Workshop on Functional Materials Science and Engineering (WFME 2023)

ABSTRACTS AND PROCEEDINGS

TOROS UNIVERSITY
FACULTY OF ENGINEERING

Workshop on Functional Materials Science and Engineering

(WFME 2023)

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INVITED SPEAKERS
Assoc. Prof. Dr. Doğan Kaya Department of Physics, Faculty of Sciences and Letter, Çukurova University **Title: Exploring Functional Nanoparticle Design: Magnetic and Catalytic Harmony**
Prof. Dr. Mahmut Kuş Chemical Engineering, Faculty of Engineering and Natural Science **Title: Fotovoltaik Hücrelerde Yeni Trend: Perovskite Güneş Hücreleri**

PROGRAM

December 27, Wednesday	
10:00-10:20	**Opening Ceremony / Açılış Konuşması** **Prof. Dr. Adnan Mazmanoğlu** ***Vice Rector and Dean of Engineering Faculty of Toros University*** ***Rektör Yardımcısı ve Mühendislik Fakültesi Dekanı***
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10:30-10:50	**Exploring Functional Nanoparticle Design: Magnetic and Catalytic Harmony** **Assoc. Prof. Dr. /Doç. Dr. Doğan Kaya** ***Department of Physics, Faculty of Sciences and Letter, Çukurova University*** ***Fizik Bölümü, Fen Edebiyat Fakültesi, Çukurova Üniversitesi***
	Coffee Break/Kahve Arası **Poster Session**
	Influence of peripheral substituents on photocatalytic hydrogen evolution in subphthalocyanine-based photocatalysts **Şifa Doğan** ***Department of Natural and Mathematical Science, Faculty of Engineering, Tarsus University*** ***Doğa ve Matematik Bilimi Bölümü, Mühendislik Fakültesi, Tarsus Üniversitesi***
	Optically stimulated luminescence of $LiAlO_2$ doped with Ag^+ and Na^+ synthesized by sol-gel technique **Volkan Altunal** ***Department of Physics, Faculty of Sciences and Letter, Çukurova University***

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	Enhanced hydrogen evolution reaction activities of Pt-loaded Au nanostructures: insights from structural and electrochemical analyses **Emre Can Tayfun** ***Department of Physics, Faculty of Sciences and Letter, Çukurova University*** ***Fizik Bölümü, Fen Edebiyat Fakültesi, Çukurova Üniversitesi***
	Investigation of structural and thermoluminescence properties of potassium sulfate (K2SO4) based phosphors Bilal Işık ***Department of Physics, Faculty of Sciences and Letter, Çukurova University*** ***Fizik Bölümü, Fen Edebiyat Fakültesi, Çukurova Üniversitesi***
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	Department of City and Region Planning, Faculty of Engineering and Architecture, Bozok University ***Şehir ve Bölge Planlama, Mühendislik ve Mimarlık Fakültesi, Bozok Üniversitesi***
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15.20-15.40	**Concrete Technology with 3D Printer: A Review** Assist. Prof. Dr. Semire Oğuzhan Güven ***Civil Engineering, Faculty of Engineering, Toros University*** ***İnşaat Mühendisliği, Mühendislik Fakültesi, Toros Üniversitesi***
15.40-16.00	**Artificial Intelligence Applications in Healthcare and Applied Sciences with Quality Assurance in Opticianry** Lecturer Sefa Sezer *Department of Opticianry, Vocational School of Health Services, Toros University* *Optisyenlik Bölümü, Sağlık Meslek Yüksekokulu, Toros Üniversitesi*
16.00-16.10	**Closing Workshop** Assoc. Prof. Dr. Ali Kemal Havare ***Electric Electronic Engineering, Faculty of Engineering, Toros University*** *Elektrik Elektronik Mühendisliği, Mühendislik Fakültesi, Toros Üniversitesi*

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Workshop on Functional Materials Science and Engineering (WFME) 2023'te yayınlanan özetlerin dil, bilim, hukuki ve etik sorumluluğu yazarına aittir. Özetler kaynak gösterilmeden kullanılamaz.

