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ABSTRACT BOOK

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19 October 2025-Sunday

ROOM-1

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	ONLINE (19 October 2025-Sunday)
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FOREWORD

Dear Colleagues,
I am pleased to host you all in **"12th International Conference on Computational and Experimental Science and Engineering (ICCESEN-2025)"**. The conference has been taken place in the period of 17-20 October, 2025 in Kemer-Antalya (Turkey) which is one of the best known holiday center in the World. The ICCESEN-2025 will provide excellent international forumand covers highlights about new results in the wide spectrum of categories from science and engineering in theory, methods and applications and also socal sicence in this year. The participants will have the opportunity to take part in the presentation of plenary lectures, contributed papers of both oral and poster session types, and of their scientific discussions. There are 10 different theme in ICCESEN-2025 and planning enlarge this topic in future.
Those are;

Theme 1. Physical Science and Technology
Theme 2. Mathematical Science and Applications
Theme 3. Energy and Applications
Theme 4. Earth Science and Applications
Theme 5. Engineering Science and Applications
Theme 6. Material Science and Applications
Theme 7. Biological and Medical Science and Applications
Theme 8. Education Technologies and Applications
Theme 9. Agricultural Science and Technology
Theme 10. Forestry and Environmental Science and Engineering

I hope that all participants will enjoy their visit and stay in Antalya-Turkey and also hoping to meet you again in somewhere else in Turkey for ICCESEN-2025.

Prof. Dr. İskender AKKURT
Chairman of the ICCESEN

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INVITED SPEAKERS

Sustainable Development in the Global Rankings

Prof.Dr. Mansour Almatarneh
University of Jordan-Jordan

ABSTRACT

The seminar will examine how universities promote sustainability and measure these efforts by three major global rankings: QS Sustainability, THE Impact, and GreenMetric. We will analyze the criteria and impact of each ranking, focusing on their assessment of environmental impact, social justice initiatives, governance, and contributions to the UN's Sustainable Development Goals. The seminar aims to highlight the role of these rankings in encouraging universities to adopt sustainable practices and their influence on university policies and operations towards a more sustainable future.

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Artificial Intelligent as a Concept or as a System: utilizing and conceptualizing AI in Industrial and health care

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ABSTRACT

Knowledge Technology for progressive Quality in Agricultural economy recently belong to the most development issues in the agricultural economics also in food industry. Based on that it has been introduced numerous challenges for novel marketing strategies, efficient management in practical approaches for food consumption. There are integrated technologies addressing these multifaceted challenges and requires a heightened emphasis on improving the quality of various aspects within this dynamic process. By approaching AI as a concept should be defined as association of some progressive aspect like federated learning, Decision support, sentiment analysis and Recommender systems. These all are linking each other navigating, searching, collecting Data, information and Knowledge through a production process, environmental insights, extensive extracted knowledge from text. It will be able to accumulate experiential info's, significant challenge for human resources. We applied AI as a system than we describe multi-dimensional algorithms as nested subroutine which can be called as intelligent Algorithm. This kind of resources and their necessitates for effective approach in today's "Society 5.0" is to optimize and improve, health care and environment. Of course, cyber-technologies is able ability to prove instrumental because of huge data fusion, and offer lot more possibilities to improve qualities in advanced and professional industrial development. Artificial Intelligence (AI) algorithms should have the abilities processing complex tasks, but their solutions often demand extended time or remain unattainable due to time-sensitive data availability. Developing AI algorithms becomes paramount in enhancing our ability to comprehend the intricacies inherent in the challenges we seek to address. AI need more transparency and open sources to be accurate for precision approaches.

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Advancing High-Performance Solar Cells with Ca3NCl3 Perovskite A3BX3-Type Absorbers for Next-Generation Photovoltaics

Dr. Hayat ARBOUZ
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ABSTRACT

Calcium-based inorganic perovskites of the formula Ca3BX3 are emerging as promising, environmentally friendly candidates for photovoltaic applications, particularly as absorbers for single and tandem solar cell structures, due to their advantageous optoelectronic characteristics and thermodynamic stability. This study focuses on the numerical simulation and subsequent optimization of a photovoltaic cell whose absorber layer is the perovskite material Ca3NCl3 with a wide bandgap energy of 1.66 eV. A configured reference structure: ITO/SnS2/Ca3NCl3/P3HT/Ag was used as a reference. A theoretical approach was carefully developed to evaluate critical device parameters such as power conversion efficiency (PCE), open-circuit voltage (Voc), short-circuit current density (Jsc) and fill factor (FF). The variation of these parameters as a function of the intrinsic properties of the materials making up the absorber and the surrounding transport layers was evaluated according to the established simulation model. Analysis of the contours of key cell parameters under the action of combined physical parameters, as well as of the current-voltage characteristic curve, has enabled the evaluation of the performance of the basic structure, as well as structures based on numerous alternative carrier transport layer materials under different conditions, and to define an optimized structure that performs better (PCE = 22%) than the basic one (PCE = 18.5%) and that can serve as an adequate top sub-cell in a more elaborate tandem device capable of achieving conversion efficiencies of over 25% in different outdoor temperature conditions. The aim of this study is to develop stable, non-toxic, high-efficiency perovskite solar cells.

Keywords: *Solar Energy, Perovskite, Simulation, Inorganic*

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Regime-switching models via stochastic optimal control & robust control theory, with applications in finance and insurance

Prof.Dr. Gerhard-Wilhelm WEBER
Poznan University of Technology-POLAND

ABSTRACT

This presentation consists in newest advancements in both (i) stochastic optimal control and games with jumps in finance under delay and regime switching, and (ii) stochastic optimal control and games in pension fund systems with new elements of regime switching and longevity. (iii) Time is reserved to enjoy the beauty of the underlying and employed mathematics, to discussions about pros and cons of different approaches, e.g., maximum principle vs dynamic program and Isaacs-Hamilton-Jacobi-Bellman equation, as well as to outlooks at future studies and applications, such as in physics, neuroscience and cosmology.

***Keywords**: Optimal control and applications, Optimization under uncertainty and applications, SS - Optimal and stochastic optimal control and games*

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Trustworthy AI-enabled Sustainable Technologies

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Edinburgh Napier University, UK

ABSTRACT

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PRESENTATIONS

12th INTERNATIONAL CONFERENCE ON COMPUTATIONAL AND EXPERIMENTAL SCIENCE AND ENGINEERING (ICCESEN-2025)
17-20 October 2025, ANTALYA -TURKEY

Abs. No: 279

OPPORTUNITIES AND LIMITATIONS OF ARTIFICIAL INTELLIGENCE-BASED VISUALISATION TOOLS IN ARCHITECTURAL REPRESENTATION

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ABSTRACT

Digital design tools, which form the basis of contemporary architectural practice, are constantly redefining the conceptual framework and methodologies of the discipline. Digital visualisation and representation software has become indispensable in concretising design ideas and securing project approval. Thanks to advancing computer technologies, these tools contribute significantly to the design process, particularly in lighting production and material representation. The introduction of artificial intelligence technologies has created new opportunities such as ease of use and speed in visualisation, while beginning to replace traditional physics-based systems. However, inaccuracies in light and material representation produced by AI tools have prompted criticism within architectural circles.

This study comparatively examines AI-supported and physics-based visualisation tools in terms of material representation and lighting simulation performance. The aim is to evaluate both technologies comprehensively in the context of design quality, efficiency, and professional applicability, highlighting the opportunities and limitations of AI-based tools. Three interior designs modelled with the 3D Max programme are visualised using traditional tools such as Corona and V-Ray, and AI systems including ChatGPT and Claude. The results are assessed separately for material accuracy and lighting quality. A mixed research approach is employed.

In conclusion,the findings indicate that AI-supported systems offer clear advantages in efficiency, but physics-based engines deliver more reliable results in material representation and light simulation accuracy. These results suggest that no single technological solution satisfies all requirements of architectural practice. Instead, different tools may be most appropriate at different phases of the design process.

Keywords: *Digital architecture, artificial intelligence visualisation, architecture.*

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12th INTERNATIONAL CONFERENCE ON COMPUTATIONAL AND EXPERIMENTAL SCIENCE AND ENGINEERING (ICCESEN-2025)

17-20 October 2025, ANTALYA -TURKEY

Abs. No:6

Optimizing roasting processes in rotary kilns for iron-nickel ores

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ABSTRACT

This paper presents the results of a project aimed at optimizing the roasting processes in rotary kilns used for processing iron-nickel ores. Due to the low nickel content and high moisture levels in iron-nickel ores, the roasting process encounters numerous challenges, necessitating technological interventions to enhance efficiency and improve the quality of the final product.The project involved significant modifications to the body and structure of the rotary kilns, including: Installation of shovels in the body of rotary kilns

- In the first zone, longer shloves were installed to ensure uniform load distribution and more efficient mixing.
- In the second zone, shorter shloves were used to enable optimal heat penetration.
- In the roasting zone, conical shloves were implemented to enhance the pre-reduction rate.

Replacement of refractory material:The previous fireclay material was replaced with reinforced thermoconcrete, resulting in improved thermal resistance and overall process efficiency.Results: Implementing these changes demonstrated substantial improvements in process performance:Pre-reduction rate: Increased from 46.97% in 2018 to 51.14% in 2019, and 53.9% in 2020. Average furnace temperature: Increased from 738°C in 2018 to 751°C in 2019, and 760°C in 2020.These advancements contribute to reducing energy consumption and ensuring a higher-quality composition of the processed material. The adoption of optimized blades and advanced refractory materials has established a successful model for enhancing metallurgical processes in rotary kilns. In the future, pre-drying the ore prior to roasting will remain a critical step for further optimizing this process.

Keywords: *Rotary kiln, Calcine, Pre reduction etc*

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17-20 October 2025, ANTALYA -TURKEY

Abs. No:7

Macroseismic evaluation of the location in Rahovec for the installation of solar panels

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ABSTRACT

Macroseismic assessment is of particular importance for the behavior of engineering structures and other structures of interest to society under the effects of earthquakes. This refers not only to the location of the structures themselves, but also to their wider surroundings. When designing a location for the installation of solar panels, it is necessary to meet several conditions that will allow obtaining high-quality seismic and seismic wave data and determining earthquake parameters with the best possible accuracy. This will provide high-quality seismological data, which are of interest to seismology and earthquake engineering. The accuracy of the earthquake parameters, the geographical coordinates of the epicenter, the hypocentral depth and the hypocentral time (the time at which the earthquake occurred) are a number of factors that affect the macroseismic assessment of a given location.

Keywords: *macroseismic, evaluation, earthquake*

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17-20 October 2025, ANTALYA -TURKEY

Abs. No:13

Antioxidant activity of essential oils and ethanolic extracts of four medicinal plants alone and in combination

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ABSTRACT

The present work aims to evaluate the antioxidant activity of ethanolic extracts and essential oils of aromatic plants of the Lamiaceae family: Thymus algeriensis and Salvia rosmarinus, and Anacardiaceae: Pistacia lentiscus, Myrtaceae: Eucalyptus polybracetea. The polyphenols were measured using the Folin-Ciocalteu method; the results showed that the essential oils studied as well as the ethanolic extracts are relatively rich in polyphenols. Their antioxidant properties were tested by the synthetic DPPH radical trapping method. The IC50 values were determined according to the graph representing the percentage of inhibition of the DPPH radical by essential oils and by ethanolic extracts, according to our results there is a correlation between the level of polyphenols present in the different essential oils and different ethanolic extracts and their ability to neutralize free radicals. Several combinations were carried out between the essential oils and also between the ethanolic extracts in order to determine the type of interactions existing between the combined substances, the results were represented in the form of isobolograms. Additive and super-additive effects were observed in combinations of essential oils, and super-additive and sub-additive effects were observed for combinations of ethanolic extracts.

Keywords: *: Essential oils, ethanolic extracts, Combination*

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12th INTERNATIONAL CONFERENCE ON COMPUTATIONAL AND EXPERIMENTAL SCIENCE AND ENGINEERING (ICCESEN-2025)

17-20 October 2025, ANTALYA -TURKEY

Abs. No: 14

Towards a Bio-Inspired Approach for the Optimization of Product Distribution in a Transport Company

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ABSTRACT

One of the primary objectives of any company is to achieve high levels of customer satisfaction, which is often regarded as a top priority. This highlights the central focus of businesses on the customer experience and the efficiency with which their needs are met. In this context, ensuring the timely and cost-effective delivery of products plays a crucial role in maintaining customer satisfaction.

This work addresses the challenge of optimizing the distribution of final products across multiple repositories dispersed throughout the national territory. The problem under consideration incorporates several critical constraints: the distance traveled during product deliveries, the cost of fuel consumption, and the allocation of drivers for each delivery route. These factors significantly influence the overall efficiency, cost management, and environmental impact of the distribution process.

To tackle this complex problem, the optimization method employed is the genetic algorithm, a robust technique within the family of evolutionary algorithms. Genetic algorithms are particularly well-suited for solving such multi-constraint and large-scale optimization problems due to their ability to explore vast solution spaces and converge toward optimal or near-optimal solutions.

The use of genetic algorithms allows for the consideration of multiple objectives and constraints simultaneously, ensuring that the final distribution strategy minimizes costs and resource usage while maintaining a high level of service quality. By employing this approach, companies can streamline their logistics operations, reduce environmental impact, and ultimately enhance customer satisfaction.

Keywords: *Genetic algorithm, Optimization, Logistics, Transport, Repository, Distribution*

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Abs. No:15

Integrating Computational Modeling with Experimental Methods in Bending Behavior Analysis of Round Rods

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ABSTRACT

The integration of modeling software into scientific research has gained significant traction as a reliable complement to traditional experimental methods. This study investigates the mechanical behavior of round rods under three-point bending tests, combining experimental procedures with computational simulations. In the experimental setup, a downward force (F) is applied at the center of the rod while the resulting flex (Δx) is recorded, allowing the calculation of the effective stiffness (F/Δx). By varying the distance between the anvils, the study measures the relationship between stiffness and beam length, yielding data to determine the Flexural Elastic Modulus of the material. Computational simulations using ANSYS software are employed to model the same parameters and can be extended for additional measurements. The findings validate the experimental results and highlight the ability of computational modeling to predict material behavior. This approach provides critical insights into material properties, enabling the modeling of real-world applications where these materials are utilized. By emphasizing the synergy between experimental and computational methods, this study underscores the growing importance of modeling software in engineering research and education.

Keywords: *Three-point bending test, Finite element analysis (FEA), ANSYS simulation*

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Abs. No: 23

Application of flory patterson theory on the volumetric properties of liquid mixtures 1,2- dichloroethane with diethylether and diispropylether

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ABSTRACT

The physico –chemical properties of liquids materials in the industrial field, in general, and in that of the chemical industrie in particular, constitutes a prerequisite for the design of equipment, for the resolution of specific problems (related to the tehniques of purificationand separation, at risk in the transport of certain materials, etc.) and therefore, at the production stage. Choloalkanes, ethers constitute three chemical families having an industrial, theoretucal and environment interest . For example, these compounds are used in various application in the chemical and pharmaceutical industries. In addition, they contribute to the partical thermodynamic behavior (deviation from ideality, association, etc.) of certain mixtures which constitute a severe test for preditive theoretical models. Finally, due to the degradation of the environment in the wod, arenewedinterest is observed for ethers, because somme of their physicochemical properties could contribute to lower pollution (ethers would used as additives in aqueous fuels). This work is a thermodynamic, experimental and theoretical study of the volumetric properties of liquid binary systems formed from compounds belonging to the chemical families of chloroalkane, ethers, having an industrial, theoretical and environnemental interest. Expreimental determination of the interval [283.15 – 303.15] K and at atmospheric pressure, using an Anton- Parr vibrating tube densitometer of the DMA 5000 type. This contribution of experimental data, on the volumetric properties of the binary liquid mixtures of 1,2 – dichloroethane with an ethers, supplemented by an application of the theoretical model of Prigogine –Flory- Patterson PFP, will probably contribute to the enrichment of the thermodynamic database and the further development of the theory of Flory in its Prigogine – Flory –Patterson (PFP) version, for a better understanding of the thermodynamic behavior of these liquid binary mixtures.

Keywords: *Prigogine-Florry-Patterson (PFP), Volumetric Properties Excess Volume, Ethers.*

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17-20 October 2025, ANTALYA -TURKEY

Abs. No: 26

Explicit formula and Prime Number Theorem for zeta Function on Function Field and Its Applications

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ABSTRACT

First published in Riemann's groundbreaking 1859 paper (Uber die Anzahl der Primzahlen unter einer gegebenen Grosse, Monatsber. Konigl. Preuss. Akad. Wiss. Berlin, (1859), 671—680), the Riemann hypothesis is a deep mathematical conjecture which states \pause that the nontrivial Riemann zeta function zeros, i.e., the values s other than -2, -4, -6, … such that(ξ)s=0 where

$$\zeta(s)=\sum_{n=1}\frac{1}{n^s}$$

is the Riemann zeta function all lie on the "critical line"Re(s) =1/2

Explicit formulas in number theory first appeared in the works of Riemann and von Mangoldt.

The most famous among them is the explicit formula obtained by von Mangoldt.

$$\zeta_0(s)=\sum_{p^n\le x}\log p=x-\sum_{\rho}\frac{x^{\rho}}{\rho}-\frac{\zeta'}{\zeta}(0)-\frac{1}{2}\log(1-x^{-2}).$$

The sum on the left is taken over all prime powers, and the sum on the right is taken over the non-trivial zeros of Riemann zeta function.

The behavior of zeta functions in the critical strip has received a lot of attention since the first proof of the prime number theorem. Special values of zeta functions often carry relevant arithmetic or geometric information on the objects that were used to define the zeta functions. Especially the value at the central point s = ½ is an important property and subject of intensive study.

In this talk we:

Formulate a theorem giving an upper bound for the multiplicity of the eventual zero at 1/2 of functions in the Selberg class and to the automorphic L-functions attached to irreducible unitary

automorphic representations of $GL_n(\mathbb{Q})$

Formulate a theorem for the location of the first zero with positive imaginary part of functions in a certain subclass of the extended Selberg class and apply our results to automorphic L-functions attached to irreducible unitary automorphic representations of $GL_n(\mathbb{Q})$

Give an explicit formula for the zeta function ξK of K of genus g over a finite field $\mathbb{F}_q$.

Formulate a theorem of bounding the order of the central zero of a zeta ξ_K of K of genus g over a finite field $\mathbb{F}_q$.

Keywords: *Zeta function, Explicit formula, Riemann hypothesis*

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17-20 October 2025, ANTALYA -TURKEY

Abs. No: 27

Deep Neural Networks For Transmission Line Fault Diagnosis

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ABSTRACT

One of the most crucial parts of the power system are power transmission lines, and identifying their flaws has grown in popularity. Nonetheless, short circuits are the primary failure type to which a transmission network is susceptible. This research proposes a deep neural network (DNN) model-based monitoring system to establish an accurate diagnosis of short circuit problems. Key indices have been computed from the gathered current signals in order to train and test the DNN. The network's output uses a variety of error codes. To determine the optimal neural network, the Levenberg-Marquardt learning algorithm has been used to optimize the DNN's hidden layer. As a result,the suggested approach works well for diagnosing and tracking a number of other industrial issues.

Keywords: *Transmission lines 1, Electrical indicators 2, Deep Neural Network (DNN) 3*

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Abs. No: 31

Electrochemical characterization of a composite (PANI/PEDOT:PSS) for application in supercapacitors

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ABSTRACT

The aim of this study is to synthesis of a copolymer PANI/PEDOT:PSS by electrochemical means to apply in supercapacitors. Polyaniline (PANI) is a conductive polymer, it was synthesized by electrochemical polymerization. It exhibits very stable properties in different environments,whereas PEDOT:PSS is a conductive polymer based on poly(3,4-ethylenedioxythiophene) (PEDOT) and poly(styrene sulfonate) (PSS). It is commonly used with polyaniline to improve its electrical conductivity. Several physico-chemical and electrochemical techniques were used for the characterization PANI/PEDOT:PSS: cyclic voltammetry (VC), electrochemical impedance spectroscopy (EIS), open circuit potential, SEM, X ray diffraction…etc. The results showed that the PANI/PEDOT: PSS composite is a promising material for supercapacitors due to its high electrical conductivity and high porosity.

Electrochemical and physicochemical characterization tests have shown that the composite has high electrical and structural performances, making it a material of choice for high-performance energy storage applications.

Keywords : energy storage, supercapacitors, SIE, VC, PANI, poly(3,4-ethylenedioxythiophene) (PEDOT),poly(styrene sulfonate) (PSS)

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Abs. No: 34

Prediction of compressive strength of concrete modified with marble waste powder using artificial intelligence model

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ABSTRACT

Marble quarrying activities are accompanied by the generation of huge quantities of waste. Several studies demonstrated the beneficial effect of marble waste on fresh and hardened concrete properties. This work aims to predict the compressive strength of concrete based marble waste. Using data from previous studies investigated the effect of marble waste on properties of concrete, a model based on artificial neural networks was built using six parameters including cement content, water/binder ratio, marble powder content, supperplasticizer content, and testing age as the model input parameters. The results obtained showed that using best iterations with different architectures, the model built exhibited an accurate prediction of the compressive strength with higher correlation of 99%.

Keywords: *Concrete, Marble, Compressive strength, Model, Artificial intelligence.*

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Abs. No: 35

Modeling the thermal conductivity of some metals

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ABSTRACT

This study investigates the thermal conductivities of three different metals—aluminum, bronze, and stainless steel—using both experimental measurements and Finite Element Method (FEM) simulations. The TD-8513 Heat Conduction Apparatus was used to analyze temperature variations along metal rods, with thermistors placed at specific positions to measure the transient temperature field. The metal rod was subjected to a heat flux, causing temperature variations along its length. A finite element model (FEM) was developed to simulate heat conduction in the rods, employing the SOLID70 thermal element for meshing. The experimental and FEM simulation results showed a consistent trend, indicating compatibility.These findings validate the accuracy of FEM in modeling thermal conduction and demonstrate the effectiveness of numerical methods in predicting heat transfer behavior in metallic materials.

