ICKEM 2021

The 11th International Conference on Key Engineering Materials

Skoltech, Moscow, Russia | March 26-29, 2021

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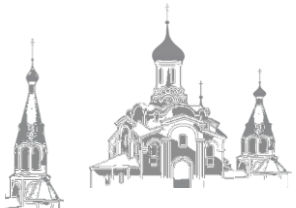
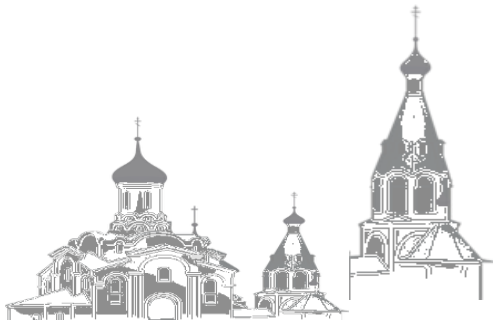
Content

Welcome

Dear distinguished delegates,

We are pleased to welcome you to the 11th International Conference on Key Engineering Materials (ICKEM 2021). Due to the severe impact of COVID-19, we have to hold the conferences online, which can not only make a smooth communication and conference holding, but also can protect everyone away from the virus.

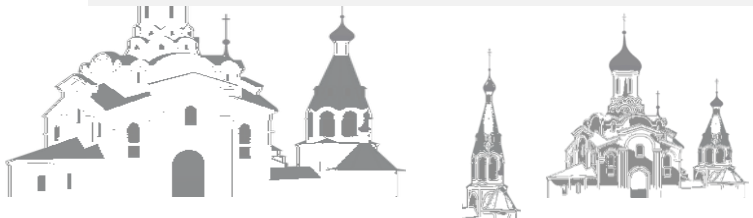
The objective of the conference is to bring together interested academics and industry experts in the field of Key Engineering Materials. The evaluation of all the papers was performed based on the reports from anonymous reviewers, who are qualified in their field. The presentations are divided into 6 parallel sessions with topics Metal Materials and Manufacturing Technology, Composite Materials and Building Materials, Material Physics and Electronic Technology, Computational materials Science and Chemical Engineering , Materials Science and Application, and Mechanical and Manufacturing Engineering.

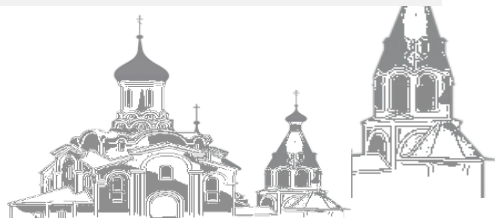
We'd like to express sincere gratitude to everyone who has contributed to this conference. A word of special welcome is given to our speakers who are pleased to share their new research ideas with us. They are Prof. Alexander Korsunsky, Trinity College, Oxford University, UK; Prof. Carsten Gachot, Vienna University of Technology, Austria; Prof. Geoffrey Mitchell, Institute Polytechnic of Leiria, Portugal and Prof. Ramirez-Castellanos Julio, Universidad Complutense, Spain. Additionally, our special thanks go to our Committee members for their excellent work in securing a substantial input of papers from all around the world and in encouraging participation.

We believe that by this conference, you can get more opportunity for further communication with attendees. We are dedicated to higher and better international conference experiences. Your suggestion and comments are always welcome. Wish you will enjoy this conference, contribute effectively toward it and take back with your knowledge, experiences, contacts and happy memories of these days.

Stay safe and be healthy! We look forward to meeting you again next time!

Conference Chair
Prof. Alexander M. Korsunsky, Trinity College, Oxford University, UK





