

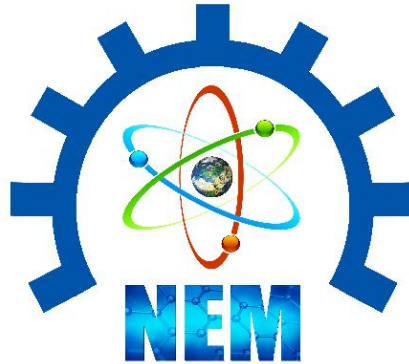


6th International **N**atural Science, **E**ngineering and **M**aterial Technologies Conference
Sep 10-12, 2026, Famagusta, Northern Cyprus

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NEM 2026

ABSTRACT BOOK



6th International **N**atural Science, **E**ngineering and **M**aterial Technologies Conference

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FOREWORD

It is a pleasure for us to offer you this Book of Abstract for the 6th International Natural Science, Engineering and Material Technologies Conference (NEM 2026). Our goal was to create a platform that introduces the newest results on internationally recognized experts to local students and colleagues and simultaneously to display relevant Turkish achievements to the world. The positive feedback of the community encouraged us to proceed and transform a single event into a conference series. Now, NEM 2026 is honored by the presence of over 102 colleagues from various countries. We kept the original NEM 2026 concept and accepted contributions from all fields of materials science and technology to promote multidisciplinary discussions. The main points of the conference emerged spontaneously from the submitted abstracts: energy applications, advanced materials, electronic and optoelectronic devices, organic electronic materials, chemistry, physics, environmental science, medical science, applied and engineering science, computer simulation of organic structures, biomedical applications and advanced characterization techniques of nanostructured materials. Further fields of interest include e.g. new advanced and functional materials, advanced-functional composites, biomaterials, smart materials, dielectric materials, optical materials, magnetic materials, organic semiconductors, inorganic semiconductors, electronic materials, graphene, and more.

Therefore, we hope that getting first-hand access to new results, establishing new connections and enjoying the Famagusta, Northern Cyprus ambience will make you feel that your efforts were spent well in NEM 2026.

Our warmest thanks go to all invited speakers, authors, and contributors of NEM 2026 for accepting our invitation, visiting Northern Cyprus and attending NEM 2026 as a medium for communicating your research results.

We hope that you will enjoy the conference and look forward to meeting you again in the forthcoming **NEM 2027** event.

Best regards,
Chairmen's of Conference

Assoc. Prof. Burhan COŞKUN

Prof. Dr. Huriye İCİL



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Sep 10-12, 2026, Famagusta, Northern Cyprus

Editors:

Prof. Dr. Burhan COŞKUN

Prof. Dr. Huriye İCİL

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PROGRAMME

10 SEPTEMBER 2026 (THURSDAY)

10:00-10:30	Registration
10:30-10:35	Opening Ceremony
10:35-11:00	OPENING SPEAKERS - Prof. Dr. Huriye İCİL / Conference President - Prof. Dr. Burhan COŞKUN / Conference President - Prof. Dr. Hasan KILIÇ / Rector of Eastern Mediterranean University
11:00-12:00	1st session (Oral Talks) Chair: Prof. Dr. Ali ÖVGÜN
11:00-11:30	Invited Talk-1: Prof. Dr. Ş. Altındal: “THE MAIN SOURCES OF DISCREPANCIES BETWEEN BARRIER HEIGHTS, OBTAINED FROM THE FORWARD-BIAS I-V AND REVERSE-BIAS C-V DATA OF Au/(RGO:CF)/n-Si STRUCTURES IN WIDE RANGE OF TEMPERATURE AND VOLTAGE
11:30-12:00	Invited Talk-2: M. Arafat : “MEDICAL ARTIFICIAL INTELLIGENCE IN SCIENCE AND TECHNOLOGY MANAGEMENT:THE EDKD APPLICATION FOR EARLY KIDNEY DISEASE DETECTION”
12:30-13:30	Lunch
13:30-15:30	2nd session (Oral Talks) Chair: Prof. Dr. Nur PAŞAOĞLULARI AYDINLIK
13:30-13:45	S. Mancini: “MONITORING OF INDOOR RADON IN HISTORICAL BUILDINGS AND CULTURAL HERITAGE SITES”
13:45-14:00	S. Iqbal, M. Fakhar-e-Alam, <u>M. Shafiq</u> , W. A. Farooq: “APPLICATIONS OF NANOMATERIALS FOR THE DIAGNOSIS OF CANCER”
14:00-14:15	<u>F. Sivrikaya</u> , G.E. Özcan, K. Enez: “ MACHINE LEARNING APPLICATIONS IN TURKISH FORESTRY RESEARCH: A BIBLIOMETRIC PERFORMANCE ANALYSIS AND SCIENCE MAPPING (2000-2025)”
14:15-14:30	<u>K. Enez</u> , M. Uslu, G.E. Özcan, F. Sivrikaya: “ OCCUPATIONAL HEALTH AND SAFETY RISK ASSESSMENT IN FOREST FIRE: AN L-TYPE MATRIX APPROACH”
14:30-14:45	M. C. Mumcu: “ STABILITY ANALYSIS OF POSITIVE AND NEGATIVE FEEDBACK CIRCUITS USING NON-IDEAL OP-AMP MODELS ”
14:45-15:00	<u>E. Poorkahnooji</u> , S. H. Mazharimousavi: “ QUANTUM CONFINEMENT IN CURVED NANOSTRUCTURES”
15:00-15:15	<u>Y. Duysak</u> , S. Gündoğan: “ ENHANCING THE PERFORMANCE OF EXISTING STRUCTURES WITH FIBER REINFORCED POLYMER COMPOSITES”



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15:15-15:30	<u>E. Kızılyar</u> , O. Yavan, E. Keskin: “ A COMPARISON OF THE FHWA (1999) AND KDYY (2022) DESIGN APPROACHES FOR DEEP EXCAVATION SUPPORT SYSTEMS USING NUMERICAL ANALYSES
15:30-16:00	Coffee Break
16:00-18:00	3rd session (oral talks) Chair: Assoc. Prof. Dr. Murat Özdenefe
16:00-16:15	<u>A. Erten</u> , G. Akcan, O. Ferhanoğlu: “ MICROFLUIDIC REFRESHABLE BRAILLE SYSTEM WITH INTEGRATION FOR SMARTPHONES ”
16:15-16:30	<u>A.R. Ergün</u> , H. Bozkır, U. Ertem, A.Ş. Arıkan, M.M. Yıldırım: “ INVESTIGATION OF THE EFFECT OF VACUUM MICROWAVE DRYING TECHNOLOGY ON THE PRODUCTION OF POWDERED RED PEPPER AND ITS EFFECT ON AFLATOXIN CONTENT”
16:30-16:45	<u>A.R. Ergün</u> , A.Ş. Arıkan, M.M. Yıldırım, T. Baysal: “ EFFECT OF LYOPHILIZED RED PEPPER AND SEED ENRICHMENT ON THE ANTIOXIDANT ACTIVITY AND QUALITY PROPERTIES OF FUNCTIONAL GLUTEN-FREE SNACKS”
16:45-17:00	<u>I.V. Onwuzulike</u> , C. C. Onwuzulike, M. A. Ozdal: “ LIVED EXPERIENCES AND PERCEPTIONS OF NURSES WORKING IN SOUTHEAST NIGERIA ON OCCUPATIONAL HAZARDS, HAZARDS MITIGATIONS AND THEIR EFFECTS ON QUALITY OF WORK-LIFE AND JOB SECURITY”
17:00-17:15	<u>I.V. Onwuzulike</u> , <u>M. A. Özdal</u> : “ THE IMPACT OF OCCUPATIONAL HAZARDS AND HAZARD MITIGATION ON NURSES’ QUALITY OF WORK LIFE AND JOB SECURITY IN SOUTHEASTERN NIGERIA”
17:15-17:30	<u>A. Akalu</u> , M. Artaç Özdal: “ ASSESSMENT OF RATIONAL DRUG USE IN THE MANAGEMENT OF ANTIBIOTIC-RESISTANT INFECTIONS IN PEDIATRIC PATIENTS ACROSS AFRICA”
17:30-17:45	<u>N. C. Chidera</u> , Q.Y. Quadri, M. Hastunç:“ BEYOND DETECTION AND CLASSIFICATION: A FIVE-STAGE AUDIT FROM DETECTION TO COST-BENEFIT DECISION MAKING”
17:45-18:00	<u>C. Güler</u> , S. E. Bayer Keskin: “ RECONFIGURABLE ANTENNAS FOR NEXT-GENERATION COMMUNICATION SYSTEMS: TECHNIQUES AND APPLICATIONS”
18:00-19:00	Poster Session



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PROGRAMME

10 SEPTEMBER 2026 (THURSDAY)

HALL 2

13:30-15:45	4 th session (oral talks) Chair: Asst. Prof. Dr. Mustafa RIZA
13:30-13:45	<u>M. Dinleyici</u> , B. Al-Khateeb, Huriye İcil: “SYNTHESIS AND CHARACTERIZATION OF SWALLOW TAIL BAY-FUNCTIONALIZED NOVEL PERYLENE BISIMIDES”
13:45-14:00	M. Karagözlü, D. El Miari, M. Moghazi, <u>S. Aşır</u> , I. Göktürk, F. Yılmaz, A. Denizli, D. Türkmen: “DEVELOPMENT OF A MOLECULARLY IMPRINTED PENCIL GRAPHITE ELECTRODE FOR THE VOLTAMMETRIC DETECTION OF Hg ²⁺ IONS”
14:00-14:15	<u>S. Temürlü</u> , K.T. Fupa, M. Karagözlü, Ş. Güler, S. Aşır, F. Yılmaz, I. Göktürk, D. Türkmen, A. Denizli: “AN ELECTROCHEMICAL SENSOR BASED ON MOLECULARLY IMPRINTED POLYMERS FOR SELECTIVE OLEUROPEIN DETECTION ”
14:15-14:30	<u>J. Ngirabakunzi</u> , D. Kavaz, M. Karagözlü, V. O. Agbor, S. Aşır: “ELECTROCHEMICAL DETECTION OF DOPAMINE USING CARBON PASTE ELECTRODE MODIFIED WITH ZINC OXIDE NANOPARTICLES”
14:30-14:45	<u>V. O. Agbor</u> , S. Aşır, M Ozsoz, M. Karagözlü, M. Hoca, I. Göktürk , D. Türkmen, F Yılmaz, A. Denizli: “COMPARATIVE PERFORMANCE OF ANTIFOULING MOLECULARLY IMPRINTED PENCIL GRAPHITE AND SCREEN-PRINTED CARBON ELECTRODES FOR ULTRASENSITIVE ELECTROCHEMICAL DETECTION OF VITAMIN B ₁₂ ”
14:45-15:00	Z. Alizada: “COMPARATIVE EVALUATION OF ARTIFICIAL INTELLIGENCE-BASED MODELS FROM ACTIVATED CARBON PRODUCTION TO ADSORPTION PERFORMANCE”
15:00-15:15	İ. Taşçıoğlu: “ADMITTANCE SPECTROSCOPY ANALYSIS OF Au/rGO–CoFe ₂ O ₄ :PVA/n-Si SCHOTTKY DIODES UNDER TEMPERATURE VARIATION”
15:15-15:30	Ç. Ş. Güçlü: “A COMPARISON OF DIELECTRIC PARAMETERS, AC CONDUCTIVITY, AND NYQUIST CURVES OF THE Au/n-Si STRUCTURES WITH VARIOUS RATIOS (3,5,7%) CdTe:PVA INTERLAYER ”
15:30-15:45	S. Mansouri, “PENTACANE BASED ON THIN FILM ORGANIC PHOTOTRANSISTOR”
15:45-16:00	Coffee Break
16:00-17:45	5 th session (oral talks) Chair: Asst. Prof. Dr. Devrim ÖZDAL
16:00-16:15	<u>S. Soyel</u> , H. İcil: “PHOTOCHEMICAL REMEDIATION AND PHASE-SELECTIVE RECOVERY DYNAMICS OF OLIVE MILL WASTEWATER VIA N,N'-BIS(4-SULFOPHENYL)-1,4,5,8-NAPHTHALENE DIIMIDE SENSITIZATION”
16:15-16:30	<u>D. N. Varlı</u> , H. İcil: “PERYLENE DIIMIDE FUNCTIONAL MATERIALS IN ELECTROCHEMICAL SENSING ”
16:30-16:45	<u>S. İ. Çelikli</u> , H. İcil: “SYNTHESIS OF HIGH-PERFORMANCE ORGANIC SEMICONDUCTORS: PHOTOPHYSICAL, ELECTROCHEMICAL, AND DFT STUDIES”
16:45-17:00	H. Boranlı, <u>N. D. Turgay</u> : “ON SOME TOPOLOGICAL PROPERTIES OF ULTRAMETRIC SPACES”



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17:00-17:15	S. Asgharzadehbonab, M. Taşkın, <u>N. D. Turgay</u> : “ A TIMETABLE-REFINED MIXED INTEGER PROGRAMMING APPROACH FOR UNIVERSITY EXAMINATION TIMETABLING”
17:15-17:30	<u>Ö. Sevinç</u> , G. K. Bayram: “ TUBE-NUMBER EFFECTS ON THE ELECTROMAGNETIC PERFORMANCE OF A PLASMA ANTENNA”
17:30-17:45	C. N. Karahan: “ PHENOMENOLOGY OF NEUTRINO MASS AND LEPTON FLAVOR VIOLATION IN THE TYPE-I TWO-HIGGS-DOUBLET MODEL WITH VECTOR-SPINOR EXTENSION”
18:00-19:00	Poster Session

PROGRAMME

11 SEPTEMBER 2026 (FRIDAY)

HALL 1

09:30-10:30	6th session (oral talks) Chair: Assoc. Prof. Dr. Süleyman AŞIR
09:30-10:00	Invited Talk-4: Assoc. Prof. Dr. M. Yağmurekardes: “ DIMENSIONAL REDUCTION AND EMERGING PROPERTIES: FROM 2D MNPS₃ TO 1D NANORIBBONS”
10:00-10:15	Ali Övgün: “TESTING STRONG-FIELD GRAVITY VIA BLACK HOLE SHADOWS ”
10:15-10:30	<u>B. Akgenc Hanedar</u> , R. Yazdaanpanah, K. Aydın: “ WATER INTERCALATION AS THE ORIGIN OF HUMIDITY SENSING IN LAYERED LIINP2S6: AN EXPERIMENTAL AND FIRST-PRINCIPLES STUDY”
10:30-11:00	Coffee Break
11:00-12:00	7th session (oral talks) Chair: Assoc. Prof. Dr. Macide Artaç Özdal
11:00-11:15	P. M. Shema, <u>D. Özdal</u> : “ KNOWLEDGE AND ATTITUDES TOWARD WASTE MANAGEMENT AMONG UNIVERSITY STUDENTS: EVIDENCE FROM A UNIVERSITY IN NORTHERN CYPRUS”
11:15-11:30	<u>A. Hürriyet Bozdağ</u> , D. Boylu, S. Sargın: “ PARTHENOGENETIC HAPLOID AND DOUBLED HAPLOID PRODUCTION IN MELON (CUCUMIS MELO L.) VIA IRRADIATED POLLEN: CURRENT APPROACHES AND THEIR IMPORTANCE IN GENETIC BREEDING”
11:30-11:45	<u>B. Öngören</u> , M. F. Kayadeğirmeni, O. K. Oklu, M. Çavuşoğlu, B. B. İncecik, E. Ilgın, E. Palantöken, M. K. Özmen: “ COMPARISON OF MOISTURE ADSORPTION BEHAVIOUR OF CLASS-4 AND CLASS-5 TITANIUM SPONGES USING GRAVIMETRIC ANALYSIS”
11:45-12:00	<u>A. H. Enden</u> , A. Şimşek, B. Öngören, B. Yerlikaya, Ö. E. Yoleri: “ DEVELOPMENT AND STANDARDIZATION OF ULTRASONIC THICKNESS MEASUREMENT METHODS FOR AIRFOIL GEOMETRIZED COMPONENTS”
12:30-13:30	Lunch



