ISBN: 978-605-68918-2-3

NEM 2024

ABSTRACT BOOK

4th International Natural Science, Engineering and Material Technologies Conference

September 12-14, 2024, İğneada / Kırklareli

FOREWORD

It is a pleasure for us to offer you this Book of Abstract for the 4th International Natural Science, Engineering and Material Technologies Conference (NEM 2024). Our goal was to create a platform that introduces the newest results on internationally recognized experts to local students and colleagues and simultaneously displays 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 2024 is honored by the presence of over 105 colleagues from various countries. We stayed true to the original NEM 2024 concept and accepted contributions from all fields of materials science and technology to promote multidisciplinary discussions. The focal 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 so many new results, establishing new connections and enjoying the İğneada, Kırklareli ambience will make you feel that your resources were spent well in NEM 2024.

Our warmest thanks go to all invited speakers, authors, and contributors of NEM 2024 for accepting our invitation, visiting İğneada, Kırklareli and using NEM 2024 as a medium for communicating your research results.

We hope that you will enjoy the conference and look forward to meeting you again in one of the forthcoming **NEM 2025** event.

Best regards,
Conference President

Assoc. Prof. Burhan COŞKUN

Editor:

Assoc. Prof. Burhan COŞKUN

Published, September-2024

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PROGRAMME 12 SEPTEMBER 2024 (THURSDAY)	
10:00-10:05	Opening Ceremony
10:05-10:40	**OPENING SPEAKERS** Assoc. Prof. Dr. Burhan COŞKUN / *Conference President* Prof. Dr. Bülent ŞENGÖRÜR / *Rector of Kırklareli University* Derya BULUT / *Mayor of Kırklareli* Assoc. Prof. Dr. Birol EKİCİ / *Governor of Kırklareli*
10:40-12:00	**1st session (Oral Talks)**
10:45:11:15	Invited Talk-1: Prof. Dr. Fahrettin YAKUPHANOĞLU: "PHOTONIC AGRICULTURE FOR NEXT GENERATION"
11:20-11:50	Invited Talk-2: Prof. Dr. Serap GÜNEŞ: "ON THE PERFORMANCE AND STABILITY OF PEROVSKITE SOLAR CELLS"
12:00-13:30	**Lunch**
	HALL 1
13:30-15:00	**2nd session (Oral Talks) Chair: Prof. Dr. Serap Güneş**
13:30-14:00	Invited Talk-3: Prof. Dr. Huriye ICİL: "THE NOVEL, HIGHLY SENSITIVE AND SELECTIVE FLUORESCENT CHEMOSENSORS"
14:00-14:15	O. Karaduman, G. Mutlu, B. Sönmez: "EFFECT OF FILL RATE, INTERNAL STRUCTURE AND PRESS DIRECTION PARAMETERS ON MECHANICAL PROPERTIES OF PARTS PRODUCED BY ADDITIVE MANUFACTURING"
14:15-14:30	S. Çelebi, Ü. Demir: "EFFECT OF USE OF ETHYL ACETATE AS SECOND FUEL IN A DUAL FUEL DIESEL ENGINE ON ENGINE NOISE AND VIBRATION"
14:30-14:45	A. Bozan, R. Oyguç: "INVESTIGATION OF THE EFFECT OF REPLACEABLE PLASTIC HINGE MEMBER ON DIFFERENT TYPES OF FRAMES IN PRECAST REINFORCED CONCRETE STRUCTURES USING ABAQUS SOFTWARE"
14:45-15:00	A. Şenol, İ. C. Kaya: "SURFACE MODIFICATION OF $Cs_2AgBiBr_6$ PEROVSKITE FILM FOR EFFICIENT ALL-INORGANIC LEAD-FREE PEROVSKITE SOLAR CELL FABRICATION"
15:30-16:00	**Coffee Break**
16:00-17:45	**3rd session (oral talks) Chair: Assoc. Prof. Dr. Mustafa Kurban**
16:00-16:15	T. Türk, B. Bahadur, T. Öcalan, Y. Demirel, C. Altuntaş: "A DIFFERENT APPROACH FROM TRADITIONAL METHODS FOR DIRECT GEOREFERENCING IN UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY"
16:15-16:30	B. A. Hanedar: "FIRST PRINCIPLES STUDY OF THE STRUCTURAL AND ELECTRONIC PROPERTIES OF DOPED 2D-GOLDENE MONOLAYER"
16:30-16:45	M. A. Usal: "DEFORMATION CONTROL OF SINGLE LAP ADHESIVE JOINT WITH PIEZOELECTRIC PATCHES BY FINITE ELEMENT METHOD"
16:45-17:00	M. A. Usal: "INVESTIGATION OF AXIAL DEFORMATION OF A PIEZOELECTRIC ROD WITH ANALYTICAL AND NUMERICAL METHODS"

17:15-17:30	H.C. Çekil, B. Özdemir, N.T. Yıldız, M. A. Sabaner, Ü. Dömekeli, F. İşık, S. Şengül, M. Özdemir: "ENERGY BAND STRUCTURE AND ELECTRON-PHONON SCATTERING PROPERTIES OF TWO DIMENSIONAL ZRS_2"
17:30-17:45	H. Karayer, D. Demirhan, C. Aydın and A. Ahmadov: "DIRAC EQUATION for MANNING-ROSEN and a YUKAWA-TYPE POTENTIAL"
18:00-19:00	**Poster Session**

PROGRAMME 12 SEPTEMBER 2024 (THURSDAY) HALL 2	
13:30-15:30	**4th session (oral talks) Chair: Assoc. Prof. Dr. Hale KARAYER**
13:30-13:45	B. Bekar: "CALCULATION OF OPTICAL TRANSITIONS IN AN ARROWHEAD-SHAPED QUANTUM WIRE DEPENDING ON THE ELECTRIC AND LASER FIELD"
13:45-14:00	Ç. Yeşil: "MAXIMUM POWER POINT TRACKING FOR A PHOTOVOLTAIC PANEL USING ARTIFICIAL NEURAL NETWORK"
14:00-14:15	D. D. A. Kamer "MODELING THE INTERACTIONS OF PLANT PROTEINS AND GUMS USING MOLECULAR DOCKING SIMULATION"
14:15-14:30	H. Önder, N. Akkurt, N. Kurnaz Yetim, C. Özcan "RECOVERY OF Cr(VI) AND Pb(II) IONS WITH IONIC LIQUIDS"
14:30-14:45	N. K. Yetim, E. H. Özkan, H. Öğütcü, İ. Özdemir, D. Nartop: "INVESTIGATION OF ANTIBACTERIAL ACTIVITY OF SYNTHESIZED NEW COPPER (II) CONTAINING THIOSEMICARBAZONE COMPLEXES"
14:45-15:00	E. Yalaz: "FABRICATION AND CHARACTERIZATION OF ORGANIC SOLAR CELLS USING LOW BAND GAP POLYMERS"
15:00-15:15	M. Usal, P. K. Akman, F. Törnük: "INVESTIGATION OF MINERAL, BIOACTIVE SUBSTANCE AND PROTEIN BIOACCESSIBILITY OF BOZA OBTAINED USING DIFFERENT STARTER CULTURE COMBINATIONS"
15:15-15:30	M. Usal, H. G. Ağca Küçükaydın, H. Ş. Aloğlu: "HEALTH BENEFITS OF CHIA SEED (Salvia hispanica L.) AND EVALUATION OF ITS USE IN FOOD INDUSTRY"
18:00-19:00	**Poster Session**

PROGRAMME 13 SEPTEMBER 2024 (FRIDAY) HALL 1	
09:30-10:30	**5th session (oral talks) Chair: Prof. Dr. Serpil AKÖZCAN PEHLİVANOĞLU**
09:30-10:00	Invited Talk-4: Prof. Dr. Şemsettin ALTINDAL: "ON THE INTERSECTION AND DOUBLE-EXPONENTIAL BEHAVIOR IN THE FORWARD BIAS CURRENT-VOLTAGE (IF-VF) CURVES AND POSSIBLE CURRENT TRANSPORT MECHANISMS (CTMS) IN Al/(Al_2O_3/Ge)/p-Si HETEROSTRUCTURES IN WIDE TEMPERATURE RANGE OF 90-420K"
10:00-10:30	Invited Talk-5: Prof. Dr. Michele GUIDA: "A MULTIDISCIPLINARY INTRAEUROPEAN FAN OF PROJECTS WITH THE VISION OF PURSUING SUSTAINABILITY, INCLUSION AND WELL-BEING"
10:30-10:45	**Coffee Break**
10:45-12:00	**6th session (oral talks) Chair: Prof. Dr. Cemile ÖZCAN**
10:45-11:00	B.G. Kaynarca, Ş. Y. Karabulut, H. Şanlıdere Aloğlu: "PRODUCTION AND OPTIMIZATION OF GEOGRAPHICALLY INDICATED OAK HONEY POWDER IN A SPRAY DRYER"
11:00-11:15	M.M. Koç: "Ag/MnPc/Si/Ag HETEROJUNCTIONS for SOLAR DETECTOR APPLICATIONS"
11:15-11:30	Z. A. Kurt, S. Özden, S. A. Pehlivanoğlu: "THE STUDY OF TLD-100 AT RADIOTHERAPY DOSE LEVEL"
11:30-11:45	B. Balkan, S. Balkan: "ANTIFUNGAL POTENTIAL OF SOME PLANTS ON INHIBITION OF THE GROWTH AND AFLATOXIN B1 BIOSYNTHESIS OF ASPERGILLUS FLAVUS"
11:45-12:00	I. A. S. Abualsebah, S. Ö. Gönen, S. Çehreli: "GREEN SOLVENT-BASED REACTIVE EXTRACTION OF CITRIC ACID"
12:00-13:30	**Lunch**
13:30-15:30	**7th session (oral talks) Chair: Prof. Dr. Huriye İÇİL**
13:30-14:00	Invited Talk-6: Assoc. Prof. Dr. Mustafa KURBAN: "ELECTRONIC PROPERTIES OF DOPED NANOPARTICLES FOR VARIOUS APPLICATIONS"
14:00-14:15	M. Dinleyici, H. İcil: "SYNTHESIS, PHOTOPHYSICAL AND ELECTROCHEMICAL STUDIES OF NOVEL TRIAZINE-BASED PERYLENE DIIMIDE AND OLIGOMER"
14:15-14:30	P. Karsili, H. İcil: "SYNTHESIS, SELF-ASSEMBLY, OPTICAL AND ELECTRICAL PROPERTIES OF A PLANAR NAPHTHALENE DIIMIDE DERIVATIVE"
14:30-14:45	D. Uzun, H. İcil: "PHOTOINDUCED ELECTRON TRANSFER REACTIONS WITH NAPHTHALENE DIIMIDES AS ELECTRON ACCEPTORS"
14:45-15:00	M. K. Büyükakın, O. Salcı, S. Öztuna: "A CFD STUDY ON HYDROGEN-ENRICHED METHANE COMBUSTION IN A TEST FURNACE"
15:00-15:15	O. Salcı, M. K. Büyükakın, S. Öztuna: "THE EFFECT OF THE DESIGN DIFFERENCES ON HEAT TRANSFER IN ALUMINUM ALLOY INTERNALLY FINNED TUBES"
15:15-15:30	A. Özceçelik, E. Sünbüloğlu: "A COMPARISON OF FATIGUE STRENGTH ASSESSMENT OF SEAM-WELDED JOINTS USING METHODS OF DIFFERENT STANDARTS USED IN RAIL VEHICLE CONSTRUCTION"
15:30-15:45	**Coffee Break**

15:45-18:00	**8th session (oral talks) Chair: Assoc. Prof. Dr. Seda BALKAN**
15:45-16:00	N. Akkurt: "DESIGN, SYNTHESIS AND CHRACTERIZATION OF NOVEL IONIC LIQUIDS"
16:00-16:15	B. Akkurt, G. Ağca Küçükaydin, C. Özcan: "DETERMINATION OF QUERCETIN IN JUJUBE FRUIT BY HPLC-DAD"
16:15-16:30	F. K. Baysak, G. Geyik, C. Özcan: "REMOVAL STUDY of Pb^{2+} ION with PVA/CS-g-PDMAM MEMBRANE"
16:30-16:45	G. Geyik, F. K. Baysak, C. Özcan: "COMPARISON of Ni^{2+} and Cd^{2+} IONS REMOVAL with PVA/PVA-g-EGDMA and PVA/κ-KRG-g-EGDMA MEMBRANES"
16:45-17:00	S. Özden, S. A. Pehlivanoğlu: "EVALUATION OF THE ACTIVITY CONCENTRATIONS OF 137CS AND DOSE RATES IN BEACH SAND ALONG THE AEGEAN SEA COASTLINE"
17:00-17:15	A. B. Demir, Z. Alı-Zada, E. F. Erkan, İ. Dinç, Z. Özcan, F. Algül, H. Algül, M. Uysal, S. Tan, A. Alp: "EFFECT OF SDS SURFACTANT CONCENTRATION AND HEAT TREATMENT TEMPERATURE ON WEAR, CORROSION AND HARDNESS PROPERTIES OF ELECTROLESS NI-B-P-B4C COMPOSITE COATINGS"
17:15-17:30	M.U. Chaudhry : "ORGANIC LIGHT EMITTING FIELD EFFECT TRANSISTORS: ADVANCES AND PERSPECTIVES"
17:30-17:45	R. K. Gupta : "NANOSTRUCTURED SEMICONDUCTORS FOR ENERGY APPLICATIONS"
17:45-18:00	S. Mansouri: "PENTACANE BASED ON THIN FILM ORGANIC PHOTOTRANSISTOR"

