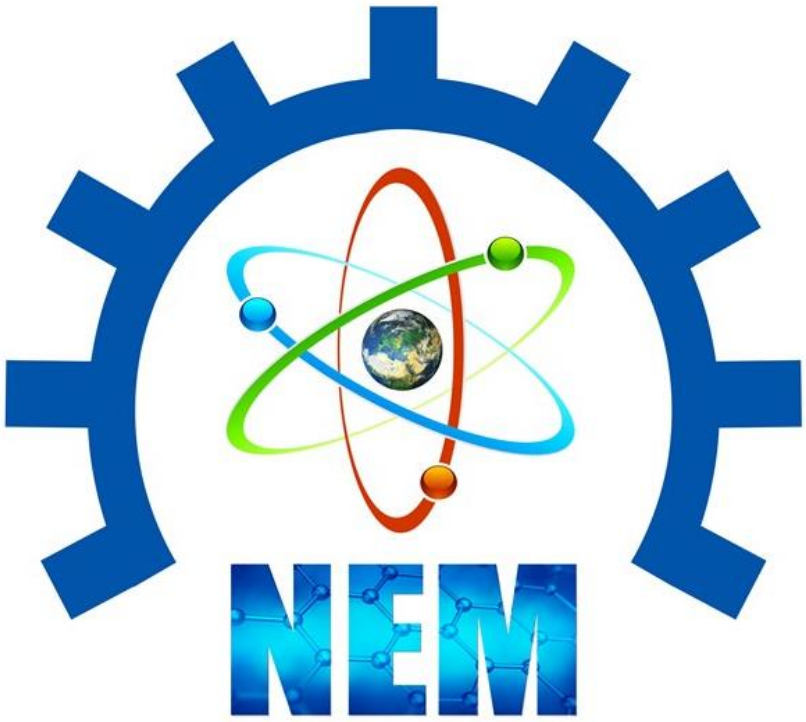
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NEM 2023

ABSTRACT BOOK



3rd International Natural Science, Engineering and Material Technologies Conference

September 21-23, 2023, Turkish Republic of Northern Cyprus

FOREWORD

It is a pleasure for us to offer you this Book of Abstract for the 3 rd International Natural Science, Engineering and Material Technologies Conference (NEM 2023). 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 2023 is honored by the presence of over 110 colleagues from various countries. We stayed true to the original NEM 2023 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 Turkish Republic of Northern Cyprus ambience will make you feel that your resources were spent well in NEM 2023.

Our warmest thanks go to all invited speakers, authors, and contributors of NEM 2023 for accepting our invitation, visiting Turkish Republic of Northern Cyprus and using NEM 2023 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 2024** event.

Best regards,
Chairmen's of Conference

Assoc. Prof. Burhan COŞKUN

Prof. Dr. Huriye İCİL

Editor:

Assoc. Prof. Burhan COŞKUN

Published, September-2023

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PROGRAMME 21 SEPTEMBER 2023 (THURSDAY) HALL-1	
10:00-10:05	Opening Ceremony
10:05-12:00	**1st session (Oral Talks) Chair: Assoc. Prof. Burhan COŞKUN**
10:05-10:50	**OPENING SPEAKERS** **- Prof. Dr. Huriye İCİL / Conference President** **- Prof. Dr. Aykut HOCANIN / Rector of Eastern Mediterranean University** **- Olgun AMCAOĞLU / TRNC Minister of Economy and Energy** **- Nazım ÇAVUŞOĞLU / TRNC Minister of National Education and Culture**
10:50:11:15	**Invited Talk-1:** Prof. Dr. Fahrettin YAKUPHANOĞLU: "NANOSTRUCTURE RADAR ABSORBING MATERIALS FOR PHANTOM AIRCRAFTS"
11:15-11:40	**Invited Talk-2:** Prof. Dr. Serap GÜNEŞ: "EFFECT OF BIOFILMS AND ADDITIVES ON THE PERFORMANCE AND STABILITY OF PEROVSKITE SOLAR CELLS"
12:00-13:30	**Lunch**
13:30-15:30	**2nd session (Oral Talks) Chair: Prof. Dr. Serap GÜNEŞ**
13:30-14:00	**Invited Talk-3:** Prof. Dr. Şemsettin ALTINDAL: "HIGH THERMAL SENSING CAPABILITY AT HIGH TEMPERATURES AND IMPEDANCE-VOLTAGE-TEMPERATURE (Z-V-T) CHARACTERISTICS IN Al/(S:DLC)/p-Si/Au STRUCTURES"
14:00-14:15	*S. TEMURLU, H. CANER, H. İCİL:* "A NEW MULTICHROMOPHORIC PERYLENE DYE: DONOR/ACCEPTOR SYSTEMS"
14:15-14:30	*E. DOĞRU, N. B. ÜLLEN, B. KIZILDUMAN, H. İCİL:* "COMPARISON OF CYPRUS LATE BRONZE AGE BOWL MANUFACTURING METHODS IN PERSPECTIVE OF ARCHEOMETRIC STUDI ES"
14:30-14:45	*A. ABOURAJAB, S. KOYUNCU, H. İCİL:* "SYNTHESIS AND CHARACTERIZATION OF TWO NOVEL MONO BAY-SUBSTITUTED PERYLENE DIIMIDE DERIVATIVES"
14:45-15:00	*M. DİNLEYİCİ, H. İCİL:* "SYNTHESIS, PHOTOPHYSICAL, ELECTROCHEMICAL AND MORPHOLOGICAL PROPERTIES OF A NOVEL CHITOSAN-BASED FLUORESCENT POLYMER"
15:00-15:15	*S. SOYEL, H. İCİL:* "FLUOROPHORES IN UNPROCESSED OLIVE EXTRACT: NOVEL APPLICATIONS AND CHARACTERISATION TECHNIQUES"
15:15-15:30	*D. UZUN, H. İCİL:* "THE EFFECT OF OXIDATION POTENTIALS OF MONO- AND POLYALKENES IN INITIATION OF BIOMIMETIC CASCADE CYCLIZATION OF TERPENOID POLYALKENE VIA PHOTOCHEMICAL ELECTRON TRANSFER"
15:30-16:00	**Coffee Break /**
16:00-18:00	**3rd session (oral talks) Chair: Dr. Instructor Ufuk PAKSU**
16:00-16:15	*P. KARŞILI, M. KUŞ, H. İCİL:* "SYNTHESIS, CHARACTERIZATION, PHOTOPHYSICAL AND ELECTROCHEMICAL PROPERTIES OF NAPHTHALENE DIIMIDE MOLECULES AND THEIR POTENTIAL APPLICATIONS IN ORGANIC ELECTRONICS"
16:15-16:30	*O. A. OBA, N. P. AYDINLIK:* "PREPARATION OF MESOPOROUS ACTIVATED CARBON FOR PESTICIDE REMOVAL: KINETICS AND EQUILIBRIUM STUDIES"

16:30-16:45	*O. G. KEBEDE, N. P. AYDINLIK, O. A. OBA:* "GREEN SYNTHESIS AND CHARACTERIZATION OF LIMONIUM SINUATUM AgNPs: ANTIOXIDANT AND ANTIMICROBIAL STUDIES"
16:45-17:00	*O. ESSAFI, I. AKANYETI, N. P. AYDINLIK:* "REMOVAL OF METHIDATHION FROM WATER USING CAROB WASTE"
17:00-17:15	*H. A. QAYYUM, N. P. AYDINLIK:* "BIOSYNTHESIS AND CHARACTERIZATION OF MALVA SYLVESTRIS AND LANTANA CAMARA AGNPS: ANTIMICROBIAL ACTIVITY"
17:15-17:30	*M. MOGHAZI, S. AŞIR, M. KARAGÖZLÜ, I. GÖKTÜRK, F. YILMAZ, D. TÜRKMEN, A. DENIZLI:* "ELECTROCHEMICAL DETECTION OF ALUMINIUM ION USING PENCIL GRAPHITE ELECTRODES COATED WITH A MOLECULARLY IMPRINTED POLYMER"
17:30-17:45	*N. A. SHAMA, S. AŞIR, I. GÖKTÜRK, F. YILMAZ, D. TÜRKMEN, A. DENİZLİ:* "ELECTROCHEMICAL DETECTION OF CORTISOL BY SILVER NANOPARTICLE-MODIFIED MOLECULARLY IMPRINTED POLYMER-COATED PENCIL GRAPHITE ELECTRODES"
17:45-18:00	*REBWAR RASHIDA, MÜMTAZ GÜRAN, HURIYE İCİL:* "FABRICATION OF A NOVEL NDI DERIVATIVE: CHARACTERISATION, IN-VITRO ANTIBACTERIAL ACTIVITY ANALYSIS, MOLECULAR DOCKING AND MOLECULAR DYNAMIC STUDIES"
18:00-19:00	**Poster Session**

PROGRAMME 21 SEPTEMBER 2023 (THURSDAY) HALL 2	
13:30-15:30	**4th session (oral talks) Chair: Prof. Dr. Mahmut KUŞ**
13:30-14:00	**Invited Talk-4:** Prof. Dr. Hasan HAVITÇIOĞLU: "THE ROLE OF CELLULAR AND TISSUE ENGINEERING METHODS IN THE TREATMENT OF AVASCULAR NECROSIS OF THE FEMUR AND TALUS"
14:00-14:15	*M. HORLU, G. İ. KARA, C. K. MACİT, B. AKSAKAL, E. YILMAZ:* "TRIBOLOGICAL EFFECTS OF CHROME, ZIRCONIUM, AND GRAPHITE ON COPPER BASED COMPOSITES IN SPOT WELDING PROCESSES"
14:15-14:30	*C. K. MACİT, M. HORLU, G. İ. KARA, B. AKSAKAL, E. YILMAZ:* "INVESTIGATION of TRIBOLOGICAL PROPERTIES of BORON CARBIDE and CHROMIUM REINFORCED COPPER MATRIX COMPOSITES"
14:30-14:45	*G. İ. KARA, M. HORLU, C. K. MACİT, B. AKSAKAL, S. SEZEK, E. YILMAZ:* "INVESTIGATION OF TRIBOLOGICAL PROPERTIES OF Cu-Cr-B HYBRID COMPOSITES"
14:45-15:00	*S. SEZEK, G. İ. KARA, M. H. AKINCI, B. AKSAKAL:* "ECAP MOLD DESIGN WITH TWO DIFFERENT EDGE ANGLES AND SIMUFACT ANALYSIS WITH Zn-A-B"
15:00-15:15	*Y. UZUN, B. TAŞ, Ş. M. TÜZEMEN, A. ÇELİK:* "THE IMPROVEMENT OF CORROSION PERFORMANCE OF CoCrW ALLOY WITH BIOACTIVE GLASS COATING"
15:15-15:30	*Y. UZUN, B. TAŞ, Ş. M. TÜZEMEN, A. ÇELİK:* "INVESTIGATION OF WEAR RESISTANCE OF ELECTROPHORETİC DEPOSITION ONTO Ti6Al4V ALLOY"
15:30-16:00	**Coffee Break**
16:00-18:00	**5th session (oral talks) Chair: Prof. Dr. Hasan HAVITÇIOĞLU**
16:00-16:15	*S. RAZAVI, M. ÖZDENEFE:* "SIMULATION OF BUILDING VENTILATED CONCRETE-SLAB IN COMSOL"
16:15-16:30	*S. ERDEM, M. ÖZDENEFE:* "THERMAL REGULATION OF PVs BY PCM BASED HYBRID SYSTEMS"
16:30-16:45	*O. SHEKOOFA, Q. ZEESHAN, M. ÖZDENEFE, A. GAZİOĞLU:* "COVID-19 IMPACTS ON THE EDUCATION OF MECHATRONIC ENGINEERING IN EASTERN MEDITERRANEAN UNIVERSITY"
16:45-17:00	*I. MUSILI, B. OZARİN, O. SHEKOOFA:* "ECONOMIC VIABILITY AND COST BENEFIT ANALYSIS OF THE DESIGN AND MANUFACTURING OF SMART SPEED BUMPS"
17:00-17:15	*N. BRIAN, M. ABDULLAHIM, SULTAN, A. ABDULAZIZ, A. SKANDARI, O. SHEKOOFA:* "COMPARATIVE ANALYSIS OF SUITABLE LIGHT SOURCES FOR MINIATURIZED SOLAR SIMULATORS"
17:15-17:30	*G. DÖLEK, B. N. BÜTÜN, M. TOK, E. YENEL, M. KUŞ:* "USE OF POLYOXOMETALATES AS ELECTRON TRANSFER LAYER IN PEROVSKITE SOLAR CELLS"
17:30-17:45	*B. N. BÜTÜN, G. DÖLEK, E. YENEL, M. KUŞ:* "PEROVSKITE SOLAR CELLS BASED ON NATURAL CLAY MATERIALS AS SCAFFOLD LAYER"
17:45-18:00	*S. ALTINIŞIK, A. KORTUN, S. KOYUNCU:* "CARBAZOLE BASED CROSSLINKED POLYMER FILMS FOR ELECTROCHROMIC APPLICATIONS"

PROGRAMME 22 SEPTEMBER 2023 (FRIDAY) HALL 1	
09:30-10:30	**6th session (oral talks) Chair: Assoc. Prof. Fatih ERSAN**
09:30-10:00	**Invited Talk-5:** Prof. Dr. Mahmut KUŞ: "A NEW CANDITATE FOR PV MARKET; PEROVSKITE SOLAR CELLS FROM LAB TO MODULE"
10:00-10:15	*S. IQBAL, M. FAKHAR-E-ALAM1, M. SHAFIQ, W. A. FAROOQ* "APPLICATIONS OF NANOMATERIALS FOR THE DIAGNOSIS OF CANCER"
10:15-10:30	*R. O. OCAYA, F. YAKUPHANOĞLU:* "ORGANIC SEMICONDUCTOR PHOTOSENSORS"
10:30-11:00	**Coffee Break**
11:00-12:30	**7th session (oral talks) Chair: Dr. Instructor Burhan CEYLAN**
11:00-11:15	*H. G. AKTAS, M. TANRIVERDI, Z. CELIK, B. TOSUN, C. GUNGORMEZ, E. KAPTAN, M. B. A. DJAMGOZ:* "IMPACT OF NARINGENIN UNDER HYPOXIC CONDITIONS ON CANCER CELL MOVEMENT MEDIATED BY VOLTAGE-GATED SODIUM CHANNELS"
11:15-11:30	*N. G. ÇOLAK, A. H. BOZDAĞ:* "AN *IN-SILICO* APPROACH TO IDENTIFY POTENTIAL NATURAL COMPOUNDS AS PESTICIDES AGAINST TOMATO MOSAIC VIRUS"
11:30-11:45	*M. KIZILŞİMŞEK, H. DEĞİRMENCİ:* "AN EFFECTIVE METHOD FOR ISOLATION OF LACTIC ACID BACTERIA STRAINS WITH HIGH LACTIC ACID PRODUCTION POTENTIAL"
11:45-12:00	*E. KIRKOÇOĞLU, S. KALKAN, M. S. ENGİN, M. R. OTAĞ:* "PHYSICOCHEMICAL, MECHANICAL AND ANTIMICROBIAL PROPERTIES OF CHITOSAN EDIBLE FILMS ENRICHED WITH MICROENCAPSULATED PROBIOTIC BACTERIA"
12:00-12:15	*F. Y. H. SUNCAK, M. ÇELİK:* "EFFECTS OF USING ORANGE FIBER ON TEXTURAL PROPERTIES AND QUALITY PARAMETERS IN MEATBALL PRODUCTION"
12:15-12:30	*S. ARÇAY, P. ADUN:* "VALIDATION OF GERBER METHOD TO DETERMINE FAT IN MILK AND DIARY PRODUCTS"
12:30-13:30	**Lunch**
13:30-15:30	**8th session (oral talks) Chair: Assoc. Prof. Mehmet YAĞMURCUKARDEŞ**
13:30-14:00	**Invited Talk-6:** Assoc. Prof. Fatih ERSAN: "TUNING THE ELECTRONIC AND MAGNETIC PROPERTIES OF TWO-DIMENSIONAL MXENES"
14:00-14:15	*H. DEĞİRMENCİ, M. KIZILŞİMŞEK:* "PERFORMANCE ANALYSIS OF GÜZELYURT WATER USER ASSOCIATIONS WITHIN ATATÜRK DAM IN ŞANLIURFA"
14:15-14:30	*E. ERDAG, E. BECER, H. S. VATANSEVER:* "CYTOTOXIC AND PROAPOPTOTIC EFFECTS OF NOVEL TRIAZOLYL-ISATIN COMPOUNDS AGAINST GLIOBLASTOMA CELLS"
14:30-14:45	*B. CEYLAN:* "EVALUATION OF IN VITRO ANTIOXIDANT ACTIVITIES OF TRADITIONAL FERMENTED NON-ALCOHOLIC BEVERAGES FROM TURKEY AND ANALYSIS OF ITS PHENOLIC CONTENTS BY LC-MS/MS"
14:45-15:00	*B. CEYLAN, G. TIRIS, S. E. K. TEKKELİ, C. ÖNAL, A. ÖNAL:* "A NOVEL HPLC METHOD FOR SELEXIPAG IN HUMAN PLASMA AND APPLICATION TO A PROTOTYPE PHARMACOKINETIC STUDY"
15:00-15:15	*E. NANKALI:* "EXPLORING NATURAL RESOURCES AND INNOVATIVE TECHNOLOGIES: SEA MOSS BIOACTIVE AND HYDROGEL ADVANCES IN PHARMACEUTICALS AND SKIN CANCER TREATMENT"
15:15-15:30	*M. AVER, H. PIHTILI:* "INVESTIGATION of ZETA POTENTIAL of NATURAL DERIVED HYDRXYAPATITE at THREE DIFFERENT ALCOHOL"
15:30-16:00	**Coffee Break**

16:00-18:00	**9th session (oral talks) Chair: Prof. Dr. Sermet KOYUNCU**
16:00-16:15	*F. YAKUPHANOĞLU:* "FABRICATION AND CHARACTERIZATION OF PHOTONIC DEVICES BY FYTRONIX SYSTEMS"
16:00-16:15	*N. K. YETİM, E. H. ÖZKAN, M. M. KOÇ:* "THE USE OF HRP ENZYME IMMOBILIZED MAGNETIC DENDRIMERS IN THE REMOVAL OF TEXTILE DYES"
16:15-16:30	*N. K. YETİM, E. H. ÖZKAN, N. AKKURT, C. ÖZCAN:* "DETERMINATION AND ENRICHMENT OF Pb(II) AND Cd(II) IONS BY FAAS USING MAGNETIC SOLID PHASE EXTRACTION"
16:30-16:45	*B. A. HANEDAR, M. YAĞMURCUKARDEŞ:* "ASYMMETRIC JANUS FUNCTIONALIZATION IN 2D MXENE FOR PIEZOELECTRIC PROPERTIES"
16:45-17:00	W. ASLAM FAROOQ: "HYDROGEN PRODUCTION AND ROLE OF HYDROGEN IN RENEWABLE ENERGY"
17:00-17:15	*U. PAKSU:* "FOOD IRRADIATION AND IDENTIFICATION OF IRRADIATED FOOD BY PHYSICAL TECHNIQUES"
17:15-17:30	*Ç. Ş. GÜÇLÜ, M. ULUSOY:* "A COMPARISON ELECTRICAL PARAMETERS AND ENERGY DEPENDENT PROFILE OF SURFACE STATES OF Au/n-Si STRUCTURE WITH PVA AND (CdTe: PVA) INTERLAYER USING CURRENT-VOLTAGE (I-V) AND CAPACITANCE-VOLTAGE (C-V) MEASUREMENTS"
17:30-17:45	*A. DERE:* "BIODIELECTRIC MATERIALS FOR BIOSENSOR APPLICATION"
17:45-18:00	*B. COŞKUN:* "SILICON BASED PHOTODETECTOR ANALYSIS DEVICE"
18-00: 23:00	**KIBRIS GECESİ**

