the effects of alteration in bone microstructural and biochemical parameters on viscoelasticity. Results The stress relaxation and frequency sweep responses of T2D and non-T2D trabecular bone specimens were not found significantly different. However, the storage modulus, initial stiffness, and initial stress were found lower in T2D bone. The significant correlation of percentage stress relaxed is obtained between the mineral content (r= - 0.52, p-value = 0.003), organic content (r = 0.40, p-value = 0.02), and mineral-to-matrix ratio (r = - 0.43, p-value = 0.009). Further, storage and loss modulus were correlated with bone volume fraction (BV/TV) for both groups. The stress relaxation and frequency sweep characteristics were not found significantly connected with the other chemical, structural, or clinical parameters. Conclusion This study suggests that T2D does not affect the time-dependent response of human femoral trabecular bone. The viscoelastic properties are positively correlated with organic content and negatively correlated with mineral content.
24.	Electricity mediated [3+ 2]-cycloaddition of N-sulfonylcyclopropanes with olefins via N-centered radical intermediates: access to cyclopentane analogs D Saha, IM Taily, N Banerjee, P Banerjee - Chemical Communications, 2022 **Abstract**: An external oxidant free electrochemical strategy is designed towards the β-scission of strained C–C bonds in cyclopropylamine. Moreover, the mechanistic studies ascertained that the methodology encompasses the N-center radical (NCRs) route and provides access to di- or tri-substituted cyclopentane analogs.
25.	Emotion Regulation Difficulties and Health-Risk Behaviours in Adolescents P Singh, A Singh - Behaviour Change, 2022 **Abstract**: Health-Risk Behaviours (HRBs) are significantly associated with avoidable mortality in adolescents, and preventing HRBs requires an adequate understanding of related factors. Among associated factors, emotion regulation difficulties may impact youths' engagement in HRBs. Researchers explored the relation of emotion regulation with HRBs; however, specific emotion regulation difficulties for less severe and more prevalent HRBs, such as self-harming behaviour, risky-driving, violence, unhealthy dietary behaviour, and poor adherence to prescribed medication, has not been much explored. The current study aimed to explore the predictability of adolescents' specific difficulties in emotion regulation in relation to their engagement in HRBs. For this purpose, six different HRBs, that is, self-harm, violence, risky-driving, unhealthy dietary behaviour, inadequate physical activity, and lack of medication adherence, were studied. A total of 617 (Males = 356) adolescents (M_{age} = 15.77) from five districts of Punjab state (India) provided required information on standardised self-report measures. The data were subjected to regression analysis, and the findings show that the participants who scored high on emotion regulation difficulties reported engagement in HRBs more than their counterparts. Some specific difficulties are more important than others for different forms of HRBs. It implies that the intervention

	programmes targeting specific HRBs should address specific facets of emotional dysregulation.
26.	Engineering strong magnetic dipole resonance in all-dielectric metasurfaces M Khokhar, RV Nair - Workshop on Recent Advances in Photonics, 2022 **Abstract**: We have investigated the all-dielectric metasurface comprising the square array of nanodisks periodically arranged in two dimensions. The studies examined by performing the simulations determine the origin of the electric and magnetic dipole resonances induced by the structure. The underlying physics of the different resonances is elucidated by tuning the diameter, height, and periodicity of the metasurface. The strong magnetic dipole resonant feature with high scattering efficiency is scrutinized by engineering the structural parameters optimized at the desired resonance wavelength for the metasurface. The studies are crucial to illustrate such metasurfaces with enhanced magnetic behavior for various magneto-optical studies.
27.	Epileptic Seizure Stage Classification from EEG Signal Using ResNet18 Model and Data Augmentation VK Dubey, S Sarkar, R Shukla, G Singh, A Sahani - IEEE Delhi Section Conference, 2022 **Abstract**: Epilepsy is a widespread neurological disorder nowadays. It can occur to people of any age and any physiological condition. For the proper treatment of epilepsy, the accurate detection of epileptic seizures is crucial. There are many procedures available, and research is still going on. This study focuses on detecting and classifying epileptic seizures from EEG signals using the Convolutional Neural Network. For this purpose, data augmentation was implemented on EEG signals first. We divided the raw signal into four parts of 5 seconds and then rearranged it with four different combinations. We have applied Continuous Wavelength Transform in these newly formed signals to construct the scalogram images. These images were later classified using ResNet-18. The stages classified were Ictal vs. Interictal, Normal vs. Ictal, Normal vs. Interictal. We found the accuracy of 98.4%, 99.1%, and 98.2%, respectively. The accuracy and acceptance of the method can be developed further by applying different epileptic datasets and tuning other neural network parameters.
28.	Exploration of a Psychological Defensive Syndrome Against Depressive Symptomatology in a Community Sample of Indian Women P Singh, N Mishra - Psychological Reports, 2022 **Abstract**: The prevalence of depressive symptomatology in Indian women and the associated treatment gap are alarming and require interventions at a community level. Such interventions may succeed if the specific risk and protective factors are appropriately identified and addressed. Identifying such factors may suggest a Psychological Defensive Syndrome (PDS) against depressive symptomatology, and inculcating this PDS through specific interventions may help individuals manage depressive symptomatology. For evaluating the feasibility of such an idea, a two-phase research project was initiated, and the current paper presents findings of its first phase. The primary aim of the first phase was to explore the predictive relationship between depressive symptomatology and rumination, reappraisal, resilience, self-efficacy, neuroticism, and extraversion. A total of 671 women (Mage = 23.71) responded to standardized questionnaires in a semi-structured interview setting. The obtained data were subjected to correlational, regression, and path analysis. The findings support all the hypotheses; women, who reported less engagement in rumination and more in reappraisal, who scored low on neuroticism and high on extraversion, resilience and self-efficacy, showed less severe depressive symptoms than their counterparts. This pattern can be thought of as a PDS against depressive symptoms in Indian women. These results highlight the importance of addressing these factors in preventing and assuaging depressive symptomatology in Indian women.