Keywords: *Finite Element Modeling (FEM), thermal conductivity, metal, transient heat transfer, temperature distribution.*

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Abs. No: 50

Application of Artificial Intelligence for Fault Diagnosis in Bevel Gears Using Vibration Analysis

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ABSTRACT

The early detection of faults in bevel gears is crucial for preventing catastrophic failures and minimizing downtime in industrial machinery. This study explores the application of artificial intelligence (AI) techniques for diagnosing faults in bevel gears based on vibration indicators. A comprehensive dataset of vibration signals from healthy and faulty gears is collected and preprocessed to extract relevant features. A piezoelectric sensor collects signals in three directions: two radial and one axial, from which it calculates the main vibrational indicators. Support vector machines (SVM), random forests (RF), and Deep neural networks (DNN) are some of the AI models that are trained and tested for fault classification. The results show that DNN methods can correctly identify different types and levels of faults in bevel gears with a high level of recall and precision. Additionally, the suggested method is strong enough to handle complex and noisy vibration data, making it more accurate and time-saving than current diagnostic methods. This research enhances condition monitoring and predictive maintenance by providing an automated fault detection framework for bevel gears, improving the reliability and operational efficiency of industrial systems.

Keywords: *Bevel gears, Monitoring conditions, Vibration analysis, Artificial Intelligence,Diagnosis and prognosis*

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Abs. No: 54

Analysis and Numerical Simulation of a 316L Stainless Steel Femoral Plate

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ABSTRACT

Stainless steel 316L is one of the most commonly used metals for manufacturing medical devices,including orthopedic, intravascular, and dental applications. The continuous development of high-performance biomaterials and the rapid advancement of manufacturing and quality controltechniques require the training of highly skilled specialists capable of understanding biomaterialsand mastering the latest analysis methods. This study aims to characterize a previously implanted316L femoral plate that fractured approximately six months after implantation. Physicochemical testsindicate that the plate does not meet the required standards, using the ASTM standard as areference. Numerical modeling suggests that the femoral plate fracture could not have occurred dueto external loading or fatigue stress.

Keywords: *Physicochemical characterization, Stainless steel 316L, Biomaterials, Numerical modeling.*

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Abs. No: 55

Stepped Double-Slope Solar Still: Comparative Study between Analytical Simulation and Experimental Validation

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ABSTRACT

This study presents the development of a mathematical model for the **S**tepped **D**ouble **S**lope **S**olar **S**till (SDSSS) to estimate the theoretical hourly distillate output. Energy balance equations for the various components of the SDSSS (Fig.1), were formulated and numerically solved using the Matlab/Simulink dynamic simulation software. The main objective is to validate the model by comparing the simulated hourly distillate yield with experimental data reported by S.W. Sharshir et al. The results show a strong correlation between numerical predictions and experimental measurements conducted in Kafr-el-sheikh, Egypt (latitude 31.07° N, longitude 30.57° E) during operating hours from 9:00 AM to 5:00 PM in April and May 2018. The deviation between theoretical and experimental results ranges from 5% to 8%.

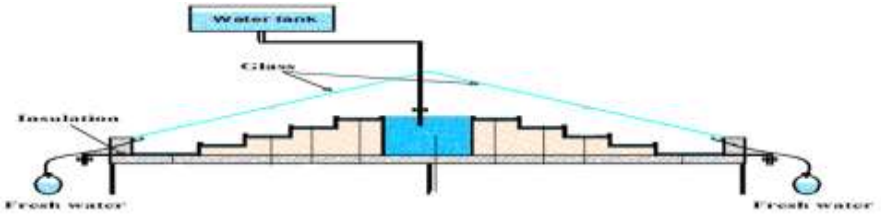

Fig.1. *Schematic of stepped double slope solar still.*

Keywords: *Solar still, Numerical solution, Matlab/Simulink, hourly distillate, Solar radiation, Experimental validation.*

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Study of the probiotic potential and anti-Staphylococcus aureus power of Lactobacillus strains

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ABSTRACT

Thirty lactic acid bacteria (LAB) strains were isolated from Algerian fermented milk. The initial screening showed that ten strains out of twenty-one were tolerance to acid pH and bile salts and were furthermore identified as Lactiplantibacillus plantarum (L. plantarum) strains by 16S rDNA sequencing. The identified strains were then characterised for their surface properties such as self-aggregation, hydrophobicity and biofilm formation. only 5 strains were selected for further analysis. These five strains, named L. plantarum 1, 2, 3, 4 and 5, were found to be safe and able to adhere to human epithelial colorectal adenocarcinoma Caco-2 cells. In particular, all these strains were active against Staphylococcus aureus ATCC 6538. In this study, isolation of strains of S. aureus is made from 60 samples of artisanal fermented milk « L' ben » harvested from 20 farms in Bejaia. Phenotypic and biochemical identification was performed. In order to select strains of S. aureus antibiotic-resistant's, an antibiotic susceptibility testing of cefotaxime and ceftazidime was performed and an analysis resistance phenotypes . The analysis of the resistance phenotypes revealed the production of CTX-M-15 β-lactamases in 5 strains. The study of the antibacterial activity revealed zones of inhibitions which vary between 15 and 35 mm. These results delineate the different beneficial functions of these L. plantarum strains from Algerian traditional fermented milk and consider them potentially usable as probiotics and biopreservative agents.

Keywords: *potentiel probiotic, antimicrobial activity , Staphylococcus aureus.*

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Finite Element Analysis of Elasto-plastic Material Model for Cardiovascular Stent

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ABSTRACT

One of the most prevalent health problems is coronary artery disease which may cause pain and heart attack. Stent implantation is a non-surgical method to treat the coronary artery disease that can support arterial walls and reduce the risk of heart attack. The study of the stresses encountered by a cardiovascular stent is particularly complex due to its highly nonlinear response. During the balloon expansion phase, it is common for the stent's diameter to increase by more than three times. Due to its design, the implant undergoes significant plastic deformation, preventing it from returning to its original shape after the balloon is deployed. Since the deployment stresses are in the plastic range, the implant does not undergo elastic recovery but keeps the artery open in an expanded state. The main aim of the present work consisted of the complete simulation of the stent's behavior in a finite element analysis carried out using the Abaqus software. Contact devices were inserted between the balloon and the implant. The balloon was inflated to force the implant to have a diameter slightly larger than that of the artery. Then, the balloon was deflated and the plastically deformed implant continued to keep the artery open. Subsequently, a pulsatile blood pressure was applied to the artery to assess the history of the stresses endured by the implant. It is concluded that the stent underwent significant deformation due to bending. The stent was compressed to a diameter of only 1.25 mm during the complete crimping process. Following the crimping process, the stresses were highly concentrated in the U-bend areas. The von Mises stress peaked in the stent.

Keywords: *Coronary Stent; Balloon; Atherosclerosis; Plaque and vessel; Finite element method; Nonlinearity*

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Study of Nano-Biomaterials for Bone Regeneration by TPMS Lattice Structure

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ABSTRACT

Bone regeneration is a major challenge in surgery. Current grafting techniques, although widely used, have their limitations: limited availability of grafts, risks associated with surgery, and sometimes insufficient quality of reconstituted tissue. Tissue engineering, an innovative approach, offers new prospects by combining cells, biomaterials and biological signals to stimulate bone regeneration. However, many challenges remain: the design of biocompatible materials that promote bone growth. The aim of this study is to develop a new therapeutic approach based on the design of new biomimetic materials capable of mimicking the extracellular matrix of bone to enhance bone regeneration. The TMPS method is used to manufacture scaffolds for tissue engineering based on mathematical equations, 3D printed with interconnected pores and appropriate biomorphic surfaces. The material chosen for the bone, LithaCon ATZ 980, an alumina-hardened zirconia supplied by Lithoz with Young's Young of 220 GPa and a theoretical density of 5.48 g/cm3, a compressive strength of 2200 MPa and a Poisson's ratio of 0.27. The numerical development is using Ansys workbench for lattice configuration and meshing, this design undergoes a comprehensive stress analysis using finite element analysis (FEA). The scaffolds exhibited comparable stiffness and tensile strength to cortical bone, mitigating the risk of failure and suggesting their suitability for bone replacement.

Keywords: *Bone regeneration, bone defects, biomimetic materials, bioceramics, TPMS*

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Research on the novel quantum phenomena in infinite-layer nickelate unconventional superconducting films

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ABSTRACT

The unconventional superconductivity in infinite-layer nickelates (ILN) resembles cuprate superconductors and have generated great research interest recently. However, due to its complex electronic correlations and distinct unconventional superconducting properties, many scientific questions remain unresolved. In this report, spontaneous rotational symmetry breaking (RSB), a hallmark phenomenon in cuprate and iron-based high-temperature superconductors, is discovered in the normal state of $La_{1-x}Sr_xNiO_2$. Although ILNs share similar crystalline structure and the same nominal 3d-electron configurations with cuprates, they have significant differences in Fermi surface topology, electronic band characteristics, charge order, etc. These distinctions make ILN an ideal platform for studying RSB in unconventional superconductors. Through angular-resolved resistivity measurements within a large temperature and doping range, we identify pronounced RSB signatures near doping concentrations x=0.05 and 0.25. Based on the strongly correlated electronic structures from the combined density functional theory and dynamical mean field theory calculations, we find that the calculated electronic susceptibility has a peak structure at the corresponding doping concentration, indicating pronounced electronic instabilities which drive RSB. Detailed analysis of the electronic susceptibility demonstrates that the van Hove singularity at the Fermi level significantly contributes to the electronic instability at x=0.05. Our findings reveal the important role of electronic correlation, van Hove singularity, and Fermi surface nesting in the emergence of RSB. In addition, we will also report the recent discovery of isotropic quantum Griffiths singularity in ILN superconducting thin films.

Keywords: *Infinite-layer nickelates, Unconventional superconductivity, Spontaneous rotational symmetry breaking, Electronic instability*

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CTX-M-15 ESBL-Producing E. coli Isolated from Pigeons in Bejaia, Algeria

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ABSTRACT

This study investigates antimicrobial resistance profiles and genetic determinants of extended-spectrum β-lactamase (ESBL)-producing Enterobacterales isolated from pigeon droppings in Bejaia, Algeria, in 2016. Among 200 Enterobacterales isolates analyzed, six multidrug-resistant (MDR) E. coli strains were identified using MALDI-TOF mass spectrometry. Antibiotic susceptibility testing revealed resistance to β-lactams, fluoroquinolones, and tetracyclines, with retained susceptibility to carbapenems, colistin, and fosfomycin. PCR screening detected the blaCTX-M-15 ESBL gene in all isolates, associated with the aac(6')-Ib-cr variant, which confers resistance to aminoglycosides and quinolones. No mcr-1, qnr, or SHV/TEM genes were identified. Phylogenetic analysis classified all isolates into phylogroup D, indicating clonal dissemination of high-risk strains within the local pigeon population.

These findings highlight urban pigeons as reservoirs of MDR E. coli in Algeria and emphasize the urgent need for enhanced surveillance of ESBL epidemiology and resistance mechanisms in both environmental and clinical settings.

Keywords: *Antimicrobial resistance, E. coli, CTX-M-15, phylogroup D, urban pigeons, Algeria.*

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Abs. No: 69

Modeling and Experimental Analysis of Drying Parameters Affecting Pistacia Atlantica Leaf Preservation

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ABSTRACT

This Drying is defined as a reduction in the moisture content of food material to increase the solid concentration, thereby reducing the possibilities of degradation of various origins (microbial, enzymatic, lipid oxidation, chemical reactions, etc.), while preserving the physical and chemical characteristics as much as possible. The Atlas pistachio tree (Pistacia atlantica) used in this study is located in southwestern Algeria (Bechar). The gas used in the convective dryer is hot air, whose thermodynamic properties allow it to be both a cooling fluid and a vector for removing evaporated water. In this drying, convection is the major transfer mode; Many empirical mathematical models have been developed to account for the kinetics of thin-layer drying of plant products. The results obtained show that the Midilli-Kucuk model describes well all the experimental points of Pistacia atlantica drying. Drying time depends on several factors including: initial moisture content of the product, drying temperature and drying air flow.

Keywords: *Pistacia atlantica, convection drying, modelling, drying time.*

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Androgen Receptor (AR) Mutations and Prostate Cancer Risk in the Jordanian Population.

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Abstract

Background: Prostate cancer is a complex condition in which both genetic and environmental factors contribute to the tumor initiation and progression in a manner not fully explained or discovered till today. Many factors that may increase the risk of prostate cancer include older age, family history and race. Genetics also may affect the risks if it is associated with race, family, or environmental conditions like radiation or toxic materials. Androgen receptor is an important transcription factor that is highly related to the development of different diseases and cancers. In this study, we aimed to investigate the role of androgen receptor (AR) mutations in prostate cancer risk in the Jordanian population. We targeted exon 3 and exon 8 with the highest possibility of being mutated.

Materials and Methods: Genomic DNA was extracted from one hundred prostate cancer tissues that are already archived in Formalin-Fixed Paraffin-Embedded (FFPE) tissues. After extraction of the DNA from targeted samples we performed Polymerase Chain Reaction (PCR) followed by DNA sequencing to detect any genetic variation.

Results: We reported thirteen mutations from all samples. They were distributed in the following order: ten mutations in exon three and two mutations in exon eight and one intron mutation. Five mutations were already reported in NCBI and eight were yet to be reported.

Conclusion: In conclusion, the current study reported a high frequency of AR mutations in prostate cancer patients in the Jordanian population. Conduction of functional studies of each mutation will reveal the exact mechanism of the role of the detected mutations in the development of prostate cancer.

Keywords: *Cancer, Prostate cancer, Androgen receptor, Androgens, Mutation*

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Abs. No: 77

Formulation of a Cosmetic Cream with Anti-Inflammatory Effect Based onMedicinal Plants

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ABSTRACT

Equisetum arvense, a medicinal plant known for its anti-inflammatory, antioxidant, and healing properties, represents a promising ingredient for the formulation of cosmetic products. In a context where consumers are seeking natural and effective solutions for skin care, the objective of this study is to formulate a cosmetic cream with anti-inflammatory effects using an extract of horsetail (Equisetum arvense) and to evaluate its efficacy and stability. The horsetail extract was chosen for its active compounds, particularly flavonoids and silicates, which are known for their soothing and regenerative properties.

The extract was obtained through hydroalcoholic maceration of the aerial parts of the plant. The cosmetic cream was formulated by incorporating this extract into an oil-in-water emulsified base containing emulsifiers, hydrating agents (glycerin), and preservatives. The anti-inflammatory effect was evaluated in vitro by measuring the inhibition of pro inflammatory cytokine production in skin cells stimulated by an irritant agent.

The formulated cream demonstrated excellent physical stability, with no phase separation or texture alteration after stability testing. In vitro tests revealed a significant reduction in the production of pro-inflammatory cytokines in the presence of the horsetail extract, confirming its anti-inflammatory potential. The cream also showed good skin tolerance during preliminary tests on volunteers.

This study successfully formulated a stable and effective cosmetic cream based on horsetail extract, exhibiting significant anti-inflammatory properties. The results suggest that this cream could serve as a natural alternative for the care of sensitive or irritated skin.

Keywords: *Equisetum arvense, Cosmetic cream, Silicates, Flavon.*

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The two-stage (630 and 600 Ma) emplacement of the Amsel post-collisional Pan-African high-K calc-alkaline batholith, Hoggar, Algeria

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ABSTRACT

In the Laouni terrane (LATEA metacraton of the Hoggar, Algeria), the Amsel batholith is exposed along the West-Tamanrasset mega-shear zone (WTSZ). The batholith is composed of two magmatic suites: an early granitic suite (c. 630 Ma, zircon U-Pb age), and a late granodioritic suite (c. 600 Ma, zircon U-Pb age). The granitic suite is chemically homogeneous, whereas the granodioritic suite shows a great compositional diversity. The two suites have a similar composite source, but display distinct magmatic evolutionary trends attributed to different amounts of the mantle component. The geodynamic model includes two distinct episodes during the post-collision stage of the Pan-African orogeny in the Hoggar. During the first c. 630 Ma episode, the granitic suite was emplaced in a weakly transcurrent setting. The second episode, c. 600 Ma, was marked by a major transcurrent movements associated with the northern tectonic escape of the entire Tuareg Shield, including along the WTSZ, alongside which the granodioritic suite was emplaced. During both episodes, the same ancient continental source (Eburnean basement of the LATEA metacraton) was partially melted by the input of mantle-derived magma, represented by enclaves with depleted Nd and Sr isotopes. Minor mantle and preponderant crustal magmas mixed together to form the Amsel batholith. Mantle magma ascent was favoured by planar lithospheric delamination confined to the WTSZ, whereas the Eburnean basement of LATEA, far from the shear zones, was much less affected, a typical feature of metacratons.

Keywords: *shear zone, Hoggar, Amsel, Laouni terrane.*

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Damage Investigation and Finite Element Modeling of Sandwich Panels Subjected to Multiple Low-Energy Impacts

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ABSTRACT

This study investigates the damage mechanisms and finite element modeling of sandwich panels subjected to repeated low-energy impacts ranging from 2J to 4J. Experimental tests were performed on clamped specimens using a custom-built impact fatigue machine, with up to 60 impacts per specimen delivered by a hemispherical impactor. Damage progression was monitored through visual inspection and by measuring the diameter and depth of the resulting craters. Two distinct phases of crater growth were observed: an initial rapid increase followed by a more gradual development. A finite element model was developed in Abaqus using a predefined velocity field to simulate the multiple impact loading. The numerical results showed good correlation with the experimental data, with relative errors ranging from 9% to 16%. These findings confirm the capability of numerical simulations to predict damage evolution in sandwich panels under repeated impact conditions and support their use in the design and optimization of composite structures for impact resistance.

Keywords: *Aluminum-Aluminum Sandwich Structures, Honeycomb core, Low-Velocity Multiple Impacts, Damage Analysis, Finite Element Modeling.*

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Integrating Genetic Algorithms and Decision Trees for Efficient Fault Diagnosis in Rotating Machinery

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ABSTRACT

The study presents an expert system designed to diagnose faults in rotating machinery through the analysis of vibration signals. The methodology integrates statistical feature extraction, genetic algorithm-based feature selection, and decision tree classification to enhance diagnostic accuracy and interpretability.

Feature Extraction: Initially, six time-domain statistical indicators: Kurtosis, Crest Factor, Root Mean Square (RMS), Peak Value, Shape Factor, and Impulse Factor are extracted from vibration signals measured in acceleration, velocity, and displacement. This comprehensive feature set captures various aspects of the machinery's operational state.

Feature Selection: To manage the high dimensionality and focus on the most informative features, a genetic algorithm-based wrapper method is employed. This approach identifies an optimal subset of features that significantly contribute to fault classification, thereby reducing computational complexity and enhancing the classifier's performance.

Classification: A decision tree classifier is constructed using the selected features. Decision trees are chosen for their ability to generate interpretable rules, facilitating understanding of the fault diagnosis process. The classifier is trained to distinguish between different fault conditions based on the refined feature set.

Experimental Validation: The methodology is validated on an experimental test bench simulating five operating states: normal condition, misalignment, bearing defects, unbalance, and a combination of bearing defects and unbalance. Vibration data collected under these conditions are processed through the feature extraction and selection pipeline, followed by classification using the decision tree model. The results demonstrate the system's capability to accurately identify and classify the different fault states.

In summary, the integration of genetic algorithm-based feature selection with decision tree classification offers a balanced approach to fault diagnosis in rotating machinery, combining computational efficiency with high diagnostic accuracy.

Keywords: *Genetic wrapper, Bearing faults, Decision tree, Feature selection*

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Abs. No: 83

Finding the Best Crimping Conditions for Metal Cans through Experimental Testing

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ABSTRACT

There are two more difficult and important issues to consider in the manufacturing and development of metal packaging :
1. What are the acceptable dimensions that can be achieved when crimping a metal can to ensure crimp reliability?
2. What are the criteria for quality control (acceptance/rejection) and how is this control carried out ?
In this study, dedicated to metal cans for chemical products (paints and derivatives) and food and agricultural products, produced and marketed by the Benpack Unit for Metal Packaging, located in Fesdis, Batna, we wanted to experimentally determine the parameters related to the crimping machine and the components of the metal can (body, base and lid) in order to obtain a hermetic seal in both directions.
There are three different aspects to the technique used to evaluate a setting, all of which provide comprehensive information, both qualitatively and quantitatively:
a. Visual inspection and external measurements provide an initial indication of the effectiveness of the weld;
b. Stripping the joint to evaluate its clamp characteristics, i.e., evaluating the clamp ratio and examining the clamp footprint;
c. Cross-section of the weld to measure the actual cross section at the point of cut (optical methods).
This experimental work is based on the study of the seaming of metal cans, defined as the folding together of the edge of the can to be seamed and the hem of the lid/bottom, then pressing them firmly together. The seam must be hermetic, i.e. it must prevent infiltration and leakage.
The objective is therefore to experimentally determine the parameters of the machine (seamer) and the parameters of the can components (body, base, lid) that will allow the specific dimensions of a seam to be determined that will guarantee the reliability of the package.