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13:30-15:30	8th session (oral talks) Chair: Assoc. Prof. Dr. Mehmet YAĞMURCUKARDEŞ
13:30-14:00	Invited Talk-5: Assoc. Prof. Dr. Engin Durgun: “ BEYOND SILICON: EXPLORING 2D MATERIALS FOR FUTURE NANOELECTRONICS”
14:00-14:15	<u>E. Yalaz</u> : “ INFLUENCE OF DIFFERENT DOPANTS ON THE CRYSTAL STRUCTURE, OPTICAL RESPONSE, AND ELECTRICAL BEHAVIOR OF THIN FILMS”
14:15-14:30	Z. Taşkapılı, C. Yayla, S. Altınışık, B. Gultekin, X. Zhang, M. Li, J. Hu, <u>S. Koyuncu</u> : “SELF-DOPABLE CARBAZOLE-BASED POLYMER SELF-ASSEMBLED MONOLAYERS FOR ENHANCED INTERFACIAL CHARGE TRANSPORT in PEROVSKITE SOLAR CELLS”
14:30-14:45	S. Altınışık: “PYRENE-THIOPHENE-BASED ELECTRODES FOR SUPERCAPACITOR APPLICATIONS VIA ELECTROPOLYMERIZATION”
14:45-15:00	<u>I. Adamu</u> , O. B. Adedoyin, M. Tanriverdi, N. Karaca: “ DECONTAMINATION PARADOX: HOW REMOVING BENCHMARK OVERLAP CAN BIAS CROSS-DATASET PHISHING EVALUATION”
15:00-15:15	<u>E. Doğru</u> , B. Kızılduman, H. İcil: “ ARCHAEOLOGICAL ANALYSIS OF CERAMICS FROM KRAL TEPESİ, MUSTAFA KARATAŞ AND TRAHONAS HALASMATA USING FTIR SPECTROSCOPY AND PRINCIPAL COMPONENT ANALYSIS”
15:15-15:30	<u>D. Uzun</u> , İ. Yuçkan, J. B. Bodapati, M. Pakseresht, N. P. Aydınlık, S. Aşır and H. İcil: “ A NOVEL FLUORESCENT pH SENSOR BASED ON BENZOPURPURIN 4B-FUNCTIONALIZED PERYLENE DIIMIDE: SYNTHESIS, CHARACTERIZATION, PHOTOPHYSICAL, PHOTOCHEMICAL, AND SENSOR PROPERTIES”
15:30-15:45	Coffee Break
15:45-18:00	9th session (oral talks) Chair: Assoc. Prof. Dr. Berna AKGENÇ HANEDAR
15:45-16:00	E. Karakuş, <u>B. Coşkun</u> : “ FABRICATION OF THREE-COMPONENT METAL OXIDE BASED PHOTODIODES AND INVESTIGATION OF THEIR ELECTRICAL AND OPTICAL CHARACTERISTICS ”
16:00-16:15	<u>Ü. Kıymaz</u> , F. Sarf : “ INFLUENCE OF SILVER (AG) DOPING ON THE CHARGING-DISCHARGING PROCESSES OF MWCNTS ANODES IN LI-ION BATTERIES”
16:15-16:30	M. Özdenefe: “ AIR INFILTRATION RATE MEASUREMENT OF AN OFFICE MODULE WITH TRACER GAS CONCENTRATION DECAY METHOD”
16:30-16:45	M. Noureldin, <u>M. Özdenefe</u> : “ ENERGY PERFORMANCE AND MODELLING OF A CHILLER DURING AN OFF-PEAK SEASON PERIOD”
16:45-17:00	S. Ö. Gönen: “ RECENT ADVANCES IN CURCUMIN-LOADED ELECTROSPUN NANOFIBROUS DRESSINGS FOR DIABETIC WOUND CARE”
17:00-17:15	A. S. Hassan, <u>N. P. Aydınlık</u> : “ GREEN SYNTHESIS AND CHARACTERIZATION OF Brassica rapa subsp. narinosa SILVER NANOPARTICLES FOR ANTIOXIDANT APPLICATION AND CATALYTIC DEGRADATION OF SELECTED DYES.”
17:15-17:30	<u>A. Abourajab</u> , S. Koyuncu, H. İcil: “ DESIGN, SYNTHESIS AND CHARACTERIZATION OF NOVEL BAY-MONOSUBSTITUTED PERYLENE DIIMIDE DERIVATIVES”



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17:30-17:45	<u>S. R. V. Eyssen</u> , G. Ş. Karlıtaş, G. Oduncuoğlu: “ ALGINATE ENCAPSULATION OF ENDEMIC NORTHERN CYPRUS ORIGANUM MAJORANA L. VAR. TENUIFOLIUM ESSENTIAL OIL FOR CONTROLLED DELIVERY AND ANTIMICROBIAL ACTIVITY AGAINST ESCHERICHIA COLI”
17:45-18:00	<u>D. Aydener</u> , M. Riza: “ SIMULATING THE GROUND STATE OF HEISENBERG SPIN CHAINS: A BENCHMARK OF CLASSICAL VS. NISQ QUANTUM METHODS”



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POSTER PROGRAMME

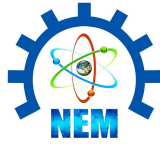
10 SEPTEMBER 2026 (THURSDAY)

PP101	FJ. Asengi, V. O. Agbor, J. J. Gana, M. O. Aboh, A. Ibrahim: “ARTIFICIAL INTELLIGENCE-BASED EXPERT SYSTEM FOR DIPHTHERIA DIAGNOSIS”
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PP103	G. Turgay, B. Ç. Aydemir: MORPHOLOGICAL AND MOLECULAR CHARACTERIZATION OF TRICHODERMA SPP. ASSOCIATED WITH GREEN MOLD IN EDIBLE MUSHROOMS
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CULTURAL CYPRUS TOUR

12 SEPTEMBER 2026 (SATURDAY)

09.00	Departure from Hotel
09:30	Arrival at Varosha and Tour Start
10:40	Departure from Varosha to Nicosia
11:40	Arrival in Nicosia and Tour Start
13:00	Departure from Nicosia to Karaoğlanoğlu, Kyrenia
13:40	Arrival at Karaoğlanoğlu, Kyrenia and Tour Start
14.45	Departure from Karaoğlanoğlu to Bellapais Monastery
15:15	Arrival at Bellapais Monastery and Tour Start
16.45	Departure from Bellapais Monastery to Kyrenia for Free Time
17:00	Arrival in Kyrenia and Free Time
18:45	Departure from Kyrenia to Hotel



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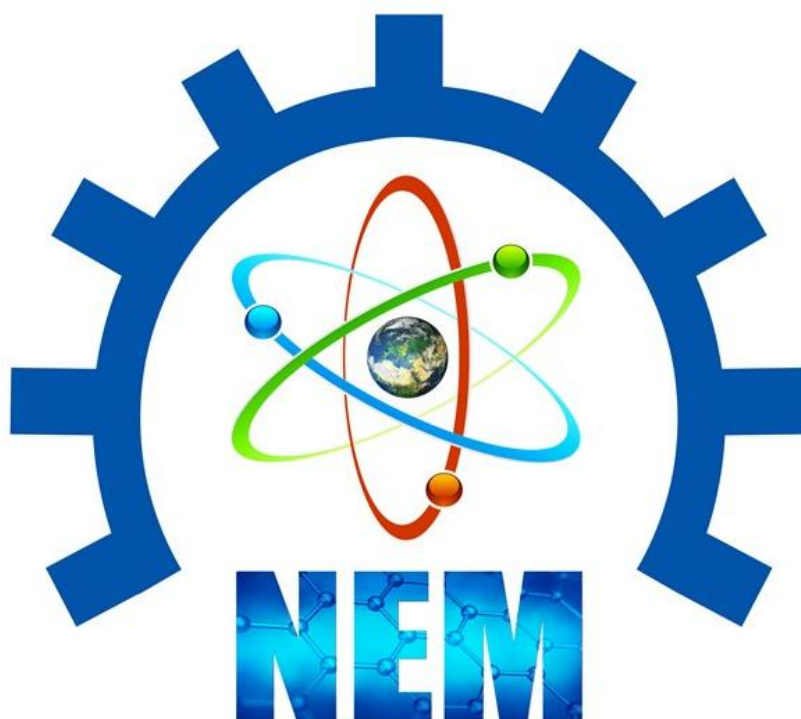
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INVITED SPEAKERS



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BEYOND SILICON: EXPLORING 2D MATERIALS FOR FUTURE NANOELECTRONICS

Engin Durgun

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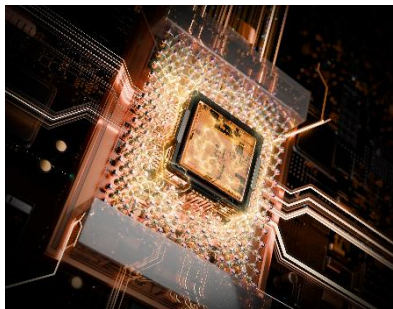
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The remarkable progress of modern electronics has been closely linked to the continuous reduction in the size of semiconductor devices. As this miniaturization approaches fundamental limits, the search for alternative materials that can sustain further advances in performance and efficiency has become increasingly important. Two-dimensional (2D) semiconductors offer exciting possibilities in this direction, combining atomic-scale thickness with a wide variety of electronic properties that can be exploited in future device technologies.

In this talk, I will discuss our recent computational efforts to explore the potential of emerging 2D semiconductors for next-generation nanoelectronics. Focusing on representative materials such as GaSe, SiAs, and Janus GePAs, we examine how their characteristic electronic properties are reflected in device operation when dimensions are reduced to the nanometer scale. By considering different device concepts, from junction-based structures to field-effect transistors, these studies provide complementary examples of how 2D materials can be incorporated into future electronic technologies.

The results reveal considerable flexibility in the electronic behavior of these atomically thin materials. GaSe, in particular, illustrates how a single 2D semiconductor can exhibit distinctly different transport characteristics depending on the device configuration. Investigations of SiAs and Janus GePAs further show how factors such as device dimensions, structural design, and external control can be used to tune electronic performance.

Overall, these studies illustrate both the potential and the challenges of transforming the distinctive properties of 2D materials into functional nanoscale devices. They also demonstrate the role of computational materials research in identifying promising material platforms and guiding the development of new design concepts for future high-performance and energy-efficient electronics.





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MEDICAL ARTIFICIAL INTELLIGENCE IN SCIENCE AND TECHNOLOGY MANAGEMENT: THE EDKD APPLICATION FOR EARLY KIDNEY DISEASE DETECTION

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Artificial intelligence (AI) increasingly influences science and technology management by supporting evidence-based decision-making, accelerating innovation, and facilitating the translation of scientific knowledge into practical solutions. In healthcare, these capabilities are particularly relevant to chronic kidney disease (CKD), a major global health challenge that may remain undetected until substantial loss of kidney function has occurred [1]. Early identification of at-risk individuals enables timely clinical assessment and intervention. This presentation examines the role of medical AI across the principal stages of technology management and introduces the EDKD application as a case study in AI-assisted early detection of kidney disease.

The EDKD development pathway covers problem identification and concept development through system implementation, clinical validation, and prospective deployment. The presentation describes the interaction between a diagnostic strip and the digital application, along with the workflow that supports rapid, accessible assessment of kidney-disease risk. The presentation highlights data quality, algorithm development, clinical validation, regulatory considerations, usability, and interdisciplinary collaboration, all essential to the responsible use of AI in healthcare [2]. These elements are integrated into a technology-management success framework to evaluate EDKD's progression from an innovative concept to a clinically relevant digital-health solution. Finally, the authors present a roadmap for future technical development, expanded validation, and potential implementation in healthcare settings. This case study demonstrates how structured technology management can help transform medical AI innovations into accessible tools for earlier disease-risk recognition.

Keywords: Medical artificial intelligence, Technology management, Chronic kidney disease, Early detection, EDKD, Digital health.

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- [1] *Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group, Kidney International 105 (2024) S117-S314.*
- [2] *World Health Organization, Ethics and Governance of Artificial Intelligence for Health: WHO Guidance, Geneva, 2021.*



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DIMENSIONAL REDUCTION AND EMERGING PROPERTIES: FROM 2D MNPS₃ TO 1D NANORIBBONS

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Dimensionality plays a fundamental role in determining the structural, electronic, magnetic, and vibrational properties of materials. Reducing dimensionality can substantially modify physical behavior through quantum confinement, reduced coordination, symmetry breaking, and the increasing influence of surfaces and edges. In particular, the transition from two-dimensional (2D) layers to one-dimensional (1D) nanostructures provides an effective route for tuning material properties through lateral confinement and edge engineering.

In this context, one-dimensional nanoribbons derived from single-layer manganese phosphorus trisulfide (MnPS₃) are investigated using density functional theory-based calculations, complemented by experimental Raman spectroscopy measurements. Cutting the MnPS₃ monolayer along high-symmetry crystallographic directions gives rise to three types of armchair nanoribbons with Mn-Mn, P-P, and Mn-P edge terminations, as well as zigzag nanoribbons. The resulting nanoribbons exhibit pronounced edge- and width-dependent structural reconstructions. In particular, S-S dimerization selectively occurs at specific Mn-terminated edges, while tilted P-P dumbbell structures form at P-terminated edges. These structural modifications strongly influence the magnetic and electronic properties of the nanoribbons. Armchair nanoribbons stabilize Néel or dimerized Néel antiferromagnetic configurations and remain semiconducting, whereas zigzag nanoribbons generally favor ferromagnetic ordering and metallic behavior, except for the narrowest structures. Furthermore, the calculated Raman response reveals characteristic vibrational modes associated with different edge configurations and local bonding environments, providing fingerprint signatures for identifying the nanoribbon edges.

Overall, these results demonstrate that the electronic, magnetic, and vibrational properties of MnPS₃ nanoribbons are strongly governed by edge geometry and ribbon width, highlighting their potential for edge-engineered low-dimensional spintronic and nanoelectronic applications.



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THE MAIN SOURCES OF DISCREPANCIES BETWEEN BARRIER HEIGHTS, OBTAINED FROM THE FORWARD-BIAS I-V AND REVERSE-BIAS C-V DATA OF Au/(RGO:CF)/n-Si STRUCTURES IN WIDE RANGE OF TEMPERATURE AND VOLTAGE

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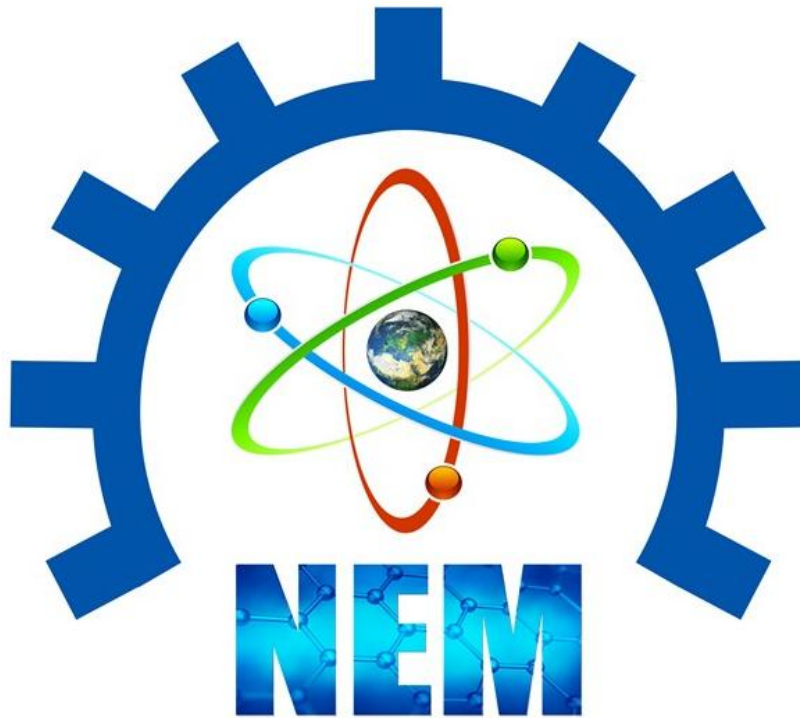
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In this study, Au/(rGO:CF)/n-Si/Al structures were fabricated, and subsequently, both their current-voltage (I-V) and capacitance-voltage (C-V) characteristics were measured over a wide range of temperatures and voltages. The evaluation of forward-bias I-V by using thermionic-emission (TE) theory revealed that an abnormal decreases of ideality-factor (n) and increases of barrier-height (BH) with increasing temperature. This increase in BH with temperature contradicts the negative temperature-coefficient of the semiconductor bandgap ($\alpha = dE_g/dT = -4.73E-4$ eV/K for Si) and the BH for an ideal diode. On the other hand, the significant deviation of n from the ideal-case ($n=1$), particularly at lower-temperatures, cannot be explained by either the tunnelling-mechanism or the existence of an interlayer at M-S interface, and interface states/traps. Because in these devices, a number of conduction-mechanisms (CMs) such as TE, thermionic-field-emission (TFE), field-emission (FE), tunnelling via traps, and Gaussian-distribution (GD) of BHs compete unusually, one of them may dominate over the others in a certain-temperature and voltage region. These discrepancies in the BH extracted from the I-V and C-V can be also explained by the nature of measurement-system and voltage dependent. It was observed that BH values derived from forward-bias $\ln(I)$ -V plots, after being modified, exhibited behaviour like those obtained from reverse-bias C^{-2} -V plots. The voltage dependent profiles of interface-traps (D_{it}) were also obtained from the forward bias I-V and low-high frequency capacitance data. The fact that both I-V and C-V measurements exhibit strong temperature dependence indicates that these fabricated structures can also be successfully used in thermal sensor applications.

Keywords: MPS structures; Possible conduction mechanisms (CMs); Temperature dependent; Discrepancies between Φ_B (I-V) and Φ_B (C-V); Interface traps and series resistance effects; Thermal sensor applications



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ORAL PRESENTATION



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ASSESSMENT OF RATIONAL DRUG USE IN THE MANAGEMENT OF ANTIBIOTIC-RESISTANT INFECTIONS IN PEDIATRIC PATIENTS ACROSS AFRICA

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Antibiotic resistance is a public health threat associated with negative health outcomes and increased healthcare expenditure. It remains a major cause of mortality and morbidity despite global recognition and efforts to prevent and control its spread. Irrational use of antibiotics increases the unavoidable consequence of antibiotic use: increasing the rate at which bacteria gain resistance. Increased antibiotic resistance impedes effective treatment of bacterial infections. In low- and middle-income countries, bacterial infections are high, and antibiotic availability is limited. Therefore, it is important to assess the appropriateness of antibiotic use in healthcare settings within Africa. This systematic review aims to assess the rational use of antibiotics in managing antibiotic-resistant infections in pediatric patients across Africa. It investigates antibiotic use, the existence and adherence to paediatric antibiotic guidelines and the challenges faced across Africa.

