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للعـلـوم التطبيـقية وكـلية العلـوم
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# كتيب ملخصات المؤتمر
# Abstract Book

## العلـوم في خدمـة
# المجتمـع والبيئـة
## Science for Community and Environment

٢-٣ فبراير ٢٠٢٥ م الموافق ٣-٤ شعبان ١٤٤٦ هـ

# Mathematics and statistics and their applications in the biological and technical fields

**ICOSACS-MATH-PS- 001**

**Dr. Azza Al Gatheem**
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Zonostrophic instabilities and their evolution over time

A classic stability problem relevant to many applications in geophysical and astrophysical fluid mechanics is that of Kolmogorov flow, a unidirectional purely sinusoidal velocity field written here as u =(0,sinx) in the infinite (x,y)-plane. Near onset, instabilities take the form of large-scale transverse flows, in other words, flows in the xdirection with a small wavenumber k in the y-direction. This is similar to the phenomenon known as zonostrophic in stability, found in many examples of randomly forced fluid flows modelling geophysical and planetary systems. The present paper studies the effect of incorporating a magnetic field B0, in particular a y-directed “vertical” field or an x-directed “horizontal” field. The linear stability problem is truncated to determining the eigenvalues of finite matrices numerically, allowing exploration of the instability growth rate p as a function of the wavenumber k in the y-direction and a Bloch wave number in the x-direction,with $-1/2 < L \leq 1/2$. In parallel, asymptotic approximations are developed, valid in the limits $k \to 0$, $L \to 0$, using matrix eigenvalue perturbation theory. Results are presented showing the robust suppression of the hydrodynamic Kolmogorov flow instability as the imposed magnetic field B0 is increased from zero. However with increasing B0, further branches of instability become evident. For the vertical field, there is a strong field branch of destabilised Alfvén waves present when the magnetic Prandtl number $Pm < 1$. For horizontal magnetic fields, a branch of field-driven, tearing mode instabilities emerges as B0 increases. The

above instabilities are present for Bloch wavenumber = 0; however, allowing to be non-zero gives rise to further branches of instabilities in the case of a horizontal field. In some circumstances, even when the system is hydrodynamically stable arbitrarily weak magnetic fields can give growing modes, via the instability taking place on large scales in x and y. Detailed comparisons are given between theory for small k and numerical results.

**ICOSACS-MATH-PS- 002**

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**Smart Knowledge Management Systems for Sustainability in Applied Sciences: A Case Study of the KISR Digital Repository (KDR)**

This study explores the role of smart knowledge management systems (KMS) in supporting sustainability in applied sciences, focusing on the KISR Digital Repository (KDR) as a case study. The Kuwait Institute for Scientific Research (KISR), through its National Scientific and Technical Information Center (NSTIC), established KDR to manage, share, and digitally preserve KISR's research outputs. KMS like KDR help organize, store, and disseminate information. KMS, including key components such as knowledge repositories, collaboration tools, data analytics, search systems, and personalized recommendations, enable efficient knowledge sharing, interdisciplinary collaboration, and alignment with the United Nations Sustainable Development Goals (SDGs). The study uses two methods: a in depth literature review to analyze existing research on KMS and sustainability,

and semi-structured interviews with information specialists and researchers at KISR. The case study examines how KDR contributes to better resource management and supports evidence-based decision-making by facilitating the sharing of research outputs across disciplines. Findings highlight challenges such as system usability and engagement with stakeholders, as well as opportunities to improve KDR through advanced tools like AI and data analytics. The study findings emphasizes the role of information specialists in managing and optimizing KMS to ensure that knowledge is effectively used to address sustainability challenges. This research provides insights into how digital repositories can enhance the impact of applied sciences on sustainable development.

**ICOSACS-MATH-PS- 003**

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Department of Mathematics and Computer Science, Faculty of Science, Damanhour University, Damanhour, Egypt.

**Time-periodic electrokinetic analysis of a micropolar fluid flow through hydrophobic microannulus**

The oscillating aspects of pressure-driven micropolar fluid flow through a hydrophobic cylindrical microannulus under the influence of electroosmotic flow are analytically studied. The study is based on a linearized Poisson–Boltzmann equation and the micropolar model of Eringen for microstructure fluids. An analytical solution is obtained for the distributions of

electroosmotic flow velocity and microrotation as functions of radial distance, periodic time, and relevant parameters. The findings of the present study demonstrate that, unlike the decrease in flow rate resulting from the micropolarity of fluid particles, velocity slip and spin velocity slip, when contrasted with Newtonian fluids, act as a counteractive mechanism that tends to enhance the flow rate. Additionally, the findings indicate that a square plug-like profile in electroosmotic velocity amplitude is observed when the electric oscillating parameter is low and the electrokinetic width is large, for both Newtonian and micropolar fluids. Moreover, in cases where there is a wide gap between the cylindrical walls and a high-frequency parameter, the electroosmotic velocity and microrotation amplitudes tend to approach zero at the center of the microannulus across all ranges of micropolarity and zeta potential parameters. Furthermore, it has been observed that the amplitude of microrotation strength rises as slip and spin slip parameters increase. Across the entire spectrum of micropolarity, the zeta potential ratio influences both the dimension and direction of the electroosmotic velocity profiles within the electric double layer near the two cylindrical walls of the microannulus. The study emphasizes the physical quantities by presenting graphs for various values of the pertinent parameters juxtaposing them with existing data in the literature and comparing them with the Newtonian fluids.

**ICOSACS-STAT-PO- 001**

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**Reproducibility of estimates based on randomised response methods**

Reproducibility of experimental estimates is a crucial issue throughout various fields, including social studies, where research findings often influence societal expectations. When research lacks reproducibility, it wastes a lot of money, delays scientific advancement, and misleads future investigations. Moreover, it reduces public trust in statistical estimates, which can have a significant impact on evidence-based decision-making. Estimating population characteristics is an essential part of statistical inference. The reproducibility of population characteristic estimates is investigated in this work. In situations when the characteristic is sensitive, it focuses on estimates derived from data collected with survey-based randomised response techniques (RRT) for obtaining the truth. This study presents a novel method based on data collected via quantitative RRT techniques known as $\epsilon$-reproducibility of estimates. According to this method, the $\epsilon$−reproducibility probability is a probability that, should an experiment happen again under similar circumstances, the estimate derived from the data from the repeated experiment will not differ from the estimate derived from the original data. Using Nonparametric Predictive Inference (NPI), the quantification technique addresses prediction problems. According to the results, fewer reported response variability for RRT techniques improves the reproducibility of estimates using representative samples and bootstraps while preserving a similar level of privacy for survey respondents. Several RRT techniques are compared, such as the Greenberg technique and the optional multiplicative technique.

**ICOSACS-MATH-PO- 001**

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**Mathematical modelling of transmission solar sun energy in partially ionized plasma: A case study of Saudi Arabia**

is composed of plasma in various ionisation state. Nearer to us, the upper Earth's atmosphere, the interplanetary space and the lower solar atmosphere have temperatures that ensure that at all times the plasma is made up from electrons, positive ions and neutrals that can interact via collisions, radiation, or charge exchange. Waves and instabilities that can appear in such environments can considerably contribute to the heating of the plasma, in a similar fashion as the heating of a fusion plasma in laboratory devices. The aim of the proposed research is to significantly advance our understand ing of dynamical processes (waves, instabilities and associated plasma heating mechanisms) in partially ionised plasmas. Secondly, the findings of the project will help understand the nature and properties of waves and instabilities that can appear in plasma fusion devices (e.g. tokamaks) that can be used in and help Saudi Arabia to produce cheap and green energy.

**Dr. Weaam A. Alhejaili**
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***Multi-dimensional dust-acoustic rogue waves in electron-depleted complex magnetoplasmas***

Modulation instability (MI) and characteristics of dust-acoustic rogue waves (DARWs) are theoretically investigated in electron-depleted dusty magneto plasmas comprised of massive dust grains of opposite polarities and nonextensive ions by considering a three-dimensional geometry. For this purpose, the (3+1)-dimensional nonlinear Schrodinger equation (NLSE) is derived using the derivative expansion method. Also, the criteria of the MI are derived and discussed in detail. Numerical analysis revealed that stable and unstable domains of the modulated waves are strongly sensitive to the magnetic field, ions nonextensivity, and some relevant dust grain characteristics (mass, density). It is worth to mention that the frequency range where the MI varies as in the one-dimensional (1-D) case has been also identified. The obtained results are important to understand the DARWs in some plasma environments, including interstellar medium, Jupiter's magnetosphere, upper mesosphere, comets, Saturn's rings, and Earth's atmosphere.

**ICOSACS-MATH-PO- 003**

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***Zonostrophic instabilities and their evolution over time***

A classic stability problem relevant to many applications in geophysical and astrophysical fluid mechanics is that of Kolmogorov flow, a unidirectional purely sinusoidal velocity field written here as u =(0,sinx) in the infinite (x,y)-plane. Near onset, instabilities take the form of large-scale transverse flows,

in other words, flows in the xdirection with a small wavenumber k in the y-direction. This is similar to the phenomenon known as zonostrophic in stability, found in many examples of randomly forced fluid flows modelling geophysical and planetary systems. The present paper studies the effect of incorporating a magnetic field B0, in particular a y-directed “vertical” field or an x-directed “horizontal” field. The linear stability problem is truncated to determining the eigenvalues of finite matrices numerically, allowing exploration of the instability growth rate p as a function of the wavenumber k in the y-direction and a Bloch wave number in the x-direction,with $-1/2 < L \leq 1/2$. In parallel, asymptotic approximations are developed, valid in the limits $k \to 0$, $L \to 0$, using matrix eigenvalue perturbation theory. Results are presented showing the robust suppression of the hydrodynamic Kolmogorov flow instability as the imposed magnetic field B0 is increased from zero. However with increasing B0, further branches of instability become evident. For the vertical field, there is a strong field branch of destabilised Alfvén waves present when the magnetic Prandtl number $Pm < 1$. For horizontal magnetic fields, a branch of field-driven, tearing mode instabilities emerges as B0 increases. The above instabilities are present for Bloch wavenumber = 0; however, allowing to be non-zero gives rise to further branches of instabilities in the case of a horizontal field. In some circumstances, even when the system is hydrodynamically stable arbitrarily weak magnetic fields can give growing modes, via the instability taking place on large scales in x and y. Detailed comparisons are given between theory for small k and numerical results.

# Physics and its applications in the fields of energy and sustainable environment

**ICOSACS-PHYS-PS- 001**

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***CuO-Supported Silica-Titania Mesoporous Nanocomposite: A Multifunctional Material for Optical and Sensing Applications***

Precise pH assessment is essential in food, medical, and environmental monitoring. In this context, silica-titania (ST) and CuO supported on silica-titania (CuST) nanocomposites were synthesized using the low-temperature sol-gel approach. CuST revealed void-free porous surfaces with diameters of 1nm. CuST demonstrated homogeneous distribution of Cu with Ti, and Si, heterogeneous chemical bonding, and thermal stability around ≥ 500 °C. The CuST exhibited $S_{BET}$ of approximately 215 $m^2/g$ and pore radius of about 3.7 nm. Phenol red (PR), phenolphthalein (PHp), and co-mixture (PR-PHp) encapsulated CuST nanocomposites sol exhibited pKa of 7.4, 9.8, and 9.9, respectively. A rapid response time of around 0.1 s in pH 12 was estimated for PR-PHp/CuST nanocomposite which is greater than 0.25 s (PR/CuST) and 0.14s (PHp/CuST). Experimental results indicated that PR-PHp/CuST has significant pH sensing capabilities than PR/CuST and PHp/CuST.

ICOSACS-PHYS-PS- 00**2**

**Prof. Adil Ahmed Al Shoaibi**

*Director of National Research Center for Giftedness and Creativity*

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***Electrical Properties of Rare Earth-Doped Barium Titanate***

Samples of undoped BaTiO3, BT were prepared by three mixed oxide routes; hand mixing, HM using a pestle and mortar, ball milling, BM using Y2O3-stabilised zirconia balls and planetary ball milling, PBM using tungsten carbide balls. The electrical properties of slow cooled (SC) and quenched (Q) BT material for HM, BM and PBM samples were studied by impedance spectroscopy, IS after heat treatments in air at different temperatures. Is measurements with application of applied voltage and in atmospheres of different oxygen partial pressure were used to determine the conduction mechanism. The application of bias voltage was used during IS measurements to separate Schottky barrier interfacial impedances from sample impedances. In general, two types of Schottky barrier can be detected: (i) barriers at electrode-sample interfaces due to Fermi level mismatch and (ii) barriers between grains associated with partial oxidation of sample surfaces. In-Ga electrodes were considered to yield ohmic contacts and associated with partial oxidation that also produced the positive temperature coefficient of resistance, PTCR effect. A methodology has been developed to understand the effect of an applied voltage and changing oxygen partial pressure on electrical properties and possible explanations. Rare earth dopants can occupy either Ba or Ti sites or a mixture of Ba and Ti sites depending on their size. This requires compensation mechanisms which can be ionic or electronic. The ionic mechanism can involve either cation or oxygen vacancies. A

survey has been carried out of the charge compensation mechanism for different rare earth ions (Gd, Dy, Ho, Y, Er and Yb). It was found that Y 3+ preferentially occupied the Ti4+ site with charge compensation by oxygen vacancies and therefore, Y behaved as an acceptor with solid solubility limit of 15%. $^{Y\,3+}$ can also simultaneously occupy both Ba and Ti sites with a solubility limit of 7.5%, but exclusive occupancy of Ba sites is limited to 1.5%. A partial phase diagram $BaO\text{-}TiO_{2}\text{-}_{Y2O3}$ can been presented showing the different solid solutions and the polymorphism of doped $BaTiO_3$. Several parameters affected the electrical properties of pure and doped BT ceramics: the charge compensation mechanism, whether ionic or electronic; the sample preparation methods; the cooling rate at the end of sample heat treatment because many samples lost a small amount of oxygen at high temperature and showed n-type semiconductivity. A common observation was that many slow cooled samples showed weak p-type behaviour attributed to uptake of oxygen on cooling. The holes may be associated with either underbonded oxide (O - ) ions or unavoidable impurities such as $Fe^{3+}$ . Leaky dielectric properties were observed for extrinsic n-type region whereas, normal dielectric properties were observed for extrinsic p-type region. The electrical properties of BaTi1-xYxO3-x/2 samples fired and cooled in air were ferroelectric insulators at $x \leq 0.05$ and relaxor ferroelectrics at higher x with no evidence of semiconductivity in any of the samples, whether they were cooled slowly or quenched from high temperatures (1200-1600 °C). The possible occurrence of a resistivity minimum in rare earth doped BT was investigated. Three possible mechanisms for semiconductivity were considered for generating $Ti^{3+}$ ions: direct donor doping,

oxygen loss at high temperatures and a more complex double doping mechanism involving $Y^{3+}$ and $Ti^{3+}$ ions to chargebalance the oxygen vacancies. No semiconductivity and resistivity minimum were observed for Yb-BT for all three joins and Er-BT. Semiconductivity was observed for other RE dopants and the total resistivity passed through a minimum at 0.1% RE substitution then increased generally for > 1% Y, Ho, Dy and Gd substitution on all three joins.