29.	Fault-Tolerant and Self-Reliant Characteristic in Series Resonant Converter for Semiconductor Open/Short Circuit Faults PS Bhakar, J Kalaiselvi - IEEE Journal of Emerging and Selected Topics in Power Electronics, 2022 **Abstract**: With the increased popularity of series resonant converter (SRC) in grids and microgrids, a robust converter with fault-tolerant feature becomes supremely important. A single switch primary side failure results in half of the pre-fault voltage and lesser power at the output. While a secondary side short circuit fault results in negligible voltage and power leading to discontinuous converter operation. For more than one switch fault on any side, the SRC behavior in the post-fault condition is different. This paper analyses the self-reliant characteristic in SRC for single/two switches open and short circuit fault. A post-fault correction is proposed which maintains the continuity of operation and the rated output voltage at the load for different fault conditions. A fault-tolerant capacitor is used along with the control parameter variation in the post-fault correction for a single switch and different combinations of two switch faults. The proposed method is also applicable for single diode short circuit or open circuit fault. The analysis of the self-reliant feature and the post-fault correction is discussed and tested on a 1 kW, 250 V SRC prototype for different fault conditions.
30.	Hellinger–Reissner principle based stress–displacement formulation for three-dimensional isogeometric analysis in linear elasticity DS Bombarde, M Agrawal, SS Gautam… - Computer Methods in Applied Mechanics and Engineering, 2022 **Abstract**: In case of Lagrangian finite element formulation, three-dimensional (3-D) stress-based hybrid solid elements have shown excellent coarse mesh accuracy for a wide range of applications. However, to the best of our knowledge, there is no work available towards the development of 3-D stress-based hybrid solid elements for isogeometric analysis (IGA). In this work, we propose stress-based hybrid solid elements to alleviate the issue of locking arising in non-uniform rational B-spline (NURBS)-based IGA. The present work primarily focuses on the linear elasticity, though the formulation can be extended to the non-linear regime. We believe that the excellent coarse mesh accuracy provided by the proposed elements will further enhance the IGA in various applications, especially involving structures with high aspect ratios and nearly incompressible materials. The proposed elements are constructed based on a two-field Hellinger–Reissner variational statement, where stress and displacement fields are interpolated separately. The stress interpolation functions have been derived systemically for various orders of NURBS displacement interpolation functions. Further, we show mathematically that the choice of the stress interpolation functions is free from spurious zero-energy modes. Lastly, the results of numerous 3-D linear-elastic benchmark problems are presented to demonstrate the efficacy and robustness of the proposed elements. The results confirm the superior coarse mesh accuracy for structures with high aspect ratios and almost incompressible materials.
31.	Hybrid turning process by interacting ultrasonic vibration and laser energies N Deswal, R Kant - Materials and Manufacturing Processes, 2022 **Abstract**: Hybrid machining processes are developed to achieve enhanced machining performance for various materials. In this study, ultrasonic vibration and laser sources interact simultaneously during the hybrid turning process and the process is termed ultrasonic vibration laser-assisted turning (UVLAT). Ultrasonic vibration-assisted turning (UVAT) fixture is mounted along with laser assisted turning (LAT) fixture on the lathe machine during the developed hybrid process. An experimental investigation on aluminum 3003 alloy is performed to analyze the machining

	performance for conventional turning (CT), UVAT, LAT, and UVLAT. Cutting speed and laser power are varied to machine aluminum alloy during various processes. The investigation shows that lower machining forces, higher machining temperature, smooth and lesser segmented chips, and lower surface roughness are obtained during UVLAT in comparison to CT, UVAT, and LAT. At higher cutting speed, machining forces and surface roughness are increased and decreased at higher laser power, whereas vice versa to machining temperature with variation in speed and power. Smooth edges and less segmentation are observed at higher laser power and cutting speed. Outcomes suggest that the machining performance of aluminum alloy is enhanced during the UVLAT process when compared with other processes.
32.	Identifying critical transitions in complex diseases S Deb, S Bhandary, SK Sinha, MK Jolly, PS Dutta - Journal of Biosciences, 2022 **Abstract**: Mortality and the burden of diseases worldwide continue to reach substantial numbers with societal development and urbanization. In the face of decline in human health, early detection of complex diseases is indispensable, albeit challenging. In this review, we document the research carried out thus far on the appearance of complex diseases marked by a critical transition or a sudden shift from a healthy state to a disease state. The theory of resilience and critical slowing down can provide practical tools to forecast the onset of various fatal and perpetuating diseases. However, critical transitions in diseases across diverse temporal and spatial scales may not always be preceded by critical slowing down. In this backdrop, an in-depth study of the underlying molecular mechanisms provides dynamic network biomarkers that can forecast potential critical transitions. We have put together the theory of complex diseases and resilience, and have discussed the need for advanced research in developing early warning signals in the field of medicine and health care. We conclude the review with a few open questions and prospects for research in this emerging field.
33.	Interaction of surface water waves with a finite dock over two-stepped bottom profile A Choudhary, N Kumar, SC Martha - Marine Systems & Ocean Technology, 2022 **Abstract**: Based on linear water wave theory, scattering of surface waves by a finite dock over two step-type bottom topography is examined. A matched eigenfunction expansion method is employed where both propagating as well as non-propagating modes are considered. The expansion method is applied to the evaluation of the physical quantities, namely, the reflection and transmission coefficients of monochromatic waves caused by the finite dock and the abrupt depth change. These coefficients are validated with the results available in literature for a particular case where a good agreement is achieved. The force and moment on the finite dock are obtained numerically. The effect of various parameters on the reflection coefficient, transmission coefficient, force and moment is studied through different graphs. The energy identity relation, an important factor of the study, is derived and verified. This problem is further generalized to M-steps and the comparison is made between the flat bottom, 2-step bottom and M-steps bottom. The present results are compared with the results available in the literature. In the present study, it is highlighted that the reflection is increasing with increasing the wave number, dock length and width of the step-1 whereas the transmission coefficient is decreasing for the same. Hence, the rigid dock and the two step bottom topography help to create the calm zone in the lee side of the floating rigid dock. This information will be helpful for the marine scientists and engineers while making the breakwaters.
34.	Interface and Interphase in Carbon Nanotube-Based Polymer Composites: A Review HS Bedi, PK Agnihotri - Handbook of Epoxy/Fiber Composites, 2022 **Abstract**: The average mechanical properties of carbon fiber-reinforced polymer composites (CFRP) primarily depend on the properties of the constituents and the interaction between them.

