2nd International Natural Science, Engineering and Material Technologies Conference
Sep 15-17, 2022, İğneada-Kırklareli / TÜRKİYE

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NEM 2022
ABSTRACT BOOK

2 nd International Natural Science, Engineering and Material Technologies Conference

(NEM 2022)

Sep 15-17, 2022 – İğneada-Kırklareli/ TÜRKİYE

FOREWORD

It is a pleasure for us to offer you this Book of Abstract for the 2 nd International Natural Science, Engineering and Material Technologies Conference (NEM 2022). 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 2022 is honored by the presence of over 120 colleagues from various countries. We stayed true to the original NEM 2022 concept and accepted contributions from all fields of materials science and technology to promote multidisciplinary discussions. The focal points of the conference emerged spontaneously from the submitted abstracts: energy applications, advanced materials, electronic and optoelectronic devices, organic electronic materials, chemistry, physics, environmental science, medical science, applied and engineering science, computer simulation of organic structures, biomedical applications and advanced characterization techniques of nanostructured materials. Further fields of interest include e.g. new advanced and functional materials, advanced-functional composites, biomaterials, smart materials, dielectric materials, optical materials, magnetic materials, organic semiconductors, inorganic semiconductors, electronic materials, graphene, and more.

Therefore, we hope that getting first-hand access to so many new results, establishing new connections and enjoying the İğneada-Kırklareli/ TÜRKİYE ambience will make you feel that your resources were spent well in NEM 2022.

Our warmest thanks go to all invited speakers, authors, and contributors of NEM 2022 for accepting our invitation, visiting Kırklareli and using NEM 2022 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 2023** event.

Best regards,
Chairmen's of Conference

Assoc. Prof. Burhan COŞKUN

Prof. Dr. Fahrettin YAKUPHANOĞLU

Editor:

Assoc. Prof. Burhan COŞKUN

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NEM 2022

2nd INTERNATIONAL NATURAL SCIENCE, ENGINEERING AND MATERIAL TECHNOLOGIES CONFERENCE

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PROGRAMME 15 SEPTEMBER 2022 (THURSDAY)	
10:00-10:05	Opening Ceremony
10:05-12:00	**1st session (Oral Talks) Chair: Prof. Dr. Serpil Aközcan**
10:05-10:50	**OPENING SPEAKERS** - Assoc. Prof. Dr. Burhan COŞKUN / Conference President - Prof. Dr. Bülent ŞENGÖRÜR / Rector of Kırklareli University - Prof. Dr. Erhan TABAKOĞLU / Rector of Trakya University - Prof. Dr. Mümin ŞAHİN / Rector of Tekirdağ Namık Kemal University - Prof. Dr. Sedat MURAT / Rector of Çanakkale Onsekiz Mart University - Mehmet Siyam KESİMOĞLU / Mayor of Kırklareli - Assoc. Prof. Dr. Birol EKİCİ / Governor of Kırklareli
10:50:11:35	**PLENARY SPEAKER** Prof. Dr. Hasan MANDAL / President of TÜBİTAK
11:35-12:00	**Invited Talk-1: Prof. Dr. Serap Güneş: "RECENT ADVANCES IN PEROVSKITE SOLAR CELLS"**
12:00-13:30	**Lunch**
13:30-15:30	**2nd session (Oral Talks) Chair: Prof. Dr. Serap Güneş**
13:30-13:45	B. A. Gozeh, F. Yakuphanoğlu: "SOLAR LIGHTRESPONSIVE ZnO NANOPARTICLES ADJUSTED USING Cd AND La Co-DOPANT PHOTODETECTOR"
13:45-14:00	A A. Fatehmulla, F. Yakuphanoğlu, "BANDGAP TUNING AND STRONG BLUE-GREEN BAND EMISSIONS OF SOL-GEL SYNTHESIZED ZnO FILMS BY HIGH Cu DOPING"
14:00-14:15	B. Bekar: "THE ENERGY STATES IN QUANTUM WELL WIRE LATTICE UNDER THE EFFECT OF EXTERNAL ELECTRIC FIELD"
14:15-14:30	M. Imran Jamil, M. Adnan, A. Ahmed: "DETERMINATION OF THE OPTICAL PROPERTIES OF TUNGSTEN TRIOXIDE THIN FILM USING THE TRANSFER MATRIX METHOD"
14:30-14:45	A. U. Ammar: "SYNERGETIC EFFECTS OF MXENE AND Mn-DOPED ZnO ELECTRODES FOR ALL-IN-ONE SUPERCAPACITORS"
14:45-15:00	M. H. Aleinawi: "UTILIZATION OF PIEZOELECTRIC EFFECT IN ZINC OXIDE NANOWIRES AS A NANOGENERATOR"
15:00-15:15	S. Najib, E. Erdem: "INVESTIGATION OF ASYMMETRIC HYBRID SUPERCAPACITOR BASED ON MORPHOLOGY OF ZINC OXIDE ELECTRODE MATERIALS FOR HIGH ENERGY SUPERCAPACITORS"
15:15-15:30	M. Menderes Alyörük: "PIEZOELECTRIC BEHAVIOR OF BOROCARBONITRIDES"
15:30-16:00	**Coffee Break**
16:00-18:00	**3rd session (oral talks) Chair: Assoc. Prof. Dr. H. Hale Karayer**
16:00-16:15	Y. Ünlütürk, D. Ünal: "DIRECTIONAL ASSOCIATED CURVES OF A PSEUDO NULL CURVE VIA BISHOP FRAME IN LORENTZ 3-SPACE"

16:15-16:30	D. Ünal, Y. Ünlütürk: "SPINOR B-DARBOUX EQUATIONS IN EUCLIDEAN 3-SPACE"
16:30-16:45	Ü. Şahin Şener, E. İşcen: "NUMERICAL SIMULATION OF ELECTROMAGNETIC WAVE AND CONCRETE INTERACTION AND DETERMINATION OF SCATTERING PARAMETERS"
16:45-17:00	M. E. Uz: "AN ANALYSIS OF STEEL ROOF PANELS' RESISTANCE TO OUT OF PLANE HAIL IMPACTS"
17:00-17:15	M. O. Özcan, K. Ayten, Ç. Özcan, B. Johansson, T. Zorlu: "KIRKLARELİ UNIVERSITY EDUCATION INFORMATION PACKAGE AND ITS DEVELOPMENT PROCESS"
17:15-17:30	M. Gören, M. O. Özcan: "REAL-TIME HUMAN DETECTION FOR UNMANNED AERIAL VEHICLE"
17:30-17:45	S. Ö. Gönen: "USING MULTI-CRITERIA DECISION MAKING APPROACH IN INTERNET OF THINGS APPLICATIONS: A BIBLIOMETRIC ANALYSIS"
17:45-18:00	M. Berberoğlu, T. Yıldırım: "MOVEMENT CLASSIFICATION WITH THE USE OF ARTIFICIAL INTELLIGENCE"
18:00-19:00	**Poster Session**

PROGRAMME
15 SEPTEMBER 2022 (THURSDAY)
HALL 2

13:30-15:45	**4th session (oral talks) Chair: Assoc. Prof. Dr. Mustafa Arslan**
13:30-13:45	A. Doğrusadık: "DERIVATION OF PARAMETRIC SURFACES OF THE SWEPT VOLUME FOR AN END MILL IN 5-AXIS CNC MILLING"
13:45-14:00	Ç. Ovaci Beji, N. Ürkmez Taşkın: "THE EFFECT OF DIFFERENT REAGENTS ON MATERIAL REMOVAL RATE IN MICROMACHINING OF ALUMINUM AND STEEL SURFACES"
14:00-14:15	E. F. Kent: "FLOW VISUALIZATION EXPERIMENTS OF STOKES FLOW IN A V-SHAPED CHANNEL"
14:15-14:30	A. T. Ergenç, Ö. Işın, D. Yıldız, H. Arıkan, M. Kabakçı, S. Bektaş, H. Aslan, M. Tufan: "CHAIN TYPE TORQUE TRANSMISSION SYSTEM DESIGN FOR A HYBRID ELECTRIC VEHICLE"
14:30-14:45	E. Er, E. Türkeş, O. Yüksel: "THE EFFECT OF USING VARIOUS CONSTRUCTION MATERIALS ON VIBRATION ISOLATION FREQUENCY BAND OF A PERIODIC STRUCTURE"
14:45-15:00	U. Gül: "BUCKLING ANALYSIS OF AXIALLY LOADED NANOBEAMS WITH INTERMEDIATE SUPPORT USING NONLOCAL ELASTICITY THEORY"
15:00-15:15	K. Kılınç, G. Kıras: "INVESTIGATION OF COMPRESSIVE STRENGTH OF MORTARS PRODUCED WITH CHEMICAL ADMIXTURES INCLUDING POLYCARBOXYLATE, SODIUM BENZOATE BASED RAW MATERIAL, CALCIUM NITRATE, VINYL ACRYLATE MONOMER AND WATER PREPARED IN THE LABORATORY"
15:15-15:30	K. Kılınç, G. Kıras, İ. Tulga: "INVESTIGATION OF COMPRESSIVE STRENGTH OF MORTARS PRODUCED WITH CHEMICAL ADMIXTURES INCLUDING POLYCARBOXYLATE, SODIUM BENZOATE BASED RAW MATERIAL AND WATER PREPARED IN THE LABORATORY"
15:30-15:45	A. Özmutlu: "VIBRATION PROBLEM OF HOMOGENEOUS DOUBLY TAPERED ROD WITH SYMMETRICALLY VARIABLE DEPTH"
15:45-16:00	**Coffee Break**
16:00-17:30	**5th session (oral talks) Chair: Prof. Dr. Huriye İcil**
16:00-16:15	Y. Keşkek Karabulut, Y. Yalçın Gürkan: "INVESTIGATION OF ECOTOXICOLOGICAL PROPERTIES OF SOME AZO DYES BY OECD QSAR METHOD"

16:15-16:30	N. Akkurt: "HYDROGEN BONDING FORMATION FROM THE MIXTURE OF 2,4,6-TRIPHENOXY-1,3,5-TRIAZINE AND 4-N-ALXOXY BENZOIC ACID"
16:30-16:45	M. Arslan: "SYNTHESIS OF NOVEL BIO-BASED BENZOXAZINES AND COMPARISON OF ROP TEMPERATURES"
16:45-17:00	S. Altınışık, S. Koyuncu: "SYNTHESIS AND CHARACTERIZATION OF VIOLOGEN BASED COVALENT ORGANIC FRAMEWORK"
17:00-17:15	H. Kayı, E. Uyanık: "EFFECT OF CHALCOGEN ATOMS ON THE SEMICONDUCTIVE PROPERTIES OF CHALCOGENDIAZOLOQUINOXALINE-CONTAINING POLYMERS"
17:15-17:30	E. Pelit: "SYNTHESIS OF HETEROCYCLIC COMPOUNDS IN AQUEOUS MEDIUM UNDER ULTRASONIC IRRADIATION METHOD"
17:30-17:45	S. Iqbala, M. Fakhar-e-Alam, M. Shafiq, W. A. Farooq: "APPLICATIONS OF NANOMATERIALS FOR THE DIAGNOSIS OF CANCER"
17:45-18:00	S. Mansouri: "PENTACANE BASED ON THIN FILM ORGANIC PHOTOTRANSISTOR"
18:00-19:00	**Poster Session**

PROGRAMME **16 SEPTEMBER 2022 (FRIDAY)** **HALL 1**	
09:30-10:30	**6th session (oral talks) Chair: Prof. Dr. Sermet Koyuncu**
09:30-10:00	**Invited Talk-3: Prof. Dr. Ceylan Zafer: "NEW APPROACHES TO IMPROVE THE STABILITY AND EFFICIENCY OF PEROVSKITE SOLAR CELLS"**
10:00-10:15	A. Aktaş, S. Koyuncu: "PREPARATION OF NOVEL CONJUGATED PENTAMER THIN FILMS VIA ELECTROSPINNING"
10:15-10:30	D. Uzun, H. İcil: "APPLICATIONS OF PERYLENE DIIMIDES IN PHOTOINDUCED ELECTRON TRANSFER REACTIONS AS ELECTRON ACCEPTOR"
10:30-11:00	**Coffee Break**
11:00-12:30	**7th session (oral talks) Chair: Assoc. Prof. Dr. Nurdan Kurnaz Yetim**
11:00-11:15	B. Turanli: "SYSTEMS BIOLOGY PERSPECTIVE FOR ELUCIDATION OF SECRETED PROTEIN BIOMARKERS IN ALZHEIMER'S DISEASE"
11:15-11:30	E. Hasanoğlu Özkan, N. Kurnaz Yetim, M. İnan, M. M. Koç: "PREPARATION OF GOLD DOPED MAGNETIC BIONANOCOMPOSITE MATERIAL FOR THE DETECT THE PRESENCE OF ENVIRONMENTAL POLLUTANTS"
11:30-11:45	S. Soyel, S. Övez, H. İcil: "TREATMENT AND PESTICIDAL ACTIVITY ASSESSMENT OF OLIVE MILL WASTEWATER BY IMIDE INVOLVED PHOTOOXIDATION PROCESS"
11:45-12:00	G. B. Kaynarca, Ş. Yanardağ Karabulut, H. Şanlıdere Aloğlu: "PRODUCTION AND STANDARDIZATION OF LYOPHILIZED HONEY"
12:00-12:15	H. G. Ağca Küçükaydın, B. Çetin: "INVESTIGATION OF PULSED ELECTRIC FIELD APPLICATION IN FRUIT JUICES: AN CHOKEBERRY FRUIT EXAMPLE"
12:15-12:30	H. G. Ağca Küçükaydın, B. Çetin: "FOOD SECURITY AND DIGITALIZATION IN TURKEY AND IN THE WORLD"
12:30-13:30	**Lunch**
13:30-15:30	**8th session (oral talks) Chair: Prof. Dr. Dilek Nartop**
13:30-14:00	**Invited Talk-4: Prof. Dr. Huriye İcil: "A NEW PERYLENE NAPHTHALENE-CHITOSAN-BASED FLUORESCENT AND ELECTROACTIVE POLYMER WITH A COMB-LIKE STRUCTURE"**

14:00-14:15	F. Kurşun Baysak, M. Arslan, C. Özcan: "REJECTION OF SOME METALS WITH DIFFERENT MEMBRANES by PERVAPORATION METHOD"
14:15-14:30	Ç. Kurşun, E. Hasanoğlu Özkan, M. Akkurt, N. Kurnaz Yetim, C. Özcan: "DETERMINATION OF Cr(III) AND Cr(VI) IONS USING MAGNETIC DENDRIMER AS ADSORBENT FOR SOLID PHASE EXTRACTION BY ATOMIC ABSORPTION SPECTROSCOPY"
14:30-14:45	O. Özcan, Ö. Taşpınar: "LEAD ADSORPTION MECHANISM ON NANO-STRUCTURED CALCIUM SILICATE, ACTIVATED CARBON, AND RICE HULL ASH"
14:45-15:00	A. Abourajab, S. Koyuncu, H. İcil: "A WATER-SOLUBLE NDI DERIVATIVE AS A DETECTOR FOR HEAVY METAL CATIONS"
15:00-15:15	E. Doğru, B. Kızılduman, H. İcil: "XRD AND SEM CHARACTERIZATION OF ARCHAEOLOGICAL LATE BRONZE AGE FINDINGS
15:15-15:30	E. Dagasan Bulucu, M. E. Palaz: "MORPHOLOGICAL CHARACTERIZATION OF AL BASED HYBRID COMPOSITE POWDERS VIA MECHANICAL ALLOYING"
15:30-15:45	**Coffee Break**
15:45-18:30	**9th session (oral talks) Chair: Prof. Dr. Hatice Öğütcü**
15:45-16:00	A Z. Macit, H. Öğütcü, E. Hasanoğlu Özkan, D. Nartop: "ANTIMICROBIAL EVALUATION OF SOME NOVEL POTENT BIOACTIVE COMPOUNDS"
16:00-16:15	Ö. Cesur, S. Erdoğan, H. B. Özalp: "EXTRACTION AND CHARACTERIZATION OF ANIMAL-DERIVED NANOCRYSTALLINE CELLULOSE FROM TUNICATE Phallusia mammillata (Cuvier, 1815)"
16:15-16:30	A. Z. Macit, D. Nartop, H. Öğütcü: "SYNTHESIS OF NOVEL THIAZOLE-BASED THIOSEMICARBAZONES AS POTENTIAL ANTIBACTERIAL AND ANTIFUNGAL AGENTS"
16:30-16:45	M. Dönmez, M. Türkyılmaz: "SYNTHESIS OF PINCER TYPE CARBENES AND THEIR SILVER(I) COMPLEXES WITH CYCLOPHANE STRUCTURE, ELUCIDATION OF THEIR STRUCTURES, AND ANTIMICROBIAL AGENT PROPERTIES"
16:45-17:00	N. Kurnaz Yetim, E. Hasanoğlu Özkan, H. Öğütcü: "ANTIMICROBIAL ACTIVITIES AND CATALYTIC DEGRADATION OF METHYLENE BLUE BY Co_3O_4 NANOPARTICLES"
17:00-17:15	S. Duman: "ECO-FRIENDLY DEHYDROGENATION OF DIMETHYLAMINE-BORANE CATALYZED BY MNPs@CELLULOSE"
17:15-17:30	S. Duman: "GREEN APPROACHES TO DEHYDROGENATION OF DMAB CATALYZED BY STARCH STABILIZED Ru(0), Cu(0) AND Ni(0) NANOPARTICLES"
17:30-17:45	S. Adıgüzel, S. Altuntaş: "FABRICATION OF PS: PANI SERS SUBSTRATES FOR DETECTION OF HUMAN SERUM COMPONENTS"
17:45-18:00	G.Karabulut, N. Beköz Üllen: "SYNTHESIS OF ULTRASOUND ASSISTED GREEN SILVER NANOPARTICLES AND COATING ON 316L STAINLESS STEEL WITH AIRBRUSH SPRAY TECHNIQUE"
18:00-18:15	G. Karabulut, N. Beköz Üllen, S. Karakuş: "CHEMICAL, MORPHOLOGICAL, AND STRUCTURAL CHARACTERISTICS OF PEGYLATED MATCHA COPPER OXIDE NANOPARTICLES"
18:15-18:30	Y. Azizian-Kalandaragh, J. Farazin and G. Pirgholi-givi: "PREPARATION AND OPTICAL CHARACTERIZATION OF CdS/ZnS-POLYMER SUPERLATTICE NANOCOMPOSITES"
18:30	**Award Ceremony**

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PROGRAMME
16 SEPTEMBER 2022 (FRIDAY)
HALL 2

09:30-10:30	**10th session (oral talks) Chair: Asst. Prof. Ufuk Paksu**
09:30-09:45	B. Uslu, S.E. Bayer Keskin: "RESONANCE FREQUENCY PREDICTION OF PATCH ANTENNA OPERATING IN WI-FI 6E STANDARD WITH LONG SHORT TERM MEMORY"
09:45-10:00	C. Güler, S.E.Bayer Keskin: "A COMPACT AND LOW PROFILE DUAL-BAND ANTENNA WITH 5G FOR INTERNET OF THINGS APPLICATIONS"
10:00-10:15	T. B. Alakuş: "PREDICTION OF SOFTWARE FAULTS WITH BILSTM DEEP LEARNING MODEL"
10:15-11:00	**Coffee Break**
11:00-12:15	**11th session (oral talks) Chair: Assoc. Prof. Dr. Cemile Özcan**
11:00-11:15	E. A. Kaçar, A. T. Keskintaş, S. Altuntaş: "DESIGNING OF PERSONALIZED PANCREATIC ADENOCARCINOMA MICROENVIRONMENT: AN EXTRACELLULAR MATRIX ANALYSIS"
11:15-11:30	M. Karameşe, S. Altuntas: "MALIGNANT PANCREATIC ADENOCARCINOMA CELLS-TARGETED LIPOSOME-LIKE PARTICLES: A TARGETED DRUG DELIVERY APPLICATION"
11:30-11:45	S. Kugu, S. Altuntas: "INVESTIGATION OF SIZE AND VIABILITY CORRELATION OF THE 3-DIMENSIONAL MICROTISSUES FOR DRUG SCREENING"
11:45-12:00	E. B. Yavuz, H. Sarı, F. K. Baysak, M. Ç. Demir: "APPLICATION OF PHTHALOCYANINE COMPOUNDS IN TRANSDERMAL DRUG RELEASE SYSTEMS"
12:00-12:15	S. Durna Daştan, T. Daştan: "INVESTIGATION OF IN VITRO BIOLOGICAL ACTIVITIES OF BEE POLLEN SAMPLES OF SİVAS PROVINCE IN ANATOLIA"
12:30-13:30	**Lunch**
13:30-15:15	**12th session (oral talks) Chair: Asst. Prof. Macide Cantürk Rodop**
13:30-13:45	S. Aközcan, S. Özden: "STUDY OF COOLING SYSTEMS OF NEW GENERATION NUCLEAR REACTORS"
13:45-14:00	N. Zaim, D. Hatipoglu: "EXPERIMENTAL INVESTIGATION OF GAMMA RADIATION ATTENUATION COEFFICIENTS FOR KIRKLARELİ MARBLE"
14:00-14:15	S. Özden: "DETERMINATON OF ^{137}Cs ACTIVITY CONCENTRATIONS IN TOPSOIL SAMPLES FROM SOUTH-CENTRAL REGION OF TURKEY"
14:15-14:30	F. Tezcan, S. Aközcan: "INDOOR RADON CONCENTRATIONS IN DWELLINGS OF UZUNKÖPRÜ/EDİRNE (TÜRKİYE)"
14:30-14:45	O. Arkoc: "GEOCHEMICAL ASSESSMENT OF SURFACE AND GROUNDWATER IN AND AROUND KIRKLARELİ PROVINCE"
14:45-15:00	U. Paksu: "INVESTIGATION OF DOSIMETRIC PROPERTIES OF COLORED PAPER SAMPLES USING ELECTRON SPIN RESONANCE (ESR) TECHNIQUE"
15:00-15:15	H. H. Karayer, D. Demirhan: "EXACT ANALYTICAL SOLUTION OF SCHRODINGER EQUATION FOR NONCENTRAL MODIFIED RING-SHAPED OSCILLATOR POTENTIAL"
15:15-15:30	**Coffee Break**
15:30-18:30	**13th session (oral talks) Chair: Assoc. Prof. Dr. Orhan Arkoç**
15:30-15:45	H. Şen: "USABILITY OF MEDICAL TEXTILES WITH PREPREG COMPOSITE TEXTILES"
15:45-16:00	H. Şen: "USABILITY OF SPORTS AND LEISURE TIME (RECREATION) TECHNICAL TEXTILES WITH PREPREG COMPOSITE TEXTILES"

