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**INTERNATIONAL
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ON
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AND
TECHNOLOGIES**

Turkish Republic
of
Northern Cyprus

18-20 September 2021

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ESKİŞEHİR TEKNİK ÜNİVERSİTESİ
ESKİŞEHİR TECHNICAL UNIVERSITY



НАЦИОНАЛЬНЫЙ УНИВЕРСИТЕТ РАДИОЭЛЕКТРОНИКИ
HYPE
NATIONAL UNIVERSITY OF
RADIO ELECTRONICS



UNIVERSITY OF MEDITERRANEAN KARPASIA
UNİVERSİTESİ



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Official Opening of the ICONAT-2021
18 September 2021 Meeting Salon I – The University of Mediterranean Karpasia
Meeting ID: 939 7615 4284
Passcode: 564762

09.00 The Start of Registration Process

10.30 Official Opening of the ICONAT-2021
Welcome by Conference

Prof. Dr. Omarov Murad, Vice-Chairman Organization Committee
Vice-Rector, NURE, (Ukraine)

Prof. Dr. Abidin Kılıç, Eskisehir Technical University, Turkey
Chairman of Organization Committee

Prof. Dr. Mehmet Nesip Öğün, Rector, University of Mediterranean Karpasia
HONORARY PRESIDENT OF CONGRESS

11.00 Invited Speaker
Prof. Dr. Yüksel Ergun (Turkey)

12.00 **Lunch Break**

- Oral presentations can take a maximum of 20 minutes.
- Poster presentations can take up to 5 minutes. Brief information about the content of the study will be presented. During the poster presentation, the image of the work will be shared on the screen.

18-20 September 2021-Meeting Salon I

Meeting ID: 939 7615 4284 Passcode: 564762

18-20 September 2021-Meeting Salon II

Meeting ID: 97293960695 Passcode: 605017

18.09.2021 Saturday-14.00

ORAL PRESENTATIONS		
	Chairing Prof. Dr. Sedef Dikmen	Hall 1 14.00
01	Murat Başaran Turkey	The Importance of The Data Taken From The No, No2 and Co Sensors in The Ventilation Process in The Railway Tunnels
02	Guram Chaganava Georgia	New Techniques for The Communication System of Sign Language Speakers
03	Mehmet Fidan Turkey	Texture Classification Based On Moment Statistics of Von Neumann Neighborhood of Centroid

18.09.2021 Saturday-14.00

ORAL PRESENTATIONS		
	Chairing Prof. Dr. Dursun Aydın	Hall 2 14.00
04	Utku Kaya Turkey	Real-Time Skin Segmentation on Low Resolution and Gray Images
05	Ömer Aydın Turkey	Achieving Price and Performance Equality On and Off The Grid By Examining Global Renewable Energy Trends
06	Nkiru E Ekechukwu Nigeria	A New method for sperm quantification in the African malaria mosquito Anopheles gambiae s.l
07	Meryem Akbelen Turkey	Investigation of Natural Alancime-Rich Zeolite Tuff From Turkey: A Combined Xrd, Xrf, Ft-Ir And Sem Study

19.09.2021 Sunday-10.00

ORAL PRESENTATIONS		
	Chairing Dr. Utku Kaya	Hall 1 10.00
08	Fatih Burak Özkanlı Turkey	Integration Of Electric Vehicles Into The Smart Grid
09	Nihal Kuş Turkey	Orbital Interactions And Stabilization Energies Of Methyl 5-6 Dihydro Benzo(H) Quinoline Carboxylate
10	Christy A.A. Norway	Drying Properties of Natural Bio-Polymers
11	Mokhtar Djehiche Algeria	Washing Of Contaminated Soil Using Solar Thermal Energy
12	Sedef Dikmen Turkey	Determination of Electrokinetic Properties of Natural Zeolites Belong to Manisa-Gördes

19.09.2021 Sunday-10.00

ORAL PRESENTATIONS		
	Chairing Dr. Mehmet Fidan	Hall 2 10.00
13	Anatoly Kozar Ukraine	Electromagnetic Wave Scattering by Pyramid-Shaped Photonic Crystal From Resonant Magnetodielectric Spheres
14	Süleyman Demir Turkey	Fluid Maxwell Equations in The Framework of Octonion Algebra
15	Olga Yunakova Ukraine	Exciton Absorption Spectrum of Kpb 2 Br 5 Thin Films
16	Nazire Burçin Hamutoğlu Turkey	The Mediation Effect of Critical Thinking Skills in The Relationship Between Lifelong Learning Tendency and Information Operational Thinking Skill

19.09.2021 Sunday-13.00

ORAL PRESENTATIONS		
	Chairing Prof. Dr. Zafer Demir	Hall 1 13.00
17	Elif Öztetik Turkey	The Effects of Heavy Metal Applications on Antioxidant Defence Activation in Barley And Wheat Varieties
18	Afamefuna Moon Nigeria	A Method for Examining the Sequencing Models of Antisymmetric Structures
19	Dursun Aydın Turkey	Nonparametric regression with error-in-variables model based on different kernel functions
20	Nihal Kuş Turkey	Dft/Td-Dft Analysis Of 2-Chloro-7-Methylquinoline-3-Carbaldehyde Using Computer Computing Method

19.09.2021 Sunday-13.00

ORAL PRESENTATIONS		
	Chairing Prof. Dr. Abidin Kılıç	Hall 2 13.00
21	Emel Ergene Turkey	Effects Of Echinophora Tenuifolia Essential Oil on Cytotoxic and Apoptotic Mechanism in Lung and Mesothelioma Cancer Cell Lines
22	Olga Yunakova Ukraine	Absorption Spectra of Thin Films Compounds in The Rbcl-Cucl System
23	Ayşegül Taşçıoğlu Turkey	Molybdenum Disulfide Thin Film Electrical and Optoelectrical Characterization under Different Atmosphere
24	Nazire Burçin Hamutoğlu Turkey	Determining the Challenges of Academicians During The Covid-19 Process: A Case Study
25	Mykola PASTUSHENKO Ukraine	Mel-Frequency Cepstral Coefficients of Authentication System User

20.09.2021 Monday-10.00

ORAL PRESENTATIONS		
	Chairing Prof. Dr. Elif Öztetik	Hall 1 10.00
26	Çağdaş Allahverdi Turkey	Creating Awareness Regarding Solar Energy and Its Use with Portable Solar Powered Generator
27	Evrım Güneş Altuntaş Turkey	Current Perspectives On Medicinal And Aromatic Plants in Food And Health Field
28	Paul Kozub Ukraine	Vector Approach for Modeling, Research And Optimization of Complex Chemical Systems
29	Kazım Guliyev Azerbaijan	Synthesis and Properties of Cyclopropane-Containing Optically Transparent Copolymer
30	Evrım Güneş Altuntaş Turkey	Investigation of The Antilisterial Activiyy of Lactic Acid Bacteria with Physiological and Chromatographic Way

20.09.2021 Monday-10.00

ORAL PRESENTATIONS		
	Chairing Prof. Dr. Nihal Kuş	Hall 2 10.00
31	Mehmey Fidan Turkey	Skin Pixel Recognition Based on Neighborhood Correlation and Moment Features
32	Utku Kaya Turkey	Comparison of Deep Learning with Machine Learning on Skin 4 Segmentation
33	Murad Omarov Ukraine	Developing the Generalized Approaches to Mathematical Modelling of Processes in Steam Generators, Water Level Automated Control Systems
34	Mykola Moskalets Ukraine	The Video Content Transmission Characteristics in Subscriber Access Network
35	Guram Chaganava Georgia	Keypoint Detector Retraining Techniques For The Communication System Of Sign Language Speakers

20.09.2021 Monday-13.00

ORAL PRESENTATIONS		
	Chairing Prof. Dr. Nihal Kuş	Hall 1 13.00
36	Konul Jabbarova Azerbaijan	Salt Deposition Process with Graphene
37	Murad Omarov Ukraine	Detailing of the main directions and components for defining models for assessing the quality of knowledge
38	Storozhenko V.A. Ukraine	Filtering of Interference of Inhomogeneous Regular Structure in Thermal Non-Destructive Control Of Cellular Structures
39	Elif Öztetik Turkey	Physiological Answers to Metal Triggered Effects in Crops
40	Erdem ONCU TRNC	Investigation Of Dogecoin Price Movements: A Gsadf Analysis
41	Mehmet Nesip Oğub TRNC	Terrorist Use of Cyber Technology
42	Şadiye Çakmak Turkey	The Log (FT) Values in Spherical And Deformed Nuclei for Some Odd-A Germanium Isotopes
43	Şadiye Çakmak Turkey	An Application of Clifford Algebra on The Semi-Symmetrical Archimedean Solid Icosidodecahedron

ORAL PRESENTATIONS		
	Chairing Prof. Dr. Sedef Dikmen	Hall 2 13.00
44	Sayyara Sadiqova Azerbaijan	The Eutectic Phase Crystallization in Co _{0,45} Sb _{0,55} -Sn and Co ₃ Sn ₂ -Sb-Zn Systems
45	Bala Ali RAJAVOV Azerbaijan	Energy in Dark Matter
46	Olena CHALA Ukraine	The Development of Manufacturing Defects In The Surface Layer of Substrates at the Functional Components
47	Sayyara Sadiqova Azerbaijan	The Phase Crystallization in Co _{0,55} Sb _{0,45} -Sn Systems
48	Fidan VELIYEVA Azerbaijan	The Mechanical Performances Pertaining to Bi-2226 Superconducting Ceramics
49	Afamefuna Moon Nigeria	The sequencing models of symmetric structures of examining
50	Menouar HANAFI Algeria	The Bifunctional Catalyst Pt / Re Used in The Platforming Unit for Obtaining High Octane Number Of The Gasoline



ABSTRACTS

1.

THE IMPORTANCE OF THE DATA TAKEN FROM THE NO, NO2 AND CO SENSORS IN THE VENTILATION PROCESS IN THE RAILWAY TUNNELS

Uğur KABADAYI¹, Murat BAŞARAN²

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² Vocational School of Transportation, Eskişehir Technical University, Eskişehir, Turkey

ABSTRACT

In railway tunnels, ventilation is carried out to prevent NO, NO2 and CO gas pollution caused by exhaust gases due to the diesel locomotives on the railway. Some ventilation calculations are used during ventilation. In these calculations, factors such as the location of the tunnel, the structure of the tunnel, and the pressure belts that may occur should be taken into the account one by one. After these calculations, control scenarios are prepared based on the locations and dimensions of the ventilation equipment to be used. These control scenarios are controlled by programmable logic controllers. In this system, data is needed for the devices to work efficiently and properly. These data are obtained in real time through sensors. These are NOx and CO sensors that measure toxic gases. The information received from the sensors provides the necessary information to start, continue, stop or switch to other scenarios. These sensors are needed to provide data necessary to operate jet fans and axial fans to ventilate the tunnels. In this article, the contribution of these sensors to the relevant ventilation scenarios and some other important aspects are mentioned.

Keywords: Railway tunnels, NOx sensors, CO sensors.

2

NEW TECHNIQUES FOR THE COMMUNICATION SYSTEM OF SIGN LANGUAGE SPEAKERS

Guram CHAGANAVA

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ABSTRACT

The study described in this article examines the approaches of retraining of the deep learning model for hand palm keypoint detection in images. This is one of the studies conducted to create an innovative communication system for sign language speakers. The target of the given study is to find an optimal technique of retraining for increasing the degree of the keypoint detector generalization. So, it must be able to accurately detect keypoints in images it has not seen during training. It will make the communication system usable in real-life conditions. In the article, there are reviewed three approaches of retraining: Retraining in series, retraining using united dataset and retraining using mixed datasets. Experiments were conducted to test the effectiveness of each of them. The paper presents the results of the experiments and a relatively optimal method selected among them.

TEXTURE CLASSIFICATION BASED ON MOMENT STATISTICS OF VON NEUMANN NEIGHBORHOOD OF CENTROID

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² Department of Physics, Eskişehir Technical University Eskişehir, Turkey

ABSTRACT

Images of specific textures carry unique statistical information depending on the variability, sharpness, continuity and change frequency of the elements that construct the texture. In this study, gray level images belonging to 10 different texture classes are tried to be classified by using the moment statistics of Von Neumann neighborhood pixels with radius r according to the Manhattan distance of the center point. Obtained features were classified with support vector classifiers with different kernels and the comparative results were presented.

Keywords: Feature extraction, Support vector classifiers, Texture classification, Moment statistics

REFERENCES

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- [6] Mayoraz E, Alpaydin E. Support vector machines for multi-class classification. In International Work-Conference on Artificial Neural Networks 1999 Jun 2 (pp. 833-842). Springer, Berlin, Heidelberg.

4.

REAL-TIME SKIN SEGMENTATION ON LOW RESOLUTION AND GRAY IMAGES

Utku KAYA^{1*}, Abidin KILIÇ²

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² Department of Physics, Eskişehir Technical University Eskişehir, Turkey

ABSTRACT

In this study, the skin segmentation problem, which is frequently used in the literature, will be detected on a real-time webcam with semantic segmentation deep learning algorithms. Skin segmentation generally requires high processing power to distinguish it from images with high resolution. The deep learning algorithm and the proposed image processing method used in this study provide real-time, very low CPU usage, and lag-free skin detection via webcam.

Keywords: Skin segmentation, Deep learning, Semantic segmentation

5.

ACHIEVING PRICE AND PERFORMANCE EQUALITY ON AND OFF THE GRID BY EXAMINING GLOBAL RENEWABLE ENERGY TRENDS

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² Department of Electricity and Energy, Porsuk Vocational School, Eskişehir Technical University, Eskişehir, Turkey

ABSTRACT

Renewable energy sources are an increasing trend in the world as an alternative solution to rapidly depleting fossil fuels. Due to the depletion of fossil fuel resources and the reduction of climate change, societies are forced to internalize these effects and to pave the way for sustainable energy technologies. Other reasons for preference are that these resources are cost-effective and environmentally friendly. Looking at rapidly falling cost curves such as solar and wind energy and the comparability of traditional production technologies in the global market help in establishing the price and performance balance. Today, with the storage options becoming more affordable, the popularity of renewable energy sources has increased. While storage methods provided an advantage for traditional energy sources in the past, today it has provided great convenience in terms of both distribution and transmission of electrical energy produced from renewable sources. The electrical energy obtained from renewable sources and the maturation of the technologies used to obtain this energy, the increase in distributed energy sources, the decrease in the costs of storage technologies, strong consumer behaviors affect the price-performance balance, as well as the way we produce, use and trade electricity. In this study, global renewable energy trends will be examined and information will be given on price and performance equality on and off the grid.

Key words: Renewable energy, energy sources, price and performance equality, energy trends

6.

**A NEW METHOD FOR SPERM QUANTIFICATION IN THE
AFRICAN MALARIA MOSQUITO ANOPHELES GAMBIAE**

Nkiru E Ekechukwu, Nigeria

ABSTRACT

Insect seminal fluid proteins are powerful modulators of many aspects of female physiology and behaviour including longevity, egg production, sperm storage, and remating. The crucial role of these proteins in reproduction makes them promising targets for developing tools aimed at reducing the population sizes of vectors of disease. In the malaria mosquito *Anopheles gambiae*, seminal secretions produced by the male accessory glands (MAGs) are transferred to females in the form of a coagulated mass called the mating plug. The potential of seminal fluid proteins as tools for mosquito control demands that we improve our limited understanding of the composition and function of the plug. Here, we show that the plug is a key determinant of *An. gambiae* reproductive success. We uncover the composition of the plug and demonstrate it is formed through the cross-linking of seminal proteins mediated by a MAG-specific transglutaminase (TGase), a mechanism remarkably similar to mammalian semen coagulation. Interfering with TGase expression in males inhibits plug formation and transfer, and prevents females from storing sperm with obvious consequences for fertility. Moreover, we show that the MAG-specific TGase is restricted to the anopheline lineage, where it functions to promote sperm storage rather than as a mechanical barrier to re-insemination. Taken together, these data represent a major advance in our understanding of the factors shaping *Anopheles* reproductive biology.

7.

