5th International Conference on Physical Chemistry & Functional Materials

BOOK OF ABSTRACT PROCEEDING

ORAL

June 23-25

2022

EDITORS

Sultan ERKAN, Ph.D.

Savaş KAYA, Ph.D.

Derya Betül ÜNSAL, Ph.D.

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Book of Abstracts of the 5th International Conference on Physical Chemistry & Functional Materials (PCFM)

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Published, June 2022

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INVITED SPEAKERS

Konstantin Katin, National Research Nuclear University - Russia

Savaş Kaya, Cumhuriyet University - Turkey

Mikhail M. Maslov, National Research Nuclear University - Russia

Arman Jalali, University of Tabriz - Iran

Bhavana Gupta, IGCAR - India

Ricardo A. Matute, Bioquímico de la Universidad - Chile

Ashish Kumar, Lovely Professional University - India

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Welcome to PCFM 2022

Dear Colleagues,

The PCFM 2022 is an international conference for sharing knowledge and results in theory, methodology, experimental, and new trends and research results in any fields of Science and Technologies. The conference will bring together researchers and practitioners from both academia as well as industry to meet and share cutting-edge development in the field. The Conference welcomes significant contributions in all areas of Science and Technology in theoretical and practical aspects.

Authors are encouraged to participate in the conference by submitting abstracts/articles illustrating research results, projects, surveying works, and industrial experiences that explain important achievements in the related areas.

Yours sincerely,

Sultan ERKAN, Ph.D.

Savaş KAYA, Ph.D.

Derya Betül ÜNSAL, Ph.D.

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IS: Invited Speakers, OP: Oral Presentation

SCIENTIFIC PROGRAM

5th

International Conference on Physical Chemistry & Functional Materials (PCFM)

23-25 June 2022

(IS: Invited Speaker, OP: Oral Presentation, PP: Poster Presentations)

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14.00 -14.30	IS-3: Prof. Ahmet Orhan Görgülü Title: **Fluorescence Probe Development for Chestnut Cancer Fungi Diagnosis**	13.30-14.00	IS-9: **Arman Jalali** Title: **Can Biofuels Solve the Global Warming Problems?**
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14.45 -15.00	OP-2: Amina Ben Ayed Title: **Synthesis of Polyacrylamide@Pollen Compositeand its Application in Uranyl Ion Removal**	14.15 -14.30	OP-14: Hakan F. Öztop Title: **Performance of Single and Multi-Teg Mounted Channel Flow by Using Ag-MgO-Water Nanofluid**
15.00 -15.15	OP-3: Rihab Gargouri Title: **Multiple Linear Regression Model and Artificial Neural Networks for the Prediction of Molar Diamagnetic Susceptibility of Inorganic Ionic Compounds**	14.30-14.45	OP-15: Muhammed Sayraç Title: **Obtained Diffraction Patterns of Small Size Structure under Different Illumination Wavelength**
15.15 -15.30	OP-4: Naeem Ullah Title: **Development of a New Green Microextraction Approach in A Syringe System Couple with GFAAS for Analysis of Trace Amount of Silver in Fresh and Wastewater Samples Using a Multivariate Strategy**	14.45-15.00	OP-16: Sibel Pekdemir Title: **Physicochemical and Biological Effects of Plant Extracts in Polymer Blend Studies**
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16.15 -16.45	IS-5: Aşkın Akpolat Title: **The place in essential oil studies of the Lamiaceae family**	16.15 -16.30	OP-17: Meltem Sarıoğlu Cebeci Title: **Investigation and Applicability of Biodiesel Production from Vegetable Oils**
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17.00 -17.15	OP-6: Fadwa Gharsallah Title: **Nonenzymatic Glucose Sensor Based on In Situ Reduction of NiO-Graphene Nanocomposite**	16.45 -17.00	OP-19: Muhammed Sayraç Title: **The effect of structure parameters and static electric field on the nonlinear optical properties of triple InGaAs/GaAs quantum well**
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11.15-11.30	OP-30: Fereshteh Gharehbaghi Maleki Title: **CFD simulation of the effect of the mixer speed on non-Newtonian fluid temperature uniformity in anaerobic digestion**	11.15 -11.30	OP-51: Tugba AGBEKTAS Title: **The Effect Of Azometine Group Compounds Containing Shifft Base On Expression Profiles Of Genes Involved İn Wnt And Mapk Pathway İn Lung Cancer Cell Lines: In Silico And In Vitro Analysıs**
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15.45 -16.00	OP-39: Nihal Deligönül Title: **Determination of Sensor Properties of Aza-BODIPy-based Molecules**	15.45 -16.00	OP-60: Usman Muhammed Sani Title: **Analysis of Boronic Acids Containing Amino Ferrocene by DFT Approach and In Silico Studies**
16.00 -16.15	OP-34: Mustafa Ersin Pekdemir Title: **Binary PLA–Waste Photopolymer Blends for Biodegradable Food Packaging Applications**	16.00 -16.15	OP-61: Sevgi Durna Daştan Title: **Chemical and Functional Composition and Biological Activities of Anatolian Hypericum Scabrum L. Plant**
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10.30-11.00	IS-12: Prof. Alaa Kadhim Farhan Title: **Smart Sensors and Iot Applications**
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10.15-10.30	OP-37: Aytül Yıldırım Title: **Accumulation of Heavy Metals in Apricot Orchards Irrigated with Stream Water Drained by Sewage**
10.30-10.45	OP-76: Hande Haykır Title: **Artificial Intelligence Applications in Personalized Medicine and Drug Development**
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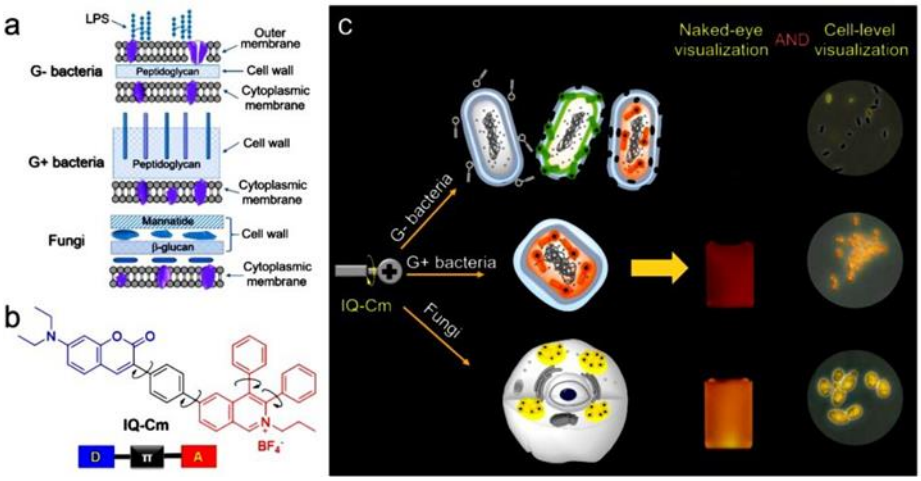
Fluorescence Probe Development for Chestnut Cancer Fungi Diagnosis

Ahmet Orhan Görgülü

Chestnut tree grows in many regions of Anatolia. As the fruit and timber of the chestnut tree are used, its honey is an extremely valuable type of honey. Therefore, we can consider chestnut as an industrial tree species. However, our chestnut forests have been dying rapidly lately. The biggest reason for this is Chestnut blight (chestnut blight cancer). Chestnut blight, which is caused by Cryphonectria parasitica, which is common in the chestnut forests of our country, is a disease that causes significant damage both in our country and in the world species, especially the European chestnut (Castanea sativa L.). This disease can also be seen in oak, Castanopsis, Maple, Rhus typhina and Caria (Carya ovata) trees along with chestnut trees. Until today, an antifungal struggle, which has given importanceto physical and biological control, has not been fully engaged. Cryphonectria parasitica can cause mass death in chestnut trees. Today, it is one of the biggest factors that surrounds the whole world and threatens chestnut forests.



(Ref.1 Chem. Sci., 2020, 11, 4730)

It was observed in the first preliminary studies that the coumarin compounds we developed wereeffective against Cryphonectria parasitica.

DMSO DMSO + coumarin - AOG

OP-1

Deep Learning Performance on the Cross-Section Data of Some Alpha Nuclear Reactions

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One of the important studies carried out to understand the nucleus in nuclear physics studies is the calculation of the cross-sections of nuclear reactions. By using alpha particles some important studies can be performed such as elemental analysis, investigation of materials properties, nuclear reaction studies and medical radionuclide production. Therefore, the alpha particle reaction cross section is also an important piece of information for such studies. The strong binding of an alpha particle makes it behave like a nucleon and this nucleon-like structure leads to stronger Coulomb interaction than a proton. The alpha particle has the ability to highly ionise and excite atoms and thus loses its energy rapidly. The interaction of an alpha particle with the nucleus is a possible cause of Coulomb excitation and inducing a nuclear reaction. In this study, reaction cross sections of alpha particles with different energies sent on some isotopes were tried to be estimated by deep learning methods. In the method used, the parameters of alpha particles were taken as inputs of the network and cross-sections were obtained. In addition, the importance degrees of these parameters in obtaining the cross-section were determined. As a result of the study, the success of the deep learning method in obtaining the cross-sections of alpha induced reactions has been observed.

OP-2

Performance of Single and Multi-Teg Mounted Channel Flow by Using Ag-MgO-Water Nanofluid

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In this study, two different TEG model (Model 1and Model 2) are designed, mounted between two channels with hot and cold flow. In Model 1, three TEGs are positioned equidistantly along the channel. In addition, three obstacles were added to the upper channel which carries hot fluid. In Model 2, one TEG is mounted in the middle of the channels and one obstacle is added. The TEG, obstacle and channel dimensions are the same in both models. Water and water-based Ag/MgO hybrid nanofluid (at 0.02 volume fraction) are used as hot and cold heat transfer fluid and the effects of these fluids on TEGs performance are investigated. The numerical study is conducted in five different Reynolds number between 500 and 1500. Analysis of the models is performed by using fined element-based code COMSOL Multiphysics. In Model 1, the electrical potential produced by water at Re=1500, TEG 1(near hot fluid inlet), TEG 2 (in the middle of the channels) and TEG 3 (near cold fluid inlet) is calculated as 0.485 V, 0.478 V and 0.0.476 V, respectively. With water-based Ag/MgO hybrid nanofluid instead of water, the electrical potential of TEG 1, TEG 2 and TEG 3 are obtained as 0.502 V, 0.495 V and 0.493 V, respectively. With the water-based Ag/MgO nanofluid, 7% increase is achieved in TEG 1, TEG 2 and TEG 3 output power compared to water. In Model 2, the electrical potential produced by TEG 4, with water and water-based Ag/MgO at Re=750, is obtained as 0.49 V and 0.506 V, respectively. With water-based Ag/MgO, higher TEG output power values are achieved in both models as compared to water. In addition to that, in Model 1, TEG 1 gives higher output power values than TEG 2 and TEG 3, with both water and water-based Ag/MgO, and for the entire Reynolds number range.

OP-3

Electric and Dielectric Properties of Poly(E-Carpolactone) Nanocomposites Reinforced with Beidellite Nanoclay

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Poly(ε-caprolactone) (PCL) nanocomposites reinforced by an organomodified Beidellite (BDT) with 3% cetrimonium bromide (CTAB) were prepared at various loading loads (1,2,3 and 5% by weight). Broadband dielectric spectroscopy was used to investigate the various samples at temperatures ranging from 0°C to 40°C and a frequency range spanning from 10^{-1} Hz to 10^{-6} Hz. Three relaxation processes were discovered in pure matrix: electrode polarization (EP), Maxwell-Wagner-Sillars polarization (MWS), and α relaxation. The addition of the filler resulted in the formation of a fourth process, interfacial polarization, in the high frequency domain of dipolar origin (IP). The non-cooperative nature of this process was proved by fitting the data using the Havriliak-Negami model and studying the relaxation time variation with temperature as a result. The activation energy and dielectric strength results revealed that a 3 wt.% displayed improved interfacial characteristics and dispersion quality.

Keywords: dielectric properties, nanocomposites, interfaces, activation energy.

OP-4

Conical Channel Design in AA7075/AZ91 Materials Joined with Mechanical Locking Method (MLM)

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In industrial applications, materials with different chemical and physical properties are used by joining them. The main purpose is to achieve high performance at the most affordable cost by joining the superior properties of materials. In joining processes, many methods such as casting, bonding, rivets, and bolts are used, especially the welding method. The mechanical locking method, which is a new and environmentally friendly method among joining methods, stands out as a successful method especially in joining different metal types. The patent studies of the method, numbered TR 2015 03256 B, were completed in 2017 and methodological research continues for its use in different industry sectors. One of the materials joined in the method is called the mold piece and the other as the reshaped piece. Within the scope of this study, the optimization of the stress distribution due to the channel geometry on the AZ91, which is designed as a mold part from the AA7075/AZ91 material pairs joined with the mechanical locking method. It is aimed that the radiuses to be made in the canal will be in a way that will not adversely affect the tensile values, and will facilitate the material flow. In the analysis, fixed connection angle and fixed channel depth determined in accordance with the data obtained from the results of the previous research were used. ANSYS package program, Workbench version 18.2, Static Structural Module, which uses the finite element method, was used in the analysis. All the work was done on 3D geometric models. According to the results obtained, it has been determined that the appropriate radiuses to be made in the channel part of the mold part reduce the stress values and facilitate the material flow.