PROGRAMME
13 SEPTEMBER 2024 (FRIDAY)
HALL 2

11:00-12:00	**9th session (oral talks) Chair: Assoc. Prof. Dr. Berna AKKENÇ HANEDAR**
11:00-11:15	G. Tırıs, S. E. K. Tekkeli, C. Önal, B. Ceylan, A. Önal: "AN UPLC METHOD FOR THE DETERMINATION OF SORAFENIB IN HUMAN PLASMA BY FLUORIMETRIC DETECTION WITH PRE-COLUMN DERIVATIZATION AND APPLICATION TO A PHARMACOKINETIC STUDY"
11:15-11:30	B.Ceylan: "DEVELOPMENT AND VALIDATION OF A NEW HPLC-FL METHOD FOR THE DETERMINATION OF OCHRATOXİN A IN SOME DRIED FRUITS"
11:30-11:45	İ. Taşçıoğlu, G. Pirgholi-Givi, Y. Azizian-Kalandaragh, S. Altındal: "COMPARISON OF THE ADMITTANCE AND DIELECTRIC FEATURES OF AU/N-SI DIODES WITH DIFFERENT INTERLAYERS"
11:45-12:00	K. Rezaie, M. Özenefe: "ENERGY PERFORMANCE SIMULATION AND MODEL CALIBRATION OF A BUILDING USING IN-SITU ENERGY USE DATA"
12:00-13:30	**Lunch**
14:00-15:30	**10th session (oral talks) Chair: Assoc. Prof. Dr. Nurdan KURNAZ YETİM**
14:00-14:15	E. Z. Meric: DESIGN AND ANALYSIS OF STRETCHABLE LOCKING JOINTS
14:15-14:30	Ç. Ş. Güçlü: "ELECTRICAL CHARACTERISTICS OF THE Au/(CdTe:PVA)/n-Si (MPS) STRUCTURES BY USING IMPEDANCE-VOLTAGE- TEMPERATURE (Z-V-T) MEASUREMENTS"
14:30-14:45	M. Bucurgat: "CURRENT-VOLTAGE CHARACTERISTICS OF THE Au/Si3N4/n-GaAs (MIS) STRUCTURES BOTH IN DARK AND UNDER 100 $mW.cm^{-2}$ IN WIDE VOLTAGE RANGE AT ROOM TEMPERATURE"
14:45-15:00	E. Yıldırım, S. İ. Özmen, H. M. Gübür, A. K. Havare: "CHARACTERIZATION OF CdS NANOWALLS DEPOSITED ON GLASS, ITO, FTO and p-Si SUBSTRATES BY CHEMICAL BATH DEPOSITION"
15:00-15:15	A. Dere: "CuPC/PTCDA BASED ORGANIC BATTERY FOR MICROPOWER TECHNOLOGIES"
15:15-15:30	E. Yıldırım, S. İldan Özmen, H. Metin Gübür, A. K. Havare: "CHARACTERIZATION OF CdS NANOWALLS DEPOSITED ON GLASS, ITO, FTO and p-Si SUBSTRATES BY CHEMICAL BATH DEPOSITION"
15:30-15:45	**Coffee Break**
15:45-16:45	**13th session (oral talks) Chair: Assoc. Prof. Dr. Mümin Mehmet Koç**
15:30-15:45	E. Macit, M. Güneş, A. Kaleoğlu: "EVALUATION OF ENERGY EFFICIENCY OPPORTUNITIES BY INVESTIGATING COMPRESSORS IN ENTERPRISES"
15:45-16:00	S. Atasoy, H. O. Tan, S. Aktaş: "THE EFFECT OF BORIDING TEMPERATURE ON THE MORPHOLOGICAL AND STRUCTURAL PROPERTIES OF RAMOR 500 STEEL"
16:00-16:15	A.T. Ciminli, H. A. Bulut: "EXAMINATION OF THE EFFECT OF DIFFERENT PERLITE TYPES ON COMPRESSIVE AND SPLITTING TENSILE STRENGTH OF POLYMER CONCRETES"

16:15-16:30	B. Coşkun: “PHOTODIODE & PHOTORESPONSIVE CHARACTERISTICS of MnPc/DLC BASED THIN FILMS”
16:30-16:45	M. H. M. Mohammad, I. Kabalci:" LIQUID PHASE EPITAXY: THE BEST AND CHEAPEST GROWTH TOOL FOR III-V SEMICONDUCTOR DEVICES THEORETICAL AND EXPERIMENTAL STUDY OF GROWTH KINETICS AND EQUIPMENT MANUFACTURE "

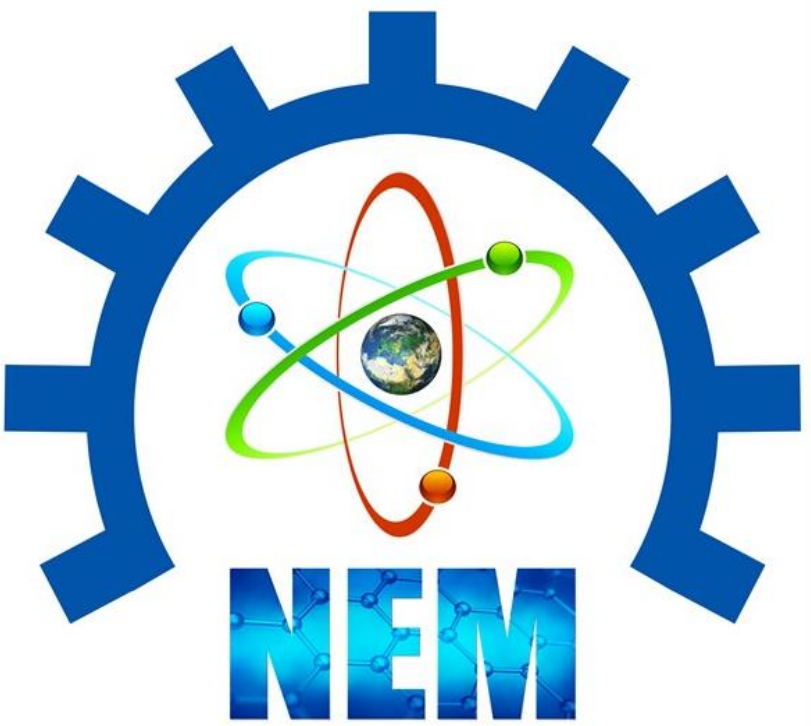
POSTER PROGRAMME 12 SEPTEMBER 2024 (THURSDAY)	
PP101	Ö. Tetik: "PVC WATER-BASED VARNISH FOR PVC COATED WALLPAPER PATTERN PRINTING"
PP102	A. F. Özdemir, B. O. Yazan, Ö. Güllü, Y. Ş. Asar, Ç. Ş. Güçlü: "SOME ELECTRICAL PARAMETERS FROM I-V MEASUREMENTS OF Al/p-Si (MS) SCHOTTKY BARRIER DIODES WITH/WITHOUT PbO INTERFACE DOPED WITH DIFFERENT Cu RATIOS"
PP103	E. Hasanoğlu Özkan, N. Kurnaz Yetim, D. Nartop, İ. Özdemir, H. Öğütcü: "NOVEL Ni(II) COMPLEXES DERIVATIVES FROM THIOSEMICARBAZONE; SYNTHESIS, SPECTROSCOPIC & BIOLOGICAL STUDIES"
PP104	Y. K. Hurcan, T. Akpolat: "AI MONITOR APPLICATION ON OPERATOR WORKING EFFICIENCY"
PP105	T. Akpolat, Y. K. Hurcan: "THE EFFECT OF ABSORBER USAGE ON 5G TDD PERFORMANCE IN MOBILE COMMUNICATIONS"

SOCIAL PROGRAMME 14 SEPTEMBER 2024 (SATURDAY)	
10:00	Longoz Forests National Park Trekking
12:00	Lunch at İğneada Resort Hotel
14:00	Tour to Dupnisa Cave

INVITED SPEAKERS

ORAL PRESANTATIONS

POSTER PRESENTATIONS



INVITED SPEAKERS

PHOTONIC AGRICULTURE FOR NEXT GENERATION

A. Dere[1], F. Yakuphanoglu[2]

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[2] *Fytronix Elektronik Teknolojileri Corp, Fırat Teknokent, 23200 Elazig,Turkey*

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Agriculture has been gradually losing its importance due to increasing production costs in recent years. With this connection, there is a need to reduce costs in agriculture. By using high technology, we can do agriculture in our homes, workplaces and large-area buildings. We can produce agricultural products at more economical costs with photon technology. In photon-based agriculture, by using photons in the visible region, the growth and development of plants can be provided rapidly. The wavelengths of visible region photos are in the range of 400-700 nm. In this region, plant development is provided by using photosynthetically activated region (PAR). PAR values can be adjusted to different values for each plan to easy growth of plants is provided. In photon technology, visible region photons convert light energy into chemical energy, thus providing growth and development of plants.

THE NOVEL, HIGHLY SENSITIVE AND SELECTIVE FLUORESCENT CHEMOSENSORS

H. İcil
Department of Chemistry, Faculty of Arts and Sciences, Eastern Mediterranean University, 99628, Famagusta, N. Cyprus, Mersin 10, Turkey
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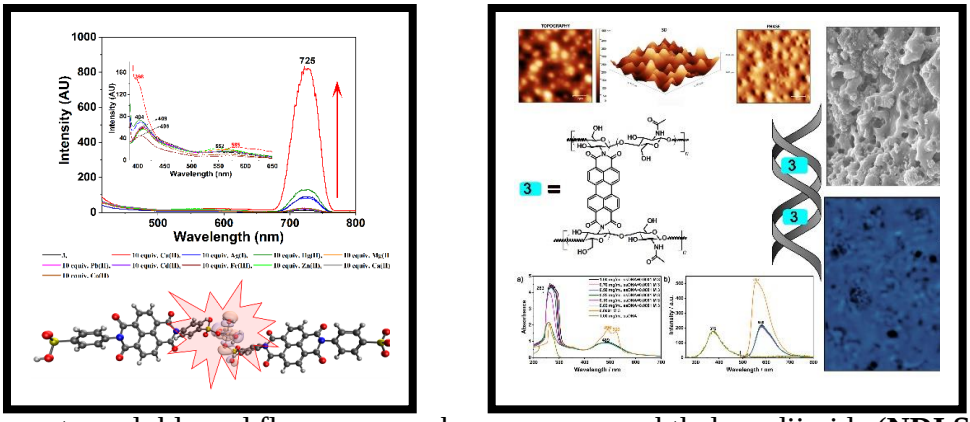
Fluorescent chemosensors have gained particular attention in the environment, molecular biology, and medicine due to their high sensitivity and real-time monitoring capabilities. The strategies for constructing highly sensitive, water-soluble and selective fluorescent chemosensors for optoelectronic, environmental, biological, and biomedical applications are challenging in improving our quality of life.

NDI Sensor **CPP Sensor**



An innovative water-soluble and fluorescence chemosensor, naphthalene diimide (**NDI Sensor**) with metal binding sites, was designed, synthesized and characterized. The selectivity of **NDI** chemosensor for the metals Cu(II), Ag(I), Hg(II), Mg (II), Fe(III), Ca(II), Co(II), Zn(II), Pb(II) and Cd(II) were investigated. **NDI** chemosensor was highly selective and sensitive toward Cu(II) metal ions. The chemosensor can detect Cu(II) in water with a detection limit of 1.11 μM, lower than the WHO (World Health Org.) standard.

The perylene-3,4,9,10-tetracarboxylic dianhydride was used for the first time in literature as a cross-linker to synthesize a novel fluorescent, chitosan-based cross-linked polymer (**CPP Sensor**). The polymer has single-stranded DNA (ssDNA) binding properties that can be used in sensor production to detect salmon sperm DNA.

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ON THE PERFORMANCE AND STABILITY OF PEROVSKITE SOLAR CELLS

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Perovskite solar cells (PSCs) have drawn significant attention in recent years due to their high power conversion efficiencies (PCEs) and potential for low-cost production. However, their long-term stability under operational conditions remains a key challenge hindering commercial viability. This study explores various strategies to enhance both the performance and stability of PSCs, focusing on the integration of interfacial and strain engineering. By employing hydrophobic coatings on interfacial layers, we reduce moisture exposure and improve the environmental stability of the devices. Additionally, the introduction of novel materials into the perovskite structure, either through anti-solvent treatment or a film deposition, significantly reduces the degradation caused by exposure to oxygen. Strain engineering is also investigated to reduce defect formation and enhance film crystallinity. Our results demonstrate that these approaches collectively lead to a marked improvement in both PCE and long-term stability.

Scientific results on the performance and stability of p-i-n type perovskite solar cells fabricated at Organic Electronics Laboratory of Yildiz Technical University will be presented.

ON THE INTERSECTION AND DOUBLE-EXPONENTIAL BEHAVIOR IN THE FORWARD BIAS CURRENT-VOLTAGE (I_F-V_F) CURVES AND POSSIBLE CURRENT TRANSPORT MECHANISMS (CTM_S) IN Al/(Al_2O_3/Ge)/p-Si HETEROSTRUCTURES IN WIDE TEMPERATURE RANGE OF 90-420K

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The CTMs of the Al/(Al_2O_3/Ge)/p-Si heterostructures were investigated using the current-voltage-temperature (I-V-T) measurements. The ln(I_F)-V_F plots show two linear-sections with different slopes and intercept points and an crossing/intersection-point at 2.4V due to the lack-of enough free electron-carriers at low-temperatures and increases of apparent-BH with increasing temperatures. Soma important main electrical-parameters such as reverse-saturation current (I_o), ideality-factor (n), zero-bias barrier-height (BH)/(Φ_{Bo}) and series-resistance (R_s) were obtained for each temperature and then the necessary graphs/tables were created for two linear-sections as carefully. The energy-dependent profiles of interface-traps (D_{it}) was obtained from the Card&Rhoderick technique considering voltage dependent of n and BH. While the value of n decreases with increasing-temperature, Φ_{Bo} increased, but this increase in Φ_{Bo} is not agreement with the negative-temperature coefficient of bandgap energy (dE_g/dT). However, the Richardson-plot was deviated from linearity at lower-temperatures and the obtained value of Richardson-constant (A*) from the linear parts of this plot was quite lower than its theoretical value. Therefore, Φ_{Bo}-q/2kT, Φ_{Bo}-n, and n.(kT)/q-(kT/q) plots were drawn to get some evidence to the existence Gaussian-distribution (GD) of BH and obtained results show that CTM can be successfully explained by Double GD of BH. The thermal sensitivity (S=dV/dT) for 1μA was found as 2.35 mV/K.

Keywords: Intersection behaviour in ln(I_F)-V_F; Conduction mechanisms; Temperature dependent/sensitivity; Double Gaussian distribution; Energy dependent of interface traps.

THE ROLE OF Zn DOPING IN THE ELECTRONIC STRUCTURE OF MgO NANOPARTICLES

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Zn-doped MgO nanoparticles have garnered significant interest due to their unique structural, electronic, and optical properties. Previous studies have demonstrated that Zn doping leads to notable changes in the lattice parameters and a reduction in the band gap of MgO, enhancing its electronic properties [1]. We also found that Zn atoms preferentially bond with Mg rather than O atoms, leading to increased Mg-Zn and Mg-O interactions, which contributes to the stability and performance of the nanoparticles [2].