Preface

Dear Participants,

Workshop on Functional Materials Science and Engineering (WFME) 2023 was held in Toros University, Turkey on 27 December 2023.

It aimed to share and discuss theoretical and practical knowledge of Functional Materials in a scientific framework by bringing together scientists, educators, non-governmental organizations, and private sector representatives in a multidisciplinary environment. This workshop will provide a multidisciplinary meeting opportunity for the presentation and discussion of scientific studies in Applied Sciences, Advanced and Functional Materials, Materials and Devices, New Materials for Energy and Energy Conversion, Biomaterials, Theoretical/Modeling/Computer Simulations of Functional Materials, Spectroscopy for Advanced Materials, Hybrid and Composite Materials, Magnetic Materials, Emerging Materials for Ionizing Radiation Detectors and Dosimeters.

The valuable presentations from expert speakers and the intriguing research shared by participants have provided a rich experience in terms of interaction and learning. Knowledge sharing and collaboration were the cornerstones of this event.

As WFME organizing committee, we will continue to organize scientific meetings to inspire each other and to contribute to science. Hope to meet at future events.

Member of the Organizing Committee
Assist. Prof. Dr. Merve Özcan

Chair of the Organizing Committee
Assoc. Prof. Dr. Ali Kemal Havare

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ABSTRACTS PRESENTED AT THE WORKSHOP

ORAL PRESENTATIONS

Functional Materials in Industrial Engineering: Perspective for Increasing Innovation and Efficiency

Selin SARAÇ GÜLERYÜZ[1]

[1]Toros University, Faculty of Engineering, Department of Industrial Engineering, Mersin, Turkey

Functional materials employed in industrial engineering are typically chosen to enhance work processes or production systems due to their desirable properties. In the realm of modern industrial engineering, the integration of sustainability, efficiency, and innovation is paramount, especially in an ever-changing and evolving environment. Fundamental industrial engineering principles, such as process optimization, material flow analysis, and supply chain management, can be strategically employed to optimize the utilization of functional materials. The incorporation of functional materials not only enhances system efficiency but also facilitates energy savings and contributes to sustainability objectives. Effectively utilizing functional materials enables industrial engineers to reduce system costs by optimizing work processes. Consequently, the application of functional materials in industrial engineering significantly contributes to improving process efficiency, enhancing production quality, and aligning with sustainability targets. Given these considerations, it is imperative for industrial engineers to approach system evaluation from a new perspective when it comes to material selection and integration.

Keywords: Functional Material, Industrial Engineering, Optimizing, Material Selection, Production System.

Atık Sulardan Ağır Metal Gideriminde Biyosorbent Kullanımı

Serpil Savcı[1]

[1]Yozgat Bozok Üniversitesi, Mühendislik Mimarlık Fakültesi, Şehir ve Bölge Planlama Bölümü, Yozgat, Türkiye

Hızlı nüfus artışı, artan sanayileşme ve şehirleşme ile birlikte su kirliliği sorunu küresel boyutlara ulaşmıştır. Atık sularda bulu-nan toksik ve biyolojik olarak parçalanmayan ağır metallerin varlığı su kirliliğinin başlıca nedenleri arasındadır. Özellikle en-düstriyel proseslerden alıcı ortamlara verilen ağır metaller ile kirletilmiş sular, alıcı ortamlarda eser miktarlarda bile olsa büyük çevresel problemlere neden olmakta, halk sağlığı açısından endişe yaratmaktadır. Bu nedenle bu kirleticilerin çeşitli yöntemlerle giderilmesi gerekmektedir. Adsorpsiyon, kimyasal çöktürme, ters ozmoz, ultrafiltrasyon, membran filtrasyon, iyon değişimi gibi yöntemler atık sulardan ağır metallerin gideriminde kullanılabilmektedir. Bu yöntemler arasında adsorpsiyon en etkili olanlardan birisidir. Adsorpsiyonda biosorbentler kullanılmaktadır. Biosorbentler doğada atık malzemelerden elde edilmekte, çevre dostu, geri kazanımı kolay, proses sonucunda atık çamur oluşturmayan, ekonomik materyallerdir. Örneğin muz kabuğu, elma posası, tarımsal atıklar, nar kabuğu, sucul bitkiler, yumurta kabuğu, algler, mantarlar atık sulardan ağır metal gideriminde kullanılan biyosorbentlerdir. Bu çalışmada, atık sulardan ağır metallerin gideriminde kullanılan biyomateryaller araştırılmış ve avantajları üzerinde durulmuştur.