Keywords: *Crimping; Metal cans; Tinplate, Overlap; Body hooks, Bottom hooks*

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An Embedded Framework for Smart Cloud Architecture Enabling Adaptive Business-Driven Solutions

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ABSTRACT

The digital transformation of Small and Medium-sized Enterprises (SMEs) is often hindered by several challenges, such as limited financial resources, fragmented data management practices, and insufficient technical expertise. Although these challenges are well-documented, this research focuses on addressing the specific gap in data management by developing a Smart Data Centre Framework aimed at supporting SMEs to be competitive in business. To achieve this goal, the study employs the Design Science Research (DSR) methodology, which provides a systematic approach for the development and evaluation of the proposed framework. The research begins with an investigation of existing data acquisition and integration practices within SMEs. Based on the insights gained, a scalable and cost-effective architectural model is proposed, and its potential to improve operational efficiency and data-driven decision-making is assessed. As part of the design process, a detailed storyboard consisting of 18 scenes was developed to illustrate the flow of data and user interaction across the various layers of the system. The architecture is structured around three key layers: the Data Acquisition Layer, utilizing Node-RED for real-time data collection; the Data Transformation Layer, which uses Python to clean and integrate the data; and the Visualization Layer, which employs Power BI for dynamic dashboards and analytics. Additionally, the system incorporates MySQL for centralized data storage, while the SME Smart Hub (SMESH), a cloud-based platform, facilitates the registration of a group of SMEs, offering scalability and flexibility and its management. The system architecture has been fully designed and is currently being implemented. Ultimately, this research contributes to the digital transformation of SMEs by providing a practical, storyboard-based framework that enhances data management, thereby improving SMEs' competitiveness and long-term sustainability.

Keywords: *Smart Data Center, Small and Medium-sized Enterprises (SMEs), Digital Transformation, Data Management*

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Abs. No: 87

Impact of Scan Rates on the Redox Behavior of Paracetamol at NiO/GrE

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ABSTRACT

Paracetamol (acetaminophen, N-acetyl p-aminophenol) is a commonly used antipyretic and analgesic drug, effective in reducing fever, and various types of pain, such as muscle aches, chronic pain, migraines, backaches, and toothaches. A nickel oxide-based electrochemical sensor NiO/GrE has been proposed for the efficient detection of paracetamol. The initial stage of this work involves the electrochemical deposition of a metallic nickel film on a graphite electrode at a potential of −1.05 V vs. SCE for 120 seconds via chronoamperometry. Subsequently, the metallic nickel layer is transformed into nickel oxide (NiO) in an alkaline medium. In the next step, the oxide film surface is analyzed using electrochemical and physico-chemical techniques. The electrochemical behavior of paracetamol on the NiO/GrE and a bare GrE was studied, using cyclic voltammetry in a buffer solution (pH=7) at a scan rate of 50 mV/s. Additionally, the influence of different scan rates on the redox behavior of paracetamol at NiO/GrE was analyzed. The modified electrode exhibited a significant improvement in electrocatalytic activity for paracetamol oxidation compared to the bare graphite electrode. The paracetamol exhibited a pair of well-defined redox waves on the modified graphite electrode, with anodic peak potential (Epa) at 0,367 V and cathodic peak potential (Epc) at 0,312 V. The redox peak currents at the modified graphite electrode in the paracetamol solution increased linearly with the scan rate in the range from 25 to 200 mV/s. This behavior indicates that the reaction at the modified electrode involving paracetamol is a surface-confined process.

Keywords: *Anodic oxidation, Cyclic Voltammetry, paracetamol.*
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Abs. No: 102

Assessment of the biochemical attributes of C4 photosynthesis in Boerhavia (Nyctaginaceae), a proposed model of C4 subtypes metabolic cooperatio

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ABSTRACT

Plants using the C_4 photosynthetic pathway are classed into three main biochemical subtypes based on the major CO_2-concentrating decarboxylase around Rubisco (NADP-ME; NAD-ME; PEP-CK). All three subtypes exist within the grass family, whereas only NADP-ME and NAD-ME subtypes have been found in 16 C_4-inclusive eudicot families. Debate exists over the occurrence or contribution of PEP-CK to carbon fixation in C_4 eudicots, with controversial reports available in the literature. In our study, we address this debate through critical reassessment of the Kranz anatomical and C_4 biochemical attributes in two *Boerhavia* species (*B. coccinea* and *B. dominii*) in the Nyctaginaceae. Both are classed as NADP-ME but also previously reported to exhibit considerable PEP-CK activity. Using light and electron microscopy, leaves of both *Boerhavia* C_4 species possess the atriplicoid *kranz* anatomy type with centripetally-positioned chloroplasts in the bundle sheath cells. Ultrastructural analysis revealed properties of the NADP-ME subtype, with grana-deficient bundle sheath chloroplasts and mesophyll chloroplasts possessing prominant grana. Using activity assays, localization and western blotting of key C_4 enzymes, we found that while NADP-ME activity was the highest, both *Boerhavia* species demonstrated substantial PEP-CK activity, and consistently dense and specific immunolocalization of PEP-CK in the bundle sheath cells. There were also evident immunoreactive bands to PEP-CK and NAD-ME on immunoblots. In conclusion, our findings provide robust evidence corroborating PEP-CK occurrence and functioning in NADP-ME *Boerhavia* species and thereby rejecting the assumption of its absence or minimal contribution to carbon acqusition in C_4 eudicots lineages.

Keywords: *atriplicoid kranz anatomy, granal development, NADP-ME subtype, NAD-ME subtype, PEP-CK subtype, enzyme activity, immunolocalization, western blotting, Nyctaginaceae*

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Abs. No: 103

Advancing High-Performance Solar Cells with Ca_3NCl_3 Perovskite A_3BX_3-Type Absorbers for Next-Generation Photovoltaics

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ABSTRACT

Calcium-based inorganic perovskites of the formula Ca_3BX_3 are emerging as promising, environmentally friendly candidates for photovoltaic applications, particularly as absorbers for single and tandem solar cell structures, due to their advantageous optoelectronic characteristics and thermodynamic stability. This study focuses on the numerical simulation and subsequent optimization of a photovoltaic cell whose absorber layer is the perovskite material Ca_3NCl_3 with a wide bandgap energy of 1.66 eV. A configured reference structure: ITO/SnS_2/Ca_3NCl_3/P3HT/Ag was used as a reference. A theoretical approach was carefully developed to evaluate critical device parameters such as power conversion efficiency (PCE), open-circuit voltage (V_{oc}), short-circuit current density (J_{sc}) and fill factor (FF). The variation of these parameters as a function of the intrinsic properties of the materials making up the absorber and the surrounding transport layers was evaluated according to the established simulation model. Analysis of the contours of key cell parameters under the action of combined physical parameters, as well as of the current-voltage characteristic curve, has enabled the evaluation of the performance of the basic structure, as well as structures based on numerous alternative carrier transport layer materials under different conditions, and to define an optimized structure that performs better (PCE = 22%) than the basic one (PCE = 18.5%) and that can serve as an adequate top sub-cell in a more elaborate tandem device capable of achieving conversion efficiencies of over 25% in different outdoor temperature conditions. The aim of this study is to develop stable, non-toxic, high-efficiency perovskite solar cells.

Keywords: *Solar Energy, Perovskite, Simulation, Inorganic*

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Abs. No: 105

Phase Pattern from Three Cylindrical Waves Using the Moiré Method

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ABSTRACT

In this paper, the moiré method is applied to obtain the equations of curves resulting from the interference of cylindrical waves by three transparent slits. In physics moiré patterns or moiré fringes are large-scale interference patterns that can be produced when a partially opaque ruled pattern with transparent gaps is overlaid on another similar pattern. For the moiré interference pattern to appear, the two patterns must not be completely identical, but rather displaced, rotated, or have slightly different pitch.

When a parallel beam of monochromatic light is incident perpendicularly on the surface of an opaque obstacle containing three very narrow and infinitely long transparent slits, generally placed at random in the plane of the obstacle, the phase pattern of the interference obtained is always formed by three systems of equilateral hyperbolas with their origins at the points of intersection of the projections of the rectilinear light sources. A detailed mathematical analysis of the problem is given. The computational results show that the semi-axes of the above mentioned systems of hyperbolas depend on the angle between the rectilinear sources and on their orientations. Graphical representation of four special cases is given as well. From this treatment it is seen that applying the moiré method of lines of the same phase in the plane of observation, is a very convenient and appropriate way to describe the theory of this type of interference.

Keywords: *Moiré fringes, Cylindrical waves, Phase pattern*

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Abs. No: 92

Green corrosion inhibitors in the oil sector - Reality and Prospects

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ABSTRACT

Corrosion inhibitors for oil fields are of great importance. They are used in several processes, including oil well stimulation and cleaning pipes, post flush treatment and corrosion prevention for transportation and storage management. Environmental protection and public health have recently emerged as critical chapter in global politics, which must be considered in all industrial processes. In line with this, some companies focuses on developing environmentally friendly solutions. However, despite substantial scientific research and great field findings, no completely green corrosion inhibitor has yet been developed. It is normal to

wonder why specialized companies in the field do not manufacture green corrosion inhibitors from plant, animal, or any other natural sources, as is done in other industrial sectors such as pharmaceuticals, cosmetics, and composite materials, and so on. Is it a scarcity of natural raw materials, a lack of information on scientific results achieved in the field, a lack of confidence in completed research, or manufacturing difficulties? In this study, we attempted to answer the posed concerns by studying the objective qualities of each element in order to provide a holistic viewpoint that may rejuvenate this essential industry while also including some useful and reliable research findings.

Keywords: *Green corrosion inhibitors, Oil well stimulation, oil fields*
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Abs. No:109

A Compact high isolation of MIMO UWB Antenna with Band Notched Characteristics for WLAN Application.

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ABSTRACT

This work presents a compact UWB MIMO antenna with band notch characteristics for WLAN application is designed and investigated. A single antenna comprises an inverted Christmas tree shaped patch fed by a 50 Ω Microstrip line and partial ground plane is designed for achieving UWB application.
The operating frequency of the proposed single antenna is 3.4–14.5 GHz with a return loss of less than 10 dB. Subsequently, a circular split ring shaped slot is implemented in the radiating element to optimize the antenna for WLAN band rejection at 5.6- 6.2GHz . Furthermore, a 2 × 1 MIMO antenna is designed by utilizing the polarization diversity technique. The two radiating elements are placed parallel and decoupling structure is placed
between them to improve the isolation performance. Finally, the compact UWB MIMO antenna prototype is designed on the FR4 substrate with the overall dimensions of 20 × 39 × 1.63 mm3.The proposed UWB MIMO antenna design provides an impedance bandwidth (S 11 < -10 dB) from (3.3-16 GHz) with band notch centered at 5.8 GHz.The isolation of the proposed MIMO antenna is higher than -15dB,. Results show that the proposed MIMO
antenna is a good candidate for handheld devices for wireless personal-area networks application.

Keywords: *MIMO, UWB antenna, high isolation, WLAN*.

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The potential of information technology in construction project management

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ABSTRACT

In recent times, in the context of the increasing pace of social development, when constraints in the sphere of production in terms of time, resources and risk are becoming more and more stringent, knowledge and possibilities of using artificial intelligence in the management of a construction project (and in construction as a whole) are becoming increasingly important. In this context, the use of artificial intelligence solutions is becoming increasingly popular and extremely important for both individual entrepreneurs and organizations, because it supports in the area of design and allows for effective management of project portfolios, creating significant competitive advantages and shaping new market segments. Thanks to such innovative approaches, new technologies can improve work, reduce process costs, increase the safety of employees and building users, and protect the environment at every stage of the building's life cycle. The purpose of this article is to examine the possibilities of using artificial intelligence solutions (digital solutions) in the construction industry. To show to what extent artificial intelligence provides support in various construction tasks or activities. The article presents the benefits of using artificial intelligence in areas such as: design, planning, automation, resource optimization, risk management, etc. The article also shows what innovative approaches in construction fit into the context of ecological construction and environmental protection. In this context, it should be noted that the article also addresses the following topics: BIM technology, sustainable construction, virtual construction site, Internet of Things, intelligent construction, intelligent management.

Keywords: *Intelligent construction, Virtual construction site, Construction management*

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Modeling Cyclonic Development on the Lee Side of West-Southwest Kosovo

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ABSTRACT

This study investigates the formation of a mesoscale lee-side 'cyclone' in the western lee of the Kosova-Albanian mountain range. The primary objective is to analyze atmospheric circulation in the lower atmosphere, with a specific focus on the orographic influence near the border of Kosova, particularly in the Gjakova region.
Employing real-time synoptic data and model simulations at 0000, 0600, 1200, and 1800 UTC, this research evaluates the role of orography in inducing cyclonic circulations. The results indicate that lee-side cyclogenesis, driven by westerly and southwesterly flows over complex terrain, frequently leads to localized heavy precipitation. Comparison of model output from the Horace Met Office global model (42×42 km grid) with updated products reveals significant discrepancies in precipitation and satellite-derived infrared imagery.
These findings underscore the substantial impact of terrain on regional weather systems in the Western Balkans. Despite advancements in regional modeling, the absence of comprehensive synoptic observations since 1999 continues to impede forecast accuracy. Moreover, limited coordinated mesoscale research efforts highlight the necessity for enhanced observational networks and cross-border meteorological collaboration.

Keywords: *Cyclone , Modeling, Lee side, West-Southwest Kosovo*

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Abs. No:107

Artificial Intelligence in Monitoring and Diagnostics in Civil Engineering

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ABSTRACT

Modern civil engineering faces significant challenges related to monitoring and diagnosing the technical condition of buildings. In response to these challenges, artificial intelligence (AI) offers innovative solutions that can significantly enhance monitoring and diagnostic processes. Decision-making during the operational phase of buildings is complex, requiring extensive knowledge and adaptable models to evaluate management decisions. The absence of expert systems for operations and diagnostics can lead to incorrect decisions, negatively impacting both the facility owner and the environment.

This article proposes an interdisciplinary approach that combines building diagnostics with AI to develop rational operational guidelines. The importance of collaboration between civil engineers and AI specialists is emphasized to create effective and reliable solutions. The primary goal is to develop a proprietary diagnostic-decision system (D-DS) that integrates expert knowledge with available data, including historical and real-time monitoring data, to assess and manage building operations. Case studies are presented where AI enables early damage detection, failure prediction, and assessment of the technical condition of structures. Special attention is given to real-time monitoring systems that, thanks to AI, can provide accurate and rapid information about the state of buildings, thereby facilitating timely and informed decision-making.

The application of AI in building monitoring and diagnostics has the potential to significantly improve civil engineering practices, making processes more efficient, accurate, and economical. By leveraging advanced algorithms and machine learning techniques, AI can enhance the predictive maintenance and operational efficiency of building structures. Future research should focus on further developing these algorithms and exploring their practical applications across various construction scenarios to ensure robustness and scalability.

Keywords: *Civil engineering, Artificial Inteligence, Diagnostics*

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Abs. No:131

Improved Shale Microcrack Prediction via Plasticity-Modified Model

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ABSTRACT

Shale micromechanical behavior critically impacts hydraulic fracturing efficiency. Traditional elastoplastic models show substantial discrepancies in characterizing microcrack propagation in clay/organic-rich shale because they overlook the complexities of plastic evolution. This research investigates the heterogeneous clustering mechanism of nanoindentation-induced cracks in C7 shale to clarify the controlling mechanisms of plastic deformation on microcrack propagation paths.

Nanoindentation experiments were performed to determine the elastic modulus, hardness, yield stress, and plastic deformation energy of constituent minerals. A modified yield function incorporating a damage variable was formulated based on plastic strain and stress state. The modified function was implemented within a finite element model for nanoindentation simulation. Validation of the enhancement in crack path prediction provided by the plasticity modification was achieved through comparison of simulated and experimental load-displacement curves and residual morphologies.

Numerical simulations reveal: (1) Conventional models underestimate the size of the crack-tip plastic zone by 18-22%; (2) The disparity in plastic deformation energy between quartz and clay minerals (0.15-0.35 MJ/m³) serves as the dominant controlling factor for crack bifurcation; (3) The likelihood of crack deflection increases by 34% when the mineral interface strength is >11 MPa. Experimental validation demonstrates that the modified elastoplastic model achieves significantly improved prediction accuracy for microcrack length.

This research confirms that ignoring plastic effects results in an overestimation of the brittle fracture propensity of C7 shale. The modified elastoplastic model enables more precise characterization of dynamic microcrack propagation behavior in clay-bearing shale. It offers a theoretical framework for advancing shale micromechanics research and optimizing hydraulic fracturing.

Keywords: *Elastoplasticity, Fracture mechanics, Nanoindentation,*

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Comparison of Intensity Modulated Radiotherapy and Proton TherapyTreatment of Head and Neck Cancer

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ABSTRACT

Head and neck cancers (HNCs) are among the most challenging malignancies to treat due to their proximity to critical structures. This study evaluates and compares Intensity-Modulated Radiotherapy (IMRT) and Proton Therapy (PT) in the treatment of head and neck cancer, utilizing the open-source treatment planning system MatRad. Twenty anonymized HNC patient CT datasets were used to generate treatment plans for both IMRT and PT, adhering to standard clinical dose constraints. Dose distributions, target coverage, and sparing of organs at risk (OARs) were analyzed quantitatively using dose-volume histograms (DVHs). The relative biological effectiveness (RBE) of protons was considered to assess potential therapeutic advantages. Results demonstrate the advantages and limitations of each modality, guiding clinicians in optimizing treatment plans.

Keywords: *Head& Neck cancer, Treatment planning, intensity-modulated radiotherapy, proton therapy*

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Abs. No:134

DEVELOPMENT AND CHARACTERIZATION OF A PVA-ZnO AND PVA- CHITOSAN-ZnO NANOCOMPOSITE DRESSING WITH ANTIBACTERIAL ACTIVITY.

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BACKGROUND :

PVA and chitosan as biomaterials have found various applications in the biomedical field especially in the management and care of wounds and burns. The main advantage of PVA and chitosan hydrogels is that they help to create a moist, cool environment for wound healing and provide high water vapour permeability while preventing the penetration of microbes into the wound. The aim of our present study is to produce hydrogels based on PVA and chitosan by chemical cross-linking and also to carry out the physico-chemical characterization of the films obtained.

METHODS :

In order to obtain a dressing with the best properties, two types of hydrogel dressings were prepared (PVA and PVA-chitosan) by chemical cross-linking using glutaraldehyde followed by in situ precipitation of zinc oxide nanoparticles in the hydrogel networks. The samples were characterised by infrared spectrometry, Raman spectroscopy and scanning electron microscopy(SEM). In addition, other properties including swelling and deflation rates, film

thickness and pH were also studied. The hydrogels prepared were tested for their antibacterial activity against Gram-negative and Gram-positive bacteria.

RESULTS :

FTIR analysis suggests that hydroxyl groups present in PVA interact electrostatically with zinc oxide nanoparticles during nanocomposite formation. SEM studies reveal that PVA-ZnO and PVA-Chitosan-ZnO nanocomposites exhibit a porous morphology with pore sizes ranging from 20 to 50 µm and a dense distribution compared to pure hydrogels without ZnO. The study of the antibacterial activity of the films prepared showed that these nanocomposites exhibited antibacterial activity against Gram + and Gram - bacteria and that this activity varied with the concentration of nanoparticles inside the matrix.

CONCLUSION :

The prepared hydrogels have proved applicable as robust wound dressings.

Keywords: *Dressing, hydrogel, PVA, chitosan, zinc oxide.*

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Abs. No:136

Integrating Digital Twins in Architecture, Engineering and Construction

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ABSTRACT

Digital Twin (DT) technologies are gaining growing attention within the Architecture, Engineering, and Construction (AEC) sector, both in academic research and professional practice. However, the widespread integration of DT solutions across the supply chain remains gradual and uneven. Key obstacles to adoption include identifying suitable technologies, clearly outlining their intended applications, and assessing the return on investment. The rise of the Fourth Industrial Revolution has driven the integration of Key Enabling Technologies (KETs), promoting the adoption of ICT-based approaches in design and project execution across multiple industries, including AEC. Broad implementation of DTs is expected to enhance operational efficiency, minimize recurring errors, and improve informed decision-making, especially in the context of risk management. Within Europe, the degree of digital advancement varies by country. Nonetheless, the predominance of small and medium-sized enterprises (SMEs) within national industries continues to pose a significant barrier to the full-scale deployment of DT solutions across the sector. Authors will tackle the following elements: system integration, data acquisition, automating processes, digital information and analysis, Digital Twin and building and construction life cycle, Digital Twin sustainability and Digital Twin societal impacts.

Keywords: *Digital Twin, AEC, ICT*

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Abs. No:137

Study on the discontinuous fracture process zone leading to multiple parallel fractures

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ABSTRACT

Multiple parallel fractures were found to be induced during hydrofracturing treatment in the Hydraulic Fracturing Test Sit (HFTS). And the number of artificial fractures is much larger than the number of perforation clusters. The activation of the discontinuous fracture process zone (DFPZ) when the main fracture propagation is blocked may be the cause of this phenomenon. In addition, discontinuous fracture process zone (DFPZ) was observed at the fracture tip in laboratory. In order to study the influence mechanism of DFPZ on fracture propagation, the DFPZ is simulated by the weak surface formed by the embedded plastic sheet. And the process of DFPZ activation is simulated by conducting a three-point bending experiment again after adhering to the main fracture. The experiment results show that: (1) When the main fracture propagation is blocked, DFPZ induces the formation of secondary fractures. (2) When the new fracture is blocked, new DFPZ will be further generated, which will induce the formation of multiple parallel fractures in turn. (3) The activation and development of fractures by DFPZ is an important mechanism for the formation of multiple parallel fractures. In this study, the formation process and mechanism of multiple parallel fractures in field hydraulic fracturing are revealed. And it is of great significance for understanding the aggregation behavior of multiple fractures in hydraulic fracturing.

Keywords: *DFPZ, Multiple parallel fractures, three-point bending*

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Abs. No:138

Experimental Study on Fracture Morphology Evolution in Horizontal Well Refracturing Based on FBG Optical Fiber Monitoring

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ABSTRACT

Refracturing in low-production oil wells is an effective method for enhancing hydrocarbon recovery. Understanding the evolution of fracture morphology during refracturing is essential for accurately evaluating well productivity, especially in reservoirs characterized by heterogeneous fluid distribution and complex inter-fracture stress interactions. In this study, a series of physical simulation experiments were conducted using a true triaxial hydraulic fracturing system combined with fiber Bragg grating (FBG) strain sensors. The experiments systematically investigated the effects of spacing between new and existing fractures, as well as formation energy supplementation on fracture propagation behavior. The results show that the spacing between pre-existing and newly initiated fractures is a key factor influencing fracture morphology during refracturing. When the spacing is small, newly formed fractures tend to propagate unevenly with significant branching, and the roughness of the fracture surfaces increases, hindering the transport of proppants. As the spacing increases, fracture propagation becomes more balanced and symmetric, with smoother surfaces, which is favorable for enhancing fracture-controlled reservoir volume. Appropriate levels of formation energy replenishment further facilitate the development of new fractures. However, excessively high energy replenishment, while promoting the formation of branch fractures, tends to suppress the extension of main fractures and reduce the effective contact area between the fractures and the reservoir, thereby impairing the overall refracturing effectiveness. These findings provide valuable insights for improving refracturing efficiency and optimizing fracturing design in low-productivity reservoirs.