OP-5

Multiple Linear Regression Model and Artificial Neural Networks for the Prediction of Molar Diamagnetic Susceptibility of Inorganic Ionic Compounds

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Popular electronic structure principles like Maximum Hardness Principle, Minimum Polarizability Principle, Minimum Electrophilicity Principle and Minimum Magnetizability Principle found many applications in the literature [1]. Chemical hardness [2] is reported as the resistance towards electron cloud polarization or deformation of chemical species. According to Maximum Hardness Principle [3] there is a remarkable correlation between chemical hardness and stability. This principle imparted to the science with the explanation "a chemical system tends to arrange itself so as to achieve to maximum hardness". In a recent paper, Kaya and Chattaraj [4] investigated the powerful link between Maximum Entropy and Minimum Magnetizability Principles. Minimum Magnetizability Principle states that in a stable state, magnetizability is minimized like polarizability. In the present study, for inorganic ionic systems, we investigated with many important quantum chemical descriptors of magnetic susceptibility considering popular electronic structure principles mentioned above. For this aim, we used Multiple Linear Regression Model and Artificial Neural Networks techniques. The equation derived via these techniques provides quite close results to experimentally measured magnetic susceptibility values and the results of Kaya magnetic susceptibility equation based on standard absolute entropy. Additionally, we note that Maximum Hardness and Minimum Magnetizability Principles support each other's.

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OP-6

Obtained Diffraction Patterns of Small Size Structure under Different Illumination Wavelength

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In this research, we study how different forms of electromagnetic radiation interact with atoms and molecules. This atom/molecule-light interaction is known as spectroscopy. There are several types of electromagnetic radiation, which depend on the frequency of light. In this study, diffraction of small size structure is studied by using the different illumination wavelength sources. Changing the aperture-screen distance and the illumination wavelength gives information about the diffraction pattern of the target structure. The transition from Fresnel to Fraunhofer region is observed for different input parameters. The numerical simulations of the diffraction pattern are performed using a personal computer with Matlab software.

Keywords: Spectroscopy, Diffraction, Optics, Numerical simulation, Micron/nanostructures.

Acknowledgment

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OP-7

The effect of structure parameters and static electric field on the nonlinear optical properties of triple InGaAs/GaAs quantum well

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In this present study, the effects of different quantum well widths and applied external electric fields on the nonlinear optical properties of $In_xGa_{1-x}As/GaAs$ triple quantum well are theoretically investigated. For this, firstly, the subband energy levels and their wave functions of the system are obtained by using the diagonalization method within the framework of the effective mass and parabolic single-band approximation. Afterward, the nonlinear optical properties such as the total optical absorption coefficients (TOACs) and total relative refractive index changes (RRICs) of the structure are numerically calculated by using the compact density matrix approach via iteration method. The obtained numerical results showed that the varied structure parameters and external electric field cause a red or blue shift in the resonant peak position of TOACs and RRICs coefficients. The importance of this shift in the resonant peak is that the optical response can be easily controlled and can be used to design the possible new optoelectronic devices within the range of THz of the electromagnetic spectrum.

Keywords: Low dimensional structures; Quantum wells; Semiconductor $In_xGa_{1-x}As/GaAs$; Numerical Simulations

OP-8

Theoretical and Experimental Characterization of Er-based Ce co-Doped Hydroxyapatites

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This is the first theoretical and experimental research of Ce and Er co-doped hydroxyapatite (HAp) structures. Ce content has been added in 0.13at. % steps from 0.13at. % to 0.78at. %. Er, the content was fixed at 0.39 % at all occasions. A wet chemical procedure was used to synthesize the samples. Powder X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, Raman spectroscopy, scanning electron microscopy (SEM), energy dispersive X-ray (EDX), differential thermal analysis (DTA), thermogravimetric analysis, EC series Cp, and in vitro biocompatibility tests were used to investigate the prepared samples experimentally. Furthermore, the energy bandgap, density of states (DOS), density, and linear absorption coefficient (LAC) calculations were theoretically studied. As well as the comparison between theoretical and experimental values of the lattice parameters and unit cell volume has been studied. It was found that the thermal behavior and morphology, as well as all X-ray diffraction (XRD)-related parameters, were all affected by Ce concentration. The HAp structure was confirmed by Raman spectroscopic, and Fourier transform infrared (FTIR) spectra for all samples. As photon energy rises, the linear absorption coefficients decrease.

Keywords: Hydroxyapatite, X-ray diffraction, Spectroscopic analysis, Bandgap

OP-9

A New Portable Green Switchable Microextraction Method in a Syringe System Couple with FAAS for Determination of Lead in Real Water Samples

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A new green and simple portable switchable hydrophilicity microextraction couple with FAAS in a syringe system was developed for preconcentration and determination of lead using 2,9 dimethyl-4,7-diphenyl-1,10-phenanthroline as complexing agent. In the proposed method triethylamine (TEA) was used as a switchable extraction solvent and their polarity was switched on and off (water miscible/immiscible) by simply using CO_2. CO_2 was used as a stimulus for triggering the transformation to the water-miscible form and removal of CO_2 to achieve the reverse phase. The switching phenomena of sitchable solvent from low to high polarity were confirmed by conductivity measurements. Under optimized experimental condition good responses were chieved in the concentration ranges of 5.0–100 µg L^{-1}. The relative standard deviation (RSD) and enhancement factor was found to be 4.5% and 150. The limit of detection (LOD) of the proposed method was found to be 0.090 µg L^{-1}. The certified reference material and a standard addition method was used to validate the desired method. The proposed method was used to quantify the trace levels of lead in real water samples.

Keywords: Lead, syringe system, microsampling, 2,9 dimethyl-4,7-diphenyl-1,10-phenanthroline), flame atomic absorption spectrometry, water samples

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OP-10

Phase Transitions of Alumina and Their Influence on Deep Desulfurization

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Synthesis of double hydrolysis mesoporous alumina using hydrothermal technique used in this study as porous support for ZnO and Ni precursor. The desulfurization activity of Ni/ZnO supported on mesoporous double hydrolysis alumina and their phase transition were compared with Ni/ZnO supported on commercial prepared alumina. The desulfurization activity and sulfur adsorption capacity of the adsorbents are strongly related to the diffusion rate of the reactant and product molecules, the formation of the inactive $ZnAl_2O_4$ phase and ZnO particles dispersion on the support. The fresh and spent catalysts were characterized and Desulfurization activity shows that Ni/ZnO/DHA-80^oC catalyst achieved an excellent breakthrough sulfur removal (10 ppm) up to 30.26 mL responsible for 110.4 mg S/g sulphur adsorption capability. This desulfurization performance is 200 times higher as compared to commercial alumina synthesized Ni/ZnO/COM adsorbent, revealing a compromised reactive adsorption desulfurization activity of 1300 ppm at set 30.26 mL model fuel flow with 38 mg S/g accumulative sulfur capacity. Detailed characterization results show that, the superior reactive adsorption desulfurization performance shown by Ni/ZnO/DHA adsorbent is due to the presence of negligible amount of coordinatively unsaturated Pentacoordinate unsaturated Al^{3+} centers on double hydrolysis mesoporous alumina surface which are responsible for less phase transitions of Ni/ZnO with Al_2O_4 and reduce the inactive spinal $ZnAl_2O_4$ and $NiAl_2O_4$ phase formation even after many regeneration cycles which increases the active ZnO molar concentration as compared to Ni/ZnO/COM catalyst.

Keywords: Desulurization; Ni/ZnO/DHA; adsorption; commercial alumina; double hydrolysis alumina

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OP-11

Photocatalytic Degradation of Brilliant Green Dye by Synthesized SnO_2 Nanoparticles: Factorial Design, Kinetics, and Isotherm Models

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The SnO_2 photocatalyst was prepared by complexation with diethyldithiocarbamate, calcinated at different temperature 450, 600 and 750 and used for photocatalytic degradation of brilliant green (BG) dye. The synthesized SnO2 NPs were characterized by different techniques EDX, zeta potential, DLS, FTIR and SEM to investigate the elemental composition, surface charge, functional groups, morphology, and particle size of prepared NPs. The calcination 600 ^{0}C showed better photocatalytic degradation capability as compared to others. The fluorescent light showed highest photo degradation% of BG dye as compared to visible and mercury light. The photodegradation of Brilliant green (BG) dye used fluorescent light source and irradiation time was 30 min. The degradation % of BG dye increased, with rise of photocatalyst dosage up to 20 mg. The highest degradation of BG dye was found at 10 pH and 10 mg L^{-1}. The degradation of BG dye is more likely followed pseudo second order and isotherm model Langmuir as compared to other models. The results revealed that BG dye was completely decolorized in 30 min. The effects of variables were examined by factorial design (18 experiments by cantered Draper-Lin small composite model).

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OP-12

Distribution of Rare-Earth Cations in RE-Doped Barium Aluminosilicate Glasses Analyzed by Molecular Dynamics Simulation

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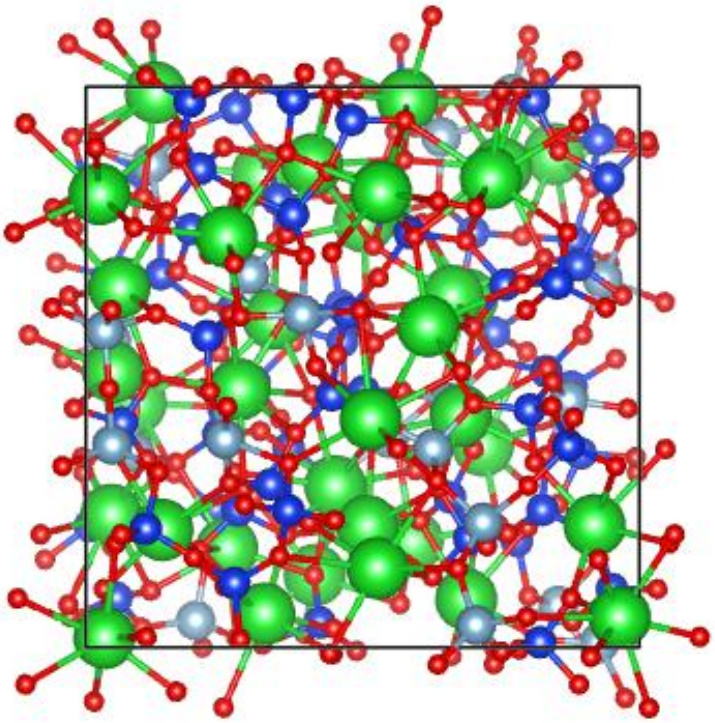
Rare-earth (RE) doped peralkaline aluminosilicate glasses are of particular interest for optical applications. The well understanding of coordination environment of RE ions in such glasses is crucial to optimize spectral proprieties. In this work, Molecular Dynamics (MD) simulation is applied to examine the atomic scale network structure and the incorporation of RE ions in barium aluminosilicate glasses co-doped with Gd_2O_3 (0–4 mol %). Pedone potential is adopted as interatomic force field. The Figure below shows snapshot of MD-generated glass structure. Structural properties like coordination numbers and pair distribution functions are compared to experimental data with an excellent agreement. Atomic distribution in the first and second coordination spheres of Gd and Ba atoms are investigated. MD-generated structures reveal different forms of RE incorporation coexisting in the glasses. Moreover, it is revealed that Ba modifier atoms are agglomerated in clusters forming depolymerized zones, while Gd ions are preferentially embedded in the barium clusters.



OP-13

Investigation of Experimental and Theoretical Optoelectronic Properties of Phthalocyanine and its Graphene Oxide Nanohydride Compound

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Optical bandgap of the organic semiconductors is an important issue, for applications such as light emitting diode (LED), organic photovoltaic devices (OPV) and the photodynamic therapy (PDT) as a photosensitizer. One of the easiest ways to determine the optical energy bandgap of the material is to use the absorption spectra. The spectroscopic properties of metal phthalocyanine compounds provide very useful information about charge transfer between the central metal and the phthalocyanine ligand, because of the overlap between the energy wave functions. In this study, phthalocyanine/graphene oxide nanocomposite compound which has the potential to be used in optoelectronic applications was synthesized as a result of the interaction of phthalocyanine compound, , with graphene oxide. The obtained phthalocyanine and non-covalent phthalocyanine/graphene oxide nanocomposite compounds were characterized using spectroscopic techniques. The optical properties of these compounds were investigated experimentally and theoretically. Optical bandgaps of the prepared thin films of the compounds were determined using the UV-Vis spectroscopy technique. The electronic (chemical hardness, electron affinity, electronegativity) and optical properties of the new produced molecules were also theoretically calculated.