**INVESTIGATION OF NATURAL ANALCIME-RICH ZEOLITE TUFF
FROM TURKEY: A COMBINED XRD, XRF, FT-IR AND SEM STUDY**

Meryem AKBELEN

Department of Physics, Faculty of Science, Eskişehir Technical University, 26470, Eskişehir,
Turkey

ABSTRACT

In this study, structural properties of natural analcime-rich zeolite tuff from Turkey and that of ion-exchanged forms investigated. Zeolites are naturally occurring hydrated aluminosilicate minerals of the alkali- and alkaline-earth metals. The microporous structure and the presence of extraframework cations are of great importance for characterizing the unique properties of zeolites. Ion-exchanged forms of analcime zeolite were prepared with 1 M KNO_3 , 1 M $\text{Ca}(\text{NO}_3)_2$ and 1 M HCl solutions in a shaker for 6 hours at 80 °C. The obtained samples were characterized by X-ray diffraction (XRD), X-ray fluorescence (XRF), Fourier transform infrared spectroscopy (FT-IR) and scanning electron microscopy (SEM) techniques.

Keywords: Natural zeolite; Analcime; XRF; XRD; FT-IR; SEM.

INTEGRATION OF ELECTRIC VEHICLES INTO THE SMART GRID**Fatih Burak ÖZKANLI¹, Prof. Dr. Zafer DEMİR²**¹ Department of Advanced Technologies, Graduate School of Science, Eskişehir Technical University, Eskişehir, Turkey² Department of Electricity and Energy, Porsuk Vocational School, Eskişehir Technical University, Eskişehir, Turkey**ABSTRACT**

The need of human beings to use vehicles in transportation was met first by steam trains, then by various automobiles and other vehicles working with internal combustion engines. Today, electric vehicles are increasingly used for transportation. As in all industrial establishments and cities, it has been determined as a goal to cause less damage to the environment and to use vehicles more efficiently in transportation. Due to the increase in the use of fossil fuels and the fact that these resources are facing depletion in the coming years, developed countries have started to search for new ones. The use of electric vehicles, which emerged with these studies, is becoming widespread day by day. In addition to being environmentally friendly compared to internal combustion engines, another advantage of electric vehicles is that they can work in an integrated manner with smart grids. In this study, research will be conducted on the current status of electric vehicles, their types, charge levels, advantages, difficulties in development and statistics on electric vehicle use in different countries. In addition, various concepts that emerge with the integrated use of electric vehicles with smart grids will be evaluated. The advantages of including smart grids in the electricity grid infrastructure will be examined. The working principles of vehicle-to-grid (V2G) systems will be evaluated. The concept of “demand-side participation”, which emerges with the use of vehicle-to-grid systems and contributes to the electricity supply-demand balance, will be examined.

Keywords: Energy, Electric Vehicle, Vehicle-to-Grid Systems (V2G), Demand Side Management

9.

ORBITAL INTERACTIONS AND STABILIZATION ENERGIES OF METHYL 5-6 DIHYDRO BENZO(H) QUINOLINE CARBOXYLATE

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ABSTRACT

In this study, methyl 5-6 dihydro benzo(h) quinoline carboxylate (MDQC) molecule, which is a quinoline derivative, was selected and analyzed. Calculations were made considering the conformers at two minimum energies at the theory level B3LYP/6-311++G(d,p). The energy difference ($\Delta E+ZPV$) between the two conformers (MDQC -1 and MDQC -2) was calculated *ca.* 2.05 kJ mol⁻¹. The relative stability of the conformers was explained using the natural bond orbital (NBO) method and performed. Donor and acceptor pairs and orbital energies for NBO pairs were calculated by the Fock matrix equation. $\pi-\pi^*$ transitions were observed in the ring structures for MDQC-1 and MDQC-2. Dominant orbital interactions of selected NBOs for MDQC-1 and 2 were calculated at the theory level B3LYP/6-311++G(d,p) and plotted. From the calculations, the total stabilization energy difference between the two conformers was found. The molecular electrostatic potential (MEP) surfaces were calculated by the DFT/B3LYP/6-311++G(d,p) method and drawn. NBO and Mulliken charges were calculated and analyzed.

Keywords: Methyl 5-6 dihydro benzo(h) quinoline carboxylate, NBO, Orbital interaction, Stabilization energy

Acknowledgement: This work was supported by Eskisehir Technical University Commission of Scientific Research Projects under Grant No: 20ADP144.

10.

DRYING PROPERTIES OF NATURAL BIO-POLYMERS

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ABSTRACT

Desiccants are substances used in the dehumidification process which is vital in order to avoid the degradation of materials. Silica gel is the most prominent type of desiccant used and today the world has developed an interest in bio-polymers due to certain demerits of silica. Hence this study was conducted to investigate the desiccant properties of the four commercial flours wheat, corn, potato and gram and to compare them with the common silica gel desiccant. The bio-polymers were dried under vacuum at 120 °C and were studied over time using Near-Infrared (NIR) spectroscopy for their -OH combination peak which appears at around 5200 cm⁻¹ and the derivative spectra were analyzed to recognize the specific -OH groups involved in hydrogen bonding process. Further, the gravimetric analysis was used to study the rate of adsorption and their long-term efficacies were detected using data loggers. The results clearly indicated that adsorption of water occurs at C1, C2+C3, C4 and C6-OH groups of the glucose units for wheat and corn flour while potato and gram flour showed only three peaks attributing to C1, C2+C3 and C6-OH. Further it was observed that C1 and C2+C3-OH groups have a similar and the highest rates. The rates of adsorption of all flours were greater than both analytical grade and commercial silica and corn flour was found to be an outstanding desiccant compared to conventional silica desiccant. **Keywords:** Adsorption, bio-desiccant, Near-Infrared (NIR) spectroscopy, Gravimetric

WASHING OF CONTAMINATED SOIL USING SOLAR THERMAL ENERGY**Mokhtar DJEHICHE^{1*}, Cheikh MOKRANI¹, Azzedine BENYAHIA², Nedjma LAHMAR¹**¹ Laboratory of inorganic materials, University of Mohamed Boudiaf, M'sila Algeria² City, Environment, Society and Sustainable Development Laboratory, University of Mohamed Boudiaf University, M'sila ,
Algeria**ABSTRACT**

In this work we present a new process of soil remediation, which operates independently. This process consists in washing a polluted soil in a bucket based on the evaporation of water by solar thermal energy. The latter refers to the use of the thermal energy of solar radiation to heat a fluid (liquid or gas), using solar thermal captors. In order to realize this process, our study consists in developing and finding the right configuration of the reactor which will allow the passage of water, without loss, from the liquid state to the gaseous state. The system is composed of a solar collector for water evaporation and a reservoir for soil decontamination, with a passage that ensures water circulation.

Keywords: Soil washing, solar thermal technologies

DETERMINATION OF ELECTROKINETIC PROPERTIES OF NATURAL ZEOLITES BELONG TO MANİSA-GÖRDES

Sedef DİKMEN

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ABSTRACT

The electrokinetic properties of a substance, inorganic or organic, are used to explain the mechanism of dispersion, understanding the performance of physical processes such as flotation, coagulation, flocculation and sedimentation in an aqueous medium and identify the adsorption mechanisms of ions or molecules at a solid liquid interface. The zeta (ζ) potential is one of the most important electrokinetic properties of natural zeolite and clay minerals. To date, a remarkable effort has been made to measure and understand the surface charge of natural zeolite and clay particles. Many laboratory experiments have been reported on ζ potential of clays and a few have also been published for natural zeolites, however, there are very few reported measurements of ζ potential of natural zeolite particles to determine the isoelectric point (iep), potential determining ions (pdi), and the effect of mono- and multivalent cations.

The present study aims to understand the electrokinetic [mobility, ($\mu\text{m/s})/(\text{V/cm})$ and ζ potential, mV] properties of natural zeolite particles. Therefore, a series of ζ potential measurements were carried out to determine the isoelectric point (iep), potential determining ions (pdi), and the effect of various salt (Na^+ , K^+ , Li^+ , Ca^{2+} , Mg^{2+}) and metal (Al^{3+} , Fe^{3+}) cations which varied concentrations of these electrolytes on the ζ potential of natural zeolite. Also, the effect of surface active agent (Hexadecyltrimethylammoniumbromide, HDTMA-Br) on dispersions of natural zeolite was evaluated by electrokinetic measurements.

The iep of natural zeolite was determined by measuring the ζ potential as a function of pH in the absence of salt and metal cations. In the pH range of 2–12, the ζ potential was found negative in water and the highest ζ potential magnitude (~ -20 mV) was obtained around pH 2. At high pH, the negative ζ potential becomes smaller in magnitude and reached about -37 mV at pH 12. This displays that natural zeolite has no iep in the pH range of 2–12. The natural zeolite particles are therefore net negatively charge over the whole pH range. This can be attributed to either the adsorption of OH^- ions on the positive charge centers of natural zeolite or the deprotonation of surface hydroxyl groups. Results reveal that the ζ potential of the natural zeolite, in general, not able to reverse in the presence of mono- and divalent salt cations. In presence of metal ions (Al^{3+} and Fe^{3+}) the ζ potential of the natural zeolite has similar trends, i.e., an increase in the concentration of these ions causes an increase in the ζ potential to the positive values at 0.005 M, and then it becomes positive. An observed increase of ζ potential in the sample treated with varying concentrations of HDTMA (0.001–0.05 M) revealed a distinct broad maximum at 0.03 M. It was established that the observed significant increase of ζ potential, from -24 up to 54 mV, correlates with a specific complex formation ability of the studied surface active agent. The relative broadness of the maximum of the ζ potential within a wide concentration range of HDTMA could be associated with intensive dissolution cations such as Na^+ , K^+ , Ca^{2+} , Mg^{2+} and Al^{3+} while an observed increase of ζ potential could be explained by adsorption of studied complexing agent on the surface of natural zeolite particles.

Keywords: Electrokinetic properties, Isoelectric point, Natural zeolite, Zeta potential

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**ELECTROMAGNETIC WAVE SCATTERING BY PYRAMID-SHAPED
PHOTONIC CRYSTAL FROM RESONANT MAGNETODIELECTRIC
SPHERES**

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The solution of the problem of scattering electromagnetic waves with a discrete
convex polyhedron - a pyramid of resonant magnetodielectric spheres based on a
complex rhombic crystal lattice is presented.

Here we consider the case equivalent to the X-ray optics of crystals, when $a/\lambda \ll 1$ and can be $a/\lambda_g \sim 1$, $d, h, l/\lambda' \sim 1$ where a is the radius of the spheres; λ, λ_g - the wavelength of the scattered wave outside and inside the spheres; d, h, l - the lattice constants. The solution of the problem is obtained on the basis of the integral equations of Fredholm electrodynamics of the 2nd kind, with non-local boundary conditions [1, 2, 3].

Expressions found in the work for a pyramid-shaped metacrystal can be used to study ras-seeded fields in the Fresnel and Fraunhofer zones, as well as to study its internal field.

The ratios obtained in the work can be used in studying the scattering of waves of various kinds by convex polyhedra, on their basis creating new types of limited metacrystals, including nanocrystals with resonant properties and in studying their behavior in various external media [4], and also when developing methods for modeling electromagnetic phenomena that can occur in real crystals in resonant regions in the optical and X-ray wavelength ranges [5].

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FLUID MAXWELL EQUATIONS IN THE FRAMEWORK OF OCTONION ALGEBRA**Süleyman DEMİR¹, Neslihan ŞAHİN¹**¹ Department of Physics, Faculty of Science, Eskişehir Technical University, Eskişehir, Turkey**ABSTRACT**

Using the resemblances between basic equations of electrodynamics and fluid dynamics, the Maxwell type equations of compressible fluids have been reformulated in terms of eight component octonions. It has been proved that single octonionic expression can summarize the basic equations of compressible fluids. In this work, the field equations of fluids have been expressed in a compact, simple and elegant form. Moreover, the generalized wave equation has been derived by taking advantage of this hypercomplex number system.

Keywords: Octonion, Maxwell Equations, Compressible Fluids, Field Equations

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EXCITON ABSORPTION SPECTRUM OF KPb_2Br_5 THIN FILMSOlga YUNAKOVA¹, Olena KOVALENKO², Mykola YUNAKOV³¹ Physical optics Department, Faculty of Physics, V. N. Karazin Kharkiv National University, Kharkiv, Ukraine² Department of Physics, Faculty ACT, Kharkiv National University of Radio Electronics, Kharkiv, Ukraine³ Department of Materials for Reactor Constructing, Physics and Technology Faculty, V. N. Karazin Kharkiv National University, Kharkiv, Ukraine

The KPb_2Br_5 compound exists in two modifications – tetragonal (I) (space group $I4/mcm$, $a = 8.14 \text{ \AA}$, $c = 14.10 \text{ \AA}$, $z = 4$) and monoclinic (II), (space group $P2_1/c$, lattice parameters are $a = 9.264 \text{ \AA}$, $b = 8.380 \text{ \AA}$, $c = 13.063 \text{ \AA}$, $\gamma = 90.06^\circ$, $z = 4$). [1, 2]

KPb_2Br_5 thin films were prepared by evaporation in vacuum of a melt mixture of pure KBr and PbBr_2 powders of stoichiometric molar composition on cold quartz substrates $T_s = 278\text{K}$. The films, produced by this method, correspond to KPb_2Br_5 (I). The phase composition of the films was monitored from the absorption spectra measured at $T = 90\text{K}$. Such control is possible due to the difference in the spectral position of the long-wavelength exciton bands in KPb_2Br_5 (3.66 – 3.84 eV), PbBr_2 (3.98 eV), and KBr (6.76 eV).

The absorption spectrum of the KPb_2Br_5 (I) thin film (Fig.1a) contains a long-wavelength A' band and a wide C band (the spectral positions of the bands are given in Table 1).

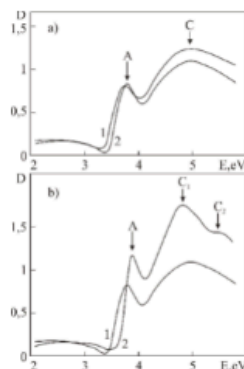


Fig. 1. Absorption spectra of a thin film of KPb_2Br_5 , a) tetragonal structure (I) at $T = 282\text{K}$ (1) and 90K (2) and b) monoclinic (II) (2) and tetragonal (I) (1) structures at $T = 90\text{K}$.

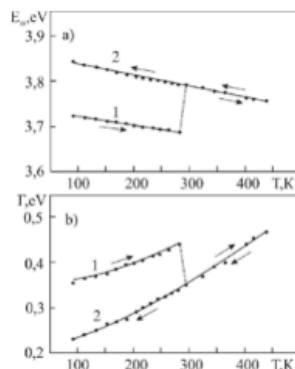


Fig. 2. Temperature dependence of the spectral position $E_{ex}(T)$ (a) and half-width $\Gamma(T)$ (b) of the long-wavelength exciton band A in the KPb_2Br_5 thin film.

The A' band with increasing temperature shifts linearly to the long-wavelength region of the spectrum with $dE_{ex}/dT = - (1,87 \pm 0,04) \cdot 10^{-4} \text{ eV/K}$ (Fig. 2) in the temperature range $90\text{--}282 \text{ K}$. At $T_c = 293\text{K}$ there are short-wavelength shift of the long-wavelength exciton A' band, which indicates an increase of the unit cell volume, narrowing and sharpening of the band. A jump in the temperature dependences of the spectral position and half-width of the long-wavelength exciton band A at $T_c = 293\text{K}$ indicates a first-order phase transition. This transition is irreversible. Cooling of the film down to a temperature 90 K does not restore the spectrum (Fig. 1b). Apparently, upon evaporation of the melt mixture on a cold substrate, the tetragonal compound KPb_2Br_5 (I) crystallizes. When the film is heated to $T \geq T_c$, a phase transition occurs to the monoclinic structure of KPb_2Br_5 (II).

The structure of the absorption spectra of KPb_2Br_5 thin films (I, II) is similar to the PbBr_2 spectrum and close in the position of the exciton bands, which is due to the similarity of the crystal structures of the compounds. Apparently, in thin films of KPb_2Br_5 (I, II), as in PbBr_2 , excitons have a cationic character, which is indicated by the similarity of their spectra in structure and the close spectral position of the absorption bands. And also the close position of the long-wavelength exciton bands to the Pb_2^+ impurity band in KBr. In this case, exciton excitations are localized in the compound sublattice containing lead ions

Table 1: Spectral position of exciton bands E_{ex} , band gap E_g , and exciton binding energy R_{ex} in KPb_2Br_5 (I, II) and PbBr_2 .