PROGRAMME 22 SEPTEMBER 2023 (FRIDAY) HALL 2	
09:30-10:30	**10th session (oral talks) Chair: Prof. Dr. Şemsettin ALTINDAL**
09:30-10:00	**Invited Talk-7:** M. YAĞMURCUKARDES: "ELECTRONIC, VIBRATIONAL, AND PIEZOELECTRIC PROPERTIES OF TWO-DIMENSIONAL ULTRA-THIN JANUS MATERIALS"
10:00-10:15	*E. ÜNAL, M. M. KUNT:* "COMPARATIVE ANALYSIS OF CONCRETE AND ASPHALT PAVEMENTS FOR SUSTAINABLE ROAD INFRASTRUCTURE"
10:15-10:30	*O. KIRILMAZ:* "RANKING OF RISKS IN CONSTRUCTION INDUSTRY ACCORDING TO THEIR INDEX VALUES: EXPLORATORY RESEARCH IN CYPRUS"
10:30-11:00	**Coffee Break**
11:00-12:30	**11th session (oral talks) Chair: Assoc. Prof. Nurdan KURNAZ YETİM**
11:00-11:15	*Y. E. AYÖZEN:* "THE IMPORTANCE OF DATA MANAGEMENT IN THE SCOPE OF URBAN MOBILITY IN TRANSPORTATION"
11:15-11:30	*S. TEKIN, D. ÖZDAL*: "THE EVALUATION OF ENVIRONMENTAL ATTITUDES AND BEHAVIORS OF HIGH SCHOOL STUDENTS IN CYPRUS: CASE STUDY OF GUZELYURT AND LEFKE"
11:30-11:45	*A. SUNCAK, Ö. AKTAŞ:* "OPTIMIZING HYPERPARAMETERS FOR ENHANCING PERFORMANCE IN NATURAL LANGUAGE UNDERSTANDING FOR TURKISH"
11:45-12:00	*C.TUNCER, A. ORAL, M.B. GEDİKLİ:* "TOOL LIFE ESTIMATION WITH NOISE LEVEL IN HIGH VOLUME METAL CUTTIN"
12:00-12:15	*K. N. OYLUM, K. SELÇUK, T. T. BİLGİN:* "ENHANCING ENERGY EFFICIENCY AND REAL-TIME MONITORING IN INDUSTRIAL ENVIRONMENTS THROUGH AN INTEGRATED SOFTWARE SOLUTION: NIGHTWATCH"
12:15-12:30	*H. ÇOKÇALIŞKAN:* "DEVELOPMENT OF SPATIAL ABILITY ACHIEVEMENT TEST FOR 7th GRADE STUDENTS"
12:30-13:30	**Lunch**
13:30-15:00	**12th session (oral talks) Chair: Assoc. Prof. Berna AKGENÇ HANEDAR**
13:30-14:00	**Invited Talk-8:** Assoc. Prof. Mujeeb U. CHAUDHRY: "ORGANIC LIGHT EMITTING TRANSOISTORS FROM BEGINNING TO RECENT DEVELOPMENTS"
14:00-14:15	*E. YÜKSELTÜRK:* "COMPARING ELECTRIC FEATURES OF Al/p-Si/Au (MS) AND Al/(Gr:PVP)/p-Si/Au (MPS) STRUCTURES THROUGH CAPACITANCE-VOLTAGE (C-V) MEASUREMENTS"
14:15-14:30	*M. DIWAN, M.AL HAJ MOUSA, M.AHMAD, M.ALANEME ,T. BAALORA, O.SHEKOOFA:* "DESIGN AND MANUFACTURE OF A SOLAR PANEL CLEANER ROBOT: CHALLENGES AND LESSONS LEARNED FROM A CAPSTONE PROJECT
14:30-14:45	*A. C. ERTEN:* "THERMOPLASTIC MICROFLUIDIC 3D CELL CULTURE AND IMAGING PLATFORM"
14:45-15:00	*C. GÜLER, S. E. B. KESKİN:* "DESIGN OF CIRCULAR-SHAPED FREQUENCY-SELECTIVE SURFACE WITH HIGH ANGULAR STABILITY"
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15:45-16:00	*B. KESKİN, S. BAŞLAYICI, B. DERİN:* "THE EFFECT OF LOW-LEVEL ADDITION OF CU AND FE TOGETHER ON MARTENSITIC TRANSFORMATION AND MICROSTRUCTURE IN THE NITI INTERMETALLIC"
16:00-16:15	*A. BUYUKBAS-ULUSAN, A. TATAROGLU:* "FREQUENCY DEPENDENCE OF ELECTRIC CHARACTERISTICS OF POLYMER BASED MPS"
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16:45-17:00	*S. R. VAN EYSSEN, D. KAVAZ: "*AN EVALUATIVE IN VITRO INVESTIGATION OF THE DELIVERY OF CYTARABINE WITH RGD DECORATED SOLID LIPID NANOPARTICLES"
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17:45-18:00	*H. BİLİCİ, M.İ. ONUR, M. TÜRKÖZ:* "STRENGTH AND CONSOLIDATION CHARACTERISTICS OF CLAY IN DIFFERENT LIQUIDITY INDEXES"
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POSTER PROGRAMME

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PP103	*S. ALTINIŞIK, S. KOYUNCU:* "SYNTHESIS AND CHARACTERIZATION OF NEW VIOLOGEN BASED COVALENT ORGANIC FRAMEWORKS"
PP104	*Ö. ACIR:* "REMOTE SENSING APPLICATIONS IN MINING INDUSTRY CASE STUDIES FOR VARIOUS MINERAL DEPOSITS (TÜRKİYE)"
PP105	*F. HACIOĞULLARI*: "DEVELOPMENT OF A MIP- BASED ELECTROCHEMICAL SENSOR FOR A CANCER BIOMARKER ADENOSINE"
PP106	*Ö. F. ÖZDEMİR: "PREPARATION AND CHARACTERIZATION OF PbO THIN FILMS WITH DIFFERENT ZINC CONCENTRATIONS BY SILAR METHOD"*

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NANOSTRUCTURE RADAR ABSORBING MATERIALS FOR PHANTOM AIRCRAFTS

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Radar absorbing materials are very important in defence technology. In particular, the production of nanoparticles increases the reliability of these materials more. Many materials can be produced with the Fytronix nanomaterial production system, as well as many materials belonging to radar absorption applications are produced. Radar absorbing materials or RAMs are coatings with determined electrical and magnetic properties that enable the absorption of microwave energy at broadband frequencies. Requirements such as wide frequency range, flexibility, lack of corrosion have led to a stealth technology that reduces the probability of detecting an aircraft. These materials are widely used in low detectable target. For this the purpose, functionalized graphene-doped ZnO radar absorption materials were produced using a Fytronix nanomaterial production system. The radar absorption properties of functionalized graphene-doped ZnO materials were analyzed by reflection, absorbtion and transmittion measurements.



Fig. Fytronix Nanomaterial Production System.

TUNING THE ELECTRONIC AND MAGNETIC PROPERTIES OF TWO-DIMENSIONAL MXENES

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In the recent years, increasing attention has been paid to the exploration of two-dimensional (2D) magnetic materials for their potential applications in logic and memory operations, spintronics devices, and quantum computation such as spin filter, spin diode, and spin valve. Although a vast majority of 2D materials are nonmagnetic, magnetization generally can be generated in these nonmagnetic materials by applying tensile strain and external electric field, depositing magnetic foreign atoms on the material, introducing specific defects or edges in the material. Although these effects produce high spin polarization, it is still challenging to prepare and control materials for experiments with ordered spin structure at room temperature. For instance, the clustering of the adatoms is always inescapable, and the defect type and the edge morphology are not controllable easily.

Numerous 2D magnetic materials have been theoretically and experimentally studied to obtain Curie/Neel (T_C/T_N) temperature at the room temperature, including transition metal dichalcogenides (TMDs), transition metal borides (MBene), and transition metal carbides/nitrides (MXenes). Among them, MXenes show a viable route towards low-cost and efficient practical spintronics devices due to their structural diversity, availability and good mechanical, chemical and electronic properties. MXene is available in a variety of forms, including single[1] and double-layered[2] MXenes. Many double-layered MXenes (DTM) have been predicted for FM/AFM spintronics in recent theoretical approach. However, overall the claim for DTM's reported magnetic properties remain unclear. In fact, these issues can be addressed, so that the theoretical efforts to classify these DTM for spintronics applications could become less tedious and more reliable. With this motivation, here we aimed to theoretically revisit the ground state magnetic properties of 10 prominent members of the Cr-based DTM as potential candidates for realistic spin-electronics device applications.

Acknowledgement: This work was supported by the Scientific and Technological Research Council of Turkey (TUBITAK) under Research Project No. 121F270.

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EFFECT OF BIOFILMS ON THE PERFORMANCE AND STABILITY OF PEROVSKITE SOLAR CELLS

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Humans have made their biggest discoveries by observing and copying what happens in nature since their existence, which paved a way for also scientists to make their well-known discoveries. Nowadays, we can find the copy of natural events in lots of technological products. Plants are changing and developing over billions of years to become better at making food through photosynthesis. Solar cells are devices that turn sunlight into electricity. They are seen as a good solution to the energy crisis we may face soon. Solar energy is renewable, clean, and doesn't cost anything. Perovskite solar cells have become very popular in recent years. Their ability to work better has improved quickly in the past decade, which makes them the most significant contenders and a game changer in the PV market, providing possibility to them to compete with their counterparts. Even though they work well, these devices suffer from stability issues because they are easily affected by oxygen, humidity, or the way they are produced.

In this study, we investigated the effect of biological molecules both as additives in the washing solvent and as biofilms on the performance and stability of perovskite solar cells.

Acknowledgement: This work has been supported by the Scientific and Technological Research Council of Turkey (Tübitak)-BIDEB 2247-A National Leader Researchers Program under the project number of 121C305.

THE ROLE OF CELLULAR AND TISSUE ENGINEERING METHODS IN THE TREATMENT OF AVASCULAR NECROSIS OF THE FEMUR AND TALUS

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The femoral head (ANFH) and Talus avascular necrosis (TAN) is a progressive disease with a complex pathogenesis. Although total hip arthroplasty (THA) is the most effective treatment for patients with avascular necrosis are often with some complications related to the prosthesis. Moreover, it is a method that does not return to the natural tissue. With the development of tissue engineering, biotechnology, an increasing number of studies pay attention to use of stem cells/ tissue engineering material for the treatment of (ANFH and TAN). Stem cells are characterized by the ability to self-renew and differentiate into multiple cell types, including differentiation into osteoblasts and endothelial cells to mediate bone repair and angiogenesis. Furthermore, stem cells can offer growth factors to promote blood supply in the necrotic regions by paracrine effects. Therefore, stem cell therapy and tissue engineering methods has become one of the hip-and talus preserving alternatives for treatment. This study summarized the current trends in tissue engineering stem cell therapy for (ANFH and TAN), from clinical applications to related basic research, and showed that an increasing number of studies have confirmed the effectiveness of stem cell therapy in treatment. However, many unsolved problems and challenges in practical applications of tissue engineering /stem cell therapy still exist, such as patient selection, standardized procedures, safety assessment, and the fate of transplanted cells in the body. Additional studies are required to find ideal cell sources, appropriate transplantation methods, and the optimal number of cells for transplantation.

A NEW CANDIDATE FOR PV MARKET: PEROVSKITE SOLAR CELLS FROM LAB TO MODULE

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The global energy landscape is undergoing a transformation, with a growing emphasis on renewable energy sources to address environmental concerns and energy sustainability. Among these sources, photovoltaic (PV) technology has played a pivotal role in harnessing the power of the sun. While traditional silicon-based solar cells have dominated the PV market for decades, recent advances in perovskite solar cell technology have led to the emergence of a compelling new candidate.

This presentation is a comprehensive exploration of perovskite solar cells' journey from laboratory-scale research to scalable module production. Perovskite solar cells have attracted significant attention due to their remarkable efficiency gains, cost-effectiveness, and versatility in terms of form factors. The research community has made significant strides in understanding and overcoming the challenges associated with perovskite materials, including stability, toxicity, and scaling issues.

The transition from lab-scale prototypes to commercial modules involves addressing various technical, economic, and regulatory challenges. This paper delves into the key advancements and breakthroughs in perovskite solar cell technology that have enabled the upscaling process. It also discusses the regulatory and environmental considerations associated with the deployment of this emerging technology on a large scale.

ELECTRONIC, VIBRATIONAL, AND PIEZOELECTRIC PROPERTIES OF TWO-DIMENSIONAL ULTRA-THIN JANUS MATERIALS

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Two-dimensional (2D) Janus materials are a new class of materials with unique physical, chemical and quantum properties. The name Janus comes from the ancient Roman god who had two faces, one looking to the future and the other to the past. This definition is used for materials with different surfaces in 2D single-layer materials, and has recently become widespread with the achievement of experimental synthesis of such materials. Prior to the synthesis of the single-layer MoSSe Janus material, two-sided structures were formed by surface functionalization in the currently known single-layer structures such as graphene. However, the experimental demonstration of 2D MoSSe revealed the existence of stable Janus-type materials, and the stability of Janus structures belonging to different material groups has been predicted in many studies.

In a recently published study, we predicted with theoretical calculations that the vertical heterostructures that can be formed with these materials, inspired by the out-of-plane asymmetry of Janus materials, may show different properties depending on the layer-layer interaction. The electronic and vibrational properties of the heterostructures formed by Janus structures consisting of Germanium Oxide (GeO) and Mo-S-O atomic layers, which have out-of-plane asymmetry and have recently been brought to the literature experimentally, were shown to depend on the interacting atomic types at the interfaces. Our calculations showed that electronically the O/Ge and S/O interfaces form heterojunctions with direct and indirect type-II band alignment, respectively. On the other hand, O/O and S/Ge interfaces formed type-I band alignment with indirect band gap. Optically, different interfacial interactions exhibit distinguishable features over the absorption spectra. Raman spectrum calculations, another characterization method, have also shown that heterostructures with different interface interactions can be distinguished, especially through low-frequency phonon modes. The piezoelectric properties of GeO/MoSO heterostructures vary significantly with the interfacial interaction type.

Our study is important in terms of predicting the diversity of properties that will arise if heterostructures formed with 2D materials are formed with asymmetric layers.

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.

HIGH THERMAL SENSING CAPABILITY AT HIGH TEMPERATURES AND IMPEDANCE-VOLTAGE-TEMPERATURE (Z-V-T) CHARACTERISTICS IN Al/(S:DLC)/p-Si/Au STRUCTURES

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In this study, capacitance/conductance-voltage (C/G-V) measurements were carried out in the temperature range of 80 – 440 K and voltage range of -5V to 10 V at 0.5 MHz to get more accuracy and reliable results on the temperature sensing and electrical characteristics. Both the C-V and G/ω-V curves showed a clear peak especially at high temperature and peak and the peak position shifted to the negative voltage region with increasing temperature due to a special density distribution of interface traps (D_{it}) and their reordering and restructure under temperature effect depend on relaxation time. The value of activation energy of charge carriers was evaluated from the slope of Arrhenius plot (ln(σ) vs kT/q) for various applied bias voltage. Meanwhile, the temperature sensitivity constant (dV/dT) was found at about 40 mV/K fort $6x10^{-10}$ F which is considerably high proven in the literature near room temperature. On the other hand, while the C and G values are almost constant for each bias voltage at low temperatures, they are increase at high temporaries as almost linearly. The series resistance value of the structure was also changed between 389 Ω (at 80 K) and 21.8 Ω (at 440 K). In conclusion, we can say that the Al/(S:DLC)/p-Si/Au structure with its high sensing ability is a good candidate for its use in thermal sensors near and above room temperatures.

Keywords: Capacitance/conductance-voltage (C/G-V) characteristics; Temperature sensing, applications; Activation energy and series resistance; conduction mechanisms

ORAL PRESENTATION

CARBAZOLE BASED CROSSLINKED POLYMER FILMS FOR ELECTROCHROMIC APPLICATIONS

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In recent years, there has been a continuous rise in the demand for high-performance conjugated polymers in various technological applications, such as electrochromic devices, OLED displays, solar cells, and field-effect transistors [1]. Furthermore, chemical cross-linking has found extensive application in modifying the physical characteristics of polymer materials. The formation of chemical bonds between polymer chains imparts increased structural rigidity to the material and holds the potential to confer a more precisely defined shape. Cross-linked electroactive films are polymer films in which cross-linkages are formed at the molecular level through electrochemical or chemical reactions [2-4]. These films combine the characteristics and behaviours of electroactive polymers, which can respond electrically, with the ability to exhibit. The cross-linking that occurs on the film surface can enhance the mechanical durability of the polymer film, making it more chemically stable and better able to withstand environmental conditions and chemical impacts [3]. In our studies, carbazole and viologen-based electroactive structures with cross-linkable allyl subunit were synthesized. ECD devices were constructed by using the anode and cathode layer obtained cross-linking on the film surface by sandwich method. As a result, it has been observed that the performance of these ECDs has improved considerably.

Keywords: Carbazole, Cross-linkable polymer, Electrochromic devices-ECDs, Organic semiconductors.

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OPTIMIZING HYPERPARAMETERS FOR ENHANCING PERFORMANCE IN NATURAL LANGUAGE UNDERSTANDING FOR TURKISH

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The field of Natural Language Processing (NLP) has succeeded remarkable progress in deep learning techniques. Deep learning-based approaches have emerged as superior alternatives to rule-based NLP methods and various NLP tasks such as text classification, sentiment analysis, and document clustering. The fact that the performance of a learning model inarguably depends on fine-tuning its hyperparameters, the selection of appropriate hyperparameters affects the capability of the model in learning and extracting meaningful patterns for the input data. Instead of an exhaustive and time consuming techniques such as trial-and-error approach, using the suitable optimization technique provides more ideal solutions and unleash the full potential of the learning model. In this study, the application of hyperparameter optimization techniques such as Bayesian Optimization, Random Search, and Grid Search to improve the performance of a detection model for defective expressions have been focused on. Despite the fact that the use of deep learning models (Long Short-Term Memory [LSTM], Convolutional Neural Network [CNN], and a hybrid model of CNN and LSTM [C-LSTM]) and machine learning classifiers (Support Vector Machine [SVM] and Random Forest [RF]) has yielded acceptable results through a trial-and-error hyperparameter tuning approach, the main goal of this study is to provide the full potential of these models by applying optimization techniques to fine-tune their hyperparameters. Thus, this study will increase model performance beyond the limitations of the trial-and-error method and make a great contribution to advance the field of NLP.