Keywords: *Refracturing, optical fiber, 3D scanning, rock mechanics*

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Abs. No:125

Enhancement of the DC Output Voltage of a Multilevel Boost Converter Using LQR Control.

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ABSTRACT

In this work, the Linear Quadratic Regulator (LQR) control strategy is identified as the most effective solution for enabling the multilevel boost converter to deliver a stable DC output voltage. The DC-DC boost converter features, at its output stage, a series of capacitors generating potential differences between them; consequently, the overall voltage corresponds to the sum of the voltages across the three output capacitors. The objective is to enhance the transient and steady-state performance of voltages and currents in terms of oscillation, disturbance rejection, and stability. To achieve this, LQR control is applied to both the voltage and current control loops, with the Q and R matrices appropriately designed to compute the gain matrix. To ensure the stability of the overall DC voltage, the LQR controller is used to supply a three-phase voltage inverter. Furthermore, to minimize the voltage error between the boost converter and the inverter, a second voltage regulation loop based on a Proportional-Integral (PI) controller is implemented. This controller enables the supply of a 1 kW three-phase load without inducing disturbances or oscillations. Simulation results obtained in MATLAB highlight the robustness of the LQR control strategy and the effectiveness of the PI controller in regulating the DC voltage at the input of the three-phase inverter.

Keywords: *Three-level boost converter, LQR control, PI controller, Three-phase voltage inverter, Three-phase load.*

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Abs. No:139

Impact of Traffic-Induced Vibrations on People in Buildings: A Neural Network Study

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ABSTRACT

Urban agglomerations are constantly developing. New places to live, work and, consequently, new access roads are being built. Traffic causes vibrations that propagates through the ground. During urban planning and sustainable urban development, this important issue is unfortunately often overlooked. Cars passing by buildings may affect the structure and people in it. The results of previous research indicate that such vibrations can have bad effects on people's mental and physical health. The frequencies of vibrations felt by people inside buildings are between 1 Hz and 80 Hz. However, low frequencies from 1 Hz to about 25 Hz are the most dangerous, as vibrations with such frequencies may enter into resonance with human organs. If a person is exposed to them for a longer period of time, they can result in heart disorders, sleep disturbances, and bad mood. The purpose of this research is to study the effects of vibrations from motor vehicles on people in buildings in close proximity to the vibration source using neural network algorithms. The results clearly show that the use of machine learning algorithms gives reliable results. The algorithms are capable to speed up data analysis significantly and reduce the costs of the whole investigation.

Keywords: *Traffic-induced vibrations, perception on human, neural networks.*

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Geometry-Driven Optimization of Oil–Water Imbibition in Capillaries

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ABSTRACT

This work presents a systematic optimization of oil–water imbibition dynamics in axisymmetric capillaries by tailoring the cross-sectional geometry to minimize total imbibition time and enhance velocity uniformity under fixed total volume and length constraints. The capillary profile is parameterized using a Fourier series, enabling smooth and flexible geometric variations. A modified Bell–Cameron–Lucas–Washburn model is developed, incorporating spatially varying radius, two-phase viscosity contrast, and inertial effects to describe imbibition dynamics accurately. The resulting nonlinear governing equations are solved numerically to predict the evolution of the imbibition front and flow velocity. An objective function that combines imbibition time, velocity uniformity penalty and regularization is optimized via a differential evolution algorithm to identify geometries that balance rapid transport with flow stability. Results show that the optimized geometries reduce imbibition time by 5%-10%, and in some cases even more, compared to uniform capillaries, while achieving improved velocity uniformity, particularly during the early imbibition stages.

Theoretical predictions are validated by lattice Boltzmann method (LBM) simulations, confirming the superior performance of the optimized geometries. This study provides a framework for passive geometric optimization of capillary-driven multiphase flow, with direct implications for enhanced oil recovery, fracturing fluid flowback, and fluid transport in porous media.

Keywords: Capillary Imbibition, Geometric Optimization, Multiphase Flow, Enhanced Oil Recovery, Lattice Boltzmann Method

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Abs. No:146

Welding of Exotic Materials

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ABSTRACT

Exotic materials are high-performance alloys of stainless steel, aluminum, nickel, titanium, magnesium and copper. Hastelroy C 276 (UNS N10276) is known as an exotic material and is a nickel-chromium-molybdenum alloy with very high corrosion resistance to many chemical environments. In this study, The weldability of Hastelloy C-276/Hastelroy C 276 alloys by manual gas tungsten arc welding (GTAW) and the microstructure properties resulting from welding were investigated. After the welding process using ERNiCrMo-4 welding filler wire and argon gas protection, it was observed that the welded materials did not have any defects or discontinuities and had high welding quality. In addition, in microstructure analyses, features such as dendritic structures, grain boundaries and annealing twins are thought to play a critical role in increasing the mechanical strength of the material and providing ductility.

Keywords: *Hastelloy C-276, Gas Tungsten Arc Welding (GTAW), welding, Microstructure, microstructure, ERNiCrMo-4*

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Abs. No:148

A 3D method for evaluating the sphericity of proppant in the field of hydraulic fracturing

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ABSTRACT

With global energy demand growing, unconventional oil and gas resources, as a vital supplement to conventional ones, play an increasingly key role in relieving energy shortages and safeguarding energy security. Hydraulic fracturing is a primary technique for stimulating unconventional reservoirs, which injects fracturing fluid and proppants to create artificial fractures, enhancing reservoir conductivity and facilitating the development of such resources. Proppants in fractures significantly affect their conductivity, with higher sphericity linked to wider fractures and better conductivity. Though sphericity is a 3D property, current assessment methods mainly depend on 2D microscopic images. An additional critical notion pertains to the influence of the center of gravity on potential energy. In the context of randomly distributed proppants, their vertical extension is often found to be comparatively smaller than their horizontal counterpart. Consequently, this disparity in dimensions poses a challenge in the accurate determination of proppant sphericity based on two-dimensional imaging. Therefore, there exists a pressing need for the development of a method grounded in the three-dimensional attributes of proppants to accurately assess their sphericity. This paper presents an innovative approach using 3D imaging technology, integrating 3D proppant features like height, surface area, and volume to improve evaluation accuracy, overcoming 2D limitations and holding broad application prospects as a new industry standard.

Keywords: *Hydraulic fracturing, Proppants, Sphericity, 3D imaging, Unconventional Reservoirs*

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Abs. No:149

The transformation of the microscopic fracture mechanism of rock induced by confining pressure and its macroscopic fracture response

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ABSTRACT

Rock is in a complex stress state in deep oil and gas extraction, and confining pressure is a crucial factor affecting fracture behavior of rock. This study aims to reveal the influence law and mechanism of confining pressure on mode I fractures of rock. The three-point bending experiments on sandstone under 0-30MPa confining pressure level were conducted. We analyzed the microfracture development process by acoustic emission monitoring technology, and utilized 3D scanning technology to characterize the mode I fracture characteristics, and revealed the fracture energy evolution mechanism. The results show that the inhibition of microfracture formation by the confining pressure leads to a longer development process of the fracture process zone, and thus the rock exhibits significant nonlinear failure characteristics; a higher confining pressure consistently produced a smoother fracture surface with a smaller fractal dimension and roughness coefficient; The internal microscopic fracture mechanism of rocks at high confining pressure levels changes from intergranular fracture to transgranular fracture, which requires more energy to be dissipated. The transformation of the microscopic fracture mode is the fundamental cause leading to a smooth fracture surface, increased fracture toughness and increased fracture energy. This research provides experimental basis and theoretical support for the fracturing of deep reservoirs.

Keywords: *Confining pressure,Nonlinear fracture, fracture mechanism*

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Abs. No:153

Elaboration and study of hybrid material of polyvinyl alcohol / polypyrrole Cu-Ni

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2- Research centre in industrial technologies CRTI, Cheraga, Algeria

ABSTRACT

Polyvinyl alcohol /polypyrrole Cu-Ni films were prepared by solution costing technique using chemical oxidolive. Polymerization of pyrrole. This technique produces addictive flexible and free-standing polymer composite films
Various techniques of characterizable (IR-UV) were applied to analyse copper and nickel interacted with PVA/PPY were obtained.
Also, in this study the electrochemical reclarify of the elaborate electrode denoted PVA/PPY/Cu-Ni was examined by cyclic voltametrie with respect to the oxidates of ascorbicacid in acid medium.
The results obtained affirm that PVA/PPY/Cu 0.85 Mi 0.15 has higher electrocatalytic activity then the PVA/PPY Cu0.50 Ni0.50 and PVA/PPY Cu 0.5 Ni 0.85.

Keywords*: PVA/PPY/Cu-Ni, casting technique films, ascorbic acid.*

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Abs. No:154

Electrochemical synthesis of polyaniline and his dipping by ions Ni^{2+}

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2- Research centre in industrial technologies CRTI, Cheraga, Algeria

ABSTRACT

This work consists in the production of new composite materials obtained on an indium tin oxide (ITO) electrode from a polyaniline, in which a nickel transition metal is incorporated in the form of microparticles.
The deposition of the polymer film is on the electrode and is obtained by electrochemical polymerization of the monomer in an aqueous Medium.
Incorporation of the nickel particles into the polymer film is accomplished by dipping the modified electrode in a nickel sulphate solution to complex the Ni^{2+} cations, followed by electro reduction in an aqueous solution of the electro deposition process.
The characterisation of the electrode material obtained were examined by Cyclic Voltammetry (CV) and Electrochemical Impedance Spectroscopy (SIE) as well as an Atomic Force Microscopy (AFM) and Scanning Electron Microscopy (SEM)

Keywords: *Electro polymerization, Polyaniline, Modified electrode*

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Abs. No:182

Synthesis of chemical polyaniline and his dopage by metallic oxide

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ABSTRACT:
In this study, we have made the chemical synthesis in pouder form of polyaniline in an acid medium.
The synthesis of polyaniline Mgo and polyaniline MnO2 composite materials by varying the oxide concentration to improve their physico-chemical and conductive properties the materials composite developed Pani-MgO and Pani-MnO_2 were characterised by spectroscopic methods UV visible and IR analysis.
Also studied the electrochemical properties of composite materials using cyclic voltammetry and conductive properties using the impedance method.
Key words: *Aniline, Magnesium oxide, Manganese dioxide, Composite polymer chemical synthesis*

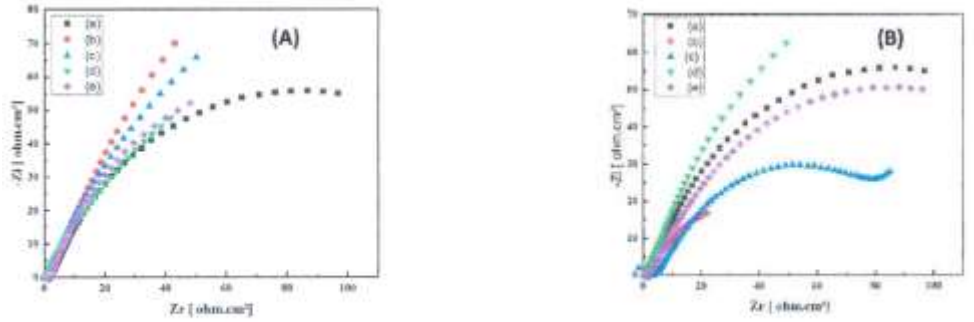

Diagramme d'impédance relative au matériaux composite Pani-MnO2 (A) et Pani-MgO (B) a différente concentration (a, b, c, d, e) 0,5,10,15 et 20% de MnO2 et MgO dans une solution de H2SO4 0.5M obtenu sur une gamme de fréquences comprise entre 100 kHz et 10 mHz.

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Abs. No:155

Dual-Pathway Optimization of Supercapacitor Components Using PEDOT-Fe_3O_4 Electrodes and Borate-Enhanced HES Electrolytes

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ABSTRACT

This study presents a complementary investigation into the development of high-performance supercapacitor materials through the integration of conductive polymers, nanostructures, and advanced polymer electrolytes. In the first part of the research, Poly(3,4-ethylenedioxythiophene) (PEDOT) was employed as a conductive polymer due to its excellent thermal and environmental stability, low band gap, high electrical conductivity, and optical transparency. Fe_3O_4 nanoparticles, synthesized via precipitation, were incorporated to enhance specific capacitance, benefiting from their low cost and ease of production. The electrodes were fabricated using a layer-by-layer film deposition method, and a widely used PVA-KOH gel served as the electrolyte. PEDOT was prepared via emulsion and mini-emulsion polymerization techniques to optimize its structural and electrochemical characteristics.

In the complementary study, hydroxyethyl cellulose (HES) films were modified with a concentrated sodium borate (SB) solution, prepared from boric acid and borax, to improve their conductivity. The introduction of SB significantly reduced the film resistance, while the addition of phosphoric acid further enhanced conductivity, reaching a maximum of 8.5×10^{-3} S/cm—doubling the performance of previously reported Borax-HES systems. Fourier-transform infrared (FTIR) spectroscopy revealed the formation of cross-linked structures between HES and borate ions, contributing to improved mechanical stability and antimicrobial properties. These enhancements support the potential of SB- and acid-modified HES films as functional electrolytic components in supercapacitor systems.

Keywords: *PEDOT, Borate solution, Capasitor, HES*

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Abs. No:156

A Cost-Effective Microwave Route to Borohydroxyapatite: Crystallinity, Elemental Composition, and Vickers Hardness Evaluation

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ABSTRACT

Boron-substituted hydroxyapatites have emerged as promising candidates for bone tissue engineering due to their enhanced bioactivity, biodegradability, and mechanical properties. In this study, borohydroxyapatite compounds were synthesized using a microwave-assisted method by reacting colemanite ($2CaO{\cdot}3B_2O_3{\cdot}5H_2O$) with various phosphate sources—H_3PO_3, $(NH_4)H_2PO_4$, $(NH_4)_2HPO_4$, and $Ca_3(PO_4)_2$—at different molar ratios. Sixteen different compositions were prepared, and the mixtures were irradiated at 600 W and 800 W for 10–15 minutes using a household microwave oven. The resulting materials were characterized by FTIR spectroscopy, X-ray diffraction (XRD), and scanning electron microscopy coupled with energy-dispersive X-ray spectroscopy (SEM/EDX). FTIR analyses identified specific samples exhibiting vibrational modes distinct from the raw materials, indicating the formation of new crystalline phases. XRD results confirmed the partial formation of borohydroxyapatite alongside unreacted colemanite. SEM/EDX analyses further revealed the coexistence of calcium, phosphorus, boron, and oxygen, supporting the successful incorporation of boron into the apatite lattice. Among all samples, one of them (colemanite and $Ca_3(PO_4)_2$ at a 2:1 molar ratio) exhibited the most promising crystallinity and mechanical performance, with a Vickers hardness value of approximately 95 HV. This level of hardness places it within the optimal range for dental restorative materials. These findings suggest that microwave-assisted synthesis using borate-rich precursors offers a rapid, low-cost, and environmentally friendly route for producing boron-containing apatites with strong potential for orthopedic and dental biomaterial applications.

Keywords: *Apatites, Microwave synthesis Biomaterial*

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Abs. No:157

HYPERHOMOCYSTEINEMIA AND ALZHEIMER'S DISEASE

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ABSTRACT

BACKGROUND-AIM

Alzheimer's disease (AD) is characterized by disorders of short-term memory, executive functions and orientation in time and space. Several factors are implicated in its onset, including genetic factors, age, the environment and cardiovascular risks (diabetes, hypertension, hyperlipidemia). In addition, several studies have suggested that increased plasma homocysteine levels are an important modifiable risk factor for vascular dementia and AD.so we aim to study the relationship between homocysteine (Hcy) and Alzheimer's disease (AD)

METHODS

This is a case-control study. Cases were Alzheimer's patients, and controls were subjects over 40 years of age and free of any neurodegenerative disease. Cases and controls underwent a biochemical work-up including blood glucose, renal, lipid and inflammatory tests, as well as homocysteine measurement on the Cobas Integra 400 plus, in addition to
a completed information form. Statistical analysis was performed using IBM SPSS version 26 software to assess the relationship between Hcy and AD, as well as other potential risk factors.

RESULTS

A total of 100 controls and 50 cases were recruited for this study. Different anthropometric, clinical and biological characteristics were compared between cases and controls, Univariate analysis indicated a significant association between early education, nutritional status, advanced age and AD ($P<0.05$). Also a significant association between Hcy and AD ($P=0.023$), suggesting that high levels of Hcy could be a potential risk factor for the development of AD. Using multivariate regression, Hcy ($P=0.04$/OR=2.54, 95% CI: 1.04-6.17) and advanced age (0.000/OR=1.18, 95% CI: 1.10-1.26) emerged as independent risk factors for AD. The ROC curve for plasma Hcy as a risk factor for AD showed an AUC= 0.62
(0.52-0.72) with a $P=0.017$, a sensitivity=60% and a specificity of 69% for a homocysteine threshold of 20.33 µmol/l..

CONCLUSIONS

This study provides evidence to support a significant relationship between Hcy and other risk factors and AD. Further research is needed to elucidate the underlying mechanisms and explore potential preventive and therapeutic strategies targeting these risk factors for the management of AD.

Keywords: *homocysteine, Alzheimer, association*

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Abs. No:158

HOMA AND TYG INDICES IN PATIENTS WITH METABOLIC SYNDROME: COMPARATIVE STUDY

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Abstract

BACKGROUND-AIM
Metabolic syndrome (MetS) is a public health problem. It is a grouping of several metabolic abnormalities in the same individual metabolic abnormalities, which predisposes to cardiovascular risk and type 2 diabetes. Insulin resistance is a pathophysiological factor in these patients; it is estimated by calculating the HOMA (homeostasis model assessment) index, which is the most widely used and best validated method. The tyg index is a new insulin resistance score
The aim of this study was to compare triglyceride–glucose (TyG) and HOMA index in patients with at least one factor of the metabolic syndrome.
METHODS
we carried out a prospective study on 130 patients with at list one factor of métabolic syndrome , for whom an information sheet was duly completed. Various biological parameters were measured, including glycemia, HbA1c, lipid balance and insulin. the HOMA index was calculated using the formula: insulin (mU/L) ×glucose (mmol/L) / 22.5 and the Tyg index using the formula: Ln[fasting triglyceridemia (mg/dL) × fasting glucose (mg/dL)]/2 statistical analysis was performed using spss software
RESULTS
Our study included 130 patients, 66.2% of whom were women (SR=0.51). The mean age of the patients was 61.51 years (SD= 9.16). The mean insulinemia was 9.65 IU/l (SD=9.35), the HOMA index 3.83 (SD=6.45), and the Tyg index 4.90 (SD=0.34). the prevalence of insulin resistance was 76.2% according to the HOMA index, and 92.3% according to the Tyg index , there was an association between the HOMA index and hyperglycemia (p=0.002), hypertriglyceridemia (p=0.03), hypoHDLemia (p=0.03) and waist circonference (p=0.001), a positive correlation between the two indices HOMA and Tyg (Rho =0.155, p=0.04, AUC =0.802)
CONCLUSIONS
TyG index is a useful tool which can be used as a simple and inexpensive alternative to assess insulin sensitivity

Keywords: *TYG index, HOMA index, matabolic syndrome*

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A Noise Reduction Evaluation Method for coal petrology CT Images Based on Multi-index Fusion and Dynamic Weight Allocation

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ABSTRACT

As an unconventional clean energy resource, coalbed methane (CBM) is primarily stored within coal matrix pore systems. High-fidelity digital core modeling constitutes an essential prerequisite for accurately characterizing coal structural architecture. High-precision denoising of coal rock CT images is crucial for digital core modeling. However, existing evaluation methods rely on single indicators or subjective judgments, failing to accurately quantify filtering effects in complex noise environments. This study proposes a noise reduction evaluation framework for coal rock CT images based on multi-index fusion, introducing a frequency-divided dynamic weight signal-to-noise ratio (QPSNR).By integrating multi-dimensional features including the Gray Level Co-occurrence Matrix (GLCM), Edge Preservation Index (EPI), Structural Similarity Index (SSIM), and spectral energy analysis, a comprehensive evaluation is achieved through an information entropy-optimized nonlinear dynamic weight mechanism, enhancing the accuracy of reservoir quality assessment. Experiments were carried out using coal rock images with a resolution of 0.2 μm to optimize parameters and evaluate the performance of 10 widely used filtering techniques. Results show that the method effectively quantifies the protection of high-frequency microstructures and low-frequency density distributions, reducing the noise reduction error rate from >18% in traditional methods to 4.2-6.5%. The QPSNR index improves the recognition accuracy of coal rock-specific “salt-and-pepper-Gaussian” mixed noise by 32%. The proposed multi-scale analysis framework and adaptive weight model establish a noise reduction evaluation standard for digital cores, providing high-quality data support for permeability prediction in coalbed methane reservoirs.

Keywords:*Digital Core, Coal Rock CT Images, Multi-index Fusion, QPSNR*

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Abs. No:161

Özel Öklid Lie Grubu SE(2)

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ÖZET

Bu çalışmada ilk önce Lie grubu tanımı ve $SE(2)$ grubu ifade edildi. Daha sonra bu grubun sonsuz küçük operatörleri ve Casimir operatörü elde edildi. Bu operatörle oluşturulan özdeğer ve özfonksiyon probleminin çözümü verildi. Fiziksel bir sistemin Hamiltonyeni ile sistemin simetri grubunun Casimir operatörü arasındaki ilişkiden Schrödinger denkleminin çözümü olan dalga fonksiyonu elde edildi.

