ISC '21

1'st International Symposium on Characterization

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1'st INTERNATIONAL SYMPOSIUM ON CHARACTERIZATION ISC'21

ABSTRACT BOOK & PROGRAMME SCHEDULE

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Turkey

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ISC'21
1'st International Symposium on Characterization

1st INTERNATIONAL SYMPOSIUM on CHARACTERIZATION

OCTOBER 8-9, 2021

Abstract Book

EDITORS

Prof. Dr. Atilla EVCIN

Prof. Dr. Ibrahim Gunes

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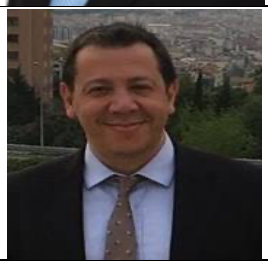
Invited Speakers		University	Presentation Tilte
Prof. Dr. Cenk AKTAŞ		**Christian-Albrechts-University, Institute of Materials Science, Kiel, Germany**	Single source precursor approach for functional nanomaterials
Prof. Dr. Yogendra Kumar MISHRA		University of Southern Denmark, Mads Clausen Institute, NanoSYD, Denmark	Tetrapods based smart materials for advanced technologies
Prof. Dr. Burç MISIRLIOĞLU		Sabancı Üniversitesi, Malzeme Bilimi ve Mühendisliği, Türkiye	Identifying defect contributions to structural phase transitions: Bulk properties vs. thin films
Assoc. Prof. Fabienne DUMOULIN		Acıbadem Üniversitesi, Tıp Mühendisliği Bölümü, Türkiye	Characterising the potential of phthalocyanines for photodynamic therapy
Assoc. Prof. Fayaz HUSSAIN		NED University of Engineering and Technology, Department of Materials Engineering, Pakistan	Electrical and magnetic properties of strontium titanate based ceramics

INVITED SPEAKERS

Yogendra Kumar Mishra is Professor MSO at Mads Clausen Institute, NanoSYD, University of Southern Denmark (SDU), Denmark. Prior joining to SDU, he worked as group leader at Functional Nanomaterials Chair, Kiel University, Germany. He did Habilitation in Materials Science from Kiel University in 2015 and Ph. D. in Physics in 2008 from Jawaharlal Nehru University (Inter University Accelerator Centre), New Delhi, India. In Kiel, he introduced a new flame-based process for metal oxide tetrapod nanostructuring and their 3D networks which showed many applications in engineering and biomedical fields. Additionally, tetrapods can be used as templates to create hybrid and new 3D materials. At NanoSYD, he is heading 'Smart Materials' group with the focus to develop new materials for green and sustainable technologies.

Publications > 220, Citations> 10000, H-index: 56

https://portal.findresearcher.sdu.dk/en/persons/Mishra

https://scholar.google.com/citations?user=TW4Bq_oAAAAJ&hl=en

Burc Misirlioglu was born in İstanbul. He received his B.Sc. and M.Sc. in Metallurgy (1998) and Materials Science (2001) from İstanbul Technical University. He obtained his Ph.D. degree from University of Connecticut in 2006. He was with Max Planck Institute of Microstructure Physics followed by a researcher position at MIT during 2007–2008. Since 2008, he has been a faculty member in the Faculty of Engineering and Natural Sciences of Sabanci University, İstanbul, Turkey. Professor with a demonstrated history of working in the higher education industry. Skilled in Mechanical Properties, Materials, Semiconductors, Interfaces, and Characterization. Strong education professional with a Ph.D. in Materials Science from University of Connecticut.

Our research is centered around understanding the effects of defects and microstructure on the physical properties of functional oxides. Using continuum level computational and experimental approaches, we try to reveal the mechanisms by which defects and interfaces impact the physical properties and at what magnitude this occurs. Such knowledge is the key to design and fabricate structures in various geometries for specific engineering applications. The applications governed by such phenomena encompass macro- and micro-scale capacitors for electric energy storage, non-volatile solid state memories, nanoscale devices and electrooptical thin films.

Associate Professor Dr. Fabienne Dumoulin first started university studying biology, graduated in biochemistry and then completed her PhD in organic chemistry in Lyon, France in 2002. After post doctoral studies in Pisa, Italy, she was a faculty member at Chemistry Department of Gebze Technical University from 2005 to 2019. She is now associate professor at Acıbadem Mehmet Ali Aydinler University in Istanbul,Turkey.

Her research focuses on the chemistry, properties and applications of phthalocyanines, mainly for photodynamic therapy. She has authored so far 82 research articles, three book chapters, and supervised many Master and PhD students. Fabienne has also been the recipient of several Young Scientist Awards: TUBA-GEBİP from the Turkish Academy of Sciences, BAGEP from the Bilim Akademisi and the Mustafa N Parlar Foundation of METU. She was elected officer of the executive committee of the European Society for Photobiology in 2015 and 2017, is an Associate Editor for *RSC Advances* and the *Journal of Porphyrins and Phthalocyanines*, and is a Member of the Royal Society of Chemistry.

Fayaz Hussain joined the department of Materials Engineering in 2007, first as a Lecturer, then after Assistant Professor in 2010 and promoted as an Associate Professor in 2020. Prior to this, he worked three years in metal industry. He is also editorial board member of journals of “Frontiers in Materials” and “Electroactive Materials”. He has completed his PhD from the University of Sheffield, England, UK, in 2016-2017, worked on “KNN based lead-oxide free piezoelectric ceramics”. This ABO3 system has been studied from the perspective of optimizing its performance for multilayer actuators; potentially for energy harvesting applications under the supervision of Professor Ian Reaney at the University of Sheffield. To fabricate the multilayers, a novel Wet-Multilayer-Method (WMM) was also developed to overcome the issues of delamination during firing of multilayers actuators. He has authored/co-authored publications in well reputed journals, around 30 papers including key articles on piezoelectric, capacitor and microwave dielectric ceramics in bulk and multilayers with 238-citations, h-index 8 and i10-index 6 of last five years. Current research interests: ynthesis of Piezoelectric Ceramics and their multilayers, Multiferroics, Thermoelectric Ceramics and Microwave dielectrics. Characterisation Methods: LCR, impedance spectroscopy, d33 meter for piezoelectric coefficient, Vibrating Sample Magnetometer for magnetic properties, XRD Analysis, SEM/ EDX, ferroelectric testing, etc.

Prof. Cenk Aktas earned his BSc and MSc in Materials Science and Engineering from Middle East Technical University-Turkey and Christian-Albrechts University-Germany, respectively. He joined Leibniz Institute for New Materials (Leibniz-INM) in 2004. After completing his PhD with distinction (summa cum laude) he was appointed as the Deputy Head of CVD Research Division. Between 2010-2015, Aktas acted as the Director of CVD/Biosurfaces Division at Leibniz-INM, which is situated in Saarbrücken/Germany. In addition to his academic duties (acting as senior instructor at Saarland University and Applied University of Kaiserslautern), he gained invaluable experiences at Leibniz-INM since it is a well-known scientific partner to national and international institutes and a provider of research and development for companies throughout the world. Aktas also acted as advisor and instructor in several professional training programs of various institutions including German Chemistry Society, Korean University of Technology, European Postgraduate School and etc. Currently he is carrying out research activities on synthesis of functional nanomaterials and their potential applications in diverse fields including energy, medicine, textile, surface, and composite technologies at the Institute of Materials Science, CAU-Kiel In addition, he acts as the PI at Cardiovascular Materials Laboratory at UdS-Homburg and is giving lectures in the Medical Faculty, UdS-Homburg. Aktas has been involved in various projects funded by EU, DFG, BMBF and similar public institutions.. Aktas published more than 70 research papers and 10 patents in different fields (on nanomaterials and nanotechnology). He has several prestigious awards including Prof. Werner Petersen Award, Prof. Horst Hardt Award, Prof. Baki Komsuoglu Award, International Nanomedicine Foundation Award and etc.