This study follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. A limited search of two online databases (PubMed and ScienceDirect) was conducted to retrieve studies carried out in Africa. A total of 140 studies were retrieved and screened using Covidence, yielding 11 studies eligible for inclusion. Critical appraisal of the studies was done using the AXIS critical appraisal tool before the relevant data were extracted. The data included the general study characteristics, diagnostic approaches, indications for antibiotic use, commonly used antibiotics, and the existence and use of antibiotic use guidelines. Included studies were mostly conducted in hospitals in East African countries. Bacterial infections were primarily diagnosed empirically. Pneumonia and sepsis were the most common infections reported in the studies. Commonly prescribed antibiotics noted in the studies include ceftriaxone, gentamicin, and amoxicillin. All studies indicated non-compliance with national and international guidelines and recommendations. The findings highlight that irrational antibiotic use in pediatric patients remains a problem in Africa. Interventions must be effectively implemented to slow down the emergence of resistance and improve the management of antibiotic-resistant infections.



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MICROFLUIDIC REFRESHABLE BRAILLE SYSTEM WITH INTEGRATION FOR SMARTPHONES

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This paper presents a novel refreshable microfluidic Braille display system fabricated from polydimethylsiloxane (PDMS), offering a semi-transparent, low-cost, and fast-response haptic interface suitable for integration with modern touchscreens. Current commercial Braille displays are predominantly piezoelectric-based, which are expensive, not easily scalable, and opaque, severely limiting their widespread integration into portable information access systems. The proposed microfluidic architecture overcomes these limitations by dynamically generating Braille characters via fluidic-driven inflation of elastomeric membranes. A key innovation of this system is the significant reduction of fluidic and control complexity: it relies on displaying an identical Braille character across all cells simultaneously. By integrating real-time finger-tracking functionality via a standard smartphone camera, the system precisely synchronizes the rendered character with the user's fingertip position. Consequently, the visually impaired reader perceives distinct letters as their finger moves, despite the entire screen being uniformly configured at any given instant. This design strategy drastically reduces the required fluidic control inlets from $6N$ (where N is the number of cells) to just 6, enhancing scalability and minimizing manufacturing overhead.

A four-cell prototype was developed and analytically modelled using an electrical circuit analogy—mapping microchannels to resistors and fluidic chambers to capacitors—to accurately determine the temporal dynamics of the microfluidic system. The device was fabricated utilizing a stereolithography-based 3D printed mold and optimized PDMS mixtures for the flexible structure. Experimental validation confirmed that the system achieves a robust refresh rate of approximately 41 ms, easily exceeding the typical finger-scanning speeds of visually impaired users, which range between 92 and 240 ms per character. Furthermore, the optical transparency of the PDMS enables simultaneous use by both sighted and visually impaired individuals by overlaying the haptic display onto a conventional smartphone or tablet screen rendering the hybrid Braille Neue typeface. This dual-mode accessibility approach, combined with minimized control requirements, establishes a highly promising foundation for the future development of portable, scalable, and highly responsive refreshable Braille technologies.



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DEVELOPMENT AND STANDARDIZATION OF ULTRASONIC THICKNESS MEASUREMENT METHODS FOR AIRFOIL GEOMETRIZED COMPONENTS

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The accuracy and repeatability of ultrasonic thickness measurements on components with airfoil geometries are directly influenced by factors such as surface accessibility, probe type, and probe positioning. In this study, the parameters affecting measurement reliability on components with different airfoil geometries were experimentally investigated.

Suitable probe technologies were evaluated for regions with varying geometric characteristics. A water-based bubbler probe was assessed for open airfoil surfaces, while a couplant-gel delay line probe was investigated for areas with limited accessibility. To ensure repeatable identification of measurement locations, part-specific positioning fixtures were developed using SLA (Stereolithography) technology. These fixtures enabled different operators to reach the same measurement locations and reduced operator-induced variability. In addition, inter-operator correlation studies were conducted to evaluate the consistency of the measurement results.

The findings demonstrated that probe selection and probe positioning have a critical impact on measurement reliability. Furthermore, the standardization of measurement locations and the identification of suitable measurement techniques contributed to obtaining more reliable and repeatable results on components with airfoil geometries. This study aims to develop a standardized measurement methodology for reliable ultrasonic thickness measurements of components with complex airfoil geometries.



INVESTIGATION OF THE EFFECT OF VACUUM MICROWAVE DRYING TECHNOLOGY ON THE PRODUCTION OF POWDERED RED PEPPER AND ITS EFFECT ON AFLATOXIN CONTENT

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Powdered red pepper, which holds significant importance in Turkey in terms of production, consumption, and export, has recently emerged as a critical concern for food safety and foreign trade due to aflatoxin contamination. In this study, vacuum microwave drying and hot air drying (tray dryer) techniques were optimized for the production of red pepper powder, and these methods were comparatively evaluated in terms of aflatoxin content. In the vacuum microwave drying system, microwave power (2–4 kW) and temperature/vacuum levels [60 °C (800 mbar), 70 °C (690 mbar), and 80 °C (530 mbar)] were investigated as process variables. For the tray dryer, air temperatures of 60, 70 and 80 °C and air velocities of 1.0, 1.5, and 2.0 m/s were examined. In vacuum microwave drying, drying rate was selected as the response variable, and the relationships between process variables and drying rate were modeled using multiple linear regression analysis. The developed polynomial models were found to be significant at the 99% confidence level, while lack of fit was insignificant at the 95% confidence level, and model predictions were consistent with experimental data. Optimization was performed using Response Surface Methodology (RSM) with a two-factor Central Composite Design consisting of 13 experimental points (including 5 center points. $\alpha = 1$). Additionally, the time required for samples to reach the target moisture content was determined, and the drying rates of both methods were compared; the relationship between moisture content and drying time was mathematically expressed. Aflatoxin analysis was conducted on samples dried under optimized conditions to evaluate the detoxification efficiency of the drying systems. The findings demonstrated that vacuum microwave drying achieved the target moisture content in a shorter time and provided higher drying rates compared to the tray dryer. These results indicate that microwave energy under vacuum conditions promotes rapid and uniform internal heat generation, enhancing heat and mass transfer efficiency. Accordingly, vacuum microwave drying was determined to be a more advantageous and efficient drying technique in terms of processing time and overall drying performance.

Keywords: Aflatoxin, Red pepper powder, Response Surface Methodology (RSM), Tray drying, Vacuum microwave drying



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EFFECT OF LYOPHILIZED RED PEPPER AND SEED ENRICHMENT ON THE ANTIOXIDANT ACTIVITY AND QUALITY PROPERTIES OF FUNCTIONAL GLUTEN-FREE SNACKS

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Snack products represent one of the fastest-growing categories in the food industry due to increasing consumption trends, while the evaluation of plant seeds generated as food processing by-products is important for sustainable production; red pepper and its seeds, rich in phenolic compounds and antioxidants, are therefore regarded as innovative and promising ingredients for functional product development. This study aimed to develop functional gluten-free snack formulations containing freeze-dried red pepper and red pepper seed powder obtained through lyophilization and to evaluate the effects of different formulations on the physicochemical, functional, and sensory properties of the final products. Three formulations were prepared: a control sample containing only gluten-free flour; a sample containing gluten-free flour and lyophilized red pepper seed powder; and a sample containing gluten-free flour, lyophilized red pepper seed powder, and lyophilized red pepper. The products were analyzed for chemical composition (moisture, ash, fat, protein), water activity, antioxidant activity, total phenolic content, textural parameters (hardness, brittleness), and sensory properties. The production process completed with baking at 150 °C for 5 min following tray drying at 60 °C and 1.5 m/s air velocity, was more effective in preserving bioactive components and promoting crisp texture than conventional atmospheric cooking. Antioxidant capacity, determined by the DPPH method, was found to be $49.126 \pm 6.944 \mu\text{mol TE/g}$ in the control group, $55.381 \pm 0.346 \mu\text{mol TE/g}$ in the seed-containing sample, and $59.504 \pm 0.795 \mu\text{mol TE/g}$ in the sample containing both red pepper and seeds; this indicates that the addition of plant-based components increased the antioxidant capacity. The limited literature on lyophilized plant by-products in functional gluten-free snacks highlights the importance of this study, whose findings demonstrate an innovative and applicable approach and provide a scientific basis for industrial-scale production of zero-waste, clean-label, nutritionally enriched gluten-free products.

Keywords: Antioxidant activity, Functional snack, Gluten-free product, Red pepper and seed, Lyophilization



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TESTING STRONG-FIELD GRAVITY VIA BLACK HOLE SHADOWS

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Black hole shadows and photon spheres provide an exceptional observational arena for testing general relativity and alternative theories of gravity in the strong-field regime. This talk delivers a comprehensive analysis of recent advancements in modeling black hole shadows, photon rings, and weak gravitational lensing within the framework of modified gravity and non-standard black hole spacetimes. By investigating the propagation of photons in the vicinity of the event horizon, we examine how specific modifications to the underlying spacetime metric distort the critical curves and geometric configurations of the shadow. Ultimately, these findings demonstrate how upcoming precise astrometric observations of black hole silhouettes can impose stringent constraints on parameters beyond Einstein's theory, offering a robust methodology to probe novel signatures of quantum gravity and dark components in the universe.



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DESIGN, SYNTHESIS AND CHARACTERIZATION OF NOVEL BAY-MONOSUBSTITUTED PERYLENE DIIMIDE DERIVATIVES

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Perylene diimide (PDI) derivatives are promising functional materials owing to their excellent photochemical and thermal stability, strong visible-light absorption, electron-accepting properties, and readily tuneable molecular structures. Functionalization at the bay position provides an effective approach for modulating the solubility, photophysical, and electronic properties of PDI molecules. Although bay-disubstituted PDI derivatives have been extensively investigated, unsymmetrical bay-monosubstituted derivatives remain comparatively less explored. The development of efficient synthetic strategies for these compounds is therefore of considerable interest for the design of new functional materials for optoelectronic and photonic applications.

In this study, two novel unsymmetrical bay-monosubstituted PDI derivatives, CP-PPDI and MB-PPDI, were successfully synthesized. The synthetic route involved the synthesis of PPDI, followed by bay bromination and subsequent substitution. The reaction progress and formation of the target compounds were monitored by thin-layer chromatography and FT-IR spectroscopy. The synthesized compounds were characterized using FT-IR, UV-Vis absorption, and emission spectroscopy, while further structural and physicochemical characterization was carried out using NMR, mass spectrometry, cyclic voltammetry, differential pulse voltammetry, thermogravimetric analysis, differential scanning calorimetry, and morphological techniques.

The FT-IR results were consistent with the proposed molecular structures. The synthesized PDI derivatives exhibited characteristic absorption and emission features in different solvents. These findings demonstrate that bay-monosubstitution provides a versatile strategy for introducing functional groups into the PDI core and modulating its photophysical properties. The newly synthesized derivatives are therefore promising candidates for further investigation in photonic and optoelectronic applications, including dye-sensitized and perovskite solar cells, as well as sensing-related technologies.



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PARTHENOGENETIC HAPLOID AND DOUBLED HAPLOID PRODUCTION IN MELON (*CUCUMIS MELO* L.) VIA IRRADIATED POLLEN: CURRENT APPROACHES AND THEIR IMPORTANCE IN GENETIC BREEDING

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Melon (*Cucumis melo* L.) is an economically important vegetable crop characterized by extensive genetic diversity and widespread cultivation worldwide. One of the primary objectives of modern melon breeding programs is the development of homozygous parental lines possessing superior agronomic traits (Pitrat, 2016; Monforte et al., 2005). While conventional selfing-based breeding programs require several years to produce pure lines, haploid and doubled haploid (DH) technologies significantly shorten this process by enabling the generation of completely homozygous genotypes within a single generation (Forster and Thomas, 2005; Germanà, 2011). Consequently, these technologies play a crucial role in enhancing selection efficiency, accelerating genetic gain, and optimizing hybrid cultivar development (Touraev et al., 2001; Forster et al., 2007). Although several biotechnological approaches, including anther culture, microspore culture, ovule culture, and *in situ* parthenogenesis, have been developed for haploid production in cucurbit species, the most successful results in melon have been achieved through parthenogenetic embryo induction using irradiated pollen (Sauton and Dumas de Vaulx, 1987; Claveria et al., 2005; Hooghvorst et al., 2020). In this method, pollen grains are exposed to specific doses of ionizing radiation, thereby preventing the genetic contribution of the male gamete while stimulating the egg cell to initiate embryogenesis without fertilization (Kurtar et al., 2002; Dal et al., 2016). Among the various sources of radiation, Co-60-derived gamma rays are the most commonly used in irradiated pollen applications, and different radiation doses have been reported to exert significant effects on haploid embryo induction and plant regeneration efficiency (Sarı et al., 1999; Dal et al., 2016). The effectiveness of the irradiated pollen technique is influenced by numerous biological and technical factors, including genotype, pollen viability, radiation dose, timing of pollination, embryo rescue protocols, and culture medium composition (Chlyah et al., 1990; Claveria et al., 2005). Recent studies have demonstrated that optimization of embryo rescue timing and improvements in culture media can substantially enhance both haploid embryo production and plant regeneration efficiencies (Huang et al., 2024; Hooghvorst et al., 2020). Subsequently, regenerated haploid plants are subjected to chromosome doubling using antimitotic agents such as colchicine or oryzalin, resulting in fertile doubled haploid lines (Dhooghe et al., 2011; Hooghvorst et al., 2020). Doubled haploid technology provides a high degree of genetic uniformity and has become an indispensable tool in hybrid parent development, fixation of disease and pest resistance genes, quantitative trait locus (QTL) mapping, marker-assisted selection, genomic selection, and next-generation plant breeding applications (Prigge and Melchinger, 2012; Ren et al., 2017; Yan et al., 2017). Furthermore, the integration of haploid induction systems with CRISPR/Cas-based genome editing technologies has considerably expanded the future potential of DH technologies in crop improvement programs (Hooghvorst and Nogués, 2020).

In conclusion, irradiated pollen-induced parthenogenesis represents one of the most effective approaches currently available for haploid and doubled haploid production in melon. This technique is considered a strategic biotechnological tool for modern breeding programs based on molecular biology and genetics. Recent advances indicate that haploid and doubled haploid technologies are likely to become fundamental components of future genomics-assisted breeding strategies. **Keywords:** Melon, haploid, doubled haploid, irradiated pollen, gamma irradiation, parthenogenesis, embryo rescue, molecular breeding, plant biotechnology, genetic improvement.

WATER INTERCALATION AS THE ORIGIN OF HUMIDITY SENSING IN LAYERED LiInP_2S_6 : AN EXPERIMENTAL AND FIRST-PRINCIPLES STUDY

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Two-dimensional layered Li-containing metal thiophosphates have recently attracted significant attention as promising humidity-sensitive materials because water molecules can be reversibly intercalated into their van der Waals gaps, thereby modifying their structural and electronic properties. Among of them, LiInP_2S_6 has emerged as a promising candidate; however, the atomistic origin of its humidity response remains largely unexplored. In this work, experimental Raman spectroscopy together with first-principles calculations is employed to investigate the structural stability, lattice dynamics, and hydration-dependent electronic properties of LiInP_2S_6 .

Intercalation-energy calculations identify the parallel H_2O configuration as the energetically most favorable structure. Upon hydration, the interlayer spacing increases from 9.90 to 10.38 Å for a single intercalated H_2O molecule, while the in-plane lattice remains nearly unchanged, demonstrating that water intercalation predominantly affects the out-of-plane structure without disrupting the layered framework. Ab initio molecular dynamics simulations further confirm the thermal stability of the hydrated structures. Water intercalation converts the pristine bilayer from an indirect semiconductor (1.92 eV) into a direct-gap semiconductor (1.83 eV). With increasing hydration (from %5 to %50), all structures preserve a direct band gap within a narrow range of 1.79-1.86 eV, whereas the Fermi level shifts systematically upward from -1.98 to -1.84 eV, indicating progressive modulation of the electronic environment.

Charge-density difference and Bader charge analyses reveal significant hydration-induced charge redistribution between the intercalated H_2O molecules and the LiInP_2S_6 framework, while work-function calculations demonstrate a pronounced dependence of the surface electronic potential on water concentration. These results provide a comprehensive atomistic understanding of water-induced electronic modulation in layered LiInP_2S_6 and establish theoretical design principles for high-performance humidity sensors and humidity-responsive optoelectronic devices.

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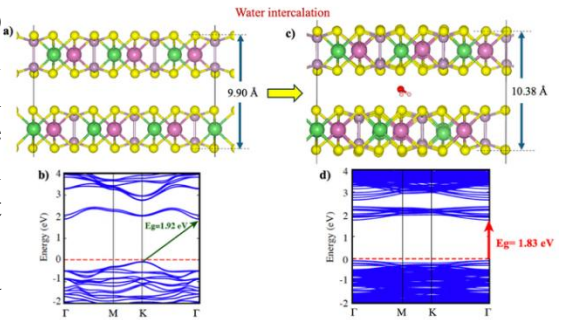


Figure: (a) Optimized pristine bilayer structure (b) Corresponding PBE-calculated electronic band structure. (c) Optimized bilayer LiInP_2S_6 after H_2O intercalation (d) Electronic band structure of the hydrated bilayer.



COMPARISON OF MOISTURE ADSORPTION BEHAVIOUR OF CLASS-4 AND CLASS-5 TITANIUM SPONGES USING GRAVIMETRIC ANALYSIS

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Titanium sponge is the primary raw material for titanium metal production. It is the product of the Kroll process, in which titanium tetrachloride is reduced by magnesium. High-purity titanium is obtained by melting this sponge, so sponge quality directly affects the final product. For this reason, the moisture adsorption behavior of the sponge is an important parameter. It affects both material quality and process efficiency. In this study, the moisture uptake of two titanium sponge grades, Class-4 and Class-5 (GB/T 2524-2019, Titanium Sponge National Standard of China), was investigated. Representative samples from both grades were exposed to identical environmental conditions for a predefined period. The sample masses were then measured using a precision balance. The samples were dried in a laboratory furnace, and the mass measurements were repeated.