Keywords: Bayesian optimization, Grid search, Hyperparameter optimization, NLP, Random search, Turkish

CYTOTOXIC AND PROAPOPTOTIC EFFECTS OF NOVEL TRIAZOLYL-ISATIN COMPOUNDS AGAINST GLIOBLASTOMA CELLS

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Various biological activities, including anticancer properties, have been observed in isatin derivatives featuring a 1,2,4-triazole group. In this study, newly synthesized derivatives of triazolyl-isatin were examined for their ability to inhibit the growth of a human glioblastoma cell line (T98), thereby assessing their cytotoxic potential. The chemical structures of the synthesized compounds were identified using spectroscopic techniques such as ^{1}H NMR, ^{13}C NMR, elemental analysis, and mass spectrometry. The synthesized compounds were evaluated using the MTT assay method to determine the impact on cell viability. The apoptotic characteristics of the compounds were assessed through immunocytochemistry, employing antibodies targeting caspase-3, cytochrome-c, and FasL. Various concentrations of the compounds (5, 10, 25, 50, and 100 µM) were incubated for 24 and 48 hours, respectively. As a result, the tested compound, 1-[3-(1H-1,2,4-Triazol-1-yl)propyl]-5-nitro-3-[2-(perfluoro-phenyl)hydrazono]indolin-2-one, demonstrated the highest anti-cancer effects amongst the others with an IC_{50} value of 189 µM concentration for 24 h incubation period. Additionally, FasL and cyt-c immunoreactivities were significantly decreased in 1-[3-(1H-1,2,4-Triazol-1-yl)propyl]-5-nitro-3-[2-(perfluoro-phenyl)hydrazono]indolin-2-one treated T98 cells. The results showed that this compound stimulated apoptosis in both extrinsic and intrinsic pathways, suggesting its potential as a promising and novel therapeutic agent for glioblastoma treatment.

EXPLORING THE INFLUENCE OF $CASIO_3$ ADDING ON THE MICROSTRUCTURE AND MECHANICAL PROPERTIES OF 3Y-ZRO_2 CERAMICS

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This study aimed to improve the mechanical properties of 3 mol% Y_2O_3 stabilized zirconia (3Y-ZrO_2) dental ceramics by incorporating $CaSiO_3$. Various amounts of $CaSiO_3$ were added to 3Y-ZrO_2, and their effects on the sinterability, microstructure, and mechanical characteristics of 3Y-ZrO_2 were investigated using Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD), and micro-hardness tests. The XRD results and SEM images revealed that up to 1% by weight of $CaSiO_3$ was soluble in 3Y-ZrO_2, beyond which it existed as a secondary phase rather than dissolving in the matrix structure. With the addition of 15% $CaSiO_3$, the relative density of 3Y-ZrO_2 decreased from 97% to 85%, while the grain size increased from 0.36 to 0.53 μm. Furthermore, the hardness values decreased from 12.89 to 5.85 GPa, but the fracture toughness improved from 7.15 to 16.41 $MPa.m^{0.5}$. Adding $CaSiO_3$ to 3Y-ZrO_2 led to an approximately 130% increase in fracture toughness. Based on these outcomes, $CaSiO_3$-doped 3Y-ZrO_2 ceramics demonstrate excellent potential for dental implant applications.

Keywords: 3Y-ZrO_2; $CaSiO_3$; Sinterability; Hardness; Fracture toughness

EFFECTS OF USING ORANGE FIBER ON TEXTURAL PROPERTIES AND QUALITY PARAMETERS IN MEATBALL PRODUCTION

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The aim of this research is to use dietary fiber in the production of meatballs extracted from orange pulp, which is the waste of orange juice industry. In addition, it is aimed at increasing the functional properties of the product and providing added value to the industry in terms of waste evaluation. In the study, meatballs were produced using different ratios of orange fiber (0%, 1%, 3%, 5%), which decreased the pH, moisture, fat, diameter reduction and cooking loss values of the meatballs. The TBARS value, which is an indicator of lipid oxidation, showed the highest value in the group with 5% fiber added. In general, sensory analysis parameters of the meatballs were not affected by use of orange fiber. However, it was determined that the textural parameters of the meatballs decreased in general with the increase of fiber ratio.

Keywords: Meatballs, Dietary fiber, Orange fiber, Texture

INVESTIGATION OF HEATSINK DESIGN PARAMETERS IN AN INDUCTION HOB BY USING DOE AND CFD METHODS

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Induction hobs have gained significant popularity as a modern and efficient alternative to conventional gas and electric hobs. The technology behind induction cooking involves the use of electromagnetic fields to heat the cooking vessel directly, as opposed to traditional methods that rely on thermal conduction. This direct transfer of heat not only promises faster and more precise cooking, but also offers potential advantages in terms of energy efficiency and safety. Induction hobs includes electronic system inside of it. For creates the electromagnetic fields via coils, high current is needed from the electronic system. During this period, electronic components reach high temperature. For sustainable usage of hobs, electronic components need to be cooled by ventilation system. One of the important components of ventilation system is heatsink. With the increasing demand for smaller, faster, and more powerful electronic devices, the efficient management of heat dissipation has become a critical challenge. Heatsinks, commonly used in electronic cooling systems, play a vital role in dissipating excess heat generated by electronic components to maintain optimal operating temperatures. The design and performance of heatsinks are crucial factors in ensuring the reliability and longevity of electronic devices. In this paper, aluminium finned heatsink design has been investigated. Electronic components are settled on finned heatsink and they inserted in a simplified induction hob. For the heatsink design, design of experiment is applied by changing number of fins, fin space and fin thickness of heatsink. DOE is created by using Minitab program. For saving tooling time and experimental set-up, CFD method is used to simulate each heatsink design. CFD method is validated with the theoretical heatsink problem. For the CFD method, FloEFD program is used. Results show the effect of each design change on IGBT (Insulated Gate Bi-Polar Transistor) surface temperature which connected to heatsink.

Keywords: Induction Hob, Heatsink, DOE, CFD, FloEFD

PHYSICOCHEMICAL, MECHANICAL AND ANTIMICROBIAL PROPERTIES OF CHITOSAN EDIBLE FILMS ENRICHED WITH MICROENCAPSULATED PROBIOTIC BACTERIA

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Probiotic consumption has been associated with a wide range of health benefits for consumers. For probiotic-containing products to provide benefits to the consumer, effective delivery of microorganisms is essential. In recent years, the microencapsulation of probiotic microorganisms has garnered significant interest as a successful method for efficiently delivering probiotics to the host. This study aimed to determine the physicochemical (thickness, moisture content, density, color values, contact angle), mechanical (tensile strength, elongation percentage, and water vapor permeability), and antimicrobial properties of chitosan films enriched with microencapsulated *Bifidobacterium animalis ssp lactis* B94 and *Lactobacillus rhamnosus* GG probiotic bacteria, for their potential applicability in food packaging. Through the extrusion method, the microencapsulated probiotic bacteria showed live counts ranging from 8.05±0.21 to 9.50±0.45 log CFU/g after microencapsulation, while viability values under simulated bile and artificial gastric conditions were found to be 4.21±0.20 to 5.80±0.16 log CFU/g and 5.09±0.15 to 6.01±0.08 log CFU/g, respectively. After drying, the viability of probiotic microorganisms in the films ranged from 86.20% to 90.94%. The produced active film samples had thickness values of 105±0.01 to 157±0.01 µm, moisture content of 16.53±1.03% to 18.75±1.48%, density of 0.71±0.16 to 1.14±0.24 $g.cm^{-3}$, contact angle of 57.02±2.22 to 84.47±0.45 θ°, *L** value of 86.86±0.22 to 87.64±0.89, *a** value of -1.02±0.15 to -0.43±0.19, and *b** value of 3.62±1.71 to 6.14±1.17. The tensile strength (TS) of the films ranged from 10.10±3.80 to 15.37±3.09 MPa, and the Elongation at break (E) values were determined to be 62.20±0.90 to 74.58±0.88 %. Additionally, the water vapor permeability (WVP) of the active film samples was found to be in the range of 2.12±0.00 to 2.93±0.00 x 10^{-12}.g.cm/cm^2.s.Pa. In terms of antimicrobial properties against *Escherichia coli* and *Staphylococcus aureus*, the obtained zone diameters ranged from 31±1.27 to 45.5±0.71 mm and 23±1.41 to 44.5±0.71 mm, respectively. Overall, the study results indicate that the produced active chitosan films hold promise as materials suitable for food packaging applications.

COMPARING ELECTRIC FEATURES OF Al/p-Si/Au (MS) AND Al/(Gr:PVP)/p-Si/Au (MPS) STRUCTURES THROUGH CAPACITANCE-VOLTAGE (C-V) MEASUREMENTS

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In this work, Al/p-Si/Au (MS) structures with and without (0.05 Graphene-doped PVP) interlayer were prepared onto same p-Si wafer in same conditions to determine the effects of (0.05 Gr:PVP) organic interlayer and compare their electrical features by using capacitance/voltage (C-V) and conductance/voltage (G-V) measurements for 1 MHz at room temperature (RT). Using the slope and intercept of C^{-2}–V data, the electronic parameters were calculated such as the doping concentration atoms (N_A), the Fermi energy level (E_F), depletion layer width (W_d), and barrier-height (Φ_B). They were found vary from $2.01x10^{16}$ cm^{-3}, 0.161 eV, $2.23x10^{-5}$, 0.897 eV for MPS and $2.44x10^{16}$ cm^{-3}, 0.156 eV, $1.82x10^{-5}$, 0.746 eV for MS structure. The voltage dependent profiles of interface-traps (Dit) and series resistance (Rs) were calculated $2.61x10^{12}$ $eV^{-1}cm^{-2}$, $2.54x10^{11}$ $eV^{-1}cm^{-2}$ and 115 Ω, 130 Ω respectively for MS and MPS. Besides, the measured capacitance and conductance were corrected taking into account the effect of series resistance (R_s).

PERFORMANCE ANALYSIS of GÜZELYURT WATER USER ASSOCIATIONS WITHIN ATATÜRK DAM in ŞANLIURFA

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The Southeastern Anatolia Project (GAP) is the most comprehensive and costly project in the history of the Republic of Türkiye, and it has been the most effectively implemented among the regional development plans and programs prepared to date. GAP is an internationally recognized and prestigious project with its integrated regional development approach and philosophy of sustainable human development. Irrigation is the most crucial factor that enhances productivity in agricultural production. The success of irrigation projects depends on operation, maintenance, and management. In Türkiye, the operation, maintenance, and management responsibility of irrigation projects constructed by the State Hydraulic Works (DSI) is carried out by water user associations (WUAs). The most significant issues faced by WUAs are maintenance and repair costs, as well as the electricity expenses for pump-irrigation systems. The accurate evaluation of the performance of transferred WUAs is of great importance.

In this study, the performance of the Güzelyurt WUA, which was constructed by the State Hydraulic Works, is assessed using some indicators. The responsibility area of the Güzelyurt WUA covers 12,245 hectares. In the literature review conducted, it is observed that there are not many studies related to operation, maintenance, and repair costs in Türkiye. The study includes 13 performance indicators for the period between 2021 and 2022, which are as follows: Energy cost of irrigated area (TL ha-1), Energy cost of irrigation water (TL m-3), Energy cost ratio to expenses (%), Maintenance and repair cost ratio to income (%), Expense coverage ratio (%), Maintenance cost of irrigation water (TL m-3), Maintenance cost of irrigated area (TL ha-1), Maintenance cost of irrigation area (TL ha-1), Income collection performance (%), Irrigation ratio (%), Irrigated area water quantity (m^3 ha-1), and Irrigation water quantity per irrigated area (m^3 ha-1).

The aim of this study is to determine the effectiveness and development opportunities of WUAs. It also aims to provide data that will assist in new project planning, contribute to the comparison of various methods and systems to make economic decisions, and serve as a resource for evaluating water use and the operation, maintenance, and repair costs of WUAs

AN EFFECTIVE METHOD FOR ISOLATION OF LACTIC ACID BACTERIA STRAINS WITH HIGH LACTIC ACID PRODUCTION POTENTIAL

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Lactic acid bacteria (LAB) strains are widely used for many kinds of lacto-fermented foods such as milks, yogurts, meats, sourdough bread, olives, kimchi, and pickled vegetables. Silage is an another lacto-fermented product for feeding for ruminants. LAB inoculation to such food and feed is generally positive effects on their fermentation profile. However, procedure of isolating and finding out a successful LAB strain from natural sources is time consuming and inconvenient.

Fermented silage feed may be a good natural source for isolating and selecting successful LAB isolates.

The objective of this study is comparing sources for selecting high lactic acid (LA) producer bacteria strains by using their natural ecology and fermented silage feeds as main source. As a result of the study it may be speculated that matured silage is a good choice compared to green forage as microbial source in order to increase accomplished LAB isolation potential in terms of high LA producing and tolerant to low pH

TRIBOLOGICAL EFFECTS OF CHROME, ZIRCONIUM, AND GRAPHITE ON COPPER BASED COMPOSITES IN SPOT WELDING PROCESSES

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In the automotive industry, spot welding and gas arc welding are mostly used as joining methods. On average, there are approximately 4000-6000 spot welds (spot resistance welding) in a passenger car. For this reason, the continuity of the spot welding process, which is one of the most widely used methods for joining body parts in the automotive industry, is one of the most important factors affecting the mechanical strength of a vehicle. Since the proportions of copper and other alloys in the welding tips used can vary according to the order, this fluctuation also negatively affects the quality and continuity of spot welding. The initial properties of the spot tip change over time under the influence of temperature and pressure, and the quality of the spot weld decreases accordingly. As a result, it is thought that new composite copper alloys should be prepared by using different reinforcing materials on the copper matrix material to minimize adverse conditions such as low wear resistance and hardness.

In this study, hybrid composites were prepared by adding chromium (Cr), zirconium (Zr) and graphite (Gr) powders to copper (Cu) powder in certain ratios (99%, 98%) so that the weight remains constant at 1%. When the literature studies are examined, it is seen that Cu is combined with different materials, but a hybrid mixture such as in this study has not been made.

In the study, Cu, Cr, Zr and Gr powders were mixed in a magnetic stirrer at 800 rpm for 90 minutes. The ready mixtures were homogenized in 40 ml ethanol in an ultrasonic mixer. The mixtures were then dried in an oven at 90 °C for 24 hours without exposure to air. The samples were prepared with powder metallurgy manufacturing parameters and the samples were structurally characterized by SEM and XRD and subjected to hardness, wear and compression tests. For each composite, the weight loss and coefficient of friction values of the samples in the wear tests were compared. At the end of the analysis and tests, it was seen that Cr, Zr and Gr additives gave higher wear life and hardness values.

Keywords: Copper Composite Materials, Powder metallurgy, Hybrid Composite, Chromium, Zirconium, Graphite, Tribology

INVESTIGATION of TRIBOLOGICAL PROPERTIES of BORON CARBIDE and CHROMIUM REINFORCED COPPER MATRIX COMPOSITES

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The wear life and electrical conductivity of Cu-based composites, which are widely used in automotive, welding and electrical applications, are important. In this study, an attempt was made to improve the wear life of Cu-based composites with different additives. For this purpose, a hybrid mixture was made by adding Boron carbide (B_4C) (1%, 2%, 3%) and (1%) powders at certain ratios by weight to pure Cu (Cu) powder. When the literature studies are examined, there are studies in which B_4C and Cr powders were added to Cu powder separately. However, it was observed that a hybrid mixture was not made as in this study. In the study, it was aimed to investigate the tribological effects of the specific properties of two different reinforcing elements on Cu powder.

Mixing of Cu powder with B_4C and Cr powders was carried out in a mechanical mixer at 750 rpm for 75 minutes. The blended powders were homogenized by ultrasonic homogenization in 20 ml ethanol (99.9% purity) at a frequency of 20 mHz for 15 minutes. The homogenously mixed samples were dried in a vacuum oven for 24 hours. Samples were prepared with powder metallurgy production parameters and microstructure, hardness and wear tests were performed under dry conditions at constant sliding distance and speed. The weight loss graphs and coefficient of friction values were generated for each composite sample.

As a result of the experiments, the microstructure of the composites was analyzed by XRD, SEM and EDX analysis. It was determined that significant changes in hardness and wear values occurred in the samples with Cr-B_4C additives. In the results obtained, much higher results were obtained with the increase in the amount of B_4C reinforcement compared to the pure Cu sample. According to the results obtained in the study, it was seen that studies can be continued with alternative reinforcing elements for Cu matrix composites.

Keywords: Copper, Chromium, Boron carbide, Hybrid Composite

THERMAL REGULATION OF PVs BY PCM BASED HYBRID SYSTEMS

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Efficiency of photovoltaic (PV) panels is inversely proportional to the operational temperature of solar cells when the operational temperature is higher than the reference temperature –which generally is 25°C– The current work is an effort to propose a solution to this problem by examining phase change material (PCM) based passive hybrid cooling systems for reducing PV temperatures.

Four different hybrid cooling systems which incorporate various melting point PCMs (25°C and 35°C) along with different heat transfer elements (fins and porous medium) were put into test to investigate their cooling effect on PVs. It was found that the system containing low melting point PCM (25°C) and fins had the highest instantaneous cooling capacity, whereas the system containing low melting point PCM (25°C) and porous medium resulted in the highest overall cooling capacity. Moreover, the maximum efficiency increase was found to be 8% which occurred for the low melting point PCM (25°C) and fins configuration.

EVALUATION OF IN VITRO ANTIOXIDANT ACTIVITIES OF TRADITIONAL FERMENTED NON-ALCOHOLIC BEVERAGES FROM TURKEY AND ANALYSIS OF ITS PHENOLIC CONTENTS BY LC-MS/MS

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Free radicals are one of the most important causes of deterioration of food products during processing and storage and are claimed to play an important role in affecting human healty by causing many diseases (such as cancer, hypertension, hear attack and diabetes) [1]. Dieatary intake of phenolic compounds and fermented food products is associated with of these diases and protective in many health related properties such as antioxidant, anticancer, antiviral, anti-alzheimer, antidiabetic and anti-inflammatory activities [2].

Fermentation is one of the oldest and one of the most economical methods used in food preservation. The beneficial healt effects of fermented foods and dairy products on humans are increased mineral bioavailability, digestibility of proteins and carbonhydrates [3].