Anahtar Kelimeler: Çevre, Biyosorbent, Ağır Metal, Sürdürülebilirlik

Investigation of Elastic tensile behaviour of a Disc with carbon Fiber-reinforced plastic (CFRP) material

Hüseyin Fırat Kayıran[1]

[1] Mersin Provincial Coordinator, Department of Agriculture and Rural Development Support (ARDSI), Mersin, Turkey

In this study, carbon Fiber reinforced plastic was used. (CFRP) stresses occurring in a disc have been studied by numerical analysis. The modulus of elasticity is constant with temperature, and the stresses occurring in the thermoplastic composite disc were studied by numerical analysis. Assuming that the modulus of elasticity does not change with temperature, the temperature distributions of 30°C, 60 °C, 90 °C, 120 °C, 150 °C were referenced in the study. CFRP materials are currently preferred in unmanned aerial vehicles, UAVs, SIHAS, aircraft industry. They are Fiber-reinforced polymer materials obtained by combining carbon Fibers with a polymer matrix, showing high strength, high hardness, and strength. The stress values obtained at the end of the study were compared among themselves and shared with the literature in graphs. It was concluded that an increase in the value of the temperature acting on the CFRP disc correctly affects thermal stresses.

Keywords: CFRP Disc, Elastic Tensile, Elastic Modulus

Lightweighting and Improvement of Truck Bumper Designed According to Regulation R58.03

Mehmet Emre Şahin[1], Mehmet Ali Kurgun[1]

[1]Koluman Otomotiv Endüstri A.Ş.

In this study, it is aimed to use a rear bumper used as rear protection equipment in N category motor vehicles and trailers by passing several structural analysis by means of Ansys program within the scope of the regulation. Forces of 10 kN and 18 kN were applied to the bumper equipment intended to be used in accordance with the relevant regulation. The design work was completed as a result of the analysis results and the relevant buffer was commissioned.

Keywords: Rear Bumper, ECE R58.03, Ansys, N Category vehicles

Concrete Technology with 3D Printer: A Review

Semire OĞUZHAN GÜVEN[1], Fatma DÜLGER CANOĞULLARI[1]

[1]Toros University, Faculty of Engineering, Mersin, Turkey

Advancements in technology have continuously introduced novel solutions from ancient times. The primary objective of these solutions is to enhance the quality of human existence while minimizing any adverse impact on the universe we inhabit. In the present day, it is imperative to utilize raw material resources efficiently in order to promote sustainability and provide a high quality of life. The advancement of 3D printer technology is a significant and crucial development in our era. The construction industry aims to adopt this technology and use it for large-scale industrial purposes. 3D concrete printing is an innovative construction technology that uses 3D printing techniques to create structures layer by layer using a specially formulated concrete mixture. This technology has the potential to revolutionize the construction industry by offering faster, more cost-effective, and sustainable building methods. The utilization of 3D concrete printer technology presents an economical and expeditious approach to construction, allowing for increased flexibility in architectural and structural design. This study includes a review of the results published in the scientific literature on structures produced with 3D concrete technology.