The moisture content of each sample was determined from the mass loss after drying. Class-4 showed higher moisture retention than Class-5. Although Class-4 has the lower specified oxygen content of the two grades, its mass loss after drying was about twenty times greater. This behavior is attributed to morphological differences, such as a larger specific surface area and higher porosity, in the Class-4 sponge. These features increase contact with atmospheric moisture and promote water adsorption.

These findings suggest that morphological characteristics, such as specific surface area and porosity, play a dominant role in the moisture uptake of titanium sponge. The results are relevant for raw material handling, storage, and quality control in titanium production. Sponge morphology also has a significant effect on the final ingot composition, mainly through its influence on oxygen uptake. Sponge should therefore be selected according to its morphology. This is particularly important for investment casting, where the final oxygen content and tight composition control directly affect casting quality.



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FABRICATION OF THREE-COMPONENT METAL OXIDE BASED PHOTODETECTORS AND INVESTIGATION OF THEIR ELECTRICAL AND OPTICAL CHARACTERISTICS

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The investigation electric and optic characteristics of the fabricated Al/(CdO:ZnO:NiO:Ti)/p-Si (5:2:2:1) photodiode in dark and under 100 mW/cm² in the voltage range of ± 4 V. Their basic electrical parameters such as ideality-factor (n), reverse saturation current (I_0), the formation of barrier-height (Φ_{B0}) at metal/semiconductor interface, series/shunt resistances (R_s , R_{sh}), rectification-ratio ($RR=I_F/I_R$ ± 4 V) were calculated by using thermionic-emission (TE) theory. Both the energy dependent of (N_{ss} - $(E_{ss}-E_v)$) and voltage dependent resistance (R_i) distributions were obtained from the Card-Rhoderick and Ohm Law, respectively. Among these parameters n , R_s , and Φ_{B0} was also calculated from the Norde and Cheung functions and compared with both TE and available literature. Optical parameters that determine the light-dependent sensitivity of a photodiode like photo-sensitivity (S), photo-responsibility (R), and photo-detectivity (D^*) values were also obtained. Obtained results show that the fabricated photodiode has good rectification ratio and more sensitivity to illumination so can be successfully used in solar cells and optical applications instead in conventional metal/insulator/semiconductor (MIS) photodiodes. The $\ln(I_F)-\ln(V_F)$ plots have also show three different linear regimes with different slopes. Among Ohmic, space charge limited current (SCLC), and trap charge limited current (TCLC) mechanisms, in current conduction mechanism, which was dominated determined by using the slopes of these linear parts.

Keywords: Al/(CdO:ZnO:NiO:Ti)/p-Si photodiode; Electric and dielectric properties; Surface states, Photosensitivity.



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PHENOMENOLOGY OF NEUTRINO MASS AND LEPTON FLAVOR VIOLATION IN THE TYPE-I TWO-HIGGS-DOUBLET MODEL WITH VECTOR-SPINOR EXTENSION

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The Standard Model (SM), despite its remarkable experimental success, remains insufficient to explain several fundamental phenomena, most notably neutrino masses. This motivates extensions of the SM through new physics frameworks. Charged lepton flavor violation (LFV) processes, which are extremely suppressed within the SM, provide an important testing ground for probing such new structures.

In this work, we consider a Type-I Two-Higgs-Doublet Model extended by an SM singlet vector-spinor field Ψ_μ , ($2HDM_\Psi$), in place of conventional right-handed neutrinos. Neutrino mass generation through the Type-3/2 seesaw mechanism and the decay $\mu \rightarrow eee$ are investigated. It is shown that two distinct parity scenarios, $2HDM_{\Psi^+}$ and $2HDM_{\Psi^-}$, in which the Ψ_μ field interacts with different Higgs doublets, lead to qualitatively different phenomenological behavior in the neutrino-mass and LFV sectors. The radiative stability of the model is examined at the one-loop level, and it is shown that the corrections induced by the vector-spinor interactions do not generate dangerous logarithmic or additive mass contributions large enough to induce a little-hierarchy problem in the scalar sector, destabilize the induced neutrino mass, or modify the charged-lepton mass hierarchy.

Phenomenological analyses show that, for the benchmark choice $\lambda=0.1$ and $m_{H^\pm} = 250 \text{ GeV}$, the $2HDM_{\Psi^-}$ scenario, in which the vector-spinor field interacts with the first Higgs doublet, Φ_1 , exhibits a strong suppression of the induced neutrino mass in the large $\tan\beta$ limit. This feature allows the parameter space consistent with the neutrino mass scale to extend down to much lower vector-spinor masses, $M_\Psi \sim 10^2 - 10^3 \text{ GeV}$. At the same time, in this low mass region, the $\mu \rightarrow eee$ decay becomes an increasingly important experimental constraint. By combining the neutrino mass and LFV requirements, a common parameter region around $\tan\beta \sim 10^5$ and $M_\Psi \sim 250 - 300 \text{ GeV}$ is identified that is compatible with the phenomenologically relevant neutrino-mass scale and remains testable within the future sensitivity reach of the Mu3e experiment.

Keywords: Neutrino Mass, Lepton Flavor Violation, Vector-spinor, Type-I 2HDM

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RECONFIGURABLE ANTENNAS FOR NEXT-GENERATION COMMUNICATION SYSTEMS: TECHNIQUES AND APPLICATIONS

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Reconfigurable antennas are antenna structures capable of dynamically modifying their operating frequency, radiation pattern, and/or polarization characteristics. This reconfigurability enables multiband, multidirectional, or multimode operation through a single antenna element, thereby reducing hardware complexity, physical size, and cost in wireless communication systems. Reconfiguration types are generally categorized as frequency, pattern, polarization, and hybrid reconfiguration, with hybrid configurations combining two or more of these capabilities. Frequency reconfiguration enables operation across different communication bands by modifying the resonance behavior of the antenna, whereas pattern reconfiguration provides control over the main radiation direction or beam shape. Polarization reconfiguration improves adaptability to varying channel conditions by allowing switching among linear, circular, and dual-polarized operating modes. In this study, the main technical approaches and application areas of reconfigurable antennas are discussed. In electrical reconfiguration, PIN diodes, varactor diodes, and RF MEMS switches are employed to modify the current distribution and effective electrical length of the antenna. In mechanical reconfiguration, the antenna geometry, feeding position, or structural configuration is altered using movable components and actuators. Optical methods provide contactless control through photoconductive switching elements, while smart material-based approaches exploit the tunable electromagnetic properties of materials such as graphene, liquid crystals, ferrites, and phase-change materials. In addition, FPGA and microcontroller-based control units enable software-controlled selection of antenna operating modes. Reconfigurable antennas offer significant advantages for next-generation wireless systems, including Multiple-Input Multiple-Output (MIMO) systems, satellite communications, the Internet of Things, and 6G networks, by improving spectral efficiency, coverage flexibility, and adaptive link performance. In adaptive communication environments, reconfiguration capabilities facilitate more efficient spectrum utilization, improved connection continuity, and more effective management of hardware resources.

Keywords: Reconfigurable antennas, frequency reconfiguration, pattern reconfiguration, polarization reconfiguration, electrical reconfiguration, MIMO, 6G.



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A COMPARISON OF DIELECTRIC PARAMETERS, AC CONDUCTIVITY, AND NYQUIST CURVES OF THE Au/n-Si STRUCTURES WITH VARIOUS RATIOS (3,5,7%) CdTe:PVA INTERLAYER

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The basic aim of this study is to prepared Au/n-Si structures with pure and 3%, 5%, and 7% (CdTe:PVA) organic/polymer film as interfacial layer and then calculation their basic dielectric parameters, AC conductivity (σ_{AC}), and Nyquist-curves in voltage range of -2V/6V for low-frequency (1kHz) and high-frequency (1MHz) at room temperature. The real & imaginary components of complex-dielectric (ϵ^*), electric-modulus (M^*), and impedance (Z^*) values were calculated from the measured capacitance (C) and conductance (G/ω) data for each voltage at 1kHz and 1 MHz. Experimental results are indicated that all these parameters are strong function of frequency, applied electric-field/voltage, and doping-ratio into PVA. The observed discrepancies depending on frequency and voltage were explained by the existence of interface traps (N_{it}) at interlayer/semiconductor interface, polarization and doping-ratio of CdTe into PVA, and series-resistance (R_s). The Nyquist-curves show double semicircular-arcs for almost each sample. The value of real dielectric constant (ϵ') of 3% and 5% was found as 520 even at 1kHz and 6V which are 37 times higher than the traditional SiO₂ insulator layer. But its value however, the sample with 7% additive content has started to deteriorate. As a result, the best one performance is observed for 3% and 5% samples, and they can be successfully used instead of traditional insulators.

Keywords: Metal/Organic/semiconductor (MPS), (CdTe:PVA) interfacial layer, Dielectric properties; AC conductivity and Nyquist-curves.

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PERYLENE DIIMIDE FUNCTIONAL MATERIALS IN ELECTROCHEMICAL SENSING

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Perylene diimides (PDIs) have emerged as promising functional materials for electrochemical sensing owing to their remarkable electron-accepting capability, excellent thermal and chemical stability, and tunable molecular structure. Their planar π -conjugated framework promotes efficient charge transport and strong π - π interactions, making them highly suitable for electrode surface modification and analytical sensing applications. This study presents an overview of the fundamental properties of PDI-based materials and their role in electrochemical sensing with particular emphasis on electrode interfaces, charge transfer mechanisms, and analytical performance [1].

The electrochemical sensing process, including the functions of working, reference, and counter electrodes, is discussed together with the contribution of PDI-modified interfaces to enhanced electron transfer kinetics, increased surface conductivity, selective molecular recognition, and signal amplification [2]. The charge transfer mechanism is described through the interaction between analytes and PDI-modified electrode surfaces, highlighting the role of PDIs as electron acceptors and charge transport mediators. In addition, the drop-casting technique is introduced as a simple and cost-effective method for fabricating PDI-based sensing films, while cyclic voltammetry is presented as a powerful tool for evaluating redox behavior and electron transfer characteristics.

Recent analytical applications demonstrate the successful use of PDI-based electrochemical sensors for the detection of heavy metal ions, dopamine, and environmental pollutants with high sensitivity and excellent operational stability [3]. Overall, PDI functional materials offer significant advantages for the development of next-generation electrochemical sensing platforms and represent a versatile approach for environmental monitoring, biomedical diagnostics, and analytical chemistry.

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KNOWLEDGE AND ATTITUDES TOWARD WASTE MANAGEMENT AMONG UNIVERSITY STUDENTS: EVIDENCE FROM A UNIVERSITY IN NORTHERN CYPRUS

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Effective waste management has become one of the most critical components of sustainable development due to the increasing challenges associated with rapid urbanization, population growth, and excessive consumption of natural resources. Universities play a significant role in promoting environmental sustainability by developing environmentally responsible behaviors among students, who are expected to become future decision-makers and community leaders.

This study aimed to assess university students' knowledge and attitudes toward waste management while identifying the major barriers preventing active participation in sustainable waste management practices. A quantitative cross-sectional survey was conducted among 384 university students selected through stratified random sampling. Data were collected using a structured questionnaire and analyzed using the Statistical Package for the Social Sciences (SPSS) through descriptive statistical techniques.

The findings revealed that although most students demonstrated positive knowledge and favorable attitudes toward waste management, practical implementation remained limited by institutional and infrastructural constraints. More than ninety percent of participants recognized recycling and waste segregation as essential environmental practices, while over eighty percent reported having adequate knowledge of proper waste management methods. Nevertheless, approximately sixty-two percent had never received formal waste management training. Furthermore, inadequate waste disposal infrastructure, insufficient waste collection bins, and limited accessibility to recycling facilities were identified as the primary obstacles affecting students' participation. The findings suggest that environmental awareness alone is insufficient to ensure sustainable waste management behavior. Universities should therefore complement environmental education with improved campus infrastructure, effective institutional policies, and practical sustainability initiatives. Such integrated strategies would significantly contribute to achieving Sustainable Development Goal 12 (Responsible Consumption and Production) while promoting environmentally responsible behavior among future generations.



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SIMULATING THE GROUND STATE OF HEISENBERG SPIN CHAINS: A BENCHMARK OF CLASSICAL VS. NISQ QUANTUM METHODS

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Simulating quantum many-body systems is computationally challenging due to the exponential scaling of the Hilbert space. We benchmark the ability of Noisy Intermediate-Scale Quantum (NISQ) algorithms to reproduce the ground state of spin-1/2 Heisenberg chains against classical numerical methods. We consider the isotropic (XXX), partially anisotropic (XXZ), and fully anisotropic (XYZ) regimes of the Heisenberg Hamiltonian, establishing classical benchmarks via Exact Diagonalisation (ED) and Density Matrix Renormalisation Group (DMRG), and using Quantum Monte Carlo (QMC) to probe the boundaries of the sign problem in frustrated geometries. In the quantum regime, we compute ground-state energies with the Variational Quantum Eigensolver (VQE) on an IBM Quantum hardware-calibrated simulator. To mitigate decoherence and gate errors characteristic of the NISQ era, we introduce a unified Quantum Error Mitigation (QEM) pipeline combining Twirled Readout Error eXtinction (T-REx), Symmetry Verification, and Zero-Noise Extrapolation (ZNE). Our results show that mitigated VQE reaches target fidelities for smaller chains ($N = 4, 6$), while accumulated gate errors and qubit-routing overhead limit attainable accuracy for larger systems ($N = 8, 10$). This direct comparison of classical tensor-network methods and hybrid quantum algorithms provides a methodological foundation for future simulations on utility-scale quantum hardware.

Keywords: Heisenberg Spin Chain, Quantum Simulation, Variational Quantum Eigensolver (VQE), Noisy Intermediate-Scale Quantum (NISQ), Quantum Error Mitigation, Density Matrix Renormalization Group (DMRG), Exact Diagonalization.



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A NOVEL FLUORESCENT pH SENSOR BASED ON BENZOPURPURIN 4B-FUNCTIONALIZED PERYLENE DIIMIDE: SYNTHESIS, CHARACTERIZATION, PHOTOPHYSICAL, PHOTOCHEMICAL, AND SENSOR PROPERTIES

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Perylene diimides (PDIs) are attractive functional chromophores for fluorescent sensing applications owing to their exceptional thermal and photochemical stability, strong absorption, high fluorescence quantum yield, and electron-accepting properties [1]. Benzopurpurin 4B, on the other hand, is a bis-azo dye commonly used as a textile dye and a biological stain, and it also exhibits pH-sensing properties [2]. Combining these two important dyes provides a promising strategy for developing optical and fluorescent pH-sensing materials with enhanced functional properties.

In this study, a novel Benzopurpurin 4B-functionalized perylene diimide (**3**) was successfully synthesized. Its structural, optical, thermal, and electrochemical properties were investigated in detail using NMR, FTIR, UV-visible and fluorescence spectroscopy, TGA, DSC, and electrochemical techniques. Its properties were compared with Benzopurpurin 4B (**2**) [1]. Compound **3** exhibited good solubility in polar protic solvents but limited solubility in non-polar solvents. The optical studies of compound **3** revealed characteristic perylene-based absorption and emission features together with molecular aggregates similar to those of compound **2** in common organic solvents and in acids [1, 2]. The low fluorescence quantum yield of compound **3** showed a good correlation with aggregation. The free amino groups play a pivotal role in the pH sensor strength [3]. Due to the protonation of free amino groups in the structure, compound **3** exhibited different colours at different pH values under daylight and UV light, especially at low pH values. Compound **3** exhibits a broad excimer-like emission in *m*-cresol due to hydrogen bond formation. Thermal analysis demonstrates that the presence of the perylene structure increased thermal stability up to 440 °C, while no glass transition temperature was observed in the DSC run up to 350 °C. Electrochemical studies revealed two reversible one-electron reduction steps in DMF, whereas only one reversible one-electron reduction step in the solid state. Notably, the overall properties make compound **3** a promising candidate for pH-sensing technologies and photovoltaic applications.

Keywords: Perylene dye, Benzopurpurin 4B, Azo dye, pH sensor, Aggregation.

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QUANTUM CONFINEMENT IN CURVED NANOSTRUCTURES

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The quantum behavior of particles confined to curved nanostructures is profoundly influenced by the interplay between surface geometry and external fields. In this work, we present an analytical study of quantum confinement in spherocylindrical nanostructures by investigating two complementary systems: a free quantum particle confined to the surface of a spherocylindrical capsule and a spinless electron confined to a spherocylindrical nanotube subjected to a uniform axial magnetic field. Using the thin-layer quantization formalism, we derive the effective surface Schrödinger equation, including the curvature-induced geometric potential, and obtain exact analytical solutions for the corresponding quantum states. This unified framework enables a systematic investigation of the combined effects of surface geometry, boundary conditions, and magnetic fields on confined quantum particles.

For the field-free system, the energy spectrum and eigenfunctions are found to depend strongly on the aspect ratio of the spherocylindrical geometry, highlighting the fundamental role of surface curvature in quantum confinement. In the presence of an axial magnetic field, the electron undergoes a pronounced localization on the hemispherical caps once the magnetic field exceeds a critical strength, accompanied by significant changes in both the probability density and the energy spectrum. Exact solutions expressed in terms of confluent Heun functions accurately describe the transition from delocalized to localized quantum states and provide a detailed description of the localization phenomenon.