OP-14

Facile Functionalization of Nano-Sized ZnO Based Adsorbents for Remarkably High Diffusion and Desulfurization Activities

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A series of different Ni/ZnO doped mixed metal oxides were synthesized using a hydrothermal precipitation technique and used for removal of high concentrated model gasoline fuel with a 3000 mg L^{-1} sulfur. The reactive adsorption desulfurization (RADS) performance and effect of different Ni and Zn based mixed oxides adsorbents were compared with that of commercial Al_2O_3. The desulfurization activity and sulfur adsorption capacity of the adsorbents are strongly related to the diffusion rate of the reactant and product molecules, the formation of the inactive $ZnAl_2O_4$ phase and ZnO particles dispersion on the support. Catalytic activity evaluation tests shows that Ni/ZnO-Al_2O_3-SiO_2 adsorbents achieved an excellent breakthrough sulfur capacity of 94 mg S/g, which is above 2 times higher as compared to Ni/ZnO-Al_2O_3-Com adsorbent with a compromised RADS performance of 39 mg S/g sulfur capacity. Detailed characterization results show that the higher diffusion rate of reactant molecules within the micro dots Ni/ZnO-Al_2O_3-SiO_2 with small ZnO particles and Ni active sites, lower zinc metallic interactions with micro Al_2O_3, inhibits the formation of inactive $ZnAl_2O_4$ may account for the superior RADS performance of Ni/ZnO-Al_2O_3-SiO_2 based adsorbents.

Acknowledgments: Rooh Ullah would like to thanks to 2221- Fellowships for Visiting Scientists by the Technological Research Council of Turkey (TÜBİTAK) for financial supports.

OP-15

Numerical Investigation of Thermal Performance of Air Cooling for Li-ion Batteries with Finned Surface

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Air cooled systems are used in electric vehicles' battery thermal management systems due to their basic construction and low-cost despite of their low cooling performance. In this study, a novel air-cooled system is proposed, especially for low power applications. Commonly used cylindrical Li-ion batteries were re-designed with different fin configurations donated on the side surface of cells. Axial and cross air flow on aligned and staggered arrays for 4S6P battery module were envisaged for different Re numbers and discharge rates. Results showed that fins have a great effect on cooling performance so that they allow for optimum battery temperature condition; maximum temperature for batteries is between 15 ºC and 35 ºC. On the other hand, they are insufficient to sustain temperature uniformity for 5 ºC temperature difference in entire module volume.

OP-16

Biomaterials for Organoid Modeling and Tumor Spheroids

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Organoids are miniature forms of organs to demonstrate spatio-temporal cellular structure and tissue function. The organoids creation revolutionized developmental biology and provided the opportunity to study and modify human development and disease in laboratory setting. Recently, new biomaterial-guided culture systems have represented the versatility for designing and producing of organoids in a constant and reproducible manner. Since 2D cell culture models often lack *in vivo* tissue architecture, recent detailed research has allowed many 3D culture models development demonstrating the characteristics of *in vivo* organ structure and function. Organoid models can create complex 3D structures that maintain multiple cell types and hide the functions of the relevant organ *in vivo*, and therefore, the development of organoids has revolutionized developmental biology, disease modeling, and drug discovery. The new biomaterials production has been important for development of in vitro 3D models. Further work with biomaterials has been on the creation of hybrid polymers that combine the advantages of both natural and synthetic polymers to replace common materials such as Matrigel and polydimethylsiloxane (PDMS). The creation of 3D culture systems has also revolutionized in vitro drug testing. Furthermore, recreating the three-dimensional environment of tumors and the functional arrangement of cancer cells has been a major motivation for developing new tumor models. Under defined culture conditions, cancer cells can form three-dimensional structures known as spheroids and steps in embryonic development to self-organize into three-dimensional cultures known as organoids. These newly designed biomaterials using for tumor modeling will make an important contribution to understand the main mechanisms of cancer.

OP-17

Catalytic Activities of a Biomaterial (Sumac) Catalyst in Sodium Borohydride Methanolysis Reactions

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Because of the poisonous chemicals emitted into the environment because of the carbonization of diminishing fossil fuel sources, the hunt for alternative energy sources is gaining traction today. Therefore, the world needs sustainable, renewable, and environmentally friendly energy to meet its increasing energy needs. Hydrogen is the most well-known clean energy source, and water is released because of hydrogen carbonization. Research on hydrogen has recently gained further importance in this respect. In the present study, methanolysis experiments of $NaBH_4$ were performed in the presence of defatted sumac (*Rhus Coriaria*) seeds were used as catalyst material. The catalyst was synthesized by the chemical reduction method with a 30% metal (Co, Ni, and Zn) loading. After the best metal type was determined, the most active metal ratio was determined by changing the metal (10–50%) ratios. After the catalyst was synthesized, the effects of $NaBH_4$ concentration (1%-7.5%), catalyst amount (0.025-0.20 g) and temperature (30-60 °C) on hydrogen generation rate were examined. At 60°C, the maximum hydrogen generation rate was obtained. Reusability tests were performed, and 100% conversion was achieved after each use.

OP-18

Effect of Si-Doped and Undoped Inter-Layer Transition Time on the Strain-Compensated InGaAs/InAlAs QCL Active Region Grown by MOVPE

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Quantum cascade lasers (QCLs) are high-performance light sources operating in the mid-infrared spectral region (3-20 μm). It offers an infrared laser application a unique combination of compact size, high power-efficiency, and design flexibility. Unlike conventional semiconductor lasers, it uses the principle of inter-subband transitions of electrons in the conduction band. QCLs are the focus of attention for many applications such as trace gas sensing, infrared countermeasures, and free space optical communications. The growth of QCLs is crucial in terms of alloy composition, layer thickness, and hetero-interface quality of hundreds of ultrathin epitaxial layers. Epitaxial growth of such layers is difficult with the MOVPE technique, and it is important to obtain optimal growth parameters. In this study, we will examine the optimization studies of the combination of Si-doped and undoped inter-layer transition time in the strain compensated $In_{0.67}Ga_{0.33}As/In_{0.36}Al_{0.64}As$ QCL structure grown on InP substrate by MOVPE. After growth, the crystal quality and thickness sensitivity of the samples will be investigated with a high-resolution X-ray diffractometer (HRXRD). Optical transitions in QCL active region structures will be determined by photoluminescence measurements. In addition, optical interband transitions will be calculated with the Nextnano simulation program and comparison between experiment and theory will be investigated.

OP-19

Synthesis of Polyacrylamide@Pollen Composite and its Application in Uranyl Ion Removal

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Uranium is the longest-lived radio nuclides, and its pure form is chemically active. It possesses health risks to humans, particularly at relatively high concentrations because of its chemical toxicity and radioactivity. The tolerable daily intake of uranium is established as 0.6 g kg^{-1} of body weight per day [1]. Therefore, the removal of uranium from aqueous solutions is an important interest in view of environmental risks. Adsorption is used as a common method for removal of several species including toxic metals and organic matters in aqueous [2]. Adsorption is not only a removal method; it is also used for enrichment and pre-concentration of target species [3]. It is mostly preferred due to simplicity, selectivity, the availability of different adsorbents, efficiency, and practical use. The content of pollen, which is rich in protein, consists of amino acids, phenolic acids, steroids, enzymes, antioxidants, beta carotene, calcium, magnesium, selenium, nucleic acid, lectin, cysteine, B1, B2, C and E vitamins [4]. In other words, it contains quite a lot of functional groups in its structure. A new material containing pollen (P) grafted polyacyril amide (PAA) was synthesized and its adsorption ability was examined for the removal of uranyl ions from aqueous media. The new developed adsorbent was characterized by FT-IR, SEM-EDX and pzc analysis. Adsorption of UO_2^{2+} ions from aqueous solution as a function of ion concentration, pH, ionic strength, temperature, and reusability of adsorbent was investigated in detail. The adsorption data were analyzed by using the Langmuir, Freundlich and Dubinin-Radushkevich models. The new developed material is a potential adsorbent for effective removal of uranyl ions from aquatic solutions.

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OP-20

Comprehensive Growth and Characterization Study of GeO_x/Si

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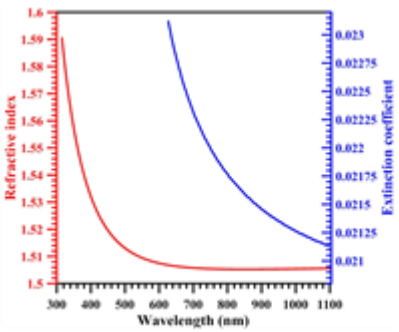
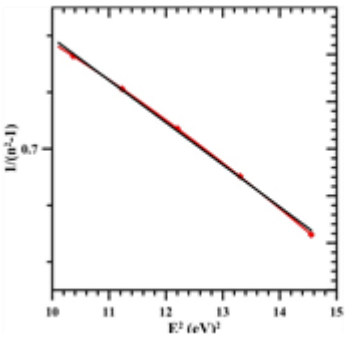
The ellipsometer is very sensitive to the surface and it is versatile thin film measurement technique. It uses polarized light and measures the change in polarity of reflected and transmitted light. It is used to determine the thickness, refractive index, extinction coefficient, surface roughness, crystallinity properties of the material. With the help of this technique, it is possible to measure thicknesses of a few nanometers very precisely.

In this study, reactive RF magnetron sputtering method was used to deposit GeO_x on Si substrate. Optical constants were obtained by using a spectroscopic ellipsometry in the 350-1100 nm spectral range. The spectral dependencies of refractive index, extinction coefficient and complex dielectric function was revealed by analyzing experimental ellipsometric data under the light of sample-air optical model. Then, average oscillator strength, single oscillator energy, and dispersion energy were calculated for GeO_x/Si structures using the Wemple-DiDomenico single oscillator model (WDD) [1-3].





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OP-21

Sol-Gel Synthesis of Molybdenum Trioxide with an Orthorhombic Crystal Structure for Supercritical Water Gasification Application

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Molybdenum trioxide (MoO_3) is a transition metal oxide and has a variety of industrial applications such as photocatalyst, the anode in lithium-ion batteries, and gas sensors, because of their electrochemical and optical properties [1]. Crystallite MoO_3 has mainly three structures; one stable orthorhombic (α-phase), and two metastable phases namely hexagonal (h-phase) and monoclinic (β-phase), respectively [2]. In this study, MoO_3 with orthorhombic crystal structure was synthesized by the sol-gel method and tested in the gasification of formaldehyde in SCW (SCWG). The presence of supercritical water (SCW) in the gasification of biomass leads to the decomposition of biomass into CO, H_2, CO_2, CH_4, and other organic compounds through acid and base catalyst action of SCW. In this system, to increase the selectivity and formation rate of H_2, MoO_3 as a heterogeneous catalyst was chosen. Structural and morphological changes of MoO_3 with SCWG were investigated using XRD, FT-IR, SEM, BET, TPO, H_2-TPR, and zeta potential. XRD results show that MoO_3 has an orthorhombic crystal structure. Its structure was not changed under SCWG. The surface area of SCWG exposed MoO_3 increased from 35.4 m^2/g into 60.1 m^2/g via the comminution of particles under high pressure and temperature. Based on the SEM pictures in Fig. 1, the MoO_3 synthesized has rod-shaped particles. After the SCWG of formaldehyde, thin planar plates formed. According to H_2-TPR analysis results, it was determined that the reduction properties of MoO_3 changed via the formation of defects. Compared to homogeneous gasification, in the presence of MoO_3 catalyst, percentages of CO_2 and CH_4 decreased and the percentages of H_2 and CO increased via changing of decomposition mechanism.