Keywords: 3D Printer, Concrete, Engineering Technology, Construction Industry, Material

Artificial Intelligence Applications in Healthcare and Applied Sciences with Quality Assurance in Opticianry

Sefa SEZER[1]

[1]Toros University, Vocational School of Health Services, Department of Opticianry, Mersin/Türkiye.

In terms of the subject of the study, the activities of artificial intelligence within the scope of health services, solving problems, reaching clear predictions, keeping up with all conditions and ensuring the management of information, make a significant contribution to the development of science. Artificial intelligence applications have become operational in higher education institutions and healthcare services globally and have gained an important place in educational activities. Artificial intelligence is now included in the classroom climate in health services and education-research institutes and continues its activities under the umbrella of an adapted learning model as a quality assurance system for academics and university students. Within the scope of artificial intelligence applications and artificial learning activities in the education process, the portfolio of a student who is difficult to reach and succeed in laboratories can be accessed by data analysis. The aim of the study is to reveal its contributions to the field of healthcare opticianry with quality assurance by providing applied multidisciplinary technology integrated with the artificial intelligence system. In this field, it is the examination of the planned contributions to the quality assurance of the roles of the academician in higher education management, the roles of the teacher and the university student in the laboratory where applied science takes place in the learning and teaching processes. In the study, eyeglass lens construction in the field of opticianry within the health services, frame construction material preparation, artificial intelligence applications that will be integrated into the Ministry of Health's e-pulse system and the selection of glasses for both health and accessory selection were examined under three headings, and artificial learning models were examined under two headings. In the last part of the study, the effect of the artificial learning process on educational pedagogy in the field of opticianry within health services will be reached and the vision of higher education, higher education-related research and public and private hospitals within the Ministry of Health in the development of artificial intelligence applications will be discussed. From this study, in which data is obtained as a scientific study, the vision-oriented activities, usage features and SWOP processes of the applied software and health equipment that are ready

for use will be included. It is important that the study will contribute to the emergence of the artificial intelligence process in the field of health services - opticianry by creating a framework for the vision within the scope of higher education and health services, and its use within the scope of learning activities of academicians and students. Artificial intelligence, which emerged in the process of globalization and digitalization, takes its place in higher education with quality assurance.

Keywords: Artificial Intelligence Quality Assurance Training, Artificial Intelligence in Higher Education Accreditation Artificial Intelligence, Health Services, Opticianry, Applied Sciences, Multidisciplinary, Health.

Structural, Magnetic And Magnetocaloric Properties of La(0.7)Sr(0.2)Ba(0.1)Mno3 Manganite

Mehmet Selim Aslan[1], Selda Kılıç Çetin[1], Ahmet Ekicibil[1]

[1]Çukurova University, Faculty of Arts and Sciences, Physics Department, Adana, Turkey.

Magnetic cooling technology is based on the principle of the magnetocaloric effect (MCE), which occurs with a reversible temperature change in a material when exposed to an adiabatically changing magnetic field [1]. They have attracted great interest over the last two decades due to their interesting physical properties such as the colossal magnetoresistance effect and MCE [2]. In this study, the structural, magnetic and magnetocaloric properties of La(0.7)Sr(0.2)Ba(0.1)MnO3 manganite were investigated. Sol-gel method was used during the production of the material, and X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM) and Energy Dispersive X-Ray Spectrometer (EDS) measurements were carried out to examine the crystal structures and surface morphologies. From XRD measurements, it was determined that the crystal structure of La(0.7)Sr(0.2)Ba(0.1)MnO3 manganite is hexagonal. Atomic percentage values were determined for each compound from the EDS analysis. In order to determine the Curie temperature (TC), temperature dependent magnetization measurements were carried out. As a result of the measurements, the TC value of La(0.7)Sr(0.2)Ba(0.1)MnO3 manganite was determined as 362 K. The maximum magnetic entropy change value of the sample was determined as 2.79 Jkg-1K-1 in an applied magnetic field of 5T.