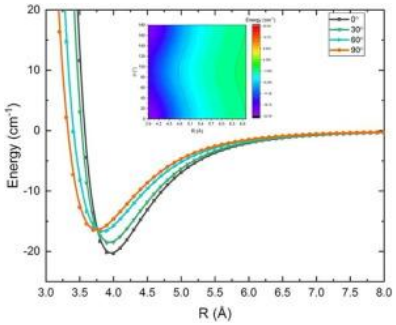
	The strength of interaction is related to the extent of interface surrounding the fiber. Enhancing the interfacial area is one of the strategies to improve the interfacial strength and hence average mechanical properties of CFRP. To this end, a review is presented on the conventional and advanced approaches followed to improve the interfacial interaction. The advanced methods include the incorporation of nanofiller such as carbon nanotubes in the composite which act as secondary reinforcement in addition to the primary fiber reinforcement. This is followed by a discussion on the importance of interphase region (a region having distinct properties from fiber and matrix) and the ways to process and characterize the same.
35.	Inverse tempered stable subordinators and related processes with Mellin transform N Gupta, A Kumar - Statistics & Probability Letters, 2022 **Abstract**: In this article, the infinite series form of the probability densities of tempered stable and inverse tempered stable subordinators are obtained using Mellin transform. Further, the densities of the products and quotients of stable and inverse stable subordinators are worked out. The asymptotic behaviors of these densities are obtained as $x \to 0+$. Similar results for tempered and inverse tempered stable subordinators are discussed. Our results provide alternative methods to find the densities of these subordinators and complement the results available in literature.
36.	Iron and Copper based bifunctional catalysts for base & solvent free CN coupling of amines and aryl/benzyl chlorides under aerobic conditions C Sharma, AK Srivastava, D Sharma, RK Joshi - New Journal of Chemistry, 2022 **Abstract**: The iron chalcogenide carbonyl cluster $Fe_3Se_2(CO)_9$ and $Cu(OAc)_2$ were found to be outstanding bimetallic catalysts for the C–N coupling reaction of amines and aryl chlorides. The reaction proceeds under base- and solvent-free conditions at 100 °C to produce excellent transformations of N-arylated products in just 4 h. The method works equally well for all the possible variants of amines, including aliphatic, aromatic and benzylic amine. The present C–N coupling method is highly economical, strongly feasible, and shows excellent competence with electron-withdrawing and base-sensitive functionalities. Moreover, it is the first report in which a zero-valent iron complex has been explored for C–N coupling reaction.
37.	Is Indonesia's Current Account Balance Optimal? Evidence from an Intertemporal Approach B Garg, KP Prabheesh - Buletin Ekonomi Moneter Dan Perbankan, 2022 **Abstract**: This study investigates whether Indonesia's Current Account (CA) balance is intertemporally solvent. We provide fresh evidence on Indonesia's CA deficit solvency by considering post-crisis period data and conducting sub-sample analysis. Our findings suggest that Indonesia's CA is not solvent. We notice evidence of excess lending prior to the global financial crisis of 2008 and excess borrowing in the postcrisis period. Policymakers need to focus on the composition of capital flows and management of volatile capital flows since discouraging foreign capital inflows may serve as a deterrent to economic growth.
38.	Machinability analysis of Titanium 64 using ultrasonic vibration and vegetable oil J Airao, CK Nirala - Materials and Manufacturing Processes, 2022 **Abstract**: Industries have been pursuing a competent machining strategy that fulfills the necessity of sustainability without deteriorating tool wear or final product quality of components made from difficult-to-cut material Titanium 64. This article attempts a combination ultrasonic vibration with vegetable oil-based cutting fluid (VCF), to increases the tool life and machinability of Titanium 64. In-house developed Ultrasonic-assisted turning (UAT) setup for vibration, and emulsion of 10% Canola oil for cooling, are used. The machinability in respect of cutting and feed force, tool-chip contact length, and flank and crater wear, are examined. As a result, the UAT under VCF offers a

	reduction in tool-chip contact length by 12–45%, cutting force by 10–25%, and feed force by 20–40%. Moreover, ultrasonic-assisted turning using vegetable oil-based cutting fluid also decreases the adhesion and abrasion wear from the rake face, which is obvious in the conventional turning process of Titanium 64.
39.	Machinability of Ti-6Al-4V and Nimonic-90 in ultrasonic-assisted turning under sustainable cutting fluid J Airao, CK Nirala - Materials Today: Proceedings, 2022 **Abstract**: Issues related to the machinability of hard-to-cut materials such as Titanium and Nickel base superalloy are well studied in past. This article attempts a comparative machinability study of Ti-6Al-4V and Nimonic-90 using conventional and ultrasonic-assisted turning . The ultrasonic-assisted and conventional turning for both the materials are performed under dry and sustainable cutting fluid , i.e., vegetable oil-based cutting fluid, keeping all the process parameters constant. Canola oil is used as vegetable oil. The machinability in terms of power consumption and tool life is analyzed. The ultrasonic-assisted turning under sustainable cutting fluid significantly reduces the power consumption and improves the tool life for both the materials. Comparing the machinability of both the materials, Ti-6Al-4V exhibits higher machinability than Nimonic-90. The sustainable cutting fluid leads to promote sustainability in the machining of Ti-6Al-4V and Nimonic-90.
40.	Music Identification Using Brain Responses to Initial Snippets P Pandey, G Sharma, KP Miyapuram, R Subramanian… - IEEE International Conference on Acoustics, Speech and Signal Processing, 2022 **Abstract**: Naturalistic music typically contains repetitive musical patterns that are present throughout the song. These patterns form a signature, enabling effortless song recognition. We investigate whether neural responses corresponding to these repetitive patterns also serve as a signature, enabling recognition of later song segments on learning initial segments. We examine EEG encoding of naturalistic musical patterns employing the NMED-T and MUSIN-G datasets. Experiments reveal that (a) training machine learning classifiers on the initial 20s song segment enables accurate prediction of the song from the remaining segments; (b) β and γ band power spectra achieve optimal song classification, and (c) listener-specific EEG responses are observed for the same stimulus, characterizing individual differences in music perception.
41.	Nanoparticles impact on miscible viscous fingering with absorbing boundary condition at inlet A Kumar, M Mishra - Physical Review Fluids, 2022 **Abstract**: The addition of nanoparticles in fluids significantly influences the fluid's viscosity and can be helpful to control viscosity-driven instability. In this work, we analyze how such nanoparticles modulate viscosity and impact miscible viscous fingering (VF) dynamics. We consider the flow configuration such that the Hele-Shaw cell is initially filled with a viscous fluid and then displaces it with other viscous fluid-carrying nanoparticles through the inlet boundary, which corresponds to the absorbing boundary condition. A closed-form solution of base-state flow using the Laplace-transform method is obtained, which overcomes the discrepancy of the base-state solution known in the form of an infinite series as available in the literature. Due to the time-dependency and nonmonotonic nature of the base state, nonmodal linear stability analysis in the self-similar domain is used to determine the onset time of instability. In this work, the effects of various governing flow parameters such as nanoparticles diffusive coefficient (α_{np}), effective log-mobility ratio (R), and deposition rate of nanoparticles (Da_{dep}) on the instability are studied. Our finding suggests that the onset occurs early with increasing Dadep for $\alpha_{np}>1$, whereas such onset time is a nonmonotonic function of Da_{dep} for smaller values of αnp. In addition, our results indicate that the onset time is a nonmonotonic function of α_{np} for the smaller value of Da_{dep}, whereas such