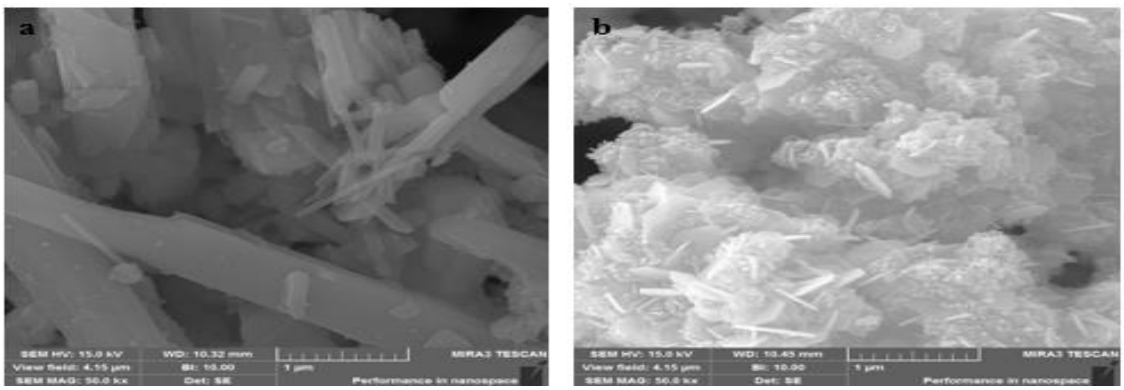

Figure 1: SEM images of MoO_3 before (a) and after (b)SCWG of formaldehyde

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OP-22

Synthesis of Polyacrylamide@Pollen Composite and its Application in Uranyl Ion Removal

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Uranium is the longest-lived radio nuclides, and its pure form is chemically active. It possesses health risks to humans, particularly at relatively high concentrations because of its chemical toxicity and radioactivity. The tolerable daily intake of uranium is established as 0.6 g kg^{-1} of body weight per day [1]. Therefore, the removal of uranium from aqueous solutions is an important interest in view of environmental risks. Adsorption is used as a common method for removal of several species including toxic metals and organic matters in aqueous [2]. Adsorption is not only a removal method; it is also used for enrichment and pre-concentration of target species [3]. It is mostly preferred due to simplicity, selectivity, the availability of different adsorbents, efficiency, and practical use. The content of pollen, which is rich in protein, consists of amino acids, phenolic acids, steroids, enzymes, antioxidants, beta carotene, calcium, magnesium, selenium, nucleic acid, lectin, cysteine, B1, B2, C and E vitamins [4]. In other words, it contains quite a lot of functional groups in its structure. A new material containing pollen (P) grafted polyacyril amide (PAA) was synthesized and its adsorption ability was examined for the removal of uranyl ions from aqueous media. The new developed adsorbent was characterized by FT-IR, SEM-EDX and pzc analysis. Adsorption of UO_2^{2+} ions from aqueous solution as a function of ion concentration, pH, ionic strength, temperature, and reusability of adsorbent was investigated in detail. The adsorption data were analyzed by using the Langmuir, Freundlich and Dubinin-Radushkevich models. The new developed material is a potential adsorbent for effective removal of uranyl ions from aquatic solutions.

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OP-23

Nonenzymatic Glucose Sensor Based on In Situ Reduction of NiO-Graphene Nanocomposite

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Diabetes is known as one of the most important health problems nowadays, the numbers of diabetes patients are increasing rapidly in the world and in our country. In this work reduced graphene oxide and oxide nickel nanoparticles composite NiO-rGO nanocomposite was synthesized by an in situ reduction process which was characterized by scanning electron microscope (SEM), Fourier-transform infrared spectroscopy (FTIR), UV-Vis spectroscopy, X-ray powder diffraction (XRD) [1]. NiO modified reduced graphene oxide (rGO) nanocomposite (NiO-rGO) was introduced to the glassy carbon electrode (GCE) surface for the construction of a nonenzymatic electrochemical glucose biosensor [2]. The electrochemical properties of such a NiO-rGO modified GCE were carefully investigated. It showed a high activity for electrocatalytic oxidation of glucose in alkaline medium. The proposed nonenzymatic sensor can be utilized for quantification of glucose. It also exhibited good reproducibility as well as high selectivity[3].

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OP-24

Investigation of Swelling Kinetics of Polyacrylamide@Chitosan Composite

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Hydrogels are increasingly used in the production, pharmaceutical, agriculture, food industries and biotechnology fields due to their wide application areas in the industry [1]. Weak mechanical properties are the most important factor limiting the usage areas of hydrogels. To improve the weak mechanical properties of hydrogels, polymeric composites were synthesized. Chitosan has proven to be one of the most promising adsorbents for heavy metal removal due to its low cost, highly available, non-toxic, bioactive, biocompatible, biodegradable, and non-toxicity [2]. Chitosan is used in many sectors such as textiles, cosmetics, the production of medical supplies, and agricultural areas. At the same time, chitosan is widely used in the removal of various dyes and heavy metals due to the functional groups in its structure [3]. The –OH, $–NH_2$, and $–NH\text{-}CO\text{-}CH_3$ groups in the chitosan chain function as chelating agents for capturing almost all kinds of ions physically or chemically. However, chitosan has disadvantages such as easy agglomeration, solubility in acid solutions, and poor strength [4]. These negative properties of chitosan are overcome by forming a composite. In the characterization of polymeric composites with swelling behavior, it is very important to examine the swelling properties, water adsorption kinetics, and to elucidate the diffusion type and mechanism. In this study, PAA@Ch composite was synthesized by using chitosan biopolymer with cross-linked network structure, high water holding capacity and inert (PAA) hydrogel. Swelling properties, adsorption kinetics and diffusion type of synthesized PAA@Ch in aqueous medium were investigated. Water holding capacities (S_{eq}), % Swelling and % Equilibrium water contents ($\%S_{BWC}$) were compared. Swelling kinetics were applied to pseudo-first-order, pseudo-second order and Weber Morris models. The results related to diffusion type were evaluated according to Fick's law.

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OP-25

Effect of Selenium Coating on NiTi Shape Memory Alloys: Electrochemical Analysis

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Selenium has many important areas from electronics to the pharmaceutical industry. It is used in Photovoltaic cells, sensors, light meters, solar cells, pigments, etc., as it exhibits semiconductor properties. Apart from this, it is used in trace amounts in the body, as it exhibits antioxidant properties. In this study, two different NiTi biocompatible alloys were coated with selenium by thermal evaporation method. After coating, whether the coating was realized or not was determined by Scanning electron microscope (SEM) and x-ray diffractogram. In addition, after the coating, the roughness test was carried out and it was said that the coating reduced the roughness of the NiTi alloy. It was concluded that the coating was successful, the biocompatibility test of the coated and uncoated alloys was determined by the electrocorrosion method. As a result of the electrocorrosion test, changes in the corrosion rate of the alloy were observed after the coating process. Besides, pitting type corrosive regions were detected after the corrosion process.

Keywords: Selenium, coating, thermal evoparation system, corrosion, roughness

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OP-26

Prunus Mahaleb Shell as a Sustainable Biological Resource for Carminic Acid Removal from Wastewater

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This study focused on the performance of Prunus mahaleb shell (MS) agricultural waste, which is used as an alternative biosorbent for Carminic acid (CA) removal from aqueous solution. The effects of different parameters such as pH, initial dye concentration, contact time, biosorbent dose and temperature on the biosorption of CA to the MS surface were investigated. The characterization of the biosorbent was done by FTIR, SEM-EDX and PZC analyses. It was determined that the isotherm and kinetics of CA removal were consistent with the Langmuir isotherm and pseudo-second-order kinetic models, respectively. The maximum adsorption capacity was calculated as 0.0224 mol kg -1 according to the Langmuir isotherm. According to the ΔH0, ΔG0 and ΔS0 results, the biosorption was found to be endothermic and spontaneous. Based on these data, it is concluded that environmentally friendly, inexpensive, simple to use and effective MS biosorbent can be used for CA removal.

OP-27

Development of a New Green Microextraction Approach in A Syringe System Couple with GFAAS for Analysis of Trace Amount of Silver in Fresh and Wastewater Samples Using a Multivariate Strategy

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A new green liquid phase microextraction method has been launched directly couple with GFAAS through micropipette tip online syringe system for analysis of trace amount of silver in fresh and wastewater samples using a multivariate methodology using 8-hydroxyquinoline (8HQ). as complexing agent. In this method decanoic acid was used as a smart solvent to switch their polarity by simply changing their pH. The multivariate strategy was applied to estimate the optimum values of experimental factors for the recovery of silver. The limit of detection (3 s), the enhancement factor was 1.12 ng L^{-1} and 80, respectively. The validity and accuracy of proposed method was checked by analysis of real water sample in standard addition method. The proposed method was successfully applied to determination of silver in different real water samples.

Keywords: 8-hydroxyquinoline, silver, microextraction, electrothermal atomic absorption spectrometry, multivariate strategy

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OP-28

Investigation of Gene Expression Levels in Thyroid Tissues in Rats Treated with WI-FI Electromagnetic Wave (WI-FI RF-EMF)

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In this study, the effects of wireless waves exposure to rats, their reflections on various enzyme levels in the thyroid tissue, the amount of total RNA and the effects of the expression degree on the determined 12 gene regions will be investigated. These analyzes will be carried out using research kits that can make extremely sensitive and reliable measurements. As a result, it is expected to contribute to the scientific world because of the presentation of the data obtained from these studies. In this context, this research, in which extremely original, reliable, and sensitive measurements will be used; It is thought that it can be a guide and light shedder for many future studies in this field.

Results: Compared to the control group, it was found that the experimental group had significant increases in gene expression values in terms of many genes investigated in the study. It was determined that the differences in gene expression values between the groups were statistically significant ($p<0,05$).

Conclusions: Among the study groups, 12 different genes such as Beta catenin-Axin, beta-actin, GAPDH, GSk-3B, TCF, WNT7A, WNT10A, WNT2, Beclin 1-2 and ATG5-12, which are known to be related to autophagy and oxidative stress, were determined according to the literature. When the expression levels were investigated, it was determined that the expression coefficients of all genes in the wnt/ß catenin pathway, except ATG5 and ATG12, were quite high in the experimental group rats exposed to Wi-Fi EM field, and there were significant differences between them compared to the control group ($p<0,05$).

OP-29

Exact Resolution of The Dynamics of Entanglement between Simple and Quenched Dicke Model

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In a full dynamic description of the Dicke model, we present an analytical treatment of quantum entanglement. To take full advantage of this issue, we solve the dynamic Schrôdinger equation by applying the gauge transformation approach then we compute the Rényi and the Von Neumann entropies. Between simple and quenched Dicke model, we graphically illustrate the results. We show that the dynamics of entanglement exhibits a multi-oscillatory behavior with a multiscale frequency increasing with time.

OP-30

Influence of The Cr and Ti Content on The Phase Transformation,Thermodynamical Parameters Crystal Microstructure, and Electrical Resistivity Of Cu-Al-X (X: Cr,Ti) Shape Memory Alloys

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Shape memory alloys (SMAs) are groups of metallic alloys that contain two solid phases. Factors affecting the alloy with austenite and martensite phase; temperature, magnetic field and mechanical stress. The feature of shape change with the effect of external factors in SMA is the shape memory effect (SME). Cu-based SMAs have become popular as an alternative to the widely studied NiTi alloy group. The low cost of copper-based SMAs is the biggest reason to study. In this study, the effect of heat treatment on some thermodynamic parameters, crystal structure and microstructure of CuAlX (X: Cr, Ti) (% weight) SMA was investigated at three different temperatures (700˚C, 800˚C and 900˚C). The change in the thermal properties of the samples was determined using DSC (Differential Scanning calorimetry). Changes in the crystal and microstructure of the samples were determined using X-ray diffraction (XRD), Scanning Electron Microscope (SEM) instrument and optical microscope at room temperature. When the DSC graph is examined, it is seen that the temperature hysteresis of the samples decreased after the heat treatment. When the XRD results were examined, the particle size of the CuAlCr alloy decreased with increasing of heat treatment temperature. The particle size of the CuAlTi alloy increased with increasing heat treatment temperature. SEM and optical images showed that chromium (Cr) was more dissolved in the alloy compared to titanium (Ti).

Keywords: Shape memory alloy; Heat Treatment; Microstructures; Cu-Al-Cr; Cu-Al-Ti.

OP-31

An Analytic Evaluation of Material, Pressure, Cutting Speed and Water Jet Diameter's Effect on the Surface Quality for the Water Jet Cutting

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The Abrasive Water Jet (AWJ) cutting process uses abrasive particles in a highly pressurized water jet for cutting the metallic and non-metallic materials. It has more advantageous features compared to other cutting methods. AWJ has the ability to eliminate toxic gases, recast layers, slag, and thermal stresses. In this study, the result of the AWJ cutting experiments will be presented. The experiments were performed on two types of steel materials which are widely used in the aviation and naval industry. These materials are BS 7191 355 EMZ and ASTM A516 Gr.60 plates of steel. In total, 180 cuttings were performed with pre-assigned water jet pressure, speed, and diameter parameters. At the end of the experimental study, it was determined that; between both steels; BS 7191 355 EMZ provides a comparatively higher surface quality than ASTM A516 Gr.60 using a small water jet diameter, low-rate speed, and low pressure.