SCIENTIFIC PROGRAMME FOR ISC'21

08 OCTOBER 2021 Friday

	ZOOM	
09:30	**Opening : Prof. Dr. Atilla EVCIN (Chair of ISC'21) Afyon Kocatepe University, Afyonkarahisar, Turkey**	
	Session Chair :	
10:00-10:30	Invited Speaker 1 Prof.Dr. Cenk AKTAŞ	
10.30-11.00	Invited Speaker 2 Assoc. Dr. Fabienne DUMOULIN	
11:00-11:20	Prasad Chandran N, Manoj D. Naik, Manjunath Patel GC, Avinash Lakshmikanthan, Ganesh R. Chate	Investigation of Green Compression Strength and Green Shear Strength in Green Sand mould using Ant Hill Slit as a partial replacement of foundry sand using Response surface Methodology
11:20-11:40	Svetlana Lilkova-Markova, Dimitar Lolov	Buckling Analysis of Axially Loaded Nanobeams Resting on a Rotational Elastic Foundation
11:40-12:00	Abdullah Alawadhi, Atilla Evcin	Self-Cleaning of Hydrophobic Surfaces
12:00-12:20	Muhsin Alçı, Recep Güneş	Tensile Characterization of Glass Fiber Reinforced Composite Materials wıth Strain Gauge and Virtual Extensometer
	BREAK	
	Session Chair :	
	Authors	Title
14.30-15.00	Invited Speaker 3 Prof. Dr. Yogendra Kumar MISHRA	
15:00-15:20	BEN Ammar Ben Khadda	Effect of curing methods on the mechanical strength and durability of prefabricated concretes intended for Alger maritime quay
15:20-15:40	Massimo Rogante	Neutron beam analysis of aging and creep processes in materials and parts from decommissioning of nuclear facilities
15:40-16:00	Reza Abolhassani, Fateme Mirsafi, Horst-Günter Rubahn, Yogendra Kumar Mishra	Tetrapods based Smart Materials for Advanced Technologies
16:00-16:20	Mourad Keddam	Growth of Iron Diboride Layer on SAE 1020 Steel by Four Approaches
16:20-16:40	Najran Mohammed Nasser Hosrom, Atilla Evcin	Hydrophobic Coating with Sol-gel Technique On Titanium Metal Substrate
16:40-17:00	Mürsel Ekrem	Hava Araçlarında Kullanılan Hibrit Takviyeli Epoksi Kompozitlerin Üretimi ve Mekanik Özellikleri
17:00-17:20	Lemiye Atabek	Doğal ve Sentetik Fiber Takviyeli Polimer Kompozitlerin Kuru Kayma Koşullarında Aşınma Oranı ve Sürtünme Katsayısı Arasındaki İlişkinin Belirlenmesi
17:20-17:40	Nada Alloush, Atilla Evcin	Coating of TiO2 Doped Hydroxyapatite on Ti6Al4V Alloy with HVOF Technique
17:40	POSTER SECTION	

SCIENTIFIC PROGRAMME FOR ISC'21

09 OCTOBER 2021 Saturday

	Session Chair :	
10:00-10:30	Invited Speaker 4 Prof. Dr. Burç MISIRLIOĞLU	
10.30-11.00	Invited Speaker 5 Doç. Dr. Fayaz HUSSAIN	
11:00-11:10	Enjila Irfan, Areeba Alam, Hafsa Shafi, Afifa Baqai	Manufacturing of Cocoon Planter Using Indigenous Recyclable Material
11:10-11:20	Muhammmad Abdul Hai, Shaheer Siddiqui, Kamran Khalid, Hammad Siddiqui	Systematic Reduction of Casting Defects with the Help of Modeling and Simulation
11:20-11:30	M. Saad Khan, Usama Khan, Ahazam Ansari, Tayyab Azad Khan	Design and development of supercritical Drying system (SCD) for Silica Aerogel production
11:30-11:40	M.Hassan Bin Shaukat, S.M AbuTalib Zaidi, M.Shariq Hasnain	Joining and Analyzing the Effect of TİG And FS-Welding on Nonferrous Alloys
	BREAK	
	Session Chair :	
	Authors	Title
13:10-13:30	Brahim Boumaali	Simulation of boriding kinetics of AISI T 1 steel by integral model
13:30-13:40	Hafiz Muhammed Bilal Hussain, Muhammed Sami Khan, Ebad Hassan Khan	Design and Development of Green Composites Using Natural Fibers
13:40-13:50	Hamna Siddiqui, Syed Usama Athar, Arsal Sohai, Asad Raza	Design of Experiments (DOE) for the Development of Green Tyre Tread by Reducing Carbon with Eco-Friendly Filler
13:50-14:00	Syeda Sabika Fatima, Faaz Ahmed Khan, Muhammad Ahmed Raza, Muhammad Usman	Design & Development Of Ceramics For Thermopower Applications
14:00-14:20	Salih Veziroğlu, Cenk Aktas, Franz Faupel	Photocatalytic deposition of hierarchical structures
	BREAK	
	Session Chair :	
	Authors	Title
14:30-14:50	Beyza Kasal, Ertancan Babaç, Yasemin Tabak, Bayise Kavaklı Vatansever, Ayşen Kılıç, Metin Usta	Fonksiyonel Derecelendirilmiş Silisyum Nitrür Esaslı Seramiklerin Üretiminde Farklı Soğuk İzostatik Basınçlarının Etkisinin İncelenmesi
14:50-15:10	İbrahim Güneş	Investigation of Corrosion Behaviour of Construction Steels in Hydrochloric Acid
15:10-15:30	Sabire Duman, Erman Duman	İnek Sütünden Elde Edilen Kaymak ve Yağının Karakterizasyonu
15:30-15:50	Çetin Öztürk	Kubbe-i Hadra Restorasyon Çinilerinin Karakterizasyonu
	BREAK	
	Session Chair :	
	Authors	Title
16:00-16:20	İbrahim Güneş	Ti-6Al-4V Alaşımının Plazma Pasta Borlanması
16:20-16:40	Redouane Chegroune, Mourad Keddam, İbrahim Güneş, Atila Gürhan Çelik	Plasma Paste Boriding oF Pure Titanium
16:40-17:00	İbrahim Güneş	Investigation of Corrosion Behaviour of S500 Steel
17:00-17:20	Cansu Kurtuluş, Mustafa Serhat Başpınar	Fly Ash Based Foam Geopolymers with Improved Drying Shrinkage Properties
17:20-17:40	Recep Kurtukuş, Cansu Kurtuluş, Hakan Ciftçi, Taner Kavas	The impact of particle size on physical and mechanical properties in waste-derived glass foams
17:40	POSTER SECTION	

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Characterising the potential of phthalocyanines for photodynamic therapy

Fabienne Dumoulin [1*]

[1] Acıbadem Üniversity, Medical Engineering Department, Turkey

The fascinating properties of phthalocyanines made them useful in a full range of applications, either for environmental, energy-related and also biomedical applications. Their maximum absorption makes them particularly interesting as photosensitisers for photodynamic therapy because it matches the phototherapeutic window, allowing excitation at wavelengths that do not excite endogeneous chromophores and also deeper tissue penetration of the light.

After an introduction on the general use of phthalocyanines in various applications, we'll focus on their characterization as photosensitisers for photodynamic therapy.

Keywords : Photodynamic therapy, Phthalocyanines, Photosensitisers

* Fabienne.Dumoulin@acibadem.edu.tr / dumoulin.fabienne@gmail.com

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INVESTIGATION OF GREEN COMPRESSION STRENGTH AND GREEN SHEAR STRENGTH IN GREEN SAND MOULD USING ANT HILL SLIT AS A PARTIAL REPLACEMENT OF FOUNDRY SAND USING RESPONSE SURFACE METHODOLOGY

Prasad Chandran N [1], Manoj D. Naik [2], Manjunath Patel GC [3], Avinash Lakshmikanthan [4], Ganesh R. Chate [2]

[1] Department of Mechanical Engineering, Sahyadri College of Engineering and Management, Manglore 590006, Visvesvaraya Technological University, Belagavi 590018, India

[2] Department of Mechanical Engineering, KLS Gogte Institute of Technology, Belagavi 590006, Visvesvaraya Technological University, Belagavi 590018, India

[3] Department of Mechanical Engineering, PES Institute of Technology and Management, Shivamoga, Visvesvaraya Technological University, Belagavi 590018, India.