Molecular Dynamics (MD) simulations have provided valuable insights into the temperature-dependent behavior of these nanostructures. Xu et al. reported that the interfacial free energies of Mg/MgO decrease almost linearly with increasing temperature, highlighting the temperature resilience of these materials up to 800 K [3]. Additionally, optical properties such as absorption peaks and reflectivity are significantly affected by Zn doping, making these nanoparticles promising candidates for optoelectronic applications [4].

In this study, DFTB calculations were employed to explore the energy optimization, electronic properties, and density of states of Zn-doped MgO nanoparticles. Furthermore, MD simulations were performed to investigate temperature-dependent properties, providing a comprehensive understanding of how these materials behave under various thermal conditions. The findings elucidate the potential applications of Zn-doped MgO nanoparticles in catalysis, sensors, and optoelectronic devices.

Keywords: Zn-doped MgO, electronic structure, DFTB calculations, nanoparticles

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A MULTIDISCIPLINARY INTRAEUROPEAN FAN OF PROJECTS WITH THE VISION OF PURSING SUSTAINABILITY, INCLUSION AND WELL-BEING

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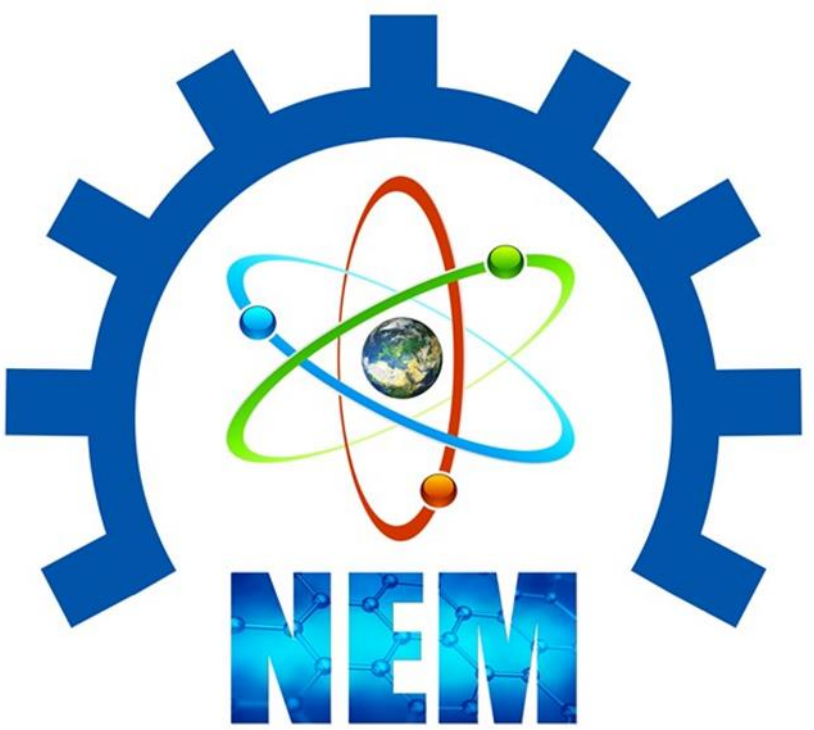
Various interdisciplinary projects on environmental monitoring, cultural heritage and health risks, exposure are being carried out and planned within the scope of research activities for the detection of natural and artificial radiation exposure. These are interdisciplinary projects covering applied physics, construction and engineering, information technology engineering, earth and environmental sciences, life and health sciences. The main axis of the projects include the determination of artificial radionuclides for soil erosion on vesuvius and natural parks due to wildfires, environmental tracers for groundwater and surface water interaction processes, radon assessment for constructions, cultural heritage conservation and preservation, eco-bio-compatible construction materials, isotopic and geoelectric measurements in soils in the context of climate change, plant growth in soil substrates in volcanic environment. The data obtained in projects, research activities and the long-run consequences provide valuable contributions to the international scientific community and increase cooperation in international studies.



ORAL PRESENTATION

INVESTIGATION OF THE EFFECT OF REPLACEABLE PLASTIC HINGE MEMBER ON DIFFERENT TYPES OF FRAMES IN PRECAST REINFORCED CONCRETE STRUCTURES USING ABAQUS SOFTWARE

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The demand for precast reinforced concrete (RC) structures is growing considering to their certain benefits, including faster assembly, homogeneous materials, and high-quality labor. The structural integrity of precast reinforced concrete (RC) constructions is influenced by the effectiveness of the joints and connections. This paper contains an analytical study about four type precast reinforced concrete frames which varies according to the number of storeys and the number of bays with two different type of moment resisting beam to column connection is investigated under cyclic displacement loading up to 5.6% drift rate by using ABAQUS software. The first connection type is the widely used moment resisting connection that is defined as wet connection in TBDY. The second connection type is known as Artificial Controllable Plastic Hinge. The goal of this connection, is to defend reinforced concrete components from earthquake related plastic deformations by keeping them in a specialized connecting section. It will be possible to repair the broken connections after the earthquake. The cyclic behavior of the four type frame with the mechanical plastic hinge and wet connection were analytically investigated, and then comparisons and suggestions are made on period, ductility, structural system behavior coefficient. The analytical study shows that the replaceable plastic hinge element provides a significant period increase. Especially in the case of two storeys and two bays, the change in period was felt the most compared to other frames. The results for ductility show a significant change in the ductility of the frames with replaceable plastic hinge. For the structural system behavior coefficient, a recommendation between 3.90 and 4.52 values was made.

Keywords: Precast structures, replaceable plastic hinge, beam to column connections.

FIRST PRINCIPLES STUDY OF THE STRUCTURAL AND ELECTRONIC PROPERTIES OF DOPED 2D-GOLDENE MONOLAYER

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In a significant advancement in the field of two-dimensional (2D) nanomaterials, researchers have successfully synthesized a single-atom-thick gold lattice known as goldene through the innovative wet chemical etching of Ti_3C_2 from layered Ti_3AuC_2. Building on this progress, we present the first comprehensive first-principles investigation, utilizing a combination of density functional theory (DFT), to examine the stability and electronic properties of doped free-standing goldene offer promising potential for nanoelectronics and catalysis.

In this study, we explore the effects of doping goldene with various elements (such as transition metals, halogens, and metalloids) using Density Functional Theory (DFT) calculations. By systematically introducing dopants into the goldene lattice, we examine the resulting modifications in electronic band structure, density of states, and magnetic properties. Our results indicate that doping can significantly tune the electronic properties of goldene, leading to the emergence of semiconducting behavior, bandgap opening, and even localized magnetic moments depending on the choice of dopant. Additionally, we analyze the structural stability of doped goldene configurations to assess their feasibility for practical applications. The findings of this study provide a theoretical foundation for the design of goldene-based materials with tailored properties for specific technological applications, such as in nanoelectronics, spintronics, and catalysis.

DETERMINATION OF QUERCETIN IN JUJUBE FRUIT BY HPLC-DAD

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Grown in tropical and sub-tropical regions of the world, jujube has been grown commercially in China for 4000 years. Jujube is a juicy and crunchy fruit that looks like a large olive and tastes like an apple. Jujube is also known to be used in traditional Chinese medicine to treat various diseases. Jujube has antioxidant, anticancer, hepatoprotective, anti-inflammatory, antimicrobial, anti-inflammatory activities due to bioactive components such as phenolic compounds, saponins, polysaccharides and ascorbic acid [1-2].

The aim of this study was the direct determination of quercetin in jujube plants grown in Kırklareli province by high sensitivity HPLC-DAD without precipitation. For this purpose, parameters such as wavelength, flow rate, column temperature, injection volume were optimized during the method development phase with HPLC-DAD. For the determination of quercetin with an optimum wavelength of 255 nm, linearity was determined in the linear range of 0.1-25 ppm and LOD-LOQ values were determined as 0.02 ppm - 0.07 ppm, respectively. Intra-day and inter-day repeatability were obtained as 0.1% and 4.8% in terms of percentage relative standard deviation. The developed method was successfully applied to jujube samples extracted by the appropriate method. In addition, standard quercetin solution was added to the jujube samples for the accuracy of the method and 88-99.9% recovery was achieved.

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PHOTODIODE & PHOTORESPONSIVE CHARACTERISTICS of MnPc/DLC BASED THIN FILMS

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Thin films are addressed in various applications in different fields such as materials science, electronics, optics, physics, chemistry, etc[1]. Various types of materials have been used for the thin film production. Metals, and metal oxides were often preferred for their enhanced electrical and optoelectronic properties with high durability. However, it is quite difficult to produce metal and/or metal oxide based thin films which requires sophisticated production techniques. They are often considered to be in rigid and stiff form. Organic based thin films are found to be flexible and can be applied to different surfaces in various shapes. However, electrical and optoelectronic properties of organic materials were found to be poor. In this regard, doping organic structures with metals significantly enhances the electrical and optoelectronic properties of the thin films which were referred to as organometallic structures. Phthalocyanine is on of the most prevalent organic materials which find applications in various fields. In recent years, doping phthalocyanine with metals/metal oxides were addressed in the literature for solar harvesting purposes [2,3]. In this regard, we Mn doped the phthalocyanine and MnPc structures and produce MnPc/DLC structures. DLC (diamond like carbon) is a highly durable and stiff material with good optical and scratch-resistant properties. We assessed the optical, optoelectronic and photodiode characteristics of MnPc/DLC structures. We used I-V, I-t plots in various illumination intensities to assess ideality factors, barrier height and series resistance.

Key words: MnPc; DLC; I-V; I-t

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ELECTRICAL CHARACTERISTICS OF THE Au/(CdTe:PVA)/n-Si (MPS) STRUCTURES BY USING IMPEDANCE-VOLTAGE- TEMPERATURE (Z-V-T) MEASUREMENTS

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In this study, the conduction-mechanisms of the Au/(CdTe:PVA)/n-Si (MPS) structures have been investigated in wide temperature range of 80-350K and voltage range of (-5V)-(+8V) by using capacitance/conductance-voltage-temperature (C/G-V-T) measurements to get more reliable and accuracy results on the basic electrical-parameters and temperature-sensing of these structures. The temperature-sensitivity (S=dV/dT)) for a constant capacitance shows two different linear-parts with different slopes which are corresponding to lower and intermediate temperatures. The value of S for 0.60 nF was found as 15.5 mV/K which is quite high when compared the literature and so these structures can be successfully used in the thermal sensor applications. Both the temperature dependent series-resistance (RS) and density of surface-states (NSS) profiles of were also extracted from the Nicollian-Brews and Hill-Coleman technique, respectively. While the value of RS decreases with increasing temperature, NSS increases as almost linearly. The value of activation-energy (Ea) was calculated from the slope of Arrhenius-plot and the obtained its lower values for different applied bias voltage was attributed to the hopping of the trapped electrons from the localised trap to another traps or conduction band. Some important electrical parameters of these structure were also extracted from the reverse-bias C-2-V plots as function of temperature.

Keywords: Au/n-Si (MS) structures with (CdTe:PVA) interlayer; Temperature sensing of capacitance and conductance; Thermal sensitivity; Series resistance and interface traps; Basic electrical parameters.

Acknowledgement: This study was performed with the funding support of the Scientific and Technological Research Council of TÜRKİYE (TUBITAK) with the 121C396 project number.

DIRAC EQUATION for MANNING-ROSEN and a YUKAWA-TYPE POTENTIAL

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In this study, we present an analytical solution to the Dirac equations for bound states exhibiting spin and pseudospin symmetries, utilizing a combined potential comprising Manning-Rosen and Yukawa-type potentials, along with a Coulomb tensor interaction potential. To address the challenges posed by the centrifugal part of the potential, we employed an approximation technique. The Nikiforov-Uvarov and supersymmetric quantum mechanical methods were used to obtain the energy eigenvalues and the corresponding Dirac spinor components of the wave functions. Our results demonstrate that both methods produce identical outcomes. Furthermore, we explore the potential applications of our findings to specific potential cases relevant to other physical systems, confirming consistency with previous studies. We present the energy spectra for the s- and ps-bound states at various levels, both in the presence and absence of tensor coupling. The energy spectra are shown to depend on the quantum numbers κ and n, as well as the parameter δ. We observe that the tensor interaction eliminates the degeneracies between the eigenstates of the Dirac s- and ps-doublet. Lastly, we provide an analysis of the parameter space for admissible bound states, characterized by the potential force parameters η and A, for both symmetry limits C_{ES} and C_{PS}.

Ag/MnPc/Si/Ag HETEROJUNCTIONS for SOLAR DETECTOR APPLICATIONS

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Organomatellic structures are organic based molecules doped/modified with metals and/or metal oxides. Such structures find applications in various fields including optics and optoelectronics Manganese (III) phthalocyanine (4) (modified MnPc) was synthesized by chemical method and thermally coated on Si coated ITO surfaces to produced Ag/MnPc/Si/Ag heterostructures. Various methods were applied to assess structural, optical and optoelectronic properties. For the assessment of surface morphology and structure, scanning electron microscopy (SEM) and X-ray diffractometry (XRD) techniques were applied. Optical properties were derived using UV-vis spectrophotometry where energy band gap of the MnPc, and Si thin films were found as 2.41 eV, and 2.90 eV, respectively. I-V investigation was employed in dark and under various illumination intensities between 20 $mW.cm^{-2}$, and 100 $mW.cm^{-2}$. It was seen that Ag/MnPc/Si/Ag heterojunctions are light sensitive. Using I-V and I-t plots different device parameters like ideality factor, serries resistance and barrier height values were derived. Moreover, various photodetector and photosensitivity parameters were calculated.

Key words: MnPc; Heterojunctions; I-V; I-t; Solar Detectors

DESIGN, SYNTHESIS AND CHRACTERIZATION OF NOVEL IONIC LIQUIDS

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Ionic liquids (ILs) are liquid organic salts with many interesting properties that have led scientists to investigate their use in various fields. They are described as being in the liquid state below any arbitrary temperature value, but there is no temperature restriction to determine that any compound is an ionic liquid. Various organic cations such as ammonium, sulfonium, imidazolium, triazolium, pyridinium, phosphonium, pyrazolium, guanidinium can be combined with different anions to design different ionic liquids based on the requirement [1].