OP-32

Synthesis and Characterization of High Internal Phase Emulsion Templated CNF Doped Polystyrene Foam for The Effective Encapsulation of PEG for Thermal Energy Storage Applications

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We propose a robust route to prepare novel microstructured phase change materials (PCMs) suitable for thermal energy storage (TES) by high internal phase emulsion polymerization method. In this study, a hierarchical emulsion-templated porous styrene-divinyl benzene polymeric with/without carbon nanofiber (CNF) framework encapsulating capric acid-stearic acid (CA-SA) eutectic mixture as PCM were synthesized. A series of composite materials were prepared by adding CA-SA eutectic mixture to polystyrene-divinyl benzene high internal phase template polymer (PHP) and PHP@CNF structure by vacuum impregnation method. This impregnation process was concluded in the creation of PCMs with increased thermal conductivity and high melt-solidification enthalpy capacity, capable of absorbing up to 75% by weight CA-SA eutectic mixture without leaking. The structural, morphological, and thermal behavior of PHPs/CA-SA and PHPs@CNF/CA-SA composite PCMs was characterized by Fourier transform infrared spectrophotometry (FT-IR), scanning electron microscopy (SEM), differential scanning calorimetry (DSC) analysis, and thermogravimetric analysis. DSC analyses indicated that composites PHPs/CA-SA and PHPs@CNF/CA-SA exhibited enthalpy up to 118.01 J/g at around 19°C. The thermal and chemical stabilities of the synthesized composite PCMs were tested with 500 repetitive thermal cycles. After 0.54, 1.08 and 2.17 wt % CNF doping, the thermal conductivity of the composite PCM increased compared to PHP and pure CA-SA eutectic mixture. The results reveal that composite structures with high PCM storage capacity, thermal stability and reusability are good candidates to fabricate new PCM-composite structures for use in thermal energy storage applications with this simple one-step fabrication approach.

OP-33

Effects of Homogenization Temperatures on the Thermodynamic Parameters and Mechanical Properties of CuAlTaGd Shape Memory Alloy

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The elements Cu, Al, Ta and Gd mixed in the ratios of 83.25, 13.5, 3, 0.25 by mass (%wt.) and turned into pellets, and then the alloy was formed by arc-melting production method. The alloy was exposed to N_2 (-196ºC) for five minutes, 850ºC for 30 minutes, and then again to N_2 (-196ºC) for five minutes. The thermodynamic and microstructural characters of the alloy, which was exposed to low temperature → high temperature → low temperature cycle, was investigated by DSC, optical microscope, and microhardness analysis. As a result of DSC analysis, it was determined that the Austenite phase formed as two successive broad peaks in the range of 156-346ºC, and the martensite phase formed as a single peak in the range of 194-251ºC. During heating and cooling, it was observed that the β_1 decomposition phase, which remained from the martensite transformation phase peak, was in the form of a sharp peak in the range of about 431-456ºC. Grain boundaries and rod-like structures were determined from optical microscope images. As a result of the microhardness analysis, the microhardness of the alloy was calculated to be 348 HV on average.

Keywords: Gadolinium, N2, high temperature, microhardness

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OP-34

Investigation of the Removal of Methyl Violet Dye Using Nanoparticles by Green Synthesis: Adsorption, Kinetic and Thermodynamic Properties

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Adsorption is one of the most commonly used methods for the removal of dyestuffs from wastewater. In this study, $FeCl_3$ nanoparticles synthesized by the green synthesis method were used. For the adsorption of methyl violet 2B, a cationic dye, from aqueous solutions, pH, adsorbent dose, initial dyestuff concentration were studied and optimum conditions were determined. Equilibrium data obtained using different initial dyestuff concentrations and different temperatures were applied to the Langmuir, Freundlich, Temkin and Dubinin-Radushkevich adsorption isotherm equations. The adsorption results applied for all temperatures best fitted to the Langmuir isotherm. The separation factor (RL) calculated using the Langmuir isotherm equations is between 0 and 1 at all temperatures, also showing that adsorpsion fits the isotherm. For kinetic studies, experiments were carried out at an initial dye concentration of 50 mg/L and it was found that the adsorption was in fiting the the pseudo-second order kinetic model. For thermodynamic studies, experiments were carried out at different temperatures and ΔG, ΔH and ΔS data were obtained from the Van't Hoff graph drawn using the equilibrium data. Negative ΔG values indicate that adsorption is spontaneous and feasible.

OP-35

Investigation of the Removal of Color and Heavy Metal from Wastewater Using Activated Sludge Continuous System and Application of Models

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In the continuous system studies, the natural state of the activated sludge was used in the packed column and fluidized bed column, and the studies were carried out with the wastewater brought from the synthetic solution scmilar to metal coating industry. In addition, regeneration of activated sludge with HCl and a second use study were carried out, and it was observed that the efficiency decreased considerably in the second use. Thomas, Yoon-Nelson and Bohart-Adams models were applied to the data obtained in the packed column system. It has been observed that there is a good agreement between the experimental breakthrough curves and the model predictions. As a result, it has been observed that all the studied materials can be used as biosorbent in the biosorption of Cu(II), Ni(II) heavy metals and Methylene Blue dyestuff, especially the activated sludge has a high biosorption capacity (Qmax 394.33 mg/g).

OP-36

From Waste to Valuable Material: Green-Synthesis of Silver Nano-Rods Using Spent Coffee Ground Extracts

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Recently, the green synthesis of metallic nanoparticles gained significant attention due to its environmentally friendly and cost effective with potential application fields. Conventional coffee brewing techniques produce large quantities of spent coffee grounds that contain bioactive compounds. In this study silver nano-rods (AgNRs) were synthesized via green method using spent coffee ground (SCG) extract. The structure and morphology of AgNRs was elucidated by different spectroscopic methods such as ultraviolet spectroscopy (UV-Vis), scanning electron microscope (SEM), energy dispersive X-ray spectroscopy (EDX). The maximum absorbance in UV-Vis was observed at 445nm. The SEM images were determined that silver nanoparticles generally have a rod shape and average size of 100 nm. Elemental composition of AgNRs was confirmed by EDX. The strong peak was observed at around 3 and 3.5 keV. This work offers a viewpoint for recycling the spent coffee ground into the economy.

OP-37

4-Phenyl-5-(2-thienyl)-2,4-dihydro-3H-1,2,4-triazole-3-thione: Crystal Structures, Optical Properties and Computational Study

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1,2,4-Triazoles act as important pharmacophores by interacting with the biological receptors with high affinity owing to their dipole character, hydrogen bonding capacity, rigidity and solubility. In this study 4-Phenyl-5-(2-thienyl)-2,4-dihydro-3H-1,2,4-triazole-3-thione was synthesized in a 75% yield and its 3D-structure confirmed by single-crystal X-ray diffraction. Hirshfeld surface analysis indicated that H…H, C-H...C, C-H...S and especially N-H...S hydrogen bond interactions are the primary contributors to the intermolecular stabilisation in the crystal. Using DFT calculations, the optimised molecular structure title compound free from the influence of the crystal field, FMO and electronic properties were deduced. The photophysical behaviour of title compound protic and aprotic solvents was studied by using UV-vis absorption and fluorescence emission spectroscopies. In order to investigate the effects of these solvents, the time-dependent density functional theory (TD-DFT) calculations with the polarizable continuum model (PCM) in the excited state were performed. The calculated results show that the optimized geometry can well reproduce the crystal structure and the theoretical results show good agreement with experimental values.

OP-38

Accumulation of Heavy Metals in Apricot Orchards Irrigated with Stream Water Drained by Sewage

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In order to obtain high efficiency from agricultural lands, the irrigation water properties must be suitable for the soil and plant type. For this reason, in this research; It was aimed to determine the heavy metal contents in apricot orchards irrigated with stream water mixed with sewage water in Baskil district. The study was carried out in 5 apricot orchards that were at the yield age. Soil samples were taken from two different soil depths (0-30 cm and 30-60 cm).

In the sampled irrigation waters, pH, EC, Ca^{++}, Mg^{++}, $Na^{+,}$ K^{+}, $(CO_3)^{-}$, $(HCO_3)^{-}$, (SO_4), B, Cl^{-}, Fe, Zn, Mn and Cu ion analyzes were performed. The SAR (Sodium Absorption Rate), % Na and irrigation water classes were determined by using the analysis results obtained. Fertility analyzes of soil samples (pH, soil texture, soil organic matter, Fe, Zn, Mn, Cu etc.) and heavy metal (Fe, Zn, Mn, Cu) analyzes of plant samples were performed in apricot orchards.

According to the results of the research, it was determined that irrigation water was found in moderately saline (0.560 dS/m), alkaline (7.8 pH)and C2S1 irrigation water classes. Maximum allowable heavy metal and toxic element evaluation was made in irrigation water samples. Evaluation result; It was revealed that the Fe, Cu, and B contents of the samples exceeded the upper limit values of irrigation water, and the Zn and Mn values of the samples did not exceed. While the Zn and Mn contents of the soil samples were at trace levels, the Fe and Cu contents of the soil samples were determined to be above the acceptable limit values.

As a result, when the soil and leaf samples of the apricot orchards were evaluated for heavy metals, it was revealed that the Fe (8,60 mg/l) and B (4,60 mg/l) contents of the irrigation water were above the limit that apricot can tolerate.

OP-39

Investigation and Applicability of Biodiesel Production from Vegetable Oils

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It is very important to find an environmentally friendly alternative such as biodiesel instead of fossil fuels, which play a major role in global warming and climate change, which are the biggest problems of our age. Biodiesel is generally produced from vegetable and animal oils. It is an important step in terms of both development and environmental sustainability to use waste oils, which cause serious damage to water resources when given to the receiving environment, by using them in biodiesel production. In this study, biodiesel was obtained from waste frying oil and unrefined sunflower oil using the transesterification method. The kinematic viscosity of the obtained biodiesels was determined as 5.54 mm^2/s and 6.0 mm^2/s, respectively. The specific gravity values were found to be 0.889g/cm^3 and 0.891g/cm^3, respectively. Performance tests can be made by burning the produced biodiesel in engines as fuel.

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OP-40

MWCNT Nanocomposite Films Prepared Using Different Ratios of PVC/PCL Blend: Transparency, Thermal and Shape Memory Properties

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MWCNT mechanically strengthens the polymer and increases heat transfer within polymers as it increases its electrical properties. In this study, composites were produced by doping with PCL/PVC blend prepared at different ratios, with a fixed MWCNTs ratio of 0.1%. By doing this, it is aimed to examine the effect of polymers, which are blend components, for the MWCNT polymer blend composite. It has been observed that all the composites have shape-memory effects. When the thermal properties of the MWCNT blend composite were examined, it was observed that the melting temperature increased with increasing PCL ratio, in addition, two-step mass loss occurred in all composites. From the opacity measurements, it was seen that the transparency increased as the PVC ratio increased.

Keywords: Shape memory polymer; PCL; nanocomposite; MWCNT; opacity

OP-41

Determination of Sensor Properties of Aza-BODIPy-based Molecules

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Essential transition metal ions are of great importance in the natural life cycle, but excessive accumulation in nature can be very toxic to the environment. The bioaccumulation of heavy metal ions affects every organism at all stages for the food chain. The search for fluorescent chemosensors that can detect transition metals with high selectivity and sensitivity remains a challenge to overcome. There are many instrumental methods for the detection of heavy metal ions, including atomic absorption/emission spectroscopy, inductively coupled plasma-mass spectroscopy (ICPMS), inductively coupled plasma-atomic emission spectrometry (ICP-AES), and voltammetry. These methods are not suitable for assay and require expensive instrumentation. The use of fluorescent chemosensors is constantly increasing due to their versatility, sensitivity, and quantitative capabilities. Molecular probes are not only faster and cheaper than their alternative methods, but they can also be applied as analytical tools in environmental, medical, biochemical fields. In this study, new azadipyrromethene chromophores were synthesized and characterized, and the photoactivity and selective ion binding properties of the prepared fluorescent molecules were determined. The chemosensory properties of the new molecules were tested on living cells.

OP-42

Performance of LightGBM and Deep Neural Networks in Dimuon Analysis

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Dimuons are muon (μ^-) and anti-muon (μ^+) pairs produced at the different stages of the medium created in high-energy collisions. Since they do not interact strongly, they can be utilized to scrutinize properties of the formed medium such as the thermal radiation and production mechanism of various particles. The success of artificial intelligence and machine learning-based on distinct learning algorithms adopted in diverse fields suggested their applications in nuclear, particle, and high energy physics. In this study, Deep Neural Networks and LightGBM, a gradient boosting framework, performances are examined for the determination of dimuons production in proton-proton collisions at the LHC.

OP-43

Binary PLA–Waste Photopolymer Blends for Biodegradable Food Packaging Applications

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Polymers that have the ability to change shape upon application of an external stimulus are called shape-memory polymers. Poly lactic acid (PLA) is a thermal sensitive polyester that is thermally sensitive and biodegradable. In this study, polylactic acid was blended with waste photopolymer in different proportions. Polymer films were obtained from the prepared PLA/photopolymer blends by solvent casting method. Polymer blend films were characterized with ATR-IR. The effect of waste photopolymer on the shape memory feature of PLA was investigated. Finally, its thermal properties were investigated by Thermogravimetric analysis (TGA) and Differential Scanning Calorimetry (DSC). In addition, the opacity test and water vapor permeability analyzes of the polymer blend for food packaging were examined.