Committee

Conference Chair

Prof. Alexander M. Korsunsky, Trinity College, Oxford University, UK

Program Chairs

Prof. Geoffrey Mitchell, Institute Polytechnic of Leiria, Portugal

Assoc. Prof. Ramirez-Castellanos Julio, Universidad Complutense, Spain

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Program Co-Chairs

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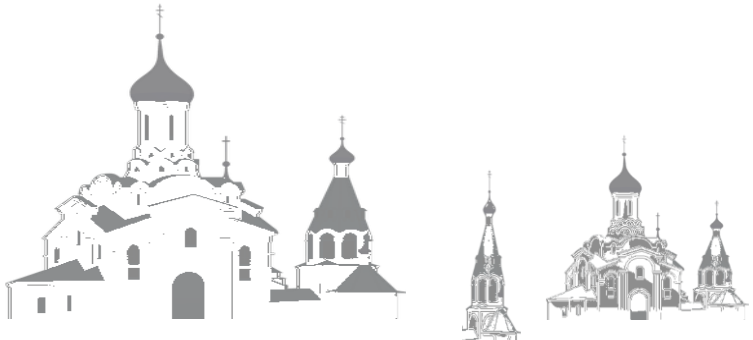
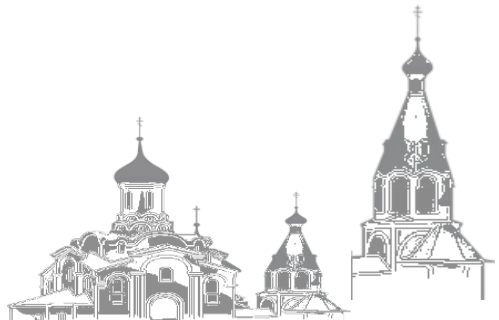
Assoc. Prof. Iosif-Vasile NEMOIANU, University “POLITEHNICA” of Bucharest, Romania





Guideline

Before the conference

Time Zone
Moscow, Russia (GMT+3)
You're suggested to set up the time on your computer in advance.

Platform: ZOOM
* You can download Zoom Platform from the link below:
  1. https://zoom.com.cn/download (Chinese authors' option）
  2. https://zoom.us/download
*Zoom Guideline:
  http://www.ickem.org/zoom

Equipment Needed
- A computer with internet connection and camera
- Headphones

Environment Needed
* A quiet place
* Stable internet connection
* Proper lighting and background

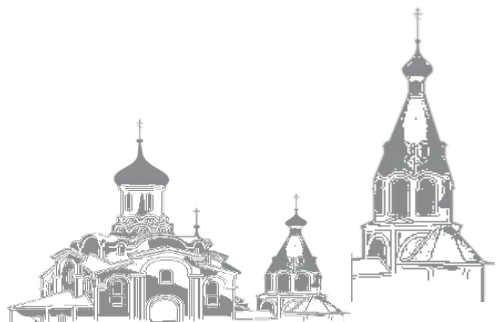
Test Your Presentation
Date: Friday, 26 March
Prior to the formal meeting, presenters shall join the test room to ensure everything is on the right track. Please check your test time on this program.
Every presenter or listener enter the ZOOM, please rename as SESSION NUMBER + PAPER ID + YOUR NAME.
*For example:
Presenters: S1+ K1-001+Jack
Listeners: L001+Jack

During the conference

Voice Control Rules
- The host will mute all participants while entering the meeting.
- Speakers can unmute microphone when it is turn for his or her presentation.
- Q&A goes after each speaker, the participant can raise questions.

Oral Presentation
- Timing: a maximum of 15 minutes in total, including 2-3 minutes for Q&A. Please make sure your presentation is well timed.
- Please join the meeting room 10 minutes in advance.
- ICKEM encourages all presenters to make live oral presentations. For technical problems such as network instability, we suggest you email a record video/slide with sound to conference secretary as backup before or on **22 Mar, 2021**.

Conference Recording
- The whole conference will be recorded. We appreciate you proper behavior and appearance.
- The recording will be used for conference program and paper publication requirements. The video recording will be destroyed after the conference and it cannot be distributed to or shared with anyone else, and it shall not be used for commercial nor illegal purpose. It will only be recorded by the staff and presenters have no rights to record. If you don't want to be recorded, please inform us ahead of time.



Agenda Overview

* All schedules will process in **Moscow, Russia** local time (GMT+3).