These findings demonstrate how curvature, boundary conditions, and external magnetic fields jointly govern quantum confinement in curved nanostructures, providing theoretical insight into geometry-controlled quantum systems and offering guidance for future studies of curved nanoscale quantum devices.

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ARCHAEOMETRIC ANALYSIS OF CERAMICS FROM KRAL TEPESİ, MUSTAFA KARATAŞ AND TRAHONAS HALASMATA USING FTIR SPECTROSCOPY AND PRINCIPAL COMPONENT ANALYSIS

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The raw material characteristics and potential functions of ceramic artifacts recovered from the settlements of Kral Tepesi, Mustafa Karataş, and Trahonas Halasmata were evaluated using FTIR spectroscopy and multivariate statistical methods. Spectroscopic analyses indicate that all analyzed ceramic samples were produced from calcareous clay sources and subjected to relatively low firing temperatures where the calcite mineral structure was preserved. Technical differences were observed among the settlement groups in spectral regions corresponding to organic residues and secondary mineral formations.

The main focus of the study is the evaluation of spectral data through Principal Component Analysis (PCA) and clustering methods. When using only the first two principal components (PC1 and PC2) in the analyses, although technical differences between settlements were visually noticeable, a statistically meaningful and natural cluster structure could not be achieved. In contrast, with the inclusion of the third principal component (PC3) into the model, it was determined that the technical separation within the dataset was also statistically validated.

The spectral contributions observed in PC3 loadings were found to be associated particularly with the distinctive mineralogical characteristics of the KT group. The clustering analysis performed using PC1, PC2, and PC3 components directly overlaps with the group separations defined as a result of petrographic examinations. The findings demonstrate that lower-order principal components explaining lower variance can contain critical diagnostic information in archaeometric evaluations, and that chemometric classifications based on FTIR data can serve as a supportive tool not only for evaluating firing temperatures/processes¹² but also for petrographic groupings.

¹ Li, G., Li, X., Dong, J., Wang, X., Gao, L., Liu, F., ... & Dong, G. (2025). Decoding ancient charcoal formation and post-deposition: Insights from chemical composition analysis. *Journal of Archaeological Science: Reports*, 61, 104963.

² Akyuz, S., Celik, S., Kurap, G., Ozel, A. E., & Basaran, S. (2023). Investigations of black and red figure pottery shards and local clay, excavated at Ainos (Enez-Turkey), by multiple analytical techniques. *Vibrational Spectroscopy*, 129, 103613.



A COMPARISON OF THE FHWA (1999) AND KDYY (2022) DESIGN APPROACHES FOR DEEP EXCAVATION SUPPORT SYSTEMS USING NUMERICAL ANALYSES

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The safe design of deep excavation support systems depends not only on the accurate characterization of soil properties but also on the design approach used. The FHWA (1999) design principles, widely used in international practice, and the Excavation Support Structures Regulation (KDYY, 2022), which has entered into force in Türkiye, serve the same engineering objective in the design of anchored diaphragm wall systems; however, they contain different design principles regarding the sizing of the anchor root zone, the determination of load-carrying capacity, and the safety approach. In this study, the effects of these two design approaches on the behavior of an anchored deep excavation system were evaluated comparatively using numerical analyses.

As part of this study, a multi-row anchored diaphragm wall system was designed in accordance with FHWA (1999) and KDYY (2022) guidelines, considering the local soil class ZC. The designed system was modelled using the PLAXIS 2D software, which employs the finite element method, and static analyses were performed first. Following the static analyses, the system was subjected to a time-domain dynamic analysis using an earthquake record with a magnitude of $M_w=6.1$. As part of the analyses, horizontal displacements, anchor forces, and internal forces developed in the diaphragm wall were examined comparatively.

The results of the static analysis showed that, in both design approaches, the anchorage forces remained within the design capacity limits and that the system met the serviceability criteria. In dynamic analyses, although there was an increase in anchorage forces and horizontal displacements under the effect of an earthquake with a magnitude of $M_w=6.1$, the system maintained its overall stability. Nevertheless, the differences between the two design approaches in terms of anchor bond length determination and safety factor formulation significantly affected the deformation characteristics and overall performance of the support system. In the FHWA (1999) approach, the anchor root length is determined based on analytical calculations, whereas in the KDYY (2022) approach, the root bearing capacity is established by the designer based on minimum design criteria; these differences have led to distinct results, particularly regarding deformation behavior.

The study found that while the FHWA (1999) and KDYY (2022) design approaches are based on the same engineering principles, the methods used in anchor design can influence the behavior of the support system. The findings indicate that the design of anchored deep excavation systems must consider not only bearing capacity but also deformation behavior, highlighting the importance of a performance-based design approach.

Keywords: Deep Excavation, Anchored Diaphragm Wall, FHWA (1999), KDYY (2022), PLAXIS 2D, Finite Element Method.



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INFLUENCE OF DIFFERENT DOPANTS ON THE CRYSTAL STRUCTURE, OPTICAL RESPONSE, AND ELECTRICAL BEHAVIOR OF THIN FILMS

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Titanium dioxide (TiO₂) is a widely studied semiconductor material because of its broad range of applications in photocatalysis, photovoltaics, and transparent electronic devices. Optimizing its structural, optical, and electrical characteristics through doping is an effective strategy for improving material performance in these applications [1-2]. In this study, the influence of different dopants on the fundamental properties of TiO₂ thin films was systematically investigated.

Structural characterization confirmed that the thin films preserved their crystalline phase after doping, while slight variations in lattice parameters indicated successful incorporation of dopant atoms into the host structure. Optical analysis revealed that the introduction of dopants caused only minor changes in the optical response of the films. Electrical measurements demonstrated that charge transport characteristics were affected by the type of dopant, highlighting the relationship between dopant incorporation and carrier transport behavior.

The results demonstrate that appropriate dopant selection can effectively tailor the structural, optical, and electrical properties of TiO₂ thin films. These findings contribute to the development of optimized semiconductor materials for future optoelectronic and energy-related applications.

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MACHINE LEARNING APPLICATIONS IN TURKISH FORESTRY RESEARCH: A BIBLIOMETRIC PERFORMANCE ANALYSIS AND SCIENCE MAPPING (2000-2025)

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Machine learning (ML) models have become widely used across various forestry disciplines in recent years due to their strong classification and prediction performance. Because of advantages such as ease of data processing, model generalizability, and high prediction accuracy, ML has been successfully applied to areas including forest fires, insect damage, biomass estimation, forest inventory, and landslide susceptibility. This paper aims to analyze the use of ML in Turkish forestry using a bibliometric approach. In this context, the literature on the use of machine learning in forestry will be examined using bibliometric analysis, and prominent research topics, publication trends, influential authors, and institutions will be evaluated. The results will reveal gaps in the literature on this subject and guide future studies. For this purpose, studies in forestry that use ML between 2000 and 2025 and are indexed in the Web of Science (WoS) database (SCI-E and SSCI) will be considered. Bibliometric analysis was performed using VOSviewer software for its advantages. To improve the consistency of the results, the data were corrected by checking for duplicate records and for incorrect or missing author and institution names. An examination of studies indexed in the WoS database between 2000 and 2025 revealed a significant increase in the use of ML in forestry research in Türkiye over the last decade. Despite the increase in the number of publications, the field remains quantitatively limited. This indicates that the ML method has potential for development within Turkish forestry research. Therefore, we should prioritize strengthening international and interdisciplinary collaborations, promoting the use of open-access data, and focusing on applying next-generation artificial intelligence approaches to forestry research. This will increase the scientific impact and international visibility of Turkish forestry research.

Keywords: Bibliometric Analysis, Machine Learning, VOSviewer



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LIVED EXPERIENCES AND PERCEPTIONS OF NURSES WORKING IN SOUTHEAST NIGERIA ON OCCUPATIONAL HAZARDS, HAZARDS MITIGATIONS AND THEIR EFFECTS ON QUALITY OF WORK- LIFE AND JOB SECURITY

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Background: Occupational hazards poses a significant challenge to healthcare systems worldwide within the nursing profession, with direct implications for patient care quality because they have a key role in responding to the needs of ill patients. Nurses work-related health is not yet prioritized in Nigeria. Their work is often accompanied by poorly maintained hospitals and clinics, shortage of medical equipment and supplies, inadequate manpower, limited use of protective equipment, and weak healthcare system management. The aim of this study is to explain the experiences and perception of nurses concerning occupational hazards and hazard mitigation, on their quality of work-life and job security.

Method: This qualitative study employed an established content analysis approach. Data were collected between November 2025 and January 2026 through a semi-structured individual interviews with 16 registered nurses working south east, Nigeria. Graneheim and Lundman, (2004) content analysis approach served as a guide and was reported in accordance with the recommendations of Lindgren et al., 2020.

Results: Five main themes with belonging nineteen subthemes were constructed from the analysis. The themes included: (1) multidimensional occupational hazards in nursing practice; (2) fragmented and uneven hazard mitigation systems; (3) occupational hazards as a determinant of quality of work life; (4) job security, economic reality, and retention decisions; (5) nurse-driven solutions and system reform advocacy.

Conclusions: Our study highlighted nurses' experiences with different occupational hazards that affect their normal duties and responsibility in the workplace. Development of practical approaches on elimination of occupational hazards through combining expert knowledge and lived experience of nurses are essential for improvement and promotion of their health and wellbeing.

Keywords: Occupational Hazards; Hazards mitigation; quality of work-life; job security; Nurses; Qualitative Research



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DECONTAMINATION PARADOX: HOW REMOVING BENCHMARK OVERLAP CAN BIAS CROSS-DATASET PHISHING EVALUATION

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Phishing URL detection models often report strong results on benchmark datasets, but these results can change when models are tested on data from another source. This study examines whether such cross-dataset evaluation provides a reliable picture when the datasets overlap and have different class distributions.

Two public phishing URL datasets, PhiUSIIL and LegitPhish, were compared at both the URL and registrable-domain levels. The audit found 36,945 shared URLs and 36,531 shared registrable domains. All shared URLs were labelled legitimate in both datasets, with no label disagreements. Upon removal of the overlapping domains, 99.27% of legitimate URLs and just 2.93% of Phishing URLs in LegitPhish were removed, thus leaving the external test set with 99.56% phishing. After that, the lexical URL features were used to evaluate the Logistic Regression and XGBoost models. The false-positive rates achieved by both models over the external set were quite high at 90.18% and 94.55%.

Despite that, the ROC-AUC of XGBoost maintained a score of 0.967 on the two data sets, internal and external. The large increase in false positives also appears to be related to the change in class distribution with a fixed decision threshold rather than a total loss of discrimination. The SHAP analysis showed that high agreement in feature ranks does not imply stable explanations since some feature contributions have switched in direction across datasets.

The outcomes reveal the importance of assessing dataset overlap, class constitution, decision threshold and explanation stability while assessing phishing detection models across datasets.

Keywords: Phishing URL Detection; Machine Learning; Cross-Dataset Evaluation; Dataset Decontamination; Explainable Artificial Intelligence



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ADMITTANCE SPECTROSCOPY ANALYSIS OF Au/rGO–CoFe₂O₄:PVA/n-Si SCHOTTKY DIODES UNDER TEMPERATURE VARIATION

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In this study, the temperature-dependent admittance response of Au/rGO–CoFe₂O₄/n-Si Schottky diodes was investigated by capacitance–voltage (C–V) and conductance–voltage (G/ω–V) measurements at 500 kHz in the temperature range of 90–420 K. The experimental results revealed that both capacitance and conductance are strongly dependent on temperature and applied bias voltage. The capacitance values increased with increasing forward bias and became more pronounced at higher temperatures, particularly in the accumulation region. This behavior can be attributed to the narrowing of the depletion region, thermally activated charge carriers, and the reordering/restructuring of interface charges at the rGO–CoFe₂O₄/n-Si interface. Similarly, the G/ω–V characteristics increased with increasing temperature and forward bias, indicating enhanced carrier mobility and charge emission from interface-related trap states.

The main electrical parameters of the diode were extracted from the C⁻²–V characteristics. The obtained results showed that the built-in potential, barrier height, carrier concentration, and depletion layer width are sensitive to temperature variation. The series resistance was found to be strongly dependent on both voltage and temperature, indicating its significant influence on the measured admittance behavior. These findings suggest that the rGO–CoFe₂O₄ composite interfacial layer plays an important role in controlling interface polarization, charge transport, and junction properties in Si-based Schottky diode structures.



ELECTROCHEMICAL DETECTION OF DOPAMINE USING CARBON PASTE ELECTRODE MODIFIED WITH ZINC OXIDE NANOPARTICLES

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Dopamine is a crucial neurotransmitter that has a significant role in motor function, cognition, and emotional responses. Abnormal dopamine levels are associated with several neurological disorders including Parkinson's disease and Schizophrenia, and Alzheimer's disease hence the need for reliable, rapid and sensitive methods. Even though the traditional methods like high-performance liquid chromatography and fluorescence spectroscopy are highly accurate, their usage entails sophisticated, time-consuming procedures and expensive equipment. Electrochemical sensors have become popular because of their simplicity, quick responses, high sensitivity, and economy. In this study, a novel electrochemical sensor for dopamine detection was developed using a carbon paste electrode modified with zinc oxide nanoparticles synthesized via a chemical precipitation method and incorporated into the carbon paste matrix to enhance the electrode electrocatalytic activity. The sensor's electrochemical performance was assessed by Cyclic Voltammetry (CV) and Differential Pulse Voltammetry (DPV), revealing improved activity for dopamine oxidation. A well-defined peak dopamine was observed at approximately 0.25 V. The sensor showed a good linear concentration response in the 5–100 μM and 5–200 nM ranges with R^2 values of 0.9920 and 0.9903, respectively and a good detection limit of 0.032 μM and quantification limit of 0.107 μM . The study highlights the sensor's excellent sensitivity and analytical capabilities with significant promise for use in the neurochemical studies and biomedical diagnostics, carbon paste electrode modified with zinc oxide nanoparticles offers an affordable, dependable and straightforward platform for dopamine detection.

Keywords: Electrochemical sensor, Zinc Oxide Nanoparticles, Carbon Paste Electrode, Differential Pulse Voltammetry



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OCCUPATIONAL HEALTH AND SAFETY RISK ASSESSMENT IN FOREST FIRE: AN L-TYPE MATRIX APPROACH

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In recent years, as in the rest of the world, Türkiye has experienced a significant increase in forest fires and burned area due to climate change. These fires negatively affect forest ecosystem functions, human health, wildlife, and the value of forest products. These fires also pose significant occupational health and safety risks to all individuals involved in firefighting. This study addresses the occupational health and safety risks faced by personnel working on forest fire crews. Personnel involved in fighting forest fires face numerous risks, including high temperatures, dense smoke, physical fatigue, toxic gases, and challenging terrain conditions.

This study, using forest fires in Türkiye as an example, evaluated seven risks (smoke inhalation, flame contact, high temperature, falls/slips, toxic gas exposure, lack of personal protective equipment (PPE), and equipment failure) using the L-Type Matrix method and presented preventive recommendations. The L-Type Matrix method was chosen for its ease of use and its ability to systematically analyze events by probability and severity. The results showed that the elements in the highest-risk group were smoke inhalation, high temperatures, lack of PPE, and equipment failures. This study highlights that measures such as mandating PPE use, regularly maintaining fire-extinguishing equipment, and providing regular training to personnel should be prioritized to ensure occupational health and safety. In conclusion, controlling forest fires requires not only the physical control of the fire but also the health and safety of the workers.

Keywords: Forest Fire, L-Type Matrix, Smoke Inhalation



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STABILITY ANALYSIS OF POSITIVE AND NEGATIVE FEEDBACK CIRCUITS USING NON-IDEAL OP-AMP MODELS

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Numerous analog electronic circuits, including amplifiers, filters, oscillators, and control systems, rely on operational amplifiers (Op-Amps) as fundamental building blocks. The stability of such circuits is strongly influenced by the employed feedback topology and the operational amplifier's non-ideal characteristics. In practical systems, Op-Amps exhibit non-ideal behaviors such as finite input resistance, non-zero output resistance, and frequency-dependent open-loop gain. Hence, the stability of feedback-based Op-Amp circuits should be studied with a non-ideal Op-Amp model for practical circuit design.

In this study, the stability properties of positive and negative feedback Op-Amp topologies are studied using a non-ideal Op-Amp model. The adopted model includes a finite input resistance, an output resistance, and a voltage-controlled dependent voltage source representing the frequency-dependent open-loop gain. Based on this model, positive and negative feedback configurations are reformulated, and the corresponding nodal equations are derived using Kirchhoff's laws. The voltage transfer functions of the feedback circuits are then obtained analytically from these equations.

The stability analysis is performed through the characteristic equations derived from the denominators of the obtained transfer functions. The analytical results show that, under the selected circuit parameters, the positive feedback configuration is unstable, whereas the negative feedback configuration is asymptotically stable. Time-domain analyses are performed on the proposed circuit models to verify the analytical results. In this respect, the circuit-level simulations are conducted in the ORCAD PSPICE environment, while the frequency-domain and time-domain responses of the derived transfer functions are investigated in MATLAB. The simulation results are consistent with the theoretical analysis and verify the significant effects of the feedback topology and non-ideal Op-Amp parameters on circuit stability.

Keywords: Active circuit elements, feedback circuits, stability analysis.