Anahtar Kelimeler : *Lie grubu, Casimir operatörü, Schrödinger denklemi*

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Abs. No:162

The Benefits of Automation in Immunohistochemistry: Efficiency,Standardization, and Cost Savings

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ABSTRACT

The growing demands in pathology laboratories have driven the adoption of automation to improve efficiency, reduce costs, and ensure consistent quality. This study compares manual and automated immunohistochemistry (IHC) processes in a high-volume laboratory setting. Using a standardized workload of 48 microscope slides—the maximum capacity of the DAKO Autostainer Link 48 immunostainer, we evaluated the time and total cost required to complete IHC staining using both methods. In our analysis, the manual IHC procedure required approximately 460 minutes per cycle, while the automated immunostainer completed the same workload in 390 minutes. This resulted in a noticeable time savings of around 15.22%. Furthermore, the cost of reagents per slide was lower when using automation (7.09 EUR) compared to the manual protocol (11.63 EUR). Technician hands-on time also differed, with 400 minutes of manual work required (0.50 EUR per slide) compared to only 80 minutes in the automated process (0.10 EUR per slide). Costs for consumables (0.12 EUR per slide) and electricity (0.01 EUR per slide) were similar between the two methods. The automated procedure also accounted for depreciation (0.29 EUR per slide) and annual maintenance costs (0.08 EUR per slide). Ultimately, the overall cost per slide was 12.26 EUR for the manual procedure and 7.69 EUR for the automated procedure, highlighting a cost reduction of approximately 37%. Beyond time and cost savings, automation ensures greater process standardization, contributing to higher reliability and reproducibility of results. Overall, automation improves turnaround time, reduces costs, enhances standardization, and supports sustainable, high-quality diagnostic workflows.

keywords: *automated immunostainer, immunohistochemistry, process standardization, automation, cost-efficiency, laboratory workflow*

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Assessment of the oxidative stress on the human health in Algeria

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ABSTRACT

Introduction:

Oxidative stress is a biochemical process resulting from an imbalance between the production of reactive free radicals and the body's antioxidant defence mechanisms. This phenomenon has been extensively studied in the fields of biology and medicine, and its impact on human health is increasingly recognised.

Objectives:

The study evaluates perceptions, knowledge, risk factors, prevention, impact on quality of life, and doctors' views on oxidative stress.

Methods:

This is a cross-sectional observational study, a questionnaire distributed and completed by a sample of doctors and people from the general population, the survey was conducted through Google forms.

Results :

The survey reveals varying perceptions of oxidative stress. Enhancing awareness and encouraging healthy habits nutrition, exercise, sleep, and avoiding smoking are vital to lessen its effects. Ongoing training for healthcare professionals is essential to ensure high-quality patient care.

Conclusion :

Oxidative stress contributes to the development of many diseases. Understanding its mechanisms is essential for effective prevention and treatment. A healthy lifestyle helps reduce it and supports overall well-being.

Keywords : *Oxidative stress, antioxidant, reactive free radicals*

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MOLAR BANDS MICROBIOLOGICAL CONTROL OF THE EFFECTIVENESS OF THE DISINFECTION PROCESS

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ABSTRACT

I.INTRODUCTION:
The objective of disinfection and sterilization for dento-facial orthopedics to prevent infectious risks both for the patient and the health care team.

II.OBJECTIVE:
Checking the effectiveness of the disinfection process of molar bands.

III.MATERIAL AND METHODS:
This is a serial case study, carried out at the the Microbiology Unit of the Central Laboratory of the University Hospital Centre unit Frantz Fanon.
The study involved 48 molar bands. Each instrument was swabbed three samples, one directly after contact with the patient's oral cavity, and two after 10 and 15 minutes of disinfection.

IV.RESULTS:
Microbiological analysis showed that 100% of molar bands the collected not disinfected are contaminated by bacteria with polymicrobial cultures mainly composed of Streptococci and Neisseria.
79.17% of the molar bands disinfected for 10 minutes are contaminated with bacteria.
43.75% of the molar bands disinfected for 15 minutes are contaminated with bacteria.
The disinfection rate of the molar bands was 20.83% after the first disinfection time and 56.25% after the second disinfection time with $p < 0.05$, the difference is significant.

V.CONCLUSION:
To reduce cross-infections transmission, sterilization of reusable instruments, and the use of medical and surgical materials to single use is the best way to ensure the safety of patients and staff from infectious risk.

Keywords: Disinfection, Infectious risks, Microbiology control, Molar bands.

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Experimental Research on the Disturbance between Fractures and Crack Propagation in Hydraulic Fracturing of Conglomerates

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ABSTRACT

Mahu conglomerate reservoir is rich in oil and gas resources and of great development potential. However, due to characteristics such as low porosity, low permeability, and strong heterogeneity in conglomerate reservoirs, the control of formation fracturing and crack propagation is difficult, severely affecting the effectiveness of fracturing transformations. Therefore, it is necessary to study the disturbance between cracks and the propagation laws of cracks in hydraulic fracturing of conglomerates. This paper explores the influences of factors such as horizontal stress difference, pump capacity, fracturing method, and well spacing on hydraulic crack initiation and extension through small-scale double well fracturing simulation experiments. The research results indicate: when two wells use the same pumping source for simultaneous fracturing, the distribution of fracturing fluid output in the two wells is uneven, and the degree of crack propagation is inconsistent; when two wells use different pumping sources but the pumped volumes are the same, crack propagation is significantly affected by the horizontal stress difference, mainly forming cracks parallel to the direction of the maximum principal stress; small well spacing can cause adjacent cracks to be in a high induced stress zone, increasing the level of stress interference; an increase in pump capacity raises the hydrostatic pressure within the cracks, shortening the interaction time between the fracturing fluid and conglomerate, making crack propagation relatively simple; during sequential fracturing of double wells, the propagation of cracks in the later-fractured well is greatly influenced, leading to deflection and intersection phenomena after the cracks converge.

Keywords: *Hydraulic Fracturing Simulation Experiments, Conglomerate, Crack Propagation*

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Experimental Investigation of Shear Friction Characteristics in Volcanic Rock Under In-Situ Shear-Enhanced Permeability Conditions

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ABSTRACT

Multistage hydraulic fracturing in horizontal wells has become a cornerstone technology for the efficient development of volcanic hydrocarbon reservoirs. The creation of an interconnected fracture network system, where hydraulically induced fractures intersect with pre-existing natural fractures, is crucial for optimizing stimulation effectiveness. This study integrates petrographic characterization (analyzing mineral composition and rock fabric) with a specialized experimental system simulating in-situ fracturing environments capable of shear-enhanced permeability measurements. Four representative Carboniferous volcanic lithologies—andesite, basalt, tuff, and volcanic breccia—were investigated to assess their fabric properties and shear friction behavior. Key results demonstrate:(1) Significant variations in shear-induced slip behavior exist among different volcanic lithologies. (2) Distinct mineralogical compositions and microstructural characteristics are the primary factors governing lithology-specific shear friction responses.(3) Volcanic lavas (basalt and andesite) exhibit markedly higher shear modulus and shear strength compared to pyroclastic rocks (tuff and volcanic breccia). These findings provide critical insights into the influence of volcanic rock composition and structure on shear friction heterogeneity under reservoir stimulation conditions.

***Keywords**: Volcanic rock, Shear-Enhanced Permeability, Shear Friction Behavior*

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Investigation of an integrated organic rankine cycle combined with water/ lithium bromide absorption chiller for a petroleum process application

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ABSTRACT

Waste heat and flare gas recovery through the integration of polygeneration enery system can enhance energy efficiency and reduce greenhouse gas emissions across various industrial applications, particularly with high carbon footprints such as the petroleum industry.
This study investigates a Combined Cooling and Power system (CCP). The CCP system utilizes gas turbine exhaust gas and flare gas heat recovery to activate both Organic Rankine Cycle (ORC) for electricity generation and water/lithium bromide absorption chiller for cooling. The investigation concerns an Algerian upstream petroleum facility. The energy a performance of the CCP system is analyzed using the Aspen tool.
This new polygeneration configuration is expected to directly reduce natural gas consumption and greenhouse gas emissions. Additionally, it offers another advantage by eliminating flare taxes.

Keywords: *Waste heat recovery 1, flare gas 2, Organic Rankine Cycle 3, absorption refrigeration system 4, combined cooling and power 5, energy efficiency 6*

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Assessment of the Tram Track Structure Condition Using Impulse Vibroacoustic Testing

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ABSTRACT

The technical condition of tramway track infrastructure plays a critical role in ensuring the safety, comfort, and environmental sustainability of urban transport systems. Degradation of track structures contributes to increased vibration and noise emissions, which can significantly impact the quality of life in densely populated areas. Reliable diagnostics of track performance, especially in terms of dynamic behavior, is essential for minimizing adverse effects on buildings and residents, while also maintaining efficient tram operation.

This paper presents the results of experimental investigations conducted on the newly commissioned Rapid Tram route in Poland. The research was carried out in the context of a track surface repair program, with the aim of assessing the technical state of the track structureusing advanced vibroacoustic methods. The objectives included evaluating the effectiveness of vibration attenuation solutions, the impact of maintenance interventions, and the operational durability of the track under service loads.

The study involved field tests performed according to dedicated, developed by the authors, procedures and the EN 15461 standard. The scope encompassed impulse vibration attenuation measurements, dynamic characterization using the Track Decay Rate method, continuous monitoring of vibration propagation during tram operations, and synchronized deflection measurements under live loading. Vibration transmission was analyzed across multiple interfaces: from rail to track slab, curb elements, subgrade, and nearby buildings with measurements in both vertical and transverse directions.

The findings confirm the usefulness of vibroacoustic diagnostics in evaluating the performance of tramway infrastructure and guiding repair strategies to mitigate environmental impacts in urban contexts.

Keywords: *Tram track structure diagnostic, Impulse field test, Track Decay Rate*

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"Solving Volterra Fuzzy Integral Equations Using the Fuzzy Sumudu Transform"

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ABSTRACT

This paper presents the application of the fuzzy Sumudu transform as an analytical method for solving Volterra fuzzy integral equations of the first kind with convolution kernels, under Hukuhara differentiability. The study demonstrates that fuzzy sumudu transform provides a simple, reliable, and effective approach for handling such integral equations. Finally, a representative example is included to illustrate the proposed method.

Keywords: *fuzzy Sumudu transform , integral equations, effective approach.*

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Effect of Lubricant Additives on Hybrid Lubrication Performance

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ABSTRACT

To enhance wear resistance and reduce friction, the addition of nanoparticles to lubricants is a widely adopted technique in lubrication engineering. This modification alters the rheological behavior of the lubricant, rendering it non-Newtonian and thereby requiring the use of advanced models to accurately predict system performance. The majority of research on the additives effect, such as nanoparticles or polymers, has focused on hydrodynamic bearings, especially journal bearings. However, when it comes to hybrid bearings (which typically combine hydrodynamic and hydrostatic regime), the body of literature is significantly smaller.

This study presents a theoretical investigation into the lubrication of hybrid journal bearings, taking into account the non-Newtonian behavior of the lubricant. The couple stress fluid theory is employed for mathematical modeling, and the governing equations are solved numerically. The hybrid bearing analyzed is an eccentric cylindrical bearing consisting of identical hydrostatic cells distributed uniformly around the periphery of the bearing. The effects of inlet pressure and the couple stress parameter on bearing performance are examined. The results indicate a significant enhancement in pressure distribution when operating with couple stress fluids compared to the Newtonian case. However, in the hydrostatic case (no-charged bearing), the influence of couple stress effects becomes negligible.

Keywords: *Hybrid Lubrication; Couple stress fluid; Non-Newtonian fluid*

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Enhanced Energy Optimization through IoT Smart Metering and AI-Driven Forecasting and Scheduling

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ABSTRACT

The integration of smart grid technologies has led to significant improvement in energy optimization, thus, new optimization technologies and methods are continuously developed by researchers, such as the integration of optimization algorithms within the home energy management system in the smart home. The main objective of this work is to develop a home energy management system through the integration of artificial intelligence and Internet of Things IoT technologies, with the goal of optimizing energy consumption on the consumer side, reducing electricity bills, and achieving peak load reduction.The software part of the HEMS is simulated in order to implement the load consumption forecasting, optimal load scheduling and battery management in the smart home, using Long Short-Term Memory LSTM and Particle Swarm Optimization PSO algorithms respectively, and a hardware implementation simulating the monitoring functionality of the IoT based smart meter in the Home Energy Management System.

The results of the simulation demonstrate significant savings in the billing and improved peak shaving with better renewable energy and battery integration, contributing to the stability, reliability and sustainability of the network. Additionaly lower price billing is achieveda and the carbon footprint of the house is reduced due to the enhanced renewable energy management.

Keywords: *Load forecasting, Load scheduling, Battery management, Renewable energy.*

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Abs. No:191

New application for detecting desert soil change based on long-term satellite images

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ABSTRACT

Web-accessible satellite imagery, such as data provided by Landsat and Sentinel programs, represents a critical resource for research and operational applications. However, its utilization is frequently hindered by technical constraints, including cloud cover, preprocessing complexity, and the lack of intelligent selection tools. This thesis introduces Optyra, an automated platform designed to optimize the selection of satellite image time series. By leveraging historical climate data (MERRA 2 cloud index) and meteorological forecasts, Optyra efficiently filters usable imagery, minimizing unnecessary downloads and enhancing the quality of thematic analyses. Developed with a modular MVC (Model-View-Controller) architecture, the system provides an intuitive interface for non-expert users while ensuring seamless integration with existing GIS tools. Results demonstrate significant improvements in selection efficiency and better planning for satellite image acquisitions. As an application of the images, we chose to monitor changes in cereal crops in the Algerian desert. We present a framework for detecting land use changes by combining K-Means classification techniques, Principal Component Analysis, and Vector Change Analysis to determine the state of vegetation. The application of the framework gives us interesting results on the state of vegetation cover in the desert.

Keywords: *Satellite image, Cloud index, Change detection*

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Hybrid statistical and artificial intelligence approach for forecasting wind speeds energy on the west coast of Algeria

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ABSTRACT

This paper present a statistical analysis of wind speed and solar energy along the Algerian coastline, using three-hourly data collected between 1960 and 2020 by the National Meteorological Office (ONM). The main objective is to assess the renewable energy potential of west costal region. The methodology is based on two complementary approaches : (1) a statistical modeling using the Weibull distribution and Multiple regression (fitted by maximum likelihood), and (2) a predictive model based on machine learning (XGBoost) to forecast short-term variations in wind speed ans solar radiation. Descriptive analyses, hierarchical classification, and feature engineering (cyclical encoding, lag variables) were used to identify local regimes and extreme wind events. The results reveal significant variability in wind regimes across regions. Arzew and Oran stand out for their high potential, with strong average wind speeds and estimated production exceeding 1 GWh/year. In contrast, Mostaganem shows low wind performance. The XGBoost model demonstrated good predictive accuracy, with low mean absolute errors for wind speed and direction. However, the Weibull model fit proved insufficient in most cases, suggesting the need for more suitable hybrid models. This study provides key insights for planning wind energy projects and opens perspectives for improvement through approaches combining topographic data and artificial intelligence methods.

Keywords: *Renewable energy, Statitiscal analysis, XGBoost Model*

12th INTERNATIONAL CONFERENCE ON COMPUTATIONAL AND EXPERIMENTAL SCIENCE AND ENGINEERING (ICCESEN-2025)
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Sustainable Sensor for Monitoring and Deactivating Waterborne Pathogens in Contaminated Water Sources using fuctionilesed metal nanoparticles

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ABSTRACT

The purity of outsourced water pools and resources is critically important for both human health and environmental protection. However, pathogens present in wastewater and biofluids pose a serious threat to public health by contributing to the spread of waterborne diseases and environmental contamination.
In this study, we present a low-cost, mobile system designed with a simple and practical approach for detecting the presence of pathogens in water samples. The sensor is based on an electrical circuit that measures conductivity in the analyte. A silver nanoparticle (AgNP)-based reference was used to calculate the required AgNP quantity for effective deactivation of pathogens present in the sample.
The innovative aspect of the project lies in the direct dispersion of AgNPs into the liquid medium, rather than immobilizing them on electrode surfaces. This method maximizes interaction with bacterial contaminants. The AgNPs were synthesized using green methods and functionalized with natural clay-based nanocomposites.
The measurement circuit allows for real-time monitoring of parameters such as electrical resistance. During experiments, the system was tested with solutions containing E. coli (ATCC 25922) and fungi. The results were promising and demonstrate the system's potential for safe water recovery and reuse.
This device holds strong potential for use in field-based water quality monitoring, emergency sanitation scenarios, and decentralized water treatment systems in both rural and urban settings.

Keywords: Mobil sensor, silver nanoparticles, nano sensors, pathogens

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Effect of the mass ratio of phosphoric acid on the chemical impregnation of a vegetal waste for the preparation of a porous material.

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ABSTRACT

In this study, several activated carbons were synthesized from a vegetal waste abundant in North Africa, by varying the mass ratio of orthophosphoric acid used as a chemical activation agent while keeping the other preparation parameters constant. The objective was to evaluate the influence of this mass ratio of $H_3\ PO_4$ on the properties of the resulting material, with the intention of using it for the adsorption of organic dyes in the context of water treatment, thereby contributing to environmental preservation.

To achieve this, we impregnated four samples of cypress cones, of equal mass, in acid solutions with a concentration of 60%, prepared from a base solution at 85%, with varying impregnation ratios (1:1, 1:2, 1:3, 1:4). The four systems (raw material + acid solution) were subjected to ultrasonic treatment for one hour, then dried in an oven for 24 hours. Subsequently, the samples were carbonized in a microwave oven with fixed irradiation parameters in terms of power and duration. After washing to obtain a neutral pH and drying, the resulting activated carbons were characterized by FTIR, XRD, and methylene blue index (MBI).

FTIR analyses revealed that the obtained materials are rich in oxygenated functional groups, such as hydroxyl groups (OH), ethers (C-O-C), and carbonyls (C=O). These functional groups influence the chemical and physicochemical properties of the material, as well as its interactions with various organic and inorganic substances. The methylene blue index (MBI), which reflects the adsorption capacity of medium-sized molecules, is used to assess the presence of mesopores and macropores. The optimal MBI, measured by UV-visible analysis, is 620.56 mg/g, corresponding to a mass impregnation ratio of phosphoric acid of 1:3. This high value indicates a strong affinity of the material for certain chemical compounds, suggesting a significant adsorption capacity.

These results demonstrate that activated carbon obtained from lignocellulosic biomass can be effectively utilized in various applications, particularly for the purification and separation of undesirable substances present in water, such as organic dyes.

***Keywords**: Chemical activation, phosphoric acid, activated carbon, vegetable waste.*

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Green Synthesis of Mesoporous Activated Carbon from Plant Waste for Azo Dye Removal in Water Treatment

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ABSTRACT

In this study, we synthesized activated carbon from cypress cone waste, a lignocellulosic biomass, through chemical activation to be applied in the adsorption of a synthetic dye, Basic Blue 41 (BB41), which is mainly used in the textile industry and poses significant environmental hazards.

To this end, a sample of raw material was crushed into millimetre-sized pieces and impregnated with phosphoric acid at a specific concentration and impregnation ratio. The mixture (raw material + acid solution) was stirred for 24 hours, then dried in an oven at 105 °C. The sample was subsequently carbonized in a microwave oven under an inert atmosphere at fixed power and irradiation time. The resulting activated carbon was washed until neutral pH, dried, and characterized using FTIR, XRD, Methylene Blue Index (MBI), BET surface area analysis, and SEM.

The synthesized material was applied for the adsorption of the organic dye BB41 in solution at various concentrations (50, 100, 150, 200, 250, 300, and 350 ppm), under continuous stirring at natural pH, room temperature, with an initial activated carbon dosage of 1 g/L and a contact time of 1 hour. After adsorption, the samples were centrifuged and analysed using UV-Visible spectroscopy.

FTIR analyses revealed that the synthesized material is rich in oxygenated functional groups. The structural analysis showed an amorphous nature with two broad bands around $2\theta = 25°$ and $2\theta = 43°$, similar to graphite. The Methylene Blue Index (MBI), determined by UV-Vis analysis, was 620.56 mg/g. Such a high MBI value indicates that the material has a strong affinity for certain chemical compounds, suggesting a high adsorption capacity, which was confirmed by its high specific surface area obtained by BET. The material was found to be mesoporous, which is favourable for dye removal applications. The adsorption of BB41 followed the Langmuir isotherm model, with a promising maximum adsorption capacity (qmax) of 277 mg/g.

***Keywords**: Activated Carbon, Plant Waste, Characterisation, Adsorption of BB 41.*

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Synergistic Evaluation of Ionizing Radiation Shielding in Novel Lead-Free Alloys Using Geant4 MC toolkit

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ABSTRACT

This study offers an in-depth assessment of the ionizing radiation shielding capabilities of three lead-free alloys through Monte Carlo simulations using the Geant4 toolkit. The simulated linear attenuation coefficients (LAC) were validated against theoretical values from the XCOM database, demonstrating excellent agreement, with most percentage differences falling below 1%. A statistical comparison using the cumulative distribution function (CDF) yielded p-values of 1.00 for all materials, confirming strong consistency between Geant4 and XCOM outputs. Core shielding characteristics, such as the mass attenuation coefficient (MAC), half-value layer (HVL), and mean free path (MFP), were analyzed across a broad photon energy range of 0.015–15 MeV. As a result, samples consistently exhibited superior performance. At 0.5 MeV, all samples achieved the lowest HVL and MFP, along with the highest Zeff and KERMA values compared to different traditional shielding materials. These findings indicate that the high-density alloys are a highly promising alternative to lead-based materials for compact and effective photon shielding, particularly in medical diagnostic environments and radiation-intensive industrial applications.