Compound	E_{ex} , eV	$E_{ex(C)}$, eV	$E_{ex(A)}$, eV	E_g , eV	R_{ex} , eV
KPb_2Br_5 (I) (thin film)	3.72	4.95		3.95	0.23
KPb_2Br_5 (II) (thin film)	3.84	4.8	5.5	4.08	0.24
PbBr_2	3.98	4.86	5.69	4.23	0.25

In the cationic exciton model, the KPb_2Br_5 (I, II) spectrum, like the PbBr_2 spectrum, is determined by transitions in the Pb_2^+ ion. The long-wavelength shift of the absorption edge in the series of compounds PbBr_2 , KPb_2Br_5 (II), KPb_2Br_5 (I) is due to a decrease in the ionicity of the compounds due to a decrease in the number of Br^- ions surrounded by the Pb^+ ion. In PbBr_2 , the coordination number of Br^- ions is 9, in KPb_2Br_5 (II) is 8.5, in KPb_2Br_5 (I) is 7.

The temperature dependence of the spectral position $E_{ex}(T)$ and half-widths $\Gamma_{1,0}(T)$ in KPb_2Br_5 (I, II) is determined by the exciton-phonon interaction. An analysis of the temperature dependence of $\Gamma_{1,0}(T)$ established the two-dimensional 2D character of exciton excitations in KPb_2Br_5 (I, II).

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THE MEDIATION EFFECT OF CRITICAL THINKING SKILLS IN THE RELATIONSHIP BETWEEN LIFELONG LEARNING TENDENCY AND INFORMATION OPERATIONAL THINKING SKILL

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ABSTRACT

It is an inevitable fact that the continuous development of information and communication technologies necessitates lifelong learning. This situation entails also the acquisition of certain skills. The efficient use of 21st century skills of individuals facilitates the adaptation of individuals to the age they live in. In this study, it is aimed to examine the mediating effect of critical thinking skill on the relationship between lifelong learning disposition and computational thinking skills of students enrolled in the pedagogical formation certificate program, which is considered within the scope of lifelong learning in education faculties. The study was carried out in the relational screening model. Structural regression analysis was used to test the relationship between variables. Among the results of the research; that computational thinking skill has a direct and significant effect on critical thinking skill, and computational thinking skill has a direct effect on lifelong learning. It is seen that it also has an indirect effect on critical thinking skills. Accordingly, considering the effect of the computational thinking skill on lifelong learning in adapting to the age in which the individual lives, learning activities that will enable this skill to be acquired at an early age are recommended. Considering the effect of this skill on critical thinking, it reveals the issue of focusing on the depth and richness of the proposed learning activities.

Keywords: lifelong learning, critical thinking, computational thinking, 21st century skills

17.

THE EFFECTS of HEAVY METAL APPLICATIONS on ANTIOXIDANT DEFENCE ACTIVATION in BARLEY and WHEAT VARIETIES

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ABSTRACT

Heavy metals are known as agents for oxidative stress by formation of reactive oxygen species and accumulated on the earth [1]. This accumulation can then be transported via food chain to humans and causes some more serious health problems. As a multicellular higher organisms, plants are the first stop for heavy metal accumulation during this traffic. Therefore, plants are not only the vehicle of this transportation, but also another affected organisms together with animals and humans, due to their lowered self productivity. However, as antioxidant defence systems play a crucial defence against oxidative stress [2], these responses could be used as early biomarkers of heavy metal toxicity in plants. Based on this, we have examined whether antioxidant defence responses are reliable indicators for the toxicity of heavy metals cadmium and lead in different crop plants within this study. By using the seeds of *Hordeum vulgare* cv. Çıldır and *Triticum aestivum* cv. Gerek, different single and combined concentrations of CdCl₂ and PbCl₂ treatments were applied to investigate glutathione (GSH), protein contents and glutathione S-transferase (GST) activities in the roots and shoots of above mentioned varieties. Our results shown that, heavy metals had an effect on the tested parameters and variability in results reflect the differences in the rate of metabolism with regard to heavy metals between varieties. On the other hand, due to the high GSH and GST values observed in the studied plants, it should be mentioned that they are generally adaptable to stress conditions with regard to applied heavy metals in the study.

Keywords: Antioxidant mechanisms, barley, heavy metals, oxidative stress, wheat.

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18.

A METHOD FOR EXAMINING THE SEQUENCING MODELS OF ANTISYMMETRIC STRUCTURES

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ABSTRACT

Some Symmetric protein assemblies get important roles in many biochemical processes. This study for application of a general framework for modeling arbitrary symmetric systems. The various types of symmetries was described in this study. Because of the symmetric modeling capabilities was run simulations on symmetric systems.

NONPARAMETRIC REGRESSION WITH ERROR-IN-VARIABLES MODEL BASED ON DIFFERENT KERNEL FUNCTIONS

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ABSTRACT

Estimation of error-invariable models is a specific problem in different fields such as medicine, economics, industry, and biostatistics. The main difference between classical regression and error-in-variable models is that explanatory variables involve random error terms. Therefore, classical estimation methods that do not include the necessary adjustments for the contaminated explanatory variables give biased results. Regarding the error-in variables, there are important studies in the literature such as Fan and Truong, (1993), Cook and Stefanski, (1994), Carroll, Maca, and Ruppert, (1999), Carroll and Hall, (2004) Delaigle and Meister, (2007) and Wang and Wang, (2011). In this paper, nonparametric regression with measurement error is considered and estimated by kernel smoothing estimator which is studied detailed by Wang and Wang (2011). This paper differs from their study with the idea of using two different kernel functions to compare them on quality of estimations. These functions are suitable for different error behaviors (see Fan, 1992). The goal of the paper is encouraged by a Monte Carlo simulation study and results are presented.

Keywords: Error in variables, kernel smoothing, nonparametric regression, kernel functions

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**DFT/TD-DFT ANALYSIS OF 2-CHLORO-7-METHYLQUINOLINE-3-CARBALDEHYDE
USING COMPUTER COMPUTING METHOD****Nihal KUŞ and Saliha ILICAN**

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ABSTRACT

Quinolines are essence of many natural products, drugs and were found synthetic compounds. They containing a quinoline ring is used various biological, and pharmaceutical activities, eg. anticancer, antibacterial, antifungal, antiplasmodial, antihistamine, antimalarial and antituberculosis. It is thought that the investigation and analysis of this molecule, which has such important functional areas, will make an important contribution to science and for that, in this study, 2-Chloro-7-Methylquinoline-3-Carbaldehyde (CIMQC) molecule, which is a quinoline derivative, was selected and analyzed. The stable structures of CIMQC molecule with minimum energy were investigated by density functional theory (DFT) together with B3LYP/6-311++G(d,p) method. It was seen that there are two different conformers (CIMQC-1, CIMQC-2) with minimum energy in the scanning made depending on the C—C—O—H dihedral angle. As a result of the B3LYP/6-311++G(d,p) method, the energy difference ($\Delta E+ZPV$) between the two conformers was calculated as 14.60 kJ mol⁻¹. Oscillator strength and excitation energies were analyzed by calculating the time-dependent DFT (TD-DFT). The energy differences between the excited energy levels are given in the graph. This was done by adding the ground state energies of both conformers. The energy corresponding to HOMO-LUMO was calculated to correspond to the S₀→S₁ transition for both CIMQC-1 and CIMQC-2. The excitation energy value was calculated as 4.02 eV for the most stable conformer and 4.06 eV for the other conformer.

Keywords: 2-Chloro-7-Methylquinoline-3-Carbaldehyde, DFT/TD-DFT, Excitation energies, HOMO-LUMO**Acknowledgement:** This work was supported by Eskisehir Technical University Commission of Scientific Research Projects under Grant No: 20ADP144.

EFFECTS OF *Echinophora tenuifolia* ESSENTIAL OIL ON CYTOTOXIC AND APOPTOTIC MECHANISM IN LUNG AND MESOTHELIOMA CANCER CELL LINES

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ABSTRACT

Essential oils isolated from aromatic plants have different biological activities such as antimicrobial, antioxidant, antidiabetic, especially their anticarcinogenic potential. Today, in addition to the treatment of various diseases, it is also used in different industries such as food, cosmetics, biological control against ecological pests and biotechnological process development. *Echinophora tenuifolia* is locally called “tarhana grass” or “pickled grass” and its essential oil has been reported to have an antimicrobial effect against some microorganisms. The antimicrobial and antioxidant properties of the methanol extract of *E. tenuifolia* have been demonstrated and its antiproliferative effect in colorectal cancer, breast cancer and melanoma has been demonstrated in various studies. In this study; in order to explain the anti-carcinogenic activity of *Echinophora tenuifolia* essential oil, its effects on cytotoxicity, cell proliferation and apoptotic processes were investigated in lung and mesothelioma cancer cell lines. It was determined that *E. tenuifolia* essential oil has significant cytotoxic activity in lung cancer (A549) and mesothelioma cancer (SPC212) cell lines at all doses and incubation times. At 48 hours of incubation; the IC₅₀ values of essential oil in A549 and SPC212 cells was determined as 0.05131% and 0.01760%, respectively. 10% increase in the number of cells in G₀/G₁ was observed in the A549 cell line treated with essential oil at an IC₅₀ dose (0.05%) compared to the control. In the SPC212 cell line, an increase of 13.5% was determined in the number of cells in G₂/M. It was noted that *E. tenuifolia* essential oil decreased the cell cycle entry rate of lung cancer cells, but increased the number of cells in mitosis in mesothelioma cancer cells. Cell morphologies were examined with a fluorescent microscope, and it was observed that there was a significant increase in the number of early apoptotic, late apoptotic and necrotic cells in both cells treated with 0.05% essential oil. In the SPC212 cell line, it was determined that 0.05% essential oil caused a significant increase in the number of late apoptotic cells. It was observed that exposure to essential oil caused a dose-dependent significant increase in the late apoptotic/necrotic cell ratio of Annexin V-FITC & PI stained A549 cells, while a remarkable increase in the early apoptotic cell ratio in SPC212 cells. In conclusion, these findings show that *E. tenuifolia* essential oil triggers cytotoxic and apoptotic mechanisms, and This study shows that in order to elucidate the details of the anticarcinogenic mechanism of *E. Tenuifolia* essential oil, it should be supported by studies at the level of gene expression in lung and mesothelial cancers.

Keywords: *Echinophora tenuifolia*, essential oil, lung cancer, mesothelial cancer, apoptosis.

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ABSORPTION SPECTRA OF THIN FILMS COMPOUNDS IN THE RbCl-CuCl SYSTEM

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Compounds of the RbCl-CuCl system have been studied by many authors. Basically, the search was conducted for the composition of the compound with the maximum ionic conductivity. Different compositions of the superionic compound were proposed - RbCu₂Cl₃ and Rb₂Cu₃Cl₅ [1], Rb₂Cu₃Cl₅ [2], Rb₂Cu₃Cl₅ [3]. However, according to the phase diagram, compounds RbCu₂Cl₃, Rb₂Cu₃Cl₅, and Rb₂Cu₃Cl₅ are formed in the RbCl - CuCl system [4]. RbCu₂Cl₃ compound has a high ionic conductivity $5 \cdot 10^{-3} \Omega^{-1} \text{cm}^{-1}$ at room temperature. The absorption spectra of compounds of the RbCl-CuCl system have not been studied, although the crystal structure of many of the above compounds has been studied in detail.

The (RbCl)_x(CuCl)_{1-x} thin films were prepared by evaporating in a vacuum a melt of a mixture of pure RbCl and CuCl powders of a given molar composition on quartz substrates heated to 100°C, followed by annealing the films for an hour at the same temperature. The study of the absorption spectra of thin films (RbCl)_x(CuCl)_{1-x}, showed that in the concentration range $0.5 \leq x \leq 0.66$ only two compounds with a stable spectrum are formed - RbCu₂Cl₃ and Rb₂Cu₃Cl₅ (Fig. 1). We failed to synthesize the compound Rb₂Cu₃Cl₅.

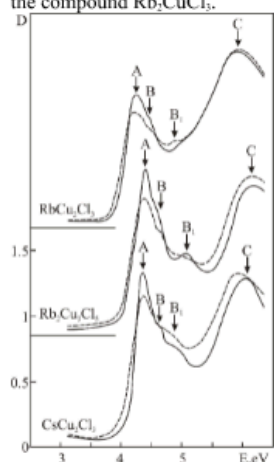


Fig. 1. Absorption spectra of RbCu₂Cl₃, Rb₂Cu₃Cl₅ and CsCu₂Cl₃ thin films at T = 90K (1) and 290K (2).

In the absorption spectra of thin films of RbCu₂Cl₃ and Rb₂Cu₃Cl₅ (Fig. 1), two narrow intense bands A and B, a weak band B₁, and a wide short-wavelength band C are observed. With increasing temperature, bands A and B shift to the long-wavelength region of the spectrum, broaden and weaken due to the exciton-phonon interaction (EPI), which indicates their exciton origin. The band C is not very sensitive to temperature and corresponds to interband transitions. The spectral positions of the absorption bands, the band gap E_g , the binding energy R_{ex} , and the exciton radius a_{ex} in RbCu₂Cl₃ and Rb₂Cu₃Cl₅ are given in Table 1.

In terms of the structure of the spectrum and the position of the main absorption bands, the spectra of thin films of RbCu₂Cl₃ and Rb₂Cu₃Cl₅ are close to the spectrum of the previously studied compound CsCu₂Cl₃ [5] (Fig. 1, Table 1). In CsCu₂Cl₃, excitons have a cationic character, are localized in the structural elements of the crystal lattice CuCl₄²⁻ and their spectrum is interpreted proceeding from the state of the Cu⁺ ion in a tetrahedral environment with Cl⁻ ions [5].

Table 1. Spectral position of absorption bands, bandgap width E_g , binding energy R_{ex} and exciton radius a_{ex} in compounds.

Compound	E_{ab} , eV	E_{ab1} , eV	E_{ab2} , eV	E_{ac} , eV	R_{ex} , eV	E_g , eV	a_{ex} , Å
RbCu ₂ Cl ₃	4.21	4.475	4.92	5.9	0.185	4.4	12.8
Rb ₂ Cu ₃ Cl ₅	4.36	4.63	5.08	6.2	0.21	4.57	11.5
CsCu ₂ Cl ₃	4.33	4.615	4.92	6.05			

The absorption spectra of compounds are linked to their crystal structure. Common to the crystal structures of the compounds RbCu₂Cl₃, Rb₂Cu₃Cl₅, and CsCu₂Cl₃ is the presence of structural elements CuCl₄²⁻ in them [6, 7, 8]. Apparently, the absorption spectra of thin films of RbCu₂Cl₃ and Rb₂Cu₃Cl₅, like the spectrum of CsCu₂Cl₃, are due to transitions in the Cu⁺ ion. Low-frequency excitations of the free Cu⁺ ion correspond to the transition $^1S_0 \rightarrow ^1D_2$. For the Cu⁺ ion located in the center of the tetrahedron, 1S_0 transforms into 1A_1 and the 5-fold degenerate state 1D_2 splits into levels 1T_2 and 1E . According to the selection rules for the local group T_d [5], the optical transition to a lower level 1T_2 is allowed, but the transition $^1A_1 \rightarrow ^1E$ is prohibited. Since the Cu⁺ ion is somewhat displaced from the center of the tetrahedron in the lattices of the studied compounds, the local group decreases to C_{2v} . Under the action of a weak axial intracrystalline field the prohibition on the transition $^1A_1 \rightarrow ^1E$ is partially lifted, and the level 1T_2 is split into components. Correspondingly, the intense exciton bands A and B in the studied compounds, such as in CsCu₂Cl₃, correspond to the transition $^1A_1 \rightarrow ^1T_2$, and the weak band B₁, to the transition $^1A_1 \rightarrow ^1E$.

From the above, it follows that excitons in RbCu₂Cl₃ and Rb₂Cu₃Cl₅ are localized in the structural elements CuCl₄²⁻ of the crystal lattice. With this localization, the top of the valence band in the studied compounds, such as in CuCl, is formed by the 3d states of the Cu⁺ ion and the 3p states of the Cl⁻ ion, and the conduction band is formed by the 4s states of the Cu⁺ ion.