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APPLICATIONS OF NANOMATERIALS FOR THE DIAGNOSIS OF CANCER

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Silver oxide nanoparticles (AgO NPs) are wonderful material and having great potential towards biomedical applications. Silver oxide nanoparticle (AgO NPs) were synthesized via Chemical Aqueous method and characterized by applying manifold available techniques. X-ray diffraction (XRD) was used to study the structural property of nanoparticle crystals and the surface morphology of synthesized nanoparticles was studied by scanning electron microscope (SEM). Phototoxic and cytotoxic effects of grown particles were examined by conduction various relevant experimental techniques on hepatocellular (HepG2 Cell line) model. The obtained results were verified by applying polynomial fit which confirmed the goodness of fit. AgO NPs have unique biointeraction characteristics and physicochemical properties such as anticancer and antibacterial agent. This study will be helpful particularly for real treatment of malignant/pre-malignant conditions.



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THE IMPACT OF OCCUPATIONAL HAZARDS AND HAZARD MITIGATION ON NURSES' QUALITY OF WORK LIFE AND JOB SECURITY IN SOUTHEASTERN NIGERIA

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Occupational hazards remain a major challenge for nurses, particularly in resource-constrained healthcare settings where inadequate hazard mitigation may adversely affect employees' quality of work life and perceptions of job security. This study examined the relationships among occupational hazards, hazard mitigation, quality of work life, and job security, and investigated the mediating role of quality of work life.

A cross-sectional survey was conducted among 415 nurses working in Southeastern Nigeria. Data were collected using validated questionnaires assessing occupational hazards, hazard mitigation, quality of work life, and job security. Statistical analyses were performed using SPSS 26.0 and PROCESS v5.0.

Occupational hazards and hazard mitigation were significantly associated with both quality of work life and job security. Quality of work life was positively associated with job security. Mediation analysis showed that quality of work life partially mediated the relationship between occupational hazards and job security, while it fully mediated the relationship between hazard mitigation and job security.

These findings suggest that reducing occupational hazards and strengthening hazard mitigation strategies may improve nurses' quality of work life and enhance perceptions of job security. Investing in safer work environments, adequate resources, and organisational support may contribute to a more sustainable nursing workforce.



SYNTHESIS AND CHARACTERIZATION OF SWALLOW TAIL BAY-FUNCTIONALIZED NOVEL PERYLENE BISIMIDES

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Perylene-3,4,9,10-tetracarboxylic bisimides (PDIs) are substances of considerable scientific and industrial attention owing to their remarkable properties, such as exceptional absorption, fluorescence, photochemical, electrochemical properties, and thermal and photochemical stabilities. These characteristics of PDIs are distinctive properties which lead to outstanding research development regarding their uses in organic solar cells, sensors, optical switches, and photoconduction materials [1].

In the present study, two novel bay functionalized PDIs have been designed, synthesized, purified and characterized, successfully. In these syntheses, 2-decyl-1-tetradecanoyl was used as a swallow tail type electron donating substituent at the bay core. These products have shown high thermal stability which is important for industrial applications. Also, they have represented broad absorbance through the UV-vis-NIR region with a robust fluorescence quenching and sufficient solubility with very poor fluorescence that could be significant for production of LCD color filters. Interestingly, a single and broad reversible reduction bands are observed in their electrochemical studies. The results could lead to further production of sterically and stereochemically controlled conductive PDIs which could direct the design of useful photo-, electro-, and optoelectronic materials.

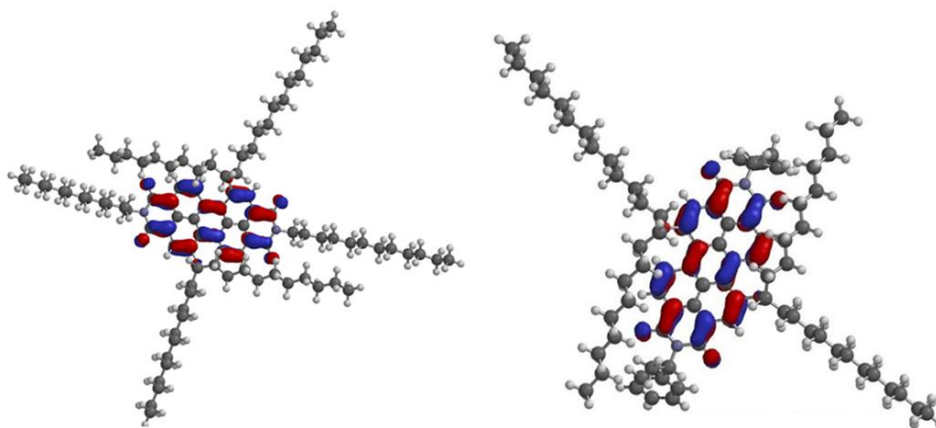


Figure: Molecular orbitals of bay functionalized PDIs.

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AIR INFILTRATION RATE MEASUREMENT OF AN OFFICE MODULE WITH TRACER GAS CONCENTRATION DECAY METHOD

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Air infiltration rate is volumetric rate of air leakage into a space through adventitious cracks and gaps in the building envelope. Typical paths for infiltration are window joints, door cracks, chimneys, ceiling light fixtures and general imperfections in the building envelope. It is an important parameter as it affects the indoor air quality, hence comfort and energy consumption of the buildings. This work is an effort to measure and evaluate the air infiltration rate of an office module using tracer gas concentration decay method.

The office module is on top floor (third floor) of a building which is located at Famagusta North Cyprus. The module's floor area and volume are 16.75 m² and 50.25 m³ respectively. It has 1.2 m by 1.8 m window facing Northwest direction and an internal door which opens to the corridor of the building. CO₂ which is naturally exhaled by the occupant of the office during the working hours was used as the tracer gas. Testo 400 universal indoor air quality instrument together with CO₂ measuring probe and differential pressure sensor were employed for measuring the decay of the CO₂ concentration in ppm and outdoor-indoor pressure difference in Pa during the unoccupied hours. The simplified tracer mass balance equation i.e. tracer decay equation, was used to evaluate the infiltration rate of the office module. The measurements were done during different days having different outdoor-indoor pressure differences in order to reveal relation between the air infiltration rate and outdoor-indoor pressure difference. This approach can be considered as an early-stage airtightness measurement.

Air infiltration rate and airtightness of buildings of Cyprus are understudied hence this work will be vanguard for the larger campaign of generating the air infiltration characteristics of the buildings of Cyprus. It is intended to carry out the proposed approach for a sample of office spaces and residential buildings in order to reveal the air infiltration rate characteristics and behavior of typical Cyprus buildings. The outcomes obviously will be used for comfort and energy studies in buildings.



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ENERGY PERFORMANCE AND MODELLING OF A CHILLER DURING AN OFF-PEAK SEASON PERIOD

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This study examines how an air-cooled chiller performed during off-peak season in the library building at Eastern Mediterranean University in North Cyprus, using field measurements. This work is also an attempt to develop an early-stage calibrated energy model of the library building.

Energy drawn by the building, its chiller, along with outdoor air temperature and global solar radiation, was monitored from 24 October to 23 November. Over this period, the building used 33.2 MWh of active energy, with 7.0 MWh consumed by the chiller, which operated at an average power factor of 0.65. The findings revealed a clear daily cycling pattern, frequent shutdowns, and lower peak power demand as outdoor temperatures dropped. Chiller demand also rose around midday as solar radiation increased, while analysis of selected days showed a 0.5 to 1 hour delay between peak weather conditions and peak chiller demand, reflecting the effects of building thermal inertia and control system response. The DesignBuilder model was able to capture the general operating behaviour reasonably well, including on/off cycling and shutdown periods, but it overestimated peak power, suggesting that additional calibration is still needed.



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WHERE PV DIAGNOSTICS RESEARCH STOPS: A FIVE-STAGE AUDIT FROM DETECTION TO COST-BENEFIT DECISION-MAKING

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Deep learning and multimodal fusion architectures have been used in photovoltaic (PV) systems to achieve high Detection and Classification accuracies of over 95 – 99 % using electrical, thermal and electroluminescence imaging modalities; however, Detection and Classification do not alone provide an actionable maintenance outcome.

This paper will argue that PV diagnostics research has concentrated on a narrow segment of the problem space of detecting and labelling faults while the steps necessary to translate predictions into deployable decisions remain relatively under addressed.

The authors present a five-stage diagnostic pipeline for PV diagnoses; detection, Localization, classification, Explanation and cost benefit decision as an audit framework by which to evaluate a curation of recent literature on PV Fault detection and diagnosis across four modalities; electrical, thermal, visual and electroluminescent.

Unlike prior surveys of the field organized around fusion strategy or model architecture, the authors map the field by degree of completion of the diagnostic pipelines with respect to each study.

Detection and Classification are both comprehensively addressed within the body of literature reviewed, Localization is unevenly addressed and predominantly found in imaging methods, Explanation is just beginning to emerge within the literature as a post-hoc addition via methods such as gradient class activation mapping (Grad-CAM) and SHAP values, and cost/benefit reasoning is almost entirely absent from machine-learning diagnostics literature existing instead as a separate body of operations-maintenance economics research that rarely engages with the underlying predictive models.

Based on this gap analysis between Fault prediction and the execution of cost-justifiable maintenance actions, the authors outline concrete research directions for closing the distance.



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GREEN SYNTHESIS AND CHARACTERIZATION OF *Brassica rapa subsp. narinosa* SILVER NANOPARTICLES FOR ANTIOXIDANT APPLICATION AND CATALYTIC DEGRADATION OF SELECTED DYES.

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The leaf extract of *Brassica rapa subsp. narinosa* (tatsoi) is used in this study to investigate the green production of silver nanoparticles (AgNPs) and assess their antibacterial, antioxidant, and dye-catalytic degradation properties. Phytochemicals were used in the fast synthesis process as reducing and stabilizing agents; a color shift to dark brown signified successful creation. The presence and characteristics of the nanoparticles, such as a prominent UV absorption peak at 460 nm and a zeta potential of -21.85 mV, indicating stability, were confirmed by characterization techniques such as UV-visible spectroscopy, Fourier Transform-Infrared Spectroscopy (FT-IR), Scanning Electron Microscope (SEM), Zeta sizer, and X-ray diffraction (XRD). Under specified conditions, the produced AgNPs showed substantial catalytic activity, reaching 60% degradation of methylene blue and 90% degradation of safranin. The DPPH assay was also used to evaluate the antioxidant activity. The results showed that the plant extract had higher antioxidant activity than the nanoparticles, with IC₅₀ values of 8.409 µg/ml and 13.40 µg/ml, respectively.

This work demonstrates the possibility of ecologically friendly nanoparticle production for useful uses in antioxidant therapy and dye pollution cleanup in the environment.

Keywords: Tatsoi Plant, Silver NanoParticles, Antimicrobial, Antioxidant, Catalytic Degradation



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ON SOME TOPOLOGICAL PROPERTIES OF ULTRAMETRIC SPACES

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Ultrametric spaces are metric spaces in which the strong triangle inequality $d(x,z) \leq \max \{d(x,y), d(y,z)\}$ holds. This condition gives rise to a distinctive topology: every open ball is also closed, every point of a ball may serve as its center, and any two balls are either disjoint or one is contained in the other. Consequently, ultrametric spaces exhibit a highly separated and hierarchical structure. This study examines these fundamental properties and their topological consequences, with particular emphasis on clopen balls, nested ball structures, and the decomposition of the space into separated components. These observations clarify how the strong triangle inequality distinguishes ultrametric spaces from ordinary metric spaces.



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A TIMETABLE-REFINED MIXED INTEGER PROGRAMMING APPROACH FOR UNIVERSITY EXAMINATION TIMETABLING

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Creating a fair, workable examination timetable is challenging: exams taken by the same student must not overlap, time-slot capacities must be respected, and students need enough time to prepare between exams. To address this, we developed a Timetable-Refined Mixed Integer Programming (TRMIP) approach: a heuristic first builds a feasible timetable by prioritizing high-enrollment courses with many shared students, and this timetable then warm-starts a mixed-integer programming model that refines the schedule while enforcing the main constraints and widening gaps between students' exams. The model was implemented in Python using PuLP and the CBC solver, and tested on five semesters (Fall 2022-23 to Fall 2024-25) of anonymized enrollment data from the Bachelor of Science in Mathematics program at Eastern Mediterranean University.

We compared TRMIP with mixed integer programming, integer programming, genetic algorithm, simulated annealing, local search, and tabu search, assessing average study gap, composite performance score, and execution time. Across the five semesters, TRMIP achieved average study gaps of 48.05–61.50 hours and performance scores of 0.49–0.81. Although no single method excelled on every measure, TRMIP offered the most consistent balance between timetable quality and computational effort; one-way ANOVA with Tukey's HSD test confirmed significant differences from genetic algorithm, local search, mixed integer programming, and tabu search. These results suggest that combining a practical heuristic start with exact optimization yields reliable, student-oriented examination timetables.



TUBE-NUMBER EFFECTS ON THE ELECTROMAGNETIC PERFORMANCE OF A PLASMA ANTENNA

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Plasma-tube-number effects on a ring-configured monopole antenna are numerically investigated. Four models containing 2, 4, 6, and 10 identical plasma-filled quartz tubes were constructed with the same ring radius, tube dimensions, materials, ground plane, coaxial excitation, and open boundaries; only tube number and angular distribution were changed. Full-wave time-domain simulations were performed from 2 to 6 GHz, and S11, -10 dB impedance bandwidth, electric-field distribution, and peak directivity were evaluated. The two-tube configuration produced its deepest resonance at 3.448 GHz with S11 = -27.84 dB and a 1.180 GHz bandwidth. With four tubes, the minimum shifted to 3.408 GHz, S11 improved to -34.42 dB, and the bandwidth increased to 1.284 GHz. The six-tube configuration achieved the strongest matching, S11 = -38.10 dB at 3.408 GHz, and the widest continuous bandwidth of 1.320 GHz, with another minimum near 2.944 GHz. In contrast, the ten-tube configuration exhibited a multi-resonant response. Its deepest minimum was -31.35 dB at 3.568 GHz, and its -10 dB response separated into the 3.253-3.326 GHz and 3.492-4.146 GHz intervals, with further minima near 3.880 and 4.056 GHz. Peak directivities for the 2-, 4-, 6-, and 10-tube configurations were 7.280, 6.262, 8.779, and 7.654 dBi, respectively, demonstrating a non-monotonic radiation response. Field maps showed altered distributions around adjacent tubes in the six- and ten-tube layouts, supporting a coupling-based interpretation of resonance splitting. Thus, increasing tube number does not produce monotonic improvement; instead, tube count can be selected according to broadband or multiband matching and radiation requirements.



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MONITORING OF INDOOR RADON IN HISTORICAL BUILDINGS and CULTURAL HERITAGE SITES

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Indoor radon in buildings is a major cause of lung cancer in Europe, a risk enhanced by the exposure to air pollution and tobacco smoke. Radon monitoring is, so, essential for determining the level of human exposure and the associated health risk. Recent literature has highlighted that historical buildings and archaeological sites could be more affected by high indoor Radon activity concentrations than modern ones because of the diffuse presence of cracks, crevices and cavities which can provide pathways for radon to enter and accumulate in unexpected areas as well as the intensive use of natural stones, like tuff, marbles..., rich in radionuclides.

Assessing radon levels in historical buildings is not as straightforward and standard as ordinary structures since the architectural treasures and huge extensions come with inimitable challenges that must be carefully navigated to ensure accurate testing results and effective radon mitigation strategies.

In the context of the regional program RADCAMPANIA, for the assessment of the radon risk in the Campania region, an innovative procedure based on indicators has been developed and the issue of radon monitoring in historical buildings and cultural heritage sites has been overcome. Results of the monitoring campaign performed in two case studies are presented.



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PENTACANE BASED ON THIN FILM ORGANIC PHOTOTRANSISTOR

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The zinc oxide semiconductor thin film transistor was fabricated on a SiO₂/Si substrate by sol gel method. The ZnO film is consisted of nanofibers with the changing diameter along the fibers. Electrical characteristics of the zinc oxide transistor under dark and white light illuminations were analyzed. The mobility value of the ZnO TFT was found to be $1.86 \times 10^{-2} \text{ cm}^2 / \text{V s}$. The ZnO thin film transistor works in an n-channel operational mode because the drain current increases with the positive gate voltages. A significant increase in the drain current of ZnO TFT is observed with a maximum photosensitivity of 100 under visible light illumination. It is concluded that the ZnO thin film transistor can be used in visible photo-detecting device applications.



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ALGINATE ENCAPSULATION OF ENDEMIC NORTHERN CYPRUS ORIGANUM MAJORANA L. VAR. TENUIFOLIUM ESSENTIAL OIL FOR CONTROLLED DELIVERY AND ANTIMICROBIAL ACTIVITY AGAINST ESCHERICHIA COLI

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O. majorana var. *L. tenuifolium* is an aromatic medicinal plant, endemic to Northern Cyprus, with reported antimicrobial activity, but the application of its essential oil (EO) can be limited by its hydrophobicity, volatility, and susceptibility to degradation. Alginate-based encapsulation offers a potential approach for improving the stability and controlling the release of essential oils within the gastrointestinal environment. Essential oil was obtained from dried *O. majorana* var. *L. tenuifolium* leaves, and the EO yield was determined. The chemical composition of the extracted EO was characterized using gas chromatography–mass spectrometry (GC–MS). Alginate beads were prepared as control beads, 10 mg/mL EO-loaded beads, and 15 mg/mL EO-loaded beads. The resulting formulations were evaluated for encapsulation efficiency, swelling behaviour, gel fraction, in vitro EO release, and chemical interactions using Fourier-transform infrared spectroscopy (FTIR). The antibacterial performance of the formulations against *E. coli* was subsequently evaluated using a time-kill assay. These findings support the potential of *O. majorana* var. *L. tenuifolium* EO-loaded alginate beads as a candidate oral/gastrointestinal delivery system for localized antibacterial applications.