Keywords: *Alloys, Geant4 MC toolkit, Simulation, XCOM*

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Retarding Effect of the Mediating Sulfane (-S-) Group on Chelation Efficacy of Thiolic-Sulfur Toward Mercury in 2-(2-Mercaptothiazol-5-yl) acetic acid Derivative. DFT-Theoretical Study.

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ABSTRACT

Mercapto-containing chelates: 2-(2-mercapto-4-methyl-2,3-dihydrothiazol-5-yl) acetic acid (**AS_2NHM),** 2-(2-mercapto-4-methylthiazol-5-yl) acetic acid **(AS_2NM),** 2-(2-mercapto-5-methyl-3H-pyrrol-4-yl) acetic acid **(ACSNM),** 2-(5-mercapto-3-methylthiophen-2-yl) acetic acid **(AS_2CM),** 2-(2-mercaptothiazol-5-yl) acetic acid **(AS_2N)** and 4-ethylthiazole-2-thiol **(S_2NM)** were studied using DFT method of calculation employing B3LYP/LanL2DZ level of theory.
Computational results have showed that mediating groups (*Sulfane -S- and imine =N-*) along with the attached substituents (*methyl -CH_3 and carboxylic -COOH*) surprisingly have a dramatic effect on charge density localization/delocalization on thiolic-sulfur as a donor atom and thus on its capability of binding the mercuric divalent ion.
Responses for modifications brought by in all simulates were tracked by calculating the charge density on thiolic-sulfur and atoms in proximity. Related changes in geometrical parameters, namely, bond lengths and bond angles in the neighborhood of thiolic-sulfur were also monitored to hopefully provide us with more insights about the effect of the performed modifications. Images of HOMO-LUMO orbitals and charge density distribution surfaces are also presented.

Effects of Sulfane (-S-) mediating group on electron density enrichment of thiolic-sulfur, thus its chelation effectiveness for mercuric ion have been investigated. This is in order to deep understand the chelation weakness of 2-(2-Mercaptothiazol-5-yl) acetic acid (AS_2NM) toward mercury(II) ions in particular, which has been encountered in earlier experimental research work.

Findings of the study, have clarified the drawbacks of AS_2NM that lay behind its failure in stabilizing the divalent mercuric ion through effective coordination. Nevertheless, it was able of developing stronger binding with Hg metal ions compared to the other chelates, this was attributed to softness close matching with Hg ion.

Keywords: *DFT-theoretical; mercaptothiazol; mediating-group;*

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Learning from Neutrons: Machine Learning and Monte Carlo Synergy in Shielding Design

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ABSTRACT

Machine learning (ML), as a prominent discipline within artificial intelligence, has emerged as a key enabler of significant advancements in data-driven decision-making processes and is widely employed across diverse scientific domains for data analysis and predictive model development. In the field of radiation protection, ML offers substantial advantages over traditional approaches in terms of cost, computation time, and complexity, particularly in dose estimation and shielding design processes.

In this study, the applicability of ML algorithms for predicting radiation dose values at various distances within a tunnel system designed to attenuate secondary neutrons generated under abnormal operating conditions of proton accelerators at 250 and 1000 MeV energy regions was investigated. The performance of the developed ML models was evaluated against reference results obtained from FLUKA Monte Carlo simulations. Linear Regression, Gradient Boosting Regressor, KNN Regressor and Random Forest algorithms were employed, and the results indicated that these methods achieved high prediction accuracy ($R^2 \approx 0.85–0.98$) for dose distributions while significantly reducing computation time compared to Monte Carlo simulations. The findings demonstrate that ML-based models can provide reliable predictions across different material, environment and energy combinations, thereby accelerating the design process and offering cost-effective solutions that contribute to enhancing safety levels in nuclear facilities.

Keywords: *High - energy neutron, Monte Carlo simulation, FLUKA, Machine Learning, Linear Regression, Random Forest, Gradient Boosting Regressor*

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Contribution to the study of the chemical composition and antioxidant activity of propolis from two regions in northern Algeria

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ABSTRACT

Propolis is a by-product of the beehive, collected by bees, whose composition differs according to several factors.
The aim of this work is to draw up a phytochemical profile of Algerian propolis. The two samples used in this study come from two different regions of northern Algeria, namely Constantine (Ain annhasse) and Bouira (Chorfa).
Phytochemical screening of propolis extracts revealed the existence of alkaloids, polyphenols, flavonoids, coumarins, catechols, and anthraquinones in both samples.
Quantitative analysis of total polyphenols and flavonoids by the Folin-Ciocalteu and aluminium trichloride methods respectively on 70% ethanolic extracts gave higher levels with the Constantine sample. The contents were 107.17±19.02 / 74.18±9 .20 µg CE/mg extract for total polyphenols and 64.01±2.3/25.42±9.18 µg RE/mg extract for flavonoids.
The antioxidant activity has been demonstrated and evaluated with the standard DPPH free radical scavenging power test using methanolic extracts of propolis, the values were 201, 05 and 202, 59.

Keywords: *propolis, phytochemical screening, flavonoids, polyphenols, antioxidant activity*

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Numerical methods used in fire-protection simulations – a review

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ABSTRACT

Introduction

The most hazardous threat to life and health of inhabitants and the firefighters in the means of fire accidents is the spreading of smoke, as various studies have shown. Smoke contains toxic materia (carbon monoxide, cyanide, etc.) that block oxygen use in the body and cause loss of conciousness, making the evacuation impossible - with a fatal outcome for the fire victim in a very short period of time.

Governing equations and solving methods

The governing equations that have to be solved numerically, are equations of fluid dynamics (Navier-Stokes or RANS Equation), often coupled with models for heat transfer (radiation), turbulence, combustion and others.

The solving techniques, that are commonly used are Finite Difference (FDM), Finite Element (FEM) and Finite Volume Method (FVM). These methods discretize the simulation space into a grid and approximate the solutions of the governing eqautions at each point based on values of the neighboring grid cell.

Results

The accuracy is significantly impacted by the size of the grid. However, the size of the grid impacts also the time needed to compute the simulation, which effects the cost. Boundary conditions (including the model of the building with all the relevant fire spreading details) have to be modelled carefully and with full understanding of fire protection elemets (various openings, ventilation shafts, smoke exhaustion, etc) and fire spreading. The chosen numerical method can offer better solving stability, but can require more computation, or on the contrary increase the accuracy or shorten the computation. Some examples of the calculation will be presented.

Discussion

Numerical methods mentioned above provide a powerful tool to predict smoke behavior in complex buildings or enviroment (stadiums, plants, etc.), leading to better fire safety practices and more predictable fire spreading behaviour. They provide a valuable tool for studying fire dynamics and smoke behaviour.

Keywords: *fire protection, warm smoke simulation, numerical methods, fluid dynamics*

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Microcontroller-Guided DIBH Phantom: A Low-Cost Training Tool for Patient Positioning in Radiotherapy

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ABSTRACT

Today, Interactive Phantoms are not only necessary but also indispensable. The advanced Deep Inspiratory Breath Holding (DIBH) treatment technique is now a clinically important technique in radiotherapy, which is particularly used to minimize cardiac exposure during the treatment of left-sided breast cancer. Mastering the positioning of the patient treated with DIBH is of particular importance and is a challenge in medical physics education due to the lack of practical training tools. The study presents the design and development of an interactive 3D printed phantom that realistically simulates the movement of the anatomical thoracic area during DIBH, and this by integrating with microcontroller-based sensors and actuators to reflect the dynamics of chest rise and breath hold. The phantoms interpret real-time feedback through sound sensors, servomotors, and various visual indicators, allowing students to observe and adjust the accuracy of positioning. The study reflects that the low cost of creating interactive phantoms advances the teaching of the principles of DIBH and patient positioning in radiotherapy, also demonstrating maximum student engagement, resulting in improved conceptual understanding and potential for broader application in academic-clinical settings.

Keywords: DIBH Simulation, Microcontrollers, Patient Positioning.

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Glioblastoma Multiforme: Case Report, Treatment, and Prognosis

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ABSTRACT

Glioblastoma multiforme (GBM) is the most aggressive glial neoplasm of the central nervous system, with a median survival of less than one year despite existing therapies. We discuss the case of a 66-year-old woman exhibiting diplopia, dizziness, and numbness, in whom MRI revealed a 52x43 mm lesion in the left occipital lobe. This qualitative study, performed in the Oncology Clinic of the University Clinical Centre of Pristina from 2018 to 2023, examined MRI data and treatment outcomes. The patient underwent 3D conformal radiation and temozolomide for 60 months, resulting in a substantial extension of survival. The findings indicate that contemporary techniques like IMRT, SRT, and SRS may enhance outcomes for GBM patients.

Keywords: *Glioblastoma multiforme, case report, radiation therapy*

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The Potential and Difficulties of Using 3D Printing to Create Vaginal Applicators for Brachytherapy

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ABSTRACT

The anatomical modification of vaginal applicators in the field of brachytherapy is now more than essential for the purpose of efficient dose delivery and not only. The creation of 3D applicators provides great results as a key tool for the personalization of oncological therapies.

This literature review reflects on the benefits and difficulties of the clinical adaptation of the creation of 3D vaginal applicators. The analysis of the literature on 3D vaginal applicators demonstrates that they offer superior coverage of the target volume while reducing exposure to sensitive organs in comparison with conventional ones. It is reflected that the role of physics and medical physicists is fundamental in this path, including dosimetry verification, quality control, and adaptation of the design to the required clinical parameters. The remaining challenges are sterilization, biocompatible material solutions, and the lack of standardization, and not only that. According to international criteria (ESTRO, AAPM), the procedures and verification of clinical application cannot be overlooked. Gynecological brachytherapy is emerging through the potential of medical physicists and the printing of 3D gynecological applicators as a guarantee for ensuring safety and increasing effectiveness, but more study, validation, and practical standardization are still required.

Keywords: *3D printing, vaginal applicators, brachytherapy, medical physics, dosimetry, quality assurance, personalization, gynecological cancer*

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Optical Performance and Clinical Relevance of CAD/CAM Ceramic Materials

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ABSTRACT

The continuous evolution of CAD/CAM technology has enriched the selection of restorative materials, providing improved mechanical durability and enhanced optical performance.This in vitro study aimed to compare the translucency and opalescence across three monolithic zirconia systems, a polymer-infiltrated hybrid ceramic, and a lithium disilicate glass-ceramic used as a group control. Uniform specimens (14 × 12 × 1 mm, shade A2) were examined with the Vita Easyshade V spectrophotometer following the CIELAB color protocol. The results revealed pronounced variations among the groups: lithium disilicate demonstrated the most favorable optical properties, the hybrid ceramic exhibited intermediate performance, while zirconia specimens showed a progressive reduction in translucency and opalescence depending on their grade. From a clinical standpoint, these outcomes underscore the importance of material-specific indications. Lithium disilicate remains the material of choice for restorations in highly esthetic regions, hybrid ceramics represent a balanced alternative between optical quality and strength, whereas zirconia, despite its lower translucency, is particularly suitable for posterior areas where functional resilience is prioritized. Overall, the study highlights that aligning the intrinsic properties of ceramic materials with clinical demands is crucial to ensure both aesthetic excellence and long-term restorative success.

Keywords: *CAD/CAM, esthetics, zirconia, hybrid ceramics, translucency, opalescence*

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Validation of the ındividual monitoring system for radiation workers through ıntercomparison tests

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ABSTRACT

Individual monitoring of external exposure for radiation workers is required under national and international laws. Individual monitoring began in Kosovo in 1978 and lasted until 1982, when film dosimeters were used to create the first systematic dosage records for radiation workers. Following that, the monitoring system was modified with thermoluminescent dosimeters (TLD-100), which enhanced dosage assessment accuracy and reliability, particularly for personal dose equivalent Hp(10) and Hp(0.07).

This study discusses how quality assurance is achieved by regularly verifying the TLD system with reference irradiations from ISO-accredited laboratories and participating in EURADOS intercomparisons tests. In these blind tests, dosimeters are irradiated at different doses, energies, and angles, and the reported values are compared to reference doses to determine accuracy using trumpet curves.

Recent intercomparison findings indicate that Kosovo's monitoring service fulfills international acceptability standards. This study illustrates how the setting up of TLD-based monitoring, along with rigorous validation and international comparisons, resulted in high-quality dosimetric data and compliance with European radiation safety regulations in Kosovo.

Keywords: *Radiation, exposure, TLD-100, Keywords 2, Keywords 3*

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Microbiological safety of artisanal honey: Detection of C. botulinum and other bacteria in Kosovo

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ABSTRACT

Honey is widely consumed for its nutritional and therapeutic value, yet it may harbor microbial contaminants of public health concern. This study investigated the occurrence of Clostridium botulinum and other bacteria in polyfloral honey from small-scale artisanal producers across Kosovo. Twenty-seven geographically distributed samples were collected between July and September 2023 to provide representative national coverage.

Bacteria were isolated using direct centrifugation and enrichment culture, characterized by Gram staining, catalase and oxidase tests, and identified by 16S rRNA gene amplification with universal primers, followed by sequencing and phylogenetic analysis. Eleven samples (41%) exhibited ~96% sequence identity with C. botulinum. Thirteen samples (48%) showed ~99% identity to Bacillus spp. (including B. licheniformis, B. cereus group, and B. subtilis), while Staphylococcus saprophyticus (~98%), Alcaligenes faecalis (100%), and Paenibacillus dendritiformis (~99%) were each detected in one sample. To our knowledge, this is the first comprehensive survey of C. botulinum in honey from Kosovo.

The relatively high detection rate of C. botulinum, together with frequent recovery of other spore-forming and opportunistic bacteria, underscores potential food-safety risks particularly for infants vulnerable to botulism. These findings support the need for continuous microbiological monitoring, improved hygienic practices along the production chain, and targeted consumer education to minimize health risks and inform national food-safety policies for artisanal honey.

Keywords: *honey, Clostridium botulinum, Polifrolar, artisanal, 16S rRNA*

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Determination of Physico-Chemical Properties and Heavy Metals Lead (Pb), Cadmium (Cd), Aluminum (Al), Nickel (Ni), and Chromium (Cr) in Cabbage Cultivated in the Region of Prishtina and Prizren.

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ABSTRACT

The work aims to determine the physicochemical properties and heavy metals lead (Pb), cadmium (Cd), aluminum (Al), nickel (Ni), and chromium (Cr) in cabbage cultivated in the regions of Prishtina and Prizren. The impact of heavy metals on agricultural products is an important public health concern, as these elements can accumulate in the human body through the consumption of contaminated food. Sampling was conducted in October and November 2024. Cabbage samples were collected from different areas within the municipalities of Prizren and Prishtina, then processed and analyzed using standard analytical methods. The analyses were performed at the laboratory of the Faculty of Agriculture and Veterinary Medicine. Results were obtained using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP/OES), an analytical technique used to measure heavy metals in each sample. The findings revealed significant variations in the concentrations of Pb, Cd, Al, Cr, and Ni, highlighting the contamination's impact on food safety. Comparing these levels with limits set by international standards for food products provides insight into the risks associated with consuming cabbage from these regions. This study enhances understanding of heavy metal contamination in crops and emphasizes the importance of regular monitoring of food products and agricultural land to protect consumer health.

Keywords: *physicochemical properties, cabbage, heavy metals.*

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Abs. No:282

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VALORİZATİON OF FARMING WASTE IN A COMPOSİTE MATERİAL: MECHANİCAL CHARACTERİZATİON

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ABSTRACT

Polymeric materials are known for the wide range of their properties, which in practice translates into several application possibilities. Another feature that highlights the importance of polymers is the possibility of chemical or physical structural modification, such as dissolution, the addition of additives and reinforcements (composites), and so on. In recent years, research has focused on valorizing farming waste in polymer materials to produce composite materials by various methods. The effect of adding particles (fillers) on abrasion wear has been studied ; these fillers can increase the shear resistance or the cohesion characteristics of the resulting composite material. Other authors have shown that factors affecting the properties of composites containing natural fillers include particle size, morphology, surface properties, and especially their concentration in the material.

This study focuses on the incorporation of date pit flour into a PVC matrix composite with different filler contents of 10%, 20%, 30%, and 40% by weight. The corresponding composites were prepared from a thermoplastic resin (PVC) and date pit flour by calendering and compression molding processes to improve the mechanical properties of the composite. The resulting composites, manufactured with various formulations, were then mechanically characterized to determine their mechanical properties. Analysis of the experimental results allowed us to draw the following conclusions:

- With the increase of untreated date pit flour content, both the stress and elongation at break decrease, while the elastic modulus and hardness progressively increase.
- However, a 20% filler content of date pit flour shows better improvement than the other composite formulations.

Keywords: *thermoplastic resin, date pit flour, composite materials, mechanical characterization.*

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Abs. No:12

Development and optimization of a smart wearable sensor for monitoring cardiac and respiratory signals

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ABSTRACT

The integration of optical fiber sensors, such as Fiber Bragg Gratings (FBGs), with advanced manufacturing techniques has opened new horizons in biomedical monitoring. This study focuses on the development and optimization of a smart wearable sensor for cardiac and respiratory signal monitoring, leveraging the unique advantages of FBGs. The design incorporates simulations using coupled-mode theory to analyze the impact of opto-geometric parameters such as grating period, length, and refractive index contrast on sensor sensitivity. Additionally, the combination of FBGs with 3D-printed encapsulation structures is explored to enhance sensor performance and adaptability. Finite-element analysis was employed to optimize strain localization and interface bonding between the fiber and encapsulation material, ensuring robust spectral responses under mechanical and thermal loads. The resulting system, characterized by its miniaturization, electromagnetic insensitivity, and customizable design, was validated in pilot tests for respiratory and cardiac rate monitoring through chest wall deformation detection. The findings highlight the potential of FBG-based wearable sensors as cost-effective and high-precision tools for real-time physiological monitoring, paving the way for next-generation biomedical applications.

Keywords: *FBG , finite-element analysis, cardiac and respiratory signal*

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Abs. No:237

Determination of Half-Value and Tenth-Value Layers of PLA-Based 3D Printing Filaments under Photon Irradiation

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ABSTRACT

Polylactic acid, one of the most widely used polymers in additive manufacturing, has recently gained attention for potential applications in radiation-related research. In this study, the half-value layer (HVL) and tenth-value layer (TVL) parameters of PLA were calculated through simulations. Photon beams at energies ranging from tens of keV to several MeV were simulated to assess attenuation behavior across different thicknesses.

Results demonstrated that both HVL and TVL increase with photon energy, reflecting the dominance of Compton scattering at higher energies. The findings highlight the importance of thickness optimization for radiation shielding applications using PLA-based materials.

Keywords: *Polylactic acid, HVL, TVL*

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Comparative Analysis of Linear and Mass Attenuation Coefficients of PLA Filaments for Radiation Shielding Applications

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ABSTRACT

The linear attenuation coefficient (LAC) and mass attenuation coefficient (MAC) are critical parameters in describing the interaction of radiation with matter. In this work, PLA filament samples, commonly used in 3D printing, were investigated by means of simulation to obtain their energy-dependent attenuation coefficients. Photon energies from diagnostic to therapeutic ranges were employed, and the resulting LAC and MAC values were benchmarked. The study provides a fundamental database of attenuation coefficients for PLA, supporting its evaluation as a candidate material in lightweight shielding prototypes and biomedical phantom construction.

Keywords: *LAC, MAC, Attenuation*

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Abs. No:257

Evaluation of Mean Free Path of PLA-Based Printing Materials through Monte Carlo Simulation

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ABSTRACT

The mean free path (MFP) is a fundamental measure representing the average distance traveled by photons before undergoing interaction with matter. In this research, the MFP values of polylactic acid (PLA) filaments were computed using a simulation.

Simulations were performed over a broad photon energy spectrum, and the calculated MFP values exhibited a strong dependence on photon energy, increasing steadily with higher energies. These results provide insight into the penetration depth of radiation in PLA-based structures and are particularly relevant for additive manufacturing of custom shielding devices. This results are emphasizes the practical applicability of PLA in radiation-related experimental setups.

Keywords: *MFP, PLA, Simulation*

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Abs. No:294

Risk Management in Islamic Financial Systems: Alignment with International Standards

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ABSTRACT

Islamic financial systems, grounded in Shariah principles, face a unique set of risks—including Shariah risk, liquidity risk, operational risk, and regulatory compliance risk. These risks, stemming from the non-interest-based nature and participatory contracts of Islamic banking, require specialized management frameworks.

The aim of this study is to design and validate an institutional reform model for Islamic banks, with a focus on managing Shariah, operational, and financial risks. Using Structural Equation Modeling (SEM), the causal relationships among supervisory structure, managerial training, analytical tools, and financial performance were examined. Data were collected from four countries—Iran, Malaysia, Bahrain, and the United Arab Emirates—and analyzed using applied-analytical methodology through AMOS and R software. The alignment of these systems with international standards such as Basel III and IFRS was also assessed.

Findings indicate that independent supervisory structures and specialized managerial training play a significant role in mitigating institutional risks. The path from Shariah risk to financial performance showed a significant negative coefficient, confirming the critical role of Shariah compliance in sustaining financial stability. Complementary tests—including Bootstrap, Sobel, sensitivity analysis, and multi-group modeling—confirmed the statistical and comparative validity of the proposed model. Finally, the study offers recommendations for enhancing Shariah governance, standardizing financial reporting, and designing a framework for evaluating Shariah-based performance.