In this study the antioxidant activites of acetone, ethanol and water extracts of non-alcoholic beverages (shalgam juice, hardaliye, boza, ayran and kefir) which can be an alternative to synthetic antioxidants used in removing free radical, were investigated using different methods. The antioxidant capacities of the acetone, ethanol and water extracts of traditional fermented non-alcoholic beverages were estimated using different antioxidant tests, including lipid peroxidation, 1,1-diphenyl-2-picrylhyrazyl (DPPH•) radical scavenging, superoxide anion radical scavenging, 2,2'-azino-bis (3-ethylbenzothiozoline-6-sulphoic acid) diammonium salt (ABTS•+) scavenging activity, hydrogen peroxide scavenging and cupric reducing capacity. The water extract was found to be richer in antioxidant phytochemicals, such as phenolic (189±2.77 mg Pes/g FW) and flavonoids (321.77±4.03 mg Qes/g FW). According to the phenolic substance analysis of water extracts by LC-MS/MS, the highest substance content was observed in abscisic acid (2364 ng analyte/g). This study can help in food industry as a natural compound for antioxidant activity, which might be used as an alternative to synthetic antioxidants since it is environmentally friendly and safe for consumption.

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A NOVEL HPLC METHOD FOR SELEXIPAG IN HUMAN PLASMA AND APPLICATION TO A PROTOTYPE PHARMACOKINETIC STUDY

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Selexipag (SLP) is used for the long-term treatment of pulmonary arterial hypertension (PAH) in adult patients whose disease is not adequately controlled with other PAH drugs known as endothelin receptor antagonists or phosphodiesterase type 5 inhibitors. SLP dilates the pulmonary arteries by acting similarly to prostacyclin [1]. This makes it easier for the heart to pump blood into the pulmonary arteries. SLP lowers the pressure in the pulmonary arteries, relieves the symptoms of PAH and slows the progression of PAH disease. [2].

In this study a novel, simple and cost effective HPLC technique was presented for the quantification of SLP in human plasma sample and the tecnique's applicability to a pharmacokinetic investigation. Chromatographic separation was achieved with C18 (5 µm × 4.6 mm × 150 mm) column, at 30 ºC with isocratic elution, mobile phase composed of solution A (acetonitrile), and solution B (0.5% formic acid) (65:35 v/v) at flow rate 1.2 mL min^{-1}. The linearity range is 10-150 ng mL^{-1}. As sample preparation step human plasma was precipitated with acetonitrile and the detectin was provided at 300 nm. The retention time is 8.20±0.02 min. LOD is found to be 3.3 ng mL^{-1} for drug. The method was applied to the analysis of SLP in human plasma with good recovery as 97.83%. Validation of the studied methods was carried out according to EMA guideline. The new method applied on a pharmacokinetic study by administration of 800 µg SLP to a healhy volunteer and parameters like AUC_{0-24}, $AUC_{0-\infty}$, C_{max}, t_{max}, and $t_{1/2}$ were assessed. The presented study provides simple and sensitive quantification of the SLP in human plasma sample and reveal the pharmacokinetic parameters as a prototype phase 1 clinical study.

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INVESTIGATION OF TRIBOLOGICAL PROPERTIES OF Cu-Cr-B HYBRID COMPOSITES

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Copper (Cu) and its alloys are widely used in engineering applications such as machinery, electronics, transportation, etc. due to their electrical conductivity and chemical stability. It is seen to exhibit poor mechanical and tribological properties, especially when used at high temperatures. There is a great need for Cu and its alloys with both good mechanical properties and excellent conductive properties. The most effective way to increase tribological strength is the addition of secondary phases to Cu and its alloys to fabricate Cu matrix composites. Recent studies have shown better results in the reinforcement of Cu-based hybrid composites by powder metallurgy. Therefore, strengthening with hybrid reinforcements has been the subject of much research.

In this study, a hybrid composite blend was made by adding (1%) Chromium (Cr) and Boron (B) (1%, 2%) powders at certain ratios by weight to pure Cu powder. Looking at the literature, there are studies in which Boron powder was not added to Cu powder, but Cr powder was added as a reinforcing element.

Cu, B, and Cr powders were mixed in a magnetic stirrer at 700 rpm for 60 minutes. The mixtures were stirred in a homogenizer at a frequency of 20 MHz for another 10 minutes. The mixtures were then dried in a vacuum oven for 24 hours. The samples were pressed and sintered with powder metallurgy production parameters. The microstructure of the prepared composites was analyzed by SEM-EDX and XRD analysis and the tribological properties were investigated by hardness and wear tests. As a result of the experiments, the wear and hardness values of Cr-B doped specimens increased significantly compared to pure Cu specimens as the B additive ratio increased.

With the results obtained in the study, the effects of boron and boron-doped materials on copper were examined and introduced to the literature.

Keywords: Copper, Boron, Chromium, Powder metallurgy, Tribology

A COMPARISON ELECTRICAL PARAMETERS AND ENERGY DEPENDENT PROFILE OF SURFACE STATES OF Au/n-Si STRUCTURE WITH PVA AND (CdTe: PVA) INTERLAYER USING CURRENT-VOLTAGE (I-V) AND CAPACITANCE-VOLTAGE (C-V) MEASUREMENTS

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In order to see the effect of pure-PVA and (CdTe-doped PVA) interlayers on the electrical characteristics, both Au/PVA/*n*-Si (MPS1) and Au/(CdTe:PVA)/*n*-Si (MPS2) type Schottky barrier diodes (SBDs) were grown on the same phosphor-doped *n*-Si wafer in same conditions. For this purpose, both the current-voltage (I-V) and capacitance-voltage (C-V) measurements were performed in wide range of voltage at room temperature. Some basic electrical parameters such as saturation current (I_s), ideality factor (n), rectification-ratio (R.R.=$I_{Forward}/I_{Reverse}$), barrier height B.H. (Φ_{bo}), and series/shunt resistances (R_s / R_{sh}) were calculated from the I-V data for two type SBDs and compared each other. The values of doping donor atoms (N_d), BH, depletion layer width (W_d), and maximum electric field (E_m) were also calculated from the reverse bias C^{-2} vs V plots. The N_{ss} vs (E_c-E_{ss}) profile for two SBDs were obtained from the forward bias I-V data by considering voltage dependent n and BH. All these experimental results indicated that the used (CdTe:PVA) interlayer at Au/*n*-Si interface are considerable improved the performance Au/*n*-Si SBD in respect of lower values of leakage current, n, N_{ss} and higher RR, BH, and shunt resistance when compared pure PVA interlayer and so especially (CdTe:PVA) interlayer can be used successfully instead of conventional insulators for its favored specifications like low cost, easy fabrication processes, and flexibility features.

Keywords: (CdTe:PVA) interlayer; Comparison of electrical characteristics; Energy dependent of surface states; I-V and C-V measurements

IMPACT OF NARINGENIN UNDER HYPOXIC CONDITIONS ON CANCER CELL MOVEMENT MEDIATED BY VOLTAGE-GATED SODIUM CHANNELS

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Tumors frequently experience oxygen insufficiency due to their growth rate and inadequate blood supply. In response to this oxygen deficit, known as hypoxia, tumor cells modify their behavior to survive. Hypoxia-inducible factor HIF triggers the expression of genes related to cell survival, angiogenesis, apoptosis, invasion, and metastases. One of the processes influenced by hypoxia includes the activation of voltage-gated sodium channels (VGSC), which have been linked to metastatic behavior in various cancers, such as prostate, breast, and lung, etc.

This study aimed to examine the impact of naringenin under hypoxic conditions on the movement of highly metastatic prostate cancer cells overexpressing VGSCs. Using the Alamar blue method, it was established the naringenin concentration that did not inhibit cell growth. The effect of these concentrations on cell lateral movement was assessed through the wound closure assay. Post-naringenin treatment, the Inductively Coupled Plasma (ICP) method was employed to measure intracellular Na^+ ion concentrations ($[Na^+]_i$). It was also quantified mRNA expression levels of *HIF1A* and *SCN8A*.

Naringenin concentrations of 75 and 100 µM were found not to impact cell growth. Neither did they influence lateral cell motility at these levels. ICP analysis revealed that the $[Na^+]_i$ in the group treated with naringenin decreased in normoxia (C: 59.5mM; NAR75: 47.8mM; NAR100: 54.8mM) but increased in hypoxia (C: 47.7mM; NAR75: 51.6mM; NAR100: 61.9mM) relative to the control group. In parallel, mRNA expression of *HIF1A* and *SCN8A* in normoxia reduced with naringenin treatment compared to the control, but it rose in hypoxic conditions.

In conclusion, naringenin enhanced the motility of human prostate cancer PC-3 cells under hypoxic conditions, but this effect was not observed in normoxia. Given these findings, caution is advised regarding naringenin intake, especially for cancer patients.

THE USE OF HRP ENZYME IMMOBILIZED MAGNETIC DENDRIMERS IN THE REMOVAL OF TEXTILE DYES

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Reactive dyes are widely used in the textile industry due to their easy handling, stability, colour diversity and better fabric treatment. On the other hand, most of these dyes used in the industry have aromatic structure and are resistant to biodegradation due to their synthetic origin [1]. It is known that horseradish peroxidase (HRP) enzyme can block phenolic compounds and aromatic amines released to nature with the wastes of the dye industry and is used in the decolourization of dyes in wastewater [2].

For this purpose, PAMAM dendrimer with Fe_3O_4 core was synthesised in this study. Immobilization of HRP enzyme to the synthesized magnetic dendrimer was carried out. The usability of free and immobilized HRP enzyme in the decolorization of Remazol Brilliant Blue R, Reactive Black 5 dyes, which are widely used as dyes in the industry, was investigated. The dye removal of Remazol Brilliant Blue R, Reactive Black 5 in the presence of free and immobilized enzyme with many parameters such as pH, temperature, H_2O_2 amount and dye concentration amount were investigated and optimisation study was carried out. When immobilized enzyme was used for Remazol Brilliant Blue R dye, the colour removal was 97% at the end of 60 min., while for Reactive Black 5, the colour removal was around 80% at 60 min.

Keyword: Dendrimer, HRP enzyme, Remazol Brilliant Blue R, Reactive Black 5, Dye removal

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DETERMINATION AND ENRICHMENT OF Pb(II) AND Cd(II) IONS BY FAAS USING MAGNETIC SOLID PHASE EXTRACTION

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The removal of heavy metal ions from wastewater is very important to reduce the harmful effects of heavy metals. The side effects of heavy metal ions can also cause major impacts on countries due to the impact of heavy metals on agriculture, health, marine life and thus the economy [1]. Solid phase extraction is frequently used for the enrichment and extraction of analytes in trace amounts. Recently, many studies have been reported showing the potential of nanomaterials for the removal of heavy metal ions where solid phase extraction methods are used [2]. Nanomaterials with high surface area and high adsorption capacity can be used for the extraction and enrichment of analytes in environmental samples.

In our work, new Fe_3O_4 core magnetic dendrimers were synthesized for the enrichment of Cd(II) and Pb(II) and their structures were characterized by various spectroscopic methods such as FTIR, XRD, SEM-EDX, TEM and VSM. The applications of adsorbents based on magnetic dendrimer-based nanostructures that we use have unique properties in solid phase extraction techniques. The optimum conditions (concentration and type of eluent, pH of the solution, amount of adsorbent, solution volume and ultrasonic bath retention time) required in adsorption processes for the removal of metals were determined. Optimum conditions for heavy metal recovery using Fe_3O_4@G2/Npht magnetic dendrimer were determined as pH 6.5, 1M HNO_3 and 100 mg for Pb(II) and pH 7.5, 1 M HNO_3 and 100 mg for Cd(II).

Keyword: Magnetic dendrimers; Solid phase extraction; FAAS; Cd(II); Pb(II)

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AN *IN-SILICO* APPROACH TO IDENTIFY POTENTIAL NATURAL COMPOUNDS AS PESTICIDES AGAINST TOMATO MOSAIC VIRUS

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The tomato plant (Solanum lycopersicum L.) is a globally valuable crop. However, it is susceptible to the Tomato Mosaic Virus (ToMV), which is a destructive disease that results in significant losses in both the production capacity and quality of tomato fruit. ToMV belongs to the Tobamovirus genus which can infect a wide range of hosts. ToMV is mainly spread through contaminated seeds or tools as well as through contact with infected plants or materials used by farmers. To manage this disease, infected plants should be excluded, certified virus-free seeds or seedlings should be used, and ToMV-resistant plant cultivars should be selected because there is no pesticide against the disease. In order to reduce harm to humans and prevent resistance, natural compounds are being explored as potential candidates for use as pesticides. Molecular docking, an *in-silico* technique, plays a crucial role in computer-aided drug design in medicine and as well as in agriculture. It aims to identify the most favorable binding mode of a ligand to a protein with a predetermined three-dimensional structure. In this study, more than 3000 natural compounds in the MPD3 database were scanned using AutoDock Vina. The aim was to determine their potential binding affinity to the virus helicase enzyme (PDB ID:3vkw), which plays a role in viral RNA replication in ToMV. A threshold of -9.0 kcal/mol binding energy was used for the assessment. Candidates were filtered based on binding energies and ADME properties according to Lipinski's rule of five using the DruLiTo software. Finally, the ProTox II online server was used to evaluate the toxicity, including oral toxicity, hepatotoxicity, carcinogenicity, immunotoxicity, mutagenicity, and cytotoxicity. There are three natural compounds, namely Newbouldiaquinone A, withanolide F, and heraclenol, that bind to the helicase with a binding affinity of -9.2 kcal/mol, -9.0 kcal/mol, and -9.0 kcal/mol, respectively. These compounds were in accordance with Lipinski's rule of 5 and showed no signs of toxicity. Therefore, they can be utilized to manage tomato mosaic disease.

INVESTIGATION of ZETA POTENTIAL of NATURAL DERIVED HYDRXYAPATITE at THREE DIFFERENT ALCOHOL

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Calcium phosphate-based bioceramics, which are used for different purposes in the biomedical field, have an essential area of use in orthopedic applications to improve bone defects due to their high biocompatibility and increase cell adhesion by filling the gaps between the implant and bone interface. Due to the wide applications of HAp in the medical field, researchers have taken great interest in the synthesis of HAp from natural origin, since chemically synthesized HAp involves a costly, complex, and longer process, producing unwanted by-products.

Biowaste shells are a good option for HAp synthesis due to their availability and high calcium content. Therefore, eggs and their various shells are expected to be a source of biocompatible materials for biomedical applications. To use the biocompatibility feature of these materials and the strength properties of metals together, studies for coating purposes are carried out. In this study, the zeta potentials of hydroxyapatite produced from natural sources were investigated to investigate the coating ability.

With the results obtained in the study, the zeta potential of solutions prepared with three different alcohols to be used in electrophoresis coating on AZ31B, one of the light alloys of naturally sourced hydroxyapatite, was investigated and brought to the literature.

Keywords: Bioceramics, HAp, Electrophoresis, Zeta Potential

ELECTROCHEMICAL DETECTION OF CORTISOL BY SILVER NANOPARTICLE-MODIFIED MOLECULARLY IMPRINTED POLYMER-COATED PENCIL GRAPHITE ELECTRODES

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Cortisol is a hormone that the adrenal glands generate in reaction to stress and other physiological cues. It is essential for a variety of body activities as well as maintaining homeostasis (internal balance). The significance of cortisol detection in the human body stems from its numerous functions and links to overall health and well-being(1,2).

An electrochemical sensor based on silver nanoparticle-doped molecularly imprinted polymer was effectively developed for sensitive cortisol detection. This study describes the development of a method for detecting cortisol in aqueous solution and biological samples using differential pulse voltammetry (DPV) and molecularly imprinted poly(hydroxyethyl methacrylate-N-methacryloyl-(l)-histidine methyl ester)-coated pencil graphite electrodes modified with silver nanoparticles (AgNPs). Because of the doped AgNPs with improved electroactivity, the cortisol-imprinted pencil graphite electrode (PGE) has a wide surface area. Scanning electron microscopy was used to examine the synthesized molecularly imprinted polymer. The DPV response of a synthetic electrode with exceptional electrical conductivity was investigated. For sensitive and selective detection of cortisol in aqueous solution, cortisol-imprinted polymer-coated PGEs (MIP), cortisol-imprinted polymer-coated PGEs with AgNPs (MIP@AgNPs), and nonimprinted polymer-coated PGEs with AgNPs (NIP@AgNPs) were examined.

The MIP@AgNPs were exposed to five different cortisol concentrations (0.395, 0.791, 1.32, 2.64, and 3.96 nM), and signal responses were detected by the DPV with a regression coefficient (R2) value of 0.9951. The modified electrode demonstrated good electrocatalytic activity against cortisol over a linear concentration range of 0.395 to 3.96 nM, with a low limit of detection of 0.214 nM. The results show that the MIP@AgNPs sensor has a high potential for detecting cortisol in biological samples in a sensitive and selective manner.

Keywords: Molecularly Imprinted Polymers, Cortisol, Voltammetry, Silver Nanoparticles, Pencil Graphite electrode

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USE OF POLYOXOMETALATES AS ELECTRON TRANSFER LAYER IN PEROVSKITE SOLAR CELLS

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In this study aimed to develop efficient p-i-n type perovskite solar cells using polyoxometalates (POMs) as the electron transport layer, instead of traditional organic C60 derivatives. Although POMs weren't initially used in perovskite solar cells, they began to be explored during the project's preparation. The goal is to replace PCBM with POMs, investigating their feasibility. Perovskite solar cells (PSCs) are attractive due to their high efficiency and low cost. POMs, with their excellent electrochemical properties, have potential in optoelectronic technologies. POMs show similarities to n-type semiconductors like PCBM. In this work we fabricated inverted PSCs and optimized POM film quality through various techniques. Despite challenges, including POM film quality, optimized spray coating validated POMs as effective electron transport layers. Efficiency results were: PCBM 11.5%, B1 POM 9.2%, B2 POM 11.8%, and B3 POM 15.2%. B3 exceeded expectations, proving POMs' utility in PSCs. Figure 1 Shows IV curves of PSCs

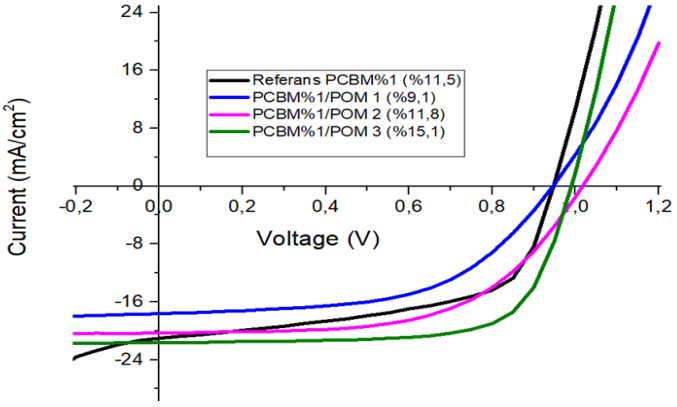


Figure 1. IV curves of PSCs with POMs and Reference PSCs

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SYNTHESIS, PHOTOPHYSICAL, ELECTROCHEMICAL AND MORPHOLOGICAL PROPERTIES OF A NOVEL CHITOSAN-BASED FLUORESCENT POLYMER

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Chitosan is a crucial biopolymer owing to its numerous applications, including pharmaceutical, cosmetics, biomedical, biotechnological, agricultural, food, and non-food industries [1, 2]. The solubility of chitosan is limited with acidic media [2]. Moreover, the strong intra- and inter-molecular H-bonding interactions between the hydroxyl and amine units cause poor mechanical properties, a real problem in its applications. Modifying chitosan polymer by cross-linking is an essential solution for these problems by increasing its stability and improving its mechanical and physicochemical properties [3].