**ICOSACS-PHYS-PO- 001**

**Dr. Ghada ALmisned**

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***Our Discovery of a New Era in Radiation Shielding: High Entropy Oxide-Doped Zinc Tellurite Glasses as Advanced Protective Materials***

The integration of high entropy oxides (HEOs) into zinc-tellurite glass matrices represents a novel advancement in radiation shielding materials. This study highlights findings from two of our pivotal studies exploring the incorporation of two different HEOs such as TiZrNbHfTaOx and TiNbWMoZrOx, into zinc-tellurite glasses, showcasing their potential to significantly enhance physical and radiation shielding properties. The escalating demand for efficient, durable, and versatile radiation shielding materials has directed attention toward novel material innovations. Zinc tellurite glass, valued for its optical transparency and compositional adaptability, has traditionally been enhanced with heavy metal oxides for improved shielding

performance. This work pioneers the incorporation of HEOs, leveraging their high entropy effects, lattice distortion, and synergistic "cocktail effect" to achieve superior radiation attenuation properties. Using a blend of equimolar metal powders, the HEOs (TiZrNbHfTaOx and TiNbWMoZrOx) were synthesized via mechanical alloying followed by high-temperature oxidation. The resulting HEOs were incorporated into zinc-tellurite glass compositions using the melt-quenching method. Characterization through XRD, SEM, EDS, and XPS confirmed the homogeneous distribution and structural integrity of the HEOs within the glass matrices. Radiation shielding efficacy was evaluated by measuring mass attenuation coefficients (MAC), half-value layers (HVL), and effective atomic numbers (Zeff) across varying photon energies and neutron exposures. Both studies revealed that HEO-doped glasses exhibited a concentration-dependent improvement in gamma-ray attenuation. Samples with the highest HEO content (4 mol%) consistently showed superior MAC values and the lowest HVL across all energy ranges, indicating optimal photon interaction and absorption. Neutron shielding properties, quantified through macroscopic cross-sections and equivalent dose rates, demonstrated a significant advantage of HEO-doped glasses over conventional materials, with enhanced fast neutron removal cross-sections. Among the tested samples,TiNbWMoZrOx-doped glasses (HEC2-4) and TiZrNbHfTaOx-doped glasses (HEC1-4) outperformed traditional zinc-tellurite glasses, highlighting the pivotal role of HEOs in elevating shielding efficacy. The unique multi-element composition of HEOs was found to enhance photoelectric absorption and scattering phenomena, crucial for effective

attenuation. Energy absorption and exposure buildup factors for HEO-doped glasses showed reduced secondary radiation effects, reinforcing their suitability for applications requiring minimal indirect radiation exposure. The integration of HEOs into zinc-tellurite glasses represents a paradigm shift in radiation shielding applications. The superior performance of TiZrNbHfTaOx and TiNbWMoZrOx-doped glasses highlights their potential for deployment in radiation-intensiv environments, such as nuclear facilities, medical diagnostics, and space exploration. These findings pave the way for future research into high entropy materials as versatile solutions for advanced material design.

**ICOSACS-PHYS-PO- 002**

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***A Combined Experimental and Theoretical Investigation of Water Absorption on Lemon Leaves: New Perspectives With Physico-Statistical Modeling***

This work contributes to a better understanding of the drying process through the results obtained. So, an investigation of water absorption isotherms on lemon leaves (40, 50, and 60°C) was analyzed more profound using physico statistical modeling to provide information about the sorption mechanism and to obtain a better comprehension of the process. A theoretical finite multilayer absorption model was developed using the grand canonical potential to characterize the experimental data

of water on lemon leaves . The estimated parameter values suggested that the water molecules are parallel to the surface of the lemon leaves, allowing for the formation of limited layers of water. The system is affected by temperature, that the density of receptor sites decrease with temperature. The process takes place through physical adsorption as the simulated adsorption energies are less than 50 kJ. $mol^{-1}$

**ICOSACS-PHYS-PO- 003**

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***Enhancement of Gallium Arsenide (GaAs) Dilute Nitride 4-Junction Solar Cells for Cube Sats***

The future of space exploration relies on innovative technologies like CubeSats—small, cost-effective satellites that benefit from renewable energy sources such as solar cells. However, space challenges like radiation and temperature variations affect solar cell efficiency. This project focuses on enhancing GaAs dilute nitride multi-junction solar cells, which achieve efficiencies over 50% by capturing a broad solar spectrum, offering a sustainable power solution for CubeSats.

**ICOSACS-PHYS-PO- 004**

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**Influence of heat treatments on the microstructure of a novel low carbon steel alloy used for automotive industry**

The microstructure of a Fe-0.2C-0.6Mn-0.2Si low-carbon steel alloy was studied after two bainitic transformation heat treatments using optical microscopy and SEM-EDX. Heat treatments showed bainite and blocky retained austenite formation, with pearlite fully transforming at temperatures above 900°C. The optimal microstructure, free of pearlite, was achieved by austenitizing at 912°C for 15 minutes then tempering at 300°C for 30 minutes, yielding a hardness of 268 HV.

**ICOSACS-PHYS-PO- 005**

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***Ultrasonic attenuation with relaxation at low temperatures of Nd3+ doped phosphate glasses for potential solid-state laser application***

The glass set, with varying compositions of (1-x) (0.659 $P_2O_5$, 0.095 ZnO, and 0.244 PbO), was used to investigate longitudinal ultrasonic attenuation at different frequencies (2 and 14 MHz) and different temperatures (120 and 300 K). The glass samples contained different mole percentages of $Nd_2O_3$, specifically x

= 0.00, 0.0046, 0.0092, 0.0138, and 0.0271. Based on the glass construction and switching frequency in well-defined broad absorption curve reaches its highest points at different temperatures. These peaks shifted to higher temperatures, indicating a relaxing mechanism, as the overall frequency increased. A thermally driven relaxation process led to the development of an approach, that the activation mechanism's average energy was mainly influenced by the mole percent content of Nd2O3. The observed diminish of the acoustical energy of activation worth's, quantifiably expressed in terms of the diminished amount of oxygen atoms moving at a double-well potential, that was determined based on the number of loss centers. Such decrease in average activation energy was correlated with the increase in; Bulk elastic modulus, linear expansion coefficient, glass transition temperature and average bond dissociation energy with Nd2O3.

**ICOSACS-PHYS-PO- 006**

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***Polypyrrole-bismuth tungstate/polypyrrole core-shell for optoelectronic devices exhibiting Schottky photodiode behavior***

A polypyrrole-bismuth tungstate (Ppy-Bi2WO6) core-shell nanocomposite (n-type material) has been developed on a layered Ppy (p-type) base as an efficient light-capturing material

exhibiting photodiode behavior. This device demonstrates promising sensitivity for light sensing and captures across a broad spectral range, from near IR to UV. The Bi2WO6/Ppy nanocomposite boasts an optimal bandgap of 2.0 eV, compared to 3.4 eV for Ppy and 2.5 eV for Bi2WO6. The crystalline size of the core-shell composite is approximately 21 nm, emphasizing its photon absorption capabilities. The composite particles, around 100 nm in length, feature a highly porous morphology that effectively traps incident photons. The performance of this optoelectronic device is evaluated using current density (J) measurements under light (Jph) and dark (Jo) conditions. In darkness, the n-p type semiconductor exhibits limited current with a Jo of −0.22 mA cm−2 at 2.0 V. When exposed to white light, the Ppy- Bi2WO6/Ppy device generates hot electrons, achieving a Jph value of 1.1 mA/cm−2 at 2.0 V. It shows a superior responsivity (R) of 6.6 mA/W at 340 nm, gradually decreasing to 6.3 mA/W at 440 nm and 4.2 mA/W at 540 nm, indicating high sensitivity across the UV-Vis spectrum. At 730 nm, the R-value is 2.6 mA/W, highlighting its sensitivity in A1the near IR region. Additionally, at 340 nm, the device achieves a detectivity (D) value of $0.15 \times 10^{10}$ Jones, which decreases with longer wavelengths to $0.14 \times 10^{10}$ Jones at 440 nm, $0.9 \times 10^{9}$ Jones at 540 nm, and $0.63 \times 10^{9}$ Jones at 730 nm. With its great stability, low cost, easy fabrication, and potential for mass production, this optoelectronic light sensor and photodiode device holds significant promise for industrial applications as a highly effective optoelectronic device.

**ICOSACS-PHYS-PO- 007**

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***Deformable registration of magnetic resonance images using unsupervised deep learning in neuro-radiation oncology***

Purpose Accurate deformable registration of magnetic resonance imaging (MRI) scans containing pathologies is challenging due to changes in tissue appearance. In this paper, we developed a novel automated three-dimensional (3D) convolutional U-Net based deformable image registration (ConvUNet-DIR) method using unsupervised learning to establish correspondence between baseline pre operative and follow-up MRI scans of patients with brain glioma. Methods This study involved multi parametric brain MRI scans (T1, T1-contrast enhanced, T2, FLAIR) acquired at pre-operative and follow up time for 160 patients diagnosed with glioma, representing the BraTS-Reg 2022 challenge dataset. ConvUNet-DIR, a deep learning-based deformable registration workflow using 3D U-Net style architecture as a core, was developed to establish correspondence between the MRI scans. The workflow consists of three components: (1) the U-Net learns features from pairs of MRI scans and estimates a mapping between them, (2) the grid generator computes the sampling grid based on the derived transformation parameters, and (3) the spatial transformation layer generates a warped image by applying the sampling operation using interpolation. A similarity

measure was used as a loss function for the network with a regularization parameter limiting the deformation. The model was trained via unsupervised learning using pairs of MRI scans on a training data set (n=102) and validated on a validation data set (n=26) to assess its generalizability. Its performance was evaluated on a test set (n=32) by computing the Dice score and structural similarity index (SSIM) quantitative metrics. The model's performance also was compared with the baseline state-of-the-art VoxelMorph (VM1 and VM2) learning-based algorithms. Results The ConvUNet-DIR model showed promising competency in performing accurate 3D deformable registration. It achieved a mean Dice score of 0.975±0.003 and SSIM of 0.908±0.011 on the test set (n=32). Experimental results also demonstrated that ConvUNet-DIR outperformed the VoxelMorph algorithms concerning Dice (VM1: 0.969±0.006 and VM2: 0.957±0.008) and SSIM (VM1: 0.893±0.012 and VM2: 0.857±0.017) metrics. The time required to perform a registration for a pair of MRI scans is about 1 s on the CPU. Conclusions The developed deep learning based model can perform an end-to-end deformable registration of a pair of 3D MRI scans for glioma patients without human intervention. The model could provide accurate, efficient, and robust deformable registration without needing pre-alignment and labeling. It outperformed the state-of-the art.

**ICOSACS-PHYS-PO- 008**

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***Plasma water purification using plasma jet***

During the past few decades, cold plasma has gained attention as an energy-efficient and eco-friendly advanced oxidation technology with numerous non-thermal applications, including wastewater treatment. Despite these benefits, the development of cold plasma as a wastewater treatment technique is still hampered by a lack of information like capital investment, proficient application and operating cost, thus necessitating additional research for its booming commercialization, as this can be an emerging approach to solving water crises

**ICOSACS-PHYS-PO- 009**

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***Control of Bacterial Infection in Potato Plant Using Extremely Low Frequency Electromagnetic Waves (ELF-EMW)***

Erwiana Carotovra is a type of soil bacteria known for causing infection in plants especially potatoes causing severe crop and global production loss. The bacterium causes soft-rot diseases in a variety of plant species including carrots, potatoes, cucumbers, onions, tomatoes, lettuce, mustard and

ornamental plants like iris, yield losses up to 98.8% have been experienced under artificial epiphytotic. The present work is devoted to determine inhibition effect of ELF-EMW of frequency 50 Hz and field intensity of 200V/m on the growth activity of Erwinia Carotovora and its ability to make division and the changes in cellular membrane properties.

**ICOSACS-PHYS-PO- 010**

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***Energy levels, oscillator strengths and transition probabilities of the singly ionized molybdenum: Mo II***

Oxide perovskites doped with rare-earth have shown change in optoelectronic properties with high dielectric constants. Herein, the structural, electronic, and optical characteristics of BaTiO3 doped with ytterbium at the Ba and Ti sites were studied by employing the first-principles density functional calculations. The Tran-Blaha modified Becke-Johnson (TB-mBJ) potential and GGA + U approaches have been used for determining the optoelectronic properties. We probed the impact of the ytterbium incorporation at the Ti and Ba sites into BaTiO3 by tuning of the structural geometry and electronic structure behavior and dielectric constants. A de-tailed analysis, of structural properties, reveals that lattice parameters of ytterbium doping shift slightly regarding those of pristine BaTiO3. The BaeO and TieO bond lengths were reduced due to the crystalline structure lattice distortion. The band structures demonstrate that ytterbium doping has induced various changes in the electronic nature of BaTiO3 by creating a

magnetism. For both Ba and Ti sites, ytterbium doping has strongly increased the BaTiO3 dielectric constants.

**ICOSACS-PHYS-PO- 011**

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***Assessing Occupational Radiation Exposure Trends and Safety Interventions for Healthcare Professionals at a University Hospital in Saudi Arabia***

This study investigates the occupational radiation exposure levels among 50 healthcare professionals, including Technologists, Nurses, and Radiologists, who were monitored for radiation doses across various operational scenarios within the Diagnostic Radiology and Nuclear Medicine departments at a university hospital, consisting of approximately 54% males and 46% females, from 2020 to 2022. The lowest recorded radiation exposure was 0.11 mSv, and the highest was 0.88 mSv, with all values remaining below the recommended safety limit of 20 mSv. Results indicate that both departments experienced reduced radiation exposure in 2020 due to pandemic-related operational changes, with subsequent years showing divergent trends. The Diagnostic Radiology department stabilized radiation levels, suggesting effective refinement of safety protocols. In contrast, the Nuclear Medicine department observed a concerning increase in radiation exposure, highlighting areas needing enhanced safety measures. A Machine Learning Linear Regression model has been used to

examine the relationship between various predictor variables and the radiation levels. The result shows that these predictors explain only about 9.2% of the variance in radiation levels. This study underscores the importance of continuous monitoring and tailored interventions to ensure the health and safety of radiation workers, reflecting dynamic changes in healthcare practices and the critical need for robust radiation safety frameworks.

**ICOSACS-PHYS-PO- 012**

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***Enhancing Antibacterial and Anticancer Properties: Synthesis, Characterization, and Evaluation of Copper-Zinc Oxide Nanoparticles via Co-precipitation Approach***

In this work, researchers synthesized copper-zinc oxide nanoparticles (NPs) of different shapes and sizes and tested their antibacterial and anticancer effects. The current research included an environmentally friendly method for forming Cu-doped zinc oxide nanoparticles (Cu-ZnO NPs). Next, the photocatalytic, antibacterial, and anticancer properties of the Cu-ZnO NPs were ascertained. Nanoparticles of Cu-doped ZnO were synthesized using the co-precipitation technology. The physicochemical characterization was carried out using X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), ultraviolet-visible (UV-Vis) and Fourier-transform infrared (FTIR) spectroscopy, and

other imaging techniques. SEM analysis confirmed that the particles observed by SEM were found to be below 100 nm in size, which aligns with the results obtained from XRD. The size histogram in the figure inset shows that the nanoparticles are mostly round and have a size range of 5 to 50 nm. The XRD diffractograms revealed the classic structure of wurtzite-phase crystalline Cu-ZnO, and crystallite size is 26.48nm. Differences in the principal absorption peaks between the FTIR and UV-vis spectra suggest that varying ZnO NPs morphologies might lead to spectrum shifts. We used the agar diffusion method to determine how effective Cu-doped ZnO NPs were against bacteria and the MTT assay to see how well they worked against cancer. The photocatalytic disintegration capacity of Cu-doped ZnO NPs was investigated by degrading crystal violet (CV) and methylene blue (MB) dyes under ultraviolet lamp irradiation. A value of 1.32 eV was recorded for the band gap energy. All peaks conformed to those of the Zn, O, and Cu atoms, and there were no impurities, according to the EDS study. Additionally, the nanoparticles had anticancer properties, indicating that the NPs were specifically targeting cancer cells by inducing cell death. At a 100 µg/mL concentration of the synthesized Cu-doped ZnO NPs, the cell availability percentages for the SW480, MDA-231, and HeLa cell lines were 29.55, 30.15, and 28.2%, respectively. These findings support the idea that Cu-doped ZnO NPs might be a new cancer treatment. Moreover, the results show the percentage of dye degradation over different time durations. After 180 hours, the degradation of CV dye reached 79.6%, while MB dye exhibited a degradation of 69.9%.

Based on these findings, Cu-doped ZnO NPs have the potential to be effective photocatalysts, antibacterial agents, and cancer fighters. This bodes well for their potential applications in the fields of ecology, medicine, and industry in the future.