Ionic liquids are remarkable chemical substances that are used in a wide range of contemporary scientific fields. Ionic liquids have become indispensable in the disciplines of synthesis and catalysis, liquid crystals, extraction, electrochemistry, analytics, biotechnology, etc. due to their extraordinary capabilities and highly adjustable nature [2].

The novel ionic liquids were obtained by adding equimolar amounts of ethanol solution of 4-picoline and aliphatic acid/aromatic acid. The mixture was stirred for 3 hours at room temperature. Then the solvent was removed in a vacuum and the precipitate was recrystallized from ethanol. The novel ionic liquids were characterized by 1H-NMR, 13C-NMR and FT-IR.

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EFFECT OF FILL RATE, INTERNAL STRUCTURE AND PRESS DIRECTION PARAMETERS ON MECHANICAL PROPERTIES OF PARTS PRODUCED BY ADDITIVE MANUFACTURING

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Additive manufacturing is a different approach from traditional manufacturing methods. Its fundamental principle is to produce a physical part by building up a digital 3D model layer by layer. In this method, virtual 3D models are created using computer-aided design (CAD) software and then printed via a three-dimensional printer. Additive manufacturing technologies offer significant advantages over traditional manufacturing methods, such as the ability to produce complex geometries, material savings, and rapid prototyping. However, the mechanical performance of parts produced by additive manufacturing methods can differ from those produced by traditional methods. Some factors that affect this mechanical performance include internal structure, infill density, and print orientation. In this study, the mechanical performances of tensile specimens with different internal structures, infill densities, and print orientations were compared. The tensile specimens were produced according to ISO 527-2 1B standards. ABS material filaments were used in the tensile specimens. The Zortrax M200 3D printer was used for production. The production speed of the tensile specimens was set at 1 mm/min. Nine specimens were produced for each test, and a total of 324 tensile specimens were tested. The specimens printed with a 20% infill density weighed 90 grams, those with a 50% infill density weighed 100 grams, those with an 80% infill density weighed 110 grams, and those with a 100% infill density weighed 120 grams. As a result of the comparisons, the highest strain values were observed in specimens with a Hexagonal internal structure, printed in the X direction, and with 100% infill density. The highest stress values were observed in tensile specimens with a Honeycomb internal structure, printed in the X direction, and with 100% infill density.

CURRENT-VOLTAGE CHARACTERISTICS OF THE Au/Si_3N_4/n-GaAs (MIS) STRUCTURES BOTH IN DARK AND UNDER 100 mW.cm^{-2} IN WIDE VOLTAGE RANGE AT ROOM TEMPERATURE

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In this study, (Au:Ti)/Si_3N_4/n-GaAs (MIS) type Schottky diodes (SDs) were fabricated and then the basic electrical parameters were extracted from the current-voltage (I-V) characteristics both in dark and under illumination at room temperature. The values of reverse-bias saturation current (I_0), ideality factor (n), zero-bias barrier height (Φ_{b0}), series resistance (R_s) and rectification ratio ($RR=I_F/I_R$) were calculated as 6.26x10^{-9} A, 2.93, 0.754 eV, 139 Ω, 1.85x10^4 in dark and 3.59x10^{-5} A, 6.90, 0.538 eV, 359 Ω, 10.40 under 100 mW.cm^{-2}, respectively. The high value of n is explained by the existence of surface states (N_{ss}) at Si_3N_4/n-GaAs interface, interfacial layer, and barrier inhomogeneity at M/S interface. The sensitivity value ($S=I_{ill}-I_{dark}/I_{dark}$) was calculated as 3.58x10^3 at ≅-0.5 V for 100 mW.cm^{-2}. The energy dependent profile of surface states (N_{ss}) was also extracted from the forward bias I-V data both in dark and under illumination conditions by considering voltage dependence of barrier height and ideality factor. They start to increase from almost the mid-gap energy of semiconductor towards to the bottom of conduction band as almost exponentially. The obtained high value of photosensitivity shows that these devices can be successfully used in photodiode, photosensor, and solar cells applications.

Keywords: Current-voltage (I-V) characteristics; Basic electrical parameters; Photosensitivity and photoconductivity; Series resistance and interface states

COMPARISON OF THE ADMITTANCE AND DIELECTRIC FEATURES OF AU/N-SI DIODES WITH DIFFERENT INTERLAYERS

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In this study, hydrothermally synthesized PVP/ZnO and Ag_2WO_4:PVP/ZnO interlayers were deposited on n-Si using the spin coating method to fabricate metal-polymer-semiconductor (MPS) Schottky diodes (SDs). Frequency-dependent impedance measurements of the SDs were performed at 1.5 V in the frequency range of 0.1 kHz-1 MHz and the main dielectric parameters including dielectric constant (ε′), dielectric loss (ε″), electrical modules, and ac electrical conductivity σac were calculated. The study reveals that incorporating a PVP/ZnO interfacial layer boosts the dielectric constant of the MPS by a factor of ten compared to the metal-semiconductor (MS) diode. Additionally, the PVP/ZnO and Ag_2WO_4:PVP/ZnO interlayers enhance electrical conductivity by reducing interfacial polarization. These findings indicate that at low to intermediate frequencies, conduction mechanisms involve charge carrier interactions and trap states, while at high frequencies, a localized relaxation process dominates. It is clear that the interlayers enhance the energy storage capacity, making them a promising alternative to intrinsic interlayers for use in nanoscale electronic/optoelectronic devices.

PRODUCTION AND OPTIMIZATION OF GEOGRAPHICALLY INDICATED OAK HONEY POWDER IN A SPRAY DRYER

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Kırklareli Oak Honey is a secretion honey characterized by its dark color, low crystallization tendency, high viscosity, lower moisture content compared to floral honeys, mild throat sensation, and high antioxidant capacity. The main components, fructose and glucose, contribute to the honey's high viscosity and stickiness, making processing challenging. Honey powder offers advantages as a convenient storage option and can serve as a viable alternative to sucrose for direct incorporation into mixtures. Lyophilization, while costly and inefficient, results in a product that loses its powder properties at room temperature, making it impractical. Considering the long processing time of lyophilization, spray drying emerges as a more economical method for honey powder production, yielding 60 times more product.

Using Design Expert (State-Ease Inc., Minneapolis, MN, USA, version 13), a response surface methodology (Box-Behnken) was modeled to maximize the manufacturing of oak honey powder. Independent variables included the feed solution flow rate (6–8 mL/min), honey concentration in the feed solution (50–70%), and carrier type (maltodextrin, whey protein isolate, and mixture). Nonlinear regression techniques determined the relationship between independent variables and the percentage yield, HMF content, and hygroscopicity. A variance analysis was conducted to assess the significance of independent variables on dependent variables, taking into account the lack of fit and quadratic effects. The carrier type of whey protein isolate was found to be highly significant (P <0.001). The calculated yield results for optimizing oak honey powder's commercial production potential ranged from 17.12% to 71.43%. The HMF content of the powder samples ranged from 2.92 to 15.88 mg/kg. An increase in flow rate had a positive impact on the powder samples' HMF, yield, and hygroscopicity values.

This study developed an optimized method for making oak honey powder using a spray dryer with whey protein isolate. The resulting honey powder is a high-value-added product serving as an alternative to sucrose. Honey powder enables the development of products with reduced sugar content and enriched protein content. This research contributes to the development of innovative products, particularly in the healthy snack and confectionery industries.

A COMPARISON OF FATIGUE STRENGTH ASSESSMENT OF SEAM-WELDED JOINTS USING METHODS OF DIFFERENT STANDARTS USED IN RAIL VEHICLE CONSTRUCTION

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Fatigue is the process of permanent structural change that occurs in a material that is subjected to conditions that produce dynamic stress states. Fatigue strength is defined as the magnitude of the stress range of dynamic loading that leads to a certain fatigue life.

At a welded joint, as a result of the melting-solidification process, residual stresses occur in the material and the neighbouring material of the weld seam becomes brittle. Apart from this, the fatigue strength of a structure decreases significantly due to reasons such as seam workmanship defects during the welding process and the porous structure of the material in the welding area. For these reasons, cracks may occur at weld toe or weld root, depending on the loading condition and welding configuration.

The location of crack initiation and the direction of crack propagation can be predicted according to various approaches, however these methods are uncertain and complex. In order to resolve this complex situation and control the designs according to established criteria, international standards and codes have been developed to determine the fatigue strength of the welded joints, based on a compilation of theoretical knowledge and practical experience in the field. Since welded joints is so common in structural designs in the railway transport, as well as automotive, marine and aircraft industries, fatigue strength assessment plays an important role.

This paper will examine the classification and comparison of the results of fatigue analyses for selected welding zones according to standarts DVS 1612, EN 1993-1-9 (Eurocode 3) and EN 17149-3 for steel structures. The standards define parameters such as obtaining the effective design value of stress with the effect of their stress range, weld quality parameters, weld inspection classes, post-weld improvement factors and geometric notch factors. This comparison of standarts was made analytically on a simple single-side welded beam model operating under dynamic load and a pressure vessel model with a welded circular area subjected to a variable internal pressure.

Keywords: Fatigue Strength Assessment, Welded joints, simple single-side welded beam model, pressure vessel model with a welded circular area

MODELING THE INTERACTIONS OF PLANT PROTEINS AND GUMS USING MOLECULAR DOCKING SIMULATION

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Molecular docking is a computational technique widely used in various fields, such as drug discovery, bioinformatics, and structural biology. It plays a crucial role in predicting how small molecules interact with proteins or other macromolecules, aiding in understanding binding affinities, interactive modes, and molecular targets. Molecular docking can be used to enhance the combinations and compositions of food ingredients in order to create products that exhibit the required flavor, texture, and nutritional value. The objective of the study was to examine the interactions between specific plant proteins [pea protein (PDB:3KSC), soy protein (PDB:3AUP), and flaxseed protein (PDB:5GYL)] and hydrocolloids (gellan gum, carrageenan, and xanthan gum) using molecular simulation techniques. The AutoDock program was utilized to calculate the binding energies. The molecular docking simulations showed that the hydrocolloids and the different plant proteins had different binding energies. The binding energies of pea protein with gellan gum, carrageenan, and xanthan gum were measured to be -9.2 kcal/mol, -7.4 kcal/mol, and -5.6 kcal/mol, respectively. The binding energies of soy protein with gellan gum, carrageenan, and xanthan gum were -9.9 kcal/mol, -7.3 kcal/mol, and -7.9 kcal/mol, respectively. The binding energies between flaxseed protein and gellan gum, carrageenan, and xanthan gum were measured to be -9.6 kcal/mol, -8.4 kcal/mol, and -7.5 kcal/mol, respectively. Gellan gum interactions had higher binding energies than those involving the other hydrocolloids. This suggests that the plant proteins and hydrocolloids have very different binding preferences. These discoveries have the potential to contribute to the development of novel ways to use plant proteins and hydrocolloids in functional meals.

Keywords: Molecular Docking, plant proteins, hydrocolloids

EXAMINATION OF THE EFFECT OF DIFFERENT PERLITE TYPES ON COMPRESSIVE AND SPLITTING TENSILE STRENGTH OF POLYMER CONCRETES

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In this study, different types of perlite aggregates (natural and expanded perlite) were evaluated as fine aggregates in polymer concretes and the changes in the mechanical properties of these concretes were investigated. Accordingly, unsaturated polyester resin and vinylester resin were selected as binding materials in polymer concretes. Natural and expanded perlite ratios were determined as 0%-5% and 10% and were used in polymer concrete production instead of quartz aggregate. Compressive and splitting tensile strength tests were performed on polymer concretes subjected to air curing for 7 and 28 days. When the 7-day compressive strength results were examined, the highest compressive strength for both polyester and vinylester resin polymer concretes after the control concretes was obtained from polymer concretes produced using 10% natural perlite. The 28-day splitting tensile strength results of polyester and vinylester resin polymer concretes produced using both 5% and 10% natural perlite were found to be even higher than the control concretes. In line with the experimental results obtained from polymer concretes produced with different perlite types and resins, it is thought that this study will be evaluated as an original study for the literature in terms of optimum ratios and material compatibility.

Keywords: Polymer concrete, natural perlite, expanded perlite, resin, compressive strength, splitting tensile strength

EVALUATION OF THE ACTIVITY CONCENTRATIONS OF ^{137}CS AND DOSE RATES IN BEACH SAND ALONG THE AEGEAN SEA COASTLINE

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Artificial radonuclides have been dispersed into the atmosphere as a result of many nuclear events such as nuclear accidents, weapons tests and nuclear accidents. In particular, as a result of the Chernobyl nuclear power plant accident in 1986, ^{137}Cs radionuclide caused radioactive contamination in many countries, including Turkey. The aim of this study was to evaluate ^{137}Cs in sand samples collected from the coastal areas of the Aegean region in Turkey where there is a high tourist population. Gamma spectrometry with a high-purity germanium (HPGe) detector was used to determine the activity concentration of ^{137}Cs in beach sand samples. The highest activity concentration value of fallout ^{137}Cs was observed as 4.2±0.34 Bq kg^{-1} d.w. The ^{137}Cs activity concentrations obtained in this study were compared with other results found worldwide. The absorbed dose rates, the outdoor and indoor annual effective dose rates due to ^{137}Cs for beach sand samples were estimated. All indoor and outdoor annual effective dose rates of the sand samples were found lower than the worldwide standard value of annual dose.

A CFD STUDY ON HYDROGEN-ENRICHED METHANE COMBUSTION IN A TEST FURNACE

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This paper examines a numerical investigation of hydrogen-enriched methane combustion in a test furnace at 60 kW thermal load. Fluent computational fluid dynamics (CFD) code was utilised for the numerical analysis. In the first part of the paper, the different combustion models, namely the partially premixed combustion and eddy dissipation model, were simulated for pure methane combustion cases. The air excess coefficient was taken as 1.2, 1.3 and 1.4, respectively. The calculated numerical results were compared with the experimental measurements. The results show that the NO_X emission level in the flue gas is calculated around 20% lower with the partially premixed combustion model, while it is calculated around 50% higher with eddy dissipation model. However, it is determined that both combustion model can perform the general variation trends in the experimental measurements. In the second part of the paper, the effects of hydrogen-enrichment of methane fuel on pollutants were investigated using eddy dissipation model, while keeping the thermal load constant at 60 kW. The hydrogen-enrichment was changed from 10% to 40% on molar base, respectively. The air excess coefficient was kept constant as 1.2 for all the cases. The obtained results show that the NO_X emission level in the flue gas does not change significantly up to 25% enrichment ratio, while it shows an increasing trend for enrichments above 25%.