[4] Department of Mechanical Engineering, Nitte Meenakshi Institute of Technology,Bengaluru, Visvesvaraya Technological University, Belagavi 590018, India.

Abstract

In sand casting foundry, quality of sand mould is very important to get a high-quality casting. The present work is focussed on partial replacement of foundry sand by Ant hill clay (slit) and also to get good sand mould properties which in turn will give defect free castings. The, responses such as green compression strength (GCS), green shear strength (GSS), mould hardness number and permeability were studied. The factors considered for experimentation were Ant hill to Sand ratio (Ant hill quantity in terms of Percentage weight of sand), number of strokes, water quantity and coal dust. Experiments were carried out using central composite design of response surface methodology which is a part of Design of Experiments. Two replicates were done and also randomization and blocking is implemented during experimentation. The optimization is carried out to maximise GCS, Green Shear Stregth. The multi-objective optimization is done to get a same settings for both GCS and GSS.Thus obtained settings of factors were not there in experimental desig matrix, hence the confirmation tests wereconducted. The five confirmation test were carried out and the average Green Compression stregth was 1502gms/cm^2, the optimum level of GSS average valve of Green Shear Shtregth was 356gm/cm2 because of the conflection requirements of both GCS and GSS, multi objectives optimization is done by using discribable function approach and level for this average values 1373 gms/cm^2 and 335gms/cm^2.From optimized levels, 15% of sand can be replaced with ant hill clay without the need of bentonite.

Keywords: Sand Casting, Cental Composite Design, Ant Hill Slit, Green Compression Strength, Design of Experiments, Optimization.

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BUCKLING ANALYSIS OF AXIALLY LOADED NANOBEAMS RESTING ON A ROTATIONAL ELASTIC FOUNDATION

Svetlana Lilkova-Markova [1]*, Dimitar Lolov [2]

[1] University of Architecture, Civil Engineering and Geodesy, Faculty of Hydraulic Engineering, Departmant of Technical Mechanics, Sofia, Bulgaria

[2] University of Architecture, Civil Engineering and Geodesy, Faculty of Hydraulic Engineering, Departmant of Technical mechanics, Sofia, Bulgaria

Abstract

A nanobeam with a static scheme of a simply supported beam was investigated. It rests along its entire length on a rotary elastic foundation. The cross section of the nanobeam is circular. The nanobeam is loaded axially with a compressive force. The nonlocal theory of elasticity is applied. A parametric study was performed to obtain the buckling force for different values of the radius of the cross section and the rigidity of the rotational foundation.

Keywords: Nanobeam, Nonlocal Theory, Buckling Force, Rotational Elastic Foundation.

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TENSILE CHARACTERIZATION OF GLASS FIBER REINFORCED COMPOSITE MATERIALS WITH STRAIN GAUGE AND VIRTUAL EXTENSOMETER

Muhsin Alçı [1*], Recep Güneş [2]

[1] Niğde Ömer Halisdemir Üniversitesi Makine Mühendisliği Bölümü, Niğde, Türkiye

[2] Erciyes Üniversitesi Makine Mühendisliği Bölümü, Kayseri, Türkiye

Abstract

Fiber-reinforced composite (FRC) materials have become the indispensable basic materials of many industries due to their low weight and high strength today. As a result, intensive studies are carried out on the characterization of these materials and the development of material models. FRC materials are subjected to many characterization tests for different material models developed due to their anisotropic structures. The most basic of these are tensile tests. In order to determine the deformation in tensile tests, strain gauges specially produced for FRC materials are generally used. The use of strain gauges can be quite laborious and expensive in characterization studies. Although strain gauges are essential for some application areas, the measurement of strain with the Digital Image Correlation (DIC) method is becoming widespread for tests that can be imaged with the help of a camera today. In the DIC method, measurements can be made on uneven surfaces by taking images with more than one camera at the same time (stereo cameras) by calibrating the cameras. However, since a flat surface can be obtained on the composite in the tensile test, accurate results can be obtained by positioning a single camera directly opposite the measurement surface. In this study; Tensile tests of glass fiber reinforced composites produced by vacuum assisted resin infusion method was carried out according to ASTM D3039 tensile test standard, both with the help of strain gauges and with the help of virtual extensometer using DIC method with a single camera. The results show that a virtual extensometer can be used instead of a strain gauge in tensile tests of fiber-reinforced composites.

Keywords : Fiber Reinforced Composites, Tensile Characterization, Strain Gauges, Virtual Extensometers

* Corresponding Author e-mail : muhsinalci@erciyes.edu.tr

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EFFECT OF CURING METHODS ON THE MECHANICAL STRENGTH AND DURABILITY OF PREFABRICATED CONCRETES INTENDED FOR ALGER MARITIME QUAY

Ben Ammar Ben Khadda [1]

[1] Mohamed Khider University, Civil and Hydraulic Engineering Department, Biskra, Algeria

Abstract

Sustainability nowadays occupies a decisive position in the new European normative context on concrete and which requires an effective control of all the factors likely to affect its behavior over time. The influence of atmospheric curing methods by solar energy on the mechanical strength for prefabricated concrete elements Intended for maritime quay was investigated. An experimental program was carried out to study in parallel the effect of water/cement ratio (0.4, 0.5 and 0.6), the influence of cement type and the influence of curing methods (four methods of curing were used: water curing, air curing, steam curing at 29°C and steam curing at 45°C) on the compressive strength of samples concrete. Six similar formulations of workability are made from ordinary Portland cement (CEM I 42.5) and a compound cement (CEM II/B 42.5), three of each type are studied. The results obtained demonstrate the beneficial effect of a steam curing procedure to achieve high compression, especially in the early curing ages, and that these concrete at all ages are durable and protected from any degradation.

Keywords : Concrete , Curing Methods, Solar Energy, Mechanical Strength, Durability.

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NEUTRON BEAM ANALYSIS OF AGING AND CREEP PROCESSES IN MATERIALS AND PARTS FROM DECOMMISSIONING OF NUCLEAR FACILITIES

Massimo Rogante [1*]

[1] Studio D'ingegneria Rogante, Contrada San Michele, n. 61 62012 Civitanova Marche (MC) Italy

Abstract

Lifetime extension and safety conditions of a Nuclear Facility (NF) are key issues and a deep knowledge of the ageing and creep processes related to the involved materials is fundamental to guarantee high levels of reliability and to deal with severe natural and plant–centred occurrences. The investigations conventionally used in this case, including non-destructive techniques (NDT) and in-service inspections required by the codes, can present a lack of information. The data obtained, therefore, need to be complemented.

NFs decommissioning is an important opportunity to get materials and parts submitted for various years to ageing and degradation, allowing new diagnostic activities helpful to suggest eventual additional measures for the installation of new components or in planning a postponed decommissioning, in order to enhance dependability and safety.

Neutron beam techniques (NBT) have lately become a progressively more helpful support in the non–destructive and non-invasive characterisation of industrial materials and parts of nuclear/traditional interests, and there are positive recommendations to use neutron methods for reactor materials' control. Applications of neutron-based methods, furthermore, have been developed in a variety of new sectors.

In this paper, ageing processes occurring in the NFs field are briefly introduced as well as a short description of some examples of applications. The obtainable results, associated with knowledge of nature and features of materials' damages, assist to understand the trends of materials fracture and evaluate a latent picture of preliminary degradation processes leading to any fast crash of material, including eventual period of inoperability prior to the NF decommissioning.

Keywords : Neutron Beam, Nuclear Facilities.