Keywords: Magnetocaloric Effect, Manganite, Curie Temperature, Magnetic Entropy Change

Sustainable Energy Catalyst: Exploring CoFe2O4 for Improved Oxygen Evolution in Water Electrolysis

Hasan Huseyin Isik[1], Dogan Kaya[1], Ilknur Baldan Isik[1]

Faruk Karadag[1], Ahmet Ekicibil[1]

[1]Çukurova University, Faculty of Art and Sciences, Department of Physics, Adana, Turkey

The Oxygen Evolution Reaction (OER) plays a pivotal role in energy transformation and storage, particularly within the context of water electrolysis. Over the past decade, precious metals and their oxide counterparts, such as Ru, Ir, RuO2, and IrO2, have pre-dominated in OER processes, aiming to reduce energy consumption and enhance energy conversion efficiency [1]. However, the escalating costs, scarcity, and limited durability of these precious metals have prompted an exploration of alternative catalysts devoid of such elements for the OER In this study, we investigated CoFe2O4 nanostructures, synthesized as a spinel material through a sol-gel method. Structural analysis was conducted using X-ray diffraction, revealing diffraction peaks at 30.1º, 35.5º, 37.0º, 43.0º, 53.4º, 57.0º and 62.6º, corresponding to the (220), (311), (222), (400), (422), (511) and (440) planes of the CoFe2O4 material in a face-centered cubic structure. The morphology of CoFe2O4 was confirmed through scanning electron microscopy, with an average particle size of 11.2 nm. Additionally, we evaluated the electrocatalytic activity of the CoFe2O4 material within the OER region in a 1 M KOH solution at room temperature. Cyclic voltammetry measurements were conducted between 1 V and 1.8 V (vs. Ag/AgCl) with a scan rate of 50 mV s-1, revealing OER regions between 1.3 V and 1.7 V. Linear sweep voltammetry measurements were performed with a scan rate of 50 mV s-1 within the potential range of 1.0 V to 2.4 V. The onset potential and overpotential for OER were determined as 362 mV and 854 mV at 10 mA cm^{-2}, respectively. Moreover, the maximum current density value was recorded as 199.5 mA cm^{-2} at 1.5 V.

Keywords: CoFe2O4, Structural Properties, XRD, SEM, OER Activities

Acknowledge: We would like to thank the Research Fund of Çukurova University (FDK-2023-15837) for financial support of this research

POSTER PRESENTATIONS

Investigation of structural and thermoluminescence properties of potassium sulfate (K2SO4) based phosphors.

Bilal Isik[1], Volkan Altunal[1], Veysi Guckan[2], Adnan Ozdemir[3], Ahmet Ekicibil[1]

[1]Çukurova University, Art Sciences Faculty, Department of Physics, Balcalı, Sarıçam, 01250 Adana, TURKEY

[2]Mersin University, Physics Department, Yenişehir, Mersin, 33343, Turkey

[3]Kahramanmaras Istiklal University, Elbistan Vocational High School of Health Service, Elbistan, Kahramanmaras, Turkey

The primary objective of this study is to synthesize potassium sulphate (K2SO4) phosphors via the solid-state synthesis method, incorporating dopants consisting of lanthanides and alkali metals. The focus lies on characterizing their structural composition and exploring their luminescent properties in-depth. The crystal structures of the synthesized materials were ascertained utilizing XRD methodology, while their morphological attributes were analysed through SEM analysis. To enhance luminescence efficiency, specific lanthanide elements (Ce, Eu, Tm, Tb, Dy, La) were chosen as activators. Additionally, sulphate-based Na+ ions were introduced into the K2SO4 structure to serve as charge compensators. The co-doping of Dy and Na ions notably augmented the thermoluminescence (TL) signals of the host material, resulting in a tenfold increase in TL sensitivity. These TL signals exhibited a nearly linear response across a broad dose range spanning from 0.2 to 200 Gy. Remarkably, there was minimal degradation in TL signals observed even after 60 days of being kept in darkness following irradiation. However, in experiments assessing reusability, an unexpected decline in TL signals was noted after a minimum of 20 cycles. The findings of this study hold promise for advancing further research in developing novel materials for dosimetric applications using solid-state synthesis. Moreover, this work contributes to enhancing existing dosimetric materials by improving their performance.