Perylene diimides which are well-known as organic chromophores, have been widely used in photovoltaics, optical switches and ultra-sensitive photochemical biosensors regarding their outstanding properties. Notably, a composite formed from graphene consisting of perylene fluorophore and chitosan polymer showed excellent conductivity and potential for chemical sensor applicability [1].

In this research work, a new fluorescent and conductive, chitosan-based cross-linked polymer was synthesized successfully using perylene-3,4,9,10-tetracarboxylic dianhydride as a cross-linker. Its absorption, photophysical, electrochemical and morphological properties were investigated in detail. The polymer's weight average molecular mass (Mw) was determined as 21300 g/mol using gel permeation chromatography. Seventeen hydrophobic perylene units were determined in the polymer. The energy levels of the new polymer's highest occupied molecular orbitals (HOMO) and lowest unoccupied molecular orbitals (LUMO) were calculated as − 6.24 and − 3.96 eV, corresponding to the band gap of 2.28 eV. The perylene dye incorporating chitosan possessed many advantages over parent chitosan, such as solubility and photophysical properties.

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PEROVSKITE SOLAR CELLS BASED ON NATURAL CLAY MATERIALS AS SCAFFOLD LAYER

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Perovskite solar cells (PSCs) are emerging as strong contenders for replacing conventional silicon-based photovoltaic technologies in solar power plants. Efforts are being directed towards resolving reproducibility and stability challenges that hinder PSC commercialization. In current work, we propose using natural clay as scaffold layers in mesoporous PSCs, deviating from synthetic materials. Initial results using sepiolite clay are promising, motivating the work to enhance efficiency, reproducibility, and stability of the PSCs. Compared to montmorillonite, hallosite, and laponite with reference PSC, efficiencies increased by 5%, 13%, and 7%, respectively. Figure 1 shows a comparison of clay based PSCs with sepiolite included and planar reference PSCs.

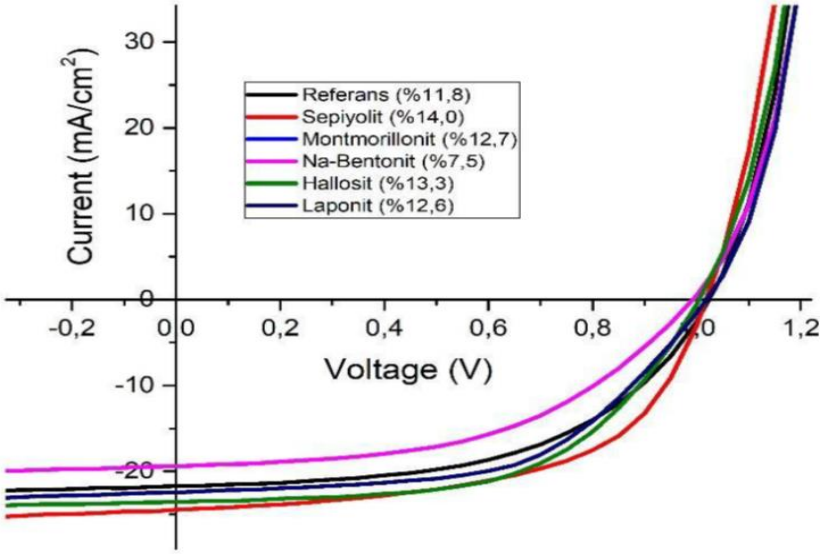


Figure 1. Comparison of clay based PSCs with sepiolite included and planar reference PSCs.

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THE EVALUATION OF ENVIRONMENTAL ATTITUDES AND BEHAVIORS OF HIGH SCHOOL STUDENTS IN CYPRUS: CASE STUDY OF GUZELYURT AND LEFKE

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With the rapid industrialization of the World and the technological developments people's need get increased at a level that push them towards over-exploiting natural resources. The most devastating environmental problems that we are confronting with are global warming, thinning and drilling of ozone layer, inefficiency in fresh water resources, loss of green areas and desertification, disappearance of living species, loss of natural life, agricultural problems, nuclear contamination, climate change, air pollution, toxic wastes, decrease in energy resources etc.

Quimbita (2005) suggested that turning human behaviors in a more naturalist or environment-friendly manner may help to prevent the destruction and harming to the environment which in turn decrease the environmental problems. Scholars have proposed several different models to explain the relations between human and environmental relationship. They considered several different components (attitudes, behaviors, knowledge, gender, culture, etc.) to predict the role of human in environmental issues.

This study mainly focus on the role of attitudes and behaviors towards environment. With this aim 243 high school students from Güzelyurt and Lefke high school students were recruited in the study. The correlational survey method was used in the research. The data collected during the course of this study was processed, analyzed and interpreted for further data analysis through the use of the Statistical Package for Social Sciences (SPSS) software. Results indicated that the level of education does not affect the attitudes and behaviors of students towards the environment. It was also revealed that the income level of the family has no effect on the attitude and behavior of the students. One of the important findings of the study showed that there is no effect of gender on behavior but it has a significant effect on attitudes.

In conclusion, regulations in the educational curriculum may help to develop knowledge about environment and more positive attitudes and knowledge towards environment.

AN EVALUATIVE IN VITRO INVESTIGATION OF THE DELIVERY OF CYTARABINE WITH RGD DECORATED SOLID LIPID NANOPARTICLES

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To synthesise cytarabine-loaded SLNs modified with the RGD peptide as a ligand, suitable for effective cancer therapy. SLNs were synthesised by the high shear, hot homogenisation technique. A 2 level 3 factor analysis was used in optimisation. Particle size, zeta potential, poly-dispersion index and surface morphology were measured. Drug encapsulation, drug release, release kinetics, nanoparticle stability and chemical structure were determined. LIVE/DEADVR Fluorescence Assay was used to qualify cytotoxicity and Tryphan Blue assay to quantify. Cyt-SLNs exhibited a size of 161 ± 2.25 nm, a PDI of 0.49 ± 0.15 and a zeta potential of _19.8 mV. Entrapment fell at 88.87 ± 0.02% and release at 83.5 ± 0.95%. The in vitro release kinetics pointed towards a diffusion-based drug release mechanism. SLNs remained stable for 60 d. Cytotoxicity studies revealed that conjugation of the ligand with the RDG peptide resulted in a significant decrease in cell viability in both cell lines. Overall, the study suggests that RGD-SLN-cyt can be used for effective cancer therapy.

GREEN SYNTHESIS AND CHARACTERIZATION OF LIMONIUM SINUATUM AgNPs : ANTIOXIDANT AND ANTIMICROBIAL STUDIES

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Biosynthesized nanoparticles (NPs) have been constituting the propitious future of nanomedicine because of biologically active plant secondary metabolites that are involved in green synthesis and due to their unique biological applications. This present study reports a simple, ecofriendly, sustainable, and cost-effective synthesis of silver nanoparticles (AgNPs) using the aqueous leaf extract of *Limonium sinuatum*, and their antioxidant and antimicrobial properties. The biosynthesized L. *sinuatum* silver nanoparticles (Ls-AgNPs) were characterized using different spectroscopic techniques such as UV-Visible spectroscopy, Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM), and the Zeta-sizer and Zeta-potential. Successful biosynthesis of silver nanoparticles was confirmed using UV-Vis spectrophotometry that recorded the Surface Plasmonic Resonance peak at around 420 nm. The morphology of the green synthesized silver nanoparticle pellets was investigated using X-ray diffraction technique and revealed to be spherical, with diameters ranging from 20 to 80 nm and a crystal structure was identified to be face-centered cubic. The antioxidant activity of the biosynthesized nanoparticles was determined using 2,2-diphenyl-1-picryl-hydrazyl (DPPH). Resultantly, the study shows that the aqueous L. *sinuatum* water extract and the AgNPs made from it both have extremely strong radical-scavenging abilities, even when measured against the industry standard, L-ascorbic acid (DPPH method).

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FLUOROPHORES IN UNPROCESSED OLIVE EXTRACT: NOVEL APPLICATIONS AND CHARACTERISATION TECHNIQUES

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This research unveils the potential of unprocessed olive extract and paste as a unique and promising source of fluorophores. These compounds emit light when stimulated and delve into their possible applications in various scientific domains and industries. Despite the widespread consumption and known health benefits of olives, their unprocessed extracts have been relatively unexplored, particularly concerning their fluorescent properties [1]. This study presents a systematic approach to extracting, isolating, and characterising these fluorophores from fresh, unprocessed olives, employing analytical techniques, and focusing on sustainable methodologies.

Firstly, Thin Layer Chromatography (TLC) is employed to separate the different components of the extract, allowing for the identification and isolation of the individual fluorophores. Fourier Transform Infrared Spectroscopy (FT/IR) is conducted to provide a comprehensive molecular fingerprint of the extracts. These spectra confirm the fluorescent compounds' chemical identity and offer insight into their molecular structure and functional groups. Furthermore, UV emission experiments are carried out to explore the optical properties of the identified fluorophores, including their excitation and emission wavelengths, quantum yields, and stability under various conditions [2].

Our preliminary data suggests that the fluorophore chemicals derived from unprocessed olive extracts may exhibit strong and stable fluorescence, potentially making them ideal candidates for diverse applications, including bioimaging [3] and the development of eco-friendly sensors and optoelectronic devices. These olive-derived fluorophores, if validated through further experimentation, could represent a sustainable and cost-effective alternative to synthetic fluorescent dyes, leveraging olives' widespread availability and renewability. However, comprehensive analysis of the results and additional experimentation are imperative to draw definitive conclusions regarding the potential applications of these promising compounds.

Keywords: Fluorophore, fluorescence, olive extract, spectroscopy, emission, chromatography.

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REMOVAL OF METHIDATHION FROM WATER USING CAROB WASTE

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The carob waste is an eco-friendly, economical, and effective adsorbent however it has never been studied before for removing pesticides from water. This study examined the possible application of carob waste powder treated with potassium hydroxide (KOH) as a substitute adsorbent for removing methidathion pesticide from water. The adsorbent was characterized by X-ray diffraction, Brunauer-Emmett-Teller, Fourier-transform infrared spectroscopy and particle size analyser. pH, adsorbent dose, contact time, temperature, and initial concentration of methidathion pesticide were among the experimental factors that were elucidated.

The results showed that solution pH 5 and 2 g/L adsorbent dose were the optimum conditions at an equilibrium time of one hour and 25 °C. Linear isotherm had the best fit to the experimental data with a correlation coefficient R square of 0.95 and pseudo second order described the kinetic data well with an R square >0.95. The adsorption capacity of the adsorbent increased with the increasing temperature indicating an endothermic process. The highest amount of methidathion adsorbed by the KOH treated carob waste was recorded as 21.3 mg/g comparable and higher than the adsorption capacity of alternative sorbents reported in the literature. Although the adsorption process requires further optimization, the findings revealed that KOH treated carob waste show to be a promising adsorbent for the removal of pesticides from aqueous solutions.

Keywords: Carob waste, Potassium Hydroxide, regeneration/reuse study, Thermodynamic modelling

SYNTHESIS AND CHARACTERIZATION OF TWO NOVEL MONO BAY-SUBSTITUTED PERYLENE DIIMIDE DERIVATIVES

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Perylene diimide (PDI) derivatives have shown outstanding physicochemical, photochemical, and optical properties and have been widely used in different fields ranging from photovoltaics and sensors to biological applications. Synthesizing novel PDI derivatives with cheap and facile synthetic procedures, high-quality thin film formation ability, versatile structures and tuneable properties are of great interest specially in the field of photovoltaics. Furthermore, PDI derivatives could also be synthesized accordingly to have good solubility and adjustable optical and electrochemical properties by attaching the appropriate substituent at the bay position.

Nowadays, synthetic approaches for attaining sufficient access to bay-monobrominated PDIs are becoming essential. Practical synthetic routes for different PDI monobromides are of great interest since they are also significant intermediates for developing novel materials based on PDI molecules.

Two novel mono bay-substituted perylene diimide (PDI) derivatives were successfully synthesized and characterized for future applications in DSSCs, PSCs, chemosensors, biological sensors and anti-cancer studies. Initially, mono bay-brominated perylene diimide molecules were synthesized and then used to further synthesize two novel mono bay-substituted PDI derivatives, **1** and **2**. The progress of the reactions was monitored using thin-layer chromatography (TLC) and FTIR spectroscopy. The compounds were characterized using different techniques. The measurements have shown that the peaks are consistent with the assigned structures of the molecules.

Keywords: PDI derivatives; solubility; bay-monosubstitution.

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SYNTHESIS, CHARACTERIZATION, PHOTOPHYSICAL AND ELECTROCHEMICAL PROPERTIES OF NAPHTHALENE DIIMIDE MOLECULES AND THEIR POTENTIAL APPLICATIONS IN ORGANIC ELECTRONICS

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Naphthalene diimides are important representatives of rylene diimides with outstanding properties including high chemical and thermal stability, redox activity and appropriate self-assembly. Due to these exceptional properties, naphthalene diimides became promising candidates for various applications such as organic light-emitting diodes, organic field-effect transistors, organic photovoltaics, sensors and DNA intercalation [1].

The optical and electronic properties of naphthalene diimides can be tailored by functionalization at the imide position and substitution at the core-position. For instance, the substituents at the imide-position can substantially influence their solubility and molecular organization, while having minimal impact on their optoelectronic properties. Conversely, chemical modification at the core-position can adjust the optical and photophysical properties of naphthalene diimides [2].

This study aims the synthesis of several naphthalene diimide molecules as potential candidates for organic photovoltaics. For this purpose, both symmetrical naphthalene diimide and bay-functionalized symmetrical naphthalene diimide molecules were prepared. Initially, a symmetrical naphthalene diimide was efficiently synthesized by a one-step procedure. Then, core-functionalized naphthalene diimide molecules at 2,6 bay-positions were synthesized in a three-step approach. The final purified products were further characterized by FTIR, H-NMR and C-NMR spectroscopic techniques. Their electrochemical properties were analyzed by UV-Vis, Emission, Cyclic voltammetry, SEM, AFM and Spectroelectrochemical measurements. The synthesized compounds showed promising properties for application in organic electronics.

Keywords*: naphthalene diimide, bay-functionalization, spectroscopy, optoelectronics; electrochemistry*

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A NEW MULTICHROMOPHORIC PERYLENE DYE: DONOR/ACCEPTOR SYSTEMS

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New photovoltaic (PV) technology is interested in Organic Multichromic Materials based on conductive, conjugated organic polymers, which play an essential role in the development of organic photovoltaic devices. 2,7-substituted carbazole materials act as p-type semiconductors, and perylene dyes as n-type semiconductors are two different excellent π-conjugated chromophoric units with great potential in constructing organic-based devices.

Following this reality, two unsymmetric perylene-3,4,9,10-tetracarboxylic diimide derivatives substituted with 4-(2,7-dibromo-9H-carbazol-9-yl) aniline were synthesized respectively in few steps. These Donor/Acceptor (D/A) monomers with corresponding different amine groups were characterized for comparison also. Photophysical properties of D/A monomers were demonstrated, and fluorescence quantum yields of D/A monomers in solvents were decreased with the increase of solvents' polarities. The results prove that due to the electron transfer mechanism from the carbazole to perylene groups, there was an excellent fluorescence quenching as a non-radiative decay. Their thermal stabilities were verified by TGA and DSC since there was no visible glass transition. The surface morphology of all D/A materials was investigated by scanning electron microscope (SEM). Because of the similarity of their structures, both of the monomers have almost the same morphological properties.

In brief, combining electron acceptor PDI units with electron donor Carbazole derivative and corresponding different amine groups yielded π-conjugated structures. All these properties make them suitable for a wide range of applications, including energy transfer systems and organic solar cells.

Keywords: Perylene; carbazole; donor/acceptor materials; energy transfer.

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ASYMMETRIC JANUS FUNCTIONALIZATION IN 2D MXENE FOR PIEZOELECTRIC PROPERTIES

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The piezoelectric properties of two-dimensional (2D) materials have been widely studied due to their broad application prospects. MXenes, a new family of two-dimensional (2D) transition metal carbides and nitrides, are predicted to be a highly directional piezoelectric material with a non-centrosymmetric lattice structure. Mainly, the functional groups on the surface of the MXene break the inversion symmetry of lattice structures, thereby opening up new design opportunities for controlling their physical and chemical properties.

We have investigated the structural, electronic, magnetic and piezoelectric properties of asymmetric Janus structure of pristine MXene by means of first-principles calculations. The ground state structures of Janus monolayers of MXenes are found in different magnetic configurations. Our calculated electronic band structures indicate that the Janus monolayers MXenes are half-metallic, metallic and semiconductor behaviors upon compounds. Janus monolayers of MXenes suggest that they are promising candidates for future spintronic applications and piezoelectric properties, which should stimulate interest in their synthesis.

ELECTROCHEMICAL DETECTION OF ALUMINIUM ION USING PENCIL GRAPHITE ELECTRODES COATED WITH A MOLECULARLY IMPRINTED POLYMER

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Aluminum (Al) is among of the most abundant metals in the earth's crust, around 8% of all mineral components combined [1]. Al compounds are used in water purification, making utensils, pharmaceuticals, production of alloys. The necessity for reliable and effective detection methods for Al ions has grown as their presence can have a negative impact on human health, aquatic life, and terrestrial ecosystems [2].

The paper presents a novel 2mm pencil graphite electrode modified with a thin layer of molecularly imprinted polymer (MIP). The MIP is composed of 2-Hydroxyl Methacrylate (HEMA) and N-methacryloyl-L-glutamic acid (MAGA) components. This modified electrode was fabricated to determine Al ion levels using differential pulse voltammetry (DPV) and square wave voltammetry (SWV). Compared with the traditional electrodes, our electrode is expected to offer higher sensitivity and selectivity due to the presence of the MIP. All experiments were carried out under optimized conditions. The optimization of the conditions are determined by first undergoing cyclic voltammetry (CV). Furthermore, two other electrochemical techniques; DPV and SWV were utilized to measure the Al ion concentrations.

Expected results suggest a linear relationship between peak current and Al ion concentration, allowing for the quantitative determination of the Al ion. The developed electrochemical sensing platform is anticipated to exhibit low detection limits and high reproducibility, making it a promising tool for Al sensing applications. The combination of molecularly imprinted polymers with pencil graphite electrodes offers a cost-effective and efficient approach for the electrochemical detection of Al ions in complex sample matrices.