THE EFFECT OF THE DESIGN DIFFERENCES ON HEAT TRANSFER IN ALUMINIUM ALLOY INTERNALLY FINNED TUBES

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Energy demand relies on heat energy used in different sectors such as industry, transportation, and domestic heating. The energy efficiency emerges as a critical requirement in buildings for a sustainable energy future. The effective and efficient use of heat energy offers significant environmental and economic benefits. In this study, the heat transfer performance and useful thermal efficiency of aluminium alloy internally finned tubes with different designs, manufactured by extrusion and used to enhance the useful thermal efficiency of condensing boiler heat exchangers, were investigated.

Al 1070 was used as the heat exchanger tube material. The fluid passing through the inside of the tube is hot flue gas released by the combustion of natural gas with 30% excess air, while the fluid passing around the outside of the tube is water. The hot flue gases cool down due to the impact of the internal fins within the tube, which enhance flow turbulence and heat transfer, and as a result, the water outside the tube is heated. Increasing the rate of cooling in heat exchangers enhances the useful thermal efficiency of condensing boilers, leading to reduced fuel consumption to meet heat demand.

In the numerical calculations, the results obtained using Fluent codes were compared with experimental data. In the experimental studies, the thermal efficiency was calculated by measuring the inlet and outlet temperatures of the flue gas and water in the heat exchanger. Flue gases were released to the heat exchanger internal finned tube by using premixed gas burner in the experimental studies. Geometric optimizations, a design for internally finned heat exchanger tubes with high thermal efficiency (96.2%) was developed, which can be produced by extrusion and does not experience melting or deformation when exposed to hot flue gases.

SYNTHESIS, PHOTOPHYSICAL AND ELECTROCHEMICAL STUDIES OF NOVEL TRIAZINE-BASED PERYLENE DIIMIDE AND OLIGOMER

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Perylene dyes are among the most promising candidates for solar cell applications due to their photochemical and electrochemical properties and chemical and thermal stabilities [1]. The planar structure of single perylene dyes will likely form aggregation owing to a π-π interaction, affecting charge separation and transportation characteristics [1]. Perylene oligomers are constructed to prevent PDI aggregation. These oligomers exhibit three-dimensional (3D) geometry [3].

Triazine is a heterocyclic aromatic ring that contains three carbon and three nitrogen atoms. The chemistry of triazine allows accessing a multitude of compounds with uses ranging from materials to medicinal chemistry [2]. 1,3,5-Triazine improves the total electron withdrawing capacity of the perylene derivatives and results in a less twisted geometry by decreasing the steric effect or introducing non-covalent interactions between the triazine core and the perylene moiety [3].

In this study, 1,3,5-triazine containing perylene diimide dye (3) and its oligomer (4) were synthesized and characterized. The UV-vis absorption and emission and thermal, electrochemical, and morphological properties have been studied. The weight-average molecular mass (M_w) of 3500 g/mol was found for the oligomer (4) from the gel permeation chromatography (GPC) measurements, showing the heptamer structure formation. The HOMO and LUMO energy levels of dyes 3 and 4 were −5.83/−3.93 and −6.10/−4.01 eV, respectively. The photovoltaic parameters V_{oc}, I_{sc}, FF and η_{cell} of diimide 3-based DSSC are 0.316 V, 0.432 mA/cm^2, 0.08 and 0.011% respectively. These factors were determined for the 4 as 0.318 V, 0.455 mA/cm^2, 0.15 and 0.0211%, respectively.

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SYNTHESIS, SELF-ASSEMBLY, OPTICAL AND ELECTRICAL PROPERTIES OF A PLANAR NAPHTHALENE DIIMIDE DERIVATIVE

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Naphthalene diimides are highly promising molecules in various fields, including organic-field effect transistors, organic light-emitting diodes, organic photovoltaics, supramolecular chemistry, DNA intercalation, and sensing. Their reputation is mainly due to their excellent high mobility, electron affinity, and chemical and thermal stability [1].

Naphthalene diimides' optical, electrical, and solubility properties can be easily modulated by even the slightest change in their molecular structures. Their easy and cost-effective synthesis, solution processability, mechanical flexibility, and band gap tunability make them ideal for the electronic and optoelectronics field. Due to these advantageous properties, naphthalene diimides became especially valuable chromophores for developing organic photodiodes [2].

In this work, we have successfully synthesized a thin-film forming, self-assembled, planar naphthalene diimide with a subtle moiety at the imide nitrogen. The synthesized molecule was characterized in detail by Fourier Transform Infrared Spectroscopy (FTIR), Nuclear Magnetic Resonance Spectroscopy (NMR), High-Resolution Mass Spectroscopy (HRMS), UV-visible Absorbance and Fluorescence Spectroscopies, Thermal Gravimetric Analysis (TGA), and Differential Scanning Calorimetry (DSC). The energy levels of the highest occupied molecular orbital (HOMO), lowest unoccupied molecular orbital (LUMO), and the band gap (E_g) values were determined as -6.14 eV, -4.02 eV, and 2.12 eV, respectively. The synthesized molecule exhibited a high thermal stability with a glass transition temperature (T_g) of 208 °C. The synthesized naphthalene diimide's self-assembly, perfect solubility, extraordinary chemical and photochemical stability, and exciting chemical and photochemical properties render it a promising active layer for molecular electronics [3].

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CHARACTERIZATION OF CdS NANOWALLS DEPOSITED ON GLASS, ITO, FTO and p-Si SUBSTRATES BY CHEMICAL BATH DEPOSITION

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In this study, CdS semiconductor thin film with nanowall (NW) structure was obtained by chemical deposition (CBD) method. The CdS film was deposited on glass, glass/ITO, glass/FTO and p-type Si substrates at 85 °C for 40 minutes. UV-Visible Spectrophotometry, scanning electron microscopy (SEM), X-ray diffraction (XRD), energy dispersive X-ray spectroscopy (EDS), Raman spectroscopy, Hall effect measurement system and Fourier Transform Infrared (FT-IR) spectroscopy of films. Their characterizations were examined by Linear Scanning Voltammetry (LSV) and amperometric measurement. All of the films are polycrystalline and n type. The resistivity of the films is in the order of glass/CdS 10^5, glass/ITO/CdS 10^3, glass/FTO/CdS 10^4 and p-Si/CdS 10^5 Ω-cm. The optical band gap (Eg) of the films is glass/CdS 2.21, glass/ITO/CdS 2.12 and glass/FTO/CdS 2.29 eV. According to the LSV analysis results of the films, the highest current value was found in the FTO substrate. These results are compatible with amperometric measurement results. The conductivity of the films is quite good and with their NW properties, they are a good candidate material that can be used in solar cells and optoelectronic devices.The abstract submission is possible only electronically, using this template.

THE EFFECT OF BORIDING TEMPERATURE ON THE MORPHOLOGICAL AND STRUCTURAL PROPERTIES OF RAMOR 500 STEEL

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Ramor 500 armor steel is categorized as a high-strength ballistic protection steel, featuring a hardness range of 490 to 560 HV and thicknesses typically from 2 to 30 mm. It is specifically designed to endure high-velocity impacts. Boriding is a thermo-chemical process that involves the diffusion of boron, creating a hard surface coating composed of mixed boron compounds, depending on the substrate material. In this study, a thermo-chemical coating method known as box boriding was used to boride Ramor 500 steel, performing at 900 °C, 950 °C, and 1000 °C for 4 hours. The structural and morphological properties of borided Ramor 500 were examined using scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDS) and profilometer. The boride layer thickness, microhardness values and structural characteristics of the steels were compared based on the boriding temperature. As a result, higher boriding temperatures led to increased surface roughness and microhardness values for the steel and thicker boride layers.

Keywords: Boriding, Boriding temperature, Ramor 500 steel, mechanical properties

DEVELOPMENT AND VALIDATION OF A NEW HPLC-FL METHOD FOR THE DETERMINATION OF OCHRATOXİN A IN SOME DRIED FRUITS

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Ochratoxin A, which is produced mainly by *Aspergillus ochraceus* and *Penicillium verrucosum*, has the most toxic effects among all ochratoxins. Because ochratoxin A biosynthesis requires complex fungi-substrate interactions, its production and accumulation are difficult under normal conditions. Scientific investigations indicate that food may be mainly contaminated with ochratoxin A during storage, and it is stable during most food in cereals and starch rich foods with spices, coffee, dried fruits, grapes, wines, beer, and meat [1]. Ochratoxin A can be nephrotoxic, hepatotoxic, teratogenic, mutagenic, and carcinogenic and can show fertiliy inhibition effects of an immunosuppressive nature in a variety of laboratory animals. It was considered to be responsible for a chronic kidney disease that had been observed in Balkans' people (Balkan Endemic Nephropathy). Therefore, the detection of ochratoxin A, known as the most potent carcinogen, is of great importance. In this study, a new HPLC-FL method was developed and validated using solid phase extraction for the determination of ochratoxin A in some dried fruits (apricot, fig, mulbery, grape, orange, apple, strawberry and plum). Solid phase extraction (SPE) cartridges containing silica were used for the extraction of ochratoxin A from dried fruits. In the method, C18 column (5 µm × 4.6 mm × 150 mm) was used as the stationary phase at 25 ºC and a mixture of methanol:water (80:20, v/v) was used as the mobile phase at flow rate of 1.1 mL/min. Isocratic elution was applied. The injection volume was 20 µL. The excitation and emission wavelengths were 333 and 460 nm, respectively. The method was validated according to the International Harmonization Society criteria [2]. This new method, which is very fast, simple, and economical, can be used for the analysis of ochratoxin A in dried fruit products.

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AN UPLC METHOD FOR THE DETERMINATION OF SORAFENIB IN HUMAN PLASMA BY FLUORIMETRIC DETECTION WITH PRE-COLUMN DERIVATIZATION AND APPLICATION TO A PHARMACOKINETIC STUDY

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Sorafenib is a multikinase inhibitor which is effective in the treatment of advanced renal and hepato-cellular carcinoma. The chemical name of sorafenib is, 4-[4-[[4-chloro-3-(trifluoromethyl)phenyl]carbamoylamino]phenoxy]-*N*-methylpyridine-2carboxamide; 4-methylbenzenesulfonic acid. However it is not a fluorogenic molecule, the carboxamide groups in its structure provides the molecule suitable for fluorogenic derivatization reactions [1]. This research presents a new, sensitive and selective UPLC method wtih fluorometric detection for the determination of sorafenib in human plasma and application of the method to a pharmacokinetic study. Sorafenib was precolumn derivatized with 7-chloro-4-nitrobenzofurazan (NBD-Cl) and the seperation of the fluorescent derivative was performed with a C18 column (50 mm × 2.1 mm × 1.7 µm) at 40 ºC using a mobile phase composed of acetonitrile – 0.1% trifluoroacetic acid in water (60:40, v/v) by isocratic elution with flow rate of 0.5 mL min^{-1}. The injection volume was 7 µL. The method depends on the measurement of the derivative using fluorescence detection (λ_{ex}=398 nm, λem=425 nm). The retention time of sorafenib was 3.10±0.02 min. The novel method was validated in accordance with ICH criteria by studying on the parameters such as specificity, linearity, precision, accuracay, and robustness [2]. The method was determined to be linear in a concentration range of 0.25-10 µg mL^{-1} with the correlation coefficient of 0.9995. Limit of detection and quantitation were found to be 0.075 and 0.25 µg mL^{-1}, respectively. Intraday and interday RSD values were less than 5.48%. The plasma concentration-time profile and pharmacokinetic parameters such as AUC_{0-t}, $AUC_{0-\infty}$, C_{max}, t_{max}, $t_{1/2}$ were measured according to the assays. The proposed method is feasible to investigate the bioquivalence and bioavailability and routine analysis of the drug in plasma.

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ENERGY BAND STRUCTURE AND ELECTRON-PHONON SCATTERING PROPERTIES OF TWO DIMENSIONAL ZRS_2

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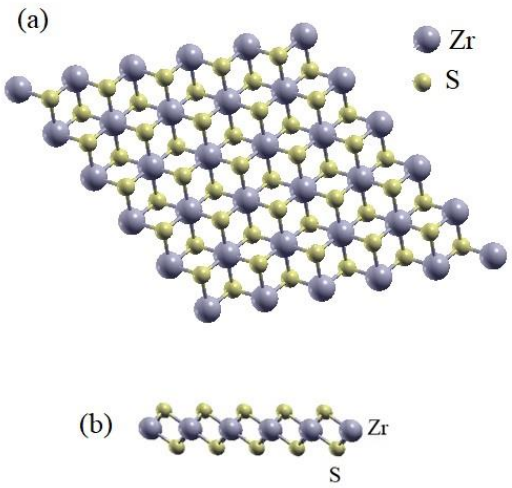
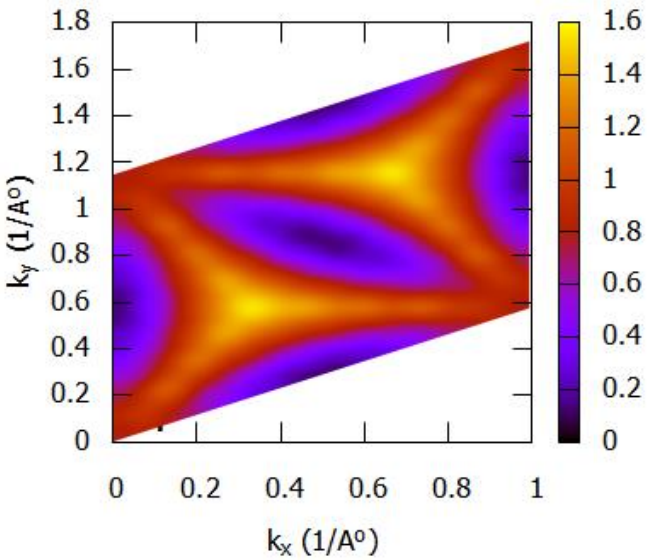
ZrS_2 is a two dimensional material with hexagonal symmetry where Zr (zirconium) atoms are sandwiched between two layers of S (sulphur) atoms. Zr is a transition metal and S is a chalcogenide and the combination of these structures are generally referred to as transition metal dichalcogenides. The energy band structure of ZrS_2 is obtained in the framework of density functional theory (DFT) along the high symmetry points Γ-K-M-Γ direction in reciprocal space. The Heyd-Scuseria-Ernzerhof (HSE) method which uses hybrid functionals is also employed to calculate the band structure more accurately along the same high symmetry points. Additionally the full energy band landscape of the first conduction band of ZrS_2 is obtained in the two dimensional reciprocal space. It is verified that ZrS_2 is a semiconductor with an indirect energy band gap, the minimum of conduction band occurs at K point and the maximum of valence band at Γ point. From the band structure the effective mass of electrons in the conduction band at the minimum of the valley (K point) is also calculated. The effective mass is anisotropic and exhibits significant variations with respect to direction. Furthermore the scattering rates of conduction band electrons due to both acoustic and optical phonons are calculated using the method called maximally localized Wannier functions. These rates can be presented as a function of two dimensional reciprocal space or a function of electron energy. The scattering rates due to acoustic phonons and so called out of plane or flexural phonons are found to be the highest.