Keywords: PLA; waste photopolymer; shape memory polymer; opacity; blend

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OP-44

Development of a New Functional Material for the Accurate Determination of Anastrozole and Letrozole

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Breast cancer is the most common type of cancer in women and the second most common cause of cancer-related death. Estrogen is known to play a major role in the development and proliferation of breast cancer. The effect of estrogen can be prevented either by blocking the estrogen synthesis via antiestrogens or inhibiting the estrogen synthesis by aromatase inhibitors. There are several agents to block this aromatization. The new generation aromatase inhibitors such as Anastrozole and Letrozole have a very strong effect in inhibiting/blocking the estrogen synthesis. Anastrozole and Letrozole are both non-steroidal aromatase inhibitors used in breast cancer treatment. In the study newly synthesized magnetic nanoparticles (Fe_3O_4@TEPA) were used for the first time as sorbent material in a magnetic solid phase extraction of ANA and LET at trace levels. The method provided the linear range for both the molecules ($r^2 > 0.9900$) in the range of 4–160 ng mL^{-1}. The limit of detections (LODs) for ANA and LET were found to be 1.14 and 1.26 ng mL^{-1}, respectively. The method was validated accordingly to International Guidelines, and the recovery experiments were also carried out. The material has satisfactory performance as a promising sorbent material in the development of MSPE techniques with high analytical performance.

Keywords: Anastrozole, Letrozole, RP-HPLC, Magnetic Solid Phase Extraction
Acknowledgments
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OP-45

Artificial Neural Network Predictions on Flexible CdTe Solar Cell Performances Despite of Bending and Time

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CdTe solar cells which are commonly used in the alternative energy source studies were introduced about 50 years ago and they have been particularly studied recently. CdTe solar cells on ultra-thin glass substrates are light and flexible. Flexible CdTe solar cells are widely preferred modules in technological fields. The flexibility of these cells enables them to cope with deformations. The efficiency of CdTe solar cells, which are advantageous in terms of costs, has been reached 19%. In this work, we have used artificial neural network (ANN) method for the determination of the performance of flexible CdTe solar cells despite of bending and time. The performances of the solar cell before and after bending have been predicted. According to the results obtained from the ANN calculations we performed using the experimental data available in the literature, MSE values of ANN estimates range from 0.06% to 0.28%.

OP-46

Use of Magnetic Functional Nanoparticles as a Solid Phase Material in Sensitive Analysis of Antidepressant Drugs in Wastewater and Urine Samples

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Depression is an important health problem that is accompanied by cognitive, psychomotor and psychophysiological disorders, has a chronic course, can go with repetitions, and leads to severe loss of work power and disability. As with many drugs active ingredients, it is important to analyze the low concentrations of such molecules in terms of both monitoring the therapeutic dose and monitoring the excretion products after use. Two main problems encountered in these analyzes are, in most cases, the complexity of the sample matrix and the concentration of target molecules below the detection limits of the chromatographic system. A new enrichment and determination method including HPLC-DAD analyzes after Magnetic Solid Phase Extraction (MSPE) has been developed to monitor trace amounts of SNRI group drug Duloxetine (DUL) and SSRI group drug Vilazodone (VIL). The characterization of the synthesized magnetic nanoparticles for this study was carried out by SEM, FTIR, Raman and XRD techniques. In this proposed method, DUL and VIL molecules were enriched by extruding newly synthesized magnetic-based nanoparticles in the presence of pH: 10.0 buffer medium and desorbing with ACN to a smaller volume again before chromatographic determinations. After experimental variables was optimized, VIL and DUL molecules were analyzed at wavelengths of 228 nm for DUL and 238 nm for VIL using a DAD detector with gradient elution of 10 % Methanol, 60 % Trifluoroacetic Acid (TFA) (0.1%), 30 % Acetonitrile. The detection limits obtained under optimized conditions were 1.48 ng mL^{-1} and 1.43 ng mL^{-1}, respectively. Finally, the developed method was successfully applied to wastewater samples and synthetic urine samples, and quantitative results were obtained in the recovery experiments.

Keywords: Duloxetine, Vilazodone, Magnetic Solid Phase Extraction, Waste water samples, Synthetic urine samples

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OP-47

Magnetic Solid Phase Extraction Method for Sensitive of Sibutramin and Fluoxetine Molecules in Herbal Slimming Products

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A new enrichment and determination method including chromatographic (HPLC-DAD) analyzes after Magnetic Solid Phase Extraction (MSFE) has been developed to monitor the trace amounts of Sibutramine and Fluoxetine molecules found at trace levels in herbal slimming products. In the proposed method, fluoxetine and sibutramine analytes were extracted into the solid sorbent phase with the help of newly synthesized magnetic-based nanoparticles in the presence of pH 10 buffer. Before the samples were transferred to vials, they were filtered with a 0.45 µm porous PTFE injector-tip filter, and then they were placed in the HPLC autosamplers. After optimization of the experimental variables such as pH, desorption solvent and amount, analytical parameters of the developed method such as linear range, enrichment factor and detection limit were studied and determined according to official guidelines.

In the developed method, Fluoxetine and Sibutramine molecules were analyzed after enrichment at a wavelength of 225 nm for Fluoxetine and 265 nm for Sibutramine, using a DAD detector with 30% pH 5.0 Acetate buffer (0.6%), gradient elution of 70% Methanol running phases. The detection limits obtained for each type of antidepressant under optimized conditions were 0.32 ng mL^{-1} for fluoxetine and 0.33 ng mL^{-1}, respectively. In the repeated measurements made with model solutions containing 100 ng mL^{-1} drug active ingredients, the RSD % values were found below 5.0%.

Keywords: Fluoxetine, Sibutramine, Magnetic Solid Phase Extraction, Synthetic urine samples

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OP-48

Synthesis and Use of New Magnetic Nanoparticles for Sensitive Analysis of Antidiabetic Drugs, Gliclazide and Glimepiride

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Within this work, a new enrichment and determination method including HPLC-DAD analyzes after Magnetic Solid Phase Extraction (MSPE) has been developed to monitor trace amounts of two Oral Antidiabetic drugs (OAD), Gliclazide (GLC) and Glimepiride (GLM). Target molecules were extracted by using newly synthesized magnetic-based nanoparticles in the presence of pH 6.0 buffer. After MSPE process, the drug molecules were desorbed with Acetonitrile: methanol (1:1) phase and filtered prior to HPLC analysis. Before analysis, the experimental variables such as pH, adsorption time, desorption solvent, analytical parameters such as linear range, enrichment factor and detection limit were studied step by step and optimized. After MSPE process, Gliclazide and Glimepiride molecules were analyzed at 229 nm wavelengths using DAD detector with isocratic elution of mobile phases of 10 % Methyl alcohol, 40% pH:3.0 PBS, 50% ACN. The RSD % values were found below 3.50 % in triplicate measurements with model solutions containing 100 ng mL-1 GLC and GLM. Finally, the developed method was successfully applied to synthetic urine and real urine samples and quantitative results were obtained in the recovery experiments.

Keywords: Gliclazide, Glimepiride, HPLC, Magnetic nanoparticles.
Acknowledge: This study has been supported by Sivas Cumhuriyet University Scientific Research Projects Unit (CUBAP) with ECZ-082 code and TUBITAK as a 2209-A student project with the 1919B012112121 code.

OP-49

Development a Functional Material for Reliable Analysis of Pesticide Molecules in Juice Samples

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A magnetic solid phase extraction (MSPE)-based chromatographic determination method has been developed that can accurately and sensitively analyze Pendamethalin and Fenorimol pesticide molecules, which have negative effects on human health. Newly magnetic nanoparticles were synthesized and characterized in order to use as solid phase material. Low concentration of these molecules in this type samples is a big challenge due to inadequate detection limit of conventional chromatographically systems. By the way, a kind of micro-extraction technique was developed based on HPLC-DAD after MSPE. Extraction variables such as pH of the working environment, adsorption-desorption conditions, desorption solvent type and its amount were studied and optimized step by step. In the developed method; after enrichment, Pendamethalin and Fenorimol pesticide molecules were analyzed by gradient elution of methyl alcohol trifluoro acetic acid and acetonitrile by using DAD detector at 202 nm for Fenorimol and at 232 nm for Pendimethalin. The detection limit obtained for pesticide molecules under optimized conditions is 4.28 ng mL^{-1} for Pendamethalin and 4.28 ng mL^{-1} for Fenorimol. In 5 repeated measurements made with model solutions containing 100 ng mL^{-1} pesticide molecules, the RSD % values were found below 2.40%. Finally, the developed method was applied to juice samples with quantative recovery values.

Keywords: Pendamethalin, Fenorimol, Pesticides, HPLC, Magnetic functional materials

Acknowledge: This study has been supported by TUBITAK as a 2209-A student project with the 1919B012111760 code.

OP-50

Adsorption Properties of Natural Gas Molecules on the Surface of Calcium Carbonate Under Different Conditions: A First-Principles Study

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Carbonate rocks, which are the main component of the natural gas reservoirs, are characterized by a large diversity of depositional faces and complex porosity system. Therefore, understanding the structural effects on the adsorption properties of natural gas components can be of practical importance. In this work, we use density functional theory calculations to study the adsorption behavior of natural gas molecules on the surface of CaCO3 with a particular focus on:

- *Effect of surface morphology on methane interaction with calcite* [1]. The simulation results show that the adsorption capacity of the materials can be more than an order of magnitude larger for a certain surface orientation.
- *Effect of vacancy defects on the adsorption of methane on different surfaces of calcite* [2]. The simulations results show that both types of vacancy defect results in strong adsorption of the gas molecules as compared to defect-free sample due to the orbital-overlap/hybridization between the organic molecules and the substrate.
- *Effect of strain on gas adsorption (CH_4, CO_2, C_2H_6, and N_2) in tight gas carbonates*, which can occur due to natural thermodynamics or environmental changes [3]. We found that depending on the type of the molecule the adsorption capacity of the materials can be increased by more than 25% by changing the strain.
- *Effect of the size of the calcite nanopores on the adsorption properties of CH4 and CO2 gas molecules* [4]. The simulation results show that as the nanopore diameter decreases, the adsorption energy increases exponentially due to the geometry of the smallest pore that increases the affinity of the molecules to the surface.

These findings can be useful for determining the estimated ultimate recovery in carbonaceous tight gas reservoirs by quantifying the geomechanically effects on the adsorbed gas and accounting for heterogeneous porosity and permeability of the carbonate reservoirs.

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OP-51

Physicochemical and Biological Effects of Plant Extracts in Polymer Blend Studies

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Materials obtained by blending two or more polymers with different physical properties to form a new material are defined as "Polymer Blend". Miscibility and compatibility are necessary for polymer blend materials to be of academic and industrial importance. Nowadays, the results of the negative effects of non-biodegradable materials on health and the environment increase the importance and necessity of biodegradable materials day by day. Materials derived from biodegradable polymers have applications in food packaging or containers, in medical fields such as stent implantation, tissue engineering and medical suturing, in pharmaceutical fields such as drug delivery. Studies on the application areas of films prepared with biodegradable polymer blends are also continuing rapidly. There are positive developments in studies to increase the production and usage areas of biomaterials in terms of human health and protection of nature with biodegradable polymer mixtures containing plant extracts. This study summarizes the research progress in functional modifications of plant extracts of polymer blends. It is possible to develop studies on the investigation of physical and biological properties because of the treatment of plant extracts into biocompatible polymer blends.

Keywords: polymer blends; plant extract; composite; biodegredable

OP-52

CdS Nanoparticle-Induced Toxicity in The Olfactory Neuron Cells: in Vitro Studies

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Cadmium sulfur (CdS) is a light-emitting semiconductor nanocrystal that is a form of quantum dot. Quantum dots are used in a variety of industries, including optoelectronics, solar cells, biology, and medicine. The rate of CdS consumption by humans has recently grown because of developments in diagnostic and medicine delivery technologies. As a result, the goal of this research was to look at the toxicity of CdS on Olfactory Neuron cell cultures. The Viridibacillus arenosi K64 (biosynthesis method) was used to produce CdS quantum dot particles, which is an environmentally friendly, cost-effective, dependable, and regulated method. Transmission electron microscopy (TEM), X-ray photoelectron spectroscopy (XPS), and X-ray diffraction (XRD) techniques were used to examine the morphological features and structural analyses of fluorescent particles. Toxicity testing was performed on Olfactory Neuron cells. To test the toxicity of CdS particles, Olfactory Neuron cells were obtained. The cells were treated with various concentrations of CdS (100, 10, 1, 0.1, and 0.01 g/mL) and incubated for 24 hours (5 percent CO2; 37°C) to achieve this goal. Cell viability (MTT test) and oxidative stress/status (TAC/TOS) were examined in vitro to determine the harmful effects of CdS on Olfactory Neuron cells. According to our findings, when the concentration of CdS increased, cell viability dropped. Following exposure to the lowest amounts of CdS, neurons' total antioxidant capacity (TAC) increased. Furthermore, contrary of our TAC findings, total oxidant status (TOS) was reduced after exposure to lower CdS concentrations.

Keywords: CdS, Olfactory Neurons, TEM, XRD, XPS.