	onset time is an increasing function of α_{np} for the larger value of Da_{dep}. Further, nonlinear simulations are performed using COMSOL MULTIPHYSICS, and the nonmonotonic nature on the onset of instability for different α_{np} is observed which is in good agreement with the linear stability analysis results. The present investigation removes various inconsistencies in the literature about the impact of the nanoparticles on VF with the quasi-steady-state approximation.
42.	Non-relativistic conformal field theory in the presence of boundary RK Gupta, R Singh - Journal of High Energy Physics, 2022 **Abstract**: We study non-relativistic conformal field theory on a flat space in the presence of a planar boundary. We compute correlation functions of primary operators and obtain the expression for the boundary conformal block. We also discuss the non-relativistic conformal field theory on a general curved background in the presence of a boundary. As an example, we discuss the spectrum of boundary primary operator and compute scaling dimensions in a fermionic theory near one and three spatial dimensions.
43.	Novel Data Processing Approaches for Testing and Evaluation of Mild Steel Sample Using Frequency-Modulated Thermal Wave Imaging A Rani, V Kher, K Kaur, R Mulaveesala - Advances in Non Destructive Evaluation: Part of the Lecture Notes in Mechanical Engineering book series, 2022 **Abstract**: Frequency-modulated thermal wave imaging (FMTWI) is an emerging thermal non-destructive testing and evaluation (TNDT&E) technique widely used for damage monitoring of various structural materials. The present paper discusses the theoretical aspects of a three-dimensional simulated mild steel model for FMTWI to predict the detection of air defects. In this paper, a comparative evaluation of the results has been carried out by the conventional frequency-domain-based post-processing scheme and is compared with the recently proposed correlation-based time-domain data processing approach. Results show the merits of the time-domain-based post-processing scheme over the frequency-domain-based analysis schemes for improved defect detection capability.
44.	Optimal Synthesis of Unconventional Links for Modular Reconfigurable Manipulators A Dogra, SS Padhee, E Singla - Journal of Mechanical Design, 2022 **Abstract**: Customization of manipulators having unconventional parameters and link shapes have gained attention to accomplish non-repetitive tasks in a given cluttered environment. Adaptive modular and reconfigurable designs are being used to achieve customization, and have provided time and cost-effective solutions. Major challenges are associated to provide the systematic approach on the design and realization of modular components considering connectivity and integration with each other. This paper focuses on the architectural synthesis of modular links, optimized with respect to the dynamic torques while following a prescribed set of trajectories. The design methodology is proposed as an Architecture Prominent Sectioning-k strategy which assumes a modular link as equivalent system of k number of point masses, performing optimization to minimize the joint torques and map the resulting re-adjusted point masses into a possible architecture. The proposed strategy is general and can be applied to planar or spatial manipulators with n-DoF even with non-parallel and non-perpendicular jointed configurations. The design of optimal curved links is realized resulting from the optimized solution considering the dynamics of the modular configurations over primitive trajectories. The proposed modular library of unconventional curved link modules with joint modules have shown lesser requirement of the joint torques compared to the conventional straight links.

45.	Photonic materials: from fundamentals to applications RV Nair, F Wang, X Yang, C Jagadish - The European Physical Journal Special Topics (Editorial), 2022
46.	Polymer curing assisted formation of optically visible sub-micron blisters of multilayer graphene for local strain engineering M Pandey, R Kumar - Journal of Physics: Condensed Matter, 2022 **Abstract**: The local or global straining techniques are used to modulate the electronic, vibrational and optical properties of the two-dimensional (2D) materials. However, manipulating the physical properties of a 2D material under a local strain is comparatively more challenging. In this work, we demonstrate an easy and efficient polymer curing assisted technique for the formation of optically visible multilayer graphene (MLG) blisters of different shapes and sizes. The detailed spectroscopic and morphological analyses have been employed for exploring the dynamics of the confined matter inside the sub-micron blisters, which confirms that the confined matter inside the blister is liquid (water). From further analyses, we find the nonlinear elastic plate model as an acceptable model under certain limits for the mechanical analyses of the MLG blisters over the (poly)vinyl alcohol (PVA) polymer film to estimate the MLG-substrate interfacial adhesion energy and confinement pressure inside the blisters. The findings open new pathways for exploiting the technique for the formation of sub-micron blisters of the 2D materials for local strain-engineering applications, as well as the temperature-controlled release of the confined matter.
47.	Progress and challenges in layered two-dimensional hybrid perovskites PP Mohanty, R Ahuja, S Chakraborty - Nanotechnology, 2022 **Abstract**: Dimensionality is the game-changer property of a material. The optical and electronic properties of a compound get dramatically influenced by confining dimensions from 3D to 2D. The bulk 3D perovskite materials have shown remarkable up-gradation in the power conversion efficiency, 1hence grabbing worldwide attention. But instability against moisture, temperature, and ion migration are the factors constantly back-stabbing and hindering from full-scale commercialization. 2D Perovskite material has emerged as an excellent bridging entity between structural-chemical stability, and viable commercialization. Organic-inorganic 2D perovskite materials come with a layered structure in which a large organic cation layer as a spacer is sandwiched between two inorganic metal halide octahedra layers. Moreover, hydrophobic spacer cations are employed which isolate inorganic octahedral layers from water molecules. Hydrophobic spacer cations protect the authentic structure from being degraded. These layered structures occur in two phases namely the Ruddlesden-Popper phase and Dion-Jacobson phase, depending on the spacer cation types. Alternating inorganic and organic layers form multiple quantum wells naturally, along with Spin-Orbit-Coupling (SOC) gives Rashba Splitting.[1] 2D perovskite materials are coming up with interesting chemical, physical properties like exciton dynamics, charge carrier transport, and electron-phonon coupling as a result of the quantum confinement effect. Despite appreciable stability, limited charge transport and large bandgap are limiting the application of 2D perovskite materials in solar cells.[2] These limitations can be overcome by using the concept of 2D/3D multidimensional hybrid perovskites, which includes the long-term stability of 2D perovskite and the high performance of 3D perovskite at the same time. Here in this perspective, we have given brief insight on structural versatility, synthesis techniques, some of the unique photophysical properties, potential device fabrication, and recent advancements in the 2D structure to stand against degradation. Certain shortcomings and future outlooks are also discussed to make the perspective more informative.

48.	Real-time Estimation of Nitrogen, Phosphorus, and Potassium in Soil V Reddykapa, A Jayavardhan, H Panguluru, M Garg, G Gill, S Agarwal, N Gupta - IEEE Delhi Section Conference, 2022 **Abstract**: Nitrogen (N), Phosphorous (P), and Potassium (K) are considered the most important nutrients and are essential components in the soil affecting the growth and yield of crops. For optimal growth of the plant, the nutrients N, P, and K present in the soil must be in a balanced proportion. However, based on the parent material (like sand, peat, and clay), climatic conditions, and the differences in the past management of the crop residues and the use of fertilizers, the farmers need to know the accurate proportions of N, P, and K to maximize the crop growth, production, and yield. Therefore, its measurement to maintain an accurate balance is crucial. In this paper, two methods to estimate N, P, and K in the soil are proposed which can provide results in real-time without the need for any chemicals. The first method makes use of electrical conductivity and pH sensors to measure these parameters from the soil and uses machine learning techniques to estimate the N, P, and K values. The second method makes use of optical sensors to measure the amount of light absorbed and reflected by the soil and uses regression techniques to estimate N, P, and K. In both cases, the N, P, and K values are classified into different classes. We obtain more than 75% accuracy in both cases. A hand-held electronic device to measure N, P and K can be easily designed using these techniques. The proposed schemes can optimize fertilizer usage as well as assist farmers in an economical and efficient crop yield.
49.	Recent developments in spark erosion–based machining processes: A state of the art in downscaling of spark erosion based machining processes (Chapter 5) R Nadda, CK Nirala - Advanced Machining and Finishing: Handbooks in Advanced Manufacturing, 2021 **Abstract**: Spark erosion or electrical discharge–based machining processes are electrothermal energy-based advanced machining processes. These processes have been identified and developed to overcome the challenges of conventional machining. The present chapter includes a wide range of studies and research work performed from the spin-off electrical discharge machining (EDM) to the different advancements in EDM-based processes. The study addresses the μ-EDM variants, which includes monitoring and optimization of different factors that influence the machining productivity and efficiency. This study also highlights a comprehensive review of the advanced robust control strategies developed for tool condition monitoring and tool wear compensation systems in real time for EDM-based processes. The closing section of the chapter discusses the outlines and future research scope.
50.	Rotational quenching of C_2 with ^{3}He and ^{4}He collisions at ultracold temperatures Ritika, TJD Kumar - Chemical Physics Letters, 2022 **Abstract**: Quantum mechanical closed coupling scattering calculations are carried out at temperatures ranging from 10^{-8} K to 100 K for studying rotational transitions of C_2 due to collisions with ^{3}He and ^{4}He employing our new C2-He potential energy surface computed at the CCSD(T)-F12b/aug-cc-pVQZ level of theory. Among the isotopes of He, the heavier ^{4}He isotope has larger value of rotational quenching cross section than ^{3}He isotope. Wigner's threshold law holds below 10^{-1} cm^{-1}. Quenching rate coefficients suggest that C_2 can be cooled with ^{4}He buffer gas. The dominance of ^{4}He on C_2 molecule is further addressed by calculating the predissociation lifetime of C_2.