Keywords: Aluminium ions, Pencil graphite electrode, Molecularly imprinted polymer, Differential Pulse Voltammetry, Square Wave Voltammetry

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THE EFFECT OF OXIDATION POTENTIALS OF MONO- AND POLYALKENES IN INITIATION OF BIOMIMETIC CASCADE CYCLIZATION OF TERPENOID POLYALKENE VIA PHOTOCHEMICAL ELECTRON TRANSFER

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Biomimetic cyclization of acyclic terpenoid polyalkenes *via* photoinduced electron transfer (PET) is a powerful synthetic method in the single-step synthesis of mono- and all-*trans*-fused polycyclic terpenoid skeletons which mimic non-oxidative biosynthetic transformation [1]. Mechanistic investigations conducted using geranyl acetate as a model monoalkene reveal that reactions are photochemically initiated by the regioselective oxidation of the ω-alkene site of the acyclic starting mono- and polyalkene, by forming radical cation. The formed radical cation is first regio- and stereoselectively trapped in an *anti*-Markovnikov sense by a nucleophile, such as water or methanol. The resulting radical initiates cascade cyclization(s) and, finally, termination of such processes either by protonation of carbanions or hydrogen transfer [2]. The initial formation of radical cations by the regioselective oxidation of the ω-alkene site of the acyclic starting mono- and polyalkene upon PET with suitable acceptors plays an important role [1].

In this work, the role of substituents in the photooxidation of mono- and polyalkenes has been studied intensively. A total of six acyclic mono- and polyalkenes were successfully synthesized by functionalized with electron-donor and electron-withdrawing groups at the ω-alkene sits of acyclic polyenes. NMR and mass spectroscopy characterized all the synthesized products. The oxidation potentials of the selectively synthesized acyclic polyenes were measured with electrochemical methods by using cyclic voltammetry and square wave voltammetry techniques in solution. Furthermore, their PET reactions were investigated in detail, and formed products were identified. The oxidation potential of the ω-alkene sits increases in parallel with the electron-withdrawing nature of the substituents. In addition, conjugation with the ω-alkene sites increases the oxidation potential. The electrochemical and photoinduced electron transfer cyclization results of the synthesized acyclic polyenes are in agreement with each other.

Keywords: Photoinduced Electron Transfer, biomimetic cascade cyclization, terpenoids, radical cation, oxidation potential

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THE IMPROVEMENT OF CORROSION PERFORMANCE OF CoCrW ALLOY WITH BIOACTIVE GLASS COATING

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In the developing world, increasing needs and health problems are constantly on the agenda. Solutions to these problems should support each other and should not cause another problem. In this context, implants and prostheses used to replace a missing or damaged structure in living organisms must show the necessary mechanical, electrochemical and biocompatibility properties together. Although CoCr alloys, which are frequently preferred for their superior mechanical properties in places such as dental implants and hip prostheses, show good corrosion performance, it has been found that they cause the release of Cr ions into the body after a while. In addition, these alloys are also weak in terms of biocompatibility as osseointegration. With the surface engineering approach to such problems, it is known that the desired properties can be gained with a number of surface treatments without destroying the desired mechanical properties of the structure.

In this study, commercial 63S bioactive glass powder was coated on the surface of CoCrW alloy by electrochemical storage using different parameters, then sintered and corrosion behavior in artificial saliva was investigated. As a result of the investigation, necessary morphological and structural analyzes were performed. Based on the analysis, it was observed that coatings with 63S bioactive glass powder improved the corrosion resistance of CoCrW alloy.

Keywords: CoCr alloy, Electrophoretic deposition, Bioactive glass, Corrosion

INVESTIGATION OF WEAR RESISTANCE OF ELECTROPHORETİC DEPOSITION ONTO Ti6Al4V ALLOY

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Ti alloys are one of the most preferred biomaterials in the body due to their superior mechanical properties and biocompatibility. However, it is known that when these alloys are subjected to wear depending on where they are used, ion and particle release from the structure into the body occurs. In order to prevent this, surface treatments are preferred, and other desired properties can be gained without damaging the superior properties of Ti alloys. In this context, within the scope of this study, Ti6Al4V samples produced by selective laser melting (SLM) method were coated with bioactive glass at different concentrations using electrophoretic storage (EPD), a green coating method that does not require heat treatment. Necessary morphological and structural examinations were made before and after the coating. After coating, coated and uncoated samples were subjected to tribology tests in dry medium and in liquid medium using stimulated body fluid (SBF). As a result of the examinations, it was observed that the wear resistance of the coated samples increased in both mediums compared to the uncoated samples.

Keywords: Ti6Al4V, Electrophoretic deposition, Bioglass, Wear

RANKING OF RISKS IN CONSTRUCTION INDUSTRY ACCORDING TO THEIR INDEX VALUES: EXPLORATORY RESEARCH IN CYPRUS

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With the increase in the human population, the construction industry continues to grow all over the world. Construction projects generally consist of wide range of complex activities. All those activities must be scheduled and managed carefully and professionally in order to complete the project on the promised time. Because of this growth, complexity and the precedency relationship between activities, the risks faced in the sector are also increasing and risk management has become vital in construction sector. The aim of this research paper is to analyze the risks that affect the turnkey time of the construction projects and to rank the analyzed risks according to their significance level. For this purpose, the risks are identified through literature review and interviews with the project managers of five large-scale construction companies operating in Northern Cyprus. Then, the probabilities of occurrences and the effects of these risks are assessed, and a risk index is created for each identified risk by using probability-impact (P-I) model. Afterwards, the risks are ranked in order of significance according to the index values. Finally, results are discussed, and some risk mitigation measures are proposed.

THE IMPORTANCE OF DATA MANAGEMENT IN THE SCOPE OF URBAN MOBILITY IN TRANSPORTATION

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This study discusses the importance of data management within the scope of sustainable and smart mobility. Urban transport mobility aims to create a healthy infrastructure with data management on a city's transportation, mobility, and sustainability issues. To solve the problems that occur in urban mobility, fundamental indicators of economic, environmental, and social structures are considered. In this study, statistical analyzes were carried out on the data management required for urban mobility in the field of transportation, taking into account many indicators under three main headings. In addition, the advantages of data management within the scope of urban mobility in transport can be increased with applications in the field of transportation to be developed. In particular, it is necessary to integrate data management and applications for processing existing data for data management and for the benefit of parties in the transportation sector. As a result, this study is aimed at users in the transportation sector to manage the data obtained for urban mobility analysis.

Keywords: Mobility, Smart Mobility, Transportation, Data Management, Applications

FOOD IRRADIATION AND IDENTIFICATION OF IRRADIATED FOOD BY PHYSICAL TECHNIQUES

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Since the first days of existence on Earth, mankind has tried to extend the shelf life of the foods collected or hunted and has tried many different methods. Some of those can be sorted as cooling-freezing, drying, pasteurization, adding preservatives, keeping in a controlled atmosphere etc. Another method that extends their shelf life and increases the safety of foods is irradiation. Food irradiation is a process that involves exposing food to ionizing radiation to eliminate harmful microorganisms, including bacteria, viruses, and parasites that may be present in food. According to the report published by the United Nations (UN) in 2020, 44% of the food produced worldwide in 2030 is expected to turn into waste for various reasons. Food irradiation can be an effective instrument to prevent this loss. For the correct use of this instrument, some regulations and restrictions have been made under the leadership of international organizations such as the Food and Drug Administration (FDA), World Health Organization (WHO) and Food and Agriculture Organization (FAO). Controlling the irradiation processes and informing the consumers are among the important steps of this method. There are five different European standards for diagnosing food irradiation. These European standards, using the Thermoluminescence (TL) technique with the code EN-1788, using the Optical Stimulated Luminescence (OSL) technique with the code EN-13751 and using the Electron Spin Resonance (ESR) technique with the codes EN-1786 (for the foods containing bone), EN-13708 (for the foods containing sugar) and EN-1787 (for the foods containing cellulose).

BIOSYNTHESIS AND CHARACTERIZATION OF MALVA SYLVESTRIS AND LANTANA CAMARA AGNPS: ANTIMICROBIAL ACTIVITY

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Silver nanoparticles were synthesised by an effective, environmentally friendly, and biosynthetic process by Lantana Camara and Malva Sylvestris leaf extracts. Due to its cost- and environment-friendly attributes, the biosynthesis of nanoparticles using plant extracts has gained a significant attention. In this study the synthesis of AgNPs was carried out by mixing silver nitrate solution with aqueous leaf extracts and ethanolic leaf extracts, leading to a reduction of Ag+ ions and subsequent formation of NPs.

UV-Vis spectroscopy was employed to observe the formation of AgNPs and revealed distinctive UV absorption peaks around 420 nm. Synthesized Crystalline AgNPs were demonstrated by the patterns produced by X-ray diffraction and SEM was used to determine the shape and size of the AgNPs. The surface charge and potential stability of AgNPs in solution are measured by Zeta potential. The average particle size of the prepared aqueous Malva AgNPs was found 47.99nm with potential of (-29mv) and 29.51nm for aqueous Lantana NPs with (-30mv). The presence of band at 3425cm^{-1}- 3454cm^{-1} was observed in FTIR chromatograph corresponding the presence of $^{-}$OH which indicates the strong affinity of plant extract towards the surface of AgNPs thus the stabilization of biosynthesized AgNPs. Their antimicrobial activity measurements show their potential for various biomedical applications. Thus it can be concluded the biosynthesis of AgNPs by Malva Sylvestris and Lantana Camara leaf extract is feasible, eco-friendly and alternative conventional method. These synthesized AgNPs preparations show potential for application as broad-spectrum antimicrobial agents.

Keywords: *Malva Sylvestris, Lantana Camara, Silver nanoparticles, antimicrobial.*

SILICON BASED PHOTODETECTOR ANALYSIS DEVICE

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Silica based photodetector analysis device was built to characterize photodiodes, photodetectors, and solar cells. Photodetectors, photodiodes, and solar harvesting devices were used in the development of different technologies such as military technologies, telecommunication technologies, missile guiding systems, medical imaging technologies, mobile phones, matrix displays, etc. Therefore, such a characterization system has an essential role in the development of such technologies. The device can be used in institutions where high-tech research is conducted such as research labs, technology companies, solar panels, and solar energy companies. Hence, the device could be beneficial for different industries. Proper characterization of photodetectors and photodiodes helps such companies to produce better, more stable, and highly efficient appliances which has significant effect on modern technology.

Keywords: Photodetectors; Dielectric properties, Optoelectronic Properties; Photovoltaic Properties

THE EFFECT OF LOW-LEVEL ADDITION OF CU AND FE TOGETHER ON MARTENSITIC TRANSFORMATION AND MICROSTRUCTURE IN THE NITI INTERMETALLIC

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NiTi is a notable intermetallic known for its shape memory characteristics. It possesses a B2 crystal structure and can dissolve specific elements at elevated temperatures. In the study, the stoichiometry of NiTi (100 at.%) was retained, and by decreasing the atomic ratio of nickel within the B2 lattice, Cu and Fe were added in varying proportions to achieve a similar crystal structure through combustion synthesis. The exchange of nickel with Cu-Fe was restricted to 10 at.% ratio. The investigations were conducted using optical microscopy, XRD, and thermal analysis methods. XRD results revealed the presence of small amounts of $Ti_2Ni(Fe,Cu)$ precipitates alongside the B2 phase with high intensity. With increasing Fe content in the microstructure (approaching 10 at.%), the martensitic transformation shifted to lower temperatures, accompanied by unclear second martensitic peaks. Dendritic phases containing Fe were observed in the microstructure. Elevated Cu content led to a reduction in dendritic structures and a more homogeneous elemental distribution. As the Cu content approached 10 at.%, martensitic (B19') peaks became sharper due to the homogenization of the structure. This was attributed to the negative mixture enthalpy formed by Fe with other elements, except Ni-Ti. Consequently, Fe primarily engaged with Ti and Ni, forming NiTi(Fe) dendritic structures and segregating in the microstructure.

PREPARATION OF MESOPOROUS ACTIVATED CARBON FOR PESTICIDE REMOVAL: KINETICS AND EQUILIBRIUM STUDIES

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Novel African Walnut Shell (AWS) was treated and improved as an agricultural waste by-product to produce high surface area activated carbon via chemical activation with potassium hydroxide (KOH) to achieve extremely effective adsorptive characteristics for deltamethrin removal. The adsorbent (KOHAWS) was characterized by scanning electron microscopy (SEM) analysis, Fourier Transform Infrared (FT-IR) spectroscopy, the Brunauer-Emmett-Teller (BET) surface area and pH point of zero charge (PH_{PZC}). Batch sorption experiments were investigated to study the effect of pH, initial concentration and contact time, sorbent dosage and agitation speed. The results reveals that the experimental data fitted well with Langmuir isotherm model (R^2 = 0.997) with maximum adsorption capacity at 57.64 mg. g^{-1} and the kinetic of the sorption follows the pseudo-first order model (R^2 = 0.995). The sorption of deltamethrin onto KOHAWS reveals a high removal efficiency of 98.2%. The findings show that the Novel AWS has excellent regeneration and reusability properties and may be used to remove pesticides from aqueous solutions instead of conventional activated carbon.

Keywords: Deltamethrin, African Walnut Shell, Adsorption, Activated Carbon, Surface Area, Adsorbe

FREQUENCY DEPENDENCE OF ELECTRIC CHARACTERISTICS OF POLYMER BASED MPS

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In this study, CuO–Cu_2O–PVA polymer composite was deposited on p-Si wafer using spin coating technique. To investigate the electric characteristics of the Au/polymer/p-Si (MPS) device, the admittance (Y) and impedance (Z) measurements were used. The admittance of the Au/polymer/p-Si (MPS) device was measured utilizing the HP 4192A LF Impedance Analyzer. Furthermore, the impedance was measured utilizing the Solartron SI1260 Impedance Analyzer and Solartron 1296 Dielectric Interface. The admittance measurements were made at a frequency ranging from 10 kHz to 1 MHz. Then, for each frequency, the electric parameters such as V_D, N_A, and Φ_B were obtained from special plots which are C^{-2}-V plots. From the C^{-2}-V characteristics, the V_D, N_A, Φ_B, and W_D values are found as 0.272 eV, $4.73x10^{13}$ cm^{-3}, 0.586 eV, $9.78x10^{13}$ $cm^{-2}eV^{-1}$, $2.75x10^{-4}$ cm at 10 kHz and 0.857 eV, $2.92x10^{13}$ cm^{-3}, 1.182 eV, $1.58x10^{14}$ $cm^{-2}eV^{-1}$, $6.21x10^{-4}$ cm at 1 MHz, respectively. Furthermore, the impedance spectroscopy was carried in between 10 Hz-1 MHz and at 0.1, 0.2, and 0.3 V applied dc biases. The impedance measurements were modeled by an equivalent electrical circuit. The Cole-Cole plots were used to obtain other parameters, including R_p, C_p, and R_s. The value of R_p decreases while C_p remains almost constant with the change of the dc biases. This decrease is a result of the increase in the amount of charge carriers injected into the device with the bias increment. The current transport mechanism of the MPS was analyzed using impedance spectroscopy. The dependence of R_p on V voltage was investigated. The voltage-dependent R_p is given by $R_p \propto V^{-m}$. The m represents the conductivity of major charge carriers in the device. m > 1 and m = 1 should be for the space charge limited current (SCLC) theory with exponential trap distribution and trap free, respectively. The m value was found as 1.12 from the slope of the log R_p vs. log V curve of the device. This result concludes that the conductance of the charge carriers follows the SC

USE OF FECR SLAG IN IRON AND STEEL

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Eti Krom, which was established as a state-owned enterprise in Elazig in 1936, has been the only high-carbon ferrochrome producer in Turkey since 1976. Joining Yıldırım Holding in 2004 within the scope of privatization, the company increased its production capacity by modernizing 4 arc furnaces to meet the increasing demand for high quality high carbon ferrochrome. Ferrochrome is an alloy containing 50% - 70% chromium and 50% - 30% iron. Ferrochrome produced by reducing chromite ores enriched by extracting from mineral deposits in electric arc-resistance furnaces using coke. High carbon Ferrochrome slag is produced as a waste in the production of high carbon ferrochrome. High carbon ferrochrome slag is mainly composed of MgO, Al_2O_3, and SiO_2. This slag is stored in stock areas.

The main objective of this study is to eliminate the environmental hazard of ferrochrome slag, which is released during ferrochrome production and stored as waste in the fields, to obtain economic returns and to prevent future storage problems.

Keywords: Ferrochrome, Slag, Zero Waste

AN INVESTIGATION ON THE COLOR CHANGE OBSERVED IN FERROCHROME METAL POWDER

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Eti Krom, the world's largest marketable hard lumpy chrome ore producer, is Turkey's only high-carbon ferrochrome producer. Ferrochrome production briefly consists of feeding the raw materials to the furnaces, separating the slag from the metal and preparing the products for sale at the Sandvik crushing-screening plant. Sandvik crushing-screening plant has primary (jaw crusher) and secondary (cone crusher). Powder metal of 0-5 mm size that emerges at the primary (jaw crusher) stage in the crushing-screening plant is called by-pass metal powder. In addition, 0-5 mm ferrochrome metal powder is formed in the secondary crusher. While ferrochrome metal powder is sold, by-pass metal powder is mostly re-laid in metal pools. Although these two products, ferrochrome metal powder and by-pass metal powder, have the same content, the color of the by-pass powder is darker. Raw materials containing Fe_2O_3 are used to color ceramic bodies, glazes and linings. Therefore, ferrochrome metal powders attract attention.

This study was conducted with the aim of operational process improvement. Samples were taken from all stages of the by-pass metal powder from laying in the pool to crushing-screening it. X-ray diffraction (XRD), X-ray fluorescence (XRF) and Scanning Electron Microscope (SEM/EDX) analyses of ferrochrome metal powder and by-pass metal powder were made and the color change between them was analysed. Fe-Cr hematite pigments tend to actually form a brown color. The darker colors of this structure are affected by parameters such as raw material particle size distribution, initial composition, synthesis temperature and time. As a result, it has been observed that the by-pass metal powder, which is continuously laid in the metal pool, is exposed to heat for a long time, causing color darkness. The dissemination of these or similar studies will contribute to the development of projects based on industry-university cooperation.

Keywords: Ferrochrome, By-pass metal powder, Color change

THERMOPLASTIC MICROFLUIDIC 3D CELL CULTURE AND IMAGING PLATFORM

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Traditional cell culture practices are based on Petri dishes made of polystyrene for two-dimensional (2D) cell culture. However, this monolayer approach has limited success in replicating in vivo models. One of the main reasons for this disparity between in vivo models and culture platforms is that living organisms are 3-dimensional (3D), whereas cell culture in Petri dishes is only 2D. Recently, various 3D cell culture platforms, such as microfluidic platforms, have been proposed to address this issue.

Microfluidics has been used in diverse fields, including chemistry, material science, and biology. In particular, in cell culture, microfluidics has enabled many novel capabilities, such as more precise control over cell microenvironments and the establishment of chemical gradients. Unfortunately, most microfluidic platforms have been fabricated using polydimethylsiloxane (PDMS) because of its unique properties, including ease of fabrication, gas permeability, and optical transparency. However, PDMS has some disadvantages, such as difficulty in mass fabrication and adsorption of hydrophobic molecules, which make some cell studies impossible. Especially for the goal of converting the proof-of-concept devices developed in the lab to commercial products, PDMS poses many challenges, including high cost and low throughput. Therefore, a material that is compatible with high-throughput fabrication methods such as injection molding and hot embossing is desired.