* Corresponding Author e-mail : info@roganteengineering.it

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TETRAPODS BASED SMART MATERIALS FOR ADVANCED TECHNOLOGIES

Reza Abolhassani [1], Fateme Mirsafi [1], Horst-Günter Rubahn [1], Yogendra Kumar Mishra [1]

[1] Smart Materials, NanoSYD, Mads Clausen Institute,

[1] University of Southern Denmark, Alsion 2, 6400, Sønderborg, DENMARK

Abstract

Considering the size dependent utilization complexities of nanoscopic dimensions towards real applications, the focus of nanomaterials community is merging to three-dimensional (3D) form of materials which are built out interconnected nanostructures. This talk will briefly introduce the importance of complex shaped nanostructures towards smart 3D nanomaterials structuring. A simple flame based single step approach was developed for synthesizing zinc oxide tetrapods which demonstrated many applications in different technologies. These tetrapods have been used as building blocks to construct highly porous interconnected 3D nanonetworks in form of flexible ceramics which offer further new application avenues. Additionally, these 3D networks have been utilized as sacrificial templates to develop hollow tetrapodal 3D networks from almost any desired material, carbons, nitrides, oxides, polymers, hydrogels, etc. The sacrificial template-based strategy offers new and unique opportunities in the direction of 3D nanomaterials engineering and accordingly advanced technological applications. Some examples of 3D nanomaterials engineering will be demonstrated alongwith their applications [1-10]. The scopes of 3D nanostructuring based smart materials in sensing, electronics, optoelectronics, energy, and biomedical engineering will be briefly highlighted in the talk.

Keywords: Smart materials; Tetrapods, Hybrid Nanomaterials, Advanced Technologies

* Corresponding Author e-mail : mishra@mci.sdu.dk

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GROWTH OF IRON DIBORIDE LAYER ON SAE 1020 STEEL BY FOUR APPROACHES

Mourad Keddam [1*]

[1] University of Science and Technology Houari Boumediene, Laboratoire de Technologie des Matériaux, Bab-Ezzouar, Algiers, Algeria

Abstract

The pack-boriding kinetics of SAE 1020 steel has been studied through utilizing four mathematical approaches in case of the formation of iron diboride layers. For each model, the values of boron diffusivity in Fe_2B in the range of 850 to 950°C with incubation times included. Finally, the models were put to the test by comparing the predicted results to the simulated values of Fe_2B layer thickness determined at 925°C for 6 hours.

Keywords : Boriding, Iron Diboride, Kinetics, Activation Energy, Diffusion Models.

* Corresponding Author e-mail : keddam@yahoo.fr

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HYDROPHOBIC COATING WITH SOL-GEL TECHNIQUE ON TITANIUM METAL SUBSRATE

Najran Mohammed Nasser Hosrom [1*] , Atilla Evcin[2]

[1] 22 may street apt:1 No:5 Amran, Yemen

[2] Afyon Kocatepe University, Materials Science and Engineering Department, Afyonkarahisar, Turkey

Abstract

The wettability of solid surfaces is an important topic in material science and fundamental research. Because of their numerous potential applications, intensive research have been done in recent years. The sol-gel process is an extensively used method to prepare the various coating and films because it has a many advantage according to other film formation methods, such as low temperature processing, easy coating of large surfaces, good adhesion ability to surface of film or coating, homogeneous oxide film formation, and adjustment of film composition and porosity. In this study, it was tried to create a hydrophobic coating on Ti (titanium) metal substrate with Sol-gel technique. In the preparation of the coating solution, tetraethoxy silane - TEOS (C8 H20 O4 Si), Ethanol (C2 H6 0), Purified water, Nitric Acid (HNO3) were used. Coating solution was applied on metal surface by dip coating method. Scanning electron microscope (SEM LEO 1430 VP model) was used to examine the microstructure of the obtained products. Attention ThetaLite 101 contact angle measuring device was used to determine the wetting properties of the prepared nanocomposite surfaces.

Keywords : Coating, Sol-gel, Contact Angle

* Corresponding Author e-mail : najranmh@gmail.com

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HAVA ARAÇLARINDA KULLANILAN HİBRİT TAKVİYELİ EPOKSİ KOMPOZİTLERİN ÜRETİMİ VE MEKANİK ÖZELLİKLERİ

Mürsel Ekrem [1*]

[1] Necmettin Erbakan Üniversite, Makine Mühendisliği Bölüm, Konya, Türkiye

Özet

Bu çalışmada, ağırlıkça % 0.25 Çok Cidarlı Karbon Nanotüp (ÇCKNT) ile ağırlıkça farklı oranlarda (% 0.25, 0.5 ve 0.75) nanoSiO_2 parçacıklı epoksi esaslı nanokompozitlerin üretimi ve mekanik özellikleri incelenmiştir. ASTM D638-10 standardına göre üretimi yapılan epoksi esaslı hibrid nanokompozitlerin çekme numuneleri sabit çekme hızında çekme testine tabi tutulmuştur. Modifiye edilmiş epoksi hibrid nanokompozitlerin maksimum yükleri, çekme dayanımları, elastiklik modülleri, toklukları ve birim şekil değiştirme değerleri hesaplanmış olup, bu testin sonucunda bu özellikler epoksi numuneyle kıyaslanmıştır. Referans numune ile ağırlıkça % 0.25 oranındaki ÇCKNT ve ağırlıkça % 0.5 oranındaki nanoSiO_2 parçacık takviyeli nanokompozitin maksimum yükleri sırasıyla 1730 N ve 1875 N olup, 0.25CNT+0.5 nanoSiO_2 epoksi esaslı kompozit % 8 oranında artış gözlemlenmiştir.

Anahtar Kelimeler: Çekme Dayanımı, Epoksi Nanokompozitler, MWCNT, Nano SiO_2.

* İlgili yazar e-posta: mekrem25@hotmail.com

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DOĞAL VE SENTETİK FİBER TAKVİYELİ POLİMER KOMPOZİTLERİN KURU KAYMA KOŞULLARINDA AŞINMA ORANI VE SÜRTÜNME KATSAYISI ARASINDAKİ İLİŞKİNİN BELİRLENMESİ

Lemiye Atabek Savaş [1]*

[1] Erciyes Üniversitesi, Malzeme Bilimi ve Mühendisliği Bölümü, Kayseri, Türkiye

Özet

Bu çalışmada yüksek-yoğunluklu polietilen (HDPE) matrisli karbon, bazalt ve kokonat fiber takviyeli (%10 ve %30) kompozitlerin kayma aşınma davranışları incelenmiş olup, aşınma oranları ile sürtünme katsayıları arasındaki ilişki araştırılmıştır. Kompozitler ergiyik harmanlama yöntemi ile üretilmiş, uyumlaştırıcı olarak maleik anhidrit-aşılı polietilen (PE-g-MA) kullanılmıştır. Ek olarak kokonat fiberlerin matris malzemesi ile karışabilirliğini bir adım daha artırmak için sodyum hidroksit (NaOH) çözeltisi içinde alkali yüzey işlemi uygulanmıştır. Aşınma testleri özel üretim bir ball-on-disk tribometresi kullanılarak kuru kayma şartlarında, 5 N normal yük ve 1100 dev/dak kayma hızında açık atmosfer koşullarında tamamlanmıştır. Yapılan tribo-testler sonucunda, kullanılan tüm bileşimlerdeki kompozitlerin sürtünme katsayılarının saf HDPE'den yüksek olduğu tespit edilmiştir. En düşük sürtünme katsayısına 0,121 ile saf HDPE'de ulaşılmıştır. %30 bazalt fiber içeren HD-BF30 numunesi 0,303 ile en yüksek sürtünme katsayısı değerini vermiştir. Aşınma oranı her bir fiber için konsantrasyon ile artış eğilimindedir. Karbon fiber takviyeli kompozitler saf polimerden yüksek sürtünme katsayısına sahip olsa da yüksek rijitliğinden dolayı daha yüksek aşınma direnci sergilemişlerdir. En düşük aşınma oranına 64×10-6 (mm3 N-1m-1) ile %10 karbon fiber içeren kompozitte ulaşılmıştır. Kokonat fiber takviyeli kompozitler karbondan sonra ikinci en yüksek aşınma direncine sahip kompozitler olup, aynı konsantrasyonda bazalt fiberden daha yüksek aşınma direnci göstermişlerdir. En yüksek aşınma oranı 177×10-6 (mm3 N-1m-1) ile %30 bazalt fiber içeren kompozitte görülmüştür. Sonuç olarak karşılaştırılan fiberler içerisinde karbon fiberin düşük sürtünme ve yüksek aşınma direnci anlamında diğer fiberlere göre üstün olduğu bulunmuştur. Fiber tipine göre sürtünme katsayısı ve aşınma oranı değerleri değişkenlik gösterebilmektedir.