Keywords: *Islamic Banking, Shariah Risk, Structural Equation Modeling (SEM), Shariah Supervision, Financial Performance*

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Chemical study and valorization of the essential oil of *Teucrium polium L.* as a bioactive material for the development of a natural pharmaceutical formulation with anti-inflammatory purposes

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ABSTRACT

Context: Essential oils extracted from medicinal plants are natural bioactive materials of great interest for pharmaceutical research, thanks to their multiple therapeutic properties. *Teucrium polium L.* (Lamiaceae family), a plant long used in traditional medicine for its healing, anti-inflammatory, antioxidant and antibacterial properties, is distinguished by its richness in bioactive compounds such as flavonoids and tannins. This study aims to enhance and characterize the essential oil from *Teucrium polium L.*, considered as a bioactive material for the development of a natural pharmaceutical formulation with anti-inflammatory properties. ***Methods:*** The essential oils were extracted by hydrodistillation and appear as complex mixtures primarily composed of terpenoid compounds, including monoterpenes, sesquiterpenes, and, to a lesser extent, diterpenes. They may also contain other molecules such as acids, alcohols, aldehydes, esters, acyclic aliphatic hydrocarbons, and lactones; more rarely, nitrogen and sulfur compounds, coumarins, and phenylpropanoid derivatives are also present. The chemical profile of the essential oil of *Teucrium polium L.* (Lamiaceae family) was determined by gas chromatography-mass spectrometry (GC-MS). Furthermore, the antimicrobial activity was assessed using the microdilution method. ***Results:*** GC-MS chromatographic analysis revealed a complex chemical composition, dominated by monoterpenes and sesquiterpenes. The main constituents identified include verbenone (3.46%), terpenyl acetate (4.14%), and valencene (4.84%). These compounds are likely to explain the observed biological activities, including anti-inflammatory and healing properties. Furthermore, the cream formulated with this essential oil has shown promising

potential as a natural pharmaceutical device for the treatment of inflammation and skin lesions. ***Conclusions:*** *Teucrium polium L.* essential oil is distinguished by its chemical composition rich in monoterpenes and sesquiterpenes, as well as by its proven pharmacological activities. These characteristics make it a promising bioactive material in the field of natural materials chemistry. Its valorization in the form of a natural pharmaceutical formulation with anti-inflammatory effects represents an innovative strategy, combining therapeutic efficacy and biodiversity preservation.

Keywords: *Teucrium polium L., GC-MS analysis, chemical composition, anti-inflammatory activity, pharmaceutical formulation, bioactive materials, valorization, bioeconomy.*

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Abs. No:222

Biogenic Synthesis and Characterization of Zinc Oxide and Titanium Dioxide Nanoparticles Mediated by Plant Extracts

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ABSTRACT

Context: Nanotechnology, a multidisciplinary field involving physics, chemistry, and biology, offers major applications in biomedicine and dentistry due to the unique properties of nanomaterials. The green synthesis of nanoparticles (NPs), particularly from plant extracts, is a sustainable approach with advantages in terms of biocompatibility and reduction of harmful effects. Metal oxide nanoparticles, such as ZnO and TiO_2 , are distinguished by their photocatalytic, magnetic, and antimicrobial properties due to their small sizes and large specific surface areas. In this study, ZnONPs and TiO_2 NPs were synthesized using aqueous extracts of *clove* and *olive leaves* with a zinc salt (Zinc Nitrate) as pioneers and titanium dioxide due to its ability to catalyze chemical reactions and its efficiency in removing contaminants from the environment.

Materials and methods: Different experimental techniques are used for the preparation, characterization and analysis of these nanoparticles, highlighting the ecological approach adopted in their synthesis. X-ray diffraction (XRD), infrared spectroscopy (FTIR), UV-visible spectroscopy, surface area determination analysis (BET) and X-ray fluorescence (XRF) were used to characterize the optical, chemical, crystalline, textural and elemental properties of the formed nanoparticles.

Results: The green synthesized ZnONPs and TiO_2NPs were initially confirmed using a UV-visible spectrophotometer. This technique was used to evaluate the optical properties of the nanoparticles and estimate the band gap size. The analysis allowed us to compare the absorption bands of the two types of nanoparticles, which eliminated interferences due to the solvent or the reference substrate, and to obtain an accurate absorption spectrum of the studied nanoparticles. Other analyses were carried out on these nanoparticles such as infrared (IR) spectroscopy analysis which allowed us to identify the functional groups involved in the stabilization of the nanoparticles. X-ray diffraction (XRD) was used to determine the crystal structure and crystallite size of the nanoparticles. The Brunauer–Emmett–Teller (BET) technique was used to measure the specific surface area of nanoparticles, a crucial data for

catalytic and absorptive applications. The antimicrobial activity was tested for TiO_2 and ZnO nanoparticles synthesized from plant extracts against two bacterial strains: Staphylococcus aureus, Escherichia coli. Titanium dioxide nanoparticles showed the best overall efficacy against Gram-positive and Gram-negative bacteria while ZnO nanoparticles showed fair efficacy, but lower than TiO_2 in the majority of cases. ***Conclusion:*** The study of antimicrobial activity highlighted a notable efficacy, in particular for TiO_2 nanoparticles associated with olive leaf and clove extracts, demonstrating a strong inhibitory power on *Staphylococcus aureus* and *Escherichia coli*.

Keywords : *Nanoparticles, green synthesis, UV-visible spectroscopy, FTIR, XRD, BET, XRF, antimicrobial activity, product development, environmental civilization.*

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Abs. No:270

Electrical Resistivity and Minority Carrier Lifetime Distribution in Directional Solidification of Silicon Ingot

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ABSTRACT

In this work, the electrical wafer qualities were studied through resistivity and minority carrier lifetime variation, as a function of wafer position. The silicon ingot is grown with directional solidification by Heat Extract Method (HEM). The solid-liquid interface moves upwards from the bottom to top of the crucible. The growth rate is controlled to favour the growth of a high quality crystal structure by adjusting the position of the heat exchanger bloc and the heater power. The target is to obtain vertically aligned grains which confirm a good directional growth. This analysis was investigated using a quasi-stationary photo conductance QSSPC technique and four probe technique. The ingot produced has shown the good uniform large grain with vertically-oriented grain boundaries.
The resistivity for corner and center brick's present a maximum value of 2.3 Ω.cm and 1.69 Ω.cm respectively, after 50% of growth rate and minimal value in the first and final stage of solidification. In the initial growth rate, the initial lifetime value is 3.23 µs and 3.96 µs for corner and center bricks respectively. Both lifetimes value grow to the maximum value with 8.55 µs and 14.05 µs for corner and center of bricks respectively. The variation of electrical resistivity is probably affected by the impurity concentration and grain structure. The lifetime results are affected by the structural defected and grain morphology..

Keywords: *Silicon ingot, Directional solidification, Heat exchange method, Lifetime, Growth rate*

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Abs. No:274

Nickel Zinc thin film for Hydrogen production

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ABSTRACT

By serving as a catalyst and boosting reaction efficiency in procedures like water electrolysis, biomass gasification, and photochemical reactions, nickel based component plays a crucial part in the production of hydrogen.
The purpose of this work was to use the Magnetron Sputtering technology to develop nickel-zinc thin films on a stainless steel substrate.
Scanning electron microscopy, optical profilometer, optical microscopy, X-ray diffraction, and the electron probe microanalyser (EPMA) were used to examine the surface morphology, crystal structure, and chemical composition of the Ni-Zn thin films.
The chemical activation of the electrode was achieved in an alkaline solution.

The hydrogen evolution reaction was shown to be enhanced with temperature and activation in the performance and stability tests conducted with and without an active electrode.

Keywords: *Nickel/Zinc, characterization, water splitting, hydrogen production.*

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Abs. No:268

Bismuth oxide electrode for CO_2 conversion application

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ABSTRACT

For the active and selective electroreduction of CO_2 to formate and formic acid, bismuth is a potential electrocatalyst.

In the present work, an electrode based on bismuth oxide /carbone /pvdf composite was synthesized.

Scanning electron microscopy (SEM) was used to examine the films' morphology, while x-ray photoelectron spectroscopy (XPS) and Fourier transform infrared spectroscopy (FTIR) were used to examine their structure. Next, these films' stability and electrocatalytic activity in relation to CO_2 electroreduction in aqueous solution were evaluated.

Keywords: *bismuth oxyde, CO_2,conversion,formate.*

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Abs. No:269

Processing of recovery Si down to purified Si powder from SIREVIVAL PROJECT

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ABSTRACT

With rapidly increasing production and installation of photovoltaic panels, recycling of PV modules has become the main issue. In this study, we developed pure silicon powder from EOL panel.

The process is divided into three parts, organic solvents soaking and thermal treatment to eliminate EVA.

In the second part, the recovered silicon from EOL panel was purified and characterized by SEM, EDS and XPS spectroscopy.

Finally, the pure silicon was reduced to powder using Mortar Grinder RM 200 and a planetary Ball Mills PM 200 and its granulometric parameters were study by Laser.

Keywords: *End of life, silicon, purification,powder.*

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Abs. No:235

Strengthening Radiation Safety Education in the Pre-Internship Health Associate Degree Curriculum

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ABSTRACT

Purpose: The purpose of this study was to evaluate the impact of radiation safety training administered during the pre-internship period on the knowledge and awareness of students in associate degree programs in health sciences. Increasing radiological practice requires students to effectively learn basic radiation safety principles before beginning their professional careers.

Method: The study employed a quasi-experimental (pretest-posttest) design. The study group consisted of 186 students enrolled in associate degree programs in health sciences at a university in Turkey. Participants received a training program that included additional radiation safety modules in addition to the standard curriculum. Pre- and post-training knowledge levels were measured using a 20-question test and a structured questionnaire covering radiation safety principles, exposure reduction methods, and the use of personal protective equipment. Data were analyzed using a dependent samples t-test.

Findings: The mean knowledge score before the training was 42,3±11,5, and after the training, this score increased to 78,7±9,8, and the difference was found to be statistically significant ($p<0,001$). 82% of students stated that the additional training provided significantly contributed to their pre-internship preparation process, and 76% stated that it increased their awareness of the use of personal protective equipment.

Conclusion: Strengthening radiation safety education before internship significantly increases the occupational safety and awareness levels of associate degree health students. These findings support the need for a stronger integration of radiation safety education into the curriculum.

Keywords: *Radiation Safety, Radiation Protection, Associate Degree Education, Radiation Training*

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Abs. No:236

Internal Radiation Alarm: Safety Awareness in Future Healthcare Workers

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ABSTRACT

Purpose: The aim of this study was to assess the level of radiation safety awareness among healthcare students and to examine the relationship between individual awareness levels, which can be defined as "internal radiation alarms," and professional training processes. Given the widespread use of radiation in healthcare, raising awareness early in future healthcare professionals is critical for both reducing occupational risks and ensuring the sustainability of safe healthcare delivery.

Method: This cross-sectional study was conducted among 170 students enrolled at a health sciences college in Turkey during the spring of 2024. Participants were 68% female (n=116), 32% male (n=54), and the mean age was 20,9±2,1 years. The "Radiation Safety Awareness Scale," adapted from literature, and a sociodemographic information form were used as data collection tools. Data were analyzed using SPSS 25,0, using descriptive statistics, independent samples t-tests, and analysis of variance.

Findings: According to the analysis results, students' general radiation safety awareness was found to be above the average level (mean = 3,78±0,62). Female students' awareness levels were statistically significantly higher than male students ($p<0,05$). Furthermore, students studying radiology and nursing were found to have developed a higher level of awareness compared to other healthcare programs. Students who received prior training in radiation safety had significantly higher mean scores than those who did not ($p<0,01$).

Conclusion: The study revealed that future healthcare professionals are beginning to develop safety awareness, a form of internal radiation alert, but this awareness varies across programs. The higher awareness among female students, in particular, indicates the influence of societal and individual factors. It is recommended that radiation safety courses be systematically incorporated into educational programs, simulation-based practices be expanded, and interdisciplinary collaborations be increased. Consequently, raising student awareness early is considered a strategic necessity for both protecting personal health and providing safe healthcare services at the societal level.

Keywords: *Radiation safety, Health students, Occupational risks, Safety culture*

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Abs. No:246

ASSESSMENT OF CANCER PATİENTS' CONCERNS DURİNG RADİOTHERAPY: A RADİATİON ONCOLOGY PERSPECTİVE

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ABSTRACT

Radiotherapy is a cornerstone treatment modality in oncology, offering significant therapeutic benefits for various types of cancer. Despite its efficacy, patients undergoing radiotherapy often experience anxiety and concerns related to treatment side effects, procedure complexity, and long-term outcomes. Understanding these concerns is critical for improving patient care, adherence to treatment, and overall quality of life (Smith et al., 2013; Lee et al., 2010).

This study aims to evaluate the perceptions, fears, and expectations of cancer patients regarding radiotherapy. A cross-sectional descriptive design was employed, involving structured interviews and validated questionnaires administered to patients receiving radiotherapy at a tertiary oncology center. Data were analyzed to identify the most common sources of anxiety, including fear of radiation-induced side effects, uncertainties about treatment efficacy, and concerns regarding physical changes and social implications (Patel et al., 2021).

The findings indicate that patients' primary concerns center around potential adverse effects, including fatigue, skin reactions, and organ-specific complications. Psychological stress and lack of sufficient information were also significant contributors to patient anxiety. Effective communication between healthcare providers and patients, individualized counseling, and educational interventions were identified as key strategies to alleviate concerns and improve treatment adherence (Nguyen et al., 2022). Furthermore, the study emphasizes the role of

healthcare professionals in addressing ethical and emotional aspects of care. By incorporating patient-centered approaches and ensuring transparent, empathetic communication, oncology teams can enhance patient satisfaction, reduce treatment-related anxiety, and foster trust in the therapeutic process (Khan et al., 2023).

In conclusion, comprehensive assessment and proactive management of cancer patients' concerns regarding radiotherapy are essential components of high-quality oncology care. Integrating educational, psychological, and ethical considerations into routine radiotherapy practice not only improves patient experience but also contributes to optimal clinical outcomes.

Keywords: *Cancer Patients, Radiotherapy, Patient Anxiety, Patient Education.*

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RADİATİON SAFETY AND MANAGERİAL ETHİCAL PRİNCİPLES İN HEALTHCARE SERVİCES

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ABSTRACT

Radiation is widely used in modern healthcare for diagnostic, therapeutic, and research purposes. While it provides significant benefits, exposure to ionizing radiation carries inherent risks to patients, healthcare professionals, and the general public. Effective radiation safety management in healthcare institutions is therefore crucial to minimize risks and ensure compliance with national and international regulations (WHO, 2024; IAEA, 2024).

Radiation safety management encompasses principles such as justification, optimization, and dose limitation. Justification ensures that each radiological procedure is medically necessary and beneficial (NCBI, 2023). Optimization, guided by the ALARA (As Low As Reasonably Achievable) principle, aims to minimize radiation exposure. Dose limitation involves adhering to established dose limits to prevent harmful effects (OSHA, 2025).

Beyond technical measures, managerial and ethical considerations play a central role in fostering a culture of safety. Healthcare managers are responsible for implementing protocols that ensure safe usage of radiation, monitoring occupational exposure, providing staff training, and maintaining transparent communication with patients regarding potential risks (WHO, 2022). Ethical principles such as accountability, transparency, beneficence, and non-maleficence guide decision-making in scenarios involving radiation exposure, balancing patient care with staff safety (AMA, 2007).

Keywords: *Radiation Safety, Managerial Ethics, Healthcare*

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EVALUATİON OF ANXİETY LEVELS İN CANCER PATİENTS UNDERGOİNG LONİZİNG RADİATİON THEARAPY DUE TO SİDE EFFECTS

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ABSTRACT

This study aims to describe the anxiety and psycho-social challenges experienced by cancer patients undergoing radiotherapy due to side effects. The study group consists of cancer patients from a foundation hospital in Istanbul. In determining the study group, one of the purposive sampling methods, convenient sampling, was taken into account. This research was conducted using qualitative data collection techniques within the framework of a heuristic approach, one of the types of qualitative research. The data for this study were obtained using an interview form composed of semi-structured and open-ended questions. The interviews were conducted face-to-face in environments chosen by the participants, adhering to the principle of voluntarism. For the analysis of the collected data, content analysis was employed. The information gathered from the interviews was transcribed by the researcher during the sessions. The data were subjected to simple coding, and the codes obtained through this process were categorized. Themes appropriate to these categories were determined, and content analyses were conducted. The study's findings revealed that cancer patients experienced anxiety from the diagnosis stage onward, with their anxiety levels increasing after the emergence of side effects. Additionally, they faced social issues such as changes in daily habits, dependency on others, decreased performance in professional life, inability to fulfill family responsibilities, and a narrowing of social relationships. Furthermore, it was depicted that patients experienced psychological challenges, including shock, disbelief, denial, rebellion, and anxiety at the diagnosis stage, as well as anger, problems related to physical appearance, hopelessness, and insomnia during the treatment phase.

Keywords:*Radiotherapy, Patient, Cancer, Anxiety*

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Abs. No:231

Manufacturing and Printing of Urogenital System Organs

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ABSTRACT

Radiation is commonly used in the medical field, primarily for diagnostic purposes and, in some cases, for therapeutic applications. In hospitals, it is employed in radiology, nuclear medicine, and radiation oncology departments. Unlike other applications, nuclear medicine involves the injection of a radioactive substance directly into the patient's body. This radioactive material disperses throughout the entire body, with a significant portion accumulating in the bladder before being excreted. The radioactive substances collected in the bladder also irradiate the nearby genital organs.

The aim of this study is to design and fabricate models simulating the organs of the urogenital system using three-dimensional (3D) printing technology. In subsequent stages, these printed organs will be assembled into a urogenital system phantom, enabling experimental investigations for various applications in nuclear medicine.

Keywords: *Radiation 1, phantom 2, urogenital 3*

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Abs. No:232

Radon Concentration Variations in the Adalar District, Istanbul

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ABSTRACT

The relationship between radon concentrations and earthquakes has been extensively investigated as radon anomalies are often considered potential precursors of seismic events. Variations in radon levels, particularly sudden increases or decreases in soil gas or groundwater, are attributed to stress accumulation and micro-fracturing processes in the Earth's crust prior to an earthquake. These fractures enhance the migration pathways of radon from deeper layers to the surface, leading to measurable anomalies. Therefore, continuous radon monitoring has become an important tool in seismological studies, aiming to better understand crustal movements and to evaluate the feasibility of radon as a short-term earthquake forecasting parameter. In this study, a continuous radon monitoring station was established in the Adalar district of Istanbul. Radon concentrations were recorded at 10-minute intervals, providing high-resolution temporal data. Along with radon, meteorological parameters such as temperature, pressure, and humidity were simultaneously measured to account for environmental influences. The variations in radon levels over a specific period were systematically observed and analyzed in order to evaluate possible correlations with both atmospheric conditions and seismic activity.

Keywords: *Radon 1, seismic 2, anomalies 3*

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Abs. No:264

PET/CT versus Conventional Imaging in Cancer Diagnosis: Evidence from a Comprehensive Meta-Analysis

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ABSTRACT

Accurate and timely diagnosis is essential for effective treatment planning in oncology. Conventional imaging modalities, including magnetic resonance imaging (MRI), bone scintigraphy, and computed tomography (CT), are widely used in the evaluation of prostate and breast cancers; however, their overall diagnostic performance remains limited. This study compared the diagnostic accuracy of positron emission tomography/computed tomography (PET/CT) with conventional imaging techniques and examined the influence of tracer selection (^{11}C-Choline, ^{18}F-FDG, ^{18}F-NaF) on diagnostic yield. A comprehensive meta-analysis of 29 studies published after 2010 was conducted. Diagnostic metrics, including sensitivity, specificity, accuracy, positive likelihood ratio (PLR), negative likelihood ratio (NLR), and diagnostic odds ratio (DOR), were systematically assessed. PET/CT demonstrated significantly greater diagnostic accuracy than conventional modalities, with pooled improvements in sensitivity (+13.69%), specificity (+7.30%), and accuracy (+9.72%) (all $p<0.01$). In prostate cancer, PET/CT showed distinct advantages in sensitivity ($Z=2.819$, $p=0.005$), specificity ($Z=2.275$, $p=0.023$), and accuracy ($Z=3.237$, $p=0.001$). Compared with MRI, PET/CT achieved superior accuracy ($Z=1.956$, $p=0.050$), while relative to bone scintigraphy, it yielded higher accuracy and PLR values. Subgroup analysis indicated that ^{11}C-Choline PET/CT provided the most consistent diagnostic performance, whereas ^{18}F-FDG and ^{18}F-NaF showed non-significant trends. PET/CT demonstrates superior diagnostic performance compared with conventional imaging, particularly in prostate cancer. PET/CT demonstrates superior diagnostic performance compared with conventional imaging, particularly in prostate cancer. Tracer selection substantially influences diagnostic value, with ^{11}C-Choline providing the most consistent benefit. PET/CT, when combined with appropriate tracer choice, may support more accurate diagnosis and facilitate optimized treatment planning in oncology.

Keywords: *PET/CT; Diagnostic Imaging; Meta-Analysis; Radiopharmaceuticals; Cancer diagnosis*

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Abs. No:233

Organ-Specific Dosimetry in Ovarian Vein Embolization

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Abstract

Transcatheter ovarian vein embolization (TOVE) is an invasive radiological procedure. This procedure is used in the treatment of pelvic congestion syndrome. Even though this procedure offers clinical benefits, this method relies heavily on fluoroscopic imaging, which inevitably reveals not only the targeted vessels but also the surrounding pelvic structures. Distant organs may be exposed to ionizing radiation. Understanding the distribution and magnitude of this exposure is important to minimize potential risks and optimize procedure safety. With this study, a phantom based dosimetric approach was used to evaluate organ specific radiation doses during TOVE under simulated clinical conditions. A phantom was used and thermoluminescent dosimeters (TLDs) were strategically placed at eleven anatomical sites, including both ovaries, various segments of the uterus, bladder, cervix, recto-uterine pouch, vagina and pubic symphysis. Dose measurements were recorded following a standard protocol. The results showed that the pubic symphysis absorbed the highest radiation dose (10.87 mSv), followed by the rectouterine pouch (9.03 mSv) and the corpus uteri (7.63 mSv). The lowest exposure was observed in the bladder region (3.49 mSv). Moreover, the left uterine tube (7.72 mSv) received a slightly higher dose than the right tube (6.78 mSv), this can be attributed to the projection geometry and beam angle during imaging. These findings suggest that radiation exposure during TOVE is significantly influenced by the anatomical location of the organ relative to the treatment field. Data from this phantom model highlight the importance of dose optimization strategies and careful adjustment of imaging parameters to reduce unnecessary exposure. Given that the study simulated bilateral procedures with deliberately increased fluoroscopy, the reported organ doses should be interpreted as upper limit estimates of clinical exposure. These results provide a conservative yet valuable reference for patient safety assessments and underscore the necessity of dose optimization strategies in TOVE.