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MOLYBDENUM DISULFIDE THIN FILM ELECTRICAL AND OPTOELECTRICAL CHARACTERIZATION UNDER DIFFERENT ATMOSPHERE

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ABSTRACT

Third generation solar cells, which are one of the renewable energy sources with the developing technology, are among the popular solar cells of recent years with their low costs and high efficiency. The most popular solar cell group in the third generation solar cell family are organo-halide hybrid solar cells. Among the advantages of organo-halide hybrid solar cells; There are features such as ease of production processes, controllability of the forbidden energy range and diversity. However, organo-halide hybrid solar cells suffering from degradation/metastability problems. In order to understand metastability problem, solar cells layers have to investigate layer by layer. In organo-halide hybrid solar cells, it is observed that two-dimensional materials and especially di-chalcogenides are used in the electron transfer layer and hole transfer layers. Because of their superior properties, scientists seem to focus on researching various versions of di-chalcogenides in the layered structures of photovoltaic materials. As a result of these researches, single layer molybdenum disulfide (MoS₂), which is a member of the di-chalcogenides group, has become a popular material in photovoltaic applications. MoS₂ is a promising, 2-dimensional semiconductor material for next generation optoelectronics applications with adjustable forbidden energy band gap.

In this study, MoS₂ thin films metastability behavior was investigated. MoS₂ thin films was produced by radio frequency (RF) sputtering method. MoS₂ was investigated by electrical and optoelectrical methods such as temperature-dependent dark conductivity, time-dependent dark conductivity and flux-dependent photoconductivity measurements. Morphological characterization was done by Scanning Electron Microscopy (SEM). MoS₂ thin films have been characterized under different atmospheric condition such as laboratory atmosphere, vacuum atmosphere, high purity oxygen atmosphere and under UV light.

Keywords: Di-chalcogenides, Molybdenum disulfide, Metastability, Temperature-dependent dark conductivity, Time-dependent dark conductivity, Flux-dependent photoconductivity, SEM.

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24.

**DETERMINING THE CHALLENGES OF ACADEMICIANS DURING THE COVID-19
PROCESS: A CASE STUDY**

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ABSTRACT

COVID-19 global epidemic has affected many sectors, especially in education all over the world. This situation undoubtedly brings about a 'new social transformation' that can affect not only classes, schools and universities, but also the world economy. Faculty members working in higher education institutions have also turned to using online environments for both academic and administrative processes. In this context, the aim of the research is to reveal the difficulties faced by academics during the COVID-19 pandemic process and how they overcame these difficulties. The data obtained within the scope of the research are collected through semi-structured interviews with academicians working in two state universities, unit managers of these universities (department head, dean, rector) and IT department heads who provide technical logistical support. The research will be carried out by following the qualitative paradigm. The data obtained will be subjected to content analysis; the difficulties encountered will be explained with themes, sub-themes and codes. Based on the results, good practice examples in our country and in the world will be examined and recommendations will be presented.

Keywords: COVID-19, higher education, technology, difficulty, academic

25.

MEL-FREQUENCY CEPSTRAL COEFFICIENTS OF AUTHENTICATION SYSTEM USER

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ABSTRACT

The preference has been recently given to access systems based on biometric user characteristics. Initially, preference was given to the static biometric characteristics of the user (face image, finger papillary pattern and the iris of the eye), which did not meet the expectations of developers and users due to the simplicity of their counterfeiting. Nowadays, dynamic (behavioral) biometric features of users, namely, voice authentication systems are more preferable. As it is known, voice authentication systems have a number of advantages: simplicity, compactness, low cost, and a number of others. In addition, the passphrase can be rapidly changed and increased during the authentication process. However, the quality indicators of all biometric access systems do not meet the increasing requirements. In the process of voice authentication, the amplitude-frequency spectrum of registration materials is analyzed. The main research is focused on the use of formant estimates, cepstrum coefficients, mel-frequency cepstral coefficients, linear prediction coefficients as a user template; and based on them, solutions are formed on the basis of the Gaussian Mixture Model and Support Vector Machine as well as Hidden Markov Models or artificial neural networks. In the report, the analysis of the amplitude-frequency spectrum is proposed to be supplemented with studies of phase data, which are traditionally ignored in this authentication.

Keywords: Authentication; voice signal; amplitude and phase information; cepstrum coefficients

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CREATING AWARENESS REGARDING SOLAR ENERGY and ITS USE WITH PORTABLE SOLAR POWERED GENERATOR

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ABSTRACT

Increasing the share of renewable energy sources such as sun, wind, hydropower compared to energy sources which are not renewable such as fossil fuels, coal, nuclear energy in production of electricity is very important in terms of decreasing greenhouse gas emissions which cause global warming. Turkey targets to supply at least 30% of its energy production from renewable energy sources by 2023. In parallel with the activities of increasing the installed solar power capacity of ~49.9 MW in Mersin which is a city located in the south of Turkey, activities such as conferences, symposiums, festivals etc. which increase the knowledge and awareness level of the local community about solar energy and its use have been carried out. In order to contribute to the awareness regarding this matter, a portable solar powered generator of which its dimensions are ~520×400×110 mm has been built. Its mass is ~11 kg and it has 230 V AC and 1.1-10.2 V DC voltage output. The mechanical and electrical installation of the power generator is explained in this paper.

Keywords: Renewable energy, Public awareness, Solar generator, Semiconductor, Photovoltaics

CURRENT PERSPECTIVES ON MEDICINAL AND AROMATIC PLANTS IN FOOD AND HEALTH FIELD

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ABSTRACT

Plants, with the substances they contain, are of great importance in terms of nutrition as well as human and animal health. Although it has been known since ancient times that increasing the consumption of herbal products is beneficial for health, which special components were responsible for this beneficial effect was later started to be searched. In these days, the age of antibiotics, which has been on our agenda until recently, is about to end, it is seen that herbal control has gained more and more importance. In studies conducted in this context, new strains of microorganisms have shown resistance to drugs, and therefore, the use of drugs has decreased, and instead, the use of natural antimicrobials has begun. In this way, plants and essential oils obtained from plants gain importance as an alternative to synthetic preservatives again. Studies on plants have led to the discovery of new drugs used against various diseases. The discovery of secondary metabolites, which are bioactive compounds contained in plants, has triggered studies in this field. In many studies, it has been revealed that different secondary metabolites exhibit different biological activities such as antimicrobial, antiviral, anticancer and antioxidant. Based on their common usage areas, these plants are used as spices, herbal tea, food supplements and additives. The most important feature that an antimicrobial substance should have is that it has only a selective toxic and lethal effect. Conditions such as the structure and type of the plant, the concentration and the type of the test microorganism affect the antimicrobial activity. Temperature, pH, oils and proteins are important in observing the antimicrobial effects of phenolic compounds. Among the medicinal and aromatic plants, cinnamon (*Cinnamomum verum*), rosemary (*Rosmarinus officinalis*), fennel (*Foeniculum vulgare*) and thyme (*Thymus vulgaris*) essential oils have antimicrobial effects against Gram-positive and Gram-negative bacteria as well as yeast, molds and viruses. With the support of these studies, the use of limonene, carvacrol and thymol, which are the most preferred essential oil components in the food and pharmaceutical industry, has increased significantly. It has been determined that these oils are broadly effective against food spoilage pathogens including *Escherichia coli* O157:H7, *Salmonella*, *Shigella*, *Campylobacter*, *Listeria*, *Staphylococcus*, *Bacillus* and *Vibrio* genera. In addition, well-known medicinal and aromatic plant, in recent years, harem (*Peganum harmala L.*), tea tree (*Melaleuca alternifolia*) and propolis plants have started to attract attention. Endemic plants around 3700 in Turkey indicate that our country has the potential to provide many new alternatives to medicinal and aromatic plants. In this context, it is important to perform further investigate on the antibacterial, antiviral, anti-inflammatory, antiseptic, antioxidant, antiparasitic, antitoxic and insecticidal properties of medicinal and aromatic plants and essential oils, and to reveal their effectiveness on microorganisms that have gained resistance to antibiotics are gaining in the studies. For this purpose, although the importance of medicinal aromatic plants and essential oils obtained from these plants is sometimes overlooked, due to the richness of the molecules they contain and the antimicrobial effects they will create, today they are the strongest candidates that will serve the need in the field of food and health and provide an alternative use to chemical preservatives and additives.

Keywords: medicinal and aromatic plants, endemic plants, antimicrobials

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28.

VECTOR APPROACH FOR MODELING, RESEARCH AND OPTIMIZATION OF COMPLEX CHEMICAL SYSTEMS

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ABSTRACT

The main purpose of this project is a theoretical substantiation of a method that can predict all chemical reactions in different complex systems. Basic chemical laws, chemical thermodynamics and new vector approach to visualization of chemical compounds and interactions were used in the project. Methods: representation of chemical objects in the form of multidimensional vectors taking into account the elemental and energy (thermodynamic) coordinates, use of methods of chemical thermodynamics for calculations of the basic thermodynamic indicators of reactions, use of mathematical methods to determine the sequences of chemical reactions. The result of the project is an algorithm that can help scientists predict chemical reactions between different substances and calculate their possibility and thermodynamics parameters. In addition, an example of using this method was given. System of interaction that consists of methane, oxygen, carbon (II) oxide, carbon (IV) oxide, carbon, hydrogen and water was researched. The results of calculations are interesting, because they showed many new unknown interactions in this system, but calculations of possibility showed that well-known reactions are the most possible. Hence, this method can predict chemical interactions and calculate their possibility. Test system showed that the method gives real results, but also it complements them. This project has big prospects, because it can help scientists create new sources of energy, invite new synthesis routes of different useful materials and research chemical interactions in nature that can help us decrease harmful influence on the environment.

Keywords: chemical interactions, vectors, thermodynamics

29.

SYNTHESIS AND PROPERTIES OF CYCLOPROPANE-CONTAINING OPTICALLY TRANSPARENT COPOLYMER

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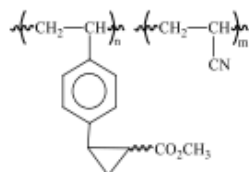
The efficiency of use of the polymer optical means has been based on reduction of the cost for materials and their processing. The optical copolymer of styrene with acrylonitrile (SAN) has good technological and exploitation qualities [1]. Polystyrene has a number of disadvantages: brittleness, low adhesive strength, low surface hardness, low atmospheric and chemical resistance. An introduction of methoxycarbonylcyclopropyl fragment into polystyrene chain favors the improvement of some indices.

With the aim of preparation of optically transparent copolymer of styrene the copolymerization of 2-methoxycarbonylcyclopropyl styrene (MCCPS) with acrylonitrile (AN) has been carried out. The preparation of copolymer on the basis of these monomers is carried out by radical copolymerization in mass and in benzene solution in the presence of dinitrileazodiisobutyric acid. MCCPS has been obtained by interaction of p-divinylbenzene with methyldiazoacetate in the presence of the catalyst of anhydrous CuSO₄. Yield – 93 %.

The synthesized copolymer is dissolved in the chlorinated hydrocarbons, acetone, benzene, etc. The polymerization of MCCPS+AN proceeds smoothly until the copolymer is formed with 85% yield. MCCPS+AN has higher optical indices than copolymer PS+AN.

On the basis of elemental analysis and spectral data the compositions and structures of the synthesized copolymers have been established. The results of study of the copolymerization process of these monomers showed that the reaction proceeds on double bonds of the comonomers without touching of cyclopropane ring, ether and nitrile group.

The chemical structure of the copolymer is expressed by the following formula:



The copolymerization constant values of MCCPS (M_1) and AN (M_2) have been determined by Fainemann-Ross method and the factors of activity ($Q_1=0.509$ $e_1=-0.176$) have been calculated on scheme Q-e of Alfrey-Price. The found values $r_1=0.60$ and $r_2=0.25$ ($r_1>r_2$) evidence that M_1 is more active monomer than M_2 at radical copolymerization. In all cases of conversion of the comonomers, the soluble copolymers are obtained, i.e., at M_1 and M_2 copolymerization the chain transfer processes to polymer or structuring don't occur practically.

For creation of a copolymer with the highest light transmission, the ratio of MCCPS, equal to 75:25 (AN in the initial monomer mixture) is optimal. At a higher AN content, due to the formation of chromophore conjugated bonds ($C\equiv N$) a weak painting of the copolymer occurs. The obtained copolymer on the basis of monomers of MCCPS+AH shows higher optical transparency ($n_D^{20}=1.5830$) than the copolymer of polystyrene with acrylonitrile (1.568-1.570).

Most likely, this has been connected with the availability of a cyclopropane ring and ester fragment in the macromolecule links.

It has been revealed that a light transmission of the obtained copolymer is 82%. A distinctive feature of the obtained copolymer is its high physical-mechanical and adhesive properties. Thus, as a result of the carried out investigations, an optical material exhibiting the high optical transparency and light transmission has been obtained.

The copolymer of 2-methoxycarbonylparacyclopropyl styrene with acrylonitrile can be used as an optically transparent material in optotechnology, as well as in the manufacture of optical details for integral microscheme.

Key words: 2-methoxycarbonylparacyclopropyl, acrylonitrile, *copolymerization, optically transparent materials*

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INVESTIGATION OF THE ANTILISTERIAL ACTIVITY OF LACTIC ACID BACTERIA WITH PHYSIOLOGICAL AND CHROMATOGRAPHIC WAY

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ABSTRACT

Lactic acid bacteria (LAB) can show antagonistic effects on pathogenic microorganisms through their metabolites. LAB has the potential to be a protective culture in the inhibition of important pathogens such as *Listeria* due to the bacteriocins they produce. In the current study, the inhibitory effect of LAB isolated from fermented food samples on the pathogen *Listeria monocytogenes* was investigated. In the study, the physically inhibitory effect was investigated by agar spot and well diffusion tests, supernatant samples of LAB were examined by HPLC and chromatogram images of the isolates were evaluated. It was found that 5 isolates (71, 91, 223, 9C, F2) included in the study and *Pediococcus pentosaceus* ATCC 43201 strain used as a reference strain had an inhibition effect on *Listeria monocytogenes* ATCC 7644 with the zone diameter ranged between 11.0 – 29.0 mm in the trial performed using direct active culture; In the experiment carried out with the supernatants of the isolates, it was determined that the LAB had an inhibitory effect on *Listeria monocytogenes* in the range of 9.0 – 20.0 mm. All of the strains were Gram positive tetracocci in microscopic examination and exhibited catalase negative features. It was determined that the strains whose genetic identification tests were carried out with universal primers over the 16S rDNA region were included in the lactic acid bacteria group such as *Lactilactobacillus*, *Lactiplantibacillus*, *Pediococcus*. The Agilent 1100 HPLC system was used during the HPLC analysis of the strains with antilisterial effect at the supernatant level, and analyzes were carried out with a Kinetex C18 protective column and a Kinetex Evo C18 (150x4.6, 5µm) analytical column with a flow rate of 1mL/min. 220 nm was chosen as the detection wavelength. When the chromatograms obtained are examined, it is noteworthy that the peak obtained around the 6th minute is similar to the peak region of pediocin bacteriocin in previous studies. When the peak areas of the isolates in this region are examined; The peak areas of the F2 and 9C determined as 1114 and 1132 which were higher than the peak areas of other isolates. These results also revealed that the antilisterial activities of LAB isolated from fermented foods are likely due to lactate or other metabolites as well as pediocin-like bacteriocin production.

Keywords: Lactic acid bacteria, antilisterial activity, chromatography.

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SKIN PIXEL RECOGNITION BASED ON NEIGHBORHOOD CORRELATION AND MOMENT FEATURES

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ABSTRACT

In this study, a new feature extraction method is proposed for the recognition of human skin pixels from color images. The variability in picture quality, the different skin colors of different human races, the existence of surfaces similar to human skin in ambient light, color and texture make it difficult to recognize the pixels of human skin in color pictures. In order to obtain a recognition as independent as possible from these challenging conditions, the relations of the pixels to be recognized with their neighboring pixels and the moment statistics of their neighborhood are used as distinguishing features. The obtained feature vectors were used in the k-Nearest Neighbors classification algorithm, and a significant skin recognition success was achieved.

Keywords: Feature extraction, k-nearest neighbors, Skin segmentation, Moment statistics, Correlation

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32.