AN ELECTROCHEMICAL SENSOR BASED ON MOLECULARLY IMPRINTED POLYMERS FOR SELECTIVE OLEUROPEIN DETECTION

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Oleuropein (OLE) is the major phenolic compound. It is found in olive leaves, olive fruits, and extra virgin olive oil. For food, pharmaceutical, and biomedical applications, it has attracted considerable attention due to its antioxidant, anti-inflammatory, antimicrobial, cardioprotective, and anticancer properties [1].

Conventional methods for oleuropein determination provide accurate results such as high-performance liquid chromatography (HPLC) and liquid chromatography–mass spectrometry (LC–MS). However, these methods require expensive instrumentation, complex sample preparation, and long analysis times. In contrast, electrochemical techniques offer rapid, sensitive, and cost-effective analysis, including cyclic voltammetry (CV) and differential pulse voltammetry (DPV) with minimal sample preparation [2].

In this study, for the selective electrochemical detection of oleuropein, a graphene oxide-modified molecularly imprinted polymer (MIPGO) was prepared on a pencil graphite electrode (PGE). The addition of graphene oxide improved the electrocatalytic activity, active surface area, and electron transfer of the sensor. The electrochemical performance of bare PGE, non-imprinted polymer (NIP)/PGE, molecularly imprinted polymer (MIP)/PGE, and MIPGO/PGE was evaluated using CV and DPV. Among all electrodes toward oleuropein, MIPGO/PGE showed the highest oxidation signal at pH 7.0 with high sensitivity and selectivity. The sensor exhibited a nanomolar detection range, good repeatability, reproducibility, and stability. In addition, successful analysis of real samples demonstrated the potential of the proposed sensor for rapid and reliable phenolic compound detection.

Keywords: Oleuropein, Electrochemical Sensor, Molecularly Imprinted Polymers, Pencil Graphite Electrode,

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SELF-DOPABLE CARBAZOLE-BASED POLYMER SELF-ASSEMBLED MONOLAYERS FOR ENHANCED INTERFACIAL CHARGE TRANSPORT in PEROVSKITE SOLAR CELLS

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Self-assembled monolayers (SAMs) have emerged as highly effective interfacial materials for improving charge extraction and reducing energy losses at the perovskite/charge-transport layer interface in perovskite solar cells (PSCs). In particular, carbazole-based SAMs have attracted considerable attention as hole-selective interfacial materials owing to their suitable energy levels, strong interfacial interactions, and ability to form ultrathin, electronically selective layers on transparent conducting substrates. Molecular engineering of carbazole-based SAMs has enabled substantial improvements in photovoltaic performance; however, the use of molecular SAMs can be accompanied by limitations related to film formation, interfacial coverage, and charge transport. In this context, polymeric SAM architectures offer an attractive strategy for combining the interfacial advantages of SAMs with the improved charge-transport characteristics of conjugated polymers.

In this study, a self-dopable carbazole-based conjugated polymer (PCS-2) was investigated as an alternative polymeric SAM for perovskite solar cell applications and benchmarked against its corresponding monomeric analogue, CS-2 (4-PACz). The electrochemical characteristics of CS-2 and PCS-2 were investigated by cyclic voltammetry and differential pulse voltammetry, while the morphology of their films deposited on FTO/glass substrates was examined by atomic force microscopy. Preliminary photovoltaic device studies revealed a clear performance improvement for PCS-2 compared with CS-2, indicating that polymerization together with the self-doping character of the polymer can facilitate interfacial charge transport. These results demonstrate the potential of the self-dopable carbazole-based polymer SAM as an efficient interfacial material for PSCs, with the power conversion efficiency increasing from **13.48% for the monomeric CS-2 (4-PACz) to 14.65% for the polymeric PCS-2**. This improvement highlights the beneficial effect of polymerization and self-doping on interfacial charge transport and provides a promising basis for further optimization of the polymer structure, film morphology, and device architecture.

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SYNTHESIS OF HIGH-PERFORMANCE ORGANIC SEMICONDUCTORS: PHOTOPHYSICAL, ELECTROCHEMICAL, AND DFT STUDIES

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Naphthalene diimides (NDIs) are electron-deficient aromatic chromophores with remarkable optical and electronic properties, making them attractive molecular platforms for organic semiconductor and fluorescent sensing applications. In particular, core functionalization provides an effective strategy for tuning their electronic structure and photophysical behavior. The water-soluble N,N'-bis(4-sulfophenyl)-1,4,5,8-naphthalene diimide (SNDI) has previously demonstrated high sensitivity and selectivity toward Cu²⁺ ions, highlighting its potential as a fluorescent chemosensor in aqueous media [1]. In this study, the effect of core bromination on the structural, electronic, and optical properties of SNDI was investigated using density functional theory (DFT) and time-dependent density functional theory (TD-DFT) calculations. The brominated derivative (Br-SNDI) was evaluated comparatively with the parent SNDI to elucidate bromination-induced changes in molecular orbital energies and electronic transitions.

Geometry optimizations and electronic-structure calculations revealed a pronounced modification of the frontier molecular orbitals upon bromination. For SNDI, the calculated HOMO-LUMO energy gap was 3.61 eV. Introduction of bromine into the NDI core increased the HOMO energy from -7.24 to -5.52 eV while lowering the LUMO energy from -3.63 to -4.12 eV, resulting in a Br-SNDI energy gap of 1.40 eV and an approximately 61.2% decrease relative to SNDI. This substantial narrowing indicates facilitated electronic excitation and enhanced intramolecular charge-transfer character [2]. TD-DFT calculations further demonstrated modification of the absorption behavior following bromination, with a bathochromic shift toward approximately 380 nm. The theoretically calculated absorption and emission characteristics of SNDI showed good agreement with the available experimental spectroscopic data. Considering the established Cu²⁺ sensitivity and selectivity of SNDI, these bromination-induced electronic and photophysical changes are particularly relevant for assessing whether core functionalization can further modulate its metal-ion sensing performance. These findings highlight Br-SNDI as a promising platform for the future development of tunable water-soluble fluorescent chemosensors.

Keywords: Naphthalene diimide, Bromination, Density functional theory, TD-DFT, HOMO–LUMO, Photophysical properties.

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RECENT ADVANCES IN CURCUMIN-LOADED ELECTROSPUN NANOFIBROUS DRESSINGS FOR DIABETIC WOUND CARE

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Diabetic chronic wounds present severe regenerative barriers driven by persistent oxidative stress, sustained pro-inflammatory macrophage arrest, defective angiogenesis, and resilient microbial biofilm colonization. Curcumin provides broad antioxidant, anti-inflammatory, and antimicrobial properties. However, its clinical utility is fundamentally restricted by poor aqueous solubility and rapid physiological degradation. Electrospun biomimetic nanofibrous scaffolds resolve these biopharmaceutical limitations by delivering high specific surface area and controlled mass-transport release kinetics. This review provides a comprehensive synthesis of modern polymeric formulations and sophisticated structural topologies, including core-shell fibers, nanocapsule-in-nanofiber assemblies, three-dimensional porous aerogels, and asymmetric self-pumping Janus membranes. Furthermore, advanced multifunctional platforms integrating dual pharmaceuticals, inorganic nanozymes, therapeutic stem cells, and wireless optoelectronic sensors are evaluated. Finally, critical engineering and regulatory barriers, such as high-throughput manufacturing, residual solvent clearance, and biocompatibility verification, are systematically assessed to guide successful clinical adoption.

Keywords: Curcumin, Electrospinning, Nanofibers, Wound Healing.



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PYRENE-THIOPHENE-BASED ELECTRODES FOR SUPERCAPACITOR APPLICATIONS VIA ELECTROPOLYMERIZATION

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The increasing demand for efficient energy storage technologies has stimulated significant interest in the development of advanced electrode materials with high energy storage capacity and long-term cycling stability. Among various energy storage systems, supercapacitors have interested considerable attention owing to their fast charge-discharge rates, high-power density and cycling durability. Conjugated polymers can facilitate charge transport due to their extended π -conjugated structures and provide additional pseudo-capacitive charge storage through reversible redox processes. Therefore, integrating conjugated polymers onto highly conductive carbon-based materials such as graphite sheet is considered an effective way to improve electrode conductivity and electrochemical performance.

In this study, a pyrene- and thiophene-based conjugated monomer, 1,3,6,8-tetra(thiophen-2-yl)pyrene (TThP), was synthesized and then employed for the fabrication of a polymer-based electrode through electropolymerization directly onto a graphite sheet electrode surface. The extended π -conjugated structure of the pyrene core, combined with the electron-rich thiophene units was designed to facilitate charge transport and enhance charge-storage capability. The electrochemical performance of the resulting TThP-derived polymer coated graphite sheet electrode was investigated in a three-electrode configuration using cyclic voltammetry (CV), galvanostatic charge-discharge (GCD), and electrochemical impedance spectroscopy (EIS). Specific capacitance, cycling stability and charge-transfer characteristics were systematically evaluated. The P(TThP) based electrode exhibited a specific capacitance of 385 F/g at 1.0 A/g, while 94 % of its initial capacitance was retained after 10.000 charge-discharge cycles. These results demonstrate that the combination of TThP-based conjugated polymer is a promising candidate for sustainable electrochemical energy storage applications.

DEVELOPMENT OF A MOLECULARLY IMPRINTED PENCIL GRAPHITE ELECTRODE FOR THE VOLTAMMETRIC DETECTION OF Hg²⁺ IONS

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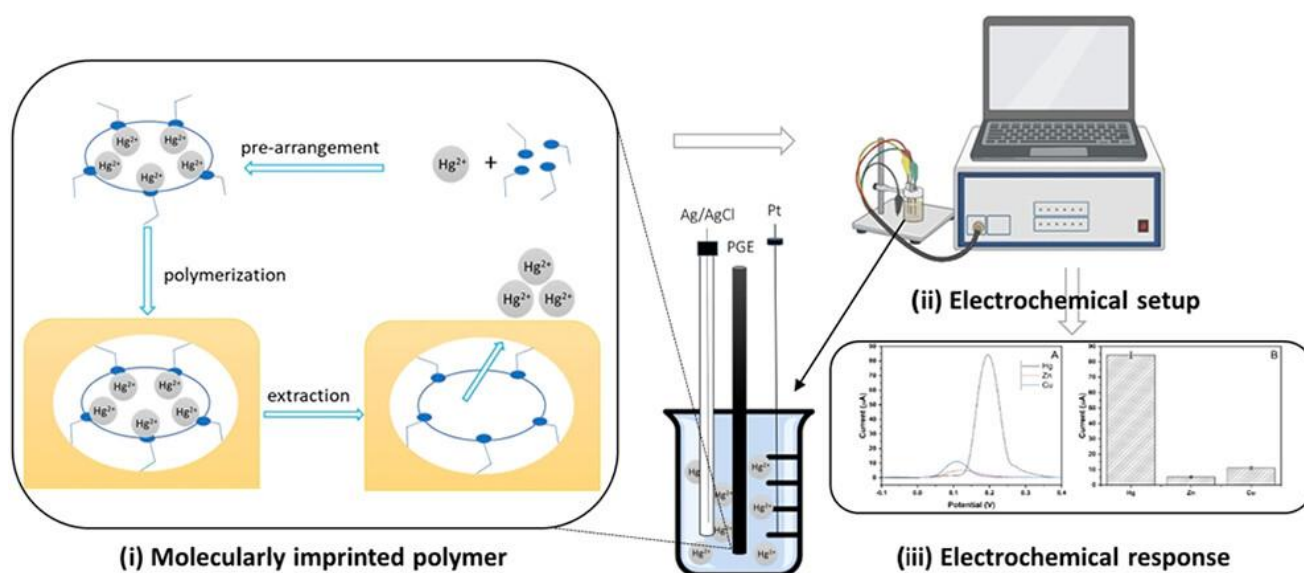
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The ability to detect trace amounts of mercury has become critical due to its possible severe toxic effects on both humans and the environment when exposed to unsafe amounts. This study focuses on developing a novel mercury detection technique using differential pulse anodic stripping voltammetry (DPASV) with a pencil graphite electrode modified with a molecularly imprinted polymer (MIP-PGE). The amino acid-based N-methacryloyl-(L)-cysteine methyl ester (MAC) monomer was used for the imprinting process of Hg²⁺ ions. Fourier transform infrared spectroscopy equipped with an attenuated total reflection (FTIR-ATR), contact angle (CA), and scanning electron microscopy (SEM) was used to characterize the electrochemical sensors. The obtained results revealed that the voltammetric detection method using MIP-PGE was able to accurately detect Hg²⁺ in both aqueous solutions and real samples for different concentrations, with an acceptable linear relationship. This novel sensor demonstrated low detection and quantification limits of 0.188 nM and 0.570 nM, respectively. The produced sensor offers rapid, simple, and cost-effective detection of Hg²⁺ ions.

Keywords: Electrochemical sensor, Ion Imprinting, Pencil Graphite Electrode, Differential Pulse Anodic Stripping Voltammetry



PHOTOCHEMICAL REMEDIATION AND PHASE-SELECTIVE RECOVERY DYNAMICS OF OLIVE MILL WASTEWATER VIA N,N'-BIS(4-SULFOPHENYL)-1,4,5,8-NAPHTHALENE DIIMIDE SENSITIZATION

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Olive mill wastewater (OMWW) represents a major environmental hazard in Mediterranean agrarian economies due to its exceptionally high chemical oxygen demand (COD), acidic nature, and recalcitrant, phytotoxic polyphenolic compounds that strongly resist conventional biological treatment [1-2]. To address this recalcitrance, advanced oxidation processes (AOPs) utilizing solar or ultraviolet radiation have emerged as effective remediation pathways [2]. This study investigates an AOP driven by a water-soluble organic photosensitizer, N,N'-bis(4-sulfophenyl)-1,4,5,8-naphthalene diimide (SNDI), under 365 nm UV irradiation and continuous oxygenation. A three-phase experimental architecture was evaluated to deconvolute degradation kinetics, structural photostability, and matrix-induced inner-filter optical shielding: baseline efficacy in raw OMWW (Phase I), optical shielding mitigation at 1:4 dilution (Phase II), and decoupling photochemical radical pathways from dark aerobic oxidation at 1:9 dilution (Phase III).

Fourier-transform infrared (FTIR) spectroscopic analysis of the treated matrices confirmed extensive photooxidative ring-cleavage of complex polyphenols. This structural transformation was evidenced by the depletion of aromatic C=C skeletal stretches ($\sim 1638\text{ cm}^{-1}$) and out-of-plane aromatic C-H bending ($700\text{-}900\text{ cm}^{-1}$), alongside the emergence of aliphatic C-H signatures ($2920\text{-}2928\text{ cm}^{-1}$) and blue-shifted carboxylic C=O envelopes ($1716\text{-}1740\text{ cm}^{-1}$) in the post-irradiation extracts, aligned with vibrational profiles observed in phenolic extraction matrices [3]. Paired dark controls confirmed that covalent bond cleavage is strictly light driven rather than adsorptive. Furthermore, the persistence of the 1716 cm^{-1} imide carbonyl signal demonstrated the photolytic stability of the SNDI core. Following extraction at $\text{pH} \leq 2.5$ with 5-10% NaCl, the Hofmeister salting-out effect successfully partitioned degraded organic fragments into the upper organic phase while thermodynamically trapping the hydrophilic, divalent anionic SNDI catalyst in the aqueous phase for closed-loop recycling.

Keywords: Olive mill wastewater, Naphthalene diimide, Advanced oxidation processes, FTIR spectroscopy, Phase recovery.

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INFLUENCE of SILVER (Ag) DOPING on the CHARGING-DISCHARGING PROCESSES of MWCNTs ANODES in Li-ion BATTERIES

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Li-ion batteries (LIBs) are recognized as one of the most promising rechargeable batteries due to their long-life span, abundant resources, low toxicity, high thermal stability and high energy density. Traditional LIBs consist of lithium transition metal oxide cathode and graphite anode (342 mAhg⁻¹); both are typical rigid materials. Among these components, anode as an active material development is so important to improve charging-discharging process. Carbon nanotubes (CNTs) have many remarkable properties such as high electrical conductivity which arises from electron delocalization throughout the tubular structure and abundant in nature that make them ideally suited for use in LIBs. However, pristine MWCNTs tissue anodes suffer from extremely high (1000 mAhg⁻¹) irreversible capacity in the first formation cycle, which prevents them from entering the market. As shown in Figure 1, they also increase the available surface area for charge storage and enable synergistic interactions, resulting in electrodes with superior electrochemical properties as compared to their individual components. Among these approaches, the integration of noble metal nanostructures with carbon-based materials has emerged as a promising strategy with significant potential. In particular, silver nanowires (Ag-NWs) have attracted considerable attention owing to their excellent electrical conductivity, mechanical flexibility, and ability to participate in lithium alloying reactions. Furthermore, the optimized Ag-NWs/MWCNTs composite exhibits remarkable electrochemical performance, achieving a high specific capacity of 817 mAh g⁻¹, superior rate capability of 423 mAh g⁻¹ at 5 C, and outstanding cycling stability with a capacity retention of 91.2% after 500 cycles. In this study, it was investigated that the effect of Silver nanoparticle doping ratio (12% and 32%) on the electrochemical performance of multi-walled carbon nanotube (MWCNT) anodes in Li-ion batteries. The structural and morphological studies were conducted using various techniques such as X-ray diffraction (XRD), Raman spectroscopy and FESEM (Field Emission Scanning Electron Microscopy).