16:00-16:15	N. Becenen, E. Karaman: "COMBINED MERCERISING MACHINE FOR DENIM FABRICS AND ITS ADVANTAGES"
16:15-16:30	M. Çakır, E. Akın, B. Berberoğlu: "URETHANE ACRYLATE AND SILICON ACRYLATE CONTAINING NOVEL EPOXY ACRYLATE SYSTEMS FOR 3D SLA PRINTERS"
16:30-16:45	M. Çakır, E. Akın, B. Berberoğlu: "PREPERATION AND CHARACTERIZATION OF NOVEL MODIFIED GRAPHENE OXIDE REINFORCED NANOCOMPOSITE MATERIALS BY SLA 3D PRINTER"
16:45-17:00	M. M. Koç, N. Kurnaz Yetim, E. Hasanoğlu Özkan: "SYNTHESIS OF MOLYBDENUM AND TUNGSTEN NANOPARTICLE DOPED MAGNETIC DENDRIMERS AND THEIR USE IN THE DETERMINATION OF PNP"
17:00-17:15	A. Dere, F. Yakuphanoğlu: "BLACK CARBON DOPED COPPER PHTHALOCYANINE OPTICAL MATERIALS"
17:15-17:30	F. Ünal: "OPTICAL PROPERTIES OF GaZnO METAL OXIDE SEMICONDUCTOR THIN FILM"
17:30-17:45	B. Coşkun: "SILICON BASED PHOTODETECTOR ANALYSIS"
17:45-18:00	S. Aktaş, M.Ş. Kurt, F. Ünal, B. Coşkun: "OPTICAL PROPERTIES OF ZnAlO THIN FILMS PRODUCED BY ONE STEP ELECTROCHEMICAL DEPOSITION METHOD"
18:00-18:15	S. Durna Daştan, T. Daştan: "A STUDY ON THE ANTIOXIDANT, ANTIMICROBIAL AND CYTOTOXIC ACTIVITY OF ROYAL JELLY SAMPLES FROM SİVAS CITY"
18:15-18:30	R. O. Ocaya, F. Yakuphanoğlu: "ORGANIC SEMICONDUCTOR PHOTOSENSORS"
18:30	**Award Ceremony**

NEM 2022

2nd INTERNATIONAL NATURAL SCIENCE, ENGINEERING AND MATERIAL TECHNOLOGIES CONFERENCE

Sep 15-17, 2022, İğneada-Kırklareli/TÜRKİYE

POSTER PROGRAMME

15 SEPTEMBER 2022 (THURSDAY)

PP101	A. Ulubey: "FIRST PRINCIPLE STUDIES OF SURFACE PHONON MODES IN GeSe LAYERED CRYSTAL"
PP102	D. Ç. Tunç, E. Dündar, E. A. İpek, H. Toros, A. Ulubey: "EVALUATION OF AIR QUALİTY IN ESKİSEHİR"
PP103	H. Öğütcü, M. Güler: "DETERMINATION OF RESISTANCE TO COBALT ($CoCl_2$) HEAVY METAL OF PLANT PROBIOTIC BACTERIA TO BE USED AS BIOLOGICAL FERTILIZER IN AGRICULTURE"
PP104	T. Dedecan, N. Baylan, İ. İnci: "ANTI-ULCER AGENT LANSOPRAZOLE REMOVAL FROM WATER USING BISMUTH OXIDE NANOPARTICLES: A SYNTHESIS, CHARACTERIZATION AND ADSORPTION STUDY"
PP105	T. Dedecan, N. Baylan: "ALUMINUM OXIDE NANOPARTICLES AS A NOVEL ADSORBENT FOR BIOREFINERY CONTEXT: SYNTHESIS AND APPLICATION FOR CITRIC ACID REMOVAL"
PP106	E. Hasanoğlu Özkan, N. Kurnaz Yetim, H. Öğütcü: "PREPARATION of ZINC-CONTAINING MICROFLOWERS with DIFFERENT MORPHOLOGIES USING HYDROTHERMAL SYNTHESIS & INVESTIGATION of THEIR USABILITY as ANTIMICROBIAL AGENTS"
PP107	Ş. Korkmaz, N. Kurnaz Yetim, M. M. Koç, C. Özcan: "MAGNETIC SOLID PHASE EXTRACTION OF Fe_3O_4 DOPED NANOFLOWERS FOR ENRICHMENT OF HEAVY METAL IONS"
PP108	E. A. Berberoğlu, M. M. Koç, N. Kurnaz Yetim, C. Özcan: "RECOVERY OF Cr(VI) AND Cd(II) IONS BY SOLID PHASE EXTRACTION USING Co_3O_4 NANOFLOWERS"
PP109	H. M. Alishah, F. P. Choi, C, Kahveci, T. Demirbay, S. Güneş, M. Cantürk Rodop: "THE EFFECT OF QUERCETIN ON THE PERFORMANCE AND STABILITY OF PEROVSKITE SOLAR CELLS"
PP110	A. Kurt, M. Koca: "THERMAL DEGRADATION KINETICS OF A NEW PYRAZOLE DERIVED METHACRYLATE POLYMER, POLY (1,3-DIPHENYL-1H-PYRAZOL-5-YL METHACRYLATE)"
PP111	A. Kurt, M. Koca: "SYNTHESIS, CHARACTERIZATION AND THERMAL DECOMPOSITION KINETICS OF A NOVEL PYRAZOLE BASED COPOLYMER SYSTEM: POLY(1,3-DIPHENYL-1H-PYRAZOL-5-YL METHACRYLATE-CO-STYRENE)"
PP112	E. Pelit, C. Özcan, N. Akkurt: "SYNTHESIS OF NEW HETEROCYCIC COMPOUNDS AND EVALUATION OF THEIR ANTIOXIDANT ACTIVITIES"
PP113	C. Kahveci, F. P. Choi, H. M. Alishah, T. Demiray, M. Cantürk Rodop: "THE EFFECT OF DOPING OF PEDOT: PSS ON THE PERFORMANCE OF PEROVSKITE SOLAR CELLS"

INVITED SPEAKERS

ORAL PRESENTATIONS

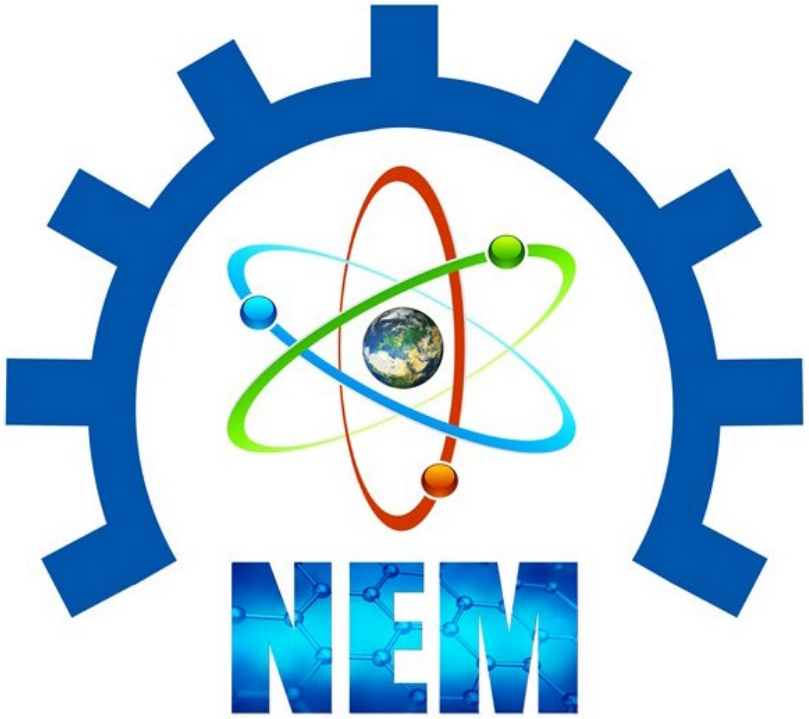
ORAL PRESENTATIONS

ORAL PRESENTATIONS

ORAL PRESENTATIONS

ORAL PRESENTATIONS

POSTER PRESENTATIONS



INVITED TALKS

RECENT ADVANCES IN PEROVSKITE SOLAR CELLS

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Perovskite solar cells provide promising solutions for producing light weight, flexible and cost effective solar panels. It has been demonstrated that they can have high efficiencies as much as 25.8 % [1], which makes them competitive with silicon solar cells of today's leading PV technology in the PV market. Higher efficiencies were also achieved by combining silicon solar cells with perovskite solar cells in the tandem structure leading to power conversion efficiencies (PCE) of 29.1 % [2]. With this rapid increase in their PCEs perovskite solar cells drew worldwide attention by both scientists and the investors. However, despite their high efficiencies, stability problems are experienced and the lifetime of the devices is shortened due to their sensitivity to oxygen and humidity or the structural properties of perovskite materials.

In this study, recent advances in perovskite solar cell research will be reviewed. On the other hand, scientific results on the performance and stability of p-i-n type perovskite solar cells fabricated at Organic Electronics Laboratory of Yildiz Technical University will be presented.

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A NEW PERYLENE–NAPHTHALENE–CHITOSAN-BASED FLUORESCENT AND ELECTROACTIVE POLYMER WITH A COMB–LIKE STRUCTURE

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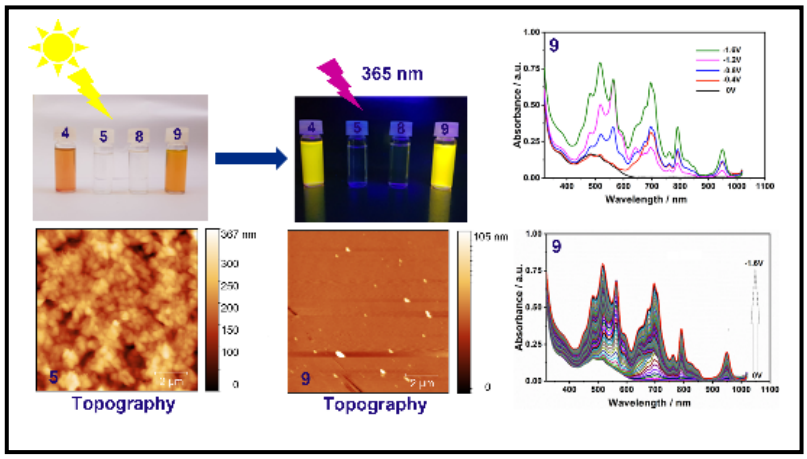
Perylene and naphthalene diimide (PDIs, NDIs) containing molecules and polymers with excellent photochemical, electrochemical, and thermal stabilities have attracted more attention due to their strong fluorescence quantum yields in solutions. They show solid electron-withdrawing ability besides their high photochemical activity and strong luminescent characteristics [1].



On the other hand, chitosan is a distinguished polymer with excellent environmental acceptability and non-corrosiveness. Unfortunately, its poor solubility in water and organic solvents reduces chitosan polymer's chemical reactivity. The modification of chitosan polymer is straightforward due to the presence of hydroxyl and aliphatic amino groups in its structure, which can also help overcome this problem [1] .

In this study, we aimed to produce a novel chitosan polymer with fluorescence, stable, electroactive and conductive properties for potential applications in photonic technology. We selected *N*-(4-hydroxyphenyl)-3,4,9,10-perylenetetracarboxylic-3,4-anhydride-9,10-imide and *N*-(4-hydroxyphenyl)-1,4,5,8-naphthalenetetracarboxylic-1,8-anhydride-4,5-imide to synthesize a Comb-like chitosan polymer. The weight-average molecular mass (M_w) of 19800 g/mol was obtained for the polymer. The fluorescence quantum yield efficiencies for the polymer are very high in all studied solvents. Notably, the polymer showed five stepwise, fast, reversible one-electron reductions in electrochemical investigations. In detail, we have studied the polymer's photophysical, thermal, electrochemical, spectroelectrochemical, and morphological properties. Conclusively, the new polymer has the potential to apply in various photonic applications.

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ORAL PRESENTATION

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.

BANDGAP TUNING AND STRONG BLUE-GREEN BAND EMISSIONS OF SOL-GEL SYNTHESIZED ZnO FILMS BY HIGH Cu DOPING

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Undoped and Cu doped ZnO thin films onto glass substrates with different Cu doping concentrations (0.0%, 0.8%, 3.0%, 5.0%, 10.0% and 20.0%) have been synthesized using sol-gel spin coating technique. The XRD patterns show that undoped and Cu doped ZnO films crystallized in hexagonal wurtzite structure. The films have the strongest reflection at (002) plane indicating preferential orientation along the c-axis. The absorption spectrum recorded the fundamental absorption edge and it gradually exhibits redshift with the increase of Cu concentrations. All prepared films showed a high transmittance above 70% in the visible region. The energy gap Eg for undoped ZnO films was found to be 3.239 eV and showed a little increase to 3.248 eV after doping with 0.8% Cu concentration and is attributed to Burstein-Moss shift. However, with further increase of Cu doping concentration in ZnO films, the energy gap Eg is decreased from 3.248 eV to 3.107 eV for 20% Cu doping concentration. This decrease is due to the creation of different impurity levels in the forbidden energy region in ZnO lattice which act like recombination centers and this leads to band gap narrowing. The Urach energy is increased as Cu doping concentration increased; the increase in the amount of Eu indicates the disorder of the films, due to the presence of defects and impurities in the film structure with increasing Cu doping concentration. The photoluminescence (PL) emission spectra of the films show ultraviolet (UV) and blue-green band emissions. The UV peak intensities are decreased with increasing Cu doping concentration and the blue peaks intensities are increased with the increase of Cu concentration. These results show that Cu doped ZnO films are suitable for applications in different blue emission devices.

ORAL PRESENTATION

THE ENERGY STATES IN $Ga_{1-x}Al_xAs/GaAs$ QUANTUM WELL WIRE LATTICE UNDER THE EFFECT OF EXTERNAL ELECTRIC FIELD

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In the lattice consisting of three quantum wires, the effect of the external electric field applied on the energy states of the electron is the focus of this study. The energy states and wave functions of the electron were calculated using the finite difference method with the effective mass approach It was found that the energy states exhibit different behavior when the diameters of the quantum wires are considered as the same and different. When an electric field was applied to both quantum wire lattices, the electron's energy states showed interesting changes.

SYNERGETIC EFFECTS OF MXENE AND MN-DOPED ZNO ELECTRODES FOR ALL-IN-ONE SUPERCAPACITORS

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Here in we report the development of high-performance supercapacitor devices by using manganese-doped Zinc oxide nanowires (Mn-ZnONW) and MXene as electrode material which will help to increase supercapacitor application in the energy storage market. Mn-doped ZnO samples has intrinsic and extrinsic defect signal which was analyzed by Electron paramagnetic resonance spectroscopy (EPR) and photoluminescence spectroscopy (PL), presence of these defects increase the overall synergy between the components of supercapacitor device which leads to enhanced performance of our supercapacitor. Mn-doped ZnO material when used in combination with MXene as a second electrode increases the device capability even further as MXene offered high conductivity and high surface area. The electrochemical result of the assembled supercapacitor when measured by techniques like Cyclic voltammetry, impedance spectroscopy, and Galvanostatic charge-discharge showed some very encouraging results to further pursue this direction.

UTILIZATION OF PIEZOELECTRIC EFFECT IN ZINC OXIDE NANOWIRES AS A NANOGENERATOR

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Zinc oxide (ZnO) holds a special stature in materials for energy applications due to its phenomenal properties. The wide range of ZnO morphologies enables a wide range of applications such as nanogenerators, sensors, dilute magnetic semiconductors (DMS), light-emitting diodes (LED), and many others. Synthesis techniques of high aspect ratio ZnO nanowires (NW) have been thoroughly studied in the past decade for high piezoelectric properties products. This work provides an addition to the vast research of ZnO NWs synthesis by the microwave-assisted hydrothermal method owing to its advantages of high-quality NWs product, simplicity, and rapidness. ZnO NWs synthesized by the microwave-assisted method are analyzed by spectroscopic techniques to gain an understanding of the defective structure of ZnO. The intrinsic and extrinsic defective structure of ZnO NWs is analyzed by electron paramagnetic resonance (EPR) spectroscopy, introduced into the structure by the controlled manipulation of the nano-structure, or doping with transition metal ions (TMI) such as Mn. The outcome is optimizing the process of producing ZnO NWs with a high piezoelectric coefficient up to 20 pC/N.

INVESTIGATION OF ASYMMETRIC HYBRID SUPERCAPACITOR BASED ON MORPHOLOGY OF ZINC OXIDE ELECTRODE MATERIALS FOR HIGH ENERGY SUPERCAPACITORS

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Supercapacitors are highly attractive for a large number of emerging mobile devices for energy storage and harvesting issues. Here, we present a summary of the recent developments in supercapacitor research and technology, including all kinds of supercapacitor design techniques using various electrode materials and production methods. It also covers the current progress achieved in novel materials for supercapacitor electrodes. The latest produced EDLC, Hybrid, Pseudo supercapacitors have also been described. Metal oxides, specifically ZnO, used as electrode materials with different morphologies are in focus here. The ZnO nanostructures were synthesized in the form of nanoparticles, nanoflowers and nanourchins. Structural, electronic and optical characterization of the samples were done via standard techniques such as XRD, SEM, Photoluminescence, Raman and UV-Vis spectroscopy. The point defect structures which are specific to each morphology has been investigated in terms of their concentration and location via state of art EPR spectroscopy. According to core-shell model the samples all revealed core defects however the defects on the surface smeared out. Finally, all three morphology has been tested as electrode material in a real supercapacitor device and the performance of the device, particularly the specific capacitance and the storage mechanism has been mediated by the point defects. Morphology dependent defective ZnO electrode enable to monitor the working principle of supercapacitor device from EDLC to pseudosupercapacitor.

ORAL PRESENTATION

PIEZOELECTRIC BEHAVIOR OF BOROCARBONITRIDES

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Borocarbonitrides ($B_xC_yN_z$) is a new family of two-dimensional materials derived from graphene and hexagonal boron nitride structures. Although there are many studies about their synthesis, structural and electronic properties, there is a lack of information about their piezoelectric capabilities in the literature. This study is aimed to investigate the piezoelectric behaviors of twenty different borocarbonitride formations via ab-initio calculation technics. Density functional theory-based calculations were performed to investigate the electronic, elastic, and piezoelectric properties of these materials. Dynamical stabilities of these materials were investigated via phonon calculations. Effect of the selected functional on piezoelectric stress and strain coefficients, LDA and PBE functionals were used crosswise via finite displacement(FD) and density functional perturbation theory(DFPT) methods. DFPT calculations in which PBE and LDA were used showed that e_{11} and e_{12} piezoelectric stress coefficient results do not affect the selected function. Although FD calculations for e_{12} values give close results to DFPT methods, e_{11} values calculated via this method differ from the other two by %10–30. It was observed that $B_xC_yN_z$ structures are promising piezoelectric materials and their piezoelectricity can be tuned by changing x, y, and z ratios and atomic conformations. The effect of atomic bonding types on the piezoelectric properties of these materials was revealed. The lowest e_{11} and e_{12} piezoelectric coefficients were calculated for the BCN_2 structure, which has an undesired N-N bond. The highest relaxed-ion e_{11} values were calculated for BC_2N structures, 5×10^{-10} C/m. B_2CN structure gives the highest relaxed-ion e_{12} value 5.5×10^{-10} C/m. $B_3C_2N_3$ formations give close results to each other for e_{11} and e_{12} values around 4.5×10^{-10} C/m. Our calculations reveal that $B_xC_yN_z$ structures are strong candidates for future atomically thin piezoelectric applications.

This research has been supported by Kütahya Dumlupınar University Scientific Research Projects Coordination Office under grant number 2021-01.