	Graphical Abstract: 
51.	Ru-decorated N-doped carbon nanoflakes for selective hydrogenation of levulinic acid to γ-valerolactone and quinoline to tetrahydroquinoline with HCOOH in water A Chauhan, AK Kar, R Srivastava - Applied Catalysis A: General, 2022 **Abstract:** The effective dissociation of biomass-derived formic acid, as a sustainable hydrogen source, in water is explored for the hydrogenation of levulinic acid (LA) and quinoline. Ru decorated carbon nanoflakes prepared by carboreduction (in Ar/H2 atmosphere) of Ru containing N-doped carbon were used as catalysts. The successful formation of Ru-decorated N-doped carbons was confirmed by numerous spectroscopic tools. The catalyst exhibited outstanding activity and selectivity for the hydrogenation of LA and quinoline using formic acid as a hydrogen donor in water under mild conditions. The catalyst afforded 99.8% LA conversion and 100% selectivity for γ-valerolactone (GVL), whereas 99.8% quinoline conversion and 93% selectivity for 1,2,3,4-tetrahydroquinoline (THQ) were obtained. Recycling experiments suggested that the catalyst was stable even after the 5 cycles. Various controlled experiments and characterizations were conducted to demonstrate the structure-activity relations and suggest plausible reaction mechanisms for the hydrogenation of LA and quinoline. The exploration of formic acid as a sustainable H2 source and the development of metal decorated N-doped carbons for hydrogenation of LA and quinoline will be fascinating to catalysis researchers and industrialists.
52.	Selenium nanoparticles stimulate osteoblast differentiation via BMP-2/MAPKs/β-catenin pathway in diabetic osteoporosis S Poleboina, VG Sheth, N Sharma, P Sihota, N Kumar… - Nanomedicine, 2022 **Abstract:** Aim: To evaluate whether selenium nanoparticles (SeNPs) can stimulate bone formation and inhibit the bone loss involved in hyperglycemia-induced osteoporosis. Methods: Rat osteoblastic UMR-106 cells were used for in vitro studies and female Sprague–Dawley rats were used for type 2 diabetes-associated osteoporosis in vivo study. Results:In vitro studies show that SeNPs promote osteoblast differentiation via modulating alkaline phosphatase (ALP) activity, and promoting calcium nodule formation and collagen content. The authors also provide evidence regarding the involvement of the BMP-2/MAPKs/β-catenin pathway in preventing diabetic osteoporosis. Further, in vivo and ex vivo studies suggested that SeNPs can preserve mechanical and microstructural properties of bone. Conclusion: To the best of our knowledge, this study provides the first evidence regarding the therapeutic benefits of SeNPs in preventing diabetes-associated bone fragility.
53.	Self-assembled di-and tripeptide gels for the passive entrapment and pH-responsive, sustained release of an antidiabetic drug, glimepiride M Halder, Y Bhatia, Y Singh - Biomaterials Science, 2022 **Abstract:** Diabetes is a global epidemic that poses a severe challenge to public health. The

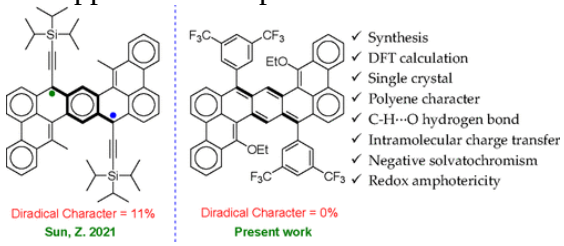
	characteristic features of this disease are hyperglycemia and deterioration of the function of pancreatic β-cells, which leads to oxidative stress and organ damage. Glimepiride is used to treat type II diabetes but is associated with side effects, like lower half-life, faster elimination, and hypoglycemia. Self-assembled peptide gels have drawn attention as a drug delivery depot because of their biocompatibility, diverse design, tunable functionality, and dynamic self-assembly properties. In order to overcome the challenge of oxidative stress and side effects associated with the use of glimepiride, we have developed glimepiride-loaded, self-assembled peptide gels from di- and tripeptides employing amino acids with inherent antioxidant properties. Dipeptides, Fmoc-Tyr-Tyr-NH2 (YY) and Fmoc-Trp-Trp-NH_2 (WW), and a tripeptide, Fmoc-Trp-Trp-His-NH_2 (WWH), were developed and self-assembled into gels. The gels exhibited excellent viscoelastic properties and self-healing abilities, and the presence of β-sheet secondary structures. The dipeptide gels provided a sustained drug release but more drug was released at physiological pH (7.4) than acidic pH (5 and 6), whereas the tripeptide gel released more drug at acidic pH. The gels showed free radical scavenging activities of more than 90% and were able to decrease the amount of oxidative stress caused by the ROS in HepG2 cells. They were non-toxic to the cell line tested and HepG2 cells treated with the releasate of tripeptide gels showed enhanced glucose uptake. This work for the first time reports the development of glimepiride-loaded self-assembled peptide gels, which can serve as a dynamic, multidimensional biomaterial to reduce oxidative stress, hypoglycemia, and repetitive dosing of drugs in diabetic patients by controlling glimepiride release.
54.	Sensing of environmentally and biologically important analytes using organic nanoparticles (ONPs) (Chapter 12) S Sharma, A Singh, N Kaur, N Singh - Sensing and Biosensing with Optically Active Nanomaterials: Micro and Nano Technologies, 2022 **Abstract:** Over the last few decades, nanoparticles' importance has increased significantly for molecular recognition, drug delivery, bioimaging, and biomedical application. Organic nanoparticles (ONPs) are an emerging class of nanotechnology owing to their excellent water solubility, variation in flexibility of material synthesis, easy availability of the organic molecules, biodegradation, biocompatibility, and photostability. In this chapter, we will cover the fabrication techniques of the ONPs followed by their types. We will further cover the techniques such as UV-visible absorption spectroscopy, fourier-transform infrared spectroscopy (FTIR), scanning electron microscope (SEM), transmission electron microscopy (TEM), dynamic light scattering (DLS), and Zeta-potential used to characterize ONPs. Additionally, we will discuss the application of ONPs in the sensing and biosensing of ions, neutral molecules, and biomolecules, along with their mechanisms.
55.	Si doped T-graphene: 2D Lattice as Anode electrode in Na Ion Secondary Batteries N Yadav, TJD Kumar - New Journal of Chemistry, 2022 **Abstract:** Heteroatom doping into 2-dimensional lattice of materials such as graphene brings revolutionary reform in the field of materials endowing remarkable properties to the parent material. Herein, a state-of-the-art 2-dimensional carbon lattice doped by Si atom, Si-doped T-graphene (t-SiC_3), has been reported depicting its application as anode electrode material in secondary Na ion batteries. The detailed theoretical investigation following density functional theory establishes the geometric, physical, and chemical domains of the monolayer. The metallic nature of the monolayer verified by the density of states adds up to its advantage of being used as the electrode. Moreover, efficient adsorption in conjugation to easy diffusion emphasizes the high rate kinetics of the monolayer. Efficient redistribution of charge is achieved signifying energetically stable adsorption of Na ion during the electrochemical half cell cycle. For practical realization, an efficient storage capacity of 686 $mAhg^{-1}$ assisted with less energy barrier of 0.3 eV for Na ion