Anahtar Kelimeler : Yüksek-Yoğunluklu Polietilen, Karbon Fiber, Bazalt Fiber, Kokonat Fiber, Aşınma Oranı, Sürtünme Katsayısı.

* İlgili yazar e-posta : atabekl@erciyes.edu.tr

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SELF-CLEANING OF HYDROPHOBIC SURFACES

Abdullah Alawadhi [1*] , Atilla Evcin [2]

[1] Sana'a, Yemen

[2] Afyon Kocatepe University, Materials Science and Engineering Department, Afyonkarahisar, Turkey

Abstract

In Greek, "hydro" means "water", "phobos" means "fear" and "philia" means "friendship". Afraid of hydrophobic water, that does not like water; hydrophilic means friends with water, that is, loves water. These surfaces are named according to the angle of contact they make with the water. Superhydrophobic means water-hating, superhydrophilic means water-loving. If the water droplet spreads completely on the surfaces, it is superhydrophilic; If the droplet is spherical on the surface and its angle with the surface is greater than 150° and approaching 180°, they are called superhydrophobic surfaces. The "Water Repellent" coating on the surface is called hydrophobic coating. Thus, it creates problems in using and cleaning the materials as clear. In this study, ceramic tile was coated with a silicone compound. An organic–inorganic molecular hybrid compound was firstly prepared by the mixing of silicone rubber-salts-silane coupling agent. Prepared mixture was coated on a clean ceramic tile by a film applicator. After samples were characterized by scanning electron microscope (SEM) and Contact Angle Goniometer. Superhydrophobic surface was obtained Zn stearate doped modified silanes.

Keywords : Silicone, Superhydrophobic, Contact angle.

* Corresponding Author e-mail : al3wadhiabdullah@gmail.com

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COATING OF TIO2 DOPED HYDROXYAPATITE ON TI6AL4V ALLOY WITH HVOF TECHNIQUE

Nada Alloush [1*], Atilla Evcin [2]

[1] Idlib, Suriye

[2] Afyon Kocatepe University, Materials Science and Engineering Department, Afyonkarahisar, Turkey

Abstract

Hydroxyapatite is a calcium salt found in bone and teeth with the chemical formula Ca10(PO4)6(OH)2. It forms the inorganic part of the bone structure. Calcium phosphate based HA is used as a bioceramic material due to its biocompatibility, as artificial bone, in the manufacture of various prostheses, in the repair of broken and cracked bones, and in the coating of metallic biomaterials. Traditionally, the use of titanium has been concentrated in the aircraft, space and marine industries. The metal's durability and rigid structure, low specific gravity and relative lightness, resistance to high temperatures and resistance to corrosion have led to its widespread use in these special areas. In recent years, there has been a significant increase in the medical and dental applications of titanium and titanium alloys. In this study, Hydroxyapatite containing 1, 2 and 3% TiO2 powder was coated on the Ti alloy by the High Velocity Oxy Fuel (HVOF) method. The coatings were characterized in terms of their contact-opening and morphological properties.

Keywords : Coating, Sol-gel, Contact Angle, Ti6Al4V

* Corresponding Author e-mail : nada.alloush97@gmail.com

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MANUFACTURING OF COCOON PLANTER USING INDEGENIOUS RECYCLABLE MATERIAL

Enjila Irfan [1], Areeba Alam [1], Hafsa Shafi [1], Afifa Baqai [1]

[1] Materials Engineering Department, NED Universitty of Engineering an Technology

Abstract

"Cocoon planter" is a water-efficient technology that helps trees to survive with little irrigation even in desert-like climates. It provides a safe shelter from the harsh surrounding environment and an adequate water for irrigation of first critical year of tree. Cocoon Planter is basically an Innovative technologies of planting and foresting to people living in arid and semi-arid climates. In our Cocoon Planter we aren't using the standard materials that are being used until now by Land Life and Groasis Companies. Instead we are using an indigenous material that are available in Pakistan to make the Cocoon Planter.

Keywords : Cocoon Planter, Water-Efficient Technology, Recycle

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SYSTEMATIC REDUCTION OF CASTING DEFECTS WITH THE HELP OF MODELING AND SIMULATION

Muhammmad Abdul Hai [1], Shaheer Siddiqui [1], Kamran Khalid [1], Hammad Siddiqui [1]

[1] NED University Of Engineering and Technology, Materials Engineering Department

Abstract

Sand casting, also known as sand molded casting, is a metal casting process characterized by using sand as the mold material. Over 60% of all metal castings are produced via sand casting process. Modeling refers to creation of a 3d model using a CAD software. It is then exported to a CAE software for Simulation or to a CAM software for manufactur-ing. Simulation is the imitation of a situation or process on a CAE Soft-ware. It is used for the purpose of thermal analysis, removing defects, optimization etc. It includes designing a 3d model on a CAD software, exporting it to a CAE software for simulation, filling in the parameters, and observing the results.

Keywords : Sand Casting, Metal Casting, Cad

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DESIGN AND DEVELOPMENT OF SUPERCRITICAL DRYING SYSTEM (SCD) FOR SILICA AEROGEL PRODUCTION

[1] M.Saad Khan, [1] Usama Khan, [1] Ahazam Ansari, [1] Tayyab Azad Khan

[1] Ned University of Engineering and Technology Karachi Department of Materials Engineering

Abstract

Aerogels belongs to an innovative class of advanced materials with applications ranging from heat transfer to fluid separation processes. This research study focuses on the development of a Super critical drying (SCD) systems which is an integral part to produce fine quality aerogels. A typical SCD system consists of a high pressure chamber (up to 100bar) with temperature range of 50°C. After research and the group has completed the procurement of the SCD parts, and assembly of the system[2]. This SCD system was designed and developed and the synthesis of Silica aerogel was performed by using different organic chemicals i.e TMOS, Methanol, Ammonium Hydroxide. The study aims at synthesis of silica-based aerogels using phase one SCD system and got the final product which is Silica Aerogel. [2] The silica aerogel is characterized by using Scanning Electron Microscopy, X-ray Diffraction and Fourier Transfrom Infrared Spectroscopy to conclude the final product which is Silica Aerogel.

Keywords: Silica Aerogel, Advanced Materials, Super Critical Drying

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JOINING AND ANALYSING THE EFFECT OF TIG AND FS-WELDING ON NONFERROUS ALLOYS

M.Hassan Bin Shaukat [1], S.M AbuTalib Zaidi [1], M.Shariq Hasnain [1]

[1] Ned University of Engineering and Technology Karachi, Department of Materials Engineering

Abstract

Joining is a fundamental manufacturing process that is essential for making any assembly such that jet plane could never be possible to form in a single piece.In joining category, welding class has strongest and permanent joint moreover welding result in changing metallurgical, mechanical and physical properties in weld and near weld region. In the current research, TIG welding is applied to overcome welding problems in nonferrous alloys whereas FSW welding is adopted to replace fusion (TIG) welding because of various metallurgical, environmental and mechanical strength disadvantages occurred in fusion welding.

Keywords : TIG welding, FS-Welding, Nonferrous Alloys

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SIMULATION OF BORIDING KINETICS OF AISI T 1 STEEL BY INTEGRAL MODEL

Brahim Boumaalı [1*]

[1] University of Science and Technology Houari Boumediene, Laboratoire de Technologie des Matériaux, Bab-Ezzouar, Algiers, Algeria

Abstract

AISI T1 steel was hardened by the solid boriding process in the temperature range 1123-1273K, for a period of 2 to 8 hours. A kinetic model, based on the integral method, was applied to the growth of a single boride (Fe2B) layer on the surface of AISI T1 steel. The activation energy for the diffusion of boron in AISI T1 steel was estimated at 213.03 kJ mol-1 and a comparison was made with other values available in the literature. A satisfactory concordance has been observed when comparing the experimental values of Fe2B layers' thicknesses with the predicted results. This diffusion model has been validated experimentally by considering two additional boriding conditions.