DIRECTIONAL ASSOCIATED CURVES OF A PSEUDO NULL CURVE VIA BISHOP FRAME IN LORENTZ 3-SPACE

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In this study, the directional associated curves of a pseudo null curve have been investigated according to Bishop frame in Lorentz-Minkowski 3-space. The relational equations have been obtained between the curvature functions of the pair donor-associated curves and the distance function. Further an answer has been sought for the question: does a self-associated curve of a pseudo-null curve via Bishop frame exist or not in Lorentz-Minkowski 3-space.

Keywords: Directonal associated curve, pseudo null curve, Bishop frame, Lorentz space.

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SPINOR B-DARBOUX EQUATIONS IN EUCLIDEAN 3-SPACE

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In this study, spinor representations of the curves on surfaces have been expressed via B-Darboux frame in Euclidean space E^3. The relation between Darboux and B-Darboux frame has been established according to their spinor formulations. Moreover, all these spinor characterizations have been interpreted in the meaning of Darboux frame (via the curvatures) in Euclidean 3-space. Finally, an application has been presented about the characterizations of the relations between the B-Darboux frame and the spinors.

Keywords: Clifford algebra, Spinors, Bishop-Darboux frame, Darboux frame.

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NUMERICAL SIMULATION OF ELECTROMAGNETIC WAVE AND CONCRETE INTERACTION AND DETERMINATION OF SCATTERING PARAMETERS

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The simulation of the interaction of electromagnetic waves with a medium whose geometric and material properties are known is called a forward problem. A numerical simulation scheme called the Finite Difference Time Domain (FDTD) technique is used to solve the forward problem. The FDTD technique involves the numerical solution of the time dependent Maxwell's curl equations, which can be written in differential form for an isotropic, homogeneous, and non-magnetic material. By incorporating the electromagnetic properties of the medium interacting with the electromagnetic wave and applying appropriate initial and boundary conditions, a uniform solution of the forward problem can be obtained using curl equations for a given excitation source [1]. Gaussian waveform is used as an excitation source in the simulations. The advantage of using a Gaussian waveform is the ability to simultaneously perform multiple frequency experiments in a time domain simulation. Since the expression of the wave equations is in free space, it is assumed that the propagation of the wave continues to infinity. The simulation of the infinite wave is not possible numerically, therefore the interaction of electromagnetic wave and material is truncated after a certain computation step [2-3].

To characterize the interaction of concrete samples with electromagnetic waves, scattering parameters (also known as S-parameters) need to be obtained. The FDTD numerical approach is used to determine the electromagnetic properties of concrete samples and many different material types. By using the FDTD algorithm, the scattering parameters are calculated and the concrete sample and the different mediums (such as rebar, air, void) that can be found in the concrete sample are determined [3].

Acknowledgments: The authors acknowledges financial support the KLU-BAP under the Project Number 224

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KIRKLARELI UNIVERSITY EDUCATION INFORMATION PACKAGE AND ITS DEVELOPMENT PROCESS

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Universities in Turkey have established and are using Information Package web applications in accordance with the Bologna Process for a while. In these packages, it offers information such as department information, course contents and learning outcomes. In recent years, the Quality Assurance System has gained importance, and learning outcome based applications have begun to be developed for the sustainability of quality in Higher Education.

Within this scope, the Education and Teaching Evaluation System was developed within Kırklareli University, and afterwards, it was necessary to develop the Education Information Package application in order for the developed system to work efficiently. In this study, information is given about the situations that require the development of the Information Package, the advantages it brings and the development process.

REAL-TIME HUMAN DETECTION FOR UNMANNED AERIAL VEHICLES

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The use and importance of unmanned aerial vehicles (UAV - Unmanned Aerial Vehicle) is constantly increasing. With the developing technology, there is a new development in the use of these tools in many areas of life, such as military research, agricultural applications, disaster management, large-scale map making. Due to these developments, there is an increase in both quality and quantity of aerial images.

Using images taken from unmanned aerial vehicles, one of the most important needs for detecting objects, people, etc. and follow-up studies is to create high quality and large data sets. In order to meet the aforementioned need, the human detection and recognition process was carried out by transferring information from the Convolutional Neural Network, which was trained with a data set with a proven training success. The images taken from the unmanned aerial vehicle are taken from high and the images of objects and people are taken as a bird's eye view. This makes it difficult to recognize objects and to process these large images in real time. In this study, the 'You Only Look Once' YOLO-V5 algorithm was used in the research, since it is very fast in real-time data processing. Another difficulty we face in processing images taken from an unmanned aerial vehicle is the detection of small and distant objects, as they are represented by a small number of pixels. In order to overcome this difficulty, the SAHI 'SLICING AIDED HYPER INFERENCE AND FINE-TUNING FOR SMALL OBJECT DETECTION' algorithm, which is compatible with YOLO-V5, has been used, and the performance has been increased with the use of this algorithm.

USING MULTI-CRITERIA DECISION MAKING APPROACH IN INTERNET OF THINGS APPLICATIONS: A BIBLIOMETRIC ANALYSIS

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This study aims to provide a bibliometric analysis of using multi-criteria decision making approach in internet of things applications. 105 articles were collected through Scopus. Articles published after 2021 and non-English articles were not included in the study.

The first article in the related field was published in 2013. However, only 4 articles were published in the first 5 years. On the other hand, the articles published in the last 2 years constituted 71% of the current literature. Therefore, interest in this topic has been increasing in recent years and 57% of all articles were in the subject area of Computer Science.

Meanwhile, the most cited article was "Internet of Things (IoT) and Its Impact on Supply Chain: A Framework for Building Smart, Secure and Efficient Systems" published in 2018. In the study, a smart and secure supply chain management system was proposed by applying the internet of things. DEMATEL and AHP were presented in neutrosophic environment to effectively deal with vague, uncertain and incomplete information.

The country that published the most articles was India (23% of all articles). 71% of these were published by researchers affiliated with institutions only in India, and the remaining articles were made in partnership with researchers affiliated with institutions in countries such as China, Saudi Arabia, and United Kingdom. On the other hand, the journals in which the articles were published, the researchers who published the articles and the institutions to which these researchers were affiliated varied. Moreover, the most recurring words were Internet of Things, Decision Making, and Multi-Criteria Decision Making. In addition, VOSviewer software was used for constructing and visualizing bibliometric networks.

In conclusion, this study summarizes the current literature on IoT applications using multi-criteria decision-making approach. We believe that it will guide future researchers to see trends, gaps and opportunities in the related field.

MOVEMENT CLASSIFICATION WITH THE USE OF ARTIFICIAL INTELLIGENCE

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Electromyography is the measurement of the bioelectrical signals produced by the muscles and can be used to evaluate the movements of body parts. There are a lot of studies and commercial products which utilize the correlation between the EMG signal and muscle movement. Some of these studies utilize very advanced mathematical methods but stay on theoretical plain [1]. These mathematical methods are computationaly heavy therefore are not practically viable. Some practically realised prostheses can only facilitate finite sets of movements, so they lack the necessary flexibility of the natural extremity, and commercial products are too niche and expensive to be used widely [2]. In this study, the aim is to create a cheap, flexible and opensource method which can be used by the amputated individual themselves for facilitating finger movements. For this end, the signal acquisition is made by the Myoware Muscle Sensor Version 2. Four of these sensors are used for the acquisition of the myography signals of flexor digitorum superficialis, flexor carpi radialis, flexor pollicis longus and extensor digitorum muscles. Signal processing and classification are made on the Raspberry Pi 4 Model B. Training and testing of the neural network are made via the Google Colab. Data acquisition is made at 800 samples per second. A fully connected multi layer perceptron which has twenty inputs and four outputs is chosen for the classification process. 20 features, which are; rectified and integrated signal from four channels, moving average of the rectified and integrated signals, root mean square of the raw signals, variance of the raw signals and frequency means of the four channels, are used for the classification. There are 16 classes which consist of four finger movements and their combinations which are binary coded as the outputs of the neural network. Data is taken at 4 sessions and 270.204 data points are recorded. The neural network is trained with the 70% of the data with the learning rate of 0.01 and momentum of 0.5 for 180 epochs. The final loss is 0.0286. The network is tested with the 30% of the data. Test resuts are: 98,51% of mean accuracy, 89.16% of accuracy, 99.7% of maximum sensitivity, 74.12% minimum sensitivity and 89.2% mean sensitivity, 1.9% of maximum selectivity, 0.05% of minimum selectivity and 0.8% of mean selectivity.

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DERIVATION OF PARAMETRIC SURFACES OF THE SWEPT VOLUME FOR AN END MILL IN 5-AXIS CNC MILLING

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5-axis CNC (Computer Numerical Control) milling is usually used to create sculptured surfaces. The tool paths required for the CNC machines are generated, and it is important to check the tool paths before an actual cutting operation because the obtained surfaces may differ from what is desired after cutting. In such a case, the machined part becomes scrap or rework is required. A sculptured surface usually takes hours to create for the CNC machine tools. Therefore, simulation of the milling process before actual cutting is essential. The motion of an end mill in 5-axis milling is defined using two vectors. One is the position vector of the tool control point (usually the tip point of the tool), and the other one is the tool orientation vector. As the tool moves along the defined tool path, it sweeps a volume called swept volume. The created surface is obtained by subtracting the swept volume of the tool from the initial workpiece volume. A swept volume consists of three parts. These are the ingress part, swept envelope, and egress part. In this work, parametric equations of the faces which compose the swept volume have been obtained. A local coordinate system was used for the tool. One axis of this local coordinate system is collinear with the tool orientation vector, another axis is along the perpendicular component of the tool path tangent vector to the tool orientation vector, and the last axis is orthogonal to both axes. An end mill is a cylinder whose surface can be represented by parameterizing a circle along the orientation vector of the tool. Therefore, swept volume of a circle was considered first. Investigation of the swept volume of a circle yields that the some certain points on the circle oriented according to the local coordinate system always coincide with the swept envelope. Then parametric faces of the swept volume were introduced using this relationship. A case study was also presented. As a result, it was shown that the swept volume could be represented fully analytically in 5-axis end milling.

THE EFFECT OF DIFFERENT REAGENTS ON MATERIAL REMOVAL RATE IN MICROMACHINING OF ALUMINUM AND STEEL SURFACES

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The research sheds the light on developing solutions that prevent contact with liquids without reducing the functionality of metal surfaces in all engineering applications for inhibition of corrosion. Since the last century the self-cleaning feature, inspired by the lotus effect plays a significant role in a variety of applications [1]. Surfaces, where the contact angle between the solid surface and the water droplet dripped on it, is greater than 150 ° are super-hydrophobic surfaces. There are different methods in literature to create hydrophilic, oleophobic, hydrophobic and superhydrophobic surfaces, also called smart surfaces. Development of cheaper and easier production methods of superhydrophobic and other intelligent surfaces; has gained economic and functional importance in parallel to technological progress in a broad sectoral area ranging from wind turbine blades to solar panels, food and packaging, automobile, aerospace and defense industries [2]. However, most of those methods have certain limitations. Chemical etching is a simple and cheap method in the fabrication of rough structures on metal surfaces [3].

In this study, by using chemical abrasives consisting of HNO_3, $FeCl_3$, CTAB and HCl; aluminum and steel surfaces have obtained roughness varying in micrometer and nanometer dimensions by chemical etching method. The effects of etching periods and molarities of reagents on these surfaces have been investigated. Samples were chemically etched at certain time intervals. Material Removal Rate (MRR, g/min) values were determined. As a result, it was determined that the highest MRR obtained for Ç1040 and St37 samples were obtained with 2.8M HNO_3, 5M HNO_3, and 5M HNO_3 + $1.2x10^{-3}$M CTAB chemical abrasives, for Al6013 samples with 10M $FeCl_3$ chemical abrasive between 5-35 minutes.

As an extensive research, Surface Roughness (R_a) values will be analyzed and modification processes will be carried out.

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FLOW VISUALIZATION EXPERIMENTS OF STOKES FLOW IN A V-SHAPED CHANNEL

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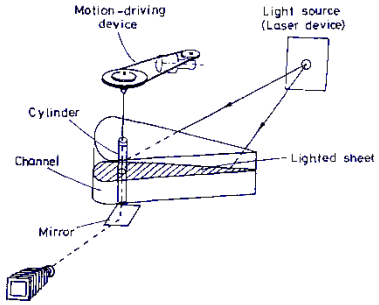
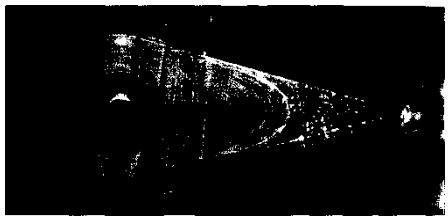
In this work, flow visualization experiments of Stokes flow in a V shaped channel have been performed. Many problems of physical interest involve the flow of fluids at low Reynolds numbers, i.e. Stokes flow. Much work has been devoted the study of cavity flow, to separation phenomena and to viscous cells. The most studied case is naturally a cavity of a rectangular shape. Due to its simple geometry, this problem serves also as a test case for numerical algorithms. This type of flow in which viscous cells occur is important not only from a fundamental point of view, but is encountered in many practical applications. Although the rectangular cavity flow has been investigated extensively, few papers have been published on the subject of the triangular cavity. It is worth to note that triangular cavity is more common in practice than rectangular cavity. Most of them have been published recently. On the other hand, from the experimental point of view, there is very few paper exist in the literature for V-shaped cavities. This is the main motivation to conduct a flow visualization experiment in a V shaped channel. To this end, a special V-shaped channel bounded by a cylindrical surface has been constructed. The sketch of the apparatus constructed to visualize the flow is shown in Figure.



This channel is filled with a highly viscous silicon oil of viscosity v — 300 cm^2/s. The motion is induced by a very slow rotation of a circular cylinder positioned in the channel. Flow visualization experiments have been carried out using solid tracers of magnesium. The purpose of this work is to show the detailed flow structure experimentally in a V-shaped channel. This is realized experimentally by a flow visualization technique. Flow visualization experiments are carried out using solid tracers of magnesium of about 40 µm in length and 4 µm in thickness. They are illuminated by a thin sheet of light coming from a laser device. By means of very long time exposure photography, we obtain the flow visualization photographs. Some quantitative data are deduced from these visualization photographs. The obtained visualization photograph by means of very long time exposure is shown below.



CHAIN TYPE TORQUE TRANSMISSION SYSTEM DESIGN FOR A HYBRID ELECTRIC VEHICLE

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The effects of global warming have led to emission restrictions on land vehicles, and researchers are working hard to reduce the CO_2 production per kilometer of internal combustion engines. This situation brings hybrid vehicles to the forefront and studies in this field are increasingly continuing. Power transmission in hybrid vehicles is basically carried out in three different ways: serial hybrid, parallel hybrid and power split.

In hybrid powertrain systems, the internal combustion engine can either contribute directly to the powertrain or operate independently. The important thing at this point is to ensure that both the internal combustion engine and the electric motor transmit the torque to the gearbox or directly to the wheels without any problems.

In this study, the transmission of torque from the electric motor to the gearbox is carried out with a chain gear mechanism. In this system, instead of the traditional clutch, electromagnetic powder clutch, in which partial clutch and full clutch can be controlled by electronic signals, is used in the transmission of motion from the internal combustion engine to the automatic transmission. In the connection of the electric motor with the gearbox, a one-way clutch is used to transmit the motion independently of the internal combustion engine. With this clutch system, the electric motor is prevented from turning the internal combustion engine and independent power transmission is possible with both clutches.

Keywords: Hybrid, Torque transmission, electromagnetic clutch, one way clutch, chain drive.

THE EFFECT OF USING VARIOUS CONSTRUCTION MATERIALS ON VIBRATION ISOLATION FREQUENCY BAND OF A PERIODIC STRUCTURE

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Traditionally, passive vibration isolation is achieved by using mass-spring type structures. However, as an innovative approach, periodic structures can also be utilized as vibration isolators, as well. This special kind of periodic structures are called phononic band gap structures or elastic metamaterials. These periodic structures can be designed via Bragg Scattering, Local Resonances or Inertial Amplification [1, 2] methods.

In this paper, inertial amplification induced vibration isolation frequency band properties of various periodic structures formed by using different construction materials, are studied. At first, a compliant inertial amplification mechanism is presented. Then, by incorporating three of these mechanisms in a linear sequence, a one-dimensional periodic structure is formed. Finally, by alternating the construction materials of flexure hinge connections and rigid body blocks of the periodic structure, vibration isolation frequency band properties (i.e., band width and band depth) are analyzed, compared with each other and discussed via displacement transmissibility (i.e., frequency response function) plots.

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BUCKLING ANALYSIS OF AXIALLY LOADED NANOBEAMS WITH INTERMEDIATE SUPPORT USING NONLOCAL ELASTICITY THEORY

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In this study, buckling analysis of axially loaded nanobeams with intermediate support is investigated based on nonlocal elasticity theory. In nonlocal elasticity theory, the stress at a point is regarded as a functional of the strain tensor. Unlike the classical elasticity theory, nonlocal elasticity theory takes into account the inter-atomic long-range interactions and nano-scale effects in mechanical analysis of size-dependent materials. Minimum total potential energy formulation has been employed and the approximate Ritz method has been applied to obtain the critical buckling loads of axially loaded cantilever nanobeams with intermediate support. The effect of position of the intermediate support on the critical buckling load has been investigated in detail. Critical buckling loads obtained from the present model have been compared to the classical elasticity solution for different nonlocal scale parameters. Also, mode shapes in critical buckling loads have been presented for various positions of the intermediate support. Present results can be used for the design of carbon nanotube-based structures.

INVESTIGATION OF COMPRESSIVE STRENGTH OF MORTARS PRODUCED WITH CHEMICAL ADMIXTURES INCLUDING POLYCARBOXYLATE, SODIUM BENZOATE BASED RAW MATERIAL, CALCIUM NITRATE, VINYL ACRYLATE MONOMER AND WATER PREPARED IN THE LABORATORY

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In this experimental study, chemical admixtures with 10 different designs were prepared in the laboratory by using polycarboxylate raw material, sodium benzoate based raw material, calcium nitrate, vinyl acrylate monomer and water. The pH values of the chemical admixtures prepared in the laboratory environment were determined. Cement mortar mixtures were prepared using these chemical admixtures. At the same time, a control mortar mixture was produced to compare the results. The percentage of chemical admixtures used in each different mixture in production was 1.2% of the cement weight. CEM I 42.5R Portland cement, tap water, natural sand, crushed sand and chemical admixture were used in the production of cement mortar. In each mortar production, 50% natural sand + 50% crushed sand was used as aggregate. Cement mortar samples were kept in rectangular prism three-chamber molds for 24 hours and then cured in 21 °C water until the compressive strength test. Compressive strength test was applied on 3, 7 and 28 day hardened cement mortar samples. As a result of the study, it was observed that some of the 3-day compressive strength results of the cement mortar samples produced with chemical admixtures were greater than the 3-day compressive strength results of the control mortar samples. Some of the 3-day compressive strength results of the cement mortar samples produced with chemical admixtures were less than the 3-day compressive strength results of the control mortar samples. It was found to be significant that the 7-day compressive strength results of the cement mortar samples with chemical admixtures were generally greater than the 7-day compressive strength results of the control mortar samples. Besides, it was concluded that some of the 28-day compressive strength results of the cement mortar samples produced with chemical admixtures were greater than the 28-day compressive strength results of the control mortar samples. It can be particularly emphasized that since sodium benzoate-based raw material and calcium nitrate are used in chemical admixture designs, they accelerate cement hydration. Therefore, the 3 and 7-day compressive strengths are generally greater than the 3 and 7-day compressive strengths of the control mortar samples.

Keywords: Polycarboxylate, Sodium benzoate, Calcium nitrate, Natural sand, Crushed sand, Compressive strength.

INVESTIGATION OF COMPRESSIVE STRENGTH OF MORTARS PRODUCED WITH CHEMICAL ADMIXTURES INCLUDING POLYCARBOXYLATE, SODIUM BENZOATE BASED RAW MATERIAL AND WATER PREPARED IN THE LABORATORY

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In this experimental study, chemical admixtures with 30 different designs were prepared in the laboratory by using polycarboxylate raw material, sodium benzoate based raw material and water. The pH values of the chemical admixtures prepared in the laboratory environment were determined. Cement mortar mixtures were prepared using these chemical admixtures. At the same time, a control mortar mixture was produced to compare the results. The percentage of chemical admixtures used in each different mixture in production was 1.2% of the cement weight. CEM I 42.5R Portland cement, tap water, natural sand, crushed sand and chemical admixture were used in the production of cement mortar. In each mortar production, 50% natural sand + 50% crushed sand was used as aggregate. Cement mortar samples were kept in rectangular prism three-chamber molds for 24 hours and then cured in 21 °C water until the compressive strength test. Compressive strength test was applied on 3, 7 and 28 day hardened cement mortar samples. As a result of the study, it was observed that the 3 and 7-day compressive strength results of the cement mortar samples produced with chemical admixtures were greater than the 3 and 7-day compressive strength results of the control mortar samples. However, looking at the 28-day results, it was concluded that the 28-day compressive strength results of the control mortar samples were slightly greater than the 28-day compressive strength results of the cement mortar samples with chemical admixtures. It can be particularly emphasized that since sodium benzoate-based raw material is used in chemical admixture designs, it accelerates cement hydration. Therefore, the 3 and 7-day compressive strengths are greater than the 3 and 7-day compressive strengths of the control mortar samples.