COMPARISON OF DEEP LEARNING WITH MACHINE LEARNING ON SKIN SEGMENTATION

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ABSTRACT

In this study, a skin segmentation study is investigated with deep learning methods. The skin segmentation problem is chosen as a case study. The main reason for this is that there are numerous studies on this subject and the abundance of available data sets. In addition, images containing skin pixels contain multiple attributes. That's why human images are very suitable for comparative studies on machine learning and deep learning. In the first stage of this study, skin segmentation will be done by using RGB space, which contains deep information as an attribute in machine learning. At the same time, to show the success of the deep learning algorithm, the effect of deep learning will be tested by converting images to grayscale, and success differences will be given.

Keywords: Skin segmentation, Deep learning, Machine learning, Semantic segmentation

DEVELOPING THE GENERALIZED APPROACHES TO MATHEMATICAL MODELLING OF PROCESSES IN STEAM GENERATORS' WATER LEVEL AUTOMATED CONTROL SYSTEMS

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ABSTRACT

The generalized approaches to mathematical modelling of processes in the steam generators' water level automation systems are developed. Due to the complicated nature of the steam generators as the automation object, the main principle of the proposed approaches is in possibility of having the most simple mathematical model which can be complicated in needed by the more detail considering of the processes as well as by taking into account the more kinds of existed processes. In agreement with the formulated principle, it is developed the basic simplest mathematical model representing the water level changing in the steam generators in depending with the generated steam and feed water consumptions as well as the design of the steam generator. This basic model is represented by the first order ordinary differential equation with the variable coefficients in general case and with the initial condition for the water level's height. It is shown that this simple model allows to represent in generalized view the mathematical models for vertical and horizontal types of steam generators used in modern nuclear power plants, so that the principal difference between these steam generators' types is in the possible evaporation mirror area which is the multiplier near the water level height time derivative in the deferential equation involved in the proposed mathematical model. Due to this model it is shown also that the mathematical model of water level changes in vertical types steam generators can be really linear initially in some case, but this model for horizontal type steam generators is initially nonlinear in principle due to the correspondent geometries relations inherent for these types of the steam generators. It is considered the linearization of the proposed mathematical model for the vertical and horizontal types of the steam generators widely used in the modern nuclear power plants, and due to this linearization it is shown that the horizontal type steam generators are more suitable for automated water level control because of the possible greater of the evaporation mirror area, which make smaller the water level changing under the given difference between consumptions of the generated steam and the feed water. To have the more complicated mathematical model of steam generators this basic simplest model must be complemented by other relations defining the generated steam amount and the feed water consumptions depending on supplied feed water's and heat carrier's temperatures on the basis of the heat and mass transfer processes, and taking into account influencing from the water level's automation control systems. In general, this complementary relations will be defined by means both partial and ordinary differential equations with the required boundary and initial conditions, and due to this the mathematical model of the water level changes in the steam generator will be significantly complicated. At the same time, to have the more understood mathematical model of the water level changes required for primary designing of the automated system it is possible to use the proposed simple mathematical model without these complicated complements. It is shown one possible approach to have such understood models for primary designing the water level automation systems and especially for defining the automatic governors' parameters of the feed water consumption providing the required water level height in the steam generators during their operational time. In this shown approach it is sufficiently to define the generated steam consumptions as the summation of the constant representing the average expected value and of some random time function representing the fluctuations naturally existing during the operation time. At the same time, the consumption of the feed water can be defined as the summation of the constant average value corresponded to the average expected value of the generated steam consumption and of some variable consumption defining in agreement with the governor's law accepted to the feed water. The mathematical models of water level changes in steam generators with the different governors' types for feed water consumptions including with the proportional, differential, integral as well as PI- and PID-governors, are considered using this simplified approach. Considering all these mathematical models allowed showing the effects of involving the different typical components to the feed water consumption's automatic governor on the steam generator as the automation object. It is shown, involving the differential components to the feed water consumption's automatic governor is equivalent to correspondent changing the evaporation mirror area, so it is theoretically possible to change the evaporation mirror area without changing the geometry of the steam generator's housing, and it is especially interesting for the vertical type steam generators which cannot provide such big evaporation mirror area like the horizontal type steam generators due to the understandable geometries specifics. It is shown also, involving the integral components to the feed water consumption's automatic governor leads to increasing on unit of the order of the differential equation defining

the water level changes in steam generators, so in this case the mathematical model of the water level's height in steam generators will be represented by the second order ordinary differential equation with the required initial conditions. Only due to the integral law component of the feed water consumption's automatic governor it is possible to provide the required water level's height in the case of inconsistency between the constant values defining the average expected steam generating and actually accepted feed water consumption. All the theoretical results are clearly illustrated by corresponding computer simulations, which are made by using the Scilab free open source software for the scientific and engineering computing. Computer simulations has shown that only PI- and PID-governors for the feed water automatic consumption can practically provide the required water level's height in the steam generators.

Keywords: Mathematical Modelling; Automation Control; Water Level; Steam Generator.

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THE VIDEO CONTENT TRANSMISSION CHARACTERISTICS IN ADSL SUBSCRIBER ACCESS NETWORK

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Abstract. Using the developed technique, the experimental dependences were approximated by the least squares method, and for each of them the corresponding coefficients of the approximating polynomials of the nth degree were obtained. Subsequently, these coefficients were used by the video quality assessment function for subjective assessment of the integral quality of multimedia. An experimental evaluation of the performance of ADSL/2/2+ systems for the entire range of linear DSLAM rates for video content transmission has been carried out. The experimental results are compared with the calculated values using a multi-layer model for assessing the performance and quality of multimedia. The calculation method and the results of the work can be used to implement IPTV in real access networks based on ADSL2 + technology.

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THE COMMUNICATION SYSTEM OF SIGN LANGUAGE SPEAKERS

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ABSTRACT

The study described in this article examines the approaches of retraining of the deep learning model for hand palm keypoint detection in images. This is one of the studies conducted to create an innovative communication system for sign language speakers. The target of the given study is to find an optimal technique of retraining for increasing the degree of the keypoint detector generalization. So, it must be able to accurately detect keypoints in images it has not seen during training. It will make the communication system usable in real-life conditions.

In the article, there are reviewed three approaches of retraining: Retraining in series, retraining using united dataset and retraining using mixed datasets. Experiments were conducted to test the effectiveness of each of them. The paper presents the results of the experiments and a relatively optimal method selected among them.

Keywords: Sign language. Communication system. Keypoint detection. Retraining.

STUDY OF FULLERENE, GRAPHENE AND TAUNIT BASED NANOSTRUCTURAL INHIBITORS AGAINST SALT DEPOSITION PROCESS

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ABSTRACT

The presented work is dedicated to the development and study of nanostructured inhibitors to prevent the problem of salt deposition in oil production processes. Thus, the protective effect of nanostructured inhibitors based on fullerene, graphene and taunit nanoparticles against salinity has been studied and it has been determined to be very effective in overcoming this problem.

It is known that the salt deposition process is observed when the density of salts or ions forming deposits in produced waters exceeds the ion density limit corresponding to the equilibrium state. The formation of water-insoluble deposits occurs in consequence of mixing various types of produced water, evaporation of water, excessive saturation of water as a result of changes in thermobaric conditions in the well or deep well pump. This, in turn, leads to a reduction of time between overhauls, complication of the operation process, corrosion of equipment, and a decrease of oil production [1-4]. These types of problems are more common during the operation of flooded wells that are in the closing phase of development. The fact that the vast majority of oil fields are in the closing phase of development highlights the urgency of the problem.

Various methods are used to prevent salt deposition in oil and gas production equipment and in the wellbore zone [5, 6]. However, the methods used did not completely solve the problem in the oil industry, which necessitated the use of a new innovative method - nanotechnology [7].

A new nanostructured salt deposition inhibitor has been developed by adding nanoparticles to the compositions of nonionic and ionic surfactants. As a non-ionic surfactant can be used linear Laprol 4202 polyester resin or demulsifier containing linear polyester resins obtained from the copolymerization of ethylene oxide and propylene oxide - Alkan DE-202 B. As an ionic surfactant was used Sulphanol reagent.

The ionic and nonionic surfactants used in the treatment of the inhibitor prevent agglomeration by isolating the surface of formed salt crystals, and small salt crystals are removed from the system by fluid flow. The protective effect of ionic and nonionic surfactants, observed in different proportions from salt deposition, is higher than the additive amount of indicators in this ratio, in other words, the combined use of these reagents provides a synergistic effect.

Fullerene [8], graphene [9] and taunit [10] were used as nanoparticles in the development of the nanostructured inhibitor. The protective effect against salinity at 50 and 100 g / t was studied by gravimetric method with the addition of 0.001% of fullerene, graphene and taunit nanoparticles separately to the composition of Sulphanol and Alkan DE-202 B reagents in a 3: 1 mass ratio. Studies have shown that the protective effect of fullerene, graphene and taunit-based compounds against salt deposition is more than about 10% compared to non-nanoparticle formulations. An analysis of preliminary results shows that the protective effect against salt deposition of compounds based on graphene and taunit is approximately the same, while in general the protective effect against salt deposition of compounds based on fullerene is higher than that of others.

To ensure uniform distribution and stability of nanoparticles in working solutions, sodium carboxymethyl cellulose (Na-CMC) was added to the composition in an amount of 0.4-1.0%. The pH of the 2% water solution of the reagent is 6.5-11.0. The dynamic viscosity of a 2% reagent solution with a polymerization rate of 350 at a temperature of 25 ° C is 40.0 MPa · s.

In addition, inhibited hydrochloric acid is added to the nanostructured inhibitor to prevent the sedimentation of carbonate and hydrocarbonate salts. Thus, 20-23% hydrochloric acid used contains 0.5% inhibitor.

Numerous experiments were conducted to determine the optimal composition of nanostructured fullerene, graphene, and taunit based inhibitors. Therefore, the protective effect of inhibitors against salt deposition at a rate of 100 g / t was studied in experiments.

Experiments have shown that Laprol 4202 and Alkan DE-202 B have almost the same efficiency. When the amount of Na-CMC exceeds the range of 0.4 ÷ 1.0%, it leads to excessive reagent consumption and high viscosity of the working solution. High efficiency is observed during the development of a new nanostructured inhibitor in the amount of 0.05-0.2% of inhibited hydrochloric acid.

The protective effect against salt deposition of fullerene, graphene and taunit nanoparticles at concentrations of 0.0005 and 0.001% is approximately the same, but at a concentration of 0.0005%, the protection effect gets a high price with a slight difference.

Thus, the optimal composition of the nanostructured inhibitor against salt deposition is 0.1% non-ionic surfactant (Laprol 4202 or Alkan DE-202 B), 0.3% ionic surfactant (Sulphanol), 0.4-1.0% Na-CMC, 0.05-0.2% inhibited hydrochloric acid, 0.0005-0.001% fullerene or graphene or taunit, and the rest is water.

An analysis of the results shows that the presence of nanoparticles in the reagent increases the activity of the system in all cases. Among these nanostructured inhibitors, the fullerene-containing inhibitor has a higher protective effect (91.6%) than others.

It should be noted that the use of nanoparticles in the composition increases the effect of the composition, as well as, has a synergistic effect with surfactants in preventing from salt deposition. It is known that most atoms in nanoparticles are located on the surface, and their number on the surface increases due to decrease in particle size. As a result, an increase in surface energy is observed. Accordingly, the role of surface atoms in the formation of the system energy increases. This increases the activity of the nanoparticles and their ability to react, which, in turn, increases the effectiveness of the inhibitor against salt deposition.

In summary, a nanostructured inhibitor with an optimal composition and a high protective effect against salt deposition in oil and gas production and transportation system was developed, and its high efficiency was confirmed by investigations.

Keywords: nanoparticle, fullerene, graphene, taunit, salt deposition

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Detailing of the main directions and components for defining models for assessing the quality of knowledge

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ABSTRACT

The subject of research in the article is the perception, processing and transmission of data as one of the components used in various knowledge processing systems. **Objective:** to analyze such systems aimed at obtaining data, their dissemination, forming a knowledge base and conducting various assessments to determine the degree of data transformation into knowledge, the formation of adequate and simple queries to relevant knowledge bases in order to develop the necessary competence, knowledge dissemination and mastering (loss) of such knowledge during a certain period of time (phase of mastering or formation of knowledge). **The following tasks are solved in the article:** development of a management system from the point of view of knowledge formation in the educational process, which is reduced to a stable definition of input and output information flows, which are influenced by the "subject of knowledge" and "recipient of knowledge". These managerial influences that determine, in general, the detailing of the main directions and components for the definition of models for management in knowledge processing systems. The criterion for such management is the assessment of the level of knowledge by the "recipient of knowledge". Relevant disclosure of individual elements of content management of knowledge processing from the point of view of knowledge formation in the educational process. The key issues in this aspect are both the definition of a general model for the formation of knowledge (on the provision and development of relevant knowledge in general), and, in accordance with the selection and definition of a model, a method for assessing the level of such knowledge. At the same time, the formation of management influences from the point of view of the "recipient of knowledge" consists of: in mastering the knowledge provided by the "subject of knowledge", in determining and clarifying the need to adjust the input stream of information, as a function of the components of the output stream [1].

The following results were obtained: analyzed the relevance of the scientific problem, the essence of which is that the results of the analysis in the educational process can be divided into separate levels of so-called "subjects of knowledge", such levels can be formed according to individual educational programs, courses, areas, etc. At the same time, it is necessary to respect the formulation of the various models with the reasons for the communication system with subsystems. The same subsystem is used to formulate knowledge, how to use information. Until then, the food supply is by the initial, since such a subsystem is tied to the computerization and the manifestation of the possibilities to form knowledge for additional remote access. The subsystem of the commune between the subsystem of the management of the operations of knowledge is given one of the key meanings, since the subsystem is not deprived of the first form of knowledge, but the permission to use the necessary form of the tool. As a matter of fact, it's about the deforming of the forms and the formulation of knowledge. The price is tied to this, but it also allows the conversion of information technology to form knowledge. The possibility of introducing remote access systems for the dissemination and provision of knowledge to various subjects, they are mastered. Therefore, it is common to form and master knowledge without mediocre communication between those who provide such knowledge and those who receive this knowledge. Therefore, this imposes its own requirements on the assessment of knowledge in distance learning systems [2-3].

Conclusions: The developed system shows that knowledge forms the input stream, and inverse queries and responses form the output stream of the general formation of knowledge in the educational process. Consequently, the provision and development of relevant knowledge as a whole determines the general formation of knowledge, which is subject to the appropriate management influences and is one of the components of the knowledge processing management process. Thus "Subject of knowledge" according to a certain educational program, which conventionally defines the first level of knowledge processing management; In the future, such programs can be considered in terms of individual credits for certain phases of knowledge acquisition (for example, these are individual semesters), which will conditionally determine the second level of "subjects of knowledge" in the management of knowledge processing; "Subject of knowledge", which in general defines, coordinates and forms the management of knowledge processing, where on the example of the educational process it can be considered as a function of the dean's office.

Keywords: assessment of the quality of knowledge, knowledge formation, knowledge processing, subject of knowledge, recipient of knowledge.

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FILTERING OF INTERFERENCE OF INHOMOGENEOUS REGULAR STRUCTURE IN THERMAL NON-DESTRUCTIVE CONTROL OF CELLULAR STRUCTURES

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ABSTRACT

Honeycomb constructions are the most widely used materials in contemporary aviation and space technology. They are the basis for the housings of practically all products of this sector, where reliability of all parts should meet the increased requirements. Special attention is paid to the quality of composite materials and to the absence of defects such as the places of adhesion failure (exfoliation) between the skin and the honeycomb filler. Therefore, increase in the efficiency and reliability of thermal flaw detection, based on in-depth analysis of the processes of detecting defects and development of the principles of optimization of both the procedure of control and subsequent processing of the obtained information, is an important and relevant task.

Keywords: honeycomb structure, thermal flaw detection, emissivity.

Cellular structures are one of the most common structural materials in aviation, space technology and other industries, where the reliability of components is subject to increased requirements.

In order to improve the quality of the investigated materials, the present studies search for ways to suppress interference that reduces the accuracy of quality control by creating algorithms for processing thermograms obtained as a result of thermal non-destructive testing. [1]

To achieve the goal, a theoretical-experimental approach was used, combining the construction and analysis of a thermophysical model of a cellular structure [2] and the experiment on real samples with defects.

One of the most image affecting interference is the interference caused by the internal regular pattern of the control sample. It does not depend on the state (defect) of the sample and is present in all products of complex internal structure.