ENERGY PERFORMANCE SIMULATION AND MODEL CALIBRATION OF A BUILDING USING IN-SITU ENERGY USE DATA

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This work is an effort to develop an energy model and carry out an energy performance simulation of a selected building as well as to calibrate the energy model by employing in-situ energy use data. The work strives to provide a basis for effective decision-making for possible energy conservation measures and optimization studies. The selected building is the Health Centre Building located in the Eastern Mediterranean University Campus, at Famagusta, North Cyprus. Design Builder software is employed for developing an energy model and carrying out performance simulation. One year (August 2022-July 2023) in-situ electricity use data of the building is retrieved and employed for the energy model calibration. Calibration will be performed by comparing the simulation results with the real measured in-situ electricity use and reconciling the two via iterative tuning of the major parameters: U-values of the building fabric, efficiencies/COPs of AC unites, internal heat gains, and schedules of various operations. In-situ measurements of certain parameters such as U-values of the walls and ceiling, indoor air temperature and relative humidity were also performed and the relevant parameters will be inputted to the energy model to further enhance the prediction accuracy of the energy model. The preliminary energy model of the building was generated and successful energy performance simulations were performed. It has been found that the model predicted the annual electricity use as 75459.3 kWh which is 6.6% less than the in-situ/actual electricity use of 80815.0 kWh. Although the discrepancy between the annual simulated and actual electricity use seems moderate, monthly CV(RMSE) and NMBE values were found to be 54.1% and 7.2% respectively which do not satisfy the ASHRAE standard (CV(RMSE) =15% and NMBE =5% respectively) for the calibrated model. In the subsequent phases of this work, tuning of the aforementioned parameters will be done and a series of simulations will be performed to attain the acceptable error for satisfying the ASHRAE standard.

RECOVERY OF Cr(VI) AND Pb(II) IONS WITH IONIC LIQUIDS

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Over the past decades, industrial productivity has increased and human life has been significantly enriched thanks to economic development. However, this productivity increase has also brought along various problems, especially water pollution. The first and primary source of clean water pollution is wastewater contaminated with heavy metal ions, which adversely affect living organisms and cause serious damage to the ecosystem [1-2].

In this study, a solid phase extraction method was developed for the selective extraction of Cr(VI) and Pb(II) ions using n-tetradecyl-4-methylpyridinium bromide like ionic liquid [1-3]. Flame atomic absorption spectrometry (FAAS) was used for Cr and Pb determination in solid phase extraction. Optimum conditions were determined by examining the important parameters such as elution type and concentration, pH, ionic solid amount, ligand amount, surfactant amount, foreign ion effect. The developed method was successfully applied to tap water, wastewater and dam water samples and high recovery was achieved.

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Acknowledgements: This work supported by Kırklareli University Scientific Research Fund with project number KLUBAP-277.

COMPARISON of Ni^{2+} and Cd^{2+} IONS REMOVAL with PVA/PVA-g-EGDMA and PVA/κ-KRG-g-EGDMA MEMBRANES

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Pervaporation is used for the separation of water-organic, organic-water or organic-organic mixtures, as well as for the treatment of wastewater, having already proven its superiority over conventional separation methods. The separation principle of pervaporation method is based on the affinity of the membrane for the components in the feed solution mixture[1-3].

In this study, new graft copolymers synthesized with different initiators were aimed to remove Ni^{2+} and Cd^{2+} heavy metals from wastewater. For this purpose, the graft copolymer obtained by grafting the hydrophilic ethylene glycol dimethacrylate monomer on poly(vinyl alcohol) and κ-carregenane separately was synthesized by blending with pure poly(vinyl alcohol). The synthesis of the graft copolymer was carried out using 3 different initiators, cerium ammonium nitrate, benzoyl peroxide and ammonium persulfate, and the effect of each initiator on the formation of the graft copolymer was investigated. The membranes prepared from the synthesized graft copolymers were characterized by FT-IR, TGA, AFM and contact angle measurements. Pervaporation studies were carried out using synthetic wastewater containing Ni^{2+} and Cd^{2+}, slightly polluted and highly polluted wastewater. PVA/κ-KRG-g-EGDMA membrane was found to be selectively permeable to Ni^{2+} among Ni^{2+} and Cd^{2+}ions. For Ni^{2+} ion, the highest rejection in wastewater with different contamination rates was found to be 183.46, 180.81, 236.72 kg/m^2h for the PVA/κ-KRG-g-EGDMA membrane synthesized using benzoyl peroxide initiator, respectively.

Keywords: Graft copolymer, wastewater treatment, Ni^{2+} and Cd^{2+}, membrane

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REMOVAL STUDY of Pb^{2+} ION with PVA/CS-g-PDMAM MEMBRANE

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Due to the rapid increase in urbanization and industrial activities, heavy metal levels in water have risen to alarming levels. This situation negatively affects all living organisms as heavy metals gradually accumulate in tissues, muscles, bones and joints and cause various diseases, especially neurological disorders and cancers. Pervaporation method used in vital wastewater treatment is an environmentally sensitive method.

In this study, poly(vinyl alcohol)/(chitosan-g-poly ethylene glycol dimethacrylate)) (PVA/CS-g-EGDMA) membranes were used for the recovery of Pb^{2+} ion by pervaporation technology. First, CS-g-EGDMA copolymers were synthesized using 3 different initiators and then characterized by various spectroscopic methods. Then, PVA/CS-g-EGDMA membranes were prepared and used for the treatment of wastewater with different contamination rates by pervaporation technique. The highest separation factor in wastewater was found to be 115.15, 125.53, 135.60 kg/m^2h, respectively.

Keywords: Graft copolymer, wastewater treatment, $Pb^{2+,}$ membrane

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EFFECT OF SDS SURFACTANT CONCENTRATION AND HEAT TREATMENT TEMPERATURE ON WEAR, CORROSION AND HARDNESS PROPERTIES OF ELECTROLESS NI-B-P-B4C COMPOSITE COATINGS

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Electroless nickel coatings are intensively studied in the development of aluminum surfaces due to their superior properties. These properties have made the production and research of multiple alloys and composites popular.

In this study, NiBP-B4C alloy composite coatings were obtained by using two different reducers together on aluminum substrate by chemical reduction method and by depositing B4C particles together with nickel-boron phosphorus. In order to obtain optimum results in the study, firstly B4C ceramic particle concentration (10 g/L) was kept constant and the amount of sodium dedosyl sulfate (SDS) surfactant (0.05, 0.1, 0.15) and heat treatment temperature (375°C, 400°C and 425°C) were examined.

Surface and morphological properties of the produced composite coatings were performed by SEM-EDS, XRD. In terms of Hardness and Coating Thickness, optimum values were obtained in the coating bath where the heat treatment temperature was 400°C and the SDS amount was 0.1 g/L, and they were 1006 (Hv) and 26.3 µm, respectively. In the studies, optimum parameters based on surfactant and heat treatment inputs were determined using Taguchi design and L9 orthogonal array. ANOVA analysis was performed by taking into account the interactions of the factors with each other.

DESIGN AND ANALYSIS OF STRETCHABLE LOCKING JOINTS

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This study focuses on the design and analysis of "flex-lock connections," a widely preferred method for assembling plastic products that offers various advantages due to its flexibility. Flex-lock connections are a method that leverages the flexibility of components during assembly, providing significant benefits such as cost efficiency and ease of assembly. These connections are commonly used in sectors such as automotive, electronics, household appliances, and toys, facilitating the joining of both plastic materials and non-plastic components.

Key factors to consider in the design process of flex-lock connections include material selection, connection geometry, elongation, and thickness ratios, all of which directly impact the durability and performance of the connections. Engineering analyses and simulations conducted in this study examine the behavior of these connections under different forces and identify optimal design conditions. The results indicate that deformations occur at forces above 20N, which is a critical criterion for design optimization.

In conclusion, flex-lock connections offer an efficient solution for the mass production of plastic components in terms of time and cost. Additionally, these connections provide environmental sustainability benefits due to their ability to accelerate the assembly process and reduce the use of additional materials. Thus, this study makes a significant contribution to the broader adoption of flex-lock connections in engineering and manufacturing processes.

EVALUATION OF ENERGY EFFICIENCY OPPORTUNITIES BY INVESTIGATING COMPRESSORS IN ENTERPRISES

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The concept of energy efficiency is becoming crucial as a main part of sustainable production. In industrial facilities, energy frequently represents a substantial part of production expenses. Measures that decrease energy usage have a direct impact on reducing costs and enhancing profit margins. In the hygiene sector, the manufacturing of items such as baby diapers, adult diapers, wet wipes, and cosmetics depends exclusively on electricity consumption.

This study investigates energy efficiency within a hygiene facility in the industrial sector. At the specified baby diaper plant, both electrical energy and compressed air are required. Compressed air is a crucial input used in various production stages within industrial facilities. It is produced by compressing atmospheric air using specialized equipment, typically a compressor. A substantial amount of electrical energy used for generating compressed air is lost due to inherent inefficiencies in the compression process. As a result, compressed air, as produced by the compressor, becomes a more costly energy source compared to electricity due to these process losses.

In this study, the factory's existing energy consumption was analyzed to determine strategies for enhancing energy efficiency. The focus was particularly on the energy performance of the compressors at the baby diaper production facility. It was found that the on-off compressors used in the plant were inefficient. Switching from fixed-speed compressors to variable-speed drive (VSD) compressors resulted in a reduction of energy losses. Variable-speed compressors optimize their operating speed based on the air demand, thus helping to reduce overall energy consumption.

The results of this study are anticipated to contribute to the efficient use of energy in the hygiene industry and benefit the national economy. Reductions in energy costs will lead to decreased production expenses and enhanced competitive advantage within the sector. The data obtained from this study reveal that practices aimed at improving energy efficiency have the potential to both lower costs and reduce environmental impacts.

SURFACE MODIFICATION OF $Cs_2AgBiBr_6$ PEROVSKITE FILM FOR EFFICIENT ALL-INORGANIC LEAD-FREE PEROVSKITE SOLAR CELL FABRICATION

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All-inorganic lead-free halide perovskites have recently attracted great attention in the field of optoelectronics due to their high stability in ambient environments and non-toxicity. Among these materials, $Cs_2AgBiBr_6$ has stood out with its promising optoelectronic properties and has been applied in various areas such as gas sensors, photodetectors, and solar cells. Although $Cs_2AgBiBr_6$ is stable under atmospheric conditions, the power conversion efficiency (PCE) of the cells produced using this material is lower than that of organic-inorganic Pb-based perovskite solar cells (PSCs). The quantity of bulk and surface defects which forms during the manufacturing is one of the main factors affecting the performance of these cells. Therefore, research focusing on the passivation of bulk and surface defects of the $Cs_2AgBiBr_6$ has gained momentum recently.

In this study, carbon electrode-based PSCs with a TiO_2 electron transport layer and a $Cs_2AgBiBr_6$ absorber layer, without a hole transport layer, were successfully fabricated under atmospheric conditions. The gas quenching approach was used to synthesize the $Cs_2AgBiBr_6$ film. XRD, FE-SEM, and UV-vis analysis revealed that the $Cs_2AgBiBr_6$ phase, with an optical band gap of ~1.9 eV and an average grain size of approximately 300 nm, was successfully produced without any impurities or pinholes. In addition, various amounts of ionic liquid (IL) (1-Butyl-3-methylimidazolium tetrafluoroborate (BMIMBF4)) was used to passivate surface defects between perovskite and carbon electrode layers. While the use of the IL did not alter the structural, morphological, or optical properties of the perovskite film, the PCE of the cell fabricated with the IL-modified perovskite film improved due to surface defect passivation and enhanced charge transport.

Acknowledgements

This study was supported by Scientific and Technological Research Council of Turkey (TUBITAK) under the Grant Number 122M345. The authors thank to TUBITAK for their supports.

FABRICATION AND CHARACTERIZATION OF ORGANIC SOLAR CELLS USING LOW BAND GAP POLYMERS

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Organic solar cells (OSCs) utilizing a low band gap polymer, Poly[2,6-(4,4-bis-(2-ethylhexyl)-4H-cyclopenta[2,1-b;3,4-b']dithiophene)-alt-4,7(2,1,3-benzothiadiazole)] (PCPDTBT), as the donor material and N,N′-Bis(2,6-dimethylphenyl)perylene-3,4,9,10-tetracarboxylic diimide (PDI) as the acceptor material have been fabricated and characterized. The blend of these materials aims to harness the complementary absorption spectra and efficient charge transport properties of PCPDTBT and PDI, respectively, to enhance the overall power conversion efficiency (PCE) of the OSCs.

Device fabrication involved spin-coating the active layer from a solution of PCPDTBT and PDI. The morphological, optical properties of the thin blend films and current-voltage characteristics of the bulk heterojunction organic solar cells were characterized using techniques such as atomic force microscopy (AFM), UV-Vis spectroscopy, and current-voltage (J-V) measurements under solar simulator.

The results indicated a strong absorption in the visible to near-infrared region, attributable to the low band gap of PCPDTBT, which effectively complements the PDI absorption. The J-V characteristics revealed a modest PCE. Further optimization of the blend ratio and annealing conditions is suggested to enhance the interfacial area for exciton dissociation and improve the device performance.