OP-53

Experimental and DFT study of (E)-4-bromo-2(((3-chloro-4-(4-chlorophenoxy)phenyl)imino)methyl)-5-fluorophenol: Molecular and Electronic Properties in Solvent Media

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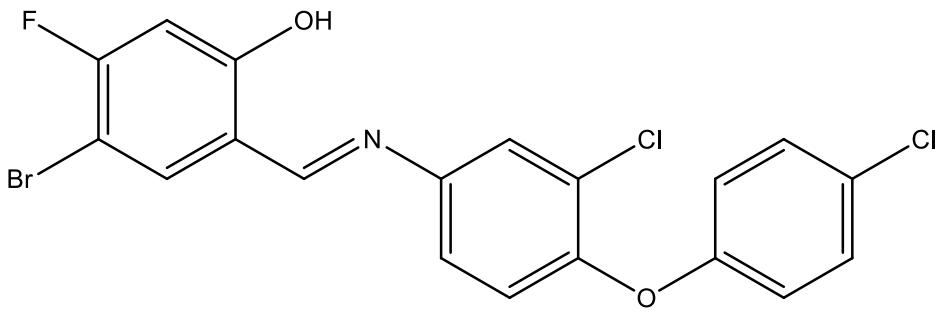
In this study, (E)-4-bromo-2(((3-chloro-4-(4-chlorophenoxy)phenyl)imino)methyl)-5-fluorophenol, $C_{19}H_{11}BrCl_2FNO_2$, a new Schiff base molecule has been synthesized and characterized by experimental analysis (X-ray, FT-IR and UV-Vis) and theoretical methods. Single crystal x-ray diffraction analysis reveals that crystallizes in the triclinic system, with P-1 space group, a=8.651(3)Å, b=10.237 (4)Å, c=11.152(4)Å, α=85.21(3)^0, β=68.14 (3)^0, ɣ=80.90(3)^0, V=904.781 Å^3 and Z=2. In addition to molecular geometry and electronic properties such as molecular electrostatic potential (MEP), frontier molecular orbitals (FMOs) and non-linear optical (NLO) properties of the title compound have also investigated DFT/B3LYP/6-311++G(d,p) basis set in solvent media. When the theoretical results are compared with the experimental data, it has been demonstrated that the results are in a good agreement with each other.



Keywords: Schiff base compound, Experimental Analysis, Density Functional Methods.

OP-54

Effect of JWH-133 on TLR4/NF-κB Pathway Expression in Rats with Uterine Ischemia-Reperfusion Model

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Abstract

Background: The endocannabinoid system includes Cannabinoid Type 1 (CB1) and Cannabinoid Type 2 (CB2) receptors that play important roles in various biological conditions. CB2R is a G protein-coupled receptor. It is expressed in peripheral tissues, including the immune system, and regulates cell migration and cytokine secretion in an immunological context. JWH133 is a CB2R selective agonist and belongs to the class of Δ8-tetrahydrocannabinol derivatives similar to Δ9-tetrahydrocannabinol. Ischemia is the tissue deprivation of oxygen and inability to be nourished as a result of occlusion of the vessels supplying blood to organs or tissues by a clot or mechanical factors. Paradoxically, organ and tissue damage increases after ischemia-reperfusion (IR) injury. Therefore, various pharmacological agents are tried to reduce reperfusion injury in studies with IR model.

Aim: The aim of this study was to determine whether JWH-133 has an effect on the expression of IL-1β, IL-6, NF-κB, TLR4, and TNF-α genes in rats with a uterine IR model.

Methods: Wistar albino female rats (n = 40, 180–220 g) were divided randomly into five groups of eight: control group, IR group, IR + 0.2 mg/kg JWH-133 group (JIRG1), IR + 1 mg/kg JWH-133 group (JIRG2) and IR + 5 mg/kg JWH-133 group (JIRG3). After the uterine horns were exposed, a vascular clip was placed in the abdominal aorta and under the right infundibulopelvic ligament. The ischemia and reperfusion times were 3 hours each, and the right uterine horn was removed. RNA isolation was performed from uterine tissue samples. The cDNA concentrations were equalized as 30 ng/µl in all samples. Expression analysis was measured by RT-PCR analysis using suitable primers (IL-1β, IL-6, NF-κB, TNF-α, TLR-4, GAPDH). In addition to experimental studies, theoretical analyzes were made.

Results: Expression analyzes showed that administration of JWH-133 synthetic cannabinoid significantly decreased the expression levels of IL-1β, IL-6, NF-κB, TLR-4 and TNF-α ($p<0.05$). Molecular docking analysis results were in agreement with the experiments.

Conclusions: In summary, the exogenous activation of CB2R by JWH133 reduced uterine IR injury through inhibition of TLR4/NF-κB expression.

Keywords: Gene expression, Inflammation, Ischemia, JWH-133, Uterus.

OP-55

Determination of Trace Cobalt (II) in Spices Samples by Ultrasonic Assisted Cloud Point Extraction with Spectrophotometry

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In this study, ultrasonic assisted cloud point extraction (UA-CPE) method was developed for the determination of Co(II) in spices. After extraction and preconcentration, the Co(II) contents of the samples were determined by UV-VIS. After complexing with Ponceau Xylidine (PX) and EDTA in the presence of cationic surfactant, CTAB at pH 4.0 with Britton–Robinson (BR) buffer, Co(II) ion was withdrawn the surfactant-rich phase of nonionic surfactant, TX-114. The concentrated surfactant-rich phase containing the analyte was diluted with ethanol to a volume of 3.0 mL and then analyzed by UV-VIS spectrophotometer. The various analytical parameters affecting the UA-CPE yield were investigated and optimized. Analytical data achieved after optimization: limits of detection (LOD) and quantification (LOQ) are 0.34 and 1.14 μg/L, respectively; The calibration curve is rectilinear for Co(II) with changed calibration sensitivity in the range of 1-10 and 10-210 μg/L. The precision (as RSD%) is 29.5. This optimized method was applied in the analysis of various spice samples.

Keywords: Cobalt, Ponceau Xylidine, TX-114, CTAB, EDTA, UA-CPE, UV-VIS, Spice samples

OP-56

Effect of Carvacrol Against Glutamate-Induced Cytotoxicity in C6 Cell Line

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Carvacrol (5-isopropyl-2-methylphenol) is an important component of thyme essential oil. Carvacrol is a monoterpenic phenol with significant antibacterial, antifungal, insecticidal, analgesic and antioxidant activities and has been used as a cosmetic ingredient. However, its effect on glutamate-induced cytotoxicity in glial cells is still unclear. Our study was designed to investigate the effect of carvacrol on glutamate-induced cytotoxicity in C6 glial cells. C6 glioma cell line was used in this study. To evaluate the protective effect of carvacrol on glial cells after glutamate-induced cytotoxicity, four cell groups were prepared. No treatment was applied to the control group. Cells in the glutamate group were treated with 10 mM glutamate for 24 hours. Cells in the carvacrol group were treated with various concentrations of carvacrol (3.75, 7.5, 15 and 30 µM) for 24 hours. Cells in the carvacrol + glutamate group were pretreated with various concentrations of carvacrol (3.75, 7.5, 15 and 30 µM) for 1 hour, followed by exposure to 10 mM glutamate for 24 hours. Cell viability was assessed by the XTT assay. Various concentrations of carvacrol had no effect on cell viability in C6 cells after glutamate-induced cytotoxicity ($p > 0.05$). Carvacrol has no protective effect on glial cells after glutamate-induced cytotoxicity in C6 cells.

Keywords: Carvacrol, Glutamate, Cytotoxicity, C6 Glial Cell

OP-57

Evaluation of Anticancer, Antimicrobial, Antibiofilm Activity and Molecular Docking Study of Ethanol Extracts of Abies cilicica (Antoine & Kotschy) Carrière) Resin

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Abies cilicica (Antoine & Kotschy) Carrière) is an endemic species of industrial and medicinal importance. It is known that the resin obtained from this plant is effective on different diseases. The chemical content of the ethanol extract of *A.cilicica* resin by GC-MS method, its antimicrobial activity on 12 different microorganisms by MIC value, antibiofilm activity on 6 microorganisms by Christensen method and biological activities on three different cancer cell lines by MTT method were investigated. In addition to experimental studies, theoretical studies were also carried out with the molecular docking method. As a result, the major component of the resin was abietic acid. Antimicrobial and antibiofilm activity were found to be high on L. monocytogenes. The resin extract showed strong anticancer activity on all three of DU-145, HeLa and SaOS-2 cells and molecular docking analysis results were compatible with the experiments. In this study, in which the strong biological properties of *A.cilicica* resin were revealed, it is thought that the resin can increase the inhibition of cancer cell growth while strengthening the immune system against pathogenic microorganisms. More extensive studies will strengthen the possibility of using the resin as a therapeutic agent.

Keywords: *Abies cilicica*, Anticancer, Antimicrobial, Antibiofilm, Molecular Docking

OP-58

Structural Characterization of a Fluorene Based Imine Compound for The Sensing of Heavy Metal Ions

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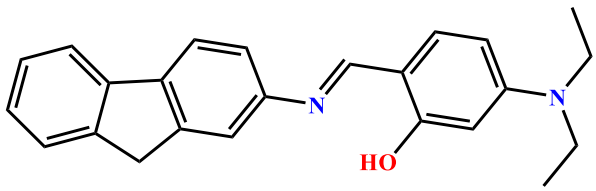
Fluorescence based chemosensors for the sensing of heavy metal ions as well as biologically important molecules have taken considerable interests due to their ease of use and field applications [1-3]. Several studies based on turn on/off fluorescence have been published [4,5]. For designing fluorescent chemosensors, several mechanisms such as photoinduced electron transfer (PET), metal to ligand charge transfer (MLCT), internal charge transfer (ICT), photoinduced proton transfer (PPT), excited state intra-molecular proton transfer (ESIPT) and chelation-enhanced fluorescence (CHEF) were employed [6]. Imine compounds, also known as Schiff bases, usually show weak fluorescence due to the C=N isomerism and phenol imine/ketoamine tautomerisms. On the other hand, coordination of metal ions to Schiff bases through imine imine nitrogen atom and phenolic oxygen atoms inhibited tautomeric transformation resulting in much stronger fluorescence. In the course of this work, a new fluorene-based Schiff base compound (SB) from the condensation reaction 2-aminofluorene and 4-(diethylamino)salicylaldehyde was synthesized (Fig. 1) and used as fluorescence sensor for the sensing heavy metal ions. The structure of the synthesized compound (SB) was characterized by FTIR, $^{1}H/^{13}C$ NMR spectroscopies and single crystal X-ray diffraction study.



SB

Fig. 1 Structure of fluorene-based imine compound

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OP-59

Two Guanidium-Polyoxometalates, Crystal Structures and Photopysical Properties

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Polyoxometalates (POMs) are polyatomic ions, usually an anion, in which three or more transition metal oxyanions are connected by oxygen atoms to forming closed 3-dimensional clusters [1]. Due to their polyatomic nature and charge, they have found several applications in several fields including catalysis, medicine, analytical chemistry as well as material science [2]. It has been reported that POMs were found to exhibit diverse pharmacological activities such as antitumor, antimicrobial, and antidiabetic activities [3]. Biguanidines are compounds and used in synthesis of heterocycles, organocathosis, metal complexation, and crystal engineering. The metformin is biguanidine used in the treatment of type 2 diabetes [4, 5]. In the course of this work, we have prepared two guanidium-polyoxometalates and their structures were characterized by single crystal X-ray diffraction studies. The photopysical properties of the compounds were investigated in solution as well as in the solid state. The X-ray structure of one of the guanidium-polyoxometalate $Na(C_2H_7N_4O)[AlMo_6O_{18}(OH)_6](C_2H_4N_4)(H_2O)_2$ is shown in Fig. 1.

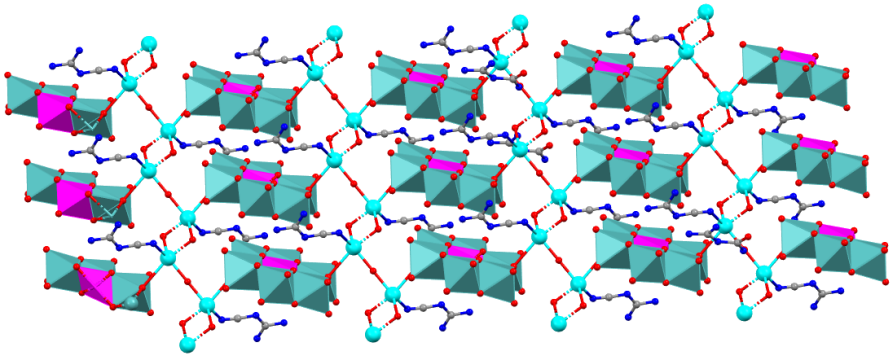

Fig. 2 Packing diagram of guanidium-polyoxometalate $Na(C_2H_7N_4O)[AlMo_6O_{18}(OH)_6](C_2H_4N_4)(H_2O)_2$

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OP-60

Chemical And Functional Composition and Biological Activities of Anatolian Hypericum Scabrum L. Plant

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Hypericum scabrum L. plant has wide use in ethnopharmacology and is cultivated both naturally and technologically [1-3]. This study was conducted to determine chemical and functional properties and in vitro biological activities as antimicrobial, antioxidant, anticancer composition of *Hypericum scabrum* L. (Hypericaceae) from Anatolia. This plant was collected from Elazıg and Sivas province of Turkey. The ICP-OES method was used for the investigation of the heavy metal composition and GC-MS method was used for the determination of chemical components. Antimicrobial activities of plant extracts were investigated on 8 different microorganisms by minimum inhibition concentration (MIC) method [4]. Antioxidant activities were investigated by using Rel Assay Diagnostic kits, which provide 99% reliable results with chemical reduction reactions [5]. In vitro anticancer properties of the extracts were investigated on 5 different cell lines by using MTT method [6]. It was determined that the plant has a very high antioxidant capacity and has mediocre antimicrobial activity only on 2 microorganisms. Also, moderate cytotoxic activities on some cell lines were determined. It is thought that *Hypericum scabrum* plant has functional bioactive compounds and might be an important natural antioxidant source in various sectors like cosmetics, drug, and food industries.