Keywords: Polycarboxylate, Sodium benzoate, Natural sand, Crushed sand, Compressive strength test, Compressive strength.

VIBRATION PROBLEM OF HOMOGENEOUS DOUBLY TAPERED ROD WITH SYMMETRICALLY VARIABLE DEPTH

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There is a need to use beams of variable depth in engineering structures such as high-rise buildings, bridges, and machine parts. Vibration problems that may occur during the service life of these structures are essential for safety. Therefore, wave propagation and vibration problems of conical rods and beams have attracted the attention of researchers for many years. In such problems, analytical and numerical solution methods can be preferred depending on the geometry and material properties. Magnucki et al. analyzed the free vibrations of homogeneous beams with symmetrically variable depth and bi-symmetrical cross-section analytically and numerically [1]. Todorovska et al. modeled a high-rise building as a layered truncated pyramid and studied wave propagation through the structure [2]. Šalinić et al. studied both the longitudinal vibration of the bars and the transverse vibration of beams composed of stepped and continuous segments in axially functionally graded conical geometry [3]. Banerjee and Ananthapuvirajah determined the free vibration properties of cone beams of different support types through the analytical solution of the governing equation [4].

This study investigates the longitudinal vibrations of a double tapered rod of homogeneous isotropic and linear elastic material, whose depths vary symmetrically. The rod in the problem under consideration has a cross-section with both lateral dimensions varying linearly and symmetrically in the axial direction. Conical geometry is defined in spherical coordinates; the equation of motion is separated into its variables by accepting the behavior of the rod as harmonic motion and reduced to the Bessel differential equation [5]. The transfer matrix for a truncated conical element is derived using the solution obtained from spherical Bessel functions. Vibration frequencies and mode shapes are obtained using the transfer matrix method with satisfactory boundary conditions when the rod is simply supported at both ends. The results obtained are compared with a homogeneous prismatic bar with the same support conditions and are given with the help of graphs and tables.

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INVESTIGATION OF ECOTOXICOLOGICAL PROPERTIES OF SOME AZO DYES BY OECD QSAR METHOD

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Azo dyestuffs constitute 60-70% of all dyestuffs related to textile production. These are synthetic compounds and make up more than 50% of all dyes produced annually, showing the widest range of colors. Almost all dyestuffs used in the textile industry are azo dyes [1]. While azo dyes meet the needs of people, they also cause ecological changes in hydraulic sources, soil, and atmosphere. The presence of dyes in water causes problems in the body and can hurt public health. They degrade readily under natural conditions and are typically not removed from wastewater by conventional wastewater treatment systems. According to recent studies, aromatic amines transported to consumer products, especially aromatic amines, have been shown to pose a risk to human health due to their toxicological, ecotoxicological, mutagenic, and/or carcinogenic properties [2]. OECD QSAR Toolbox is software designed to support the hazard assessment of chemicals and efficiently evaluate mechanical and other information about chemicals cost-effectively. As a freely available computational tool, it encourages the use of alternative assessment methods to animal testing and minimizes unnecessary animal testing without compromising human health and environmental safety. It is designed for use by governments, the chemical industry, and other stakeholders [3].

This study, it is aimed to investigate the effects of aromatic amines on the environment. In this context, raw materials commonly used in textile dyes and dyestuffs produced from these raw materials were examined ecotoxicological properties by the OECD QSAR method. Examining the ecotoxicological properties of raw materials, 2-Bromo-4,6-dinitroaniline aromatic amines, which are considered raw materials, were found to be the most important toxic in Daphnia. With a value of 0.0675 mg / L LC50 of Disperse Blue 291 dye, all structures were found to show the highest toxicity in fish among aromatic amines. When aromatic amines were examined in terms of biological degradation, it was found that it does not show degradation features in nature. While biodegradation characteristics of azo dyes have not been observed, bioaccumulation has been observed [4].

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HYDROGEN BONDING FORMATION FROM THE MIXTURE OF 2,4,6-TRIPHENOXY-1,3,5-TRIAZINE AND 4-N-ALKOXY BENZOIC ACID

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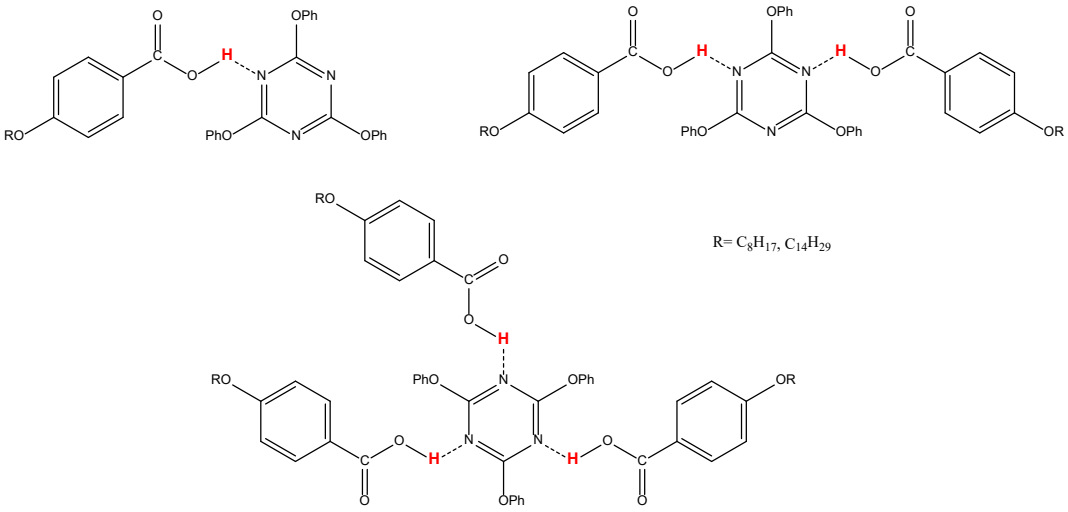

Scheme 1: Structure of inter molecular hydrogen bonded molecules

Liquid crystals are nowadays widely used in all types of display applications such as mobile phones, calculators, computers, televisions etc. Since Bennett and Jones identified mesomorphism as a result of hydrogen bonding in organic compounds in 1939, numerous liquid crystals (LCs) based on H-bonded systems have been investigated [1]. 2,4,6-triphenoxy-1,3,5-triazine was mixed with 4-*n*-alkoxy benzoic acid with 1:1, 1:2 and 1:3 ratio respectively to produce hydrogen bonding. All the final compounds were studied by FT-IR, NMR and DSC.

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SYNTHESIS OF NOVEL BIO-BASED BENZOXAZINES AND COMPARISON OF ROP TEMPERATURES

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Epoxies, phenolics, cyanate esters, bismaleimides, vinyl esters, and polyimides are the most commonly known thermosetting resin systems. Recently, polybenzoxazines (PBZs) have been introduced as a new type of polyphenolic structures and attracted much attention in industrial and scientific areas [1].

Great flexibility of monomer molecular design allows to produce novel benzoxazine monomers with various properties and specific functionalities. Furthermore, bio-based benzoxazine materials have taken excessive attention from the academy and industry for the advancement of less toxic and renewable polymers. In this regard, a catechol-based benzoxazine copolymer is reported via a new approach using an oxazine-thiol reaction. The main chain benzoxazine precursor was obtained via the classic benzoxazine synthesis methodology using the raw chemicals catechol, formaldehyde, and 4,7,10-trioxa-1,13-tridecanediamine. The countercomponent was synthesized from poly(ethylene glycol) methyl ether via the Fischer esterifcation reaction. The obtained reactive catechol-based benzoxazine was then reacted in mild conditions with polymeric thiol precursor to obtain a copolymer structure by the COLBERT reaction. Moreover, Phenolic hydroxyl groups have a significant role as a catalyst due to the activation effect. To investigate the position effect of phenolic hydroxyl groups, gallic acid and catechol based benzoxazines [2] were compared and reduced ring opening polymerization (ROP) temperatures were observed for gallic monomer (Figure 1).

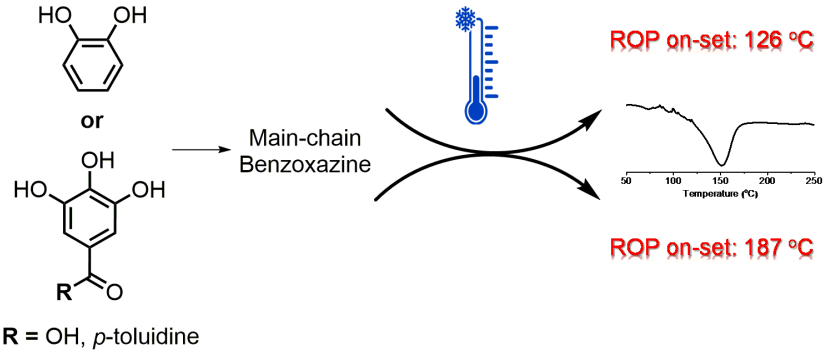

Figure 1. Synthetic route to bio-based main-chain-1,3-benzoxazines and comparison of ROP.

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SYNTHESIS AND CHARACTERIZATION OF VIOLOGEN BASED COVALENT ORGANIC FRAMEWORK

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Since they were first reported by Yaghi and coworkers in 2005 [1], covalent organic framework (COF) structures have been used in numerous applications, including catalysis [2], gas separation [3], gas storage [4] and energy storage [5]. The excellent performance of COFs with low density, high surface area, thermal stability, persistent porosity and simple functional design makes their of significant technological value. In particular, COFs are also used as a new type of photocatalyst for hydrogen production due to their high thermal and chemical stability [6].

Viologens are n-type functional organic molecules composed of conjugated bi-/multi-pyridyl with quaternary salt. In many optoelectronic applications, viologens provide significant electron transport capabilities, particularly in electrochromic and photochromic devices [7]. Viologens have been integrated into a wide range of novel and well-known materials (such as host-guest supramolecules, porous polymers, covalent- and metal-organic frameworks) as a result of the rapid development of functional materials in the twenty-first century but viologens do not yet appear to be a major player in the technology in which such COFs are used.

In this study, it was aimed to synthesis and characterize the viologen-based COF (COF-TPCBP) structure. The viologen-based covalent organic framework was synthesized using the Suzuki-Miyaura reactions. This structure was characterized using FT-IR, TGA, AFM, TEM and XRD techniques.

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EFFECT OF CHALCOGEN ATOMS ON THE SEMICONDUCTIVE PROPERTIES OF CHALCOGENDIAZOLOQUINOXALINE-CONTAINING POLYMERS

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Due to its good electron-withdrawing property, quinoxaline group was used in the electron acceptor units of the donor-acceptor-donor type conjugated polymers throughout this study. Electronic and optical properties of the related polymer systems containing chalcogendiazoloquinoxaline as electron acceptor unit and furan, thiophene, selenophene, tellurophene as electron donor units were investigated. The theoretical investigations on these polymer systems were performed with the help of density functional theory calculations utilizing hybrid functionals and double zeta quality basis sets. First, the design of the donor-acceptor-donor type hybrid monomers and their related oligomers were carried out by full geometry optimizations and conformational analyses. Then the HOMO and LUMO energy levels of the most stable monomer and oligomer structures were calculated, and the energy gaps of their corresponding polymers were approximated by using these data. Thereafter, absorption spectra of the polymers were calculated with the help of time dependent density functional theory calculations. Our theoretical findings suggested that the use of heavy chalcogen atoms, e.g. tellurium and/or selenium atoms instead of oxygen and/or sulfur atoms, results with the improved semiconductive properties.

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SYNTHESIS OF HETEROCYCLIC COMPOUNDS IN AQUEOUS MEDIUM UNDER ULTRASONIC IRRADIATION METHOD

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Heterocyclic compounds show a wide range of physical, chemical and biological properties. They are widely found in nature and play an important role in metabolism because of their structural nuclei found in a variety of natural products, including hormones, antibiotics, alkaloids, and vitamins [1, 2, 3].

In organic chemistry, the development of synthesis methods in accordance with the principles of green chemistry has an increasing importance in recent years and various studies have been carried out on this subject. Green chemistry is the redesign of chemical products and processes, presented as an environmentally friendly alternative to traditional chemistry practices, in a way that minimizes or completely eliminates the use and production of hazardous substances [4].

In this study, heterocyclic compounds were synthesized via the reaction of aromatic aldehydes, benzohydrazide or 4-phenylthiosemicarbazide and malononitrile compounds in aqueous medium under ultrasonic irradiation. The structures of the synthesized compounds were determined by spectroscopic methods [5].

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APPLICATIONS OF NANOMATERIALS FOR THE DIAGNOSIS OF CANCER

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

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.

PREPARATION OF NOVEL CONJUGATED PENTAMER THIN FILMS VIA ELECTROSPINNING

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With the discovery of electrical conductivity in a conjugated trans-polyacetylene (PA) by Alan Heeger, Alan MacDiarmid and Hideki Shirakawa, the research and technology field of conjugated polymer-based semiconductors was born. Based on this new class of materials, the development of organic light emitting diodes (OLEDs), organic field effect transistors (OFETs), organic solar cells (OSCs), electrochromic display devices and various sensors began to emerge. One advantage of semiconducting polymers is the ability to tune the band gap and the position of HOMO and LUMO levels by molecular design [1]. Recent research has mainly focused on donor-acceptor (DA) type materials with electron-rich and electron-deficient moieties in the backbone to arrange the HOMO-LUMO band gaps to produce conjugated polymers with desirable properties [2].

Electrospinning is a highly versatile method that can fabricate ultrafine fibers from various materials either in the form of individual fibers or nonwoven fiber mats with nanometer-to-micrometer size diameters [3]. The electrospun nanofibers of different functional polymers, including electrically conductive polymers have tunable properties and provide new fields of application. Electrospun polymer nanofibers can have a large surface area by forming a percolation path for electrons. In this way, its electrical properties can be improved and promote the formation of electron-hole pairs, which can help improve electronic device performance, gas sensors or organic photovoltaic (OPV) devices [4].

In this study, a novel pentamer with a D-A-D-A-D architecture that contains conjugated thiophene-coumarin-carbazole and thiophene-coumarin-fluorene was synthesized. We were produced polymer substrates with high surface area and porosity using electrospinning, an effective fabrication technique. Additionally, we aimed to increase the crosslinking density by enhancing solvent stability and mechanical stability.

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APPLICATIONS OF PERYLENE DIIMIDES IN PHOTOINDUCED ELECTRON TRANSFER REACTIONS AS ELECTRON ACCEPTOR

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Photoinduced Electron Transfer (PET) offers a powerful method for single-step synthesis of mono- and all-*trans*-fused polycyclic terpenoid skeletons which are assembled via regioselective oxidation of acyclic terpenoid polyalkenes at the omega alkene sites which mimic non-oxidative biosynthetic transformation [1]. Mechanistic studies revealed that such oxidations, generating the parent radical cation, give rise to the first trapping of the radical cations by *anti-Markovnikov* addition of nucleophile, such as water, then radical-type cyclization(s), and finally termination of such processes either by protonation of carbanions or hydrogen transfer. These studies provide the development of new synthetic methods. The most important point in the design of a PET reaction is the selection of the appropriate photosensitizer. Although in principle many structures seem potentially suitable, in practice these photosensitizers are very few in number. Cyanoaromatics, quinolinium salts and pyrylium salts constitute the most suitable PET photosensitizer groups [2]. The search for a new PET photosensitizer continues.

Perylene diimides (PDIs) due to their attractive properties, such as outstanding absorption, emission, photochemical, electrochemical properties, and thermal, chemical and photochemical stabilities are important materials and used in fluorescent dyes, NIR dyes, organic solar cells, sensors, optical switches, organic solar cells and photoconduction materials [3]. However, due to the low solubility in organic solvents, their investigations as PET photosensitizers in the cyclization of terpenoid polyalkenes are not available in the literature. Today, many soluble derivatives of them have been synthesized out by us. This gives an opportunity to use PDIs as photosensitizers in a new application area; the biomimetic cyclization of terpenoid polyalkenes via PET reactions. In this study, different derivatives of PDIs have been used as electron acceptors in the cyclization reactions of mono alkenes as model electron donor compounds which gives singlet energy level PET reactions for the first time. The electron acceptor properties of PDIs were investigated in detail. The expected cyclic products were obtained which proves the success of our thoughts.

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SYSTEMS BIOLOGY PERSPECTIVE FOR ELUCIDATION OF SECRETED PROTEIN BIOMARKERS IN ALZHEIMER'S DISEASE

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Alzheimer's disease (AD) is the most frequent type of neurodegenerative dementia which has a multifactorial, heterogenous complex and progressive nature. to the increasing prevalence of AD as the population ages and the lack of effective treatment, it has become a major concern in healthcare worldwide with the rising burden of this disease in the next decade. Therefore, early detection and cessation of AD are highly critical to reduce disease severity and improve prognosis. The heterogenous nature and multiple pathogenesis of AD require a systems-level understanding of currently available biomarkers and the use of bioinformatics methods to search for new robust biomarkers.

In this study, three transcriptome and one proteome datasets consisting blood samples of AD patients were investigated. Common 136 differentially expressed genes (DEGs) were used as core gene sets during the study for further analysis. Common DEGs were enriched in pathways such as RHO GTPase effectors, Orexin receptor pathway, pathogenic *E.coli* infection, metabolism of steroid hormones and response to GCN2 to amino acid deficiency etc. Integration of transcriptome data with protein-protein interaction network resulted with 15 central (hub) proteins such as XRCC6, TUBB, OTUB1, DDX5, CDH1 etc. Although we evaluated biomarkers in serum, we also investigated their secretion in other tissue options to be used as an un-invasive diagnosis route.

The current study presents molecular signatures at the RNA and protein levels that may be useful for better recognition of the molecular mechanisms of AD, as well as potential secreted biomarkers that can be used for early diagnosis of the disease.

PREPARATION OF GOLD DOPED MAGNETIC BIONANOCOMPOSITE MATERIAL FOR THE DETECT THE PRESENCE OF ENVIRONMENTAL POLLUTANTS

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The active acetylcholinesterase enzyme (AChE) is responsible for signal termination at cholinergic synapses by rapid hydrolysis of the neurotransmitter acetylcholine. The presence of organophosphate (OP) and carbamate group environmental pollutants blocks the serine residue in the active site of AChE by forming a stable complex [1]. The blocked region by irreversible phosphorylation causes a decrease in the activity of the AChE enzyme (inhibition). Inhibition of AChE leads to the accumulation of acetylcholine in the body, affecting the physiology of the nervous system with serious or fatal consequences. Therefore, it is important to use AChE activity as a suitable biomarker to monitor the presence of the above mentioned contaminants. Magnetic nanomaterials (MNs) are of great interest for a wide variety of applications due to their outstanding properties, including both magnetic properties and good biocompatibility and low toxicity. Recently, the use of nanocomposites containing two or more metallic elements has attracted much attention due to the potential to combine the advantages of each metal and improve on physical properties. Core-shell nanostructures such as gold-coated magnetic core-shell nanoparticles are an ideal composite system. Gold nanoparticles (AuNPs) not only protect the core from oxidation, but also provide a platform for surface modification and functionalization [2].

In this study, Cs@Fe_3O_4 doped with gold nanoparticles with magnetic core shell was prepared by hydrothermal method and used as a support material for AChE enzyme for the qualitative determination of environmental pollutants. Since the remediation of wastewater containing OPs is an important issue in environmental fields, Dichlorovos and Chloroprifiros were selected as organic pollutants to follow the change in enzymatic activity of immobilized Au-Cs@Fe_3O_4 enzyme in this study. The synthesis of the nanocomposite was confirmed by TEM, SEM, XRD and Fourier transform infrared spectroscopy analysis. The AChE enzyme was immobilized into the structure and the optimum conditions for Au-Cs@Fe_3O_4@AChE were determined. Its applicability for the determination of pollutants in industrially contaminated waters was confirmed by field experiments.

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TREATMENT AND PESTICIDAL ACTIVITY ASSESSMENT OF OLIVE MILL WASTEWATER BY IMIDE INVOLVED PHOTOOXIDATION PROCESS

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Since historical times, Cyprus island agriculture has been renowned for its grapes, potatoes, carobs, and olives. Hence, the olive industry is essential to the island's social lives and the economic sector as in other Mediterranean countries. Olive mill wastewater (OMWW) is one of the industry's waste products, distinguished by its dark colour, elevated organic content levels, acidic pH and phytotoxic polyphenolic constituents. Olive industry wastes cause a tremendous environmental threat, ranging from surface and groundwater contamination to toxicity on plants, animals, and microbiomes when improperly discharged; thus, prohibitive precautions and regulations of the government must abide by [1].