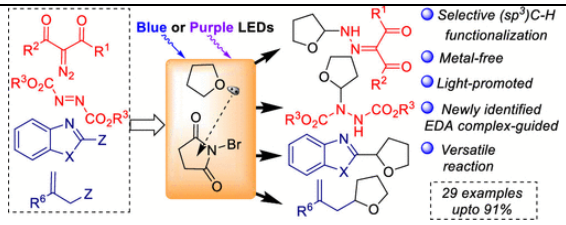
	diffusion is obtained. Further, the average voltage of 0.2 V calculated for t-SiC_3 renders its efficacy for anode material to be used in reversible Na ion batteries. The properties underlying t-SiC_3 extend its prospective in a wide spectrum of applicability.
56.	Stabilizing superconductivity of ternary metal pentahydride $CaCH_5$ via electronic topological transitions under high pressure from first principles evolutionary algorithm P Tsuppayakorn-Aek, N Phaisangittisakul, R Ahuja… - Scientific Reports, 2022 **Abstract:** We explored the phase stability of ternary pentahydride $CaCH_5$ based on the first principles evolutionary algorithm. Here, we successfully search for a candidate structure up to 500 GPa. As a consequence, the possible stable structure of $CaCH_5$ is found be to a monoclinic structure with space group Pm at a pressure of 50 GPa. Moreover, the orthorhombic structure with a space group of Cmcm is found to be thermodynamically stable above 316 GPa. With this, the Kohn-Sham equation plays a crucial role in determining the structural stability and the electronic structure. Therefore, its structural stability is discussed in term of electronic band structure, Fermi surface topology, and dynamic stability. With these results, we propose that the superconducting transition temperature (T_c) of Cmcm structure is estimated to be 50 K at 450 GPa. This could be implied that the proposed Cmcm structure may be emerging as a new class of superconductive ternary metal pentahydride. Our findings pave the way for further studies on an experimental observation that can be synthesized at high pressure.
57.	Stochastic failure analysis of proximal femur using an isogeometric analysis based nonlocal gradient-enhanced damage model A Soni, S Kumar, N Kumar - Computer Methods and Programs in Biomedicine, 2022 **Abstract:** Background and objective Medical imaging-based finite element methods are more accurate tools for fracture risk prediction than the traditional aBMD based methods. However, these methods have drawbacks like geometric errors, high computational cost, mesh-dependent results, etc. In this article, the authors have proposed an isogeometric analysis-based nonlocal gradient-enhanced damage model to overcome some of these issues. Moreover, there are uncertainties in the values of input parameters for such analysis due to various measurement errors. Hence, stochastic analysis is performed to quantify the effect of these parametric uncertainties on the fracture behavior of the proximal femur. Methods Computed Tomography images of a patient are used to create a 2D proximal femur model with a heterogeneous description of material properties. A numerical model based on gradient-enhanced nonlocal continuum damage mechanics is used for fracture analysis of proximal femur to overcome the issues related to mesh dependency in traditional continuum damage mechanics models. Further, a multipatch isogeometric solver is developed to solve the governing equations. Monte Carlo simulations are used to understand the effect of parametric uncertainties on the fracture behavior of the proximal femur. Results The developed numerical framework is used to solve the fracture problem of proximal femur under single leg stance loading conditions. The obtained results are validated by comparing the load-displacement response and the crack path with that given in the literature. Stochastic analysis is performed by considering a ±5% variation in the elastic modulus, damage initiation strain, and the neck-shaft angle values.