Keywords : Boriding, AISI T1 Steel, Integral Model

* Corresponding Author e-mail : brahimboumaali@yahoo.com

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DESIGN AND DEVELOPMENT OF GREEN COMPOSITES USING NATURAL FIBERS

Hafiz Muhammed Bilal Hussain [1], Muhamed Sami Khan [1], Ebad Hassan Khan [1]

[1] Ned University of Engineering & Technology Department of Materials Engineering

Abstract

Green composites are basically sustainable composites materials that are combination of Natural Fibers and Natural resins. Importance of these materials is biodegradability, use of natural material and strength, due to these characteristics they have gained a lot of importance in the field of Materials engineering. The overview of the project is as follows; To Develop a fiber reinforced green composite having gelatin matrix reinforced with natural fibers (include coconut, banana and sugar cane). To Compare the mechanical properties of different fibers reinforcement in a similar matrix. To Compare the effect of fiber length (different Grades of Fibers) on mechanical properties of a similar material in same matrix. Fibers were collected from the warehouse and then shredded and boiled in hot water in order to remove contamination. Banana & Sugarcane fibers are rich in sugar so their boiling is mandatory to remove the juicy liquid from them. After boiling in hot water for half an hour they were filtered and then dried in air for five days. After complete drying they were subjected to grinding to obtain a workable size of them to proceed further for composite making. According to the given composition matrix was prepared and then fibers are embedded in mold and samples are prepared through hand layup process.

Keywords : Green Composites, Natural Fibers, Natural Resins, Biodegradability

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DESIGN OF EXPERIMENTS (DOE) FOR THE DEVELOPMENT OF GREEN TYRE TREAD BY REDUCING CARBON WITH ECO-FRIENDLY FILLER

Hamna Siddiqui [1], Syed Usama Athar [1], Arsal Sohal [1], Asad Raza [1]

[1] Ned University of Engineering and Technology Materials Engineering Department

Abstract

Design of experiments(DOE) is defined as a branch of applied statistics that deals with planning, conducting, analyzing, and interpreting controlled tests to evaluate the factors that control the value of a parameter or group of parameters. DOE is a powerful data collection and analysis tool that can be used in a variety of experimental situations. DOE is suitable for a condition where more than one in put factors are suspected of influencing the output. For instance it maybe desirable to understand the effect of binder and pigment on the adhesion of paints. Or one want to analyze the effect of temperature, pressure and alloying elements on a steel alloy. Or the one is evaluating the tire performance on the basis of various factors in the recipe. So precisely it is applicable for all the industries dealing with recipes for the product development. Through DOE, you can deal with even up to 6 or 8 factors of that particular recipe. It is a one time effort approach resulting in the production to be tim effective, free of vaining raw materials, efficient, as results compiled on the basis of equations/designed models. From the obtained results it can be analyzed that the motive which is to minimize the rolling resistance yet with better traction has been achieved throgh DOE based investigation, Thus an healthy eco-system can be established with lowest amounts of fuel consumption.

Keywords : DOE (Desing of Experiments), Carbon Reducing, Eco-Friendly

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DESIGN & DEVELOPMENT OF CERAMICS FOR THERMOPOWER APPLICATIONS

Syeda Sabika Fatima [1], Faaz Ahmed Khan [1], Muhammad Ahmed Raza [1], Muhammad Usman [1]

[1] Ned University Of Engineering And Technology Department Of Materials Engıneering

Abstract

Strontium titanate(STO) ceramics were synthesized by solid state sintering using strontium carbonate and titanium dioxide. The samples were doped with bismuth oxide and iron oxide in different proportions. Compound to be formed as thermoelectric ceramic consist of SrBiTiFeO3. With the help of this project we learned that how thermoelectricmaterial ceramics can be of great importance other than their high temperature and corrosion resistance properties.

Keywords: Strontium Titanate, Thermoelectric Ceramic,

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PHOTOCATALYTIC DEPOSITION OF HIERARCHICAL STRUCTURES

Salih Veziroglu [1*], Cenk Aktas [1], Franz Faupel [1]

[1] Chair for Multicomponent Materials, Institute of Materials Science, Kiel University, 24143 Kiel, Germany

Abstract

Noble metal (Au, Ag, and Pt, etc.) hierarchical structures have been received remarkable attention during the last decades, due to their special shape, high surface area, electronic, and catalytic properties. Especially, the incorporation of these hierarchical structures with wide-bandgap metal oxide semiconductors such as titanium oxide (TiO_2) and zinc oxide (ZnO) has been shown many times for various applications such as photocatalysis [1,2], water splitting, self-cleaning[3], biomolecular detection, sensor applications, and so on. There are various studies about the synthesis of hierarchical structures with well-defined size and morphology in the literature. However, it is still a challenge to achieve good adhesion between hierarchical structures and metal oxide surfaces, especially with TiO_2 thin film. Therefore, some approaches (seed-mediated growth, etc.) have been published to enhance the adhesion of metallic hierarchical structures on TiO_2 thin film by using some binder molecules (thiols and silanes, etc.). Mostly organic molecules are used for binding metallic hierarchical structures with a solid substrate. However, these may decrease the surface conductivity and contaminate the surface which affects the performance of the hierarchical structures. Similarly, electrodeposition methods can also be used to prepare metallic hierarchical structures on solid substrates. But the electrodeposition process is only applied on the conductive substrate such as indium tin oxide (ITO). Therefore, there is a need to prepare stable Au or Ag hierarchical structures on TiO_2 thin films without using any organic molecules (binders) or a conductive electrode. Here, we demonstrated a novel photocatalytic deposition approach for preparing Au and Ag hierarchical structures on TiO_2 thin film surface by UV illumination with strong chemical adhesion for wide-range applications such as photocatalytic degradation of organic contaminants, self-cleaning and oil-water separation. This method allows the controlling the geometry, size, and distribution of such Au and Ag hierarchical structures on TiO_2 thin film by simply changing the deposition solution, photocatalytic activity of metal oxide, UV illumination intensity, and time.

Keywords: Hierarchical, Metallic and Bimetallic Structures, Photocatalytic Deposition, TiO_2 Thin Film

* Corresponding Author e-mail : sve@tf.uni-kiel.de

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WO_3 VE TEO_2 İLAVESİNİN BAZALT CAMLARININ RADYASYON ZIRHLAMA ÖZELLİKLERİ ÜZERİNDEKİ ETKİLERİ

Bilgehan Güven [1*], Ediz Ercenk [1], Şenol Yılmaz [1]

[1] Sakarya Üniversitesi, Mühendislik Fakültesi, Metalurji ve Malzeme Mühendisliği Bölümü, Sakarya, Türkiye.

Özet

Bu çalışmada doğal volkanik kayaç bazalttan elde edilen camın radyasyon zırhlama uygulamalarında kullanılabilirliği araştırılmıştır. Kırma öğütme sonrası toz hale getirilen bazalt kayacına ağırlıkça % 30 WO_3 ve TeO_2 katılarak elde edilen bileşimler homojenizasyon için bilyalı değirmende karıştırma işlemine tabi tutulmuştur. Katkısız, WO_3 ve TeO_2 katkılı olarak hazırlanan 3 bileşim 1500 °C'de ergitilerek bazalt camları elde edilmiştir. Katkı maddelerinin bazalt camının radyasyon zırh kabiliyeti üzerine etkilerini incelemek amacıyla camların 276, 302, 356 ve 383 keV enerji değerlerinde lineer zayıflatma katsayıları, yarı-değer kalınlık ve ortalama serbest yol değerleri elde edilmiştir. Elde edilen değerler ele alındığında katkı maddelerinin bazalt camının radyasyon zırhlama özelliğini arttırdıkları tespit edilmiştir. Ayrıca WO_3 ilavesinin bazalt camının zırhlama kabiliyetini arttırmada TeO_2 ilavesinden daha iyi etki ettiği görülmüştür.

Anahtar Kelimeler: Bazalt, Cam, Radyasyon Zırhlama.