The main objective of our study is to generate a novel approach for OMWW treatment and assess the applicability of recovered valuables in agriculture as pesticides while establishing a topological map and better understanding of the olive industry functioning in Northern Cyprus. The first step of the study will involve spatial assessment of the olive mills located in Northern Cyprus and characterisation of generated OMWW. Phenolic contents of olive mill wastewater obtained from different regions of Northern Cyprus will be examined. General parameters such as chemical oxygen demand (COD) and biochemical oxygen demand (BOD), total suspended solids (TSS), total dissolved solids (TDS), electrical conductivity (EC), density, pH, salinity, and total phenolic content of the OMWW samples will be investigated. Total phenolic content will be determined using the Folin-Ciocalteu assay [2]. The second step of the study will focus on the treatment efficiency and the effect of imide involved photooxidation process on the pesticide properties of OMWW. Pesticide properties will be tested on assigned agricultural fields of commonly farmed crops and microbiologically in wet labs on their microbiota. Results will be compared against commercially used pesticides to observe their effectiveness, cost, and applicability.

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PRODUCTION AND STANDARDIZATION OF LYOPHILIZED HONEY

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Honey; it is the state that bees collect nectar from plants, plant secretions, and some plant-sucking insects add saliva to their feces and mature them in honeycombs [1]. Honey is important in food formulations because of its taste and being health. The high viscosity and stickiness of honey is an obstacle to its use in product formulations. Converting honey into powder form and including it in product formulations will provide ease of use for both the food industry and the cosmetics industry. However, drying honey is a difficult process due to its high sugar content, stickiness and viscosity properties. Therefore, honey should be dried with suitable carrier agents.

In this study, as a carrier agent; maltodextrin, whey protein isolate and bovine gelatin were compared. In addition, feeds containing different ratios of dry matter were compared in terms of drying efficiency. The effect on the properties of the dry product was determined by changing the carrier agent/honey ratio. In the study, a Box-Behnken design was carried out with the response surface methodology (BBD-RSM) for the optimization of lyophilized honey production. Working conditions; carrier agent (maltodextrin, whey protein isolate), dry matter ratio (20%, 30%, 40%) in the feed, honey ratio in the dry matter of the feed (60%, 70%, 80%). High solubility, high yield, low hygroscopicity, low moisture content and maximum honey ratio were chosen as standardization parameters. Yield, moisture, water activity, bulk density, color, hygroscopicity, solubility and sensory properties were determined in powder products.

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INVESTIGATION OF PULSED ELECTRIC FIELD APPLICATION IN FRUIT JUICES: AN CHOKEBERRY FRUIT EXAMPLE

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In recent years, non-thermal new technologies as an alternative to sterilization, pasteurization, evaporation, and drying that are the microbiological control methods of maintaining the food safety are revealed. The implementation of the pulsed electric field (PEF) is one of the emerging technology and attract attention with short-duration processes at low temperature that protect the food quality. It provides a solution to the unfavorable situations in conventional methods affecting the organoleptic and nutritional value that appear based on high temperature and long processing times or the problems happening with adding the antimicrobial agent. Also, PEF has the advantages of being low-cost and environmentally friendly.

The performance parameters of PEF are the magnitude of the electric field, number of pulses, pulse waveform, pulse time, and initial temperature. These factors and the treatment chamber that various electrode shapes generate an electric field on it change the effects of PEF on foods. Besides, the foods are considerably complex structures and their ingredients show variable characteristics on electrical conductivity. The efficiency of PEF implementation varies depending on the electrical property and pH of food ingredients, so each application can cause to get different rates of yield. High intensity electric field can provoke to cell death inducing the electroporation of microorganism cell membranes. The transmembrane potential produced on the cell membrane depends on the intensity of the electric field as well as the type and strain of microorganisms influences significantly. The electric field level required to reach the threshold of transmembrane voltage is known as the critical electric field.

The chokeberry fruit (*Aronia melanocarpa*) which is begun to product in Vize district of Kirklareli province in Turkey is superior in terms of phenolic components including phenolic acids, flavonols, anthocyanins and flavan-3-ols. These antioxidant compounds own to several bioactivities. The phenolic compounds have the effects of antiallergic, anti-inflammatory, antimicrobial, antioxidant, and antithrombotic and are heat-sensitive. Other heat-sensitive ingredients of fruits are vitamins. Pulsed electric field unlike the conventional thermal methods has importance to preserve the nutritional value of foods.

In this study, the pasteurization potential with the implementation of electric field to chokeberry fruit juice that is started to product Vize district of Kirklareli province is investigated.

FOOD SECURITY AND DIGITALIZATION IN TURKEY AND IN THE WORLD

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The increasing population and drought in the world, the pandemic, and the subsequent war between Russia and Ukraine reveal the importance of the concept of food security. Despite the food crises and increasing global food demand, new technologies have been focused on in order to increase productivity, maintain the quality and meet food needs in a sustainable manner. After the pandemic, the digitalization process, which will contribute to the sustainability, traceability of food supply, food safety, and supply chain, has also accelerated. Starting from animal and agricultural production, studies should be carried out to increase the efficiency of food supply at all stages. Food security is the existence of the physical and economic conditions necessary for people to have access to safe and nutritious food to lead an active and healthy life. According to Food and Agriculture Organization (FAO) of the United Nations (UA), the four pillars of food security are availability, access, use, and stability. On the other hand, the desire to produce safe food has led to the formation of the HACCP food safety system and the concept of traceability.

Today, people's orientation to quality and healthy foods while meeting their food needs creates new preferences. The consumer's search for maximum information about the product creates a different basis for digitalization. Digitalization, which is a "mega trend" with the demand of conscious consumers in today's marketing conditions, is changing the food industry as well as changing all sectors these days. This study reviews research and developments on food security and digitalization in Turkey and around the world.

REJECTION of SOME METALS with DIFFERENT MEMBRANES by PERVAPORATION METHOD

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Pervaporation is a membrane-based process for seperation of water–organic, organic–water, or organic–organic mixtures, and thermally sensitive compounds. This proses is considered one of the most viable, economical, and eco-friendly and energy-efficient alternatives to traditional separation methods. Separation in the pervaporation process, the membrane acts as a separating barrier for the minor affinity component. For this reason, the membrane structure should be capable of separating the mixtures [1,2]. High performance membranes could be prepared from Polybenzoxazines (PBzs) due to their distinguished chemical, physical and thermal stability. The flexibility of the monomer design of benzoxazines allows to control properties of membranes.

In this study, it is aimed to remove some metals (Cr^{6+}, Fe^{2+}, Ni^{2+}, Cd^{2+}, Cu^{2+}, Mn^{2+}, Na^{+}, K^{+}) in wastewater by using the filtering feature of newly synthesized polymeric polybenzoxazine/poly(vinyl alcohol) (PBz/PVA) and monomeric polybenzoxazine/poly(vinyl alcohol) (MBz/PVA) membranes by using the pervaporation method (Figure 1). The benzoxazine structures synthesized for this purpose were characterized by ^{1}H-NMR, FTIR, DSC and TGA. Metal removal studies in wastewater were carried out with the prepared PBz/PVA and MBz/PVA membranes by using the pervaporation method. The MBz/PVA membrane was found to be selectively permeable to most metals.

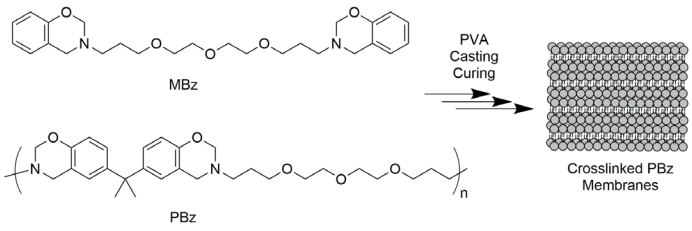

Figure 1. Schematic diagram of crosslinking approach for the fabrication of PBz/PVA and MBz/PVA membranes.

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DETERMINATION OF Cr(III) AND Cr(VI) IONS USING MAGNETIC DENDRIMER AS ADSORBENT FOR SOLID PHASE EXTRACTION BY ATOMIC ABSORPTION SPECTROSCOPY

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Dissolved chromium is usually found in natural waters in two different oxidation steps, chromium (III) and (VI). Cr(VI) and Cr(III) enter the environment from discharges from steel, electroplating, tanning industries, *etc*. The metal can also enter tap water supply systems from corrosion in inhibitors used in water pipes and containers [1]. Depending on the oxidation state, the physiological effects of chromium on biological systems are completely opposite. While Cr(III) is considered an essential element for the maintenance of glucose, lipid and protein metabolism in mammals, Cr(VI) species are toxic due to their oxidizing properties and negative effects on the lung. Various separation and enrichment methods such as liquid-liquid extraction, co-precipitation, ion exchange and adsorption are used to remove such heavy metals from the matrix [2,3]. In addition, solid phase extraction is one of the popular methods used for the recovery of heavy metals. For this purpose, applications of adsorbents based on magnetic dendrimer-based nanostructures have unique properties in solid-phase extraction techniques. PAMAM dendrimers have three-dimensional and highly branched geometry and contain high concentrations of oxygen and nitrogen, which enables them to exhibit a fascinating binding ability for the metal ion.

In our study, a novel Fe_3O_4 core magnetic PAMAM dendrimer was synthesized for the enrichment of Cr(VI) and Cr(III) and its structure was elucidated by various spectroscopic methods. The optimum parameters such as pH, eluent type and concentration, adsorbent amount and time, which are important in the enrichment process for solid phase extraction of Cr(VI) and Cr(III), were determined by flame atomic absorption spectroscopy and the optimum conditions were applied to real samples.

Acknowledgments: This study was supported by Kırklareli University Research Fund (KLÜBAP-236).

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A WATER-SOLUBLE NDI DERIVATIVE AS A DETECTOR FOR HEAVY METAL CATIONS

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It is noteworthy that the role of ions is of great importance in both life and technological processes. A metal ion detector should have good water solubility, easy synthesis and cheap raw materials [1]. Previously, naphthalene diimide (NDI) derivatives have been reported as sensors for detecting various heavy metal ions [2]. The aim of this study is to investigate the selectivity of an NDI derivative towards heavy metal cations.

A previously synthesized NDI derivative, SNDI, and various metal cations Ag^{+}, Hg^{2+}, Mg^{2+}, Cu^{2+}, Fe^{3+}, Ca^{2+}, Ni^{2+}, Co^{2+}, Zn^{2+}, Pb^{2+} and Cd^{2+} were used for this study. The recognition properties of the SNDI towards the metal cations were primarily studied by UV-vis absorption and emission spectroscopy, followed by electrochemical measurements and FTIR spectroscopy. The results have indicated that SNDI has a selectivity towards Cu^{2+}. Furthermore, emission spectroscopy results have also shown that the emission intensity of SNDI at λ_{exc} = 225 nm has increased upon addition of increasing concentrations of Cu^{2+}. Additionally, the FTIR spectra of SNDI and Cu^{2+} in HEPES, has shown that the possible binding mechanism is from the sulfo group of SNDI.

All the results of this study, including UV-vis absorption and emission spectroscopy investigations, electrochemical measurements and FTIR studies, were in good agreement. This study concludes that SNDI has the highest selectivity towards Cu^{2+}.

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XRD AND SEM CHARACTERIZATION OF ARCHAEOLOGICAL LATE BRONZE AGE FINDINGS

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A hoard consist of 26 metal artifacts was found in 2004 at Kaleburnu-Kral Tepesi settlement on the Karpaz peninsula in Cyprus [1-2]. According to the XRF analysis results of 26 discovered artifacts, they were found to be bronze (cooper-tin alloy) [3].

The types of corrosion that occur on the artifacts over time are directly related to the chemical properties, manufacturing techniques and environmental factors. As a result of spectroscopic and electrochemical analyzes carried out on six artifacts of the same typology (with the same manufacturing techniques) that have been buried for thousands of years in the same environmental factors but with different chemical contents, it was discovered that they have different types of corrosion [4-5]. However, among the reasons why these artifacts with different chemical contents have different types of corrosion, it is necessary to analyze their morphological and crystalline properties in order to understand the effect of manufacturing conditions (melting-cooling degrees etc).

In this study, five artifacts with same typology, different chemical content and different corrosion type are selected to research their morphological and crystalline properties. This study aims to understand the effects of differences in manufacturing on the formation of corrosion types that occur on artifacts of the same typology by using SEM (Scanning Electron Microscopy) and XRD (X-Ray Diffraction) analysis.

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MORPHOLOGICAL CHARACTERIZATION OF AL BASED HYBRID COMPOSITE POWDERS VIA MECHANICAL ALLOYING

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This paper involves morphological studies conducted on Al based hybrid particulate composites reinforced via ball milling process. Al_2O_3, SiC, B_4C and ZrO_2 ceramic powders were introduced into the metal matrix at different weight ratios. Ball milling process was conducted by a planetary type ball mill with WC milling balls and vial. Parameters like rotating speed, time, Ball-to-Powder ratio and Process Control Agent were kept constant as 200 rpm, 100 hrs, 10:1 and % 1.5 wt. stearic acid, respectively. Powder samples that taken from the composite mixture by time intervals of 20 hours were analyzed by FESEM and XRD. Particle size measurements were also conducted on FESEM images by an image analyzing software.

Keywords: Mechanical Alloying, Ball Milling, Aluminium Matrix Composites, Hybrid Particulate Composites, Microstructural Characterization.

ANTIMICROBIAL EVALUATION OF SOME NOVEL POTENT BIOACTIVE COMPOUNDS

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The discovery of new bioactive compounds are importance in medicinal chemistry. Most therapeutic and antimicrobial agents are composed of heterocyclic molecules. Heterocyclic compounds constitute the largest class of the most active organic compounds with antimicrobial activity. Heterocycles are cyclic compounds containing atoms such as O, N, S, and they are chemically and biologically important structures [1]. Schiff bases are obtained by the acid / or base-catalyzed reversible reaction of carbonyl compounds with aldehydes or ketones. Schiff bases are pharmaceutical and biochemical compounds due to their structural importance. They have a wide variety of bioactivity properties such as antitumor, antifungal, antimicrobial, antiulcer, antibacterial, antioxidant [2,3].

In this study, the antibacterial and antifungal properties of novel heterocyclic Schiff bases were evaluated as potential bioactive compounds against the disease-causing pathogenic microorganisms. The well diffusion method was used to determine the biological activity. For this purpose, heterocyclic Schiff bases were synthesized by condensation of 2-aminothiazole-5-carboxaldehyde with 4-methyl-3-thiosemicarbazide / or 4-phenylthiosemicarbazide and 5-floro-2-hidroksibenzaldehit, 5-floro-2-hidroksi-3-metilbenzaldehit, 3-kloro-5-florosalisilaldehit. The synthesized compounds were elucidated using some spectral analysis techniques. It was determined that all heterocyclic Schiff bases exhibited varying degree of inhibitory effects on the growth of different selected pathogenic strains.

Keywords: Heterocyclic compounds, Schiff bases, biological activity

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EXTRACTION AND CHARACTERIZATION OF ANIMAL-DERIVED NANOCRYSTALLINE CELLULOSE FROM TUNICATE *Phallusia mammillata* (Cuvier, 1815)

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In this study, cellulose was extracted from the tunic of *Phallusia mammillata* distributed in the Çanakkale Strait (The Dardanelles) by hydrolysis/kraft cooking/bleaching method, and nanocrystalline cellulose was produced from this cellulose by acid hydrolysis. The physico-chemical properties of the obtained cellulose and nanocrystalline cellulose were determined using Fourier Transform Infrared Spectroscopy (FTIR), Nuclear Magnetic Resonance Spectroscopy (NMR), Scanning Electron Microscopy (SEM), X-Ray diffraction (XRD), Thermogravimetric analysis (TGA) and elemental analysis. As a result of the study, the dry weight cellulose content of the tunic of *P. mammillata* was calculated as 16.84%. FTIR analysis showed that *P. mammillata* cellulose was in the natural cellulose I-β crystal form. *P. mammillata* cellulose had a nanofibrillar structure with a very long length compared to the width. The nanocrystalline cellulose produced by acid hydrolysis, on the other hand, appeared to form fragmented small lumps. The maximum decomposition temperatures determined for cellulose and nanocrystalline cellulose produced from *P. mammillata* were around 336- 340 ºC and their thermal stability was high. Acid hydrolysis led to a decrease in the thermal stability of cellulose from *P. mammillata.* Cellulose (98.26%) and nanocrystalline cellulose (98.59%) produced from *P. mammillata* showed a higher crystallinity than the cellulose reported for different tunicate species. *P. mammillata* cellulose has a water holding capacity of 8.5 times its dry weight. In addition, the high purity of the cellulose extracted from *P. mammillata* was proved by characterization analyses and with the whiteness of the isolated cellulose.

Keywords: Marine organism, nanocrystalline cellulose, Çanakkale Strait, TGA, XRD, SEM

SYNTHESIS OF NOVEL THIAZOLE-BASED THIOSEMICARBAZONES AS POTENTIAL ANTIBACTERIAL AND ANTIFUNGAL AGENTS

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Thiosemicarbazones are compounds obtained by the condensation reaction of thiosemicarbazides with aldehydes or ketones [1]. Thiosemicarbazone compounds are compounds of great importance due to their biological and pharmacological activities such as antimicrobial, antiviral, antimalarial, antineoplastic, antifungal, antiinflammatory, antiamoebic, antiallergic, anticancer activities [2]. Thiosemicarbazones also exhibit a wide range of applications such as anticorrosion, antifouling, plant growth-promoting activities [3].

Herein, new thiosemicarbazone compounds (MTSC-Br, MTSC-Cl, MTSC-CH_3, FTSC-Br, FTSC-Cl and FTSC-CH_3) were synthesized by the condensation reaction of thiazole derivative with thiosemicarbazide derivatives and benzaldehyde derivatives. The structures of the obtained thiazole-containing thiosemicarbazone compounds were characterized by spectroscopic methods (element analysis, fourier transform infrared spectra, proton nuclear magnetic resonance, high resolution mass spectrometry, scanning electron microscopy and energy dispersive X-ray). The antibacterial and antifungal activities of the thiosemicarbazone compounds were evaluated by well-diffusion method against tested pathogenic bacteria and yeast as potential medicinal agents.

Keywords: Thiosemicarbazone, thiazole, thiosemicarbazide, antimicrobial activity

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SYNTHESIS OF PINCER-TYPE CARBENES AND THEIR SILVER(I) COMPLEXES WITH CYCLOPHANE STRUCTURE, ELUCIDATION OF THEIR STRUCTURES, AND ANTIMICROBIAL AGENT PROPERTIES

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In organic chemistry, a carbene is a molecule containing a neutral carbon atom with a valence of two and two unshared valence electrons. The general formula is **R−:**C−**R'** or **R=C:** where the **R** represents substituents or hydrogen atoms. Carbenes are classified as singlets or triplets, depending on their electronic structure. The two classes of carbenes are singlet and triplet carbenes. Most carbenes have a nonlinear triplet ground state, except those with nitrogen, oxygen, sulfur, and halide substituents bonded to the divalent carbon. Substituents that can donate electron pairs may stabilize the singlet state by delocalizing the pair into an empty p orbital [1].

Carbenes obtained from cyclophanes and their metal complexes have of great importance in terms of their pharmacological properties such as antibacterial, antifungal, antitumoral, antiviral, and anticancer. Many metal ions are known to improve the biological activities of carbene compounds, especially low-oxidation transition metal elements. In carbene transfer from Ag(I)-NHCs;

a) Continuing the reaction with the silver salt after the free carbon is prepared
b) In situ reaction of basic silver salts and imidazolium salts
c) In situ reaction of imidazolium salts with a non-basic silver salt in the presence of a suitable base
d) Counter-anion exchange and other transmetallization methods from tungsten NHC to silver are important

The reactivity of a particular carbene depends on the substituent groups. Their reactivity can be affected by metals. Some of the reactions carbenes can do are insertions into -C-H bonds, skeletal rearrangements, and additions to double bonds. Carbenes can be classified as nucleophilic, electrophilic, or amphiphilic[2].

The structure of the synthesized compounds is illuminated by spectroscopic methods such as elemental analysis, ^{1}H-NMR, ^{13}C-NMR, FT-IR, UV-Vis, LC-Mass, TGA-DTA analysis, and electrical conductivity measurement. The antimicrobial activities of the clarified structures were examined, and the effects of microorganisms were discussed.

Keywords: Carbene, silver, cyclophane, antimicrobial agent.

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ANTIMICROBIAL ACTIVITIES AND CATALYTIC DEGRADATION OF METHYLENE BLUE BY Co_3O_4 NANOPARTICLES

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Co_3O_4 is a metal oxide that is highly stable in terms of chemical activity and has rich redox reactivity in numerous reactions [1]. Size, shape, surface area, crystal structure and surface oxidation state are important parameters affecting the catalytic activity of Co_3O_4 in reactions. In the last decade, inorganic nanoparticles (NPs) with unique physical, chemical and biological properties have gained special importance against bacterial infections [2]. In general, organic antimicrobial agents have lower stability, especially at high temperatures or pressures, and can be seriously harmful and/or toxic. On the other hand, inorganic materials with antibacterial properties, including inorganic metal oxides, are hard and ductile. The superior properties of metal oxide NPs over organic antimicrobial agents include their stability, hardness and ability to maintain their chemical stability for longer periods of time [3]. Moreover, metal oxide NPs accelerate the reduction of organic dyes due to their high catalytic properties [1]. Organic dyes are harmful to the environment due to their toxic properties for humans, animals and plants. To eliminate these substances, the method of chemical reduction is used to convert dyes into relatively low toxicity products that are easily degradable in nature.