In this work, the second method was used much less universal, but in this case more efficient. The regular structure results in an alternating change in the thermal resistance of the RTs for which the condition $F=a/b=const$ is met, which leads to the appearance of temperature contrasts on its surface reaching values (as shown by the experiment) $2,1^{\circ}\text{C}$, which is comparable to a useful signal ΔT caused by the presence of a defect. However, analysis of the experimental data obtained showed that these contrasts differ from the useful signal in space-time dependence $\Delta T(\tau, x)$. This fact formed the basis of the proposed method of suppressing this interference by computer processing of thermograms using dependence $\partial T(x) / \partial x$. [3]

The essence of this method is to calculate a two-dimensional matrix, the elements of which are the corresponding partial time derivatives.

By filtering the obtained image using the obtained dependencies, the final appearance of the thermogram is obtained. Comparison of this thermogram with the initial one confirms the fact that the reliability of detection of defects using the proposed method has increased significantly, after processing the detection of defects has increased by 1.3 times. [1.3]

This creates all the prerequisites for moving from a visual method of identifying defects to an automated method based on the corresponding technical means in production conditions.

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PHYSIOLOGICAL ANSWERS to METAL TRIGGERED EFFECTS in CROPS

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ABSTRACT

Environmental pollution is one of the most important concerns for today's people. The increasing population growth in the world, together with the industrial revolution and its side effects, brings along the risk of reaching healthy food for every newborn and existing population [1]. Contamination and/or accumulation of heavy metals, known as the source of oxidative stress, in foodstuffs and the environment directly affects human health. Since plants are often the first recipients of HMs from different environments (such as air, water and soil), it is not surprising that this results in scary scenarios for all living organisms [2]. Therefore, to determine and dispose of the possible downsides in human diet which relates to HMs, we examined whether physiological parameters are reliable indicators of oxidative stress in different crop plants. Either with single or combined CdCl₂ and PbCl₂ treatments, germination percentage, root and shoot lengths and water contents were measured in the roots and shoots of *Triticum aestivum* cv. Gerek and *Hordeum vulgare* cv. Çıldır varieties. According to obtained results, it is concluded that heavy metal treatments trigger the oxidative stress in plants, as all parameters measured are dramatically decreased.

Keywords: Barley, heavy metals, germination, water contents, wheat

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INVESTIGATION OF DOGECOIN PRICE MOVEMENTS: A GSADF ANALYSIS

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ABSTRACT

Today, people provide information through different channels. The information channels used can affect the decision-making mechanism due to asymmetric information or different tendencies. Especially in recent years, people use social media to reach information quickly. Therefore, notifications made on social media reveal economic results. Cryptocurrencies are digital currencies intended to be used as currency. Unlike their traditional financial rivals, cryptocurrencies are not backed by a central bank or authority.

The success of cryptocurrencies depends on its infrastructure, the block chain. Especially in recent years, the popularity of cryptocurrencies has increased. After the popularization of cryptocurrencies, digital currencies are discussed more especially in the media. In addition to the positive features, negative features are also included in the media. There are concerns about the misuse of cryptocurrencies. It is mentioned that cryptocurrencies provide financing for criminal organizations and are used in money laundering. In addition to these, it is reported that cryptocurrencies are used for tax evasion.

The lack of intrinsic value of cryptocurrencies puts investors in trouble in terms of investment and price determination. Cryptocurrencies, which are digital currencies, have many digital price determinants such as social media. Two different objectives were determined in this study. The first is the detection of the presence of bubbles in Dogecoin prices. The second is the examination of the relationship between balloons and tweeter notifications. In the study, Dogecoin prices between May 2020 and May 2021 are examined with the GSADF test. From May 2020 until May 2021, 10 different price bubbles are observed. Some balloons can be associated with tweets by Elon Musk. However, the biggest bubble observed, the April 2021 price bubble, is due to a different reason.

Keywords: Dogecoin, Tweets, GSADF

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41.

TERRORIST USE OF CYBER TECHNOLOGY

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ABSTRACT

The threat posed by terrorist use of cyber technology and cyber-terrorism have been of great concern to politicians, decision makers, security officials. This paper studies terrorist use of cyber technology and cyber terrorism along with history of cyber-terrorism. Moreover some concepts such as between cyber-crime, cyber-terrorism, cyber-warfare and “hactivism” will be analysed. Furthermore, the challenges faced by international organisations in tackling cyber terrorism will be discussed; measures introduced in some countries to address cyber terrorism treats are presented as well as discussions on the present and the future treat posed by cyber terrorism and terrorist use of cyber technology.

Keywords: Cyber Terrorism, Cyber Space, Critical Infrastructure, Cyber Attacks

42.

THE $\log(ft)$ VALUES IN SPHERICAL AND DEFORMED NUCLEI FOR SOME ODD-A GERMANIUM ISOTOPES

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Abstract: The $\log(ft)$ values of the allowed $\beta\pm$ decay between odd-A spherical and deformed nuclei are studied for germanium isotopes in this paper. The Pyatov Method (PM) and the Schematic Model (SM) are used to the GT strength distributions, including the schematic residual spin-isospin interaction between nucleons in the particle-hole and particle-particle channels. Particle-hole and particle-particle interaction parameters are calculated respectively with $\mathcal{X}_{ph}^{GT} = 5.2 A^{0.7}$ MeV and $\mathcal{X}_{pp}^{GT} = 0.58 A^{0.7}$ MeV. Deformed Woods-Saxon potential is used in calculations of single-particle energies and wave functions. The results are also compared with previous theoretical calculations and experiment values wherever available.

Keywords: Pyatov Method, Schematic Model, Log(ft), Beta decay, Gamow-Teller Transitions.

43.

AN APPLICATION OF CLIFFORD ALGEBRA ON THE SEMI-SYMMETRICAL ARCHIMEDEAN SOLID ICOSIDODECAHEDRON

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Abstract: Mathematical systems are needed to explain and prove the concepts in physics. This could be in algebra. Various algebras have been introduced and discussed by physicists and mathematicians throughout history. In this work, one of them, Clifford algebra, or in other words geometric algebra, is discussed and its application in physics is examined. Today, Clifford algebra provides convenience in many fields. It is frequently used in application areas such as robotics, quantum mechanics, and crystallography. After presenting Clifford algebra and quaternions, symmetry operations with Clifford algebra and quaternions are defined in molecular physics. Here, these symmetry operations are also applied to the seventh Archimedean solid, the icosidodecahedron. Also, the vertices of this solid presented in Cartesian coordinates are calculated.

Keywords: Clifford Algebra, Platonic Solids, Semi-symmetric molecules, Archimedean solids, Icosidodecahedron.

44.

THE EUTECTIC PHASE CRYSTALLIZATION IN $\text{Co}_{0.55}\text{Sb}_{0.5}\text{-Sn}$ and $\text{Co}_3\text{Sn}_2\text{-Sb}$ SYSTEMS

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ABSTRACT

There is no chemical interaction between the eutectic and the phases forming it. This allows them to be used as antidiffusion layers in the contact between a conductor and a semiconductor. We have established that solders based on eutectic compositions of the ternary Ni-Sn-Bi system have high strength mechanical characteristics [1]. The binary phases of the ternary Co-Sn-Sb system also have valuable applied properties. In particular, CoSb-based phases have superconductivity, Co_3Sn_2 has a sufficiently high microhardness, etc. [2]. Therefore, interest in the study of the ternary Co-Sn-Sb system is due to the manufacturing of eutectic composition materials with improved electrophysical, as well as with high-strength mechanical properties.

Synthesis of $\text{Co}_{0.55}\text{Sb}_{0.45}\text{-Sn}$ system alloys was performed by ampoule method [3] by joint fusion of especially pure cobalt elements, tin and antimony at 1000 °C, followed by slow cooling at a rate of $\sim(10-15)$ deg/min. Alloys in the solid state were heat treated. Studies of the alloys brought to equilibrium were carried out by differential thermal, X-ray phase and microstructural analyzes with microhardness and pycnometric density measurements.

A phase diagram of the intersecting $\text{Co}_{0.55}\text{Sb}_{0.45}\text{-Sn}$ and $\text{Co}_3\text{Sn}_2\text{-Sb}$ sections is constructed. It is established that the first section is quasibinary and its phase diagram represents an eutectic character. The eutectic of this section is degenerate near the tin component and has a crystallization temperature of 231 °C.

Keywords: eutectic compositions, phase crystallization, phase diagram

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45.

THE ENERGY IN THE DARK MATTER

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ABSTRACT

The dark matter and energy are cosmological quantum effects. De Sitter's world is considered as a cosmological model. It is shown that in the de Sitter world, gravity and antigravity are different states of the elementary quantum Wigner's system. In the limiting case of the Minkowski world, antigravity can be excluded. Moreover, it is shown that the Wigner - Inönü limit of the de Sitter model to the Minkowski world plays the role of Bohr's correspondence principle in quantum mechanics.

Keywords: de Sitter world, Wigner-Inönü limit, "dark" matter and energy, Wigner's elementary systems, correspondence principle

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46.

THE DEVELOPMENT OF MANUFACTURING DEFECTS IN THE SURFACE LAYER OF SUBSTRATES OF MOEMS' FUNCTIONAL COMPONENTS

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ABSTRACT

The last mathematical model of the development of manufacturing defects, with the prediction of the random component of the model in the substrates of functional components of MOEMS, which are made of semiconductors, in particular, silicon, are developed in the article.

The main manufacturing defects that arise in the surface layer of the substrates of the MOEMS functional components taking into account the technological processes of their production and dynamic processes were used when developing the model.

The developed mathematical model takes into account the occurrence of a random component of the model with its predictive ability.

The possibility of such control is the basis for the development of the scientific direction of technology and equipment for the production of semiconductors, materials and electronic devices - defect engineering, based on the management and forecasting of defect formation processes.

Keywords: mathematical model, defect, MOEMS, functional components.

47.

THE PHASE CRYSTALLIZATION IN $\text{Co}_{0,55}\text{Sb}_{0,45}\text{-Sn}$ SYSTEMS

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ABSTRACT

The binary phases of the ternary Co-Sn-Sb system also have valuable applied properties. There is no chemical interaction between the eutectic and the phases forming it. This allows them to be used as antidiffusion layers in the contact between a conductor and a semiconductor. We have established that solders based on eutectic compositions of the ternary Ni-Sn-Bi system have high strength mechanical characteristics [1]. In particular, CoSb-based phases have superconductivity, Co_3Sn_2 has a sufficiently high microhardness, etc. [2]. Therefore, interest in the study of the ternary Co-Sn-Sb system is due to the manufacturing of eutectic composition materials with improved electrophysical, as well as with high-strength mechanical properties.

Synthesis of $\text{Co}_{0,55}\text{Sb}_{0,45}\text{-Sn}$ system alloys was performed by ampoule method [3] by joint fusion of especially pure cobalt elements, tin and antimony at 1000 °C, followed by slow cooling at a rate of $\sim(10-15)$ deg/min. Alloys in the solid state were heat treated. Studies of the alloys brought to equilibrium were carried out by differential thermal, X-ray phase and microstructural analyzes with microhardness and pycnometric density measurements.

A phase diagram of the intersecting $\text{Co}_{0,55}\text{Sb}_{0,45}\text{-Sn}$ and $\text{Co}_3\text{Sn}_2\text{-Sb}$ sections is constructed. It is established that the first section is quasibinary and its phase diagram represents an eutectic character. The eutectic of this section is degenerate near the tin component and has a crystallization temperature of 231 °C.

Keywords: eutectic compositions, phase crystallization, phase diagram

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48.

THE MECHANICAL PERFORMANCES PERTAINING TO BI-2223 SUPERCONDUCTING CERAMICS

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ABSTRACT

In this research, our scientific group investigates the effect of vanadium addition in the Bi-2223 superconducting matrix on the general mechanical performance features by the help of experimental microhardness measurements conducted by a small indenter between the well-defined stress loads of 0.245 N and 2.940 N. Moreover, we determine the key mechanical design parameters including the elastic moduli with the hardness, stiffness coefficients, fracture toughness, yield strength, brittleness index and its opposite behavior (ductility) in the applied test loads given using the experimental data deduced from the microindentation tests. According to the experimental findings, it is observed that the presence of vanadium content in the Bi-2223 crystal structure surpasses seriously the general mechanical performance and related parameters due to the degradation in the quality of grain boundary couplings, crystal structure and basic structural quantities as a consequence of the increment in the structural problems, permanent plastic deformations, crack-producing flaws and dislocations. In other words, the augmentation of vanadium compounds in the Bi-2223 superconducting lattice brings about the considerable enlargement in the responsibility to the static indentation loads. Namely, the sensitive level to the applied loads increases rapidly with the vanadium concentration. We also search the variation of graphs between the Vickers hardness parameters and applied test loads. In this respect, all the materials prepared in this work exhibit the standard ISE (indentation size effect) characteristics but within the decrement trend as the vanadium content level increases. In more detail, the impurity atoms damage harshly the ISE feature of Bi-2223 type-II superconducting ceramics. Additionally, we discuss the change of plateau limit regions coincided with the permeant artificial structural problems in the graphics. The vanadium leads to shorten the applied test load values for the plateau limit regions of Bi-2223 materials, stemmed from the enhancement the general structural problems. To conclude, the vanadium inclusions are ploughed to improve the general mechanical performance features and key mechanical design parameters.

Keywords: Vanadium added Bi-2223 material; Microindentation tests; General mechanical performance features; ISE feature.

49.

THE SEQUENCING MODELS OF SYMMETRIC STRUCTURES OF EXAMINING

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ABSTRACT

The Symmetric protein assemblies get important roles in some biochemical processes. This study for application of a general framework for modeling arbitrary symmetric systems. The various types of symmetries was described in this study. Because of the symmetric modeling capabilities was run simulations on symmetric systems.

50.

THE BIFUNCTIONAL CATALYST Pt / Re USED IN THE PLATFORMING UNIT FOR OBTAINING HIGH OCTANE NUMBER OF THE GASOLINE.

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ABSTRACT

The original function of the process of platforming is to develop heavy naphtha (HSRN), coming from the atmospheric unit of distillation with a weak octane number (NO = 44), to obtain a mixture of fuels a number octane raised by catalytically supporting specific groups of chemical reactions. The installation is divided into two sections:

□□□Section hydrobon. Section platforming.

The rafinat coming from the bottom of column 12C2 to feed the section platforming, is divided into two parts whose flows are controlled and mixed with gas rich in hydrogen.

Bottom of the column, one obtains stabilized reformat which is aspired by there pump to ensure the heating of the column whereas a part is sent towards storage after being cooled by the air cooler and the condenser.

In catalytic catalyst of reforming, there is voluntarily associated a hydrogenating function - dehydrogenating, brought by platinum deposited, with an acid function brought by the alumina support (Al₂O₃). The mechanism of action of this bifunctional catalyst depends on the severity of the operation, of the quality of the load and the type of catalyst.

The catalyst used in the catalytic process of reforming is a very elaborate bifunctional catalyst whose performances are constantly improved thanks to the experimental research supported on an increasingly large comprehension of the phenomena.

The American company Universel Oil petroleum (UOP) marketed several series of bimetallic catalysts such as R16, R20, R30 and R62 consisted Platinum / Rhenium on an acid support consisted the alumina added with a halogenous compound (chlorine).

Keywords: Platforming, Amelioration, Octane Number, Catalyst.



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DETERMINING THE CHALLENGES OF ACADEMICIANS DURING THE COVID-19 PROCESS: A COMPARATIVE CASE STUDY

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ABSTRACT

COVID-19 global epidemic has affected many sectors, especially in education all over the world. This situation undoubtedly brings about a “new social transformation” that can affect not only classes, schools and universities, but also the world economy. Faculty members working in higher education institutions have also turned to using online environments for both academic and administrative processes. In this context, the aim of the research is to reveal the difficulties faced by academics during the COVID-19 pandemic process and how they overcame these difficulties. The data of the research were collected from the Internal Evaluation Reports of two state universities in Turkey. The obtained data were subjected to content analysis with a qualitative paradigm. Based on the data of the research, 5 themes were determined. Based on the results, good practice examples in our country and in the world will be examined and recommendations will be presented.

Keywords: COVID-19, higher education, technology, difficulty, academic

1. INTRODUCTION

Pandemics are diseases that occur from time to time throughout human history, cause millions of deaths and adversely affect public mental health. Pandemics have been seen in many periods throughout history. Each pandemic has negatively affected humanity sociologically, economically and psychologically.