* İlgili yazar e-posta: bilgehanguven07@gmail.com; bilgehan.guven2@ogr.sakarya.edu.tr

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FONKSİYONEL DERECELENDİRİLMİŞ Si_3N_4 ESASLI SERAMİKLERİN ÜRETİMİNDE FARKLI SOĞUK İZOSTATİK PRES (CIP) BASINÇLARININ ETKİSİNİN İNCELENMESİ

Beyza Kasal [1,2]*, Ertancan Babaç [1,2], Yasemin Tabak [1], Bayise Kavaklı Vatansever [1], Ayşen Kılıç [1], Metin Usta [1,2]

[1]TÜBİTAK Marmara Araştırma Merkezi, Malzeme Enstitüsü, Gebze, Kocaeli, Türkiye

[2]Gebze Teknik Üniversitesi, Malzeme Bilimi ve Mühendisliği Bölümü, Gebze,Kocaeli,Türkiye

Özet

Silisyum nitrür seramikler sitotoksik olmaması, yüksek kırılma tokluğu, uzun ömürlü olması, aşınma direnci ve düşük sürünme katsayısı gibi üstün özellikleri nedeniyle biyo uygulamalarda gün geçtikçe daha fazla kullanım alanı bulmaktadır. Bu çalışmada, şerit döküm yöntemi ile biyomalzeme uygulamalarında kullanılmak üzere fonksiyonel derecelendirilmiş Si_3N_4 malzemesinin, organik bazlı süspansiyonlarının hazırlanması ve hazırlanan şeritlerin farklı soğuk izostatik pres basıncında (1000-1500-2000-2500 bar) preslenmesi hedeflenmiştir. Kullanılan hammaddelere XRD, SEM, tane boyut analizi yapılıp hazırlanan süspansiyonun zeta potansiyeli ve reolojik ölçümleri yapılmış, optimum koşullarda döküm işlemi gerçekleştirilmiştir. Yapılan deneysel çalışmada ana hammadde olan Si_3N_4'ün dışında solvent, bağlayıcı, plastikleştirici, sinterleme katkısı ve por yapıcı (grafit tozu) gibi ilaveler kullanılmıştır. Hazırlanan süspansiyonlar 18 saat karıştırılmış ve şerit döküm cihazı ile döküm yapılarak ham şeritler elde edilmiştir. Ham şeritler kurutulduktan sonra belirlenen boyutlarda kesilip 4 farklı porozite oranında (her katman 5 şerit olacak şekilde) lamine edilmiştir. Ardından üretilen silisyum nitrür şeritlerin şekillendirmesi için ise soğuk izostatik presleme (CIP) yöntemi kullanılmıştır. Şekillendirilen parçalara bağlayıcı giderme işlemi uygulanmış olup ardından hava ortamında 1500 °C'de sinterleme işlemi yapılmıştır. Sinterlenmiş olan poroz numunelerin taramalı elektron mikroskobu (SEM) ile yapılan mikroyapı analizlerinde şeritler arasındaki bağlanma, grafitin por oluşumuna etkisi, por yapısı ve dağılımı, sinterlenmenin gelişimi incelenmiştir. Sinter sonrası XRD analizi yapılarak fazlar incelenmiş olup sonuçların değerlendirmeleri yapılarak beklenen özellikleri sağlayan CIP basıncı seçilerek proses optimize edilmiştir.

Anahtar Kelimeler : Silisyum Nitrür, Fonksiyonel Derecelendirilmiş Malzeme, Şerit Döküm, Soğuk İzostatik Presleme.

* İlgili yazar e-posta: b.kasal2020@gtu.edu.tr

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KUBBE-İ HADRA RESTORASYON ÇİNİLERİNİN KARAKTERİZASYONU

Çetin Öztürk [1*]

[1] Necmettin Erbakan Üniversitesi, Geleneksel Türk Sanatları Bölümü, Konya, Türkiye

Özet

Mevlana türbesinin (Kubbe-i Hadra) dış cephe duvarlarını yaklaşık 55 yıldır süsleyen yeşil çinilerde atmosferik etkiler nedeniyle zamanla tahribatlar meydana gelmiştir. Kültür bakanlığı ve Konya Müze Müdürlüğünce oluşturulan Bilim Kurulunun Kubbe-i Hadra' da gerçekleştirdiği incelemeler neticesinde kubbede restorasyonun gerekli olduğu anlaşılmıştır. Bilim kurulu tarafından 1835 yılına ait çini örnekleri baz alınarak yenilenecek olan çinilerin geleneksel tarzda, yüksek silis (en az %85 SiO_2) içerikli, yüksek mukavemetli ve dona dayanıklı ve de örtücü turkuaz renkte üretilmesi yönünde karar vermiştir. Bu çerçevede geleneksel tarzda çini üretimi yapan firmalardan belirlenen özelliklerde çini örnekleri talep edilmiş ve üretilen çiniler üzerinde standartlar dâhilinde yapılan kimyasal ve mineralojik analizler, kimyasallara ve dona dayanım testleri ile birlikte su emme, mukavemet ve termal şok testleri ile çiniler karakterize edilmiştir. Karakterizasyon çalışmaları sonucunda genel olarak yüksek silis içerikli (>%90) çinilerin daha düşük su emmeli ve oldukça yüksek mukavemetli olduğu ve ayrıca örtücü sırla iyi pekiştiği ve sırlı yüzeyde herhangi bir sır hatası içermediği anlaşılmıştır.

Anahtar Kelimeler: Konya, Mevlana Türbesi, Restorasyon, Çini, Karakterizasyon

* İlgili yazar e-posta : cozturk@erbakan.edu.tr

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CHARACTERIZATION OF CREAM AND CREAM OILS' OBTAINED FROM COW MILK

Sabire Duman [1], Erman Duman [2]*

1 Afyonkarahisar Sağlık Bilimleri Üniversity, Health Sciences Faculty, Nutrition and Dietetic Department, Afyonkarahisar, Turkey

2 Afyon Kocatepe Üniversitesi, Engineering Faculty, Food Engineering Department, Afyonkarahisar, Turkey

Abstract

The aim of this study was to investigate the physico-chemical properties of cream and cream oil obtained from cow's milk, such as dry matter, non-fat dry matter, protein, acidity, pH, fatty acid composition, saponification number, unsaponifiable matter and sterol composition. ; As physical and chemical analysis, the amount of dry matter in cow cream was 61.72%, the amount of non-fat dry matter was 6.72%, pH values were 7.28, protein content was 4.45%, fat content was 55.0%, acidity was 1.05%. In cream oil, the free fatty acidity is 0.078% and the peroxide number is 0.55 meq-O_2 / kg, respectively. The total saturated fat content of the fatty acid content obtained from cow's milk was determined as 66.706%, and the total unsaturated fatty acid ratio was determined as 33.699%. When the fatty acid composition values of the oil obtained from cow cream were examined, it was determined that the highest value in terms of saturated fatty acids was palmitic acid and 35,547%, and when it was examined in terms of unsaturated fatty acids, the highest value was oleic acid and 26,509%. In addition, the saponification number, the number of unsaponifiable matter and the sterol composition of the fat obtained from cow cream were determined. Studies have generally focused on cow and buffalo cream, and it will fill an important gap in the literature on the characterization of cream obtained from cow's milk as a result of our research.

Keywords: Cow milks' Cream, Cream Fat, Characterization, Sterol composition.

* Corresponding Author e-mail : eduman@aku.edu.tr

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INVESTIGATION OF CORROSION BEHAVIOR OF CONSTRUCTION STEELS IN HYDROCHLORIC ACID

İbrahim Güneş [1]

[1] Giresun University, Department of Civil Engineering, Giresun, Turkey

Abstract

In this study, the corrosion behavior of construction steel in HCl solution with three different concentrations of 0.5M, 1M, 1.5M was investigated. Properties such as section losses and weight losses after the acidic effect have not been studied much. In order to fill this gap, the corrosion behavior of rebar exposed to acidic effects at different times was investigated. As a result of corrosion, it has been observed that the cross-sectional microstructures of the construction steel are corroded in the form of small cavities and pits/pitting from the outside to the inside. In addition, reduction in steel sections and decreases in yield and tensile stresses were observed.