# Chemistry and its environmental applications

**ICOSACS-CHEM-PS- 001**

**Prof. Mohamed H. EL-Saeid**

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**Risk and Remediation of Environmental Contaminates: Recent Techniques.**

Environmental pollution problems are among the most important issues that concern many countries and international organizations due to the tremendous development in the size and quantity of environmental organic pollutants. For decades, there has been remarkable success in developing various extraction and analysis methods to monitor the chemical contaminants in the environment, which has demonstrated the size of environmental pollutant problems and the seriousness of their impact on human health. Therefore, there was an urgent need to search for methods and techniques to remediate these environmental pollutants. However, these remediation techniques face challenges related to cost-effectiveness, environmental concerns, secondary

pollution due to the generation of by-products, the risk of long-term pollution leakage, and social acceptance. Therefore, there was a need to develop remediation methods that are consistent with modern trends to treat many environmental pollutants that can cause multiple health and environmental damages. One of the most important remediation methods is photo remediation which uses ultraviolet rays, it can be developed by adding chemical catalysts to increase the efficiency of this technology and shorten the time required for remediation processes, which has efficiently treated pesticide residues, polycyclic aromatic hydrocarbons,and other pollutants in soil and water. Bioremediation and phytoremediation, or combined, also have an effective impact in treating environmental pollutants. Phytoremediation uses plants to absorb and stabilize pollutants, while bioremediation uses microorganisms to degrade organic pollutants in a sustainable manner. Nanotechnology also offers innovative solutions by using nanoparticles as adsorbents or effective catalysts that can be effective for remediation technologies. Other techniques such as heating, washing/solvent extraction, chemical oxidation,and integrated remediation approaches can also be applied to new and emerging technologies.These include electrokinetic remediation and biocatalytic enzyme remediation.

**ICOSACS-CHEM-PS- 002**

**Prof. Abdalla Ahmed Elbashir**

**Smart material for liquid phase microextraction of fluoroquinolone in water samples**

Pharmaceuticals in the environment have triggered significant concern due to their adverse impact on human health. They

were reported to have the potential to hormonal, enzymatic, and genetic systems of the human body. The extensive use of certain pharmaceuticals in recent years has resulted in their ongoing release into the environment via several pathways, including excretion and improper disposal of unused drugs. When ingested, the pharmaceuticals are only partially digested in humans' body, with about 20-80% unmetabolized residues released into the environment in a pharmacologically active form. Fluoroquinolones (FQs) are a class of relatively new synthetic antibiotics, which are among the most widely found antibiotics in the aquatic environment.In this research smart material based on ferrofluid deep eutectic solvents graphene oxide magnetite (GO@Fe3O4-DES FF) was successfully synthesized by adding choline chloride-ethylene glycol DES as carrier solvent onto GO@Fe3O4 composite. The morphological, functional group, and magnetic characteristics of the synthesized materials were characterized by elemental analysis, Fourier Transform-infrared spectroscopy, scanning electron microscopy, transmission electron microscopes and, vibrating sample magnetometer. The adsorption performances of ofloxacin (OFL) and sparfloxacin (SPR) were evaluated based on kinetic, isotherm, and thermodynamic models. The GO@Fe3O4-DES FF material was used as ferrofluid sorbent for liquid phase microextraction (LPME) of OFL and SPR prior to HPLC-UV analysis. The effect of several parameters on the peak areas of OFL and SPR including type of desorption solvent, ferrofluid volume, extraction time, desorption solvent volume, desorption time, solution pH, and sample volume were optimized. The LOD values were recorded in the range of 0.0063–0.0058 µg/L. It showed great potential as an alternative

method for the extraction of pharmaceutically active contaminants in the aquatic system.

**ICOSACS-CHEM-PO- 003**

**Prof. A. F. M. Motiur RAHMAN**

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**From Lab to Life: The Role of Hydrazone Moieties in Medicinal Chemistry**

Hydrazones are gaining attention in medicinal chemistry for their diverse biological activities, particularly their anticancer properties. This review explores various hydrazone derivatives, emphasizing their synthesis, structural diversity, and mechanisms of action against cancer cells. Recent studies have demonstrated that hydrazones can induce apoptosis, disrupt cell cycle progression, and inhibit metastasis in various cancer types. Additionally, metabolic profiling of these compounds has provided insights into their pharmacokinetics and interactions within biological systems, highlighting potential biomarkers for efficacy. Understanding the multifaceted roles of hydrazones in cancer therapy is crucial for optimizing their design and enhancing their therapeutic applications. Future research should focus on elucidating structure-activity relationships and improving bioavailability to facilitate clinical translation.

**ICOSACS-CHEM-PS- 004**

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**أثر إضـافة الألياف البوليمرية على الخصـائص الميكانيكية للطوب الطيني خطوة نحو بناء مستدام في المناطق الريفية**

في ظل تزايد الاهتمام بتحقيق الاسـتدامة البيئية في قطاع البناء، يُعد الطوب الطيني أحد المواد التقليدية الواعدة نظراً لتوافره المحلي وانخفاض تكلفته. ومع ذلك، فإن محدودية خصـائصـه الميكانيكية، ولا سيما قدرته على مقاومة الضـغط والعوامل المناخية المختلفة، تحدّ من اسـتغلاله على نطاق واسـع في مشـاريع البناء الحديثة. من هذا المنطلق، تزداد الحاجة إلى ابتكار حلول تعزز خصـائصـه وتجعله أكثر ملاءمة للاسـتخدام في البيئات الريفية والمناطق ذات الموارد المحدودة، بما يسـهم في التنمية المسـتدامة. ويهدف هذا البحث إلى دراسـة تأثر الخواص الميكانيكية للطوب الطيني من خلال إدخال ألياف بوليمرية ضمن الخلطة الطينية أثناء عملية التصنيع. تعتمد المنهجية على تصميم تجارب مخبرية تشمل تحديد نسب الإضافة ووقت دمج الألياف، ثم تقييم العينات المنتجة بواسطة اختبارات الضـغط وتحليل التماسـك الداخلي. وبذلك، يتم تحديد الشـروط المثلى التي تضـمن تعزيز قدرات الطوب على تحمل الأحمال وتحسين استقراره الهيكلي. نستهدف من هذه الإضـافات البوليمرية إلى إحداث تحسينات في مقاومة الضـغط واستقرار البنية للطوب الطيني، الأمر الذي يُسهم في تطوير مادة بناء منخفضـة التكلفة وذات كفاءة بيئية عالية. وبذلك، تدعم هذه النتائج توسيع استخدام الطوب الطيني المحسن في مشاريع البناء المستدام، خاصـة في المناطق الريفية، مما يعزز من دور تقنيات البناء التقليدية المحسّنة في تلبية احتياجات المجتمعات المحلية والحفاظ على البيئة.

**ICOSACS-CHEM-PS- 005**

**Amal BaQais**

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**Study of the Photocatalytic Degradation of Highly Abundant Pesticides in Agricultural Soils**

Organic pesticides are major sources of soil pollution in agricultural lands. Most of these pesticides are persistent and tend to bio accumulate in humans upon consumption of contaminated plants. In this study, we investigate different natural soil samples that were collected from agricultural

lands.The samples revealed the presence of 18 pesticides that belong to four different groups including organochlorines (OCP), organophosphorus (OPP), carbamates (Carb), and pyrethroids (Pyrth). Thephotocatalytic degradation of the five most abundant pesticides was studied in the presence and absence of 1% TiO 2 or ZnO photocatalysts under UV irradiation at a wavelength of 306 nm. The five abundant pesticides were Atrazine (OCP), Chlorpyrifos methyl (OPP), Dimethoate (OPP),Heptachlor (OCP), and Methomyl (Carb). The results showed that photolysis of all pesticides was complete under UV radiation for irradiation times between 64–100 h. However, both photocatalystsenhanced photocatalytic degradation of the pesticides in comparison with photolysis. The pesticides were photocatalytically degraded completely within 20–24 h of irradiation. The TiO 2 hotocatalyst showed higher activity compared to ZnO. The organochlorine heptachlor, which is very toxic andpersistent, was completely degraded within 30 h using TiO 2 photocatalyst for the first time in soil.The mechanism of photocatalytic degradation of the pesticides was explained and the effects of different factors on the degradation process in the soil were discussed.

**ICOSACS-CHEM-PO- 006**

**Amal M. Al-Amri**

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**Exploring DNA-Leukemia Interaction Using 2-Mercaptoethanol Capped CdSe Quantum Dots Biosensor for HealthCare Application**

This study investigates the interaction between DNA associated with leukemia cells and 2-mercaptoethanol (ME)-capped CdSe quantum dots (QDs) biosensors. CdSe quantum dots were synthesized and functionalized with ME to enhance their stability and bio-compatibility. Thebiosensor's efficacy in detecting DNA associated with leukemia cells was evaluated through fluorescence spectroscopy and other analytical techniques. The interaction mechanism was elucidated through structural and spectroscopic analyses, shedding light on the binding affinity and specificity. Results demonstrate the potential of ME-capped CdSe QDs biosensors for sensitive and selective detection of DNA associated with leukemia, paving the way for advanced diagnostic and therapeutic applications in cancer research.

**ICOSACS- CHEM-PO- 001**

**Hasna A. Alanazi**
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**Effect Of Gamma Irradiation on The Structure and Morphology of Metal Organic Frameworks**

This study investigates the structural, morphological, and thermal properties of Ag@Zn-MOF, a metal-organic framework, using X-ray diffraction (XRD), scanning electron microscopy (SEM), and thermogravimetric analysis (TGA). The focus is on understanding the material's decomposition behavior through isothermal and non-isothermal thermogravimetric methods. The results show a single-stage thermal decomposition process, offering insights into the stability and thermal performance of Ag@Zn-MOF. Additionally, the synthesis of Ag5%@Zn-MOF and Ag10%@Zn-MOF and their resistance to

gamma irradiation were explored. These findings enhance the understanding of Ag@Zn-MOF's potential for various applications in materials science and related fields.

**ICOSACS- CHEM-PO- 002**

**Hana Altamimi**

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**Synthesis and Characterization of Perovskite-Type Oxide Catalysts**

Numerous studies have shown perovskites' effectiveness as catalysts for removing organic contaminants and heavy metals from water, as well as in organic synthesis, hydrogen production, and CO2 reduction. Given their tunable composition and catalytic efficiency, our research will focus on synthesizing a perovskite-type oxide catalyst for degrading organic dyes. The catalyst will be synthesized via hydrothermal synthesis. We will characterize it using XRD, FTIR, and TGA. To enhance its catalytic properties, we will explore doping, A- and B-site substitutions, cocatalysts, and control over particle size and morphology.

**ICOSACS- CHEM-PO- 003**

**Bayan Alshehri**

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**Synthesis of hybrid mesoporous silica as drug delivery system and bioimagingeffective drug delivery potential.**

**These findings highlight the potential of MSN-based systems for advanced cancer therapies**

Nanoparticle-based drug delivery systems (NDDS) are revolutionizing cancer therapy by enhancing drug targeting and minimizing side effects. In this study, we developed a novel mesoporous silica nanoparticle (MSN)-based system modified with poly(2-(diethylamino)ethyl methacrylate) (PDEAEMA) and Nile Blue methacrylamide (NBM) to achieve stimuli-responsive drug delivery. The system demonstrated excellent pH-sensitive loading and release behavior of the chemotherapeutic drug doxorubicin (DOX), with loading capacities exceeding 90%. Characterization by FTIR, SEM, and DLS confirmed successful surface modification and size adaptability. Cytotoxicity tests using glioblastoma cells (ANGM) revealed that the modified MSNs are biocompatible and exhibit effective drug delivery potential. These findings highlight the potential of MSN-based systems for advanced cancer therapies.

**ICOSACS- CHEM-PO- 004**

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**Synthesis and Evaluation of New 2-Amino-4H-Pyran Derivatives for Antioxidant, Antibacterial and Anti-CRC Activities**

Colorectal cancer ( CRC) is a major global health issue, ranking third in cancer incidence and fourth in cancer-related deaths. In 2020, there were 1.9 million new cases and 0.9 million deaths, with projections suggesting 3.2 million new cases by 2040. CRC

develops through a complex process involving genetic mutations, oxidative stress, and changes in gut microbiota. Oxidative stress, caused by reactive oxygen species (ROS), contributes to CRC by inducing DNA damage, and chronic inflammation. Dysbiosis, particularly from harmful bacteria like *Escherichia coli* and *Klebsiella pneumonia*, also promotes CRC. Additionally, deregulation of cyclin-dependent kinases (CDKs), especially CDK2, plays a key role in tumorigenesis. Targeting ROS, harmful bacteria, and CDK2 presents promising therapeutic strategies. Pyran based compounds, with their anticancer properties, show potential in addressing these factors and combating CRC.

**ICOSACS- CHEM-PO- 005**

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Smart photochromic and fluorescent textile refers to garments that alter their colorimetric properties in response to external light stimulus. Cotton fibers have been reported as a main resource for many modern textile and non-textile industries, such as automobiles, medical field, and furniture design. Cotton is natural fibers that are distinguished with breathability, softness, cheapness and highly absorbent. However, there have been growing demands to find out other resources for the production of cotton at high quality and low cost for high technological applications, such as sensor for harmful ultraviolet radiation. Herein, we present a novel method toward luminescent and photochromic nonwoven textile from recycled

cotton waste. Using the screen-printing technology, a cotton fabric that is both photochromic and fluorescent was developed using aqueous inorganic phosphor nanoparticles (10-18 nm)-containing printing paste. Both of CIE Lab color coordinates and photoluminescence spectra showed that the transparent film printed on the nonwoven fabric develops a reversible green emission under ultraviolet light (365 nm), even at low pigment concentration (6%) in the printing paste. Colorfastness of printed fabrics showed high durability and photostability.

**ICOSACS- CHEM-PO- 006**

**Prof. Ghadah Al-Senani**
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**Preparation of Biomolecular Anthocyanin-Immobilized Plasma-Cured Nonwoven Fibers from Pomegranate (*Punica Granatum* L.) and Recycled Cotton Waste for Detection of Ammonia**

Cotton fibers have been one of the major resources for various modern textile and non-textile industries. They are breathable, soft, and high absorbent natural fibers with a low production cost. Cotton fibers have found uses in a wide range of fields, such as medical field, automobile industry, and furniture design. However, there have been increasing demands to find out other resources for cotton production at high quality and low cost for high technological applications, such as colorimetric sensors. In this work, we provide a novel technique for plasma-induced coloring of nonwoven recycled cotton waste with an anthocyanin natural probe obtained from

pomegranate (*Punica granatum* L.) peel. High-performance liquid chromatography (HPLC) was used to study the anthocyanin extract. Mordant was employed to bind anthocyanin to nonwoven fibers, creating an anthocyanin-mordant coordinative complex. The diameters of the anthocyanin-mordant complex particles were between 5 and 15 nm. A small coating layer of anthocyanin probe was applied to plasma-activated nonwoven cotton. Coloration parameters, absorbance spectra, and colorimetric strength (K/S) data showed that anthocyanin-finished nonwoven cotton had a detection limit of 1–250 ppb of aqueous ammonia, with a corresponding colorimetric change from purple (549 nm) to white (393 nm) due to intramolecular charge transfer. The results demonstrated satisfactory colorfastness of the anthocyanin-dyed nonwoven cotton fibers, UV blocking, and antibacterial efficacy. Promising portable colorimetric technology of anthocyanin-dyed nonwoven cotton fibers was developed for onsite detection of ammonia that can cause severely harmful effects on human organs or even death. Signs of a high surface area in the sensor material include anthocyanin-mordant complex nanoparticles and cotton microfibers.

**ICOSACS- CHEM-PO- 007**

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**Radiation Shielding Efficiency of Lead-Tungsten-Boron Glasses: A Novel Solution for Modern Radiation Challenge**

Radiation shielding is a critical requirement in various modern applications, from nuclear facilities to medical imaging and industrial operations. This study introduces an innovative series of lead-tungsten-boron (PWB) glasses doped with antimony (Sb), aluminum (Al), and bismuth (Bi), offering superior performance in shielding against gamma rays, neutrons, and charged particles. Through advanced Monte Carlo simulations (FLUKA and XCOM), these glasses were meticulously analyzed for key parameters, including mass attenuation coefficients, half-value layers (HVL), and neutron removal cross-sections. Results reveal that PWB-Bi glasses exhibit exceptional gamma shielding efficiency, achieving the lowest HVL values, while PWB-Sb glasses demonstrate outstanding neutron absorption and charged particle attenuation.The findings highlight the PWB glass systems as a cutting-edge solution, surpassing conventional materials like concrete and commercial glass in radiation protection. Their lightweight composition, high durability, and remarkable efficiency make them ideal for applications in healthcare, nuclear energy, and beyond.This work sets a new benchmark for radiation shielding technology, paving the way for safer and more efficient systems in radiation-prone environments.