DEFORMATION CONTROL OF SINGLE LAP ADHESIVE JOINT WITH PIEZOELECTRIC PATCHES BY FINITE ELEMENT METHOD

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In this study, deformation control of single-lap adhesive joint using piezoelectric patches was investigated. Single-lap adhesive joints are widely used in many engineering applications and are of great importance in terms of structural strength and reliability. However, such joints may be subject to undesirable deformations under external loads. The aim of this study is to investigate how piezoelectric materials can be used to effectively control these deformations.

Within the scope of the study, numerical modeling of single-lap adhesive joint equipped with piezoelectric patches was performed using ANSYS software. In the model, the adhesive material, materials forming the joint and piezoelectric patches were defined and the behavior of the structure under various loading scenarios was investigated. Piezoelectric patches were used as an active control mechanism against the deformation of the structure. For this purpose, different electrical voltages were applied to the patches and the effects of these voltages on the joint were analyzed.

The analysis results showed that piezoelectric patches can significantly reduce the deformation of the adhesive joint. In particular, it was observed that the deformation of the structure can be almost completely controlled under certain electrical voltages. These findings suggest that piezoelectric materials can provide an effective solution in structural control applications.

In conclusion, this study shows that piezoelectric patches are an effective tool for deformation control in adhesive joints and that such materials can be used as active control systems in engineering structures. Future studies can expand the use of piezoelectric materials in different applications by examining the effects of this technology on more complex structures.

Keywords: Single lap adhesive joint, piezoelectric materials, finite element solution

INVESTIGATION OF AXIAL DEFORMATION OF A PIEZOELECTRIC ROD WITH ANALYTICAL AND NUMERICAL METHODS

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Piezoelectric materials and systems are widely used in many areas such as precision measurement, energy harvesting, defense, medical devices, smart system design and more. Although there are comprehensive theoretical and experimental studies on piezoelectric materials in the literature, there is a need to present the basic structure with more explanatory analyses. In this paper, it will be shown how the complex mathematical formulations of piezoelectric materials can be reduced to simple problems, and the obtained results will be made more understandable with numerical analysis tools.

In the study, an electromechanical limit value problem will be created over an axially polarized cylindrical piezoelectric rod model. Open and short circuit cases will be examined, and electric field, electrical displacement and mechanical strain calculations will be made. Theoretical formulations and calculations will be supported by numerical solutions and simulations obtained using the ANSYS program.

This study aims to contribute to a wide range and effective understanding of piezoelectric technology and to guide researchers and engineering applications in this field.

Keywords: Piezoelectric materials, boundary value problem, ANSYS

MAXIMUM POWER POINT TRACKING FOR A PHOTOVOLTAIC PANEL USING ARTIFICIAL NEURAL NETWORK

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In this paper, the design and simulation results of a photovoltaic (PV) system operating at its maximum power point (MPP) using MATLAB-Simulink are presented. The parameters of a 20-Watt PV panel are used in the buck converter design. A feedforward neural network is implemented for maximum power point tracking (MPPT). The neural network features an input layer with three inputs, three hidden layers with ten neurons each, and a single output layer. This architecture is selected to enhance the accuracy and responsiveness of the MPPT algorithm, especially under varying environmental conditions. The system is primarily designed as a battery charger for a 12-Volt lead-acid battery. The performance of the system is tested with simulations using MATLAB-Simulink. These simulations focus on accuracy of the MPP tracking and fast response to environmental changes and the stability of the output voltage under dynamic conditions. The results demonstrate that the neural network-based MPPT effectively optimizes the power transfer and ensures a smooth battery charging process.

HEALTH BENEFITS OF CHIA SEED (*Salvia hispanica* L.) AND EVALUATION OF ITS USE IN FOOD INDUSTRY

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Chia seed (*Salvia hispanica* L.) is an ancient medicinal and edible seed grown in North America, mostly in Mexico and Guatemala. Studies have shown that chia is a potential food source and has been classified as a "superfood" and "super grain" due to its multiple nutrients. This interesting seed is a great source of polysaccharides, dietary fiber, protein, polyunsaturated fatty acids and phenolic compounds, including α-linolenic acid (ALA) content, which is even higher than flaxseed. Chia is also rich in calcium, magnesium and phosphorus. Chia seeds have significant protective and therapeutic effects on cardiovascular diseases, obesity, and diabetes, such as lipid-lowering, antioxidant, cardiovascular improvement, and weight loss. Chia seeds have been approved by the European Food Safety Authority (EFSA), leading to their application in the European food industry. In 2009, EFSA published a report on the safety of chia seeds, describing them as a "novel food" with valuable nutritional and therapeutic properties that can be safely consumed by consumers. In the following years (2015 and 2017), EFSA introduced some regulations regarding the safe use of chia seeds and defined the permissible levels for their application as an additive in the food industry, including in cereals, dairy products, fruit juices, and salads. Due to increasing consumer demand and the growing popularity of chia seeds, food manufacturers are seeking to incorporate them into food products. This study aimed to evaluate the health benefits of chia seeds, which are very rich in nutritional content, and the usage areas of chia seeds in the food industry.

INVESTIGATION OF MINERAL, BIOACTIVE SUBSTANCE AND PROTEIN BIOACCESSIBILITY OF BOZA OBTAINED USING DIFFERENT STARTER CULTURE COMBINATIONS

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Boza is among the most commonly consumed grain based fermented beverages in Türkiye, the Balkan countries and southern Russia. It is a highly viscous fermented beverage made from grains such as millet, rice, wheat and their flours, and is usually consumed with cinnamon and roasted chickpeas in wintertime. There are two types of fermentation in boza: lactic acid fermentation with LAB and alcoholic fermentation with yeasts. In this study, 7 boza samples were produced by fermentation with different starter culture combinations comprising LAB (*Lactococcus lactis*, *Lactiplantibacillus plantarum*, *Weisella confusa*) and yeasts (*Pichia membranifaciens*) and the effect of fermentation on the bioaccessibility of bioactive compounds, minerals (Mg, K, Fe, Zn) and protein in boza was investigated. The total phenolic content of the fermented boza samples were found to be lower as compared to the control sample (fermented after addition of commercial boza), while the bioaccessibility of total phenolic and antioxidant capacity values was higher than the control sample. While the phenolic substance bioaccessibility of the control sample was 31%, the bioaccessibility values of bozas obtained using starter culture varied between 42.11-56.30%. The Mg, K, Fe and Zn contents of boza samples varied depending on the starter culture combination. The bioaccessibility of mineral substances in boza samples increased by fermentation with different starter cultures. In the case of protein bioaccessibility, fermented boza samples exhibited better values than the control sample. The protein bioaccessibility of the control sample was 7%, whereas the bioaccessibility values of bozas produced with starter culture ranged from 14.23% to 114.09%. In conclusion, boza production with high mineral, bioactive substance and protein bioaccessibility was achieved using LAB and yeasts isolated from commercial boza.

ANTIFUNGAL POTENTIAL OF SOME PLANTS ON INHIBITION OF THE GROWTH AND AFLATOXIN B1 BIOSYNTHESIS OF *ASPERGILLUS FLAVUS*

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In this study, antifungal activities of 15 plant species were examined in vitro against toxicogenic *Aspergillus flavus*. *Origanum vulgare* powders inhibited mycelial growth of *A. flavus* by 100%. The MIC value of *O. vulgare* aqueous extract was 250 mg/mL. *O. vulgare* aqueous extracts could not completely prevent artificially induced *A. flavus* infection in sunflower, wheat, corn and rice when transferred to petri dishes after being kept in liquid medium for 5 days. At all tested concentrations (2, 4, 8, 16, and 32 mg/mL) of *O. vulgare* extracts, the protective effect was seen only in sunflower seeds during the 5-day incubation period ($p<0.05$). It was determined by SEM analysis that aqueous extracts of *O. vulgare* made lysis, collapse, flattening and degenerative changes of cells with wrinkled cell surfaces on hyphal morphology. HPLC results showed that 8 mg/mL aqueous extract of *O. vulgare* inhibited A. *flavus* production of aflatoxin B1 100%. We can emphasize that aqueous extracts of *O. vulgare* have great potential against *A. flavus*, a producer of aflatoxin B1.

Keywords: *Aspergillus flavus*, *Origanum vulgare*, aflatoxin B1, antifungal, plant extract

GREEN SOLVENT-BASED REACTIVE EXTRACTION OF CITRIC ACID

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This study focused on the separation of citric acid from aqueous solutions through reactive extraction. Tributylamine was used as the extractant, while cyclopentyl methyl ether, a green solvent, served as the diluent. The effects of varying initial extractant concentrations and initial citric acid concentrations on the reactive extraction process were investigated. Moreover, the study utilized the experimental data to predict the efficiency of multi-stage reactive extraction processes under different scenarios. These scenario-based predictions provided valuable insights for optimizing extraction performance in future studies, whether on an industrial or laboratory scale. This work provides guidance for researchers aiming to optimize reactive extraction systems, especially in green chemistry applications.

Keywords: Green Solvent, Reactive Extraction, Citric Acid

A DIFFERENT APPROACH FROM TRADITIONAL METHODS FOR DIRECT GEOREFERENCING IN UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY

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Products such as highly accurate ortho-image, map and Digital Surface Models (DSM) produced by Unmanned Aerial Vehicles (UAV) are currently being used effectively by many disciplines for different applications. Basically, the accuracy of these products depends on the specifications of the digital camera, Global Navigation Satellite System (GNSS) receiver / antenna and Inertial Measurement Unit (IMU). This criterion is also directly related to the use of the Ground Control Points (GCP) and the homogeneous distribution, which have already been established beforehand on the ground in flight by UAV and whose coordinates are precisely determined. Considering geomatics field applications in recent years, the use of UAVs with Real Time Kinematic (RTK)/Post Processing Kinematic (PPK) GNSS receiver/antenna components has made a significant contribution to the time-cost-labor measure of achieving these products with high accuracy. Taking this development into consideration, the real-time and post-processing analysis of GNSS data in UAV is of great importance for ortho-images and DSM products. Traditionally, GNSS post-measure data evaluation and analysis (Post Processing Kinematic-PPK) is performed using relative positioning techniques.

All GNSS techniques based on the relative positioning principle require simultaneous measurements at one or more reference points whose coordinates are known. Measurements must be made at least simultaneously on two points, one which's coordinates are unknown, and on another point, which's coordinates are known and can be referred as reference point, with at least 2 GNSS receivers. On the other hand, the availability of precise satellite orbit and clock information via the global, regional and local infrastructure of fixed GNSS stations networks that have been constantly observing in recent years has also led to the development of new positioning algorithms for GNSS. In this context, the Precise Point Positioning (PPP) technique, which is based on the absolute positioning principle, has emerged as an important alternative to determine the relative position. The PPP technique, in which a single GNSS receiver is sufficient for positioning, is a technique that ensures high positional accuracy in absolute terms.

In this study, it is aimed to perform tasks that analyzes the raw GNSS data obtained from the flights to be made with the UAV with the PPP method and integrates it with the IMU data to provide higher location accuracy. Thus, it is provided to eliminate the need for simultaneous reference stations of relative positioning techniques, which are widely used in today's UAV photogrammetry applications such as RTK and PPK.

Acknowledgement: This study was supported by TUBITAK (TÜBİTAK 122Y125) and Sivas Cumhuriyet University (CÜBAP M855).

CALCULATION OF OPTICAL TRANSITIONS IN AN ARROWHEAD-SHAPED QUANTUM WIRE DEPENDING ON THE ELECTRIC AND LASER FIELD

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In this study, we considered an arrowhead-shaped AlGaAs/GaAs quantum wire. We used the finite difference method under the effective mass approximation to calculate eigenvalues and eigenvectors. We applied an external electric field and a laser field to the system. We tried to show the change in optical transition coefficients when there is and without the effect of external fields.

Keywords: Kuantum Wire, Electric Field, Laser Field, Optic Apsorbtion Coefficient

This study was supported by Scientific Project Unit of Trakya University under project number: BAP 117.

INVESTIGATION OF ANTIBACTERIAL ACTIVITY OF SYNTHESIZED NEW COPPER (II) CONTAINING THIOSEMICARBAZONE COMPLEXES

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Heterocyclic compounds are organic structures with some carbon atoms substituted by heteroatoms such as nitrogen, sulfur, oxygen, and phosphorus [1]. The physical and chemical properties, as well as reactivity, of heterocyclics variable according to the ring size and structure of the heteroatoms. Recently, there has been an increasing interest in heterocyclic compounds due to their various applications [2]. Particularly, thiosemicarbazone-based heterocyclics are an important class of heterocyclic compounds because of their coordination capacity [3]. Heterocyclic compounds containing thiosemicarbazone have various biological, cytotoxic, and pharmacological activities. These properties of thiosemicarbazones are generally related to the presence of azomethine group and metal ion coordination. The coordination affects such properties as lipophilicity, drug resistance, *etc.* Heterocyclic thiosemicarbazone complexes of copper, which catalysed redox reactions and are essential for life and the most effective available divalent ion for binding to organic compounds, strong exhibit antibacterial, antitumor, anticancer, and antimicrobial activity[4].

In the present study, four new thiosemicarbazone copper (II) complexes were synthesized and their structures were elucidated by spectroscopic methods in order to investigate biologically active compounds. The in vitro antimicrobial activity of these complexes was investigated against ten disease-causing pathogens: Gram-positive bacteria (*Micrococcus luteus* ATCC9341, *Staphylococcus epidermidis* ATCC12228, *Bacillus cereus* RSKK863) and Gram-negative bacteria (*Pseudomonas aeroginosa* ATCC27853, *Klebsiella pneumonia* ATCC27853, *Enterobacter aerogenes* ATCC51342, *Salmonella typhi H* NCTC9018394, *Shigella dysenteria* NCTC2966, *Proteus vulgaris* RSKK96026,) and yeast (*Candida albicans* Y-1200-NIH). The results revealed that thiosemicarbazone copper (II) complexes were observed to be more sensitive against Gram-negative strains due to the presence of an electron-withdrawing substituent (-Br/-Cl/-F).