Keywords: Construction Steel, HCl, Corrosion Behavior, Tensile stress

* Corresponding Author e-mail : ibrahim.gunes@giresun.edu.tr

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Ti-6Al-4V ALAŞIMININ PLAZMA PASTA BORLANMASI

İbrahim Güneş [1*]

[1] Giresun University, Department of Civil Engineering, Giresun, Turkey

Özet

Bu çalışmada plazma pasta borlanmış Ti-6Al-4V alaşımının yüzey özellikleri incelenmiştir. Endüstride yaygın olarak kullanılan Ti6Al4V alaşımı plazma ortamında % 80 Ar - % 20 H_2 gaz karışımda 800ºC'de 6 saat süresince 5 mbar basınç altında plazma pasta borlanmıştır. Elde edilen borür tabakaları, X-ray difraksiyon, SEM mikroyapı özellikleri incelenmiştir. X-ray analizi sonucunda Ti-6Al-4V alaşımının yüzeyinde TiB ve Ti_2B tabakalarının oluştuğu görülmüştür. Plazma pasta borlama işlemiyle geleneksel borlama yöntemlerine göre daha düşük sıcaklıklarda titanyum ve Ti6Al4V alaşımının borlanması işlemi başarıyla gerçekleştirilmiştir.

Anahtar Kelimeler: Ti-6Al-4V, Plazma Pasta Borlama, Mikroyapı, XRD,

* İlgili yazar e-posta : ibrahim.gunes@giresun.edu.tr

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PLASMA PASTE BORIDING OF PURE TITANIUM

Redouane Chegroune [1*], Mourad Keddam [1], İbrahim Güneş [2], Atila Gürhan Çelik [2]

[1] University of Science and Technology Houari Boumediene, Laboratoire de Technologie des Matériaux, Bab-Ezzouar, Algiers, Algeria

[2] Giresun University, Department of Civil Engineering, Giresun, Turkey

Abstract

In this study, the surface properties of plasma paste borided titanium with B_2O_3 paste was investigated. Boriding process of titanium, which is widely used in the industry, was carried out in a plasma environment with 80% Ar - 20% H_2 gas mixture at 800ºC for 6 hours under 5 mbar pressure. Obtained boride layers, X-ray diffraction, SEM were investigated. As a result of X-ray analysis, it was observed that TiB and Ti_2B layers were formed on the surface of titanium.

Keywords: Titanium, B_2O_3, Plasma Paste Boriding, XRD

* Corresponding Author e-mail : chegroune_redouane@yahoo.fr

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INVESTIGATION OF CORROSION BEHAVIOR OF CONSTRUCTION STEELS IN HYDROCHLORIC ACID

İbrahim Güneş [1*]

[1] Giresun University, Department of Civil Engineering, Giresun, Turkey

Abstract

In this study, the corrosion behavior of construction steel in HCl solution with three different concentrations of 0.5M, 1M, 1.5M was investigated. Properties such as section losses and weight losses after the acidic effect have not been studied much. In order to fill this gap, the corrosion behavior of rebar exposed to acidic effects at different times was investigated. As a result of corrosion, it has been observed that the cross-sectional microstructures of the construction steel are corroded in the form of small cavities and pits/pitting from the outside to the inside. In addition, reduction in steel sections and decreases in yield and tensile stresses were observed.

Keywords: Construction Steel, HCl, Corrosion Behavior, Tensile Stress

* Corresponding Author e-mail : ibrahim.gunes@giresun.edu.tr

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FLY ASH BASED FOAM GEOPOLYMERS WITH IMPROVED DRYING SHRINKAGE PROPERTIES

Cansu Kurtuluş [1*], Mustafa Serhat Başpınar [2]

[1] Afyon Kocatepe University, Materials Science and Engineering Department, Afyonkarahisar, TURKEY

[2] Afyon Kocatepe University, Metallurgy and Materials Engineering Department, Afyonkarahisar, TURKEY

Abstract

Due to the high amount of emissions caused by the cement sector recently, there is a search for alternative raw materials instead of cement in buildings. In this context, geopolymer technology, which stands out, draws attention due to the recycling of wastes. However, the difficulties encountered during production prevent geopolymers from being put on the market. With this motivation, a total of 54 different recipes were studied using fly ash raw material in order to comprehensively examine the drying shrinkage of foam geopolymers. The molarity of the composition, the amount of fly ash it contains, the perlite additive, the calcium stearate additive, and the effect of curing temperature on drying shrinkage were investigated. Drying shrinkage data ranging from 4.053 to 1.272% were obtained. Drying shrinkage values varied inversely with the amount of fly ash, calcium stearate and perlite. The curing temperature and alkali concentration increased the shrinkage values. The obtained findings were also evaluated statistically, and it was determined that the factor affecting the drying shrinkage the most was the curing temperature.

Keywords : Geopolymer, Foam, Drying Shrinkage, Composition

* Corresponding Author e-mail : cansudemir@aku.edu.tr

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THE IMPACT OF PARTICLE SIZE ON PHYSICAL AND MECHANICAL PROPERTIES IN WASTE-DERIVED GLASS FOAMS

Recep Kurtuluş [1*] , Cansu Kurtuluş [1], Hakan Çiftçi [2], Taner Kavas [1]

[1] Afyon Kocatepe University, Department of Materials Science and Engineering, Afyonkarahisar, Turkey

[2] Afyon Kocatepe University, Department of Mining Engineering, Afyonkarahisar, Turkey

Abstract

Glass foams (*GF*) possess great potential for waste valorization purposes. The foaming characteristics can be manipulated by variations in particle size (*PS*) distributions. In this study, we selected waste cathode-ray tubes (*CRTs*), glycerine (*G*), water glass (*WG*), and water (*W*) constituents with the roles of main waste, foaming agent, particle enveloping substance, and moisturizing content, respectively. Initially, the *GF* system was designed as follows: *90CRTs+2W+6WG+2W*. After that, four different particle size ranges in waste *CRTs* were chosen as (-500/+212 µm, *PS1*-coded), (-212/+125 µm, *PS2*-coded), (-125 µm, *PS3*-coded), and (-75 µm, *PS4*-coded). The *GF* pellets were prepared by weighing, mixing, and pressing stages, accordingly. The prepared pellets were then heated via a conventional electric resistance furnace under the conditions of a 5^0C. min^{-1} heating rate up to 850^0C, which were subsequently dwelled for 30 min at the peak temperature. The impact of *PS* on physical and mechanical properties was analyzed by measuring bulk density (ρ_{bulk}), estimating porosity (*EP*), and testing compressive strength (*CS*). According to the findings, the ρ_{bulk} values were equal to 599, 460, 303, and 264 kg. cm^{-3} for PS1 to PS4 samples in the respective order. Based upon the measured ρ_{bulk}, the *EP* values were found to be 78.3, 83.3, 89.1, and 90.4 percentages for PS1 to PS4 specimens, respectively. Lastly, the *CS* values revealed that decreasing *PS* caused the obtainment of diminishing resistance to mechanical failure. In conclusion, the authors deduced that waste CRTs glass can be valorized in an effective way with the aid of manipulating particle size.

Keywords : Glass Foam, CRTs, Waste Valorization, Particle Size, Sustainability

* Corresponding Author e-mail : rkurtulus@aku.edu.tr

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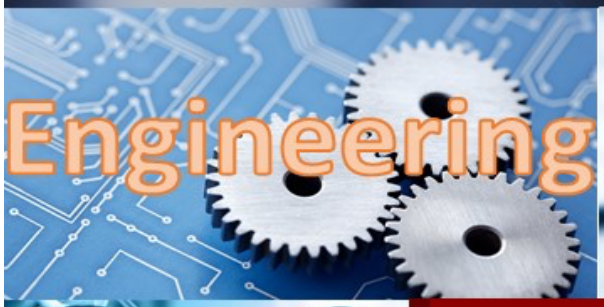

Contact

Zafer Teknopark

ANS Campus
Afyonkarahisar
/Turkey

Tel : 532 7662056

E-mail :
info@evcin.com.tr

aevcin@gmail.com

evcin@aku.edu.tr