The global epidemic of the Coronavirus 2019 epidemic (COVID-19) has caused a new social transformation by affecting many sectors, especially education, all over the world. Most countries in the world experienced an unprecedented total or partial lockdown that led to the immediate closure of universities and schools. As such, teachers and students had to learn how to adapt to distance education by experiencing it in the process. This process caught the education community from a point where it was not ready at all and unfortunately created a serious crisis situation all over the world [1]. The fact that what happens in schools and classrooms is linked to what happens in society in general [2] explains the "social transformation" in education. The world is currently experiencing a 'new social transformation' caused by Covid-19, which will undoubtedly affect not only classrooms, schools and universities, but also the world economy. Many educational institutions; In order to minimize the impact of the pandemic on students, “emergency remote access” has been implemented [3]. Emergency distance learning is defined as the sudden shift of instructional delivery to an online mode of delivery as a result of a major disaster, as opposed to online courses that were originally planned and designed to be delivered virtually [4]. Although the idea of bringing teaching online provides flexibility to the learning-teaching process for students and educators, this transformation has taken place very quickly due to the pandemic.

However, during this process, education staff faced many problems. These problems are defined as technical problems, problems with students/families, problems with faculty/department management and problems with courses in the literature [5], [6], [7], [8].

In this context, the aim of the research is to reveal the difficulties faced by university members during the COVID-19 pandemic process and how they overcame these difficulties_ The findings will be discussed within the framework of PDCA (Plan-Do-Check-Act) to ensure the quality assurance. The research question

is determined as “What are the challenges and solutions faced by universities during the Covid 19 pandemic from teaching and learning perspective comparatively?”.

2. METHODS

The research is designed as qualitative paradigm. The method of the research is document analysis. Document analysis is a systematic procedure for reviewing or evaluating documents—both printed and electronic (computer-based and Internet-transmitted) material. Like other analytical methods in qualitative research, document analysis requires that data be examined and interpreted in order to elicit meaning, gain understanding, and develop empirical knowledge [9].

3. FINDINGS

The data of the research were collected from the Internal Evaluation Reports of two state universities in Turkey. The obtained data were subjected to content analysis with a qualitative paradigm. The percentage of agreement between researchers was found as %92 with the formula given by Miles and Huberman [10].

Table 1. Theme, Sub-theme and codes

Thema	Sub-theme and codes
Academic	<p>Assessment evaluation revision (University X, University Y)</p> <ul style="list-style-type: none"> • Supervised/unsupervised exam (University X) • Guide and information on exam security (University X) • General revision (University X, University Y) <p>Course duration, exam types revision (University X, University Y)</p> <p>Course preparation process (University X, University Y)</p> <ul style="list-style-type: none"> • That week (University Y) • A week ago (University X) <p>Disabled students (University X, University Y)</p> <ul style="list-style-type: none"> • Unit responsible (University Y) • Disabled Support Unit (University X) <p>Continuation in lessons (University X, University Y)</p> <ul style="list-style-type: none"> • Not compulsory (University Y) • Compulsory (University X)
Social and Cultural Activities	<p>Career development sessions (University X, University Y)</p> <ul style="list-style-type: none"> • Post Covid career planning (University X) <p>Meetings (University X, University Y)</p> <ul style="list-style-type: none"> • General career development sessions (University X, University Y) <p>Psychological support seminar (University X, University Y)</p>
Administrative	Trainers' Training (University X, University Y)

- Distance education trainings (University X, University Y)
- Appointment of responsible unit (University X, University Y)
- Technical support staff (University X, University Y)
- Technical support videos (University X, University Y)
- Technical support trainings (University X, University Y)
- Course follow-ups (University X, University Y)
- Common social media groups (University X, University Y)
- Planning for back to school (University X)
- Meetings (University X, University Y)

Opinions of faculty members

- Low interest in lessons (University Y)
 Increased workload (University Y)
- Lesson times are not enough (University Y)
 - Insufficient audio, video, screen sharing (University Y)
- Technology literacy (University X, University Y)
- Adequate information and support at appropriate times (University X, University Y)
 - Providing trainings to academic staff about distance education methods (University X, University Y)
 - Establishment of technology infrastructure (University X, University Y)

Implemented improvements

- Establishment of multiple support units (University X, University Y)
 Some helpful applications made available by the Library Document Department (University X)
 A book about innovative applications and practices in Covid 19 (University X)
 Supporting of software in which teaching is carried out with new elements (on subjects such as homework, exam, course registration) (University X, University Y)

Based on the data of the research, 5 themes were determined. These themes are; Academic, Social and Cultural Activities, Administrative, Opinions of Faculty Members and Implemented Improvements. Under the academic theme, the sub-theme of preparation for the lesson draws attention. In one of the universities, faculty members upload documents during the course week, while in the other, students can access the document one week before the course week. The obligation to attend the course of the students under this theme was also supported by the opinions of the lecturers. Based on the Table 1, it is also seen that while the sub-theme of “assessment evaluation revision” is common for two universities, the *supervised/unsupervised exam* and *guide and information on exam security* codes were only seen on the practices of University X. Addition to this, while the “Course duration, exam types revision” and “Course preparation process” are common for two universities; *that week* code is belong to the practices of University Y and *a week ago* code

is included in the evaluation report of University X. Furthermore, while the “disabled students” sub-theme is common for both University X and University Y; the practice of *unit responsible* code is belonging to University Y and disabled support unit code is belong to University X. Finally, under the common sub-theme for both universities of “continuation in lessons” while the code of *not compulsory* is belonging to University Y, the code of *compulsory* is belonging to University X.

In the career development sub-theme under the Social and Cultural Activities Theme, it is a good example of planning to discuss the career development seminars for post-covid 19. In addition, students' psychological well-being was also taken into account in this process. It was observed that faculty members stated that their workload increased. They also stated that technology literacy developed in this process. The acquisition of some applications by the university and the establishment of a technology support unit are among the improvements made. On table 1, as a comparative reflection, it is possible to see that while the sub-theme of “career development sessions” is common for two universities, the *post Covid career planning* code was only seen on the practices of University X. Addition to this, the “meetings” and “psychological support seminar” are also common sub-themes for both University X and University Y.

Under the administrative theme trainings, remediations and construction new units to overcome this emergency. The administrations of this universities also use common groups to fire off staff. Lecturers are supported videos, trainings, meetings by administration. And also one of this universities is planning to come back school after Covid 19 precautions. When the Table 1 comparatively investigated, it is seen that “trainers’ training” sub-theme is common for the two of universities. Considering the codes of this theme, it has seen that only the *planning for back to school* code belonging to University X has a differentiation from the activities of University Y. Other distance education trainings, appointment of responsible unit, technical support staff, technical support videos, technical support trainings, course follow-ups, common social media groups, meetings codes were common in the self-evaluation reports of two universities.

It is seen that faculty members stated that students' interest in the course decreased during the distance education process carried out due to the pandemic, and that their workload increased due to the responsibility of increasing this interest, technological problems and the intense evaluation processes of the courses realized with distance education. In addition to this, it was stated that the process formed with these reasons increased their technology literacy due to increasing their interaction with technology. In addition, it was seen that some support units that they offered as suggestions were structured and this situation facilitated the difficult process. Based on Table 1, it has seen that the theme has some different sub-themes and codes compared to University X and University Y. For example, the “low interest in lessons” and “increased workload” sub-themes are belonging to University Y, and the codes under the “increased workload” sub-theme have seen as *lesson times are not enough* and *insufficient audio, video, screen sharing*. Moreover, sub-theme of “technology literacy” and the codes of *adequate information and support at appropriate times, providing trainings to academic staff about distance education methods, and establishment of technology infrastructure* are common for both universities.

In line with the opinions of the faculty members, it is seen that efforts are made to make the systems used in the distance education process more suitable for education in both institutions. It has also been observed that the university, which has been working in the context of the quality assurance system for a long time, has brought online versions of some resources to its libraries in order to facilitate the process and has published a book on innovative practices for the Covid 19 process. Table 1 shows that while “establishment of multiple support units” and “supporting of software in which teaching is carried out with new elements (on subjects such as homework, exam, course registration)” sub-themes are common for both University X and University Y; “a book about innovative applications and practices in Covid 19” and “some helpful applications made available by the Library Document Department” sub-themes are only belonging to University X.

4. CONCLUSION

This study aims to determine the difficulties faced by academics during the Covid 19 pandemic and how they try to overcome these difficulties. For this purpose, the internal evaluation reports of two different state universities, which are on the way to becoming an institution by dividing from a well-established university in the province where they are located, were examined in depth and comparatively. The issues under the main criteria of education and training in the internal evaluation reports of the institution were examined with content analysis, and the themes and sub-themes and codes of the related themes were created. It can be said that University X, which has been running the internal quality assurance system for a longer time in order to ensure the validity and reliability of the assessment methods during the Covid 19 pandemic process, has revealed more concrete evidence on exam security in this context. In addition, it is noteworthy that the students' access to the information that will be the subject of the lesson is uploaded to the system one week in advance in order to prepare the students for the lesson. Moreover; it is seen that universities exhibit different approaches in monitoring the attendance-absence status of students in the distance education process. However, in the reports of both universities, there is no information or evidence about how realistic the participation of the students is. It is a very important point for the operation of the PDCA cycle that University X, which is understood to have carried out studies on "Planning" within the scope of the quality assurance system, works on returning to school and career planning after Covid 19. In addition, both universities continue to work on the career development of their students throughout the process and provide support that will keep their students psychologically strong; It shows that both institutions have an approach that adopts the principle of developing their students entirely.

The results show that the approaches of institutions to provide quality assurance play an important role in overcoming the difficulties encountered in this process. In fact, institutions provide an infrastructure for academicians to overcome the difficulties they face with an approach aimed at continuous improvement, with the PDCA (Plan-Do-Check-Adjust) cycle, which they try to complete in the education-teaching main criterion to ensure internal quality assurance. For instance; while the sub-theme created for providing technological support is a common challenge faced by academics in the internal evaluation report of both universities; it is seen that the cycle of control and adjust phases and the establishment of a unit in this direction are resolved under the sub-theme. This situation; it also lays the groundwork for explaining the differentiation of practices related to the internalization of quality assurance by institutions. For instance; it is seen that a proposal made for planning a return to school after Covid 19 is handled by the administrative management under the administrative contact of the planning and control stages with online. This issue is included in the university report which has been following the quality assurance system for a longer period of time, while this issue is not in the university report that has been following the quality assurance system for a shorter period of time. Similarly, the relevant issues bring about the need for a good planning of the education processes. The "Turkey Higher Education Qualifications Framework: In Online Learning", which was implemented on 28 July 2021 with the cooperation of Eskişehir Technical University, Beykoz University, Manisa Celal Bayar University and Sakarya University and with the support of the Higher Education Quality Board Quality Assurance Workshop" (TYYÇ:ÇÖKG Workshop) especially draws attention to the design of online learning environments. As the Covid 19 pandemic has shown, the fact that face-to-face education and training activities are carried to online learning environments, as well as the lack of sufficient care and planning in the design of the courses, required it to be mentioned together with the concept and application of Emergency Remote Teaching. Within the scope of the related subject, Hamutoğlu (2021) made a national call as an extension of the study she carried out on how to plan, implement, evaluate and improve a course with the use of active learning strategies in ensuring quality assurance in online learning environments : Planning, Implementation, Evaluation and Improvement" received great attention (TYYÇ:ÇÖKG Workshop Final Declaration, 2021) [11], [12]. National and international studies carried out in a way that is consistent with the internal evaluation reports of institutions provide strong emphasis on the need for well-structured online learning environments to ensure quality assurance in education. Of course, while all these processes are observed; the job of designing education requires a certain level of expertise, especially considering the PDCA circle to ensure the quality assurance. With the outbreak of the pandemic,

the uncompromising approach in providing quality assurance in learning and teaching environments is reflected in the educational activities in the institutional internal evaluation reports of the newly divided universities, as it should be in every university. In particular, the implementation of meticulous planning, the continuous operation of the control and take action steps and the attempt to close the cycles; draws attention to the importance of continuous and sustainable practices that should not compromise learning outcomes. When it comes to the importance of these acquisitions in terms of learning; In the 21st century we live in, the importance of presenting output-oriented and skill-based practices to learners to use knowledge is undoubtedly reflected. In fact, it is seen that there are reflections on the need to carry out studies at the competency level, not limited to skills. Turkey Higher Education Qualifications Framework, which provides a framework for qualifications at different levels, including knowledge, skills and competence at the national level, is also ISCED basic code and in the field of education (14) Teacher training and Educational Sciences (48) With its classifications, our country offers a solid infrastructure for the necessity of Computer and Instructional Technologies Education (CEIT) graduates to use their academic and professional equipment. So much so that CEIT graduates have professional and academic knowledge, skills and competence in both educational sciences and teacher training and computer basic fields.

In addition to all these; based on the findings of the research, it can be said that the closeness of the practices carried out in both universities is the result of the efforts of YÖKAK to achieve a national understanding of quality in higher education. Considering that both universities have just separated from larger universities; although there are some shortcomings; it is seen in their reports that they try to reflect the distance education process in an open, accountable and transparent manner in order to ensure the quality assurance system.

Based on the findings obtained from the reports; it is seen that universities are trying to provide adequate support on technical issues in the context of education during the Covid 19 pandemic. Also; it can be said that students focus on their career development and maintaining their psychological integrity. However; it can be suggested that some arrangements should be made in order to ensure the extent of the students' attendance to the course and to keep the workload of the faculty members in an appropriate way in this process, which takes place with distance education. In addition to all these, it can be said that the correct operation of the PDCA cycle, which is included in the quality assurance system, will reveal a more evidence-based and traceable structure in the conduct of education and training activities both under normal conditions and in extraordinary processes such as pandemics and disasters.

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CREATING AWARENESS REGARDING SOLAR ENERGY and ITS USE WITH PORTABLE SOLAR POWERED GENERATOR

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ABSTRACT

Increasing the share of renewable energy sources such as sun, wind, hydropower compared to energy sources which are not renewable such as fossil fuels, coal, nuclear energy in production of electricity is very important in terms of decreasing greenhouse gas emissions which cause global warming. Turkey targets to supply at least 30% of its energy production from renewable energy sources by 2023. In parallel with the activities of increasing the installed solar power capacity of ~49.9 MW in Mersin which is a city located in the south of Turkey, activities such as conferences, symposiums, festivals etc. which increase the knowledge and awareness level of the local community about solar energy and its use have been carried out. In order to contribute to the awareness regarding this matter, a portable solar powered generator of which its dimensions are ~520×400×110 mm has been built. Its mass is ~11 kg and it has 230 V AC and 1.1-10.2 V DC voltage output. The mechanical and electrical installation of the power generator is explained in this paper.

Keywords: Renewable energy, Public awareness, Solar generator, Semiconductor, Photovoltaics

1. INTRODUCTION

The increase in the world's population and the decrease in the world's fossil fuel reserves in parallel have led the people to develop ways of benefiting more from other energy resources [1-3]. At the end of 2019, while 72.7% of the global electricity production was realized using energy sources which are not renewable such as fossil fuels, coal, nuclear energy, the remaining 27.3% was realized using renewable energy sources such as water, wind, sun (see Figure 1) [4].

Global Electricity Production at The End of 2019

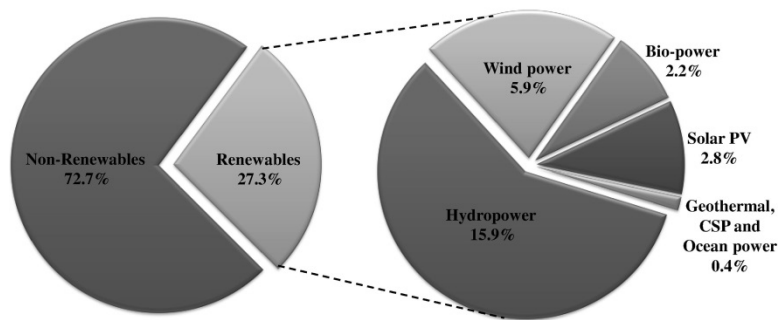


Figure 1. Share of renewable and nonrenewable energy sources in electricity production, end of 2019.