Keywords: Potassium Sulfate (K2SO4), Solid State Synthesis, Lanthanide Elements, Thermoluminescence, Radiation Dosimetry

Enhanced Hydrogen Evolution Reaction Activities of Pt-Loaded Au Nanostructures: Insights from Structural and Electrochemical Analyses

Emre Can Tayfun[1], Faruk Karadag[1], Ahmet Ekicibil [1], Dogan Kaya[1,2]

[1]Çukurova University, Faculty of Art and Sciences, Department of Physics, Adana, Turkey

[2]Department of Advance Materials and Nanotechnology, Graduate School of Sciences, Çukurova University, Adana, Turkey

Platinum (Pt)-based nanoparticles (NPs) have emerged as key contributors to addressing contemporary challenges related to global warming and energy demand. The rapid development of Platinum-Gold (Pt-Au) NPs, involving the synthesis of nano-structures with varying sizes for applications in optics, magnetics, and catalysis, has yielded promising results [1, 2]. This study focuses on the loading of Pt NPs onto Au nanostructures (NSs) using one-pot modified polyol method and explores their structural and electrocatalytic properties for the hydrogen evolution reaction (HER). X-ray diffraction and Rietveld refinement analyses revealed the formation of a face-centered cubic (fcc) structure for both Pt NPs and Au (NSs). Scanning electron microscope images unveiled two distinct formations: Pt NPs and Au nano islands with sizes approximately 10 nm and 140 nm, respectively. Electrochemical investigations of Pt-loaded Au nanostructures (NSs) were conducted using a three-electrode setup, with a 6 × 6 mm^2 Pt counter electrode, a carbon rod working electrode, and a 3 M KCl Ag/AgCl reference electrode, in a 0.5 M KOH electrolyte at room temperature. Linear sweep voltammetry curves, recorded with a scan rate of 50 mV s^{-1}, exhibited a remarkably low onset potential of -0.80 V (vs. Ag/AgCl) and an overpotential at 10 mA cm^{-2} of -0.84 V (vs. Ag/AgCl). Subsequently, cyclic voltammetry (CV) measurements were performed at scan rates ranging from 10 to 100 mV s^{-1}. The CV results indicated that the H adsorption region occurred at approximately -0.3 V (vs. Ag/AgCl), and an increase in the scan rate from 10 mV s^{-1} to 100 mV s^{-1} linearly augmented the number of charges introduced to the system, thereby increasing the current density for the HER process.

Keywords: PtAu Nanoparticles, Polyol, Structural, Catalytic, HER activities.

Acknowledgement: Emre Can Tayfun would like to express his sincere gratitude for the support by Cukurova University, Adana, Turkey, under Scientific Research Funding Grant Numbers: FBA-2023-15712 and FYL-2023-16458.

Influence of Peripheral Substituents on Photocatalytic Hydrogen Evolution in Subphthalocyanine-Based Photocatalysts

Şifa Doğan[1], Perihan Kübra Demircioglu[1], Buket Güntay[2], Emre Aslan[2], İmren Hatay Patır[3], Mine İnce[1]

[1]Tarsus University, Faculty of Engineering, Department of Natural and Mathematical Science, Mersin, Turkey

[2]Selcuk University, Faculty of Sciences, Department of Biochemistry,Konya, Turkey

[3]Selcuk University, Faculty of Sciences, Department of Biotechnology, Konya, Turkey