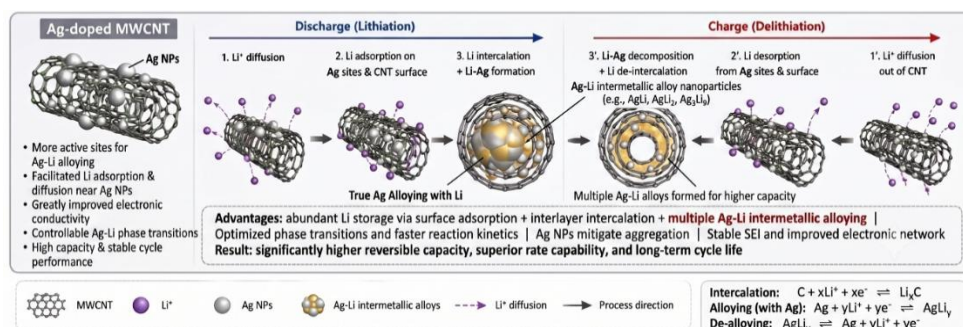


Figure 1. Possible charging-discharging processes of Silver (Ag) MWCNTs anodes in Li-ion batteries



COMPARATIVE PERFORMANCE OF ANTIFOULING MOLECULARLY IMPRINTED PENCIL GRAPHITE AND SCREEN-PRINTED CARBON ELECTRODES FOR ULTRASENSITIVE ELECTROCHEMICAL DETECTION OF VITAMIN B₁₂

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Detecting vitamin B₁₂ (cyanocobalamin) using electrochemical sensors with low-cost, selective chemical structures and portable operation is a difficulty in biomedical, pharmaceutical, and food studies. This study compared the analytical performance of two disposable electrochemical sensing platforms, AF-MIP/PGE and AF-MIP/SPCE, for ultrasensitive vitamin B₁₂ detection. Synthesised molecularly imprinted polymer recognition layers formed cavities for target analyte recognition on both electrode substrates under the identical conditions. We designed an antifouling architecture to reduce non-specific adsorption and improve sensor stability and reproducibility.

Cyclic voltammetry (CV) was utilized to examine the electrochemical characteristics of the sensor, whereas differential pulse voltammetry (DPV) measured the concentrations of vitamin B₁₂. Ideal experimental settings for sensor performance were meticulously determined to enhance analytical sensitivity. An analysis of the two electrode systems revealed notable differences in electrochemical response, signal enhancement, sensitivity, and analytical efficacy. The molecularly imprinted sensors demonstrated a robust linear range, minimal detection thresholds, excellent repeatability, and commendable storage durability, thereby validating the selective molecular recognition abilities of molecule imprinting. The variation in electrode design and surface characteristics influenced electron transport and signal responsiveness, elucidating the preference for disposable electrode platforms in molecularly imprinted electrochemical sensing.

A comparative strategy compares pencil graphite and screen-printed carbon electrodes for vitamin B₁₂ detection, followed by a practical guide for designing high-performance electrochemical sensors for B₁₂ detection using these two active materials. The molecularly imprinted anti-fouling disposable electrodes appear to be a fast, sensitive, and low-cost analytical method with great potential for point-of-care diagnostics, pharmaceutical quality control, food safety monitoring, and future intelligent electrochemical sensing applications.

Keywords: Vitamin B₁₂; Cyanocobalamin; Molecularly imprinted polymer pencil graphite electrode; Screen-printed carbon electrode; Antifouling electrode; cyclic voltammetry, differential pulse voltammetry, electrochemical sensor



ENHANCING THE PERFORMANCE OF EXISTING STRUCTURES WITH FIBER REINFORCED POLYMER COMPOSITES

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Earthquake safety of existing structures is of vital importance in countries located in active seismic zones. It has been observed that, following the earthquakes experienced in recent years in Türkiye, a significant proportion of the existing structures do not satisfy the requirements of modern seismic codes (TDY-2007 and TBDY 2018) and, in addition, exhibit low-strength concrete, insufficient reinforcement, and various types of structural damage. In addition, environmental effects, corrosion, and service loads not considered during structural design throughout the service life of structures result in reductions in structural stiffness. As an alternative to conventional strengthening methods, Fiber Reinforced Polymer (FRP) composites have been used. Fiber Reinforced Polymer (FRP) composites possess significant advantages, including high tensile strength, applicability without increasing the structural weight, high corrosion resistance, and the ability to maintain the use of the structure during application. The commonly used Fiber Reinforced Polymer (FRP) composite types consist of carbon fiber reinforced polymer (CFRP), glass fiber reinforced polymer (GFRP), basalt fiber reinforced polymer (BFRP), and aramid fiber reinforced polymer (AFRP). They are externally applied to structural members such as columns, beams, slabs, and shear walls using the wrapping technique to restrict the lateral expansion of concrete. Consequently, the compressive strength, ductility, and energy dissipation capacity of columns, as well as the flexural and shear capacities of beams and slabs, are significantly enhanced. Although the design of reinforced concrete members strengthened with FRP is based on conventional reinforced concrete design principles, specialized design guidelines, such as ACI 440.2R-17 (2017), CNR-DT 293/R1/2025 (2025) and EN 1992-1-1:2023 (2023) are employed due to the anisotropic and non-ductile behavior of FRP. The strengthening effectiveness of FRP systems is significantly influenced by key application parameters, including surface preparation, bond performance, fiber orientation, and appropriate material selection. Furthermore, the effects of environmental conditions and service conditions on long-term performance should also be considered during the design process. Consequently, FRP composite materials are considered an effective and reliable solution for the strengthening of reinforced concrete structures due to their lightweight nature, high strength, and resistance to corrosion. When properly designed and implemented with high-quality workmanship, FRP applications make a significant contribution to improving the seismic performance, enhancing the durability, and supporting the long-term serviceability of structures.



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COMPARATIVE EVALUATION OF ARTIFICIAL INTELLIGENCE-BASED MODELS FROM ACTIVATED CARBON PRODUCTION TO ADSORPTION PERFORMANCE

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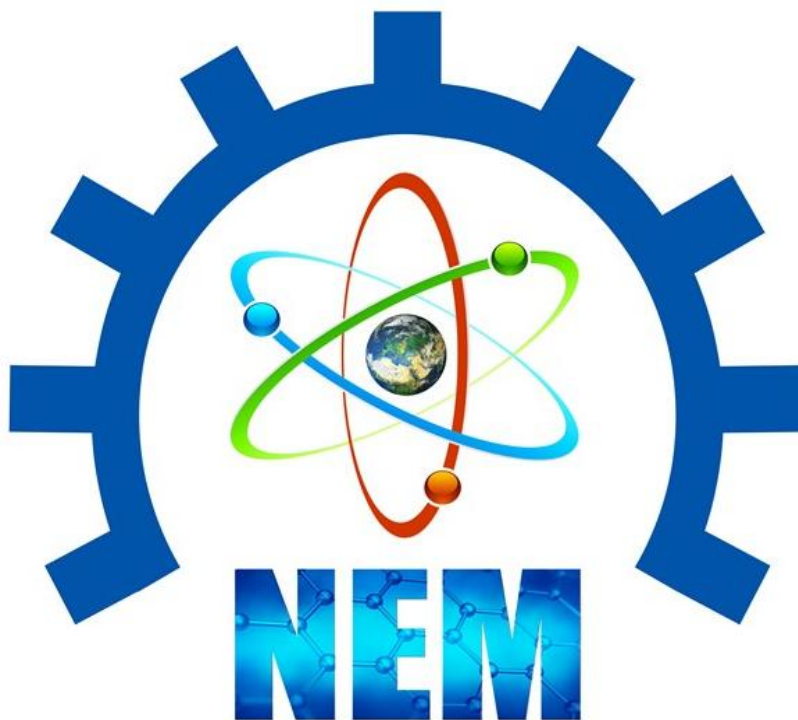
Activated carbon is one of the most widely used carbon-based adsorbents owing to its high specific surface area, well-developed micro- and mesoporous structure, and abundant surface functional groups, making it an indispensable material for water and gas purification applications. The adsorption performance of activated carbon is strongly influenced by production parameters, including the precursor material, activation method, activation temperature, processing time, and chemical activating agents. Because of the complex and nonlinear interactions among these parameters, conventional statistical approaches are often insufficient to accurately describe and predict adsorption behavior.

In recent years, artificial intelligence (AI) and machine learning (ML) algorithms have emerged as powerful data-driven tools for modeling activated carbon production processes and predicting adsorption performance. Approaches such as Artificial Neural Networks (ANN), Random Forest (RF), Gradient Boosting (GB), Support Vector Machines (SVM), and Explainable Artificial Intelligence (XAI) have demonstrated remarkable capability in learning complex relationships from experimental data, enabling accurate prediction of adsorption efficiency while identifying the most influential process variables. This review comprehensively examines recent studies employing artificial intelligence-based models for predicting activated carbon production characteristics and adsorption performance. The published studies are comparatively evaluated in terms of datasets, input parameters, model architectures, performance metrics (R^2 , RMSE, and MAE), prediction accuracy, and application fields. Furthermore, the strengths and limitations of different AI models are critically discussed regarding process optimization and the efficient design of laboratory investigations. The primary objective of this review is to provide a comprehensive assessment of the relationship between activated carbon production processes and adsorption performance through the perspective of artificial intelligence-based modeling while highlighting recent advances and emerging research trends in the literature. The novelty of this review lies in the systematic comparison of various AI algorithms within a unified evaluation framework and in addressing both activated carbon production and adsorption processes simultaneously. The comparative analysis indicates that studies involving Explainable Artificial Intelligence (XAI), hybrid machine learning models, and real-time digital twin-based optimization remain relatively limited. Therefore, future research should focus on developing physically interpretable, explainable, and industrially deployable artificial intelligence models capable of supporting intelligent optimization and decision-making in activated carbon adsorption systems.

Keywords: Activated carbon; adsorption; artificial intelligence; machine learning; adsorption performance prediction; process modeling; explainable artificial intelligence (XAI).



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POSTER PRESENTATION



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COMPARISON OF THE HALF-VALUE LAYER OF TiO₂-DOPED ZnO AND CuO COATINGS

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In order to mitigate the damaging effects of ionizing radiation, research into creating shielding materials that may be utilized as radiation shields has increased recently. This study calculated the Half-Value Layer (HVL), a significant indicator of the radiation shielding capacity of materials planned for use as radiation shields.

For this purpose, ¹³⁷Cs (662 keV) and ⁶⁰Co (1173 keV, 1332 keV) radioactive sources were used. Experimentally obtained half-value layer (HVL) values of titanium dioxide (TiO₂) coatings doped with copper oxide (CuO) and zinc oxide (ZnO) were compared with theoretically calculated values. The calculations showed that the experimental and theoretical values were in agreement.



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INVESTIGATION OF THE OPTICAL BEHAVIOR OF PMMA-SUPPORTED THIN FILM COATINGS

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In the study, to evaluate the optical behavior of extracts obtained from walnut shells, a commonly used sustainable material, in PMMA-supported thin film coatings, coating solutions with different PMMA extract ratios were prepared. Here, PMMA has been used as a polymeric carrier matrix to enhance the coating's homogeneity and ensure the extract adheres more uniformly to the glass surface.

After the coating process, the thin films were annealed and prepared for UV–Vis spectrophotometric analysis. The coating thickness was evaluated as 800 nm, and this value was also used in the optical calculations. The thickness value has been converted to centimeters and included in the calculations.

In conclusion, it was observed that the coatings strongly absorbed high-energy UV light, while absorption decreased in the visible region.

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MORPHOLOGICAL AND MOLECULAR CHARACTERIZATION OF *TRICHODERMA* SPP. ASSOCIATED WITH GREEN MOLD IN EDIBLE MUSHROOMS

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Green mold disease is a major constraint on mushroom production worldwide. This study aimed to characterize *Trichoderma* species associated with green mold disease in mushroom production in Türkiye using morphological and molecular approaches. A total of 56 *Trichoderma* isolates obtained from *Agaricus bisporus* and *Pleurotus ostreatus* production facilities in the Aegean and Marmara regions were characterized through morphological observations and sequence analyses.

Phylogenetic analyses based on sequences of the internal transcribed spacer (ITS) region and the translation elongation factor 1-alpha (*tefl*) gene assigned the isolates to *T. aggressivum*, *T. europaeum*, *T. pleuroticola*, *T. virens*, *T. harzianum*, and *T. afroharzianum*. The *tefl* sequences were more effective than ITS sequences in distinguishing *T. aggressivum* f. *aggressivum* from *T. aggressivum* f. *europaeum*. In particular, *tefl* sequence analysis identified 15 isolates as *T. aggressivum* f. *europaeum*, more than were identified using ITS analysis alone. These findings show that *tefl* complements ITS and improves the identification of closely related *Trichoderma* taxa associated with mushroom green mold.



THE SEGREGATION OF ELEMENTS IN DENDRITIC AND INTERDENDRITIC REGIONS OF TR-Ni738LC

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Nickel-based superalloys are widely used in gas turbine and aerospace applications due to their high-temperature mechanical properties and resistance to oxidation. TR-Ni738LC is one of the most commonly used superalloys in the manufacture of turbine blades.

In this study, the elemental segregation in the dendritic and interdendritic regions of TR-Ni738LC superalloy were systematically investigated. Samples taken from the casting were etched using different etchants, and microstructural characterization of the samples was performed using optical microscopy and scanning electron microscopy (SEM). Quantitative elemental analyses were performed by energy-dispersive X-ray spectroscopy (EDS) to determine the concentration profiles of the principal alloying elements across dendritic and interdendritic regions. The segregation behaviour of elements such as Cr, Co, Mo, W, Nb, Ti, Ta, Al, B and Zr has been investigated.

The results of this study provide a detailed understanding of elemental partitioning in TR-Ni738LC superalloy and highlight the relationship between solidification-induced segregation and microstructural evolution in terms of eutectic pool and carbide distribution.



BATHYMETRIC SURVEY FOR THE CRUISING ROUTES OF ANKARA SAILING CLUB, MOGAN LAKE, ANKARA, TÜRKİYE

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Lake Mogan is a shallow freshwater lake located approximately 20 km south of Ankara, within the boundaries of Gölbaşı district, and constitutes one of the most important wetlands of the Gölbaşı Special Environmental Protection Area. Geologically, the lake is classified as an alluvial barrier lake that developed during the Holocene when alluvial fans (natural barriers) formed by tributary streams dammed the main drainage valley. Continuous sediment and organic matter accumulation has resulted in progressive shallowing of the lake, while this natural process, combined with anthropogenic impacts and eutrophication, poses significant threats to both the sustainability of the lake ecosystem and its recreational use. These issues have been extensively investigated since the 1970s by various public institutions and universities, resulting in numerous scientific publications, graduate theses, and technical reports.

At present, the lake supports intensive recreational navigation, including sailing boats operated by the Ankara Sailing Club (AYK), privately owned sailboats and motor yachts, as well as a municipally operated passenger excursion boat. The increasing vessel traffic has created a growing demand for up-to-date bathymetric information, particularly along marina access routes, around piers, pontoons, and other mooring structures. Accordingly, this study aims to conduct periodic bathymetric surveys throughout the lake, with particular emphasis on the entrance and exit routes of the AYK marina and other critical navigation areas, to process the collected data within a Geographic Information System (GIS) environment, and to produce bathymetric base maps supporting safe navigation.

Within the scope of the study, seven bathymetric survey campaigns were carried out between November 2025 and July 2026 using motorboats provided by the Ankara Sailing Club, together with a handheld single beam digital echo-sounder and Global Positioning System (GPS) equipment supplied by the authors. Approximately 200 depth measurements were collected during the surveys. The results indicate that water depths within the pilot study area generally range between 0.5 and 2.0 m, reaching 3.0–3.5 m toward the central part of the lake. The collected data were compared with previously published bathymetric studies, processed in a GIS environment, and used to produce a bathymetric navigation chart for the pilot area. The resulting dataset is expected to contribute not only to safer navigation on Lake Mogan but also to provide a reference dataset for monitoring temporal changes in lake-bottom morphology and for future bathymetric investigations.



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ARTIFICIAL INTELLIGENCE-BASED EXPERT SYSTEM FOR DIPHThERIA DIAGNOSIS

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Traditional diagnostic methods often rely on the interpretative assessment of laboratory findings and clinical signs, thus leading to delays. Thus, there is a necessity for a rapid, accurate, and economical method to identify infectious diseases, thereby diminishing morbidity and mortality in underdeveloped and developing nations. Despite the extensive research completed by various scholars in the medical field employing different diagnostic methodologies, this study employed a V-P Expert System shell to develop a diphtheria diagnosing system (DDS). This is a rule-based system that utilises a forward-chaining method for diagnostic purposes. It comprises three components: the User Interface for enabling user engagement through query input and result display, the Inference Engine for processing questions and applying rules to reach conclusions, and the Knowledge Base for housing facts, rules, and relationships pertaining to the domain. The knowledge repository was established by aggregating precise information from medical authorities about diphtheria. The system provides an uncomplicated, engaging user interface, facilitating patient diagnosis through microbiological and clinical assessments. Initial evaluations indicate that the system delivers dependable and uniform diagnostic assistance, rendering it advantageous for remote regions with restricted access to healthcare professionals. Nonetheless, its precision is contingent upon the thoroughness of the knowledge repository, and it may be less efficacious in instances featuring unusual symptoms. Prospective enhancements may involve broadening the repository of information and using adaptive learning methodologies. This automated method improves the identification of diphtheria in impoverished areas, leading to better diagnostic and therapeutic results.

Keywords: Clinical Decision Support, Medical Expert System, Artificial Intelligence, Diphtheria Diagnosis, Visual Prolog