**ICOSACS- CHEM-PO- 008**

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**Nanomaterials for Renewable Energy production and Storage applications .Synergistic effect of ZnO**

**nanocomposite of Dodonea viscosa for corrosion inhibition in saline media .**

Dodonea viscosa-zinc oxide (DV-ZnO) nanocomposite was synthesized and characterized using Fourier transform infrared (FTIR), thermal gravimetric method (TGA), X-ray diffraction (XRD), scanning electron microscopy (SEM), and energy dispersive X-ray spectroscopy (EDS). The most abundant compounds in the plant extract were explored using gas chromatography-mass spectrometry (GC-MS). FTIR indicated the existence of the different functional groups, XRD showed that the nanocomposite has the hexagonal wurtzite shape of ZnO nanoparticles, SEM-EDS showed a size of 50nm, and elemental analysis depicts the existence of the different elements in the extract, which confirms,alongwithTGAresults, theformationofDV-ZnO nanocomposite. The nanocomposite synergistic effect was examined for anticorrosion capabilities using gravimetric, electrochemical, and surface analysis methods. Both the plant extract and the nanocomposite exhibited corrosion inhibition abilities. However, the incorporation of the plant extract with ZnO increased the inhibition efficiency by 20%. Weight loss and electrochemical methods concluded an inhibition efficiency of 80% for DV-ZnO nanocomposite. The inhibition of the nanocomposite is due to the adsorption of the inhibitor on the carbon steel surface, which was verified using X-ray photoelectron spectroscopy and scanning electron microscopy (SEM). The adsorption was found to follow both Langmuir and Temkin isotherms. Surface examination using atomic force microscopy (AFM) found that the carbon steel surface roughness was decreased from the sample submerged in an uninhibited medium (Sa= 121.20nm)

when adding DV-ZnO nanocomposite (Sa= 22.95nm) and DV plant extra ctinhibitor (Sa=54.73nm).

**ICOSACS- CHEM-PO- 009**

**Prof. Mohamed A. Ghanem**
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**Nanomaterials for Renewable Energy production and Storage applications**

Engineering the material nanoarchitectures, particularly the transition metal compounds with nanometer size, shape, facets, and composition, significantly boosts the electrocatalytic activity of the electrochemical energy pro-duction and storage reactions. This work demonstrates a novel chemical approach for the synthesis of mesoporous nanoarchitectures (nanoflakes, nanosheets) of transition metal (titanium, nickel, cobalt, copper) oxides, hydrox-ides and phosphate using double templates of surfactant self-assembled thin-film and foam of hydrogen bubbles concurrently produced by sodium borohydride reducing agent. The physicochemical characterizations show the nanomaterials exhibit high specific surface area and mesoporous, various nanoarchitecture morphologies (nanoflakes and nanosheets), and compositions that can be varied in a controllable way through changes in the template compositions and deposition conditions. The electrocatalytic activity and stability of the new transition metal nanomaterials have shown significantly enhanced performance for the electrochemical energy production, storage and sensing reactions of methanol, urea, glycerol, and glucose oxidation as

well as the water-splitting re-actions of hydrogen and oxygen evolution. The electroactivity high-performance of the mesoporous transition metals nanoarchitectures is mainly derived from the high conductivity, specific surface area and mesoporous ar-chitecture that provide efficient charge transfer, as well as mass transport of the electroactive species. The double templates of the surfactant-foam (SF) approach have the advantages of a one-pot template applicable to the syn-thesis wide range of nanomaterials with various compositions and nanoarchitectures at room temperature for ap-plication in electrochemical energy production and storage.

**ICOSACS--PO- 010**

**Dr. Fares-AlJuaid**
king Fahd Center for Medical Research - Clinical Trial Unit-King Abdul Aziz University

**Comparative Analysis of Rhodamin B Dye Removal Using Nanoclays and graphene/Clay Nanocomposite**

Montmorillonite nanoclay modified with octadecylamine (MODA nanoclay) and graphene/MODA nanocomposite were employed to adsorb Rhodamine B (RhB) dye from aqueous solutions. The physical characteristics of each were analysed using transmission electron microscopy, X-ray diffraction, zeta potential, and Fourier transform infrared (FTIR) methods. The ideal circumstances, including solution pH, weight of MODA nanoclay and graphene/MODA nanocomposite, solution temperature, and ionic strength, were examined for removal efficiency. The experimental findings indicated that Rhodamine B (RhB) dye could be eliminated after 120 minutes by MODA nanoclay at a removal efficiency of 65% with an adsorption

capacity of 16.26 mg/g, and by graphene/MODA nanocomposite at 78.87% removal efficiency with an adsorption capacity of 19.72 mg/g, under optimal circumstances. The kinetics and thermodynamics of dye removal onto MODA nanoclay and graphene/MODA nanocomposite were investigated, revealing that the pseudo-second-order kinetic model well characterises the adsorption process. We highlight the thermodynamic data that exhibited exothermic characteristics.

**ICOSACS-CHEM -PO- 011**

**Mahbuba Aktary**
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The addition sequence of active metal and promoter has a substantial impact on the performance of red mud-based catalysts in $CO_2$ hydrogenation. This study investigates the effect of adding promoter ($KNO_3$) and $ZrO_2$ in a different order on the conversion of $CO_2$ and the product's selectivity. A series of catalysts were prepared, including 20%ZrO2/3%K/RM, where promoter (K) was added before $ZrO_2$ in RM, and 3%K/20%ZrO2/RM, (K was added after $ZrO_2$ in RM) and these were thoroughly characterized by XRD, SEM, elemental mapping, TEM, BET, and XRF. The catalyst, 20%ZrO2/3%K/RM, produced 31% $CO_2$ conversion with the $CH_4$ selectivity of 68% under 30 bar of CO2:H2 ((1:3) at 375°C. On the other hand, the catalyst 3%K/ 20%ZrO2/RM recorded a slightly lower $CO_2$ conversion (29%), however, the reaction followed a different route towards the formation of $CH_4$ with a selectivity of (87%). These results indicate that the sequence of adding metal and

promoter not only impacts the total .catalytic activity but also significantly influences the selectivity towards methan

**ICOSACS-CHEM-PO- 012**

**Dr. Abeer Beagan**
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**Potential efficiency of magnetic mesoporous silica nanoparticles modified with aspartic acid to cationic dye removal from aqueous solution**

This work includes the preparation of Fe3O4 NPs coated with mesoporous silica nanoparticles (MSNs). The combination between two different materials could improve the removal efficiency of pollutants from wastewater. The surface modification of magnetic nanoparticles could reduce the agglomeration. The Fe3O4-MSNs surface was modified with aspartic acid liked with the adsorbent surface via hydrophobic linker (1,4-phenylene diisothiocyanate, PDITC) to effectively remove the methylene blue (MB) dye from the contaminated water. The particles size was ranged between 110 and 160 nm, as estimated by SEM and TEM. The surface zeta potential of the surface was found to be negatively at pH above 2.5. The nanosorbent efficiency was evaluated at different conditions such as pH, contact time and initial MB concentration. The maximum adsorbed amount of the MB was estimated to be 135 mg/g at 200 mg/L MB concentration and 80 min contact time. The adsorption isotherm fits with the Langmuir model and pseudo-second- order kinetics.

**ICOSACS-CHEM-PO- 013**

**Dr. Aya Osama**

Faculty of Women for Arts, Science & Education Ain Shams University, Egypt

**Fabrication of Au-CNTs-Alumina-Silica nanocomposite by unconventional technique for water purification using light.**

The rapid expansion of the industrial sector in the world leads to environmental problems such as water pollution. The colored pollutants are concentrated and accumulated inside soil and plants, becoming more dangerous for the ecosystem and human health. The usual techniques have many disadvantages. In addition to producing secondary pollutants, they are not effective for all pollutants. Therefore, the techniques based on using light to convert the organic pollutants to water and carbon dioxide are favorable for solving the environmental problems of water. In this trend, the current study focused on designing effective nanomaterials for removing dyes from water in few minutes using light and adsorption techniques. The effective nanomaterials were fabricated by explosive reactions.

**ICOSACS-CHEM-PO- 014**

**Dr.Asma Alothman**
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**Reaction Mechanism of Hydrogen Generation and Nitrogen Fixation at Carbon Nitride/Double Perovskite Heterojunctions**

Photocatalytically active heterojunctions based on metal halide perovskites (MHPs) are gaining significant attention for their versatility in facilitating various redox reactions. However, the lack of mechanistic understanding has hindered the

optimization of these materials. This study investigates a composite system of double perovskite $Cs_2AgBiCl_6$ and g-$C_3N_4$, used for simultaneous solar-driven hydrogen generation and nitrogen reduction. The composite's performance is rigorously evaluated through detailed analytical methods. It efficiently promotes both reactions, with activity strongly dependent on the ratio of perovskite to carbon nitride. Using advanced spectroscopic techniques and density functional theory (DFT) modeling, the mechanisms behind $H_2$ and $NH_3$ production are explored. For hydrogen generation, halide vacancies in the perovskite are identified as the key active sites, while low g-$C_3N_4$ loading reduces carrier recombination, enhancing efficiency. For nitrogen reduction, nitrogen vacancies in g-$C_3N_4$ are the active sites, and the heterojunction performs optimally at low perovskite loadings, maximizing light absorption and minimizing carrier losses. These insights are essential for advancing MHP-based composites in photocatalysis, providing valuable guidance for designing more efficient and versatile photocatalytic systems for energy and environmental applications.

**ICOSACS- CHEM-PO - 015**

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Department of Chemistry, College of Science,King Faisal University

**Characterizing Beta-Blocker-Cyclodextrin Complexes for Enhanced Analytical Performance**

Cyclodextrins (CDs) are cyclic, truncated cone shaped, chiral oligosaccharides .The outer periphery of the macrocyclic ring is hydrophilic due to the presence of numerous hydroxyl groups.

Objectives:1. Develop and characterize inclusion complexes of betablocker drugs (Metoprolol, Propranolol, and Atenolol) with beta-cyclodextrin to improve their solubility and stability. 2. Establish and validate spectrofluorometric methods for accurate and sensitive determination of these drugs in pharmaceutical formulations.

**ICOSACS-CHEM-PO- 016**

**Emad Almotiri**

**Application of Preformed Manganese Oxide Nanoparticle Adsorbents in Removing Malachite Green Dye from Different Aqueous Solutions.**

Herein, manganese oxide nanoparticle was prepared, characterized and used for the removal of malachite green dye from environmental water samples. The effects of different parameters on the removal process was studied; manganese oxide nanoparticle mass, shaking time, solution pH, and temperature had been explored. The optimum removal capacity of malachite green dye by the manganese oxide nanoparticle obtained was about 40.65 mg/g using 0.025 L of Malachite green dye solution with 10 mg/L concentration, and manganese oxide nanoparticle 5 mg within 120 minutes, at pH 6, and 295 K. The

removal process was studied kinetically as well as thermodynamically, and the findings showed the pseudo-second-order kinetic model suitability, thermodynamically, endothermic, spontaneity, and chemical nature of the removal process. Moreover, manganese oxide nanoparticle could be used for three consecutive times for the efficient removal of Malachite green with high efficiency. Finally, the manganese oxide nanoparticle applicability for removal of Malachite green in different spiked Red Sea water, waste water, and tap water sample was investigated and the manganese oxide nanoparticle showed a great potential application to removing Malachite green from the environment.

**ICOSACS-CHEM-PO-17**

***Shumookh Ali Alsufyani***
Department of Chemistry, College of Science, King Khalid University, Abha .

**Experimental Studies and Artificial Neural Network Modeling for the Removal of Naphthalene from Aqueous Solutions**

Polycyclic aromatic hydrocarbons (PAHs) are global environmental pollutants that originate from both industrial and natural sources. These compounds are generally undegradable, have a strong affinity for organic matter, and are insoluble in water. As a result, they pose substantial risks to human health, microorganisms, water quality, and marine ecosystems. In the

Kingdom of Saudi Arabia, PAHs are existing in various water sources, including the Red Sea and the Gulf of Aqaba. In this study, a ferrous/ferric-magnetite nanocomposite ($Fe^{2+}/Fe^{3+}$-MNPs) was synthesized using onion peels aqueous extract. The resulting nanocomposite was characterized using techniques such as Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), BET surface area analysis, and thermogravimetric analysis (TGA). The composite was tested for its ability to adsorb naphthalene from aqueous solutions. Factors affecting adsorption, including pH, contact time, adsorbent dose, initial ion concentration, shaking rate, and temperature, were examined. Optimal adsorption conditions were identified as 0.40 g/25 mL, pH 6.13, and a contact time of 30 minutes with a maximum removal efficiency of 99%. The experimental data fit well with the pseudo-secondorder kinetic model and the Langmuir isotherm model, revealing a maximum adsorption capacity of 2.0 mg/g. Thermodynamic parameters indicated that the process was endothermic, spontaneous, and followed a physio-sorption pathway. Additionally, an Artificial Neural Network (ANN) model was developed using a custom algorithm based on Gradient Descent (GD) and Monte Carlo Simulation methods implemented in Python to predict the removal efficiency of naphthalene. The models effectively predicted the removal process, with experimental data correlating well with predicted results, exhibiting low Mean Square Error and high Correlation Coefficient.

**ICOSACS-BIO-PS- 019**

**Anhar M. Alromi**
Department of Chemistry, College of Science, King Abdul Aziz University.

**Exploring lead-free perovskite materials as effective photocatalysts for CO2 reduction: a density functional theory study**

To reduce reliance on toxic materials, this study investigated lead-free perovskite materials as potential photocatalysts for carbon dioxide reduction. Our approach involved modeling a variety of reactions to identify cost-effective systems with high stability and selectivity. We began by examining the surfaces of Cs2TeX6 (where X = Br or I) to determine their optimal structural configurations. Using density functional theory (DFT) through the VASP program, we analyzed the structural, electronic, and optical properties of these compounds, along with their photocatalytic efficacy in converting CO2 to CO and CH4. We employed various DFT methods (PBE+D, HSE06, SOC, etc...) to explore the bulk properties, formation energies, band structures, and optical absorption spectra of Cs2TeBr6, Cs2TeI6 and Cs2Te(I0.5Br0.5)6. Our results show that Cs2Te(I0.5Br0.5)6 exhibits the best performance among the systems studied, offering superior stability, selectivity, and efficiency. This comprehensive study enhances our understanding of lead-free perovskite materials for sustainable CO2 reduction applications. stability, selectivity, and efficiency. This comprehensive study enhances our understanding of lead-free perovskite materials for sustainable CO2 reduction applications.

**ICOSACS-CHEM-PO- 020**

**Hamed Ayyadh Almarshi**
Department of Chemistry Sciences, Faculty of Science, King Abdulaziz University

**CHROMIUM IN ATMOSPHERIC PM2.5, CONCENTRATION AND POSSIBLE SOURCES**

Chromium pollution in PM2.5 on Jeddah city is becoming a bigger issue since Saudi Arabia's car sales have grown significantly in the past ten years, and it's common knowledge that chromium (Cr) is one of the elements found in the environment. While Cr (VI) form is a known carcinogen human substance, Cr(III) is found in various chemicals and participates in the formation and transformation of lipids, glucose, and proteins. because of the shiny finish and corrosion resistance. it is used extensively in automobile trim as Cr metal. Even though the Jeddah car industry is expanding quickly, it is unknown where and how much Cr contamination is present in Saudi Arabian airborne particles. in this thesis displays the first comprehensive study of particulate matter (PM2.5) with an aerodynamic size of less than or equal to 2.5 μm. composition of Chromium Element in Jeddah. This study has two aims: 1) To investigate the long-range transport of PM2.5 as specific urban air quality problem causing PM2.5 episodes in the study area; 2) To study the relationship between PM2.5 levels and Chromium Element pollutants; and meteorological factors. We carried out a several-months one site Jeddah sampling effort between January to March 2023, inductively coupled plasma optical emission spectroscopy (ICP-OES) was used to analyze the samples. The average mass overall concentration was 54.122 μgm-3 for PM2.5, and more than which rise the US An average

of 15 µgm-3 for PM2.5 for the National Ambient Air Quality Standard (NAAQS).