In this study, novel Co_3O_4 structures with three different morphologies were obtained using hydrothermal synthesis method [4]. The effect of different morphologies of the produced Co_3O_4 NPs on their catalytic behavior in the reduction of dye and antimicrobial properties against pathogenic strains (Gram (+), Gram (-) bacteria, yeast and standard antibiotics) were investigated.

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ECO-FRIENDLY DEHYDROGENATION OF DIMETHYLAMINE-BORANE CATALYZED BY MNPs@CELLULOSE

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In the ever-increasing demand for renewable and more environmentally friendly sources of energy, hydrogen remains a principal focus. H_2 represents an ideal energy carrier because of its high gravimetric energy density, pollution-free end product (water), and high energy efficiency *via* fuel cells [1,2]. Dimethylamine-borane (Me_2NHBH_3, DMAB) is considered an extremely promising candidate for portable hydrogen applications due to its high hydrogen content, high stability under ambient conditions, and environmentally benign character [3].

In this study, generation of hydrogen from eco-friendly catalytic dehydrogenation of DMAB that has low melting point (~ 35°C) was obtained using the simple mechanical mixing technique in accordance with the green synthesis principles [4]. In addition, synthesis of MNPs (M= Ru^{3+}, Ni^{2+}, Cu^{2+} and Pd^{2+}) supported on natural polimer cellulose and prepared in the dehydrogenation of DMAB as catalyst was carried out and the activities of MNPs@Cellulose were compared by classical methods investigating with many parameters (temperature, activation energy, reusability, etc). MNPs@Cellulose were identified by SEM, ATR-FTIR, ^{11}B NMR and UV-Vis spectroscopy.

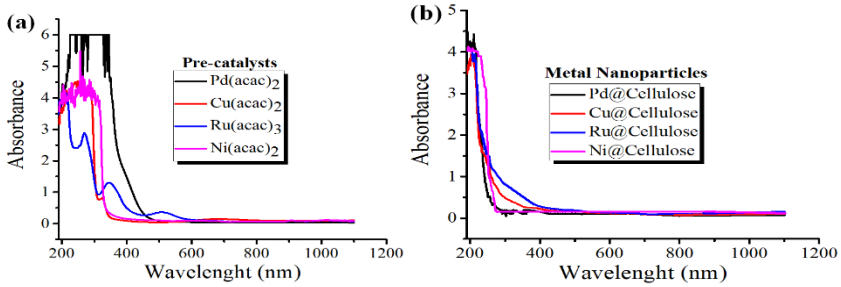

Figure 1. UV-vis spectra of a) acetylacetonate salts of metals (Pd^{2+}, Ni^{2+}, Cu^{2+}, and Ru^{3+}) and b) their corresponding cellulose stabilized MNPs with a loading of 4.0% wt (50.0 mg cellulose, 2.0 mmol DMAB).

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GREEN APPROACHES TO DEHYDROGENATION OF DMAB CATALYZED BY STARCH STABILIZED Ru(0), Cu(0) AND Ni(0) NANOPARTICLES

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The present study focused on preparation and catalytic use of Ru(0), Cu(0) and Ni(0) nanoparticles supported on natural polymer starch (with 4.0%wt transition metal loading supported on 50 mg starch, MNPs@Starch NPs, M=Ru, Cu and Ni) as catalyst in green dehydrogenation of dimethylamine-borane (DMAB, Me_2NHBH_3) [1]. They were in situ generated from the reduction of Ru^{3+}, Cu^{2+} and Ni^{2+} ions impregnated on the surface of starch during the catalytic dehydrogenation of DMAB under solvent-free medium at 35.0 $\pm$ 0.1°C. The nanoparticles exhibit excellent catalytic lifetime and gives the turnover frequency (TOF) of 92, 51 and 18 mol H_2/(mol catalyst·h) in the dehydrogenation of DMAB, which can be attributed to the presence of Ru(4.0%)@Starch, Cu(4.0%)@Starch and Ni(4.0%)@Starch NPs, respectively. The durability tests reveal that MNPs@Starch are still active in the subsequent runs of dehydrogenation of DMAB retaining its initial catalytic activity (44%, 29% and 80% for Ru, Cu and Ni, respectively) even after the fifth use. The reaction constant versus the DMAB concentration, apparent activation energy and rate constant were determined from the hydrogen evolution curves. It was noticed that the dehydrogenation kinetics depends on (i) temperature of reaction, (ii) reactant concentration and (iii) starch amount. Therefore, the kinetic constants were analyzed using existing kinetic models.

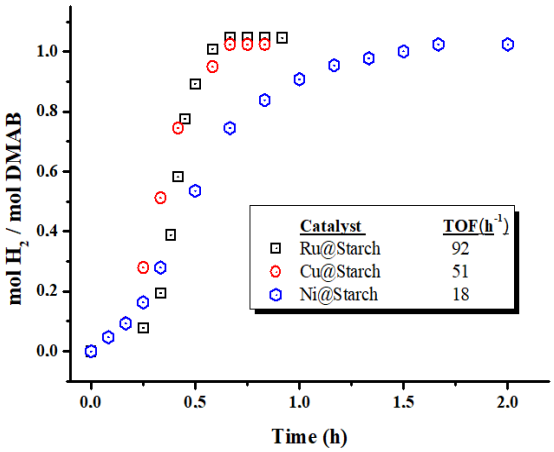

Figure 1. Plots of mol H_2 / mol DMAB *vs.* time for the catalytic dehydrogenation of DMAB starting with 2.0 mmol DMAB and 50 mg starch loaded with 4.0 wt% Ru, Cu and Ni, separately in the absence of solvent at 35.0±0.1°C.

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FABRICATION OF PS: PANI SERS SUBSTRATES FOR DETECTION OF HUMAN SERUM COMPONENTS

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Biological samples are, by nature, highly complex and heterogeneous. Various specific tools such as ELISA, Western Blot, and mass spectroscopy are required to analyze the samples' contents, but they all are labor-intensive, require personal expertise, or are expensive. Alternatively, the SERS method is an optical analysis method that stands out in analyzing biological samples, as each molecule type gives different combinations of Raman shifts, does not require high-level expertise, and is cheap compared to its counterparts. In the SERS technique, high molecular specificity and single molecule sensitivity are combined with the use of appropriate substrates. With this feature, it has become an attractive method for detecting low amounts of molecules in biological samples. Recently, its use in detecting disease-related biomolecules from biological serum samples for medical diagnosis or identification has been widely investigated [1]. In the biomolecule detection studies, the SERS substrates such as metal nanoparticles, polymer films, and conductive platforms (MIMs, etc.) provide signal enhancement. Even though designing ordered SERS platforms are a significant part of the biomolecule analysis, enhancing and reproducibility of the SERS signals require additive features on the substrates [2]. Therefore, in the study, we suggested that conductive substrates, a blend of polyaniline (PANI) and polystyrene (PS), may provide appropriate signal-enhancing properties for biomolecule detection in human blood serum. Following chemical (FT-IR), morphological (SEM), and SERS-based analyses of the silver-doped conductive nonpatterned substrates, anodic aluminum molds (AAMs) were fabricated and characterized using SEM and Image J program. Currently, we focus on developing nanopattern substrates using AAMs to increase signal reproducibility. In the future, the effect of nanopatterned surfaces on SERS signals will compare with flat counterparts, and the effects of the conductivity and nanotopography on the enhancement factor (EF) will be investigated.

Keywords: SERS, Biomolecule Detection, AAMs, Polystyrene, Polyaniline

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SYNTHESIS OF ULTRASOUND ASSISTED GREEN SILVER NANOPARTICLES AND COATING ON 316L STAINLESS STEEL WITH AIRBRUSH SPRAY TECHNIQUE

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In this study, novel PEGylated maca root extract-silver nanoparticles (PEGylated Mac-Ag NPs) were prepared using a green sonochemical method. The 316L stainless steel (SS316L) was coated with the prepared PEGylated Mac-Ag NPs using a low-cost and easy-to-use airbrush spray technique. The prepared PEGylated Mac-Ag NPs and coated SS316L with PEGylated Mac-Ag NPs were characterized to determine the surface morphology, crystal structure, and chemical functional groups using different methods such as scanning electron microscopy, transmission electron microscopy, ultraviolet-visible spectrophotometry, X-ray diffraction, Fourier transform infrared spectroscopy, X-ray photospectrometry, surface roughness and profilometry. According to the surface characterization results, it was clear that the sono-synthesized PEGylated Mac-Ag NPs had a spherical-agglomerated aggregate structure in the particle range of 30 to 50 nm. Furthermore, the surface of the coated 316L stainless steel had a uniform particle distribution with spherical and particle diameters of less than 50 nm. Consequently, it was observed that surface of the SS316L were covered with nano-sized PEGylated Mac-Ag NPs using a green chemistry approach. The proposed synthesis and coating process were promise using a simple and green process to fabricate advanced nanomaterials in biomedical applications.

Keywords: silver nanoparticle, green chemistry, airbrush spray coating, sonochemical synthesis

CHEMICAL, MORPHOLOGICAL, AND STRUCTURAL CHARACTERISTICS OF PEGYLATED MATCHA COPPER OXIDE NANOPARTICLES

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In recent years, green copper oxide nanoparticles (CuO NPs) have been widely used in various applications such as pharmaceuticals, electronics, environmental applications, catalysts, gas sensors, superconductors, solar cells, and biomedical applications. The green synthesis of the metal based nanoparticles, which are desired to be used in biomedical applications, from bio-based sources is more advantageous. In this study, PEGylated matcha extract-copper oxide nanoparticles (PEGylated Mat-CuO NPs) were synthesized using a sonochemical technique via a green chemistry approach. The green PEGylated Mat-CuO NPs were characterized by scanning electron microscopy, transmission electron microscopy, ultraviolet visible spectrophotometry, X-ray diffraction, X-ray photospectrometer, and Fourier transform infrared spectroscopy. According to the experimental results, PEGylated Mat-CuO NPs were successfully synthesized, and they had a spherical shape with a particle size ranging from 10 to 30 nm. Consequently, the prepared PEGylated Mat-CuO NPs is a promising nanocomposite using a low-cost and green way to obtain advanced nanomaterials as nanocarriers, nanoagents, and nanocoating materials in biomedical applications.

Keywords: copper oxide nanoparticles, green chemistry, sonochemical synthesis, nanobiocomposite

PREPARATION AND OPTICAL CHARACTERIZATION OF CdS/ZnS-POLYMER SUPERLATTICE NANOCOMPOSITES

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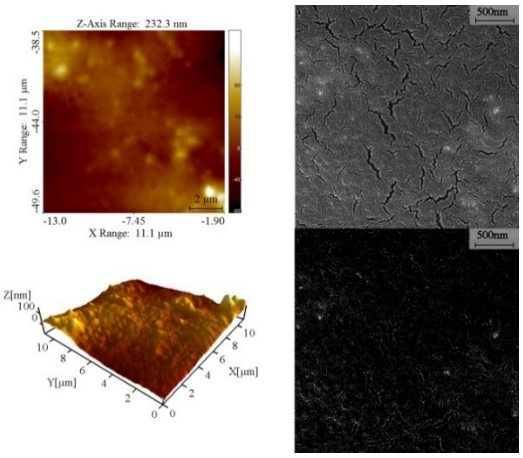
In this study, size-tunable CdS/ZnS-polymer superlattice nanocomposite materials[1] were successfully prepared using SILAR method[2]. Field Emission Scanning electron microscopy (FE-SEM) and Atomic Force Microscopy (AFM) was used for morphological, structural and porosity determination of the prepared nanocomposite materials. UV-Visible absorption spectroscopy technique was used for investigation of optical properties of the prepared nanocomposite. The confinement of electrons and holes in semiconductor nanostructured materials was observed in lower cycles of SILAR. The analyses of abtained results confirms that with increasing in particles sizes, a red shift was observed at the position of the peak in the absorption spectrum and consequently optical band gap decreases.
The figure in below shows SEM and AFM Images of the surface morphology of CdS/ZnS-polymer superlattice nanocomposite materials after 16 cycles of SILAR.



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RESONANCE FREQUENCY PREDICTION OF PATCH ANTENNA OPERATING IN WI-FI 6E STANDARD WITH LONG SHORT TERM MEMORY

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With the widespread use of wireless communication systems, the need for applications of increased IEEE 802.11 standard for wireless local area networking (WLAN or Wi-Fi) connectivity has been growing interest. The fact that billions of people have internet access today is the result of the development of Wi-Fi technologies from past to present. Wi-Fi 6E band (5925 - 7125 MHz) is a new spectrum area for today's wireless technologies, with the advantages of supporting 160 MHz bandwidth channels, faster data output, and less delay compared to 2.4GHz and 5GHz bands. Antennas complying with Wi-Fi 6E standards are essential for gain, bandwidth, low cost, and manageable amounts. Patch antennas are very suitable for producing wireless communication technology that can operate in the Wi-Fi 6E band due to their advantages, such as easy production, small size, low production cost, and lightweight manufacturing process. In addition to these advantages, patch antennas have disadvantages such as being a narrow band and low gain, operating at low power capacities, and having poor insulation between feed points and radiation patches. To reduce these disadvantages, the geometrical and electrical parameters of the antenna are optimized by various methods. As one of the optimization methods, Long Short Term Memory, a Recurrent Neural Networks, is applied in this study. This study aims to propose a patch antenna that can operate in the frequency ranges of the Wi-Fi 6E standard and perform a resonance frequency estimation application using Long Short Term Memory in the proposed antenna geometry. The proposed antenna, which stands out with antenna parameter values such as resonance frequency, high directivity gain, and bandwidth under the Wi-Fi 6E standard, is suitable for use in Wi-Fi 6E technologies. The Long Short Term Memory network algorithm makes resonance frequency estimation highly accurate. As a result, geometric antenna parameters for the desired resonance frequency in the Wi-Fi 6E standard can be applied with less power and cost than computer-aided simulation applications.

A COMPACT AND LOW PROFILE DUAL-BAND ANTENNA WITH 5G FOR INTERNET OF THINGS APPLICATIONS

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The Internet of Things is the ability of almost any device that can be used in daily life to exchange data with each other using wireless communication systems. 5G technology, a new generation wireless communication standard, comes to the fore to meet the needs such as increasing data amount, low latency, low power consumption, and security in parallel with the growth in the number of devices using IoT technologies. Hundreds of items will interact simultaneously utilizing numerous radio bands in the Internet of Things (IoT) era. Since they constitute the core of these communication networks, antenna designs, the cornerstone of wireless communication, are becoming important to combine the features of IoT and 5th generation systems to meet the needs of these systems. Antennas must be compact and functional over a range of frequency bands. This study presents a low-profile and compact microstrip patch antenna design that can operate at dual resonance frequency to work in IoT applications. The proposed antenna design works in the Ka-band 28 and 38 GHz frequency bands used in the millimeter wave region. A square-shaped monopole antenna with serrated edges supported by a partial ground plane is used, connected to a 50 Ω transmission line. CST Microwave Studio software is used to model and simulate the created structure. Rogers DiClad 880, which has a dielectric coefficient of 2.2, is built on a dielectric layer with dimensions of 10x10x0.51 mm^3. At the 28 GHz center frequency, the bandwidth is 1.39 GHz, and the directivity gain is 3.73 dBi between 27.4 GHz and 28.79 GHz frequencies. At the 38 GHz center frequency, the bandwidth is 1.42 GHz, and the directivity gain is 4.66 dBi between 37.05 GHz and 38.475 GHz frequencies. The proposed antenna prototype, which stands out with its simple design, compact structure, easy production, low cost, and antenna parameter values such as dual resonance frequency, directivity gain, and bandwidth, is a good candidate to be used in IoT applications 5G technology.

PREDICTION OF SOFTWARE FAULTS WITH BILSTM DEEP LEARNING MODEL

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In the technology industry and software sector, the detection of software faults is of great importance and plays a role in the effectiveness of the software. In the methods performed with traditional approaches, past experiences or various programs are used to identify software faults. This causes the process to be slow and, in many cases, the late delivery of the software to the end user. For these reasons, the importance of autonomous applications using artificial intelligence has increased. Such applications enable the software to work more effectively and are both time and cost efficient by minimizing errors. In this study, software faults were predicted using deep learning model and faults were classified using various features. The study consisted of four different stages: obtaining data, pre-processing the data, classifying the data, and evaluating the classification results. Three different data sets, JM1, PC1 and CM1, were used and classified in the study. BiLSTM was used in the classification process and the performance of the classifier was determined by accuracy, F1-score, and AUC score. While 82.00% accuracy was obtained in the prediction process made with the CM1 data set, a 0.7 AUC score was calculated. In the JM1 dataset, the accuracy and AUC score were 80.66% and 0.6, respectively. The most successful classification process was obtained with the PC1 dataset. In the classification process using this data set, an accuracy score of 91.89% was obtained, while a 0.84 AUC score was calculated. In line with the results obtained, it has been seen that the deep learning model used performs an adequate classification process.

Keywords: Deep learning, Software faults, Artificial intelligence, Software engineering, Fault prediction

DESIGNING OF PERSONALIZED PANCREATIC ADENOCARCINOMA MICROENVIRONMENT: AN EXTRACELLULAR MATRIX ANALYSIS

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Pancreatic cancer (PC) is a deadly disease with a 5-year survival rate of approximately 10% [1]. The main reason for the high death rate is the aggressive tumor microenvironment (TME) which contains dense collagen (COL), hyaluronic acid (HA), and fibronectin (FN) and forms as a result of desmoplastic reactions [2]. This extracellular matrix structure increases internal pressure, reduces vascularity, obstructs drug delivery, provides a safe zone to proliferate cancer-associated fibroblasts and macrophages, and causes hypoxic/acidic conditions [2]. Hence, it is important to understand patient-specific TME to develop personal drug screening systems. In this study, we have investigated patient-specific TME compositions and developed substrates for patient-derived organoids, which will be used for drug screening platforms.

Patient material was collected and stored in the Advanced DMEM/F12-based carrier medium. After protein extraction, the total protein concentrations were determined via BCA (bicinchoninic acid) assay, and COL-HA-FN amounts were analyzed by ELISAs. Additionally, histological evaluation was completed for each patient. The patient-specific porous 3D substrates were designed according to the protein ratio of the HA and FN on the COL. Next, the substrates were characterized thermally, chemically, and morphologically by differential calorimetry, Fourier transforms Infrared spectroscopy and scanning electron microscopy, respectively. Our results suggest that each patient has a specific protein ratio, and the characterized substrates can be good candidates to carry patient-derived organoids. (University of Health Sciences Clinical Ethics Committee, File Number: 19/9, 2019, TUBITAK Project Number: 121S050)

Keywords: pancreatic cancer, 3D films, tumor microenvironment

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MALIGNANT PANCREATIC ADENOCARCINOMA CELLS-TARGETED LIPOSOME-LIKE PARTICLES: A TARGETED DRUG DELIVERY APPLICATION

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Pancreatic adenocarcinoma (PA) is a disease with the seventh highest death rate worldwide and is difficult to diagnose early [1]. In addition, the average survival rate in patients with tumor resection has been reported to be 10-25% [2]. Radiotherapy, chemotherapy, and immunotherapy methods have been used to treat PA to date. Even though it has been observed that the treatments applied to increase the patient survival rate, the undesirable side effects in the patients show that the treatment methods need to be developed.

In our project, it was investigated anti-mucin 4 modified liposome-like particles were synthesized and absorbed into the cell by the pancreatic adenocarcinoma cell line, HPAF-II. The PANC-1 cell line was used as a control group since it did not present mucin-4 like HPAF-II. The particles were used in the project due to their biocompatibility, low cost, ability to encapsulate hydrophilic and hydrophobic components, and protect their contents from external factors. After the particle fabrication process, the morphological, chemical, and thermal properties of the particles were characterized using transmission electron microscopy, Fourier transforms infrared spectroscopy, and differential calorimetry, respectively. The surface of the particles has been modified with anti-mucin 4 to increase the selectivity. Afterward, cellular encapsulation of the surface-modified particles, loaded with fluorescein isothiocyanate, were analyzed for HPAF-II cells compared to PANC-1 counterparts at various dilutions via Operetta High Content System (Perkin Elmer, USA).

The results obtained showed that the fluorescent isocyanate transported by surface-modified particles continued to exist in HPAF-II cells even at day 7. It showed the particles could be used in targeted and long- term release studies. (BAP Project Number: 2020/061)

Keywords: Pancreas, adenocarcinoma, liposome-like particles, fluorescein isothiocyanate

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INVESTIGATION OF SIZE AND VIABILITY CORRELATION OF 3-DIMENSIONAL MICROTISSUES FOR DRUG SCREENING

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Drug screening systems can investigate optimizing drug doses and even combinations of drugs [1]. The conventional in vivo and in vitro studies have been known with limitations such as different metabolism, physiology, oxygen, nutrient, and metabolites circulation, and pathophysiology from human tissues [2, 3]. For instance, 2-dimensional cultures do not represent the native tumor cell microenvironment; therefore, they may show unreliable drug effects while in the clinic. [2]. Alternatively, spheroids, as 3-dimensional microtissue, can be generated from tumor cells and have hypoxic conditions at the center, likewise tumor tissues [4]. These microtissues can be used to design human-based drug screening studies. However, the tissue models still require optimization and more detailed research with regard to their formation.