It is obvious that increasing the share of renewable energy sources in electricity production is an important contribution to decreasing greenhouse gas emissions which cause global warming, especially the carbon dioxide [5-8]. In 2014, Turkey targeted to supply 30% of its energy production from renewable energy sources by 2023 within the framework of national renewable energy action plan. Within this target, it was planned to obtain a power of 3000 MW from the sun [2,7,9]. According to march 2021 installed power report

prepared by Turkish Electricity Transmission Corporation, 6964 MW power from the sun is obtained and share of renewable installed power in total installed power corresponds to ~52.3% [10]. The installed solar power capacity of Mersin which has a Mediterranean climate and is located at the south of Turkey is currently ~49.9 MW (see Figure 2). In the city which receives an average of 6.7 kWh energy daily per square meter in summer months, there are photovoltaic solar panel plants and solar power plants which use concentrating solar power (CSP) technologies in order to produce electricity using solar power [11,12]. On the other hand, informing the local community about solar energy technologies via conferences, symposiums, festivals etc. contributes to having a much more informed and aware generation in the country regarding solar energy [13]. Within this context, a portable solar powered generator has been built in order to increase the interest of the local community in solar power. The mechanical and electrical installation of this portable solar powered generator is explained at the remaining of this paper.

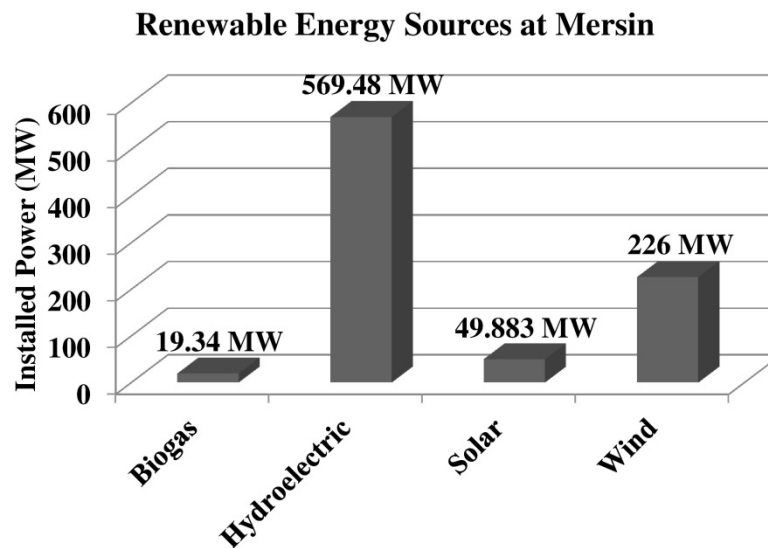


Figure 2. Mersin's installed renewable energy power, 2019.

2. INSTALLATION, DESIGN and WORKING PRINCIPLE of PORTABLE SOLAR POWERED GENERATOR

2.1. Mechanical Installation and Design

The case of portable solar powered generator has been built from 1 mm thick DKP metal sheet (a product made of steel). Suitable divisions have been allocated on the case for photovoltaic (PV) module (1 panel), voltmeters, control buttons, indicators and sockets. The case has been painted to gray using electrostatic paint. In order to contribute to ventilation of the electronic parts, 10 holes of 5 mm diameter have been opened on the right and left sides of the case. A handle has been installed on the case to carry it and its carrying has been facilitated by installing 4 wheels on the base (see Figure 3).

SOLAR POWERED GENERATOR

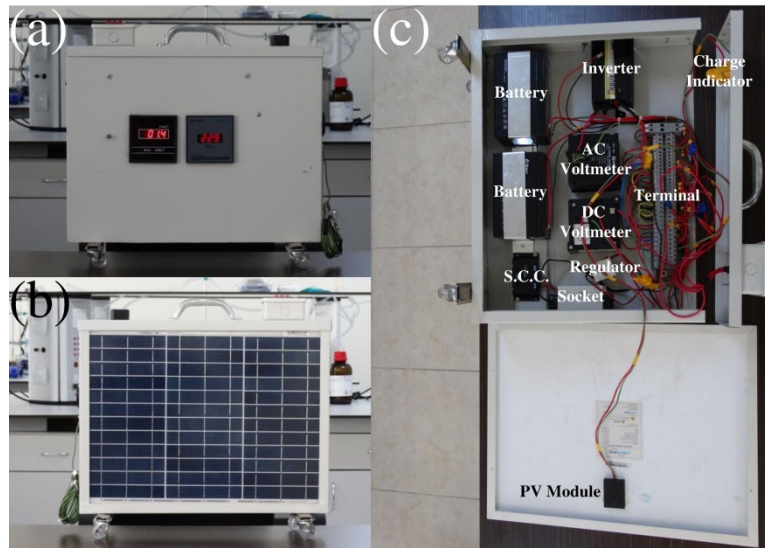


Figure 3. Portable solar powered generator: (a) Front side view of the solar powered generator; (b) Back side view of the solar powered generator; (c) Internal structure and components of the solar powered generator.

2.2. Electrical Installation and Design

As seen in Figure 3-(c), 1 PV module, 2 chargeable batteries, 1 solar charge controller (SCC), 1 alternating current (AC) digital voltmeter, 1 direct current (DC) digital voltmeter, 1 sine wave inverter, 1 regulator circuit, 1 socket group, 1 charge indicator and 1 terminal block have been used in building the case. The quantities of the components used in the construction of the solar powered generator are listed in Table 1.

Table 1. Quantities of components of portable solar powered generator

Portable Solar Powered Generator	
Component	Quantity (piece)
PV Module	1
Solar Charge Controller	1
AC-DC Voltmeter	2
Battery	2
Socket Group	1
Inverter	1
Regulator Circuit	1
Charge Indicator	1
Case	1
Transport Pack	1
Wheel	4
Thimble	40
Connector Strip	1
Terminal Block	1
Cable	1 ¹

¹ 10 meters cable is used.

The electronic components have been connected to each other according to the block diagram in Figure 4. As understood from Figure 4, two batteries connected in parallel with each other in the system can store 168 Wh ($12\text{V} \times 2 \times 7\text{Ah}$) energy from the sun. The electronic circuit in Figure 5 has been constructed on a printed circuit board (PCB) and used as regulator circuit in Figure 4. Simulation of the regulator circuit has been realized by using EasyEDA software. According to this simulation, 0.828-10.543 V DC output is observed by adjusting the resistance of the potentiometer for circuit input voltage of 12 V. 1.1-10.2 V DC output has been actually obtained from this constructed regulator circuit in accordance with its simulation.

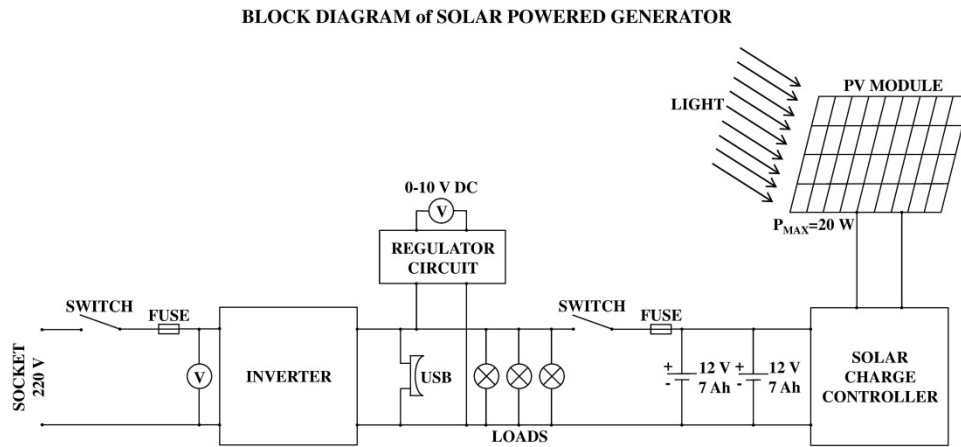


Figure 4. Block diagram of the solar powered generator.

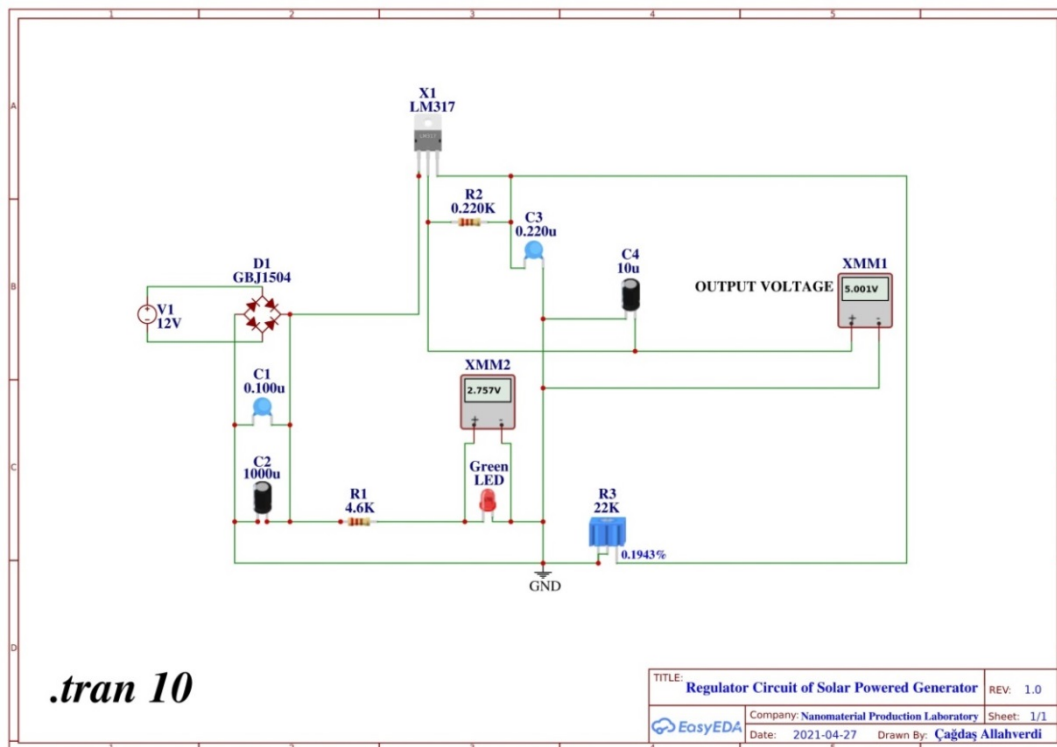


Figure 5. Simulation of the regulator circuit. 12 V DC input is converted into 5 V DC output using a potentiometer resistance of 43Ω in this circuit.

The characteristic properties of the used PV panel (Tommatech TT20-36P) are mentioned in Table 2. Its current-voltage (I-V) curve is given in Figure 6.

Table 2. Characteristic properties of the used solar module

The Properties of The Solar Module	
Cell Type	Polycrystalline
Cell Color	Blue
Cell Number	36
Panel Dimension	390×510×17 mm
Panel Weight	3 kg
Maximum Power (P_{max})	20 W
Voltage at Maximum Power (V_{pmax})	17.3 V
Current at Maximum Power (I_{pmax})	1.156 A
Open Circuit Voltage (V_{oc})	21.1 V
Short Circuit Current (I_{sc})	1.426 A

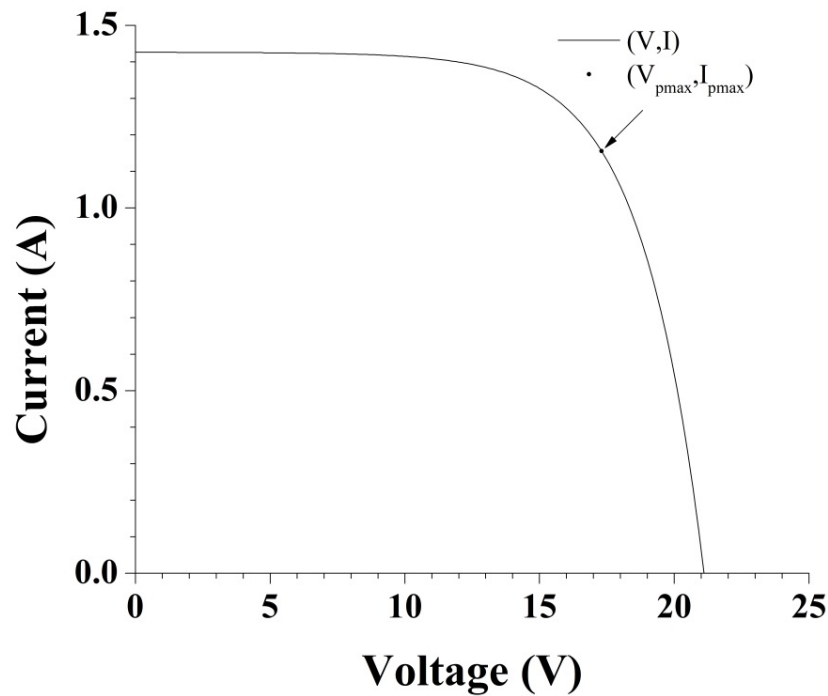


Figure 6. Current-Voltage (I-V) curve of a Tommatech TT20-36P solar module at standard test conditions (solar irradiance of 1000 W/m², cell temperature of 25°C and air mass spectrum 1.5). The point on the curve indicated by an arrow is the maximum power point.

I-V curve of a solar module can be given by Equation (1) [14,15].

$$I = I_{sc} \left[1 - \left(1 - e^{-\frac{V_{oc}}{C}} \right)^{-1} e^{-\frac{V_{oc}}{C}} \left(e^{\frac{V}{C}} - 1 \right) \right] \quad (1)$$

Here, I is current, I_{sc} is short circuit current, V is voltage, V_{oc} is open circuit voltage and C is a coefficient. I_{sc} and V_{oc} are shown in Table 1 and C equals to 2.28394 for this solar panel.

2.3. Working Principle

The polycrystalline solar cells of the PV panel absorb incident sun rays which have photon energies equal or greater than the band gap of the semiconductor used in the cell. Charge carriers, that is electrons and holes, are created in these cells by the absorbed light energy (see Figure 7). Moving charges cause electrical current and thus the sun light energy is transformed into electrical energy [16]. Power output of the PV panel is affected by environmental effects such as ambient temperature and dirt/dust accumulation on its surface [17]. The produced electrical current is stored in batteries through a solar charge controller to keep them from overcharging. This stored energy is used as DC or converted to AC with an inverter when it is needed.

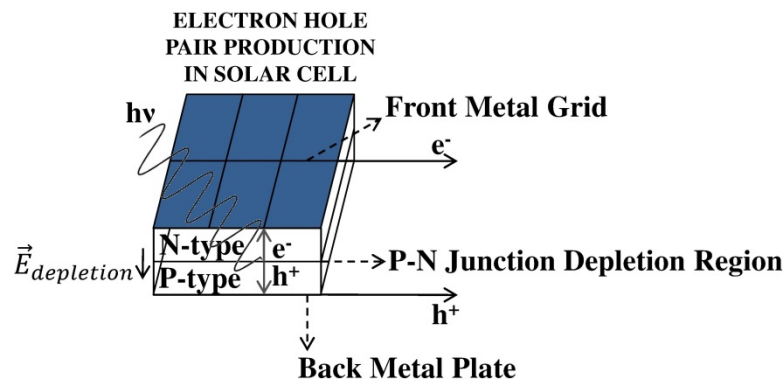


Figure 7. Creation of electron-hole pair upon absorption of a photon at p-n junction depletion region. Depletion region occurs when n- and p- type semiconductors are joint to each other. A photon having sufficient $h\nu$ energy is absorbed at the depletion region of p-n junction and created electron (e^-) and hole (h^+) are moved to their metal contacts by the electric field at the depletion region ($\vec{E}_{depletion}$).

3. CONCLUSION


It is possible to charge many electrical devices such as mobile telephones, tablets and laptops using portable solar powered generators. Wide spreading such generators is important in terms of saving energy. In order to increase the knowledge and awareness level of the local community in Mersin - Turkey regarding this subject, a portable solar powered generator has been built. The outer case of the produced generator has been made from DKP metal, its dimensions are approximately $520 \times 400 \times 110$ mm, its mass is ~ 11 kg and it is a very functional generator. Production of the requested voltage by the generator in both 230 V AC and 1.1-10.2 V DC value interval, transferring the produced voltage to power socket and instant indication of the battery voltage were ensured via the built electrical circuit design and installation.

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