Two novel Subphthalocyanine (SubPc) derivatives, denoted as SubPc 1 and SubPc 2, were synthesized to be employed as photocatalysts for hydrogen production from water. SubPc 1 features a strong electron-donating substituent, while SubPc 2 incorporates a strong electron-accepting group at the peripheral position with a carboxylic acid in the axial position. A comparative analysis of the photocatalytic activities of SubPcs with distinct electroactivity was thus conducted. Upon visible light irradiation, in the first hour, SubPc 1 demonstrated superior photocatalytic performance compared to SubPc 2 yielding 7.84 mmol g-1 h -1 of hydrogen. Both SubPc-based photocatalysts exhibited notable stability, maintaining their activity for 24 hours. Notably, after 24 hours of irradiation, SubPc 1/TiO2 showcased remarkable catalytic efficiency for hydrogen production (7.84 mmol g -1 h -1) with a Turnover Number (TON) value of 16680 and a high Solar-to-Hydrogen (STH) efficiency of 0.84%.

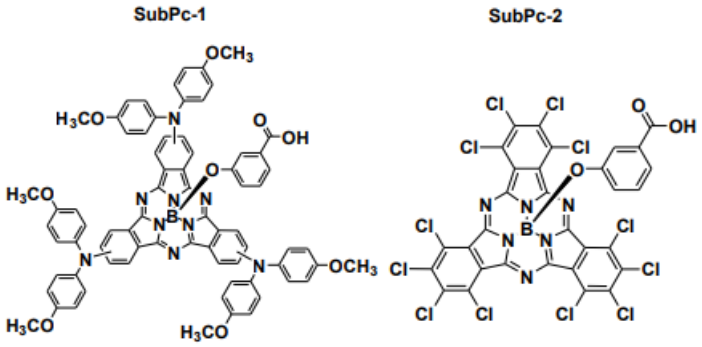

Figure 1. Molecular structures of SubPc 1 and 2.

Keywords: Subphthalocyanine (SubPc), Photocatalytic Hydrogen, Dye Sensitizer, Artificial Photosynthesis

Optically Stimulated Luminescence of LiAlO2 Doped with Ag+ and Na+ Synthesized by Sol-Gel Technique

Volkan ALTUNAL[1]

[1]Çukurova University, Art Sciences Faculty, Department of Physics, 01330 Adana, TURKEY

This investigation serves to contribute significantly to the field by exploring the luminescent responses of LiAlO2:Ag+,Na+ phosphors and enhancing their efficacy as radiation-sensitive materials. The fabrication of LiAlO2 samples involved a meticulous doping process employing Ag+ and Na+ ions through the sol-gel synthesis technique.

Comprehensive structural and morphological analyses of undoped and doped samples were conducted using X-ray diffraction (XRD) and scanning electron microscopy (SEM) techniques. The luminescent behavior of the LiAlO2:Ag,Na powders was meticulously characterized through the utilization of Optically Stimulated Luminescence (OSL) and Thermoluminescence (TL) methodologies.

A thorough investigation into concentration quenching revealed that the optimal OSL and TL sensitivities were attained at a 0.5% concentration of both Ag and Na dopants. Furthermore, the TL glow curve exhibited distinctive features, manifesting two distinct TL peaks, while the OSL decay curve revealed the presence of three decay components. Notably, the LiAlO2:Ag,Na samples demonstrated exceptional attributes, including robust dose linearity up to 50 Gy beta doses, sustained reusability across 15 experimental cycles, and minimal fading within a two-week duration.

These commendable properties underscore the potential of LiAlO2:Ag,Na samples as highly promising dosimeters, substantiating their application viability in radiation dosimetry. The comprehensive insights obtained from this study not only enrich the understanding of the luminescent behaviors of LiAlO2:Ag,Na phosphors but also pave the way for their practical utilization as efficient dosimetry tools in various radiation-related fields.

Keywords: Lithium Aluminate (LiAlO2), Sol-Gel Synthesis, Optically Stimulated Luminescence, Radiation Dosimetry, Doping