The study investigated how the spheroid size can be stabilized before drug treatment since the size is one of the vital parameters of drug screening studies. Thus, we recorded the size changes of homogenous lung carcinoma spheroids formed with 5,000, 10,000, or 50,000 cells day by day for 7 days using the Operetta High Content Screening system. The analyses were supported with viability tests and histology analyses for days 1, 3, and 7. Our data shows that the spheroid size remains constant between days 7 and 10 and is suitable for drug treatment. Currently, doxorubicin, as a model drug, is screened on the spheroids to evaluate viability and spheroid size.

Keywords: drug screening systems, 3D culture, spheroid

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APPLICATION OF PHTHALOCYANINE COMPOUNDS IN TRANSDERMAL DRUG RELEASE SYSTEMS

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The transdermal drug delivery system is a method used to avoid the decisive limitations associated with oral drug delivery methods, by using the skin as a drug administration site, delivering biologically active agents to the systemic circulation through the blood vessels in the skin [1-2]. Photodynamic therapy is a promising treatment modality in cancer management, which refers to the preferential destruction of tumor cells by combination of photosensitizer, light, and oxygen [3]. Phthalocyanines are important blue and green 18-p electron macrocyclic conjugated compounds which play a major role in modern technology with application in many fields such as semiconductor devices, photodynamic therapy, organic light-emitting devices, sensors, non-linear optics, and photovoltaic solar cells [4].

In this study, it is aimed to use peripherally and nonperipherally substituted phthalocyanines, which can be used in the treatment of skin cancer, in transdermal drug delivery systems. For this purpose, poly(vinyl alcohol)/Chitosan (PVA/CS) membranes with different thicknesses will be prepared and the effects of PVA/CS ratio, membrane thickness, temperature, pH, penetration enhancer and drug concentration on transdermal release will be examined in order to obtain the optimum transdermal release profile.

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INVESTIGATION OF IN VITRO BIOLOGICAL ACTIVITIES OF BEE POLLEN SAMPLES OF SİVAS PROVINCE IN ANATOLIA

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It is seen that bee pollen is beneficial in the preparation of new and effective nutraceutical food supplement products in terms of pharmacognosy and in keeping people's health sustainable. To strengthen the immune system and in the treatment of chronic diseases, taking pollen as a nutritional supplement and applying therapeutic dietary intakes in a controlled manner are also accepted as complementary medicinal applications [1,2]. In this study, it was aimed to determine the beneficial properties of bee pollen collected from Sivas province such as antioxidant, antiproliferative and antimicrobial in order to create alternative uses. Ethyl acetate, methanol and water solvents were used for the maceration process on the pollen samples obtained from different regions of Sivas in the 2021 harvest period, respectively. The biological activities of the isolates were investigated by applying antioxidant, antimicrobial and antiproliferative activity tests. The Minimum Inhibition Concentration (MIC) test was used in antimicrobial activity tests using gram positive and gram negative bacteria and yeasts. A moderate antimicrobial activity was observed in some pollen isolates against some microorganisms in the study. In order to determine the antioxidant activity, Total Antioxidant Status (TAS), Total Oxidant Status (TOS) and Oxidative Stress Index (OSI) analysis were applied. In general, high antioxidant activity was determined in all isolates of pollen samples. The cytotoxic activity of isolates on human cervical cancer cell line (HeLa), and Mouse fibroblast cell line (L929) and Human endothelial healthy (HUVEC) cell line was evaluated by MTT test, some pollen isolates showed mediocare cytotoxicity activities on cancer cell lines.

Keywords: Anatolia, antioxidant, antimicrobial, antiproliferative, bee pollen, Sivas.

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STUDY OF COOLING SYSTEMS OF NEW GENERATION NUCLEAR REACTORS

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Nuclear reactors are used as power plants in which the chain nuclear reaction is initiated and maintained in a continuous and controlled manner, and nuclear energy is converted to another type of energy (usually electrical energy). Today, as well as classical sources, new energy sources have been need on the nuclear energy. Nuclear energy is believed to be one of the most reliable sources of energy, having both a low carbon pollution and a low ground pollution [1]. The VVER is a series of pressurized water reactor (PWR) designs that were originally developed in Russia in the 1960s [2]. VVER-1200 is the latest model of VVER reactors. VVER stands for Vodo-Vodyanoi Energetichesky Reaktor, which means water water energetic reactor in English [3].

In this study, the performance of a Nuclear Power Plant (NPP) has been investigated for cooling system without modifying the conventional fuel assembly of VVER-1200 reactor.

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EXPERIMENTAL INVESTIGATION OF GAMMA RADIATION ATTENUATION COEFFICIENTS FOR KIRKLARELI MARBLE

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The total linear and mass attenuation coefficients, half-value and tenht-value thickness of marble samples from Kırklareli Prıvince have been investigated using different gamma ray energies. Three different gamma ray energies one at 661.7 keV from Cs-137 and others at 1173.2 and at 1332.5 keV from Co-60 hve been used. The measurements were carried out using a gamma spectrometer containing a NaI(Tl) sintilation detector. Comparison between the results from measurements and from computer code of XCOM has also been performed with the results available in literature. The measurement results obtained from marble disks and tablets of limestone powder were also matched [1].

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DETERMINATON OF ^{137}Cs ACTIVITY CONCENTRATIONS IN TOPSOIL SAMPLES FROM SOUTH-CENTRAL REGION OF TURKEY

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Artificial radionuclides such as ^{137}Cs, ^{90}Sr, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{131}I etc. have been spread out to the atmosphere by nuclear accidents and nuclear weapon tests [1, 2]. Due to the Chernobyl accident that occurred in 1986, especially artificial ^{137}Cs radionuclide spread around and caused environmental contamination [2, 3]. After the Chernobyl disaster, most European countries including Turkey were affected [4]. ^{137}Cs is an isotope with a long half-life (30.14 years) and is still present in the soil [5]. Unfortunately, ^{137}Cs radionuclide in soil transfers to the food chain and exposure to ^{137}Cs causes the health hazards [2, 3, 6].

In the present study, the topsoil samples were collected from various locations in South-Central Region of Turkey. The activity concentrations of ^{137}Cs were obtained using high-purity germanium gamma ray detector. To determine the radiological hazard due to artificial ^{137}Cs radionuclide, the dose rates, outdoor and indoor annual effective dose rates were calculated. The obtained activity concentrations and annual effective dose rates were compared with other studies. The activity concentrations of ^{137}Cs were found to range from Minimum Detectable Activity (MDA) to 31.58±0.34 Bq kg^{-1}. The mean values of absorbed dose rates, outdoor and indoor annual effective dose rates were obtained as 0.09 nGy h^{-1}, 3.77 and 15.10 µSv y^{-1}, respectively. Calculated values were found lower than the worldwide standard value of annual dose (70 µSv y $^{-1}$) and recommended annual dose rate limit (1 mSv y $^{-1}$) [7].

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INDOOR RADON CONCENTRATIONS IN DWELLINGS OF UZUNKÖPRÜ/EDİRNE (TÜRKİYE)

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Radon gas is a natural radioactive gas and has three main isotopes: radon (^{222}Ra) in the ^{238}U chain, thoron (^{220}Rn) in the ^{232}Th chain and actinon (^{219}Rn) in the ^{235}U chain [1]. When these three isotopes are compared, the half-lives of ^{220}Rn and ^{219}Rn are quite short compared to ^{222}Rn [2]. Radon exists at different levels in soil, water and air. As a result of the decay of ^{238}U in soil and rocks, radon dissolves into the groundwater, migrates to the air and penetrates into dwellings through the pores and cracks [3]. In winter, indoor radon concentration increases due to lack of ventilation in dwellings [4]. Radon and its progenies adheres to dust and particles in the air and as a result of inhalation, tissues and organs are exposed to alpha irradiation and cause cancer, especially by damaging the lung. Inhalation of radon and its progenies is the second cause of lung cancer after smoking [5, 6].

In this study, the indoor radon concentrations in Uzunköprü Edirne (Turkey) were measured for different dwellings in winter using an AlphaGuard 2000 Pro monitor. The obtained indoor radon concentrations in dwellings were compared with the results of various studies performed around the world.

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GEOCHEMICAL ASSESSMENT OF SURFACE AND GROUNDWATER IN AND AROUND KIRKLARELİ PROVINCE

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In this study, the geochemical properties of water samples taken from 15 sampling points determined in and around Kırklareli city center were evaluated. Most of the water samples are Ca-HCO_3 type, while spring waters are evaluated as Ca-Cl and Ca-SO_4 types. The pH of the spring waters varies between 6.33 and 6.81, and the pH values of the surface and groundwaters vary between 8.52 and 7.1. While the cation sequence of the groundwater samples is Ca>Na>Mg>K anion sequence is HCO_3>Cl>SO_4, the cation sequence of surface waters and spring waters is Ca>Mg>Na>K and anion sequence is HCO_3>Cl>SO_4The water-rock interaction is prominent in the chemical composition of the waters, while the chemical composition of the three spring examples interacts with precipitation. Chadha and Gibbs diagrams revealed that, reverse ion exchange due to silicate and carbonate weathering in the host rock and recharge from precipitation played a dominant role in shaping the geochemical properties of the waters in the research area.

INVESTIGATION OF DOSIMETRIC PROPERTIES OF COLORED PAPER SAMPLES USING ELECTRON SPIN RESONANCE (ESR) TECHNIQUE

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Some modern colored paper samples were studied as possible dosimeters for gamma doses up to 10 kGy using Electron Spin Resonance (ESR) spectroscopy technique. Paper samples of five different colors produced by the same manufacturer were examined before and after gamma irradiation. The ESR spectra of the red and yellow paper samples contained no resonance signals before irradiation, while the blue, green, and orange paper samples showed signals of Mn^{2+} impurities. The ESR spectra of the gamma irradiated samples showed two different radiation induced signals originating from cellulose and calcium carbonate. Inorganic mineral fillers and binders are used together with cellulose fibers in papermaking and the most common mineral filler is $CaCO_3$ [1]. The dose-response curves associated with the radiation-induced sharp ESR signals originating from the $CaCO_3$ filler of the blue paper (g=1.9990) and the orange paper (g=1.9990) follow a single exponential saturation function. Despite the observed decrease in signal intensity of blue and orange paper over time, detectable ESR signals were obtained even 300 days after irradiation. The results suggest that free radicals induced in mineral $CaCO_3$ filler grains in papers have the potential to be used for retrospective ESR dosimetry.

Keywords: ESR; Paper; ESR dosimetry; Free radicals; Gamma irradiation; Radiation

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EXACT ANALYTICAL SOLUTION OF SCHRODINGER EQUATION FOR NONCENTRAL MODIFIED RING-SHAPED OSCILLATOR POTENTIAL

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Schrödinger equation for noncentral modified ring-shaped oscillator potential is investigated by using extended NU method in analytical manner. The potential is a generalized type of ring-shaped oscillator potential, double ring shaped potential, double ring shaped harmonic oscillator potential, some extended class of Smorodinsky-Winternitz potentials, double ring shaped Coulomb oscillator potential, anisotropic ring shaped oscillator potential. Bound state solutions of the Schrödinger equation are obtained exactly. Wave functions which are achieved in terms of biconfluent Heun polynomials are presented graphically.

ORAL PRESENTATION

USABILITY OF MEDICAL TEXTILES WITH PREPREG COMPOSITE TEXTILES

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Medical textiles covers an area of technical textiles in 12 different areas. Technical textiles provide a very simple product with the addition of specific, useful, ergonomic and desired different features, thus providing a product with high added value. Technical textiles are also widely used in the use of medicine and hygiene products.

With the development of synthetic fibers, the need for raw materials in the field of technical textiles can be met very quickly, so the production of disposable products in this field has been given importance. This is due to the increase in fiber diversity. The use of non-woven surfaces with woven and knitted surfaces has increased the ergonomic properties of the products. However, more specific medical textiles; For example, it is important to process medical textiles with prepreg composite materials in order to develop protective lead aprons for x-rays and to expand their usage areas.

In this study; The usability of medical textiles with prepreg composite materials in specific productions is emphasized.

Keywords: Technical textiles, Medical textiles, Prepreg composites, Nano fibers.

USABILITY OF SPORTS AND LEISURE TIME (RECREATION) TECHNICAL TEXTILES WITH PREPREG COMPOSITE TEXTILES

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Prepreg materials are composite fabrics that are pre-impregnated with resin. Technical textiles are located in 12 different fields. Sports and leisure time (recreation) technical textiles reveal an ergonomic and high added value product with the desired features of a very simple product.

Especially thanks to the very high strength aramid based kevlar fabrics, carbon prepreg fabrics, glass fiber and other synthetic fiber added prereg composites, great progress has been made both for the production of sports equipment and for clothing and equipment used in the realization of sports and recreational activities. We can attribute this to the development of synthetic fibers. Examples of the development of helmets, racing cars, racing bikes, canoe hulls, sports shoes, walking shoes, swimming fins, tennis rackets, hockey sticks, grass pitches, sleeping bags, camping equipment and other sports and leisure (recreation) technical textiles used in speed sports constitutes.

In this study; The usability of sports and leisure time (recreation) technical textiles with prepreg composite materials was emphasized.

Keywords: Technical textiles, Sports and leisure time (recreation) technical textiles, Prepreg composites.

COMBINED MERCERISING MACHINE FOR DENIM FABRICS AND ITS ADVANTAGES

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Denim products produced from cotton fibers have gained popularity due to their features such as comfort, durability, easy processing, low cost and biodegradability [1].

Natural cotton fibers consist of large amounts of impurities and highly crystalline regions that restrict the penetration of dye molecules and other auxiliaries into the fiber structure [2,3]. For this reason, mercerization process is applied to cotton denim fabrics with the effect of NaOH, high temperature, tension, to increase absorbency, brightness, dye uptake and reduce the shrinkage of the fibers [4].

The purpose of the study: To investigate the effect of the combined mercerization machine, which applies the double mercerization process in one step, on the properties of denim fabrics in the production of denim fabrics. For this purpose, the mercerization process was applied to the denim fabrics with the same properties under the same conditions, separately in the machine applying the single mercerization process and the machine applying the double mercerization process. At Mercerized denim fabrics; Strength and air permeability tests were carried out in accordance with the standards, and color values were measured. With the test results obtained, the effects of the combined mercerizing machine on the denim fabric properties were revealed. It was determined that the denim fabric passed through the combined mercerization machine had better breaking strength, air permeability, brightness and dye uptake.

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PREPERATION AND CHARACTERIZATION OF NOVEL MODIFIED GRAPHENE OXIDE REINFORCED NANOCOMPOSITE MATERIALS BY SLA 3D PRINTER

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As well known, epoxy acrylate resins have been widely used in SLA 3D printers applications. Epoxy acrylate systems have generally consisted of bisphenol-A glycerolate diacrylate (epoxy acrylate resin) and 1,6-Hexanediol diacrylate (HDDA, reactive diluent resin). The purpose of this study is to develop novel epoxy acrylate systems for 3D SLA printers and observe the properties of produced materials. For this reason, novel modified graphene oxide phases were synthesized. First, graphene oxide was synthesized by Hummers method. Then aromatic diisocyanates (TDI;toluendiisocyanate and IPDI; isophorone diisocyanate) and 2-Hydroxyethyl methacrylate (HEMA) were reacted with graphene oxides in THF solvent. These modified graphene oxide solutions were entegrated into epoxy acrylate system. Tensile, izod impact resistance, shore-D hardness, abrasive and density tests were applied to the produced materials. Considering of the results, substantial increases were observed in terms of tensile strength and modulus, izod impact resistance, taber abrasive resistance and shore-D hardness. Moreover, densities of the produced novel samples presented considerable increases.

ORAL PRESENTATION

SYNTHESIS OF MOLYBDENUM AND TUNGSTEN NANOPARTICLE DOPED MAGNETIC DENDRIMERS AND THEIR USE IN THE DETERMINATION OF PNP

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Magnetic nanoparticles (MNPs) are frequently preferred nanomaterials that have been the subject of many applications due to their unique physical properties, magnetic susceptibility, biocompatibility and stability [1]. Unmodified magnetic nanoparticles show clustering and agglomeration behavior due to magnetic interactions between them and this prevents the nanoparticles from exhibiting their unique superior properties [1,2]. Generally, by adding a dendrimer to the surface of magnetic nanoparticles, their aggregation in liquid can be prevented and their physical stability can be increased. At the same time, silanol surfaces can be functionalized with intermediate linkers (organosilane molecules containing amine, carboxylic acid, aldehyde end groups) to covalently bind specific bio-ligands to the surfaces of magnetic nanoparticles [3]. Organic molecules can be attached to these functionalized groups as well as inorganic molecules or nanoparticles. Especially in catalytic applications requiring surface activity, metallic nanostructures or molecules can be doped into these dendrimer structures.

In this study, the synthesis of two generations (G_2) of water-insoluble dendritic structures with new magnetic properties and the synthesis and characterization of two new supports by adding Molybdenum (Mo) and Tungsten (W) separately into the cavities of the dendritic structure were carried out. The role of Mo and W doped dendritic materials as catalysts for the reduction of paranitrophenol (PNP), a water pollutant from factory wastes, was investigated.

Keywords: Magnetic dendrimers, Molybdenum, Tungsten, Reduction of (PNP)

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OPTICAL PROPERTIES OF GaZnO METAL OXIDE SEMICONDUCTOR THIN FILM

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Metal oxide films were vastly researched due to flat screen applications, liquid crystal device applications, transistor applications and solar harvesting device applications [1-3]. GaZnO thin films are metal oxide thin films which illustrate outstanding electrical and optical properties [4]. In this work, GaZnO thin films were grown on ITO using the electrochemical deposition method to investigate the optical properties of the thin films. which is an affordable and reliable method, to investigate the optical properties of thin films. The method is found to be reliable and affordable where reasonable thickness control was obtained. In the deposition, Zn and Ga molar rates were kept stable. Voltage was set to – 0,9 V and reaction pot was at 70ºC and deposition took 3600 sec.

The optical properties of the GaZnO thin films were investigated between 300 – 850 nm using a UV-Vis spectrophotometer. The maximum absorption coefficient was measured at 366 nm as 2.77×10^6 m^{-1}. Transmission and reflectance values at maximum absorption were measured as 6.14% and 25.05%, respectively. The forbidden band gap energy of the films was found as 2,66 eV which was measured in the visible region. The maximum extinction coefficient (k) was measured at 613 nm as 0.10 whereas the maximum refractive index (n) value was obtained at 366 nm as 1.36. Moreover, optical conductivity (σ), real dielectric constants (ϵ_r), imaginary dielectric constant (ϵ_i) and dielectric loss (ϵ_i/ϵ_r) values of GaZnO thin films were found to be 8.91×10^{14}, 1.86, 0.27 and 0.15, respectively.

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SILICA 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

OPTICAL PROPERTIES OF ZnAlO THIN FILMS PRODUCED BY ONE STEP ELECTROCHEMICAL DEPOSITION METHOD

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Different electronic components like photovoltaics, displays, transistors, etc are consisting of metal oxide thin films. Metal oxide thin films exhibit outstanding optic, optoelectronic, electrical and electronic properties and therefore, are vastly researched by researchers from different fields. [1]. Metal oxide thin films have high thermal stability with low electrical resistance while they can be consisting of a single material or multiple materials [2]. The electrochemical deposition method is cost efficient with good thickness control while it does not require expensive equipment such as high vacuum systems, etc. Hence, it is commonly preferred to produce metal oxide films. In this work, we use one step electrodeposition method to produce ZnAlO thin films on ITO. We investigate the optical properties of thin films using a UV-Vis spectrophotometer between 200 nm – 800 nm wavelength. In the absorption spectra of the ZnAlO thin films, an apparent peak at 588nm was seen while the maximum absorption coefficient was found at 372 nm as 9.79×10^5 m^{-1}. Bandgap energy was calculated as 3.57 eV which was found to be coherent with the reports presented in the literature. Transmittance values of ZnAlO films were found to be 80% in the visible region while it can drop up to 37% in the max absorption region. The refractive index of the ZnAlO thin films increased with decreasing wavelength while the extinction coefficient diminished with decreasing wavelength. The maximum n value was found to be 1.26 while the minimum k value was 0.007. Moreover, optical (Єi), dielectric loss(Єi/Єr), optical conductivity (σ) values were found as 1.61, 0.09, 0.06 and 2.92×10^{14}, respectively.

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A STUDY ON THE ANTIOXIDANT, ANTIMICROBIAL AND CYTOTOXIC ACTIVITY OF ROYAL JELLY SAMPLES FROM SİVAS CITY

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The raw material source of royal jelly is pollen, water and honey. The worker bees change the nutrients they take in their bodies in the production of royal jelly for feeding of queen bees and baby bees. After young worker bees consume pollen as a result of digestion in digestion organs, it comes to the mammary glands through blood. The first milk is produced and supplied to the oral cavity, at this stage it seems like milk. It has the consistency of cream, then it thickens and turns into a cream color. The most important feature of royal jelly is effective on the regeneration, production and metabolism of the cell in the body. In these subjects, it was found to be significantly increased on life expectancy in insects, poultry and mammals. In this study, it was aimed to determine the antioxidant, antiproliferative and antimicrobial efectiveness of royal jelly from Sivas city in order to create alternative uses. Water extraction was used for the maceration process on the royal jelly samples obtained from different regions of Sivas in the 2022 harvest period, respectively. The Minimum Inhibition Concentration (MIC) test was used in bacteria and yeasts. A moderate antimicrobial activity was observed in some royal jelly isolates against some microorganisms in the study. In order to determine the antioxidant activity, Total Antioxidant Status (TAS), Total Oxidant Status (TOS) and Oxidative Stress Index (OSI) analysis were applied. In general, high antioxidant activity was determine in all products. The cytotoxic activity of isolates on human cervical cancer cell line (HeLa), and Human endothelial healthy (HUVEC) cell line was evaluated by MTT test, royal jelly samples showed weak cytotoxicity activities on both HUVEC and HeLa cell lines.