	Conclusion The proposed numerical framework can correctly predict the damage initiation and propagation in a proximal femur. The results reveal that the heterogeneous nature of material properties of bone plays a significant role in determining the fracture characteristics of the proximal femur. Further, the results of the stochastic analysis reveal that the parametric uncertainties in the neck-shaft angle have a much more significant influence on the results of the analysis than the parametric uncertainties in the elastic modulus and damage initiation strain.
58.	Strategic design of a bifunctional Ag (I)-grafted NHC-MOF for efficient chemical fixation of CO_2 from dilute gas at ambient conditions R Das, V Parihar, CM Nagaraja - Inorganic Chemistry Frontiers, 2022 **Abstract**: The chemical fixation of carbon dioxide into valuable products constitutes a promising step toward reducing the atmospheric CO2 concentration. Consequently, herein we report the strategic design of a bifunctional catalyst by grafting catalytically active Ag(I) ions onto N-heterocyclic carbene (NHC) sites in a MOF for efficient chemical fixation of CO_2 from a dilute gas to oxazolidinones, bio-relevant commodity chemicals. Indeed, Ag(I)@MOF-NHC demonstrated excellent catalytic activity for efficient fixation of CO_2 from a dilute gas (CO_2[thin space (1/6-em)]:[thin space (1/6-em)]N_2 = 13[thin space (1/6-em)]:[thin space (1/6-em)]87%) with alkynes to afford valuable chemicals, oxazolidinones, under RT and atmospheric pressure (balloon) conditions. The superior activity of the Ag(I) anchored MOF over the individual ($AgNO_3$ and MOF-NHC) components has been ascribed to the synergistic effect between the CO_2-philic NHC and alkynophilic Ag(I) sites exposed in the 1D channels of the MOF. Furthermore, the Ag(I) anchored MOF showed high recyclability without significant loss of catalytic activity and structural rigidity. Overall, this is a unique demonstration of the utilization of dilute CO_2 under environmentally friendly mild conditions and can pave the way for the development of efficient catalytic systems for sustainable utilization of CO_2 from dilute gases.
59.	Structural Diversity of D-Alanine: D-Alanine Ligase and Its Exploration in Development of Antibacterial Agents Against the Multi-Variant Bacterial Infections JS Sidhu, G Joshi, J Sindhu, N Kaur, N Singh - ChemistrySelect, 2022 **Abstract**: D-alanine: D-alanine ligase (Rv2981c or Ddl) (EC 6.3.2.4) is a bacterial protein that performs critical functions for the proper growth and development of bacterial cells. Understanding the activity profile of Ddl within the various strains of the bacteria seems vital in broad-spectrum antimicrobial drug discovery. Therefore, to understand this heterologous nature, we focused on understanding the functional impact of the structural differences in the Ddl protein from Legionella pneumophila and E. coli bacteria. The structural features and dynamic behavior of Ddl, the interaction pattern, and the docking score of the Ddl-ATP/ADP are also found significantly different from each other. In-depth analysis viz molecular dynamics simulation and residue interaction network (RIN) studies provided us the detailed insight into the differences in the Ddl proteins from both the bacteria. In conclusion, understanding the inter-specific differences in the antibiotic targets Ddl in the case of diverse bacterial strains is vital for rationalizing the treatment of these infectious diseases. Therefore, the current work attempts to foresee the development of more efficacious antibacterial agents devoid of emerging resistance to bacterium strains.
60.	Structural Stability and Electronic Properties of 2D MXene Hf3C2F2 Monolayer by Density Functional Theory Approach RP Jadav, P Mishra, S Kumavat, Dt Singh, R Ahuja, Y Sonvane - Biointerface Research in Applied Chemistry, 2023 **Abstract**: The two-dimensional (2D) materials are highly demandable for the high charge rate in

	batteries. In Li-ion batteries, the 2D graphene materials are mostly well-studied. For metallic material, the physical/chemical properties can be tuned because the MXenes surface has a dangling bond according to their functional group, which provides MXenes are novel materials for batter electrochemical performance. The optimization and stability of the $Hf_3C_2F_2$ monolayer are given abinitio molecular dynamics (AIMD) by the density functional theory approach. Here, the monolayer of $Hf_3C_2F_2$ has a stable structure, metallic nature, and low diffusion energy barrier shows a metal anode material for the rechargeable storage device.
61.	Subsurface Storage of Water S Ganguly - Resonance, 2022 **Abstract**: To survive on this planet, to thrive, and to lead a healthy life, water is a basic and essential need. Now, with the growing population, booming industrialization, enhancement of living standards, and changing climate, water has become an asset that we must preserve carefully. Water is presently a major topic of discussion and debate and a matter of possible conflict in the coming years among different provinces, states, countries, and even continents. With the rapidly declining reserves of this asset, the world is looking for solutions for its better management and conservation. This article emphasizes the storage and conservation of underground water in the subsurface porous media. But how does it work in reality? Let us discuss this in detail.
62.	The DESPEC setup for GSI and FAIR AK Mistry, HM Albers, T Arıcı, A Banerjee…Sharma, A - Nuclear Instruments and Methods in Physics Research Section A, 2022 **Abstract**: The DEcay SPECtroscopy (DESPEC) setup for nuclear structure investigations was developed and commissioned at GSI, Germany in preparation for a full campaign of experiments at the FRS and Super-FRS. In this paper, we report on the first employment of the setup in the hybrid configuration with the AIDA implanter coupled to the FATIMA $LaBr_3$(Ce) fast-timing array, and high-purity germanium detectors. Initial results are shown from the first experiments carried out with the setup. An overview of the setup and function is discussed, including technical advancements along the path.
63.	The impact of COVID-19 on the comorbidities: a review of recent updates for combating it JA Malik, S Ahmed, M Shinde, MHS Al-Marmash… - Saudi Journal of Biological Sciences, 2022 **Abstract**: Coronavirus disease is caused by the SARS-CoV-2 virus. The virus first appeared in Wuhan (China) in December 2019 and has spread globally. Till now, it affected 269 million people with 5.3 million deaths in 224 countries and territories. With the emergence of variants like Omicron, the COVID-19 cases grew exponentially, with thousands of deaths. The general symptoms of COVID-19 include fever, sore throat, cough, lung infections, and, in severe cases, acute respiratory distress syndrome, sepsis, and death. SARS-CoV-2 predominantly affects the lung, but it can also affect other organs such as the brain, heart, and gastrointestinal system. It is observed that 75 % of hospitalized COVID-19 patients have at least one COVID-19 associated comorbidity. The most common reported comorbidities are hypertension, NDs, diabetes, cancer, endothelial dysfunction, and CVDs. Moreover, older and pre-existing polypharmacy patients have worsened COVID-19 associated complications. SARS-CoV-2 also results in the hypercoagulability issues like gangrene, stroke, pulmonary embolism, and other associated complications. This review aims to provide the latest information on the impact of the COVID-19 on pre-existing comorbidities such as CVDs, NDs, COPD, and other complications. This review will help us to understand the current scenario of COVID-19 and comorbidities; thus, it will play an important role in the management and decision-making efforts to tackle such complications.