In this work, to overcome these challenges, we introduce a thermoplastic microfluidic 3D cell culture and imaging platform using polymethylmethacrylate (PMMA) capable of generating chemical concentration gradients. Specifically, the 3D cell culture platform was fabricated using a benchtop CNC and sealed by solvent-assisted bonding, and its functionality was demonstrated with several different cell lines. The platform design incorporated three channels, the central channel being slightly shallower than the two side channels. This central channel allowed the encapsulation of a hydrogel such as collagen via capillary action and the generation of a chemical concentration gradient across the channel. Therefore, this platform has great potential for studying cell-cell interactions, angiogenesis, and drug responses in cells.

DESIGN OF CIRCULAR-SHAPED FREQUENCY-SELECTIVE SURFACE WITH HIGH ANGULAR STABILITY

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In recent years, frequency selective surfaces have been widely used in fields such as communication, radar systems, medical imaging, and security for the purpose of processing, transmitting, and detecting signals within specific frequency ranges. These surfaces are generally designed with features like bandpass, bandstop, or absorption in certain frequency intervals. Wideband frequency selective surfaces have the capability to effectively absorb, reflect, or transmit signals across different frequency ranges, showcasing high performance within a broader frequency spectrum. This allows the same structure to be employed in various application domains, handle multiple frequencies simultaneously, and exhibit efficient response across a wider electromagnetic spectrum. Within the scope of this study, an original design of a circular-shaped and wideband absorptive frequency selective surface is proposed. The transmission/reflection characteristics of the absorptive surface are simulated using a software that employs full-wave electromagnetic (EM) calculations. Through this study, it is observed that the proposed structure maintains high angular stability in both TE and TM modes due to its circular design. Consequently, the presented structure stands out with its advantages of wideband characteristics and high angular stability. Furthermore, the impact of using different dielectric materials as alternatives in the proposed frequency selective surface on the reflection/transmission performance is also investigated.

COMPARATIVE ANALYSIS OF SUITABLE LIGHT SOURCES FOR MINIATURIZED SOLAR SIMULATORS

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Solar simulators play a crucial role in the testing and characterization of photovoltaic devices, enabling researchers and manufacturers to evaluate their performance under controlled laboratory conditions. The choice of light source in a solar simulator significantly impacts the accuracy and reliability of these tests. This study presents a comparative analysis of different light sources commonly employed in miniaturized solar simulators, with a focus on their suitability for accurately replicating solar spectral irradiance. The study evaluates three primary light sources: xenon arc lamps, light-emitting diodes (LEDs), and halogen lamps. Various performance parameters, including spectral matching, temporal stability, spatial uniformity, and energy efficiency, are assessed to determine the strengths and limitations of each light source. Special attention is given to their ability to mimic the spectral composition of natural sunlight across a broad wavelength range.

In conducting the comparative analysis of Light Sources, light sources for small and low cost simulators were considered. To assess light source performance, various methods and criteria were employed for comparison such as spectral matching, temporal stability, spatial uniformity, energy efficiency, and durability. Furthermore, this study explores the impact of light source selection on the accuracy of photovoltaic device testing, emphasizing the need for careful consideration when designing miniaturized solar simulators for various applications, including research, quality control, and product development within the solar energy industry.

By understanding the strengths and limitations of different light sources, engineers can make informed decisions when selecting the most suitable light source for their sun simulators.

VALIDATION OF GERBER METHOD TO DETERMINE FAT IN MILK AND DIARY PRODUCTS

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One of the most important constituents and quality criteria of milk is the fat which affects taste, odour, texture and durability of the end-product. The Gerber Method is a primary and historic chemical test to determine fat content of raw and processed milk. In this study, the Gerber Method was validated using milk, yoghurt and halloumi samples having different fat content and measurement uncertainty of the method was determined.

Mean recovery of the method for milk, yoghurt and halloumi samples were found as 98, 100 and 99% respectively. Reproducibility values (RSD) were 3, 8 and 3% for milk, yoghurt and halloumi samples. Finally, overall recovery, i.e. accuracy of the Gerber Method was 99% with 4% of measurement uncertainty (n=126). Linearity and limit of detection (LOD) are important method validation criteria and decisive parameters in internal quality control. Correlation coefficient (R^2) was 0.929 and standard deviation of weighted linear regression (Srr) was 0.09 with the method. Typical LOD value for fat was calculated as 0.453%.

The Gerber Method was successfully validated for fat analysis in all three matrices and all fat levels. Method can be used for routine analysis by implementing internal quality control measures, since all the findings comply with the acceptable ranges.

SIMULATION OF BUILDING VENTILATED CONCRETE-SLAB IN COMSOL

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This work evaluates the distribution of temperature in standard concrete slab building roofs and compares it to that of ventilated concrete slabs in regions with high diurnal temperature ranges (DTR) during the summertime. The overall contribution of incorporated hollow-core slabs to minimizing the need for air-conditioning-cooling was simulated in a finite element code software, COMSOL Multiphysics 6.0. The models represent a thermal network of heat transfers via convection–conduction between the air at the outside and inside of the room, through the hollow slab, and across the building wall components. The simulation results show that the ventilated concrete slab decreased the room's ceiling temperature by about 1.3℃ along with an additional 34% increase in the total heat flux through the ceiling, leading to further cooling of the structure as compared to the standard concrete system. It is also observed that the thermal bridge effect is reduced with the incorporated ventilated slab due to the effect of the air-filled hollow cylinders which adds further thermal resistance to the slab.

COVID-19 IMPACTS ON THE EDUCATION OF MECHATRONIC ENGINEERING IN EASTERN MEDITERRANEAN UNIVERSITY

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In the wake of the coronavirus pandemic, the negative and positive effects of this global crisis and the resulting limitations such as widespread quarantines have been studied on various aspects of human life, including university education through various methods and at different levels.

Among these investigations, the study of the negative effects of this pandemic on the education of mechatronics engineering, considering the specific characteristics of this field which is inherently a multidisciplinary domain and heavily relies on practical, workshop, and laboratory education, can shed light on many aspects related to the quality of education in this discipline.

In this research, an attempt is made to examine the effects of the coronavirus pandemic on the mechatronics engineering curriculum by categorizing the courses into three general, core, and specialized categories. The impact of the pandemic period in the form of complete quarantine and the delivery of courses fully online in one phase, and then the implementation of social distancing and the delivery of courses in a blended format of online and face-to-face to students from 2016 to the present will be examined.

Among the different core and specialized courses, they are categorized based on the extent to which they utilize workshops, laboratories, or practical activities. Then the students' susceptibility to pandemic conditions and their secondary effects on future courses until graduation will be assessed.

For this purpose, the curriculum of mechatronics engineering courses at EMU University is taken as a sample for examination. It considers the prerequisite courses for each group of students, starting from the regular entry of students in the year 2016, who were on the verge of graduation when the pandemic occurred, up to the students entering in 2022, who are the latest group to be partially affected by this pandemic. The study explores the impact of the pandemic on their curriculum and potential effects on the level of acquired skills.

The result of this study can be useful in identifying potential weaknesses of graduates during this period, as well as in formulating and strengthening the curriculum in future years based on the lessons learned from covid-19 pandemic.

ECONOMIC VIABILITY AND COST BENEFIT ANALYSIS OF THE DESIGN AND MANUFACTURING OF SMART SPEED BUMPS

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We propose a systematic survey of financial sensibility and the savings made by generating power using smart speed bumps. The smart speed bumps model uses rollers to directly produce mechanical energy that's magnified and rotates a DC generator to produce usable energy. The smart bump produces electrical energy and serves traffic management purposes. This paper discusses the targets, procedure and anticipated results of the proposed study.

The study has multiple objectives. One of the aims of this study is to evaluating the financial feasibility of the smart bump in urban and suburban settings. Economic and environmental aspects are factored in by calculating the cost of installation, maintenance and operation of the energy harvesting speed bump. There is need to analyze the traffic volumes in order to factor in the optimum installation locations. Calculating the reduction in carbon emissions and other ways that this design is beneficial for the environment is necessary for this study.

The proposed methodology to carry out this research is briefly summarized in this paraghraph. Initially, we compare previous cost benefit analysis of different energy harvesting designs related to road infrastructure. The next step would be to collect data on vehicle types, road characteristics, energy generation potential, installation costs, maintenance expenses and energy consumption rates. Third step is simulating and modeling the design in order to predict the energy generated in different scenarios of vehicle weight or traffic volume and speed bump design. Finally, financial analysis is carried out where the initial investment, operational costs, maintenance expenses and potential revenue from energy generation are used in the discounted cash flow analysis. Financial analysis is required for project sustainability and perpetual improvement. Sensitivity analysis helps vary parameters of the proposed design to maximize the output and increase economic viability.

There are various expected results of this analysis process. The financial viability, including return on investment and net present value, are obtained from the proposed calculations. It's expected that economic, environmental and societal benefits will be determined in this research. The potential energy for the system in different settings and different methods of energy generation will also be presented.

In conclusion, this study assists in finding a financially feasible way to generate clean energy. This study also offers valuable insights for urban planners, policy makers and investors considering that the method is innovative as well as environmentally friendly

ENHANCING ENERGY EFFICIENCY AND REAL-TIME MONITORING IN INDUSTRIAL ENVIRONMENTS THROUGH AN INTEGRATED SOFTWARE SOLUTION: NIGHTWATCH

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Globally, the demand for energy continues to escalate due to factors such as heating, lighting, transportation, and fuel supply for various devices. In a context where energy has garnered such paramount importance, achieving energy efficiency has necessitated a comprehensive approach encompassing activities related to energy generation, transmission, and consumption.

Any positive or negative developments in the realm of energy significantly impact both human and environmental factors, which constitute the focal points of sustainable development. Consequently, enhancing efficiency in production and consumption phases, rather than mere expansion, is poised to yield positive economic, social, and environmental contributions.

The presented study centers around a software application developed to address these concerns. The application operates within industrial settings and interfaces with energy analyzers, collecting and analyzing data such as energy consumption, instantaneous current, and voltage. This initiative seeks to provide real-time visibility into energy-related operations on factory premises. Additionally, the software's capabilities extend to retrospective data analysis, enabling informed insights for future extrapolations. Furthermore, the integration of energy consumption data from the analyzers into the Manufacturing Execution System (MES) facilitates energy tracking on a per-job basis. The software's dashboard component empowers users to establish customized threshold values for monitored energy parameters. When these thresholds are exceeded or when values deviate from expected levels, the software triggers alerts and notifications via email and other communication channels, ensuring timely dissemination of pertinent information. Consequently, the software allows businesses to evaluate unit costs associated with specific job orders. Additionally, the study aims to establish a correlation between energy consumption data at the job-order level and machine-level energy consumption. This correlation could foster the augmentation of efficient energy utilization, thereby enhancing competitiveness and overall efficacy.

Keywords: Real-time Data Monitoring and Visualization, Data Analytics, Cloud Systems, Energy Tracking and Analysis, Industry 4.0, Intelligent Manufacturing.

DEVELOPMENT OF SPATIAL ABILITY ACHIEVEMENT TEST FOR 7TH GRADE STUDENTS

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The aim of the research is developing valid and reliable test which are directed to determining the 7th class students' spatial ability success and to gain this tool to the literature. Spatial Ability Achievement Test (SAAT) was developed by the researcher. For this purpose, firstly the aim of the test was determined, critical behaviours were included within the test and the table of specifications was prepared. Then, 84 items of trial test were prepared in accordance with the steps of Bloom taxonomy. The pilot scheme of test prepared was carried out after the necessary corrections were made by receiving experts' opinion. Based on the expert opinions, the number of questions was reduced to 64.

In the first stage, the achievement test prepared was applied to the 7th grade 139 students in 2022-2023 academic year. The data obtained from the application was analysed TAP software program. According to the obtained data, the necessary corrections have been done and the final form have been given. At the end of the research, SAAT, including 25 questions which are valid and reliable, was formed. The KR-20 reliability parameters of 7th class tests have been found out as respectively 0.848 and 0.918; the average difficulty value have been found out as respectively 0.647 and 0.540.

As the result of analysis, it has been seen that the tests provided the construct validity. As a result of this study, "Spatial Ability Achievement Test" for 7th grade students have been formed.

COMPARISON OF CYPRUS LATE BRONZE AGE BOWL MANUFACTURING METHODS IN PERSPECTIVE OF ARCHEOMETRIC STUDIES

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The determination of the manufacturing techniques of metal artifacts used in prehistoric periods sheds light on the cultural, social, economic, and technological evolution of the era. Identifying the production processes through the metallurgical and chemical characterization of archaeological findings is a noteworthy aspect of archaeometallurgical research.

In 2004, at the Kral Tepesi settlement located in the Kaleburnu village of Karpaz, one of the significant ports of the Late Bronze Age, a hoard consisting of 26 bronze artifacts was discovered inside a storage pithos [1]. The discovery of these artifacts within a storage container, the diversity of the artifacts, and the collective presence of a stirrup jar alongside this assemblage have raised several scientific questions. One of the most intriguing questions is to determine the production processes of these metal-based artifacts. The abundance of bowls, seen as part of both rituals and daily use, reflecting the diverse typology among the artifacts, raises another worthwhile question regarding the possibility of different production methods. Within the scope of this study, the determination of the manufacturing process of the bowls found in the 2004 hoard has been planned based on their internal structure and material properties. For this purpose, Scanning Electron Microscopy (SEM) and its associated chemical analysis unit, Energy Dispersive Spectroscopy (EDS), were employed to examine the surface morphology, shape, size, and distribution of the pieces. X-ray Diffraction (XRD) analyses were conducted to study the crystalline structure. The grain structure, grain orientation, fracture mechanism, and differences in the crystalline structure of the examined artifacts suggest that different production processes may have been employed. From the artifacts that distinctly show the mentioned characterization differences, select samples have been chosen to elucidate their production processes.

This study offers a unique perspective to the scientific community in understanding and comparatively analyzing the different production techniques of the Late Bronze Age bronze bowls found at Kral Tepesi in Cyprus. In light of the findings obtained, an interdisciplinary approach has been emphasized, bridging archaeology, chemistry, and material science, aiming to evaluate the production techniques within a broader evolutionary and cultural context.

Keywords: archaeometry, bowl, bronze, kral tepesi, scanning electron microscopy

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STRENGTH AND CONSOLIDATION CHARACTERISTICS OF CLAY IN DIFFERENT LIQUIDITY INDEXES

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In this study, unconfined compressive strength and consolidation characteristics of clay soil in different liquidity indices (LI) were evaluated. According to the results of the identification and compaction tests performed on the samples taken from the clay soil; liquid limit (LL) 46%, plastic limit (PL) 19%, plasticity index (PI) 27%, free weight (Gs) 2.65, optimum water content (wopt) 15% and maximum dry density (**ρ**dmax) 1.86 gr/cm3 has been determined. The soil was found to belong to the Low Plasticity Clay (CL) class according to the unified soil classification method (USCS). The strength, deformation and consolidation characteristics of soils depend on soil type and water content. LI is a ratio depending on the water content of the soil, liquid and plastic limit values. When the water content of the soil is equal to the plastic limit, LI is zero, when LI > 0, the soil consistency is plastic, and when LI> 1, the soil's consistency is fluid. It is not possible to prepare a free pressure sample at the values where the soil consistency is plastic and fluid, even if it is possible, the unconfined compressive strength is very low. In this study, the unconfined compressive strength, deformation and consolidation characteristics of the soil were determined at water contents where LI ≤ 0. In order to determine the different LI values, the water content values were used as wopt, wopt ± 2, wopt ± 4. While the soil used in the study has a plastic consistency at wopt + 4 (LI=0), it has a semi-solid consistency at other water contents (LI<0). As a result, the liquidity index of the sample prepared at optimum water content is -0.15, and as LI approaches from negative value to zero, the highest unconfined compressive strength is realized at optimum water content, although the unit deformation increases. In the consolidation characteristics, it has been observed that the lowest initial void ratio occurs at the optimum water content, the initial void ratio is lower at higher than optimum water contents, but the compaction amount is higher in dry samples than the optimum as you move away from the optimum water content at the same rate. The study also supports that the pre-consolidation pressure depends on the loading on the soil, does not change according to the water content, and shows once again the importance of the water content in the soil.

Keywords: Clay, Compaction, Liquidity Index, Strength, Consolidation

TOOL LIFE ESTIMATION WITH NOISE LEVEL IN HIGH VOLUME METAL CUTTING

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High-speed and high-volume cutting technology has become an increasingly useful technology in high-volume metal cutting industries such as molding. However, the high intensity noise generated during high-volume, high-speed metal cutting operations can also have adverse effects on the accuracy and quality of the workpiece. While the increase in noise, especially in worn teams, creates an effect that can disrupt the hearing health of employees; efforts to establish a relationship between increased noise and tool life have also gained importance.

In this study, an experimental study was carried out to determine the tool life in a machine developed at the Gesbey R&D Center that performs high-volume environmental milling that can open the welding bevel of 30 mm thick plates in a pass. According to ISO 3684, tool life is considered to end when the free surface wear value is 300 μm. In the study, machining length and sound pressure levels and free surface wear values were measured as tool life criteria when the tool started machining each plate.

In this study, a practical tool life estimation method has been developed for our business by measuring the cutting length and noise levels corresponding to the wear value at which the tool life ends according to ISO 3684.

Keywords: tool wear, metal cutting, tool life

FABRICATION OF A NOVEL NDI DERIVATIVE: CHARACTERISATION, IN-VITRO ANTIBACTERIAL ACTIVITY ANALYSIS, MOLECULAR DOCKING AND MOLECULAR DYNAMIC STUDIES

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Naphthalene diimides are extensively studied in various fields including supramolecular chemistry, sensors, dyes, solar cells, intercalating agents with DNA and RNA, and medicinal chemistry. Here, we have synthesized a novel structure of bay and core substituted NDI and evaluated its antibacterial activity against various bacterial strains. Compound HIRR04 showed good antibacterial activity against *E.coli* and *S. aureus*. Therefore, the antibacterial activity was further studied in detail with molecular docking and molecular dynamic stimulation to determine the mechanism of action as well as the stability of the complex and binding. The penicillin binding protein (PBP) was selected to be targeted in the bacterial cell for both strains. Both PBP 3D structures were obtained from protein data bank and docked with the ligand HIRR04. The ligand showed higher activity against *E.coli* and was confirmed by better binding and stability with the computational studies. The binding affinity was found -7.49 Kcal/mol and -6.15 Kcal/mol for 3VMA and 1MWS respectively. MM/GBSA calculations were utilized for the ranking the energies during the stimulation. The total binding energy ΔG has an average energy of -78.01 kcal/mol for 3VMA and -54.55 kcal/mol for 1MWS complex with ligand HIRR04.

DESIGN AND MANUFACTURE OF A SOLAR PANEL CLEANER ROBOT: CHALLENGES AND LESSONS LEARNED FROM A CAPSTONE PROJECT

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This paper explores the development journey of a smartphone-controlled solar panel cleaning robot, with advanced features such as edge detection, adjustable cleaning speed, and autonomous operation. It places special emphasis on material selection, 3D printing, and the choice of mechanical components, while also sharing valuable lessons learned along the way.