Keywords: Anatolia, antioxidant, antimicrobial, antiproliferative, royal jelly, Sivas.

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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.

POSTER PRESENTATION

FIRST PRINCIPLE STUDIES OF SURFACE PHONON MODES IN GeSe LAYERED CRYSTAL

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The surface phonon dispersion spectra of GeSe layered crystal was investigated by using first principles calculations based on the density functional perturbation theory (DFPT). In a result of the calculations, the surface of GeSe has been interpreted as an arrangement of periodically placed slabs of finite different thickness along the direction perpendicular to the surface with infinite extension in other two directions.

Based on the periodic boundary conditions, a detailed first principles analysis of the surface modes located in the area of allowed bulk phonon states of GeSe crystal, as well as outside (above and below) of the boundaries of phonon states area have been performed. To obtain the phonon states the forces acting on the atoms after small deviations of the atoms from their equilibrium positions have been calculated.

The existence of localized vibrational modes at the slab's surface has been revealed. Both longitudinal and transverse surface modes localized within a few atomic layers were found at energies above the bulk bands. The effect of film thickness by comparing the surfaces of two-, four-, six-, and eight - layer slabs has also been discussed.

EVALUATION OF AIR QUALITY IN ESKİSEHİR

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Air pollution is the presence of certain substances in the air in the form of solid, liquid and gas in the atmosphere at a level and for a period of time that may pose a danger to humans and other living things or non-living things. Therefore, air pollution control should be done and pollutants should not exceed certain limits. For this reason, it is important for our health to be informed about the air quality of the city we live in and to consider our lifestyle in accordance with the air quality.

In this study, hourly data of particulate matter (PM), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2) and ozone (O_3) between the years 2019-2021 at Eskişehir Odunpazarı station were examined. The temporal variation graphs of all pollutants drawn at Odunpazarı station, it was observed that pollutant concentrations increased between 06-12 and 18-23 hours, generally in late summer and autumn. The wind rose drawn for the station, it was observed that the prevailing wind direction is “West”, “North West” and “East”. The pollution winds shows that the directions with the maximum pollution frequency are east for PM_{10} pollutant parameter, west for CO, west for NO pollutant parameter, west for NOx pollutant parameter, East for NO_2 pollutant parameter, East for $PM_{2.5}$ pollutant parameter, direction and the east direction for the SO_2 pollutant parameter.

The highest value was found to be 94% in the correlation relationship chart examined to examine the relationship of pollutants with other atmospheric parameters and this value is between NOx and NO pollutants. A value greater than 50% indicates that there is a strong and positive relationship between pollutants. The lowest value was determined to be -67% and this value was observed between humidity and temperature parameters. The value being less than -50% indicates that there is a negative but strong relationship between the parameters. To sum up, only NOx exceeding the critical limit value is caused by vehicle emissions and high-temperature combustion processes. For this reason, suggestions have been made in the study to attract this pollutant to the boundary layer determined to create healthy conditions.

DETERMINATION OF RESISTANCE TO COBALT ($CoCl_2$) HEAVY METAL OF PLANT PROBIOTIC BACTERIA TO BE USED AS BIOLOGICAL FERTILIZER IN AGRICULTURE

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Biofertilizers can be defined as products containing live microorganisms [Plant growth promoting microorganisms (PGPM)] and Plant probiotic. Biofertilizers have a very important role in agricultural production and economy globally and have become an important parameter of organic farming.

In this study was collected rhizosphere soil samples from different plants; (Triticum aestivum L (Wheat), Hordeum vulgare L. (Barley), Helianthus annuus L. (Sunflower), Cicer arietinum L. (Chickpea), Avena sativa L. (Oat), Phaseolus vulgaris L. (Bean) and total of 48 bacteria were isolated. Resistance of isolated bacteria to heavy metal (CoCl2) was determined using concentrations of 5 mM, 10 mM, 15 mM. In 5mM concentration, 8 isolates (MH34-1, MH 34-4, MH34-8, MH36-8, MH36-8, MH37-2, MH37-3, MH37-4) were resistant and 40 isolates were susceptible; at 10mM concentration, 7 isolates (MH34-1, MH34-8, MH36-8, MH36-9, MH37-2, MH37-3, MH37-4) were susceptible and 41 resistant isolates; at 15 mM concentration, 4 isolates (MH34-1, MH34-8, MH36-8, MH36-9) were found to be resistant and 44 isolates to be susceptible.

Keywords: Biofertilizer, Plant probiotic, PGPR, Heavy metal

ANTI-ULCER AGENT LANSOPRAZOLE REMOVAL FROM WATER USING BISMUTH OXIDE NANOPARTICLES: A SYNTHESIS, CHARACTERIZATION AND ADSORPTION STUDY

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Lansoprazole, is known as proton pump inhibitors, is a widely used anti-ulcer agent drug that specifically inhibits gastric acid secretion. It is used in the treatment of heartburn and gastroesophageal reflux disease, treatment of gastric and duodenal ulcerative diseases and Zollinger-Ellison syndrome Therefore, the anti-ulcer agent lansoprazole is abundant in wastewater [1-2].

In recent years, the use of nano-metal oxides in various applications in physical, chemical, biological, medical, optical, mechanical and engineering sciences has attracted great interest due to their small size, large surface area and porous structure [3-4]. Drugs in water are one of the main organic pollutants. Considering the potential toxic effects of drugs on the human health and environment, it is very important to remove them from the aquatic medium or wastewater. In this context, bismuth oxide nanoparticles were synthesized with a simple, effective, low-cost, useful and green method, and the usability of the synthesized bismuth oxide nanoparticles was evaluated in the adsorption of anti-ulcer agent lansoprazole. The characterization of the synthesized particles was carried out by various analyzes including SEM, FTIR, XRD and BET. As a result of the characterization, the nanostructure of nano-metal oxide nanoparticles were confirmed. Moreover, isotherm, kinetic and thermodynamic studies were carried out to analyze and model the experimental data obtained for adsorption of lansoprazole by bismuth oxide nanoparticles. The results obtained in this study showed that bismuth oxide nanoparticles are more effective adsorbent in removing the anti-ulcer agent lansoprazole.

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ALUMINUM OXIDE NANOPARTICLES AS A NOVEL ADSORBENT FOR BIOREFINERY CONTEXT: SYNTHESIS AND APPLICATION FOR CITRIC ACID REMOVAL

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Carboxylic acids are mainly manufactured by fermentation route, and so their removal and recovery from the fermentation broths is necessary and of great importance for their continuous production. In this context, this study aims to propose novel adsorbent for biorefinery. Citric acid is an economical and environmentally friendly versatile chemical used in cleaning, separating, buffering, wetting and dispersing applications. It is also utilized in the food, cosmetics, beverage, metal processing and pharmaceutical industries [1-2]. Due to their widespread use and high consumption, the biorefinery of citric acid is necessary and important.

In recent years, nano-metal oxides have emerged as a new adsorbent group for the separation of various compounds, since nano-metal oxides have desired adsorption properties such as a larger surface area and higher porosity [3-4]. Taking into account the important adsorption properties of nano-metal oxides, in this study, aluminum oxide nanoparticles were synthesized and characterized, and assessed the applicability as a novel adsorbent for biorefinery context. For this purpose, the removal of citric acid from water was investigated by adsorption method using aluminum oxide nanoparticles. The effects of adsorption parameters on the removal capacity such as equilibrium time, initial citric acid concentration, aluminum oxide nanoparticles amount, and temperature were examined. Additionally, isotherm, kinetic and thermodynamic modelling studies have been executed to determine the adsorption characteristics. This work concluded that aluminum oxide nanoparticles can be utilized as a novel sorbent for the removal of citric acid from water or wastewater.

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PREPARATION of ZINC-CONTAINING MICROFLOWERS WITH DIFFERENT MORPHOLOGIES USING HYDROTHERMAL SYNTHESIS & INVESTIGATION OF THEIR USABILITY AS ANTIMICROBIAL AGENTS

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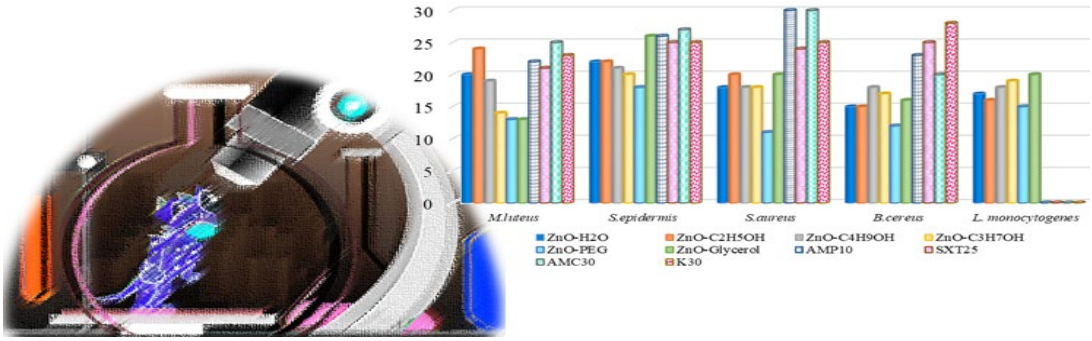
Zinc oxide (ZnO) is a semiconductor with distinctive physicochemical properties such as wide bandgap, biocompatibility and non-toxicity. ZnO nano/microflowers are used in flat panel displays, UV laser diodes, photodetectors, gas sensors, spintronic devices, field emission devices, photoluminescent materials, *etc.* [1]. Due to their outstanding optical properties, such as UV absorption and transparency to visible light, these ZnOs are used to make sunscreens, paints and cosmetics.

In recent years, some multidrug resistant (MDR) microorganisms have been the subject of research interest in the field of nanotechnology to study, evaluate and develop new elimination strategies. Different nano/micromaterials such as TiO_2, MgO, Ag_2O and ZnO have been studied as potential antibacterial agents. However, ZnO is the most promising due to its biocompatibility and low cost; previous reports have demonstrated its bioactivity against *Staphylococcus aureus* ATCC25923 (*S. aureus)* and *Escherichia coli* ATCC1280 *(E. coli*.) These bacteria are of great importance for human health. *E. coli* is the most studied and widely used prokaryotic organism; it is almost ubiquitous and extremely common in the intestines of humans and some animals and has been linked to foodborne illnesses and outbreaks [2].



In this study, synthesis of zinc-containing nano/microflowers with different morphology obtained by hydrothermal method and were evaluated against pathogenic bacteria. The results obtained showed that antibacterial and anticandidal activities of the synthesized zinc-containing nano/microflowers had remarkable inhibitory effects on the growth of various pathogenic microorganisms when compared with standard antibiotics.

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MAGNETIC SOLID PHASE EXTRACTION OF Fe_3O_4 DOPED NANOFLOWERS FOR ENRICHMENT OF HEAVY METAL IONS

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Most of the industrial activities require high amount of water and therefore, vast amount of wastewater was produced. Such wastewaters could contain heavy metals [1]. Heavy metals (Hg, Cd, Pb, As, Cd, Cr, etc.) in wastewaters were found to be dangerous for ecology and living organisms. Removing heavy metal ions from wastewaters were important to reduce their harmful effects. Heavy metals could have side effects on marine life, health, agriculture and therefore on economy of countries. Recently, various reports illustrated the potential of nanomaterials which was used in the solid phase extraction method to remove heavy metal ions from wastewaters [2,3]. To enrich the trace amount of analytes solid phase extraction was used. Nanomaterials have high surface area and high adsorption capacity and therefore, could be used in analyte extraction and enrichment. To collect nanomaterials from reaction pot, researchers tend to produce nanomaterials with magnetic characteristics. Magnetic materials could easily be collected from solution via external magnet.

In this work, cobalt(II/III) oxide (Co_3O_4@Fe_3O_4) nanoflowers were used in lead (II) and cadmium (II) adsorption where nanomaterials were used as adsorbent. To optimize the adsorption, parameters like pH, eluent type, eluent amount, adsorption duration were investigated. The highest adsorption rate of Co_3O_4@Fe_3O_4 nanoflowers for Pb^{2+} was achieved at pH 7.5, 1M HNO_3 and 20 mL, 100 mg, 30 min; for Cd^{2+}, the highest recovery rate was obtained at pH 8, 1 M HNO_3 and 5 mL, 200 mg, 30 mins.

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RECOVERY OF Cr(VI) AND Cd(II) IONS BY SOLID PHASE EXTRACTION USING Co_3O_4 NANOFLOWERS

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Inorganic and organic pollutants including heavy metals were used in various products such as pharmaceuticals, dyes, additives, etc. Such pollutants could be found in fresh waters and wastewaters and therefore, became one of the most essential problems since, the rate of the heavy metal ions (Pb(II), Cd(II), Cr(VI), Hg(II), Ni) becoming dangerous. Heavy metal ions are hazardous and can be harmful for humans, environment, and animals. Low cost adsorption methods are vastly used for heavy metal recovery since the method is simple, repeatable, and selective. At this point, nanostructures are becoming important since nanostructures can be used in different technological applications due to their outstanding physical and morphological properties. Among those, nanoflowers are quite important since they have high surface area/volume ratio and therefore, can be used in heavy metal recovery applications. Nanoflowers could be produced using different methods; however, hydrothermal synthesis method steps forward since, it is simple, and low cost method where nanostructures in good crystallinity could be observed [1-4].

In this work, Co_3O_4 nanoflowers were produced using hydrothermal synthesis. Nanoflowers were used in adsorption of chrome (Cr^{6+}) and cadmium (Cd^{2+}) heavy metal ions where Flame Atomic Absorption Spectrometry (FAAS) was used. In our work, optimization of eluent type, eluent amount, pH and sample volume was studied. In the optimum conditions, repetition, SRM, and recovery of the heavy metal ions was also studied using FAAS.

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

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Recently, perovskite solar cells have become the rising star of the third-generation solar cell technologies due to the superior physical and chemical properties of perovskite materials. As of today, the certified power conversion efficiencies have reached 25.8% [1]. Despite very competitive efficiencies of perovskite solar cells, the sensitivity of perovskite solar cells to oxygen and humidity adversely affects their stability. Several methods such as to prevent ion diffusion [2], to develop inert carbon-based electrodes [3] have been studied. Besides, the development of encapsulation techniques [4], perovskite surface passivation with antioxidant materials have been developed in the literature for their improvement.

In this study, quercetin was used both in the perovskite structure and in the washing solution, in order to improve the stability of perovskite solar cells, especially to improve the stability problems caused by oxygen sensitivity. Quercetin was extracted from onion and we have observed that the insertion of quercetin into the perovskite solar cells structure has both improved the performance and the stability of herein investigated perovskite solar cells.

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THERMAL DEGRADATION KINETICS OF A NEW PYRAZOLE DERIVED METHACRYLATE POLYMER, POLY(1,3-DIPHENYL-1H-PYRAZOL-5-YL METHACRYLATE)

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In present study, we synthesized a new pyrazole derived methacrylate monomer, 1,3-diphenyl-1H-pyrazol-5-yl methacrylate, from the reaction of 1,3-diphenyl-5-pyrazolone with methacryloyl chloride in the presence of triethylamine. After that, its homopolymerization was carried out by free radical polymerization method at 60 °C initiated with benzoyl peroxide [1]. Spectral characterizations were achieved by ^{1}H-NMR and FTIR spectroscopies. The kinetics of thermal degradation of the new polymer, poly(1,3-diphenyl-1H-pyrazol-5-yl methacrylate) were investigated by thermogravimetric analysis at different heating rates [2,3]. The initial decomposition temperature of the polymer changed from 216.3 °C to 243.5 °C depending on the increasing heating rate. The thermal decomposition activation energies in a conversion range of 7–19% were 79.45 kJ/mol and 81.56 kJ/mol by the Flynn–Wall–Ozawa and Kissinger methods, respectively. Thermodegradation mechanism of the present polymer were investigated in detail by using different kinetic methods available in the literature [4,5] such as Coats-Redfern, Tang, Madhusudanan and Van Krevelen. Among all these methods, the best result was obtained for Coats-Redfern method (E =90.93 kJ/mol) at the optimum heating rate of 15 °C/min for a one-dimensional diffusion type deceleration mechanism, D_1 mechanism.

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SYNTHESIS, CHARACTERIZATION AND THERMAL DECOMPOSITION KINETICS OF A NOVEL PYRAZOLE BASED COPOLYMER SYSTEM: POLY(1,3-DIPHENYL-1H-PYRAZOL-5-YL METHACRYLATE-CO-STYRENE)

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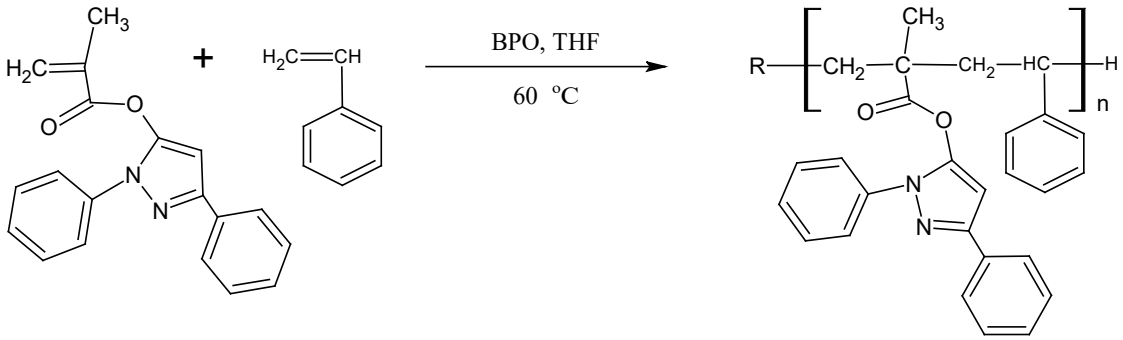
A new copolymer containing pyrazole substituted 1,3-diphenyl-1H-pyrazol-5-yl methacrylate (DPMA) and styrene (St) units, [poly(DPMA-co-St)], was synthesized and characterized [1]. Thermal degradation kinetics of the copolymer system was investigated in detail with the thermogravimetric analysis (TGA) technique [2]. An increase in the thermal stability of the copolymer from 252.02 °C to 274.89 °C was observed depending on the change in heating rate (5 °C/min – 20 °C/min). The thermal degradation activation energies of the copolymer were 149.37 kJ/mol and 140.99 kJ/mol, respectively, with the Kissinger and Flynn-Wall-Ozawa methods in the conversion range of 9% - 21%. The thermal degradation mechanism of the copolymer was investigated in the light of different kinetic methods such as Coats-Redfern, Tang, Madhusudanan, Van-Krevelen and Horowitz-Metzger [3-5]. The results showed that the thermal decomposition mechanism of the copolymer proceeds through one-dimensional diffusion-type deceleration mechanism at the optimum heating rate of 20 °C/min.



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SYNTHESIS OF NEW HETEROCYCIC COMPOUNDS AND EVALUATION OF THEIR ANTIOXIDANT ACTIVITIES

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Multicomponent reactions (MCRs) are an extremely useful type of organic reaction in which three or more different starting materials react with the one-pot method to turn into a product. These types of reactions are one of the interesting and important subjects of organic chemistry, as they reduce the synthesis steps and energy consumption and enable the formation of new carbon-carbon and carbon-hetero atom bonds [1, 2].

Oxazines, a class of heterocyclic compounds, are found in many important dyes, medicinal substances and pesticides [3, 4].

In this study, oxazine derivative compounds were synthesized in different reaction environments (temperature, catalyst, solvent, etc.), their structures were determined by various spectroscopic methods (FTIR, ^{1}H NMR, ^{13}C NMR) and the antioxidant activities of these compounds were studied.

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THE EFFECT OF DOPING OF PEDOT: PSS ON THE PERFORMANCE OF PEROVSKITE SOLAR CELLS

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Perovskite-based solar cells appear to have significant potential to overcome the disadvantages of first, second and third generation solar cells and may outperform. Perovskites are inexpensive, abundant, and solution-processable. Recently, their certified power conversion efficiencies have reached 25.8% [1]. Despite high efficiencies their stability problems due to their sensitivity to light, oxygen and humidity seem to be the major drawbacks beyond their commercialization [2].

In this study, we fabricated inverted type perovskite solar cells in the p-i-n structure. PEDOT:PSS was used as a hole transporting material (HTL). We have investigated the effects of the effect of doping of PEDOT:PSS with Co, Cd, Li, Ce, KI. We have observed that the Cd and Co doping of PEDOT:PSS have significantly affected the device performance and stability.

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