64.	Thermo-hydraulic efficiency and correlation development of an indoor designed jet impingement solar thermal collector roughened with discrete multi-arc ribs R Kumar, S Kumar, R Nadda, K Kumar, V Goel - Renewable Energy, 2022 **Abstract**: The present work examines the combined influence of artificial roughness and jet impingement on the performance of solar air heater (SAH). The impingement jet SAH is roughened with discrete multi-arc-shaped ribs. The experiment is performed by varying the Reynolds number (Re) from 3000 to 19,000. The different roughness parameters of multi-arc ribs varied during experimentation are as follows; relative discrete distance (Dd/Lv) from 0.27 to 0.86, relative discrete width (gw/Hr) from 0.32 to 1.72, relative rib height (Hr/H) from 0.025 to 0.047, relative rib pitch (Pr/H) from 0.58 to 3.1, arc angle (αa) from 35° to 65°, the streamwise pitch ratio (X/Dh) from 0.47 to 1.72 and spanwise pitch ratio (Y/Dh) from 0.46 to 0.82. The Nusselt number (Nu) and friction factor (f) for roughened solar thermal collector are found to be 7.61 and 6.48 times higher than that of smooth channel. A thermal-hydraulic performance of 4.1 is obtained for the array of designed parameters. The correlations are also established for Nu and f using experimental data. So, utilizing roughness element along with jet impingement in SAH is found to have a substantial impact on its thermo-hydraulic performance (η_{thp}).
65.	Three-dimensional miniaturized super wideband antenna with filtering capabilities S Agarwal, A Sharma, IJ Garcia Zuazola, WG Whittow - International Journal of RF and Microwave Computer-Aided Engineering, 2022 **Abstract**: This article presents a miniaturized three-dimensional super wideband antenna with filtering capabilities. A conventional rectangular patch antenna has been modified by truncating its corners with semi-circles and a trapezoidal shaped partial ground plane is utilized to achieve super wideband performance. The planar design is later extended to a 3D design with the addition of three dielectric cuboids in the radiator. The cuboids are inserted at low current density regions within the operating range to achieve miniaturization compared to the planar antenna. The impedance bandwidth of the 3D antenna is ~17.55 GHz, measured from 2.45 to 20 GHz. The filtering capabilities are achieved by means of an upside-down T-shaped resonator introduced in the center of the patch and two U-shaped slots etched from the patch. In total, three interfering communication bands are rejected, WiMAX (3.2–3.8 GHz), IEEE 802.11/WLAN (5.17–5.33 GHz), and ITU (7.7–8.5 GHz). The proposed antenna is miniaturized as it merely has an overall size of $0.20\lambda_l \times 0.19\lambda_w \times 0.011\lambda_h$mm3 (corresponds to 2.45 GHz) compared to the relevant literature. The design has been analyzed using an equivalent circuit model, fabricated and measured for validation. The simulated and measured results are found well in agreement.
66.	Unraveling the Synergistic Participation of Ni–Sn in Nanostructured NiO/SnO2 for the Catalytic Transfer Hydrogenolysis of Benzyl Phenyl Ether A Kumar, AK Kar, R Bal, R Srivastava - Energy & Fuels, 2022 **Abstract**: Selective transfer hydrogenolysis of lignin-derived aromatic ethers by the utilization of hydrogen donor solvent without hydrogenation of aromatic rings is a crucial strategy for the selective production of mono-aromatics. The use of non-noble metal-based catalysts toward transfer hydrogenolysis of an aromatic ether bond with high activity and selectivity is still to be achieved. Herein, we report the synthesis of a non-noble metal-based nanostructured NiO(x%)/SnO2 catalyst for the catalytic transfer hydrogenolysis of benzyl phenyl ether and its homologues ether. The developed catalyst afforded >95% reactant conversion and 100% selectivity toward the aromatic compounds using 2-propanol as a hydrogen source at 250 °C and 4 h in the N2 atmosphere. The catalyst was thoroughly characterized by several physicochemical analytical

	techniques. The oxygen vacancy was analyzed by Raman and FT-IR spectroscopies & XPS analysis, and acidity was analyzed by the temperature-programmed desorption and pyridine-adsorbed FT-IR spectroscopy. The synergistic participation of NiO and SnO2 nanoparticles in NiO/SnO2, reducing ability, and interface formation were confirmed using temperature-programmed reduction, several physicochemical characterization techniques, and control reactions. Based on the catalytic activity data, it is concluded that the appropriate NiO loading (10 wt %) was the dominant factor for controlling the aromatic selectivity. The catalyst was efficiently recycled after a simple calcination process with no substantial loss in the catalytic activity. An in-depth study on the change in the catalyst chemical composition and their regeneration using various characterization techniques was conducted. A simple, cost-effective non-noble catalyst and straightforward eco-friendly transfer-hydrogenolysis catalytic process involving 2-propanol to produce aromatic platform chemicals would attract significant attention from catalysis researchers and industrialists. 
67.	Unveiling a Quinoidal 2, 3: 10, 11-Dibenzoheptazethrene PK Sharma, S Das - The Journal of Organic Chemistry, 2022 **Abstract**: Parent 2,3:10,11-dibenzoheptazethrene is a singlet diradicaloid polycyclic hydrocarbon in the ground state that did not change its diradical character upon substitution (methyl and triisopropylsilylethynyl). Described herein are the synthesis and characterization of an ethoxy/3,5-$(CF_3)_2C_6H_3$-substituted 2,3:10,11-dibenzoheptazethrene 3 that prefers to retain its p-quinoidal core and shows zero diradical character, as determined by single-crystal analysis and density functional theory calculations. Negative solvatochromism, π–π interactions, C_{sp^2}–H···O hydrogen bonding, intramolecular charge transfer, redox amphotericity, and a narrow HOMO–LUMO energy gap make 3 a potential candidate for application in optoelectronics. 
68.	Visible-Light-Mediated (sp^3)Cα–H Functionalization of Ethers Enabled by Electron Donor–Acceptor Complex S Roy, I Chatterjee - ACS Organic & Inorganic Au, 2022 **Abstract**: A synthetically beneficial visible-light-mediated protocol has been disclosed to achieve C–H amination of readily available feedstocks cyclic and acyclic ethers. A rarely identified N-bromosuccinamide–tetrahydrofuran electron donor–acceptor complex served as an initiator to functionalize both α-diazoketones and dialkyl azodicarboxylates. This developed methodology gives an alternative and milder way to construct the C–N bond and can be explored for the formation of C–C bond to perform arylation and allylation reactions.

	
69.	Visual Product Assessment by Using the Eye-Tracking Equipment to Study the Effect of Product Shapes on consumer's Thinking J Singh, P Sarkar - International Conference on Advances in Mechanical Engineering and Material Science: Part of the Lecture Notes in Mechanical Engineering book series, 2022 **Abstract**: Product design has become a significant tool for successful companies. Products arouse emotional feelings in consumers. Emotions can effect buying decisions of consumers as well as product assessments. It is broadly recognized that higher user satiation and better product performance can be reached through product aesthetic design. Integrating emotional value into tangible products has become an important approach for increasing a product's emulative power in the retail market. Therefore, it is a need of manufactures to understand how product aesthetics impact the consumer's emotions. On the other hand, when designing a new product, maximum time focus is paid for the enhancement of its usability and functionality, and very little attention is paid to consumers' emotional desires. In this paper, we investigate the relationship between product structure/features and consumer emotions. Two different products are considered in this study. In addition, by using the four basic pleasures model of Jordan a closed list of product-specific semantic descriptors is developed. An eye-tracker-based experiment and open-ended survey were performed during this study, where substantial connections between product geometry and semantic were found. In this study, we find out the emotional responses for geometric features from users, and the major finding of eye-tracker is discussed in brief in the results section. The study results are helpful in future product development and reduce the failure rate of the product.
70.	Weighted geometric set cover with rectangles of bounded integer side lengths RR Madireddy, A Mudgal - Discrete Applied Mathematics, 2022 **Abstract**: In this article, we study the gradation of the complexity of the weighted set cover problem with axis-parallel rectangles whose side lengths are bounded integers. We show that the mod-one method of Chan and Hu (2015) for unit squares can be extended to these objects to get a polynomial-time approximation scheme (PTAS). We further show that the problem has a polynomial-time algorithm when all rectangles intersect a given horizontal line. On the contrary, we show that even the unweighted version of the problem is NP-hard when every rectangle intersects at least one of two given horizontal lines at the unit vertical distance.