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LIQUID PHASE EPITAXY: THE BEST AND CHEAPEST GROWTH TOOL FOR III-V SEMICONDUCTOR DEVICES THEORETICAL AND EXPERIMENTAL STUDY OF GROWTH KINETICS AND EQUIPMENT MANUFACTURE

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Liquid phase epitaxial growth method was since its invention has uniquely gathered between the cheapest as well as fundamentally one of the highest quality reproducible tools for monocrystals successive multi-layer growth of semiconductor opto and microelectronic devices. The first successful semiconductor Gallium Arsenide laser as well as the tunneling diode Gallium arsenide based were grown 61 years ago using this cheap laboratory manufactured equipment and high quality technique. This talk will be subdivided into two parts. Explanation of the theory of this liquid phase growth highlighting on the growth kinetics for the III-V such as (GaAs-GaP-InAs-InP) based devices, phase diagram, solubility curves and how to calculate the required weight ratio for binary and ternary compounds (AlGaAs(P) InGaAs(P)) relative to the solvent weight in order to control the ternary mole fraction of every layer. Lastly, a full explanation of the laboratory self-made and assembled machine of the liquid phase epitaxy, and its outcome will be presented.

CuPC/PTCDA BASED ORGANIC BATTERY FOR MICROPOWER TECHNOLOGIES

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PTCDA and CuPC based composites were synthesized using different concentrations of black carbon to produce high performance batteries. The organic batteries have been prepared using p-type organic semiconductor such as CuPC and n-type organic semiconductor such as PTCDA. The active electrode, electrolyte and current electrodes used for the preparation of p-n organic batteries are p-type and n-type organic semiconductors, copper chloride and Al-Cu metal electrodes, respectively.The structural properties of the composites were analyzed using XRD, FTIR, UV-Vis techniques. Black carbon was added to improve the electrical properties of PTCDA and CuPC organic semiconductor materials. The current-voltage and dielectric characteristics of the prepared p-n organic batteries were analyzed. The electrical conductivity of PTCDA and CuPC is increased with BC content. The current-voltage characteristics indicate that the prepared organic batteries give a short circuit current and open circuit voltages. The obtained results suggest that the batteries based PTCDA and CuPC organic semiconductors can be used in organic electronic technology for micropower applications.

EFFECT OF USE OF ETHYL ACETATE AS SECOND FUEL IN A DUAL FUEL DIESEL ENGINE ON ENGINE NOISE AND VIBRATION

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Nowadays, alternative combustion strategies and alternative fuel studies have increased due to the increase in fuel demand and restrictions on emissions due to the increasing number of vehicles. In diesel engines, especially NO_x emission and soot emission reduction studies are being tried with alternative combustion and fuel systems. The biggest problem after the emission in diesel engines is the noise and vibration caused by self-ignition. In this study, an injection system was added to the intake manifold of the diesel engine, and the effect of ethyl acetate injected as a second fuel on noise and vibration was investigated at 0%, 25%, 50%, 75%, and 100% engine loads at 1800 rpm engine speed, where the engine gives maximum torque. In the study, the effects of providing 20% ethyl acetate from the intake line in terms of brake-specific energy consumption rate on noise and vibration in the engine were investigated. A single-cylinder naturally aspirated engine was first tested in diesel mode, and then the engine was tested by injecting ethyl acetate with a gasoline injector placed in the intake manifold. Noise and vibration were measured for these two cases. As the engine load increased, the noise and vibration values In the engine increased. Ethyl acetate caused a decrease in noise for all conditions except 75% load. When examined in terms of vibration, it was seen that ethyl acetate provided a decrease in vibration level at 25% and 50% load conditions and caused an increase in other load conditions. When evaluated in general, it can be said that operating the diesel engine at partial loads with 20% ethyl acetate as a dual fuel will create an ideal situation in terms of vibration. However, since ethyl acetate reduces noise at all loads except medium-high load conditions, it can be expressed as a positive result for reducing diesel engine noise.

PHOTOINDUCED ELECTRON TRANSFER REACTIONS WITH NAPHTHALENE DIIMIDES AS ELECTRON ACCEPTORS

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Organic chemistry is essential in synthesizing natural products by developing new synthetic methods and strategies for preparing and studying the structure and reactivity of complex naturally occurring products. Photoinduced Electron Transfer (PET), as an area of organic photochemistry, offers a powerful method for single-step synthesis of mono- and all-*trans*-fused polycyclic terpenoid skeletons that comprise the most chemically and structurally diverse family of natural products. These PET reactions are assembled *via* regioselective oxidation of acyclic terpenoid polyalkenes at the ω-alkene sites, which mimic non-oxidative biosynthetic transformation [1]. The selection of the appropriate donor and acceptor molecules is crucial in the design of these PET reactions. Therefore, the initial formation of radical cations, radical-type cyclization and termination upon PET is possible with appropriate acceptor molecules [1]. Cyanoaromatics, quinolinium salts and pyrylium salts constitute the most suitable PET acceptor groups. However, these acceptor molecules are very few in practice, and the search for new PET acceptor molecules continues [1].

Naphthalene diimides (NDIs) are promising organic molecules used as electron acceptors in organic solar cells, in organic field effect transistors, as DNA intercalators, and for sensor applications due to their intrinsic electronic and optical properties, high thermal and photochemical stability with high electron affinity and good charge carrier mobility [2]. On the other hand, NDIs are easily synthesizable organic molecules at low cost and toxicity with excellent properties, allowing investigation of their use as PET acceptors in the biomimetic cyclization of terpenoid polyalkenes via PET reactions, which are not available in the literature.

In this study, different derivatives of NDIs have been synthesized and used as electron acceptors in the cyclization reactions of mono alkenes as model electron donor compounds, which gives PET reactions for the first time. The electron acceptor properties of NDIs were investigated in detail. The expected cyclic products were obtained, proving our ideas' success.

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THE STUDY OF TLD-100 AT RADIOTHERAPY DOSE LEVEL

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Thermoluminescence dosimeters (TLDs) are devices that measure ionizing radiation by detecting the light emitted from crystal materials. They provide accurate and reliable data on radiation exposure levels to ensure safety in various industries. The purpose of this study is to measure the radiation doses that workers, patients, and the environment are exposed to within a specified period in radiotherapy application areas, particularly against ionizing radiation and its effects. For these measurements, LiF:Ti (TLD-100) a dosimetric material widely used in the medical field, and a gamma-active Co-60 radioisotope source were selected. These dosimeters were placed at the designated locations at specific distances in the irradiation room, the control room, and on a Rando phantom which is equivalent to human tissue, in the PET/CT imaging room of the Radiation Oncology Clinic at Bezmiâlem Vakıf University Medical Faculty Hospital. According to the results obtained after irradiation, the absorbed dose intensities varied between 0.05 and 1.6 Gy. It was concluded that all values were within the permissible limits.

ORGANIC LIGHT EMITTING FIELD EFFECT TRANSISTORS: ADVANCES AND PERSPECTIVES

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The rapid development of charge transport and light-emission in organic materials in the last decades has advanced the field of organic optoelectronics, highlighting the high potential of light-emitting devices for industrial applications. Demonstrated for the first time over 15 years ago, light-emitting field-effect transistors (LEFETs) have transformed from an optoelectronic curiosity to a serious competitor in the race for cheaper and more efficient displays, also showing promise for injection lasers. Thus, what is a LEFET, how does it work, and what are the current challenges for its integration into mainstream technologies? The talk will shed some light on these questions. The fundamental working principle of LEFETs, materials that have been used, and device physics and architectures involved in the progression of LEFET technology for displays will also be discussed. Finally, the state-of-the-art development of LEFETs will be presented as prospective avenues for the future of research and applications in this area.

NANOSTRUCTURED SEMICONDUCTORS FOR ENERGY APPLICATIONS

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The unique and tunable electronic properties of semiconducting materials make them very suitable for energy applications. Semiconductors are used in energy production as well as for energy storage. The current high demand for energy and the necessity to use renewable resources for energy encourages scientists to tune the properties of semiconducting for high-performance energy devices. In this talk, various approaches to synthesizing and characterizing nanostructured semiconductors and their applications in energy will be explored. Various approaches such as doping, the use of conducting substrates, and the morphological effect on the electrochemical properties of semiconductors will be discussed. Emerging semiconductors such as 2D semiconductors and nanostructured metal sulfides and phosphides will be also covered particularly for their energy applications.

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 consists 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 × 10−2 cm2 /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.

POSTER PRESENTATION

PVC WATER-BASED VARNISH FOR PVC COATED WALLPAPER PATTERN PRINTING

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Wallpapers are a material used to decorate interior walls and ceilings. They are usually processed with main processes such as coating, printing and embossing. They attract attention with their rich color, strong texture, variety of patterns and environmentally friendly features. Wallpapers produced from paper materials in the early periods have been replaced by PVC wallpapers due to deformation formation and difficulty in removal over time. PVC wallpapers are also known as wipeable wallpapers. These products stand out with their easy washability, flame resistance and antibacterial properties. They have a wide range of applications thanks to their ability to be used in almost every place, wet or dry. For this reason, it is important that the water-based paints and varnishes to be used in wallpapers are scratch resistant, resistant to washing with water and have strong adhesion and do not easily separate from the surface. Pattern prints of PVC wallpapers are made using water-based paints and varnishes with the rotagravure technique. After the rotagravure application, a drying process is carried out at certain temperatures and then a cooling process is carried out. In order for water-based paints and varnishes to adhere to the PVC surface, they must have a suitable glass transition temperature and good adhesion properties. The water-based paints and varnishes mentioned above are only available in the product portfolios of certain companies and require wallpaper manufacturers in the domestic market to import. Therefore, wallpaper manufacturers in the domestic market need to meet this need. In addition, it is thought that it will be an effective solution for sectors where printing is done on PVC-coated surfaces (skin cloths, etc.) with the same technique.

NOVEL Ni(II) COMPLEXES DERIVATIVES FROM THIOSEMICARBAZONE; SYNTHESIS, SPECTROSCOPIC & BIOLOGICAL STUDIES

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The diverse applications of heterocyclic compounds have led to a recent surge in interest in them. The creation of novel, stereo-specific, functional heterocyclic compounds is highly important for the advancement of medication research and development [1]. Especially thiosemicarbazone-bearing heterocyclic compounds are used in the pharmaceutical industry for the treatment of some diseases due to their therapeutic properties and constitute an important class of heterocyclic compounds [2]. Heterocyclic compounds are employed in the agrochemical sector for crop protection purposes because of their pesticidal properties [3]. Anticonvulsant, anti-HIV, antiamoebic, antiproliferative, anti-inflammatory, antidiabetic, anticancer, and antioxidant are just a few of the many actions displayed by heterocyclic thiosemicarbazones and their metal complexes. They also have antiviral, antifungal, antimalarial, antibacterial, and antioxidant properties [4]. Nickel-based heterocyclic thiosemicarbazone complexes play an important role in the biology of microorganisms and plants, have variable binding modes, and show strong biological, antibacterial, and inhibitory activity [5].

In this study, four new Ni(II)-based thiosemicarbazone complexes were synthesized, and spectroscopic methods elucidated their structures. The biological activity of the synthesized complexes was determined using the Well-Diffusion method. The synthesized thiosemicarbazone Ni(II) complexes showed very good antibacterial and antifungal properties because they contain thiazole rings containing N and S heteroatoms, nickel metal ion with chelation ability, and asymmetric diimine groups that impart biological activity. The heterocyclic thiosemicarbazone Ni(II) complexes showed more potent impacts against yeast as potential antifungal agents.

Acknowledgements
This work was supported by the Düzce University Scientific Research Project (grant number: 2021.05.03.1215).

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SOME ELECTRICAL PARAMETERS FROM I-V MEASUREMENTS OF Al/p-Si (MS) SCHOTTKY BARRIER DIODES WITH/WITHOUT PbO INTERFACE DOPED WITH DIFFERENT Cu RATIOS

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In this study, reference Al/p-Si (MS) and Al/Cu:PbO)/p-Si (MIS) type Schottky barrier diodes (SBDs) with PbO interface doped with Cu at different rates were produced on the same p-Si substrate/wafer under the same conditions. To determine the effect of the PbO interlayer of different thicknesses on the performance of the resulting SBDs, electrical parameters such as saturation current (I_s), ideality factor (n), rectification-ratio (RR), zero bias barrier height (Φ_{Bo}) and series/shunt resistances (R_s, R_{sh}) were obtained from the current-voltage (I-V) measurements of these SBDs and compared with each other. The energy dependent profiles of N_{ss} (N_{ss} vs E_{ss}-E_v) of each structure were generated from the I–V data, considering the voltage dependence of n and BH. Comparing all experimental results shows that the diode with 2% Cu doped PbO interface significantly improves the quality of MS type SDs compared to the undoped PbO interlayer in terms of lower leakage/saturation current values, n, N_{ss} and higher RR, BH and R_{sh} values. Therefore, if PbO is used as the interface, 2%Cu doped PbO interlayer can be used instead of the traditional interlayer.

Keywords: A comparison MS and MIS SBDs; Basic electrical parameters; Energy dependent profile of surface states; Interlayer and series resistance effects on the performance

AI MONITOR APPLICATION ON OPERATOR WORKING EFFICIENCY

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In recent times, AI technology has been rapidly advancing, bringing with it numerous ideas and new solutions. Industrial sectors, in particular, have high expectations from AI technology, aiming to reduce human error and prevent mistakes arising from software. In this context, various solutions are being considered to enhance quality and efficiency in production through AI technology. Our focus is on monitoring human-induced errors using a program called AI Monitor. The purpose of AI Monitor is to statistically analyze the collected data and create performance tables for each operator. By creating profiles for each operator, it will be possible to track their efficiency at different stations. Thus, in cases of increased error rates, the AI Monitor program will recommend to the shift leader another operator who can work at the station, replacing the underperforming operator. The AI Monitor program will facilitate human management in companies by preparing weekly or monthly performance graphs and controlling various parameters. The feedback provided by the AI Monitor is expected to improve production quality and reduce human-induced errors.

THE EFFECT OF ABSORBER USAGE ON 5G TDD PERFORMANCE IN MOBILE COMMUNICATIONS

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Time-Division Duplexing (TDD) is a key technique in 5G communication networks that allows for dynamic allocation of time slots between uplink and downlink transmissions, optimizing spectrum usage. The effectiveness of TDD can be significantly influenced by the deployment of absorbers, which are materials or devices designed to reduce unwanted reflections and interference. By mitigating reflections and enhancing signal quality, absorbers can reduce interference and improve the efficiency of time slot allocation. However, the impact of absorbers on network performance varies based on their placement, type, and the specific characteristics of the environment. This review investigates the benefits and limitations of absorber implementation, analysing their effects on signal integrity, and overall network performance in TDD systems. Understanding these impacts is essential for optimizing 5G network design and deployment strategies.