**ICOSACS-CHEM-PO- 021**

**Prof. Hanan A. Al -ghulikah**
Department of Chemistry, College of Science, Princess Nourah bint Abdulrahman.

**New modified thieno[2,3-d]pyrimidine derivatives as VEGFR-2 inhibitors: Design, synthesis, in vitro anti-cancer evaluation and divers in silico studies**

Angiogenesis is a critical regulatory mechanism for tumor development and metastasis. Tumor growth is closely related to the production of the vascular endothelial growth factor (VEGF), which is mediated by the cell-surface kinase VEGFR-2. Accordingly, blocking of VEGFR-2 is an important approach to find new treatments for malignancies. The aim of this research is the synthesis of new thieno[2,3-d]pyrimidine derivatives that could be potential anticancer leads inhibiting VEGFR-2. The prepared thieno[2,3-d]pyrimidine derivatives were tested in vitro for their inhibitory effects against the kinase activity of VEGFR-2. In addition, the synthesized compounds were assessed for their anti-proliferative activities against MCF-7 and HepG2 cell lines. Compound 4c displayed the strongest anti-VEGFR-2 potentiality with an IC50 value of 0. and 15 µM exhibited good anti-proliferative effects against HepG2 and MCF-7 cells with IC50 of 17.14 and 11.56 µM, respectively. Compound 4c induced cell cycle arrest at the S phase and boosted early and late apoptosis in MCF-7 cells. Additionally, compound 4c increased BAX (4.5-fold), decreased Bcl-2 (3.5-fold), and demonstrated a notable increase in caspase-8 (2.9-

fold) and caspase-9 (3.3-fold) levels. Furthermore, compound 4c significantly reduced TNF-α (3.6-fold) and IL-6 (3.2-fold) levels in MCF-7 cells. Molecular docking studies indicated good binding affinities as well as energies of the thieno[2,3-d]pyrimidine derivatives against the VEGFR-2. Molecular dynamics (MD) simulations were utilized to study the structural, energetic, and conformational changes of the VEGFR-2–4c complex, and the results indicated its stability. The MM-GBSA study of the VEGFR-2–4c complex showed a stable thermodynamic behavior with a binding free energy of -44 kcal/mol. The PLIP analysis identified the 3D interactions and binding conformation through the VEGFR-2–4c complex. Moreover, the DFT studies have been performed to study, Mullikan atomic charge distribution, FMO, ESP, the total density of state, and the QTAIM maps of compound 4c to theoretically verify its reactivity. Finally, computational ADMET and toxicity studies were conducted to assess the drug development potential of the thieno[2,3-d]pyrimidine derivatives.

**ICOSACS-CHEM-PO- 022**

**Dr. Tarfah Al-Warhi**
Department of Chemistry, College of Science, Princess Nourah bint Abdulrahman.

**Synthesis and biological evaluations of novel 4-(pyrazolyl)benzenesulfonamide Ureas as Carbonic Anhydrases Inhibitors and Chemo-Sensitizing Agents**

Hypoxia within the tumor microenvironment (TME) significantly contributes to solid tumor resistance to chemotherapy. This resistance is exacerbated by hypoxia-induced acidosis, driven by the activity of carbonic anhydrases (hCA IX and hCA XII).

Targeting these enzymes can mitigate acidosis, thus enhancing tumor sensitivity to cytotoxic drugs. In this study, we designed and synthesized novel 4-(pyrazolyl)benzenesulfonamide ureas (SH7a-t), which were evaluated for their inhibitory activity against hCA IX and XII. These molecules showed promising results (CA IX: KI = 15.9 – 67.6 nM, CA XII: KI = 16.7 – 65.7 nM) while maintaining good selectivity over the off-target isoforms CA I and II. Among these molecules, SH7s demonstrated outstanding activity, with KIs of 15.9 nM for CA IX and 55.2 nM for CA XII. Additionally, SH7s exhibited minimal off-target kinase inhibition over a panel of 258 kinases, underscoring its potential as a selective CA-targeting anticancer agent. SH7s exhibited broad-spectrum anticancer activity in the NCI Developmental Therapeutics Program's anticancer screening. It showed an effective growth inhibition full panel GI50 (MG-MID) value of 3.5 μM and a subpanel GI50 (MG-MID) range of 2.4 – 6.3 μM. Furthermore, SH7s significantly enhanced the efficacy of the anticancer drugs TaxolTM and 5-fluorouracil (5-FU) in co-treatment regimens under hypoxic conditions in the colorectal HCT-116 cancer cell line, indicating its potential as a promising anticancer agent.

**ICOSACS-CHEM-PO- 023**

**Fisal A. Alsulaiman**
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**Pesticide Residues in Soil for Different Agricultural Activities Using QuEChERS and GCMSMS-TQD Techniques**

The multiple health and environmental risks were associated with pesticide residues, which have become a public health

concern due to their toxic, carcinogenic, and disease-causing properties, the objective of this study is to assess pesticide residues belonging to various chemical groups (such as Organochlorine Pesticides (OCPs), Organophosphorus Pesticides (OPPs), Herbicides, Fungicides, and Pyrethroids) in one of the importantenvironmental components which is soil. This is done to determine the extent of contamination with pesticide residues quantitatively using recent techniques for extraction and analysis that allow for a highly accurate assessment of pesticide residues resulting from their agricultural uses. The use of pesticides is the most widely adopted pest control strategy in the agricultural industry. Pesticides indirectly reach the soil during crop spraying. Therefore, the study was conducted to determine pesticide residues in the Riyadh region using one of the widely used multi-residue methodologies, the Quick, Easy, Cheap, Effective, Rugged, and Safe (QuEChERS) approach. This approach offers numerous advantages, including speed, cost-effectiveness, ease of use, good performance characteristics, and a wide applicability range.

**ICOSACS-CHEM-PO- 024**

**Dr.Thawab M. Al-Bugami**
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**Recent Photo-remediation and Photocatalytic Techniques of Polycyclic Aromatic Hydrocarbon (PAHs) in Saudi Mining Soils**

Soil pollution is a prevalent issue all over the world and it is naturally persistent and causes adverse effects on the

environment and human health. In this regard, this study was conducted to determine the extent of pollution by Polycyclic Aromatic Hydrocarbons (PAHs) in soils collected from Mahd Al-Dahab with mining activities, and Riyadh region with traffic density activities. Also, the study of the effect of photo-remediation on contaminated soils in the Kingdom of Saudi Arabia. The results of this study determined the pollution concentrations of polycyclic aromatic hydrocarbons (PAHs) in the soils of Mahd Al-Dahab, Riyadh showed different concentrations of the following PAHs: Naphthalene (Nap), Acenaphthylene (Acy), Acenaphthene (Ace), Fluorene (Flu), Phenanthrene (Phe), Anthracene (Ant), Fluoranthene (Fla), Pyrene (Pyr), Benzo[a] Anthracene (BaA), Chrysene (Chr), Benzo[bþ kþj]Fluoranthene (BF), Benzo[e] Pyrene (BeP), Benzo[a] Pyrene (BaP), Indeno[123-cd]Pyrene (InP), Benzo[ghi] perylene (BghiP), Dibenzo[ah] Anthracene (DahA), and Retene (Ret). Soil Samples was the most polluted by tested PAHs in Mahd Al-Dahab region, followed by Riyadh soil which has the lowest concentration of tested PAHs under this investigation.

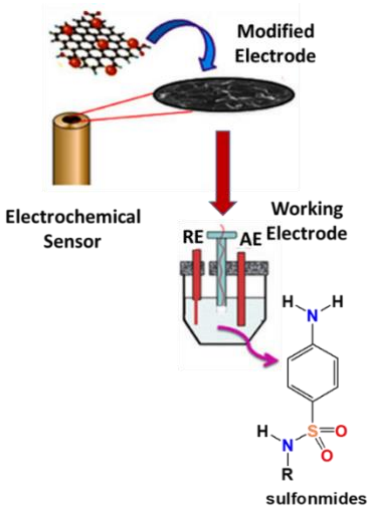
**ICOSACS-CHEM-PO- 025**

**Moammad Althowibi**

Department of Chemistry, Faculty of Science, King Abdulaziz University.

**Nickel(II) Complex Based 5,5-Diethlybarbiturate and tris (benzimidazolylmethyl) amine as an Electrochemical Sensor for the determination of some sulfonamide antibiotics**

A novel modified carbon paste electrode {[(NTB)(Barb)($H_2O$)Ni]($ClO_4$)}-CPE sensor based on [(NTB)(Barb)($H_2O$)Ni]($ClO_4$) (**1**) {Barb = 5,5-Diethlybarbiturate and NTB = tris(benzimidazolylmethyl)amine} as a neutral importer has been constructed. The modified electrode was characterized by scanning electron microscopy (SEM), electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV), as well as square wave voltammetry (SWV) for studying the electrochemical properties of Sulfathiazole drug on its surface. The experimental conditions affecting the modified electrode signal response were studied in terms of effect of pH and buffer type. Under the optimized conditions, the fabricated {[(NTB)(Barb)($H_2O$)Ni]($ClO_4$)}-CPE modified electrode was applied for the electrochemical detection of Sulfathiazole drug. By the addition of Sulfathiazole, the reduction peak current of modified carbon paste electrode



decreased by increasing sulfathiazole concentration due to the adduct formation between sulfathiazole and tris(benzimidazolylmethyl)amine; Nickel(II) complex. By using a calibration curve method, sulfathiazole was determined in different pharmaceutical formulations.

**ICOSACS-CHEM-PO- 026**

**Muhammad Aurang Zeb Gul Sial**
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**Electrochemical CO2 reduction to Ethanol mediated by novel Sn-SnO Supported Cu Single Atoms**

The electrochemical reduction of $CO_2$ into multi-carbon containing products with high activity and selectivity remains a big challenge. Herein, we propose a novel Cu-SACs (Cu single atoms catalyst) supported on tin-tin oxide (Cu-Sn-$SnO_2$) synthesized following a simple wetness impregnation and sequential reduction method for the direct conversion of CO into ethanol, which shows good product selectivity, activity, and stability. It is confirmed that the copper single atoms with an oxidation state close to 1 are stabilized on the Sn-$SnO_2$ substrates. The electrochemical analysis of Sn-$SnO_2$ displays selectivity towards other products apart from CO and H. With the impregnation with Cu single atoms, the products on the Sn-$SnO_2$ surface shifts from HCOOH to ethanol. With the increase in Cu content, the ethanol production increases at the expense of CO, pointing towards

dimerization of $C_1$ products. The synthesized catalyst exhibited a remarkable selectivity towards ethanol production with high stability.

**ICOSACS-CHEM-PO- 027**

**Norah Raqi Al-Otaibi**
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**A Facile Biodegradation of Polystyrene Microplastics by Bacillus subtilis**

Extensive application of polystyrene in the industry and the release of polystyrene microplastics (PS-MPs) in the environmental compartments has raised global concerns. The ability of microbes to utilize polystyrene as a carbon source has been currently established. This study utilized Bacillus subtilis (ATCC 11774) to break down environmentally relevant sized PS-MPs(5 µm) with and without abiotic (thermal and UV radiations) pre-treatment for a period of four weeks. The biodegradation rate was validated using UV-Visible spectrophotometry, Fourier transform infrared (FTIR), scanning electron microscopy (SEM) coupled with energy dispersive X-ray(EDX) analysis. After four weeks, all inoculated PS-MP samples with and without pretreatment showed changes in the UV-Vis spectra in comparison to the pristine PS-MPs. Additionally, the FTIR spectra displayed surface modifications of the functional groups in all inoculated samples; carbonyl and alcohol linked to chain scission/oxidation. Marked fragility of the particles observed in SEM micrographs and a probable oxidation degree evaluated using the atomic O/C ratio corroborate the biodegradative potential of B.subtilis. The core finding underscores that B. subtilis can grow on, alter, and use PS as a

carbon source, either with or without pre-treatments, emphasizing the role of biological pathways as an sustainable alternative to plastic waste management strategies.

**ICOSACS-CHEM-PO- 028**

**Khulud A. Abuhaimeda**
King Abdulaziz City for Science and Technology (KACST), Saudi Arabia

**Dual-Doped Nickel Sulfide for Electrochemical Oxidation of Ethylene glycol into Valuable Chemicals and Hydrogen Fuel**

The electro-upcycling of plastic waste into value-added chemicals/fuel is an attractive and sustainable method of managing plastic waste. A great deal of interest has been generated in electrocatalyzing the conversion of PET into formate and hydrogen, but the development of low-cost catalysts with high efficiency and selectivity for the ethylene glycol (PET monomer) oxidation reaction (EGOR) has been challenging. This project presents an innovative nickel sulfide catalyst that supports plastic waste electro-upcycling by co-doping with copper and fluoride. Due to its interconnected ultrathin nanosheet architecture, dual dopants induced d band center shifting and helped reconstruct the structurally damaged area on Ni3S2 (Cu, F-NiS), making it superior to a single doped Ni3S2 and an undoped Ni3S2. A self-evolved sulfide-oxyhydroxide heterostructure can catalyze EG-to-format conversion at high current densities (> 550 mA cm-2 @ 1.81 V vs RHE) thanks to its strong catalytic ability. As part of this study, we demonstrate how to engineer cost-effective bifunctional catalysts for electrochemical conversion

processes, as well as demonstrate how to create hydrogen energy from plastic waste.

**ICOSACS-CHEM-PO- 029**

**Prof.Siham A.Al-Issa**
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**An Eco-Friendly Method of Recycling PET Bottle Water Under Ultrasonic Radiation Utilizing A CPC-Clay Catalyst**

In this work, ethylene glycol with CPC-Clay as a catalyst was used to successfully accomplish the green depolymerization of PET wastes from poly(ethylene terephthalate) (PET) flakes from bottle drinking water under ultrasonic waves with a frequency rating of 20 kHz and a power of 190 W. PET was depolymerized to its bis(2-hydroxyethyl) terephthalate (BHET) monomer via glycolysis, using ethylene glycol (EG). The optimization of glycolysis reaction parameters such as time , size of particles, and catalyst concentration on the glycolysis reaction have been optimized to obtain maximum yield of BHET. The glycolysis products were identified using IR, $^{1}$ H and 13 C NMR.

# Biology and its applications in biotechnology and the environment

**ICOSACS-BIO-PS- 001**

**Somaya Al-Qattan**

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**Study the role of engineered S100A13 protein in modulating expression of mitochondrial dynamic proteins in lung epithelial cells**

The goal of this study is to find out how the engineered S100A13 variant (238–241del ATTG, p.I80Gfs*13) affects the expression of key mitochondrial dynamic proteins: Mitofusin 2+1 (MFN 2+1), Optic Atrophy 1 (OPA1), and Mitochondrial Fission Factor (MFF). The bronchial epithelial cell line BEAS-2B was used for this study. Cells were transfected with a plasmid carrying engineered S100A13 variant (3 ug/200,000 cells) using lipofectamine 3000 kit for 24 hours at 37°C, 5% CO2. Post-transfection efficiency was assessed by monitoring GFP expression. After, the cells were washed, lysed, and the expression of mitochondrial dynamic proteins were analyzed using western blotting The findings demonstrate that the engineered S100A13 protein significantly influences expression of mitochondrial dynamic proteins. The results showed that the levels of mitochondrial fusion proteins MFN 2+1 and OPA1 were increased. MFN 2+1 and OPA1 are in charge of fusing the outer and inner membranes of mitochondria, respectively. On the other hand, there was a notable reduction in the expression of MFF- fission protein. The manipulated S100A13 variant promotes expression of fusion-related proteins which suggests its potential role as a regulator of mitochondrial dynamics. It is recommended to validate these

findings using different lung cell types to confirm the broader effects of the S100A13 variant on mitochondrial dynamics.

**ICOSACS-BIO-PS- 002**

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**Enzyme catalytic efficiency prediction: employing convolutional neural networks and XGBoost**

The intricate realm of enzymology, the precise quantification of enzyme efficiency, epitomized by the turnover number (kcat), is a paramount yet elusive objective. Existing methodologies, though sophisticated, often grapple with the inherent stochasticity and multifaceted nature of enzymatic reactions. Thus, there arises a necessity to explore avant-garde computational paradigms. In this context, we introduce "enzyme cata-lytic efficiency prediction (ECEP)," leveraging advanced deep learning techniques to enhance the previous im-plementation, TurNuP, for predicting the enzyme catalase kcat. Our approach significantly outperforms prior methodologies, incorporating new features derived from enzyme sequences and chemical reaction dynamics. Through ECEP, we unravel the intricate enzyme-substrate interactions, capturing the nuanced interplay of molec-ular determinants. Preliminary assessments, compared against established models like TurNuP and DLKcat, underscore the superior predictive capabilities of ECEP, marking a pivotal shift in silico enzymatic turn-over number estimation. This study enriches

the computational toolkit available to enzymologists and lays the groundwork for future explorations in the burgeoning field of bioinformatics. This paper suggested a multi-feature ensemble deep learning-based approach to predict enzyme kinetic parameters using an ensemble convolu-tion neural network and XGBoost by calculating weighted-average of each feature-based model's output to out-perform traditional machine learning methods. The proposed "ECEP" model significantly outperformed existing methodologies, achieving a mean squared error (MSE) reduction of 0.35 from 0.81 to 0.46 and R-squared score from 0.44 to 0.54, thereby demonstrating its superior accuracy and effectiveness in enzyme catalytic efficiency prediction. This improvement underscores the model's potential to enhance the field of bioinformat-ics, setting a new benchmark for performance.