The first part of our exploration centers around the challenge of selecting the right materials to build the robot. These materials need to be strong, environmentally friendly, and affordable. The choice of materials plays a crucial role in ensuring the robot's durability and longevity. In addition, for materials, components such as: motors, brush, and water pipes were difficult to find.

Moving on, we tackle the complexities of 3D printing. This technology is used to create the robot's parts, and achieving consistent quality can be difficult. We delve into the challenges of maintaining high-quality printing and discuss strategies to overcome defects and improve production efficiency.

The next section dives into the selection of mechanical components, such as belts and gears, which are essential for the robot's mobility and cleaning mechanisms. We explore the intricacies of making choices that consider factors like load-bearing capacity, wear resistance, and power efficiency. We also uncover methods to ensure precise alignment and ongoing maintenance of these critical components.

Throughout this journey, the importance of effective teamwork, collaboration, and adaptability shines through. These lessons extend beyond the technical aspects, enriching our understanding of project management and innovation.

In conclusion, this paper meticulously outlines the formidable technical challenges faced and underscores the monumental significance of teamwork and adaptability in overcoming these obstacles. It concludes by shedding light on potential avenues for future advancements, aimed at enhancing the efficiency and sustainability of solar panel cleaning robots, thus contributing to the renewable energy technology field.

A 3D PRINTED BIOREACTOR FOR CARTILAGE TISSUE ENGINEERING

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Bioreactors are of great value in tissue engineering by providing a dynamic culture environment to the cells/scaffolds. Bioreactors that control the microenvironment are often complex and expensive. In this study, we wanted to demonstrate a new bioreactor using 3D software methods. 3D-printed bioreactors play a crucial role in cartilage tissue engineering by providing a controlled environment for cultivating and growing cartilage tissue constructs. Cartilage tissue engineering aims to repair or replace damaged cartilage tissue, often found in joints like the knee and hip. 3D printing technology allows for the customization of bioreactors to meet the specific needs of cartilage tissue engineering.

The bioreactor was designed in such a way that each scaffold was placed into a separate well. The cultivation of cells and scaffolds under physiological inputs and the determination of an ideal 3-plane movement structure are among the features of this study. This model will allow the desired extracellular matrix (ECM) content and increase the mechanical properties of elastic modules. The system is user-friendly and easy to clean/ sterilize.

Overall, 3D-printed bioreactors have the potential to significantly advance cartilage tissue engineering by providing researchers and clinicians with a versatile tool to create and nurture functional cartilage tissue constructs. These bioreactors can be customized to suit specific research or clinical objectives and have the potential to contribute to the development of innovative treatments for cartilage-related injuries and diseases. However, it's important to note that the field of tissue engineering is continually evolving, and researchers are constantly working on improving bioreactor design and functionality.

BIODIELECTRIC MATERIALS FOR BIOSENSOR APPLICATION

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Biomaterials are of great importance for humanity because they are used to replace diseased biological structures. Hydroxyapatite is often used in biomedical applications because they are biocompatible materials. For this purpose, Sr-doped powder materials were produced by creating calcium deficiency in the study. Hydroxyapatite-based Sr-doped powder samples were prepared by hydrothermal method. For this the Fytronix FYHD-8000 SYSTEM was used. HA-based biomaterials with 1%, 3%, 5% and 10% Sr were grown at 10h growth time. Dielectric properties of samples produced were investigated. Dielectric spectroscopy analyzes were performed in the frequency range of 1kHz-20MHz. As a result of the dielectric analyses performed, the appearance of samples based on HA, especially the semicircular cole-cole curves and the full circle B(S)-G(S) curves showed that these materials have high polarization by external influence, that is, they can be used as a biodielectric sensor.

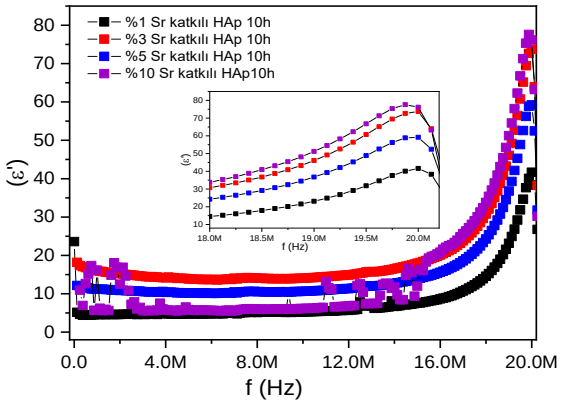


Fig 1. Dielectric constant of 10h pure HA and 1%, 3%, 5% and 10% Sr-doped HA powder samples.

Keywords: Biomaterials, Biosensor, Hydroxyapatite

SOLAR LIGHTRESPONSIVE ZnO NANOPARTICLES ADJUSTED USING Cd AND La Co-DOPANT PHOTODETECTOR

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Optical sensing from the solar light range of light is very important for industrial process monitoring and life science. Hence, we present inorganic photodetector, operating between 200 and 1200 nm wavelength invented (Cd0.1/xLa co-doped ZnO, x=0.1, 0.5, 2, and 4 Wt%) nanoparticles thin films were synthesis onto p-Si and glass substrates by the Sol-gel spin coating technique. The films indicate that a high transmittance about 92% in the visible region. The optical bandgap of the thin films was used optical data demonstrated that the band gap of the films decreased with dopant concentration. The surface morphology and elemental compositions were investigated by SEM and EDX. The diodes exhibited high photocurrent responsivity under various illuminations. Herein, from I-V characteristics determined the electronic parameters such as ideality factor, barrier height and series resistance. The C-V and G-V of the diodes were investigated in the range of 10-1000 kHz. Moreover, an approach to improve the Ion/Ioff ratio (photoresponse) by modifying the concentration has been investigated under dark and light illuminations, respectively. The Al/p-type/Cd(0.1)-La(0.1)Wt/Al photodetector exhibited a highest photo-response were found to be 2263. Finally, the interface states were determined to explain the results obtained in the present study. The obtained results suggest that Cd/La-co-doped ZnO/p-Si diodes can be enhanced and pave the way for its potential application in the optoelectronic devices e.g. photodetectors.

Keywords: Co-doped ZnO, Sol-gel, Electricalproperties, Photodetector.

APPLICATIONS OF NANOMATERIALS FOR THE DIAGNOSIS OF CANCER

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

ORGANIC SEMICONDUCTOR PHOTOSENSORS

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Coumarin doped with poly (3-hexylthiophene)/p-Si photodiodes were prepared by the drop-casting technique. The current–voltage characteristics of the prepared diodes with the structure of Al/P3HT: Coumarin/p-Si/Al diodes were investigated under dark and various illumination intensities using both I–V and C–V methods. Using both illuminated DC and transient I–V and C–V measurements, the photocurrents are shown to depend on light intensity with the P3HT: Coumarin ratio influencing photoresponsivity. The photocurrents increase with increasing illumination intensity. C–V measurements show that the capacitance of the diode depends on voltage, frequency and illumination, indicating the existence of a continuous distribution of interface states that can be described in terms of organic-organic polymer blend domains in additional to the well studied metal-semiconductor interface states. The best responses were found to be for the diode having 10% Coumarin weight. These results suggest that the Al-p-Si/P3HT: Coumarin/Al diode can be used as a photosensor.

PENTACANE BASED ON THIN FILM ORGANIC PHOTOTRANSISTOR

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The zinc oxide semiconductor thin film transistor was fabricated on a SiO_2/Si substrate by sol gel method. The ZnO film is consisted of nanofibers with the changing diameter along the fibers. Electrical characteristics of the zinc oxide transistor under dark and white light illuminations were analyzed. The mobility value of the ZnO TFT was found to be $1.86 \times 10{-}2$ cm^2/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.

HYDROGEN PRODUCTION AND ROLE OF HYDROGEN IN RENEWABLE ENERGY

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Hydrogen isn't a renewable energy, but it is a "fuel source", it's actually a "energy transport medium". It lets you store renewable energy or other form of generated energy from one place to another place for consumption. Hydrogen is the lightest element. At standard conditions hydrogen is a gas of diatomic molecule. It is the most abundant chemical substance in the universe, constituting roughly 75% of all normal matter and most of the hydrogen on Earth exists in molecular forms such as water and organic compounds. It's always in a chemical bond with something else, like Oxygen. It takes exactly as much energy to break that bond (to free the hydrogen) as is the amount of energy it can later produce by re-combining it with oxygen (either burning or in a fuel cell). The usual energy source to break those bonds is electricity, and there is some loss in efficiency. There are several methods to produce hydrogen. In this talk, methods of hydrogen along with the ways of transportation to use it as fuel source will be presented.

Keywords: Hydrogen, fuel, molecule, chemical, renewable energy, electrolysis, water, organic

FABRICATION AND CHARACTERIZATION OF PHOTONIC DEVICES BY FYTRONIX SYSTEMS

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Photonic applications, which are very important today, are widely used in many fields, especially aerospace, defence industry, LCD screens, lenses. The electrical and optical characterization of the photonic device have been performed by Fytronix systems. For this purpose, the solar simulator device produced by Fytronix takes the lead. Many analyses of optical or photonic devices were performed by FYTRONİX systems. The current-time (I-t), capacitance-voltage (C-V), conductance-time (C-t) measurements, power-voltage (P-V) measurements of solar cells can be performed by Fyronix Solar IV characterization and photoresponse systems. The nanostructure thin films are prepared by Fytronix spin coater including the multi, static and dynamic methods. Fytronix Company produces and improve the high technology equipments for scientific and manufacturing applications.



Fig. Fytronix photoresponse and photocapacitance analyzer

POSTER PRESENTATION

REMOTE SENSING APPLICATIONS IN MINING INDUSTRY CASE STUDIES FOR VARIOUS MINERAL DEPOSITS (TÜRKİYE)

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Remote Sensing (R/S) is a valuable and proven technology for collecting information about the Earth's surface from distance aerospace platforms, such as satellites, aircrafts, or drones. R/S plays a crucial role in various stages of the mining industry, especially during the initial geological exploration phase. The original Area of Interest (AOI), frequently referred to “basin” in areal geology or "concession" in the legislative industry practice for smaller acreages, is analyzed via multispectral (limited portion of the electromagnetic spectrum) or hyperspectral (the whole portion of the electromagnetic spectrum) sensors attached to those platforms. Sensors record raw data for emmitted radiation values of the earth surface in different wavelengths, which they are later processed via special softwares using either direct Band Rationing or Principal Component Analysis techniques. Outcomes of the processed imagery are shown as surface anomalies, such as alteration zones or chemical enrichment areas in attributed colors, to help geologists identify potential mineral deposits.

Satellite imagery is rarely able to identify mineral deposits directly unless they give clear outcrops on the surface which R/S sensors could catch. Economical mineral zones are mostly buried and found in small grades associated with the host rocks. Therefore it is important to know the host rock-mineralization relationship and map the boundaries of typical geological environment that could contain the mineral deposit in it. There is a comprehensive literature found in R/S applications, especially for multispectral sensors, to associate processead wavelength attributes ("signatures") with specific geological features or mineral groups.

In this study, several geographical locations among Türkiye is investigated with Landsat-8 (11 spectral bands with 15-100 m resolution) and Aster (14 spectral bands with 15-100 m resolution) satellite imagery for different mineral groups such as chrome, magnesite, bauxite and lead. These minerals are important for Turkish economy with their production and export performance. Each AOI is selected specifically since they are covering several active operational mine sites for a distinct mineral group as identifed from the geological literature and open source public information. At first, both Landsat-8 and Aster data have been processed by different techniques suggested in the literature, then the best correlated images with the surface geology of operating mine sites were selected. Results showed that, processed imagery anomalies are perfectly matched with the geology of active mine sites.

DEVELOPMENT OF A MIP- BASED ELECTROCHEMICAL SENSOR FOR A CANCER BIOMARKER ADENOSINE

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Adenosine is defined as an organic compound commonly found in nature in the form of various derivatives. Adenosine biomarkers play a crucial role in clinical research to thwart the advancement and dissemination of cancer cells. Adenosine's appropriate impact on cancer is evident, as it aids in cancer cell detection and preventive strategies. Adenosine, an organic compound found in nature, exists in various forms and is composed of adenine connected to ribose via a β-N9-glycosidic bond.

The overexpression of adenosine receptors in specific cancers like adenocarcinoma, melanoma, and peritoneal colon suggests its potential as an early diagnostic marker. This underscores the need for efficient and sensitive adenosine detection methods [1]. This study contributes to the literature by exploring the detection of cancer cells through adenosine synthesis.

Electrochemical methods are analytical techniques that use a measurement of potential, charge, or current to determine an analyte's concentration or to characterize an analyte's chemical reactivity. Cyclic voltammetry (CV) and Differential Pulse Voltammetry (DPV) when these methods are evaluated in terms of cost, they are less expensive, more useful, and more convenient in terms of being easily used by everyone. All experiments were performed under optimized conditions, and the optimization of the conditions was determined by first subjecting them to CV and then DPV. In this study, we fabricated gold nanoparticles (AuNPs) coordinated adenosine imprinted poly (hydroxyethyl methacrylate-N-methacryloyl-L-histidine methyl ester) nanoparticles (AuNPs-MIP) based electrochemical sensor. For the efficiency of this study, it is aimed to apply the molecular imprinted polymer technique. This technique is based on the principle that functional monomers form a complex around the template molecule with covalent or non-covalent interactions and then these interactions are stabilized using crosslinkers. The importance of this technique for this study is due to the fact that it plays an important role in improving health outcomes, especially in the scientific and experimental studies that enable cancer patients to start treatment early [2]. This effective, used one Adenosine-imprinted AuNPs-MIP and other blank pencil graphite electrode (PGE) electrodes were compared. It is the checksum made to observe how much the reason for making these images has increased. Finally, we observed how selective Adenosine was using our pen electrodes using our Guanasine and Cytidine composites to determine the selectivity.

Keywords: Adenosine, biomarkers, electrochemical, pencil graphite electrode, cyclic voltammetry, differential pulse voltammetry, gold nanoparicle

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SYNTHESIS AND CHARACTERIZATION OF NEW VIOLOGEN BASED COVALENT ORGANIC FRAMEWORKS

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Covalent organic frameworks (COFs) are a group of materials that utilize the strategy of extending organic building blocks through strong covalent bonds [1]. Thanks to their excellent thermal/chemical stability, porous structure, and electrochemical activities, COFs hold significant application potential in gas storage, energy conversion, and chemical catalysis [2]. Particularly, in donor-acceptor (D-A) COFs, there is a great interest in synthesizing new derivatives that facilitate effective charge separation and transport by incorporating electron-rich building blocks onto structures with electron deficiency. Despite the rapid development in COF chemistry and the discovery of various strategies for designing frameworks with functional building blocks, light-sensitive components, expanded π-conjugation, and enhanced D-A interactions, there remains a need for further exploration in this field [3-4]. In this study, new COF structures containing viologen units that can be used especially in hydrogen production reactions were synthesized and various techniques were characterized. As a result, it was determined that these materials exhibit visible light absorption, favourable energy band structures and hydrophilic properties that increase the interaction with water.

Keywords: Covalent organic frameworks-COFs, Donor-Acceptor materials, Viologen.

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DETERMINATION OF DEGRADATION KINETIC PARAMETERS OF PISTACHIO, WALLNUT AND HAZELNUT SHELLS USING THERMO-GRAVIMETRIC ANALYSIS

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This study presents pyrolysis behaviors and solid state kinetic data of hazelnut shell, wallnut shell, and pistachio shell investigated by non-isothermal thermogravimetric analysis (NI-TGA). The samples shaped as powder size and experiments performed in nitrogen athmosphere with four different heating rates of 10 oC, 15 oC, 20 oC, 30 oC, respectively. Kissinger-Akahiro-Sunose (KAS) method is non-integral free method which is used to calculate Arrhenius equation parameters and to verify reaction mechanisms of pyrolsis process. Effect of heating rate during on decomposition is also studied. According to obtained results, in DTG curves about thermal decomposition process showed weight loss rate changed with increasing heating rate. Mean activation energies of pistachio, wallnut and hazelnut shells were calculated as 140,5793 kJ/mol, 137,4402 kJ/mol and 138,5320 kJ/mol respectively. Kinetic parameters obtained from KAS method is in good agreement and also efficient to description of decomposition mechanism of samples.

PREPARATION AND CHARACTERIZATION OF PbO THIN FILMS WITH DIFFERENT ZINC CONCENTRATIONS BY SILAR METHOD

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Zinc (Zn) doped lead oxide (PbO) thin films with different doping concentrations were synthesized on glass substrate by SILAR method. XRD and SEM-EDS results showed polycrystalline structure and good coating on glass. By investigating the crystallinity and surface properties of the films, it was found that increasing doping ratio improves them. The optical band gap was found to be 3 eV for undoped PbO, while it decreased for 2%Zn doped PbO and then increased with increasing doping ratio.

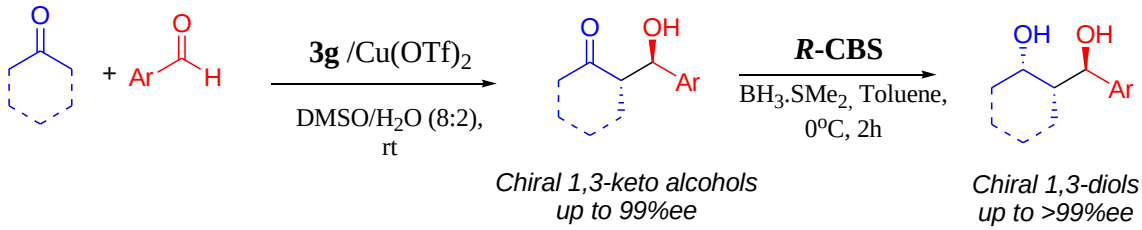
SYNTHESIS OF NOVEL HIGHLY ENANTIOSELECTIVE 1,3-DIOLS BY ASYMMETRIC REACTIONS

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Chiral diols are structural motifs often found in varied significant natural products and have also proven precious as chiral ligands and auxiliaries in stereoselective organic synthesis. Chiral diols are a useful set of key building blocks for preparing a variety of important chiral chemicals.1-3

In this study synthesized new chiral 1,3-diols with high enantiomeric purity from new chiral 1,3-keto alcohols with different configurations. Chiral 1,3-keto alcohols were synthesized by a new asymmetric aldol method in the first step. This method was developed using a new proline-derived organocatalyst and Cu(OTf)2 as an additive in DMSO-H2O for the first time. It was obtained almost >99% ee using our developed aldol procedure. In the second step, original chiral diols of high enantiomeric purity were obtained by asymmetric reduction of chiral keto alcohols with chiral oxazaborolidine reagents. In this way, a two-step asymmetric reaction was developed for chiral 1,3-diol enantiomers with high enantiomeric purity.

The structures of all the original chiral compounds obtained were elucidated by IR, NMR, Mass, and elemental analysis methods. Their enantiomeric excesses were determined by the chiral HPLC method.



Chiral 1,3-keto alcohols up to 99%ee

Chiral 1,3-diols up to >99%ee

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