Keywords: *transcatheter ovarian vein embolization, radiation exposure, organ-specific dosimetry, phantom model, thermoluminescent dosimeter, pelvic congestion syndrome.*

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Abs. No:120

Influence of Non-Homogeneous Interphases on the Elastic Behavior of Polymer Nanocomposites – A micromechanical Modeling

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ABSTRACT

This study investigates the mechanical behavior of polymer matrix nanocomposites reinforced with spherical nanoparticles, with particular focus on the role of a non-homogeneous interphase region. The interphase, characterized by spatially varying properties, significantly influences the effective elastic limit and stiffness of the composite. A micromechanical modeling approach is employed to capture the gradation of mechanical properties across the interphase, enabling a detailed evaluation of the effective behavior resulting from the interaction between the dispersed nanoparticles and the surrounding polymer matrix.

Keywords: *Polymer nanocomposites, Micromechanical modeling, Non-homogeneous interphase, Elastic properties, Nanoparticle reinforcement.*

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Abs. No:196

Multiphysics Micromechanical Modeling of PVDF/$BaTiO_3$ Composites with Strain-Induced Phase Transformation

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ABSTRACT

This paper proposes a micromechanical model to predict the electromechanical behavior of PVDF-based piezoelectric composites, accounting for two key microstructural phenomena: the strain-induced α→β phase transition and interfacial damage between the PVDF matrix and $BaTiO_3$ particles. PVDF, a semi-crystalline piezoelectric polymer, exhibits tunable properties through mechanical deformation and particle reinforcement. The model is developed within the framework of Eshelby-type homogenization theory, incorporating Avrami kinetics to describe the phase transformation and Weibull statistics to model interfacial debonding. This approach enables a comprehensive constitutive description of the composite's behavior. The model is validated against experimental data for PVDF composites with various $BaTiO_3$ contents and successfully captures the effects of temperature, strain, and filler concentration on the piezoelectric coefficient, dielectric constant, and stiffness. It provides valuable insights into the individual and combined roles of phase transformation and particle–matrix interactions, offering a robust tool for the design and optimization of multifunctional piezo-composites.

Keywords: *PVDF composites, Piezoelectric materials, Micromechanical modeling, Weibull statistics, Eshelby homogenization.*

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Abs. No:135

THERAPEUTIC EDUCATION OF PATIENTS IN PHARMACIES:CURRENT STATES.

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INTRODUCTION:
Therapeutic education is an essential component of the management of patients suffering from chronic diseases, with the aim of improving their autonomy and quality of life. But what about TPE in the day-to-day practice of dispensing pharmacists in Algeria? Are they properly trained to carry out this task? Do they have the necessary tools and sources?

METHODS:
Our study is based on a survey of dispensing pharmacists, using a questionnaire to assess their knowledge of TPE: its objectives, the different tools used, the role of dispensing pharmacists in TVE in Algeria and patients' reactions, etc.

RESULTS:
The results revealed that 72.50% of respondents claim to know what therapeutic patient education is. Of these, 94.10% realized its importance and recognized that pharmacists have a very important role to play in TPE.
With regard to the best-known objectives of TVE, the majority (80.4%) agree that therapeutic education aims primarily to improve patients' lives.
Unfortunately, only 27.8% of dispensing pharmacists provide TVE sessions to help patients acquire or maintain the skills to better manage their disease on a daily basis, while 72.2% of pharmacists do not.

CONCLUSION:
This study highlights the growing importance of therapeutic education as an essential component of pharmacy services. However, gaps remain in terms of training, resources and interprofessional collaboration, which sometimes limit the effectiveness and scope of therapeutic education practice.

Keywords: *Therapeutic education, patient, retail pharmacist.*

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Abs. No:141

Design of permanent magnets for sinusoïdal waveform of airgap induction in slotless synchronous machines

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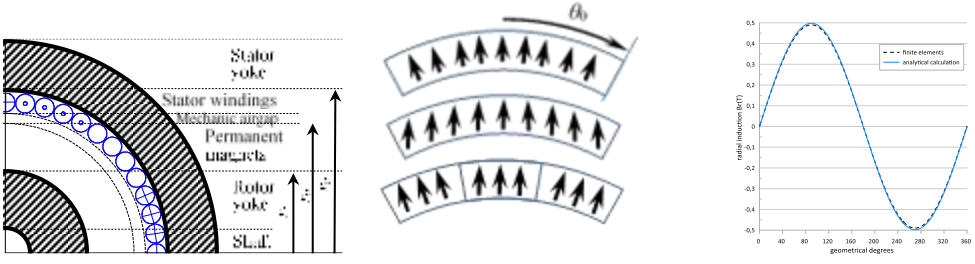
ABSTRACT

The design of electrical machines for high-speed applications includes high energy density permanent magnet machines. These machines offer the advantage of compactness. By suppressing the stator slots, the cogging torque is eliminated, which significantly reduces torque ripples, making the slotless machine a silent machine. However, a sinusoidal waveform of the induction in the air gap reduces torque ripples even further. The aim of this paper is to implement an analytical model for calculating the field in the form of harmonics and, depending on the aperture and the number of bar magnets, to decide which structure to choose.



a. b. c.

Figure 1. a. Structure of slotless machine
b. Radial, radial parallel and radial parallel bars structures studied
c. Normal induction waveform in airgap for a bipolar radial parallel magnetized structure.

Primary results are compared successfully for these obtained by a free code finite element method (femm) and experiment results. We calculate then for each configuration possible of permanent magnet switch ($p\theta_0$) fundamental Bn_1 and total harmonic distortion THD. This last value is calculated for all odd harmonics until harmonic 25 without these are multiple of 3(3, 9, 15 and 21).

In case of bipolar machine, a perfect sinusoidal distribution of flux density normal component is obtained with radial parallel magnetization, but with a lower Bn1 than all of possible

structures. For segmented tile magnets, the two bars magnets with adequate aperture is recommended for obtaining a nearest distribution to sinusoidal signal.

Keywords: *slotless machines, analytical calculation, finite elements method*

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Abs. No:225

Mechanical and microstructural study of silica intended for photovoltaic silicon production

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ABSTRACT

The solar grade silicon production technology consists of three successive stages: the ore and its treatment, the reduction of the silica by carbon to obtain metallurgical grade silicon and the purification of the metallurgical grade silicon (MG-Si) for the Obtaining solar grade silicon (SoG-Si).

This work is focused on the valorization of raw silica from Tebessa region quartz, and Mizrana region sandstone deposits as a potential mineral resources l with high added value as a raw material for photovoltaic silicon production.

For this, samples were carried out a characterization using optical microscopy with reflected and transmitted light, Raman spectroscopy to define the mineral structures and textures of the silica and also to find possible inter- or intra-crystalline impurities in the samples. When the optical analysis was not sufficient, we choose mineral inclusions on the thin sections for examination by Raman spectroscopy in order to determine the nature of the impurities.

Moreover, Vickers hardness tests were used to determine the mechanical characteristics of the studied silica in order to find a correlations chip between the raw material mineral structure and the hardness value of silica measured. This investigation was highlighted to evaluate the behavior silica in the process of photovoltaic silicon production.

The analysis results on samples showed the presence of different defects, microstructural, fluid and mineral inclusions, micro cracks as well as pores. These impurities are mostly founded on the surface where others are embedded in the crystal lattice.

The microscopic characterization results he completed by the Vickers hardness tests have shown that the studied raw material has a very appreciable purity (~ 97% SiO2) and high-mechanical characteristic performances, mainly for the Tebessa deposit quartz. This, is suitable to be used as raw material in the carbothermic process and the production of high quality Algerian silicon.

Keywords: : *Silica , Characterization, defects, Silicon*

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Abs. No:226

Valorisation of Algerian quartz vein deposits as source of energy

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Abstract
The use of advanced technologies in the latest years is responsible of incessant demands of ultrapure mineral raw materials [1, 2]. In this context, some raw material destined for industries with significant added value must be pure enough in order to achieve the required technological and economic objectives. Hence the importance of the valorization of high-purity silica deposits as a main source for photovoltaic domain, optics, electromagnetic materials, laser crystal synthesis and other advanced techniques [3-7]. In this context, specific characterization technics following by an enrichment processes based on the Information Geographic System (IGS) through ARGIS software in order to identify all silica deposits in Algeria were used. For this three important silica deposits were taken into account. The Tebessa, Draissa and Timimoun quartz deposits with silica initial average content of 97%, 96% and 97% SiO2 respectively. For this, different minerals processing technics were used based on silica mineralogical aspects. For the Tebessa quartz deposit an acid leaching process was used which has made it possible to increase the silica content up to 99.9%. Regarding Draissa deposit using reverse flotation grows the SiO2 concentration to 99%. For Timimoun deposit we obtained a pure silica nearly 99.2 % SiO2 using a direct flotation. These results serve as basis for Algerian quartz valorization for energy as products for metallurgical industry as well as for photovoltaique and optical applications.

Keywords: : *Quartz vein, Chararzeization, Mineral processing, Pure Silica*
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Abs. No:267

Half Value Layer Characteristics of Bone Tissue and Their Implications for Medical Imaging

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ABSTRACT

The half value layer (HVL) is a practical quantity used to describe the shielding capability of materials against photon beams. In this study, HVL values of human bone tissue were calculated using its elemental composition and density in the Phy-X software for photon energies ranging from 30 keV to 1.25 MeV.

The results show that HVL increases with photon energy, reflecting the decreasing attenuation efficiency of bone at higher energies. At diagnostic energy levels, the calculated HVL values demonstrate the significant role of bone in patient dose modulation and image contrast formation. These findings provide valuable input for radiation dosimetry and the optimization of exposure conditions in diagnostic radiology.

Keywords: *Tissue, HVL,Radiation*

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Abs. No:302

Evaluation of Atomic and Electronic Cross Sections of Human Bone Tissue for Photon Interactions

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ABSTRACT

Atomic cross section (ACS) and electronic cross section (ECS) parameters provide detailed insight into photon interaction probabilities with matter. In this study, ACS and ECS values of bone tissue were calculated using its elemental composition derived from hydroxyapatite and collagen with the Phy-X software. The variation of ACS and ECS with photon energy was analyzed across the diagnostic and therapeutic ranges.

The results reveal characteristic energy-dependent trends reflecting the underlying photon interaction mechanisms. The calculated ACS and ECS datasets are valuable for advanced radiation transport modeling, quantitative imaging studies, and the design of bone-equivalent phantoms in radiological research.

Keywords: *ACS, ECS, Bone*

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Abs. No:296

Doğal Su Kaynaklarındaki Toplam Organik Karbon Değişimlerinin Mevsimsel Analizi

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Abstract

Tatlı su kaynakları, küresel karbon döngüsünde önemli bir role sahip olmasına rağmen, bu sistemlerdeki toplam organik karbon (TOK) dinamikleri özellikle ılıman ve yarı kurak bölgeler için yeterince ortaya konulamamıştır. Literatürün ağırlıklı olarak Boreal ve Arktik bölgelerde yoğunlaşması, Türkiye gibi farklı hidrolojik ve iklimsel koşullara sahip bölgelerde TOK'un mevsimsel değişimine ilişkin önemli bir bilgi boşluğu oluşturmuştur (Tranvik et al., 2009). İklim değişikliği, arazi kullanımındaki değişimler ve artan antropojenik baskılar, tatlı su ekosistemlerinde organik madde taşınımı ve dönüşüm süreçlerini etkileyerek su kalitesi üzerinde belirleyici olmaktadır (Battin et al., 2008). Özellikle yaz aylarında görülen kuraklık, yükselen su sıcaklıkları ve artan mikrobiyal aktivitenin organik karbon dengesi üzerindeki etkilerinin değerlendirilmesi büyük önem taşımaktadır.Bu çalışmanın amacı, Marmara ve Ege bölgeleri arasında yer alan Balıkesir ili ve çevresindeki doğal tatlı su kaynaklarında TOK konsantrasyonlarının mevsimsel değişimini belirlemek ve bu değişimi su kalitesi açısından değerlendirmektir. Çalışma kapsamında, farklı çevresel özelliklere sahip su kaynaklarından dört mevsimi temsil edecek şekilde örnekleme yapılmıştır. Numune alma işlemleri TS EN ISO 5667 ve TS EN ISO 5667-3 standartlarına uygun olarak gerçekleştirilmiş; numuneler cam şişelerde toplanarak soğuk zincir altında laboratuvara ulaştırılmıştır. Saha ölçümleri sırasında sıcaklık, pH ve elektriksel iletkenlik gibi temel fizikokimyasal parametreler yerinde ölçülmüştür.TOK analizleri, yanma prensibine dayalı TOC analiz cihazı kullanılarak gerçekleştirilmiştir. Yanma–NDIR tabanlı bu yöntem, doğal sularda düşük seviyelerdeki organik karbonun hassas ve güvenilir şekilde belirlenmesini sağlamaktadır (Sharp, 2002). Analiz sonuçları mg/L cinsinden ifade edilmiş; veriler mevsimlere göre karşılaştırılarak istatistiksel olarak değerlendirilmiş ve anlamlılık düzeyi $p < 0,05$ olarak kabul edilmiştir.Bu çalışma, Türkiye'nin ılıman–yarı kurak iklim koşullarındaki tatlı su sistemlerinde TOK'un mevsimsel değişkenliğini ortaya koyarak su kalitesi değerlendirmelerine karbon temelli bir bakış açısı kazandırmayı hedeflemektedir. Elde edilen bulguların, tatlı su ekosistemlerinde organik madde döngüsünün anlaşılmasına ve sürdürülebilir su kaynakları yönetimine katkı sağlaması beklenmektedir.

Not: Bu çalışma S. Ü. Fen Bilimleri Enstitüsü'nde Yüksek Lisans tez çalışması olarak yapılmıştır.

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Mikrodalga destekli s- Triazin Bileşiklerin Sentezi ve Elektrot Yüzeyine Modifiye Edilmesi

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Abstract

Nüfusun artması ve teknolojinin gelişmesiyle birlikte çevre kirliliği doğanın dengesini bozan ve canlı yaşamını tehdit eden unsurların arasında ilk sırada yerini alan, önemli bir sorun haline gelmiştir [1]. Çoğunluğu endüstriyel prosesler neticesinde olmak üzere, enerji santralleri, evsel atıklar, hayvancılık ve zirai uygulamalar sonucunda oluşan çevre sorunları arasında su kirliliği büyük bir öneme sahiptir. Canlıların vazgeçilmez yaşam kaynağının su olduğu düşünüldüğünden, bilim adamlarınca insan sağlığını etkileyen en önemli sorunlardan biri olan su kirliliği ile mücadele edecek pek çok yöntem geliştirilmiştir [2]. Çevre kirliliğinin önlenmesi kadar bu sorunu ortadan kaldırmada kullanılacak tekniklerin belirlenmesi için kirliliğe neden olan etmenlerin kalitatif ve kantitatif tayini önem arz etmektedir. Bu doğrultuda yapılması planlanan proje çalışmasında, metallerle kompleks yapabilme özelliğine sahip, şelat halkası üye sayısı değiştirilerek kompleks kararlılığı artırılıp azaltılabilen [3], trimer yapısı ile her yönden farklı bileşikler oluşturarak fonksiyonlandırılmaya açık heterosiklik yapısı ile hem inorganik hem de organik kimyada son yıllarda önem kazanmış olan s-triazin ve bileşiklerinin çevre dostu olan greenchemistry yöntemi sentezlerinin gerçekleştirilmesi [4], elde edilen bileşiklerin karbon elektrot yüzeylerine modifiye edilmesi ve bu elektrot yüzeylerinin çevresel kirliliğe neden olan metallerin kalitatif ve kantitatif tayininde kullanılması planlanmaktadır [5].

Not: Bu çalışma S. Ü. Fen Bilimleri Enstitüsü'nde Yüksek Lisans tez çalışması olarak yapılmıştır.

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Synthesis of graphene using the hummers method

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Abstract

Graphene is a two-dimensional carbon allotrope that has attracted significant attention in materials science and nanotechnology due to its exceptional electrical, mechanical, and thermal properties. Despite its wide range of potential applications, large-scale and cost-effective production of graphene remains a major challenge. In this thesis, graphene oxide (GO) and reduced graphene oxide (rGO, referred to as graphene in this study) were synthesized from graphite using the chemical exfoliation-based Hummers method. In the experimental study, graphene oxide was synthesized via the Hummers method, and the obtained graphene oxide was subsequently converted into a graphene-like structure through chemical reduction. The structural, chemical, and morphological properties of graphite, graphene oxide, and graphene samples were systematically investigated using X-ray diffraction (XRD), Raman spectroscopy, Fourier transform infrared spectroscopy (FT-IR), and scanning electron microscopy (SEM).XRD results revealed a significant increase in interlayer spacing during the transformation from graphite to graphene oxide, followed by a partial decrease after reduction, indicating the formation of a graphene-like structure. Raman spectroscopy confirmed the presence of oxidation-induced defects in graphene oxide and the partial restoration of the sp^2 carbon network after reduction. FT-IR analysis verified the presence of oxygen-containing functional groups in graphene oxide and their substantial removal following the reduction process. SEM images clearly demonstrated the morphological evolution from compact graphite layers to wrinkled graphene oxide sheets and partially restacked graphene layers. Overall, the results indicate that graphene oxide was successfully synthesized using the Hummers method and subsequently reduced to obtain a graphene-like structure. This study is expected to contribute to the development of low-cost and scalable graphene production methods.

Keywords: *Graphene, graphene oxide, Hummers method, chemical exfoliation, reduced graphene oxide.*

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Half Value Layer Properties of Cellulose Acetate CdO-ZnO Polymer Composites

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Abstract

This study investigates the radiation shielding properties of cellulose acetate (CA) polymer composites enhanced with cadmium oxide (CdO) and zinc oxide (ZnO). The Half Value Layer (HVL), a key parameter indicating a material's ability to attenuate radiation, is measured for CA-CdO-ZnO composites with various additive concentrations. The HVL values of these composites are evaluated against X-rays and gamma radiation, and the effects of material composition, density, and thickness are discussed.

Keywords :*Cellulose acetate, CdO, ZnO, polymer composites, half value layer, radiation shielding, linear attenuation coefficient*.

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Investigation of Effective Conductivity (Ceff) of YbMn0.8Fe0.2O3 Composition

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Abstract

In this study, the effective electrical conductivity (Ceff) of Fe-doped rare-earth manganite $YbMn_{0.8}Fe_{0.2}O_3$ was investigated. The substitution of Fe^{3+} ions at the Mn^{3+} site is expected to significantly influence the electrical transport properties by modifying the charge carrier concentration and hopping mechanisms. The compound was synthesized using a conventional solid-state reaction method, and its electrical behavior was analyzed using impedance spectroscopy over a wide temperature and frequency range. The results indicate semiconducting behavior with thermally activated conduction. The effective conductivity was found to be strongly dependent on temperature, which suggests a dominant small polaron hopping conduction mechanism. Grain and grain boundary contributions to the overall conductivity were analyzed using equivalent circuit modeling.

Keywords : *$YbMnO_3$, Fe doping, effective conductivity, impedance spectroscopy, small polaron hopping*

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Gamma ray shielding properties for some Polymer Composites

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Abstract

The increasing use of ionizing radiation in medical, industrial, and nuclear applications has intensified the demand for effective and lightweight radiation shielding materials. Traditional shielding materials such as lead and concrete, although effective, suffer from disadvantages including high density, toxicity, and limited mechanical flexibility. In recent years, polymer composites filled with high atomic number (high-Z) materials have emerged as promising alternatives for gamma-ray shielding. This study reviews the gamma-ray shielding properties of polymer-based composites, focusing on attenuation parameters such as linear and mass attenuation coefficients, half-value layer, mean free path, and effective atomic number. The influence of filler type, concentration, and photon energy on shielding performance is discussed. The results indicate that polymer composites containing heavy metal oxides such as PbO, Bi_2O_3, and WO_3 demonstrate significantly improved gamma-ray attenuation compared to pure polymers, making them suitable candidates for advanced radiation protection applications.

Keywords: *Gamma radiation, Polymer composites, Shielding materials, Attenuation coefficient, Heavy metal oxides*

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A study on the gamma-ray attenuation parameters for concretes containing zeolite mineral

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Abstract

Gamma-ray attenuation parameters for concretes containing zeolite mineral in different rates is studied. In the study, FLUKA Monte Carlo simulation code and web version of XCOM code are used to calculate the gamma-ray interaction parameters at 0.511 and 1.275 MeV energies. Also, attenuation parameters are presented at 1 keV – 100 GeV energy range using XCOM photon cross section library. Results reveal that increasing zeolite concentration decreases the performance of concretes in terms of gamma-ray attenuation
.

Keywords: *Gamma-ray, FLUKA, XCOM, attenuation*

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Effective Electron numbers YbMn0.8Fe0.2O3 Composition

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Abstract

In this study, the chemical composition and effective electron characteristics of the mixed perovskite-type oxide $YbMn_{0.8}Fe_{0.2}O_3$ are analyzed. Partial substitution of Mn by Fe leads to modifications in the electronic structure while preserving charge neutrality. Assuming trivalent oxidation states for Yb, Mn, and Fe, the compound maintains stoichiometric balance with oxygen. An approximate effective electron count per formula unit is calculated based on an ionic model, providing insight into the electronic configuration relevant for solid-state physics and radiation–matter interaction studies.

Keywords: *Electron number,composite, effective electron number*

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