**ICOSACS-BIO-PS- 003**

**Dr. Amal Ali Al Mousa**

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**Production of natural antimicrobial pigments from filamentous fungi by submerged cultures for food applications**

The world has recently been interested in sustainable scientific research that serves present and future generations and achieves three dimensions interrelated with each other, namely the environmental, the social and the econom-ic dimension .The idea of this research was built on the achievement of sustainable

development goals in the ex-ploitation of natural resources and consumption and production patterns that ensure the protection of the envi-ronment, consumer safety and economic growth, by producing natural dyes from microorganisms to color food and textiles to protect human health from the side effects of artificial dyes , and as a safe alternative from over used the plants and to conservation of plant cover , also to protect the environment from artificial dyes that have been overused recently and have had a significant impact on eliminating biodiversity due to their toxicity. Pro-duction of pigments from microorganisms is advantageous over other sources because microorganisms can over-grow, which may lead to the high productivity of the product. The study aims at isolation and selection of fila-mentous fungi from Saudi Arabian soils depending on their naturally and highly extracellular productiveness to pigments by submerged fermentation techniques, our study is focused three genus fungi depending on their high-ly effectiveness to produce pigments ,have been identification by PCR purification and sequencing , they were Trichoderma harzianum (385bp), Chaetomium sp. (380bp) and Aspergillus flavus (351bp) ,where it were pro-duced 3 natural pigments: yellow (400 nm) by Trichoderma harzianum, red (530 nm) by Chaetomium sp., and orange (495 nm) BY Aspergillus flavus. And it has been improved optimization of pigment production it by dif-ferent physical parameters (temperature, pH, carbon sources, nitrogen sources)and results gave clear moral differ-ences, where temperature and pH played an important role and strong effect in pigment production primarily then comes natural sources ( carbon , nitrogen ) which contributed to this increased significanytlyour findings indicat-

ed that the same fungal strain does not exhibit the same extracellular pigment metabolism in submerged cultures regardless of media composition.also, none of the crude extracts pigments of the three strains demonstrated any antimicrobial activity (bacteria, fungi) contrary to brine shrimp toxicity. TLC and GC-MS was used to analyze all fractions produced pigments , our results revealed that ethyl acetate (EthAc) is the best solvent used for extraction of pigments He attributed the visual color to the presence the Diphenylmethane "chromophores " which gave high peak in the chart of all strains under this study in addition to some compounds produced like amino acid, fatty acid, drug and toxic compound. That should be highlighted in the creative industry in order to improve the quality of life.

**ICOSACS-BIO-PS- 004**

**Prof. Souad Alwakeel**

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**Production of natural antimicrobial pigments from filamentous fungi by submerged cultures for food applications**

للخصـائص الطبوغرافية للمملكة العربية السـعودية أهمية وتأثير كبير على تنوع التربة. تعتبر الأراضي المزروعة ذات أهمية كبيرة في المملكة العربية السعودية، ويتزايد أهمية تقييم التربة. وبالتالي فإن الغرض المقصـــود من هذا الدراســـة هو تحديد نوع التربة وخواصـــها والخواص الكيميائية والفيزيائية للتربة. تم جمع 50 عينة من التربة من مواقع مختلفة في المملكة العربية السـعودية عن طريق جمع عينات من التربة باسـتخدام أدوات أخذ عينات التربة. وتضمن الوصف المورفولوجيا قياسات وتوصيف آفاق وحدود التربة، وحالة الرطوبة، وقوام التربة، والبناء، والتماسـك، وتقدير كربونات الكالسـيوم،

وغيرها من الظواهر المورفولوجية. تم قياس حجم حبيبات التربة وعمل التحليل المعملي للأملاح الذائبة وكربونات الكالسيوم والمواد العضوية ونسب الطمي والطين والرمل.تتكون التربة في الغالب من الرمال في مواقع المنطقة الوسطى باستثناء منطقة الرويغيب حيث تتوافر التربة الطميية بكثرة وكان الرقم الهيدروجيني يميل للحامضية في الوسطى. أما المناطق الغربية فتشمل أربعة مواقع (مكة – عرفات، المدينة المنورة – الحنكية، المدينة المنورة – جبل الرماة، الطائف). وكان الرقم الهيدروجيني يتراوح بين 7.2 و 7.8 مما يشير إلى العلاقة بين الرقم الهيدروجيني للتربة ووجود الفطريات. كانت نسبة التوصيلية العالية (33.3) التي لوحظت في المدينة المنورة – جبل الرماة تعكس ارتفاع نسبه المادة العضوية في هذا الموقع حيث أن التوصيلية الكهربائية ترتبط بشكل كبير بتوافر العناصر الغذائية. كانت التربة طينية وطينية رملية في المنطقة الغربية مما يشير إلى ارتفاع التوصيلية الكهربائية التي تعكس ارتفاع نسبه المادة العضوية في هذه المنطقة على الرغم من أن المواقع التي تمت دراستها كانت أربعة فقط المنطقة الشرقية كان الرقم الهيدروجيني لعينات التربة من المواقع الخمسة في المنطقة الشرقية متعادلًا إلى قلويًا طفيفًا. وأظهرت البقايا أعلى درجة حموضة (8.04)، بينما أقل درجة حموضة كانت في صعدة (7.5). وفيما يتعلق بالتوصيل الكهربائي، سجلت مدينة الجبيل أعلى محتوى موصل كهربائي (4.4) وأقل محتوى موصل كهربائي في البقيعة – الجاشية (0.97). ولوحظت محتويات الرمل والطمي والطين، وأظهرت مدينة الجبيل أعلى محتوى رمل وأدنى محتوى طمي، في حين أظهرت البقايا أعلى محتوى طمي وطين وأدنى محتوى رمل. البقايا – الجاشية أظهرت أقل محتوى من الطين. وفيما يتعلق بنوع التربة، فإن تربة البقايا – الجاشية والأحساء والجبيل كانت تربة رملية، بينما كانت تربة المناطق الباقية تربة طينية رملية، ومنطقه سعد كانت تربة طينية رملية وكان الرقم الهيدروجيني لعينتي التربة من المنطقة الجنوبية متعادلاً إلى قلوي قليلاً في جميع المواقع. وكانت درجة الحموضة في شرورة (8.1) أعلى من جازان – الحسامة (7.5). وفيما يتعلق بالتوصيل الكهربائي، بلغت نسبة التوصيل الكهربائي في شرورة (1.62)، في حين بلغت نسبة التوصيل الكهربائي في منطقة جازان – الحسامة (0.84). واما محتوى الرمل والغرين والطين، وأظهرت شرورة أعلى محتوى رمل وأدنى محتوى طمي وطين، في حين سجلت منطقة جازان – الحسامة أعلى محتوى طمي وطين وأدنى محتوى رمل. بالنسبة لنوع التربة، كانت تربة جازان – الحسامة طينية رملية، بينما كانت تربة شرورة رملية. بشكل عام، تباينت خصائص التربة حسب المواقع حتى في نفس المنطقة.

**ICOSACS-BIO-PS- 005**

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**The Use of Some Species of Bacteria and Algae in the Bioremediation of Pollution Caused by Hydrocarbons and Some Heavy Metals in Al Asfar Lake Water**

Pollution is the biggest environmental and health threat in the world. Conventional treatments of polluted habitats require the removal of pollutants contaminating the environment, but removal methods are costly and involve high power consumption. This research aims to investigate the potential for bioremediation and proposes an alter-native source for implementing it that is cheaper and more environmentally friendly. The phyco-bioremediation experiment used hydrocarbon- and heavy-metal-polluted water from Al Asfar Lake, AlAhsa, KSA. The isolation and characterization of the lake's predominant microalgae and associated bacteria were carried out. Monoalgal cultures of the dominant genera of algae were employed for the treatment of contaminated water and soil samples. The concentrations of the heavy metals and hydrocarbons in these samples were determined before and after the treatments by using atomic absorption spectroscopy (for heavy metals) and gas chromatography (for hydrocar-bons). From the initial assessments, the levels of manganese, copper, and chromium were high, with chromium being the highest. Three microalgal isolates were identified: two coccoid, with one being blue-green and the other green, and one filamentous

cyanobacterium. These species were the most efficient in removing heavy metals and dangerous hydrocarbons. Molecular characterization revealed Chlorella sp. And Geitlarianema sp. To be the most promising for bioremediation. The present work sheds light on the prospect of using algal and bacterial consortia for optimized, safe, and eco-friendly pollution amelioration.

**ICOSACS-BIO-PS- 006**

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**The Immature Stages of Sarcophaga dux (Diptera; Sarcophagidae): A Proposed Nutritional Source for Poultry**

The world has recently been interested in sustainable scientific research that serves present and future generations and achieves three dimensions interrelated with each other, namely the environmental, the social and the econom-ic dimension .The idea of this research was built on the achievement of sustainable development goals in the ex-ploitation of natural resources and consumption and production patterns that ensure the protection of the envi-ronment, consumer safety and economic growth, by producing natural dyes from microorganisms to color food and textiles to protect human health from the side effects of artificial dyes , and as a safe alternative from over used the plants and to conservation of plant cover , also to protect the environment from artificial dyes that have been overused recently and have had a significant impact on eliminating biodiversity due to their toxicity. Pro-duction of pigments from

microorganisms is advantageous over other sources because microorganisms can over-grow, which may lead to the high productivity of the product. The study aims at isolation and selection of fila-mentous fungi from Saudi Arabian soils depending on their naturally and highly extracellular productiveness to pigments by submerged fermentation techniques, our study is focused three genus fungi depending on their high-ly effectiveness to produce pigments ,have been identification by PCR purification and sequencing , they were Trichoderma harzianum (385bp), Chaetomium sp. (380bp) and Aspergillus flavus (351bp) ,where it were pro-duced 3 natural pigments: yellow (400 nm) by Trichoderma harzianum, red (530 nm) by Chaetomium sp., and orange (495 nm) BY Aspergillus flavus. And it has been improved optimization of pigment production it by dif-ferent physical parameters (temperature, pH, carbon sources, nitrogen sources)and results gave clear moral differ-ences, where temperature and pH played an important role and strong effect in pigment production primarily then comes natural sources ( carbon , nitrogen ) which contributed to this increased significanytlyour findings indicat-ed that the same fungal strain does not exhibit the same extracellular pigment metabolism in submerged cultures regardless of media composition.also, none of the crude extracts pigments of the three strains demonstrated any antimicrobial activity (bacteria, fungi) contrary to brine shrimp toxicity. TLC and GC-MS was used to analyze all fractions produced pigments , our results revealed that ethyl acetate (EthAc) is the best solvent used for extraction of pigments He attributed the visual color to the presence the Diphenylmethane "chromophores " which gave high peak in the chart of all strains

under this study in addition to some compounds produced like amino acid, fatty acid, drug and toxic compound. That should be highlighted in the creative industry in order to improve the quality of life.

**ICOSACS-STAT-PS- 007**

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**استنساخ أجنة المها العربي خارجيا بواسطة استخدام بويضات ابقار محلية تم التخلص من انويتها ودمج الخلايا الجسدية للمها العربي في ستوبلازمها كتقنية واعدة للحفاظ على الحيوانات المهددة بالانقراض**

الاستنساخ ، الذي يشار إليه عادة باسم النقل النووي للخلية الجسدية (SCNT) ، هو تقنية استئصال نواة البويضة ودمج نواة خلية جسدية فيها. أجريت هذه الدراسة من خلال تقنية نقل نواة الخلية الجسدية للمها العربي باستخدام الخلايا الليفية من جلد اذن للمها ونقلها إلى داخل سيتوبلازم البويضات المنزوعة نواتها من الابقار التي تذبح في المسالخ المحلية. تم استخراج البويضات من مبايض لأبقار التي ثم تم التخلص من نواتها. تم تم دمج نواة الخلايا الجسدية للمها في سيتوبلازم بويضات البقر لإنتاج الجنين. أجريت الدراسة على ثلاث مجموعات ، 1- خلايا جسدية من المها العربي ثم دمجها مع سيتوبلازم البويضات المنزوعة انويها من الأبقار, 2- عمل استنساح لجنين الابقار SCNT بدمج خلايا جسدية من الابقاؤ ودمجت مع ساوبلازم بويضات ابقار منزوع انويتها وهي كمجموعة ضابطة للمجموعة الاولى 3- عمل الاخصاب الاصطناعي لبويضات الابقار حارجيا او في الطبق (IVF) وهي كمحموعة للتحقق من سلامة نمو الاجنة لجميع الوسائط المستخدمة في هذا العمل. بينت نتائج الدراسة ان هناك اختلاف مراحل نمو الجنين بشكل طفيف (من مرحلة الخلية الواحدة إلى مرحلة التوتية او Morula ). بالإضافة إلى ذلك كان معدل نمو الاجنة الى طور المفلجة او البلاستولة Blastula للنقل النووي للخلايا الجسدية بين الأنواع او جنين المها المستنسح من

بويضات الابقار =(9.23٪) مشابها لأجمة البقرة المستنسخه \SCNT (8.33٪). في حين أن معدل مرحلة نمو أجنة البقر في المجموعة الثالثة او بويضات الابقار المخصبة خارجيا او (IVF) أظهر أعلى معدل الانقسام (42٪) في مرحلة نمو الجنين. نتائج هذه الدراسة عززت قدرة بويضات البقر على دعم نمو المها المستنسخ متعدد الأنواع من نقل نواة الخلية ، وتكزين جنين قابل للحياة يمكن أن تتقدم إلى مرحلة المفلجة او البلاستولة والتي يمكن نقلها الى امهات مستقبلة من الابقار وإنتاج اجنة مستنسخة من المها العربي. يمكن ان يعزز استخدام هذه التقنية للحفاظ على الحيوانات المهددة بالانقراض

**ICOSACS-BIO-PS- 008**

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**Isolation and Molecular Identification of indole-3-acetic acid (IAA) producing and phosphate solubilizing Endophytes (Aspergillus tubingensis) from Lycopersicon esculentum and its role on Environmental Sustainability**

The role of phytohormones has been indisputably proven in various processes of growth and development of plants. Moreover, the numerous valuable functions performed by endophytes make it possible to consider them as the basis for biological preparations for agricultural purposes. Endophytes are a promising source for application in biotechnology as a potential source of bioactive compounds. The use of endophytes increased crop yield and production and provided an opportunity to make agriculture sustainable. Hence, the objective of this study was to save the environment and commercial crops by bioprospecting for endophytes from L. esculentum to produce bioactive compounds and to be a safe

biofertilizer. Three hundred plant leaves were taken from L. esculentum branches. Leaves surfaces were disinfected and cut into small segments (5x5 mm). The mycological analysis was confirmed by sequencing the ITS region of the rDNA gene which resulted in the isolation of 11 endophytic fungi. Screening of indole-3-acetic acid (IAA) was carried out at the cultivation of endophytes. All isolates produced IAA, but the highest level was observed in Aspergillus tubingensis which had the highest phosphate solubilization and produced significant amounts of extracellular IAA at a relatively low biomass level. In vivo, L. esculentum plant inoculation by Aspergillus tubingensis suspensions represented evidence for the positive impact of Aspergil-lus tubingensis as endophytic fungal isolates on L. esculentum host plant by improving plant growth and suppress-ing microbial growth in the surrounding habitat. In conclusion, it is promising to use Aspergillus tubingensis en-dophytic fungus as potentially effective strains and environmentally safer alternative tools to protect the environ-ment from the pollution of chemical fertilizers.