Keywords: Bioactivity, chemical contents, cytotoxic activity, *Hypericum scabrum*, ICP-OES, GC-MS analysis.

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OP-61

CFD Simulation of The Effect of The Mixer Speed on Non-Newtonian Fluid Temperature Uniformity in Anaerobic Digestion

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Anaerobic digestion results from microbial decomposition of organic matter in the absence of oxygen, leading to biogas production. The importance of biogas production technology is the production of renewable energy, the reduction of environmental pollution and greenhouse gases, and its role in the sustainable development of societies. A double-walled reactor with a volume of 400 L was optimized and manufactured in this study. The mechanical mixing system operated at a speed of 100 rpm for 6 min every 6 h. The CFD reactor was simulated to achieve the appropriate mixing speed. According to this simulation, a mixer speed of 100 rpm was selected among three speeds of 50, 100, and 150 rpm in terms of less turbulence, reaching the optimum temperature in the shortest time, and better uniformity of the substrate inside the digester in terms of temperature based on contours and vectors of speed.

OP-62

Performance of Machine Learning Methods on Neutron Activations for Ge

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Neutron activation is the process that the neutron induces radioactivity in a target material. The excited nucleus decays immediately by emitting gamma rays, or particles such as proton, alpha, neutrons, and fission products. In order to perform nuclear reactions including neutron activations, one of the important parameters is the reaction cross-section. The cross-section data can be obtained experimentally or by appropriate theoretical models. In this study, machine learning methods have been employed as a tool for the determination of neutron induced reaction cross-sections on Ge isotopes. The data for the training of the machine was taken from the experimental database EXFOR. In the estimation and modeling of the cross-sections, the multiple linear regression model and artificial neural network method were used to estimate (n, γ), (n, p), (n, α) reaction cross-sections on the targets. According to the results, it has been seen that cross-section information can be obtained safely with machine learning methods. It is concluded that these methods can be used as an alternative tool for the estimation of cross- sections data which is not available experimentally in the literature.

Keywords: Neutron-induced reaction, machine learning, Ge, cross-section

OP-63

Synthesis of Temperature Sensitive Poly (N-isopropylamide-co-2-Hydroxyethylmethacrylate) Copolymer and Investigation of Temperature Sensitive Properties

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The thermo responsive smart polymers have been extensively studied and have been used in widespread applications. The PNIPAM is a one such material which displays a cloud point of 32 ◦C. These materials are smart, and it can recognise a signal and give a response to external physical or chemical stimuli like photons, temperatures, pressure, antigens and co-solvent concentrations, pH, magnetic field, ionic strength etc. Heat sensitive poly (N-isopropylacrylamide-co-2-hydroxyethylmethacrylate) copolymers were produced in 3 different ratios in 10, 20 and 30 mole compositions by radical polymerization method. Ammonium persulfate is used as the initiator. Produced polymers were investigated by ^{1}H-NMR and ^{13}C-NMR spectroscopy techniques. The heat sensitive properties of polymers (LCST properties) of the copolymers were analysed by UV-Vis and FT-IR spectroscopy methods. While the average molecular weights and distributions of the produced copolymers were investigated by the GPC method, the glass transition temperatures and the phase transition temperature were studied by the DSC method and the degradation characteristics were studied by the TGA method. The contact angles of the copolymers were determined by films produced with a spin coater system. Poly (N-isopropylacrylamide-co-2-hydroxyethylmethacrylate) copolymers will be tested in test cabinets with glazed windows for their thermal energy storage efficiency in our future studies.

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OP-64

Doxorubicin-Loaded mPEG-Poly(propylene adipate)-mPEG Nanoparticles for Drug Delivery Systems: Preparation and in Vitro Evaluation

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Targeting chemotherapeutic drugs by encapsulation has become one of the favorite topics of nanotechnology because of the side effects of these drugs on healthy cells and organs. Synthetic and natural polymers have been generally preferred for encapsulation of chemotherapeutic drugs because they have properties biocompatible and biodegradable. Aliphatic polyesters are biocompatible biodegradable polymers that can be produced synthetically.

In this study, we synthesized poly(propylene) adipate(pPAd) with esterification and polycondensation method using adipic acid and 1,3 propanediol. In this study, we synthesized low molecular weight poly(propylene) adipate with esterification and polycondensation method using adipic acid and 1,3 propanediol. Since pPAd is a hydrophobic polymer, pPAd was pegylated with hydrophilic mPEG-550 to obtain a hydrophilic copolymer. Chemical characterization of this final product with amphiphilic properties was determined by FTIR analysis. Nanocarrier synthesis was carried out by the double emulsion method using this copolymer. The physical properties, size, and size distribution of nanocarriers were determined by the DLS method. Finally, nanocarriers cytotoxicity was tested on breast cancer cell lines MCF-7 and MDA-MB-231. It has been presented by both physical and cellular experiments that the nanocarriers produced in this study may be used as drug delivery systems.

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OP-65

Substituent Effect of Regorafenib and Its Derivatives on Anticancer Properties; A DFT and Molecular Docking Study

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Regorafenib is an oral multikinase inhibitor and is a key ingredient used by the FDA in the treatment of a variety of cancers. While regorafenib (1) contains chlorine in its structure, the change in molecular size when an electron-donating and electron-withdrawing substituent such as NH_2 (1a) and NO_2 (1b) is attached instead of chlorine, was investigated by DFT and molecular docking studies. Quantum chemical parameters, contour diagrams, molecular electrostatic potential maps (MEP) and molecular docking studies on the epidermal growth factor receptor kinase domain of regorafenib and its hypothetical derivatives were performed.

Keywords: Regorafenib derivatives, Quantum chemical parameters, Molecular docking

OP-66

Investigation of Substituent Effect on Rhenium Complexes by DFT Methods: Structural Analysis, IR Spectrum, Quantum Chemical Parameter, NLO and OLED Properties, Molecular Docking

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For the synthesized 9b, 9c and 9d complexes, hypothetical complexes were formed by adding electron-withdrawing (NO_2) and electron-donating (NH_2) groups. Benchmark analysis was performed using the bond lengths of the synthesized complexes (9b, 9c and 9d). B3LYP-LANL2DZ/6-31+G(d), B3LYP-LANL2DZ/6-31G(d), B3LYP-SDD/6-31+G(d), B3LYP-SDD/6-31G(d), M062X-LANL2DZ/6-31+G(d), M062X-LANL2DZ/6-31G(d), M062X-SDD/6-31+G(d) and M062X-SDD/6-31G(d) levels were used for Benchmark analysis. According to the correlation coefficient, the best level was determined as M062X-SDD/6-31+G(d). IR spectra of all complexes were examined in detail. Experimental results and calculation results for IR spectra were found to be in agreement with each other. The activities of the complexes were compared with the quantum chemical parameters. It was predicted that complexes containing electron donor groups are more advantageous in terms of biological activity. Electrophilic and nucleophilic regions for complexes were determined by molecular orbitals diagrams and electrostatic potentials maps. In addition, all complexes were evaluated in terms of their optical properties (NLO and OLED) and were found suitable for both materials. Experimentally, the 9b, 9c and 9d complexes were active against the A2780 and A2780/CP70 cell lines. Therefore, molecular docking was performed with the selected proteins (PDB ID 3cor and 5fi4) and all complexes. The obtained computational results were found to be in agreement with the experimental data.

Keywords: Rhenium complexes, DFT calculations, Optic properties, Molecular docking

OP-67

Effect of Heterocyclic Compounds Containing Azomethine Group on Oxidative Stress A-and DNA Repair Gene Profiles in Neuroblastoma Cell Lines: *In Silico* and *In Vitro* Analysis

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In this study, it was aimed to examine in silico analysis, anticancer activity, oxidative stress and DNA repair gene profiles of heterocyclic compounds containing azomethine group in neuroblastoma (SH-SY5Y) cell line. In our study, firstly, newly synthesized drugs were applied to the SH-SY5Y cell line at eight different concentrations (1-100µg/ml) for 24 hours, 48 hours and 72 hours, and their anticancer activities were determined by MTT method. The IC50 value was calculated. It was applied to the cells at the determined concentration and incubated for 48 hours. At the end of 48 hours, RNA was isolated from the SH-SY5Y cell line in accordance with the kit protocol and cDNA was synthesized from the obtained RNAs. In addition to experimental studies, theoretical studies were also carried out. The String v11 program was used to determine the interaction of proteins involved in oxidative stress and DNA repair mechanisms with other proteins. The results of the molecular docking analysis were found to be in good agreement with the experiments. Expression levels of oxidative stress and DNA repair genes were analyzed using ΔΔCT method in RT-PCR device. As a result, it was determined that Molecule 1, Molecule 2 and Molecule 3 drugs applied to the SH-SY5Y cell line showed the highest activity after 72 hours of incubation. It was determined that *PRDX1* gene expression was higher in Molecule 1, Molecule 2 and Molecule 3 drugs compared to the control group. In addition, *ABCB1 (MDR)* gene expression in Molecule 3 increased compared to the control group. *GPX* and *SOD1* gene expression was found to be high in Molecule 2 drug, and low expression levels of *ERCC1*, *ATR*, *CDKN1A*, *PRKDC*, *GPX1*, *ABCB1(MDR)*, *CAT*, *SOD1* and *NQO1* genes in Molecule 1 drug.

Keywords: Neuroblastoma, Azomethine-Containing Compounds, DNA repair, Oxidative Stress

OP-68

The Effect of Azometine Group Compounds Containing Shifft Base on Expression Profiles of Genes Involved in Wnt and Mapk Pathway in Lung Cancer Cell Lines: in Silico and in Vitro Analysis

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In this study, it was aimed to determine the anticancer activity of schiff base-containing azomethine groups in lung cancer (A-549) cell line and to investigate the mRNA expression levels of genes in wnt and mapk signaling pathway on this cell line. In our study, firstly, the new synthesized drugs were applied to the A-549 cell line at eight different concentrations for 24h, 48h and 72h (0,01-100µg/ml), their anticancer activities were determined using the MTT method, and the IC50 value was calculated. IC50 doses of each molecule were then administered to A-549 cells and RNA was isolated from the cells. cDNA was synthesized from the obtained RNA samples and expression levels of WNT signaling pathway (*CSNK1A1*, *CTNNB1*), MAPK signaling pathway (*DUSP1, DUSP2, DUSP4 and DUSP10*) genes in these samples were determined by RT-PCR method. In addition to experimental studies, theoretical studies were carried out. Molecular docking analysis results were found to be in good agreement with the experiments. Molecule 1, Molecule 2, Molecule 3 and Molecule 4 groups applied to the A-549 cell line showed the highest activity after 72 hours of incubation. As a result, it was determined that the expression of *CTNNB1* and *DUSP10* genes increased in Molecule 2 and Molecule 4 groups compared to the control group. In addition, it was determined that Molecule 4 increased the expression of *CSNK1A1, CTNNB1, DUSP1, DUSP2, DUSP4* and *DUSP10* genes compared to other groups.

Keywords: Lung cancer, Shiff base, WNT signaling pathway, MAPK signaling pathway, Molecular docking, Gene expression

OP-69

Artificial Intelligence Applications in Personalized Medicine and Drug Development

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Artificial Intelligence increases the therapeutic power of doctors with applications to determine the disease risks of the individual and to realize personalized prevention and treatment methods. Artificial intelligence uses complex computation and inferences to generate insights and enable the system to learn and reason. Research shows that precision medicine, genomic and non-genomic markers, combined with information from clinical history and lifestyles, facilitate personalized treatment and predict the course and duration of disease. On the other hand, artificial intelligence can contribute to every stage of drug development, from discovery and research to treatment approval processes, both in pre-clinical and clinical phases.

Keywords: artificial intelligence, personal medicine, drug development

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