**ICOSACS-BIO-PS- 009**

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**Investigations on Tephrosia Purpurea as a therapeutic agent in Oman that can**

**accelerate the healing of both soft tissue wound and bone fractures**

The use of non-biomedical treatments and care of bone fractures and tissue wounds, especially in diabetic patients in Oman, are two important health issues that are receiving significant attention worldwide. Both are hotly debat-ed by academics, health professionals, and laypeople, especially since diabetes makes it difficult for wounds and fractures to heal quickly. Moreover, as non-bio-medical approaches have become an increasingly common com-ponent of the treatment options available for both, they have become inextricably linked. The significance of this research lies in finding a natural alternative to artificial splints using a plant extract as a sterile medicinal agent in balanced proportions based on previous studies that act as an effector that accelerates wound healing and fracture healing. We have proposed the use of T. purpurea extract as a wound dressing and natural splint alternative to ar-tificial one. T. purpurea is a plant with a long history of ethnopharmacological applications in the Omani commu-nity known by the colloquial name “Sarwawranvishapaka,” which means that it has the ability to heal various wounds and promote tissue regeneration. Its anti-inflammatory and antioxidant properties help in healing wounds and fractures, promoting tissue regeneration and reducing oxidative stress. The study also highlights the use of a local plant to replace seasonal medicinal plants in traditional treatments. The research is in line with Oman Vision 2040 in terms of enhancing the relationship of the Omani people with the environment and reducing costs by re-ducing dependence on importing pharmaceutical products from other countries while preserving local knowledge. In addition, the study targets individuals with diabetes and skin allergies, and

rural populations often lack access to advanced healthcare in record time.

**ICOSACS-BIO-PS- 010**

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**Isolation and Identification of Microorganisms associated with high-quality and low-quality cosmetics from different brands in Mecca region of Saudi Arabia**

Cosmetic products contain several components that are ideal for microbial growth, they exposed to contamination by pathogenic bacteria and fungi, and this may cause health risks such as skin and eye infections. In this investigation, 50 samples were obtained from various shops in Mecca region, Saudi Arabia. Collected samples include high- and low-quality brands of makeup. Results show that most cosmetics are contaminated with microorganisms. Bacterial and fungal isolates were identified by morphological and microscopic techniques and confirmed by molecular methods: (16s rRNA) for bacterial isolates and (18s rRNA) for fungal isolates associated with cosmetics. In low-quality cosmetics, frequency of microbial growth is higher and more diverse than high-quality cosmetics. It has been observed the most contaminated product was in lip gloss and it follows by the lipstick. The most predominant species of bacteria are Staphylococcus aureus (27%), E. coli (27%), which follows by Streptococcus pneumonia (18%), Staphylococcus epidermis (17 %), Bacilli subtilis (12%), and

Pseudomonas aeruginosa (5%). Aspergillus sp is the most predominant fungi (57%), which is followed by Penicillium sp. (29%) and Rhizopus sp. (14%). In high quality brands, the frequency of microbial growth was the highest in mascara, lip-gloss. The most predominant species of bacteria is Staphylococcus aureus (41%), which follows by Bacilli subtilis and Pseudomonas aeruginosa and E. coli (17%). Streptococcus pneumonia is the less dominant (5 %). There is no growth on media of fungi. Due to the large number of cosmetics brands in Mecca region and for consumer safety, this study is prepared.

**ICOSACS-BIO-PO- 001**

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**Antibacterial Activity of Honey/Chitosan Nanofibers Loaded with Capsaicin and Gold Nanoparticles for Wound Dressing**

This paper describes the preparation, characterization, and evaluation of honey/ tripolyphosphate (TPP)/chitosan (HTCs) nanofibers loaded with capsaicin derived from the natural extract of hot pepper (Capsicum annuum L.) and loaded with gold nanoparticles (AuNPs) as biocompatible antimicrobial nanofibrous wound bandages in topical skin treatments. The capsaicin and AuNPs were packed within HTCs in HTCs-capsaicin, HTCs-AuNP, and HTCs-AuNPs/capsaicin nanofibrous mats. In vitro antibacterial testing against

Pasteurella multocida, *Klebsiella rhinoscleromatis*, *Staphylococcus pyogenes*, and *Vibrio vulnificus* was conducted in comparison with difloxacin and chloramphenicol antibiotics. Cell viability and proliferation of the developed nanofibers were evaluated using an MTT assay. Finally, in vivo study of the wound-closure process was performed on New Zealand white rabbits. The results indicate that HTCs-capsaicin and HTCs-AuNPs are suitable in inhibiting bacterial growth compared with HTCs and HTCs-capsaicin/AuNP nanofibers and antibiotics ($P < 0.01$). The MTT assay demonstrates that the nanofibrous mats increased cell proliferation compared with the untreated control ($P < 0.01$). In vivo results show that the developed mats enhanced the wound-closure rate more effectively than the control samples. The novel nanofibrous wound dressings provide a relatively rapid and efficacious wound-healing ability, making the obtained nanofibers promising candidates for the development of improved bandage materials.

**ICOSACS-BIO-PO- 002**

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**Putative remedial effect of zinc oxide nanoparticles on the apoptotic response in Nile tilapia exposed to potential micro plastics in sewage effluent.**

Microplastics (MPs) are an emerging class of ubiquitous pollutants that pose a threat to aquatic biota. It has been established that Sewage treatment plant (STP) effluents are a

potential source of MPs into the aquatic compartment of the environment. The present study elucidates the apoptotic effect of these contaminants in the effluent in the liver of effluent exposed freshwater fish (Oreochromis niloticus) and the remedial effect of UV mediated photocatalytic degradation of zinc oxide nanoparticles (ZnONPs).The fish were exposed to 50% and 75% of the effluent without treatment and with treatment with ZnO NPs. Exposure to potential MPs in the effluent induced the reactive oxygen species (ROS) generation, subsequently affecting the oxidative mechanism leading to apoptosis. The mRNA expression profile of pro-apoptotic gene Bax and tumour suppressor gene, p53 was upregulated significantly in the group exposed to 75 % effluent. Treatment with the ZnONPs, significantly retreated the alterations in the mRNA expression of both Bax and p53. In conclusion, the findings of this work suggest that the MPs and the compounds in the organic matrix of the STP effluent induced a concentration-dependent ROS mediated apoptotic response in tilapia. Furthermore, zinc oxide exhibits immense potential towards absorption and degradation of organic pollutants from wastewater in the field of heterogeneous photo catalysis and can be further encouraged as a sustainable strategy in water remediation

**ICOSACS-BIO-PO- 003**

**Dr. Njlaa Bakhsh**

**Understanding the origins and geographic distribution of genomic diversity in human populations from Saudi Arabia and the broader middle east**

The Arabian Peninsula (AP) is a geographic region that has played an important role in human evolution. To un-derstand patterns of genetic variation, including levels of Neanderthal ancestry, we analyzed whole genome se-quence data from Saudi Arabia in the AP and the broader Middle East. Consistent with prior studies, we found that the indigenous Arab genomes formed a unique cluster from other Middle Eastern populations likely due to higher levels of endogamy compared to other populations. However, our data also showed that Arabian popula-tions possessed more diverse African ancestry, while populations in the Levant and North Africa exhibited higher levels of European ancestry, leading to extensive genetic structure across the Middle East. Furthermore, we un-covered evidence of multiple waves of migration and admixture in the AP and the Levant from Africa. Interest-ingly, our analyses also showed that These results have potential implications for the incidence of complex dis-ease in different populations across the Middle East. Additionally, our findings agree with other studies that re-ported have lower amounts of Neanderthal ancestry in the Middle East compared to European populations. How-ever, our study showed that levels of Neanderthal ancestry varied across the Middle East with higher levels occur-ring in the Levant compared to the Arabian Peninsula. These genetic patterns are consistent with a single geo-graphic origin of admixture in the Levant with subsequent spread of this ancestry across the Middle EasInclude at least 5 keywords or phrases

**ICOSACS-BIO-PO- 004**

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**RNA editing-induced structural and functional adaptations of NAD9 in Triticum aestivum under drought stress**

Introduction: Mitochondria are essential organelles in eukaryotic cells, producing ATP through the electron transport chain to supply energy for cellular activities. Beyond energy production, mitochondria play crucial roles in cellular signaling, stress responses, and the regulation of reactive oxygen species. In plants, mitochondria are one of the keys to responding to environmental stresses which can significantly affect crop productivity, particularly in crops like wheat. RNA editing, a post-transcriptional RNA modification process in mitochondria, is linked to regulating these stress responses. Methods: This study explores RNA editing patterns in the nad9 gene of wheat drought-tolerant (Giza168) and drought-sensitive (Gemmiza10) wheat cultivars under drought stress to understand plant adaptation mechanisms. RNA-seq data for these cultivars were analyzed using CLC Genomic Workbench to identify RNA editing sites in the nad9 gene, examining subsequent amino acid changes and predicting secondary structure modifications. These RNA editing sites were validated using qRT-PCR on drought-treated seedlings at 0, 2, and 12 hours post-treatment. Protein models were generated using AlphaFold, with functional predictions and structure verification conducted using various bioinformatics tools to investigate the effect of RNA editing on protein level. Results:

The results showed significant RNA editing events, especially C-to-T conversions, in the nad9 gene across different drought exposure times. Giza168 had 22 editing sites, while Gemmiza10 had 19, with several showing significant differences between control and stress conditions. RNA editing influenced the NAD9 protein's secondary structure, particularly beta sheets, and 3D modeling highlighted the structural impacts of these edits. The N-terminal region of NAD9 contained important regulatory motifs, suggesting a complex regulatory environment.

**ICOSACS-BIO-PO- 005**

**Dr. Heba Ismaeil**

**"Biosynthesized Zinc Oxide Nanoparticles: A Potential Anticoccidial Therapy for Murine Coccidiosis"**

Recently, nanomedicine has become a more viable choice for treating a number of illnesses. This study investigated the in vivo anticoccidial capabilities of biosynthesized zinc oxide nanoparticles (Bio-ZnNPs) from Coriandrun Sativum leaves against Eimeria papillata-infected mice. The Bio-ZnNPs were characterized through transmission electron microscopy (TEM), Xray diffraction (XRD) and UV-visible absorption spectroscopy. Five groups of mice were included: CONT group (uninfected mice), Bio-ZnNPs Group (uninfected mice, administered with BioZnNPs at 50 mg/kg mice weight, INF (untreated mice, infected orally with 103 sporulated oocysts of E. papillata), INF+Bio-ZnNPs (infected mice, treat-ed with Bio-ZnNPs at 50 mg/kg mice weight), and INF+AC (infected mice, treated with anticoccidial; amprolium at 120 mg/kg mice weight). These treatments were five following days. Results demonstrated that

Bio-ZnNPs were spherical, averaging 35.79±7.47 nm in diameter, with four diffraction peaks in the XRD spectrum and a peak absorption at 300.06 nm. An observed increased oocyst excretion in E. papil-lata infected mice was noted. Significant jejunal histological abnormalities characterized by an increase in total endogenous parasitic stages. An increase in immunohistochemistry (IHC) caspase3 number and activity, accompanied by enhanced antioxidant and apoptotic alterations, was noted. The Bio-ZnNPs therapy resulted in decreased oocyst shedding, enhanced jejunal mucosa, and a noted reduction in total developmental stages. Following treatment, caspase-3 levels and its immunohistochemical expression diminished, while jejunal GPX levels fell. Apoptotic gene expression demonstrated a notable downregu-lation of caspase-3 and BAX, while BCL2 exhibited upregulation. In conclusion, Bio-ZnNPs significant-ly reduced the growth of E. papillata in infected mice, which raises the possibility that they could be use-ful in treating eimeriosis.

**ICOSACS-BIO-PO- 006**

**Mona M. Alrasheed**

**Morphological Characterization of Pulicaria crispa (Asteraceae) Achenes of Four Populations Distributed in the Central Region of Saudi Arabia**

The morphological structure and the different characters of the achenes are important divisive traits for the differentiation of plant species. The main aim of this study was to provide a morphological characterization of Pulicaria crispa achenes and to explore the morphological variation and the relationships

between its different populations from four different locations in the central region of the Kingdom of Saudi Arabia. Detailed descriptions of the achene surface were given for each taxon. The results indicated that the examined taxa had variations regarding their achene surfaces and these variations have great importance in determining the taxonomic information of the discussed taxa. Achene was characterized in P. crispa samples of different study sites by Carpopodium as well as Pappus. It was different between the studied taxa in shape and length, and that would be evaluated as a decisive micromorphological character of this within the species.

**ICOSACS-BIO-PO- 007**

**Dr. Khadiga Alharbi**

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**Combined application of biochar and jasmonic acid for inducing salt stress tolerance in wheat**

Combined application of biochar and jasmonic acid for inducing salt stress tolerance in wheat. A 100 mM salt stress was applied fifteen days after germination. biochar (BC, 5%) and jasmonic acid (JA, 5 µM) was applied in individual and in joint applications. The results revealed that growth traits, contents of δ-Amino levulinic acid, glutamate 1-semialdehyde, total chlorophylls and carotenoids, nutrients, nitrate reductase and leaf gas exchange traits were reduced under salt stress. Salt stress increased oxidative stress biomarkers and enzymes of glyoxylase system considerably. It was found that the single and

joint application of biochar or jasmonic acid alleviated the decline with maximal alleviation observed in biochar + jasmonic acid treated plants by preventing the oxidative damage and boosting the activities of antioxidant enzymes and enzymes of glyoxylase system. The accumulation of osmolytes and secondary metabolites was more evident under joint biochar and jasmonic acid treatments than individual under NaCl stress. The contents of reducing agents (ascorbate and glutathione) were orchestrated under joint biochar and jasmonic acid application. Nevertheless, the decline in the activity of nitrate reductase and nutrient contents was maximally alleviated under joint application of BC and JA. Therefore, it can be concluded that combined application of biochar and jasmonic acid can be exploited for improved growth and photosynthesis and salinity stress tolerance in wheat and perhaps in other cereal crops.

**ICOSACS-BIO-PO- 008**

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"**Phytochemicals of leaf extract of Ocimum species grown in Fifa mountain in the Kingdom of Saudi Arabia"**

The genus *Ocimum* L. includes about thirty species distributed in tropical and subtropical regions and spread over the world with some species cultivated in temperate regions. Six of Ocimum species were found in the Kingdom of Saudi Arabia, namely Ocimum ameriacanum, Ocimum forskolei, Ocimum

filamentosum, Ocimum serpyllifolium, Ocimum obovatum, Ocimum tenuiflorum. Among them four ( Ocimum ameriacanum, Ocimum forskolei, Ocimum filamentosum, Ocimum serpyllifolium ) are grown in Fifa mountain. Therefore, the main objective of this current study was to identify and to estimate the bioactive compounds of Ocimum species grown in Fifa mountain and to evaluate their biological activity against Staphylococcus aureus and Escherichia coli, Candida albicans and Aspergillus fumigates. Hence, the leaf methanolic extract of Ocimum species were subjected to Gas Chromatography-Mass Spectrometry (GC-MS) analysis. The GC-MS results of methanolic extracts showed that the Ocimum species contained a large spectrum of plant secondary metabolites. The O. serpyllifolium has recorded highest number (69), while the O. filamentosum recorded the lowest number (53 ) of plant secondary metabolites, as well variation between investigated species was observed. Also, the quantitative analysis of total phenolic content (TPC), total flavonoid content (TFC) and total tannin content ( TTC) was done using UV-Visible spectroscopy. The obtained results of phenols showed significant differences between the tested species, as O. forskolei recorded the high average of TPC with a value of 565 mg (GAE)/g of D.W., while the O. ameriacanum recorded the lowest average of TPC with a value of 186 mg (GAE )/g D.W. ). The O. ameriacanum gave the highest average (315 mg/g D.W. of TFC, whereas O. forskolei gave the lowest average with a value of 162 mg (QE)/g D.W. Also, the TTC results showed significant differences in the studied species. O. forskolei generated the highest average (163 mg (TAE)/g D.W.) and the O. serpyllifolium showed the lowest average ( 75.3 mg(TAE)/g D.W.) among the tested species.

Moreover, quercetin, gallic acid, tannic acid, rosmarinic acid and caffeic acid in leaf methanolic extract of tested Ocimum species were quantified using High-performance liquid chromatography (HPLC) with specific standard of each compound. The HPLC results showed significant differences between the examined species. Moreover, the antimicrobial activity of leaf extracts of Ocimum species was evaluated. The most potent leaf extract was O. americanum, which showed widest inhibition zone, whereas the C. albicans is the most susceptible organism to efficient species, tracked by S. aureus. On the other hand, A. fumigatus and E. coli have shown resistance to all plant extracts. The all-tested organisms were resistant to the commercial antibiotics used. In conclusion, this study highlighted the phytochemical profile of Ocimum species grown in Fifa mountain and evaluated their antimicrobial activity.

**ICOSACS-BIO-PO- 009**

**Dr. Nadiyah M. AL Abdallah**

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**Effects of Polysaccharide Nanoparticles from Taif Rose Petals on Eggplant under Drought and Salt Stress**

Natural polysaccharides are biomaterials with unique structural, physical, chemical, and biological properties, gaining interest for applications in green electronics, biomedicine, and agriculture. Polysaccharides can be found in plants, algae and animals (Xia et al.2020). Floral waste, such as

Rosa damascena petals, is an underexplored source of polysaccharides, with potential for crop protection under stress. Eggplant, a vital crop in the Gulf, is highly susceptible to drought and salinity, which severely impact its growth and yield (Saeedifar et al., 2014). Addressing these abiotic stresses is crucial for sustainable production, especially under climate change.

**ICOSACS-BIO-PO- 010**

**Nawaf A. Alotaibi**

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**Synergistic Role of Plant growth promoting bacteria and Nanoparticles in Mitigating Plant Abiotic Stress**

Abiotic stresses such as drought, salinity, temperature extremes, and heavy metal toxicity severely impact global agriculture, reducing crop productivity and threatening food security. Traditional stress management techniques often rely on synthetic chemicals, which are not sustainable and can harm the environment (Akhtar et al.2021). In the context of climate change and increasing global population, there is an urgent need for sustainable, eco-friendly approaches to enhance plant resilience to stress (Akhtar et al.2021). Combining plant growth promoting bacteria (PGPR) with nanoparticles offers a novel, synergistic approach to enhance plant stress resilience. This combination can simultaneously activate multiple stress tolerance mechanisms, making it a promising strategy for sustainable agriculture.

**ICOSACS-BIO-PO- 011**

**Sumayah I. Alsanie**

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**Unexplored Potential: Metabolite Screening of Local Lake Algae Isolated from Al-Asfar Lake in Saudi Arabia**

"This study investigates the commercial potential of microalgae variants found in Al-Asfar Lake, Saudi Arabia. The researchers conducted a comprehensive analysis of the metabolic profiles of the algae, comparing the concentration of metabolites in locally isolated Chlorella vulgaris with commercially available algae. The analysis yielded 168 metabolites from the microalgae samples, with two distinct clusters: Chlorella vulgaris and the microalgae isolated from the lake, and two sub-clusters with Isochrysis grouped with Tetraselmis and Nannochloropsis grouped with Spirulina. The metabolites of Al-Asfar Lake algae showed remarkable similarity to Chlorella vulgaris. These findings have significant implications for the environmental aspect of Al-Asfar Lake, providing insights into the metabolites and commercial potential of the lake's microalgae. The findings can be used to investigate the impact of nutrient abundance on the lake's biodiversity, enhance microalgal biomass production for biofuel applications, and explore the reuse of lake water in agriculture and environmental restoration projects. Overall, this study provides important groundwork for understanding the potential of Al-Asfar Lake microalgae and their application in various industries,

contributing to sustainable development and environmental health.

**ICOSACS-BIO-PO- 012**

**Dr. Measer A. Ahmed**

**A Therapeutic and Protective Effect of Silymarin against Hepatotoxicity Induced by Cisplatin in Female Rats**

The use of medicinal herbs as adjuvant therapeutic agents to mitigate or prevent drug toxicity has received increasing attention recently (Al Obaidi,2022). This interest comes from the rich cultural and historical tradition of folk medicine. The reason behind inclusion medicinal herbs into traditional medicine lies in their diverse bioactive components show antioxidants, anti-inflammatory, and cytoprotective properties. (Viktorová et al.,2019; Chambers et al.,2017). Since pharmaceutical interventions, although effective, may lead to unintended adverse effects and toxicity, silymarin represents a proactive approach to improve therapeutic findings while decreasing adverse effects of drugs (Zaker-Esteghamati, et al.,2020). Silmarin has complex chemical compounds that may work synergistically with drugs, and modulates the cellular response to alleviate oxidative stress and inflammatory pathways caused by drug use. (Gupta et al.,2000).

**ICOSACS-BIO-PO- 013**

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**Characteristics of leaves trichomes of *Fagonia* L. (Zygophyllaceae) in Saudi Arabia**

The characteristics of the leaf epidermis play a distinctive role in support of taxonomic studies within plants. However, we did not find any taxonomic studies of leaf epidermis in Fagonia L. in Saudi Arabia is considered one of the most important medicinal genera in the Zygophyllaceae family, recorded in the Flora of Saudi Arabia. In this paper, trichomes that coat Fagonia species leaves are determined. Upper and lower surfaces of leaves in all studied species had many types of trichomes with varying densities, except F. schwinfurthii leaves were smooth with sparse trichomes on their petioles. All trichomes in the studied species were unbranched glandular. Each species had more than one type of glandular trichome. Some of the trichomes were sessile and others had stalk. The studied species contained multiple forms of secretory cells. The most common shapes were the oblong and clavate secretory cells. Also, the secretory cells had other shapes, such as cylindrical, pyriform, spherical, capitate, pilate, digitiform, and hook-shaped. The secretory cell of some species contained a cupule, but F. tristis was distinguished by the radial shape of a cupule. In this study, the multiple differences in secretory cell shapes demonstrated the distinguish diversity of trichomes and recorded new shapes that were not previously observed in Fagonia

**ICOSACS-BIO-PO- 014**

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**Floristic Diversity of Al Wadi Al-Akhthar, Tabuk Region, Saudi Arabia**

This study was conducted in Wadi Al-Akhthar in the north-western region of Saudi Arabia. The main objective is to determine the floristic composition of the area, including a breakdown of its different life forms and the chorology of the recorded species. A total of 82 species belonging to 63 genera and 25 families of the Angiospermae were recorded. About 46.34% of the recorded species in the study area are belonging to three families: Asteraceae, Brassicaceae, and Fabaceae. The data also reflect a high degree of monotypism, where 56% of the recorded families were represented by a single species, and 60.78% of the genera were monotypic. Perennial species dominated the plant cover (61%) defining the character of the vegetation, while annuals were represented by about 39%. Chamaephytes (35.4) and Therophytes (31.7) were the most frequent lifeforms. Chorological analysis of the floristic data revealed that the monoregional Saharo-Arabian chorotype is the most dominant chorotype in Wadi Al-Akhthar (39%), followed by the monoregional Sudanian chorotype (11%). The results also showed the predominance of mono-regional taxa (63.4%) over the other phytogeographical elements followed by the bi-regional (30.5%). Information from the current study may provide a valuable reference for appropriate conservation and management of the study area.

**ICOSACS-BIO-PO- 015**

**Dr. Milad Mezher**

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**Risk assessment of aflatoxin in commercially available oral products**

Microbial contamination of pharmaceuticals is a big problem. Aflatoxins are produced by Aspergillus flavus and A. parasitic us that grow on poorly stored oral preparations. Many aflatoxins are genotoxic and damage vital organs leading to hepato- and neurotoxicity. The level of mold infestation and the identification of governing species are important for the quality and the future potential for the presence of mycotoxins.

**ICOSACS-BIO-PO- 016**

**Dr. Najla A. Al-Shaye**

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**DEMONSTRATING THE BREADTH OF THE ALIEN TAXA USING HERBARIUM**

The present study examined the PNUH herbarium specimens from the period (2002-2022) to analyze three elements of them: nativeness, habit, and phytogeographical distribution. A total of 6000 specimens with 251 species were examined, they included 44 families and 168 genera. Of which 205 native species and 46 alien ones belong to 18 families and 39 genera. The most represented families were Asteraceae and Poaceae followed by Brassicaceae. The most represented native genus was Convolvulus L. but the most represented alien genus was

Amaranthus L. on the other hand the Saharo-Arabian was the most represented monoregional (40 species, 16%) for native taxa, but cosmopolitan followed by Mediterranean and Irano-Turanean were the most represented alien taxa, also it was recorded that most taxa of the phytogeographical region were herbaceous. Also, the number of alien species exceeds especially in the last decade. Our data provide an estimate of the widespread most successful alien species over a very large area of the KSA. This work considered as the first thorough compilation and analysis of all records on alien plant taxa in KSA herbaria, has identified knowledge gaps about the geographic distribution and life form. We believe that our findings will raise environmental awareness about invasive species in Saudi Arabia and, more importantly, that they will spur and direct additional research on this topic in Saudi Arabia, particularly field-oriented studies. No management strategy can be created without a solid understanding of the issue.

**ICOSACS-BIO-PO- 017**

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**Heavy Metal effect on seed of *C. comosum*: morphological and molecular study**

Heavy metals (HMs) in soils risk human health, as edible plants absorb these metals. *Calligonum comosum,* an indigenous medicinal shrub in Saudi Arabia, has potential as a phytoremediator for HM-contaminated areas. This study

investigated the effects of lead (Pb) and cadmium (Cd) on the germination of C. comosum seeds under laboratory conditions. Results showed that increasing concentrations of either Pb or Cd delayed germination rate and speed, but this effect was dose-dependent. Exposure to both metals led to altered protein profiles and more significant activity of catalase enzyme and AtpB in Cd- and Pb-treated seeds. In conclusion, *C. comosum* seeds treated with Cd or Pb enhance protein degradation and denaturation, reducing seed viability. This suggests that seeds may tolerate heavy metal stress, as oxidoreduction proteins and those involved in ATP synthesis are enhanced in response to Cd and Pb stressors.

**ICOSACS-BIO-PO- 018**

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**Exploring Fisetin (natural products) as potential anticancer therapeutic against colorectal cancer**

Colorectal cancer (CRC) is a major global health problem and one of the leading cause of death worldwide, with an estimated 930 000 deaths in 2020. in Saudi Arabia. colorectal cancer (CRC) is the second most common cancer with number of cancer cases in Saudi Arabia has risen to global levels. So, there is a need for further researches to create innovative and successful treatment. CRC is a heterogeneous disease that arises from different molecular pathways that eventually lead to the development of cancer. This usually happens duo to

accumulation of genetic mutations. Therefore, it is essential to know the molecular basis of CRC to improve the field of genomic medicine including preventative, diagnostic, and treatment methods. Natural products have played an important role in controlling cancer and the development of future anti-cancer therapeutics. For example, Fisetin is a plant derived compound that has gained extensive attention due to its remarkable anticancer effects via modulating many genes and signaling pathways.

**ICOSACS-BIO-PO- 019**

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**Exploring Bacterial Contamination on Electronic Devices: A Comparative**

Electronic device screens can harbor harmful microbes, potentially facilitating the transmission of diseases when users interact with these surfaces. Bacterial contamination on the screens of electronic devices, such as cell phones and iPads, poses a potential health risk since these devices are frequently used in daily life. The presence of bacteria can be particularly harmful to health, especially for individuals with chronic health issues. Devices can have differing levels of bacterial contamination depending on the usage and environment. The main objective of this study is to screen and identify bacterial contamination o devices used by healthcare workers (HCWs) and non-healthcare workers (NHCWs).The isolated bacteria will

be cultured and identified the types present in each medium, with a focus on identifying antibiotic-resistant bacteria on device surfaces.

**ICOSACS-BIO-PO- 020**

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**Evaluation of Lacc134 Oxidoreductase of Ganoderma multistipitatum in Detoxification of Dye Wastewater under Different Nutritional Conditions**

In the present study, we investigated the effects of different carbon sources (glucose, sucrose, and maltose) on laccase production from mycelium of Ganoderma multistipitatum grown on malt extract agar plates. The preliminary screening test was performed on the guaiacol plate, where a maroon brown zone formed after laccase oxidation. A few pure mycelial discs of Ganoderma species were transferred into submerged fermentation nutrient broth. The nutrient medium of submerged fermentation at 20 g of glucose revealed the highest laccase activities (2300 U/L) than other carbon sources. The interesting results also shown by inorganic $NaNO_3$ in the production of maximum laccase (7800 ± 1.1 U/L). The organic nitrogen inducer, namely yeast extract, exhibited 5834 U/L laccase activity and a potential source of laccase secretion. The results concluded that C and N inducers enhanced the laccase production. This production process is eco-friendly and effective in the removal of dye from water. Laccase from the cultural broth was partially purified by SDS-PAGE for molecular

weight determination, while Native-PAGE confirmed the laccase band after staining with guaiacol. The Km and Vmax values of Lacc134 were 1.658 mm and 2.452 mM min−1, respectively. The Lacc134 of this study effectively removed the Remazol Brilliant Blue R (RBBR) dye (extensively used in textile industries and wastewater). For dye removal capacity, 2.0 mg, 4.0 mg, 5.0 mg, and 6.0 mg were used, from which 6.0 mg was most effective in removal (85% and 88%) dye concentration in 1st and 2nd h interval treatment, respectively. Total organic carbon (TOC) quantity after dye removal percentage in the first- and second-hour time interval was 62% and 89%, respectively, at 30 g glucose. According to the experimental finding of this study, the breakdown products catalyzed by Lacc134 are less hazardous due to lower molecular weight than the dye itself.

**ICOSACS-BIO-PO- 021**

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**Carbon Dots for Environmental Sustainability**

Carbon dots (CDs) are a class of fluorescent nanomaterials derived from carbon-based sources, known for their biocompatibility, eco-friendliness, and high surface area. This study explores the synthesis, characterization, and applications of nitrogen-doped carbon dots (N-CDs) for

agricultural and environmental sustainability. N-CDs were synthesized using a hydrothermal method with *Adansonia digitata* fruit shell extract as a green precursor. The structural and morphological properties of the synthesized N-CDs were analyzed using SEM and TEM. Their applications in seed germination enhancement were evaluated. The results demonstrated that N-CDs improve seed germination by enhancing water absorption, promoting root growth, and exhibiting antimicrobial properties. These findings suggest that N-CDs are a promising nanotechnology for advancing sustainable agriculture and environmental remediation, contributing to food security and cleaner water resources.

**ICOSACS-BIO-PO- 022**

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**Biochar A Sustainable Solution for Environmental Challenges**

Biochar, a carbon-rich material produced through the pyrolysis of organic biomass under limited oxygen conditions, has emerged as a sustainable solution for

environmental challenges. This study focuses on the synthesis, characterization, and applications of biochar derived from Adansonia digitata fruit shells. The biochar was prepared using a muffle furnace at 500°C for 3 hours, followed by structural and morphological characterization using SEM and TEM. The results demonstrated its high porosity, carbon content, and potential for soil amendment. Biochar significantly enhances soil fertility by improving water retention, and nutrient availability. Additionally, its role in seed germination and agricultural sustainability was evaluated. Despite its numerous benefits, challenges such as biochar quality variability, potential contaminant release, and long-term environmental impacts require further investigation. Optimizing biochar applications can contribute to sustainable agricultural practices and environmental restoration, making it a promising tool for a cleaner and greener planet.

**ICOSACS-BIO-PO- 023**

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**Morphological and molecular analyses of *Kannaphallus* species (Polyopisthocotylea: Heteraxinidae) parasitized on *Acanthopagrus bifasciatus* in Saudi Arabia**

Monogeneans are highly host-specific parasites infecting marine and freshwater fish. However, little information is available about the parasitic taxa within Heteraxinidae. An integrative study was performed to understand the taxonomic status of an unconfirmed heteraxinid marine species parasitizing the gill region of *Acanthopagrus bifasciatus* (Sparidae) from the Arabian Gulf (Saudi Arabia). Based on the morphological study, this parasite has all the generic features of the genus *Kannaphallus* (Heteraxinidae, Mazocraeidea). Distinct criteria that discriminated this species from other taxa of the same genus are the presence of genital spines (26–29), a short sclerotized duct in the male copulatory organ, the number of testes (mean 40, range 30–50), and clamps in the haptoral structure (45–50 in a long row and 19–22 in a short row). DNA of parasite species reported in the present study was amplified and sequenced for the nuclear large subunit of the ribosomal RNA (*28S* rRNA) gene and the mitochondrial *cytochrome c oxidase subunit I* (*COI*) gene. Results indicate that sequences obtained from both genes are unique and different from related sequences from the genus *Kannaphallus*. Morphological as well as molecular data indicate that our specimens are from a

new species, and the name *Kannaphallus acanthopagrusi* n. sp. is suggested. This is the first report of a heteraxinid parasitizing marine sparid fish from Saudi Arabia, with unique morphological and molecular features.