Day 1- Friday, 26 March

12:00-14:30	Committee & Speakers' Test Session	ZOOM ID: 654 8955 3548 ZOOM Link: https://zoom.com.cn/j/65489553548
07:00-12:30	Authors' Test Session	ZOOM ID: 850 299 5314 ZOOM Link: https://zoom.com.cn/j/8502995314

Day 2- Saturday, 27 March

13:00-15:50	Opening, Keynote & Invited Speeches	ZOOM ID: 654 8955 3548 ZOOM Link: https://zoom.com.cn/j/65489553548

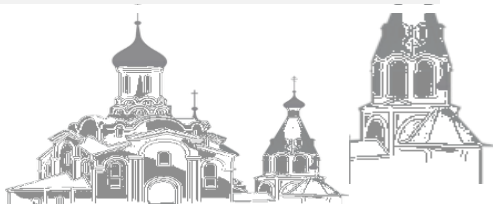
Day 3- Sunday, 28 March

07:00-15:30	Author Parallel Session: Session 1 - Session 6	ZOOM of S1&S3& S5 ZOOM ID: 654 8955 3548 ZOOM Link: https://zoom.com.cn/j/65489553548
		ZOOM of S2&S4&S6 ZOOM ID: 850 299 5314 ZOOM Link: https://zoom.com.cn/j/8502995314

Day 4- Monday, 29 March

09:00-12:30	Recorded Presentation Display	ZOOM ID: 654 8955 3548 ZOOM Link: https://zoom.com.cn/j/65489553548



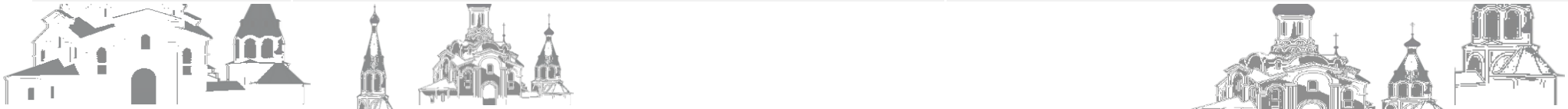


Detailed Agenda

ICKEM2021
Moscow, Russia
March 26-29

* All schedules will process in **Moscow, Russia** local time (GMT+3).

Date / Time	Day 1- Friday, 26 March	
Committee & Speakers' Test Session	**ZOOM ID: 654 8955 3548 | ZOOM Link: https://zoom.com.cn/j/65489553548**	
Moscow Time (GMT+3)	**Presenter's Local Time**	**Presenters**
12:00-12:15	09:00-09:15	Prof. Alexander Korsunsky, Trinity College, Oxford University, UK
12:15-12:30	10:15-10:30	Prof. Carsten Gachot, Vienna University of Technology, Austria
12:30-12:45	09:30-09:45	Prof. Geoffrey Mitchell, Institute Polytechnic of Leiria, Portugal
12:45-13:00	10:45-11:00	Prof. Ramirez-Castellanos Julio, Universidad Complutense, Spain
13:00-13:15	13:00-13:15	Prof. Henni Ouerdane, Skolkovo Institute of Science and Technology, Russia
13:15-13:30	13:15-13:30	Prof. Alexei I. Salimon, Skolkovo Institute of Science and Technology, Russia
13:30-13:45	17:30-17:45	Prof. Pranut Potiyaraj, Chulalongkorn University, Thailand
13:45-14:00	11:45-12:00	Assoc. Prof. Andrzej Katunin, Silesian University of Technology, Poland
14:00-14:15	19:00-19:15	Assoc. Prof. Famiza Binti Abdul Latif, Universiti Teknologi MARA, Malaysia
14:15-14:30	14:15-14:30	Prof. Nilgun BAYDOGAN, Istanbul Technical University, Turkey
Authors' Test Session	**ZOOM ID: 850 299 5314 | ZOOM Link: https://zoom.com.cn/j/8502995314**	
Moscow Time (GMT+3)	**Sessions**	**Presenters**
07:00-07:30	Session 1 - Materials Science and Application	M002, M010, M0009, M0024-A, M0025-A, M0022-A, M0017-A, M0019
08:00-08:30	Session 2 - Mechanical and Manufacturing Engineering	M007, M008, M0023, M009, M0021-A, M003
09:00-09:30	Session 3 - Material Physics and Electronic Technology	K1-030, K1-041, K1-029, K1-011, K1-031, K1-037-A, K1-028, K1-045, K1-101
10:00-10:30	Session 4 - Composite Materials and Building Materials	K1-009, K1-005-A, K1-004, K1-027, K1-033, K1-046, K1-035, K1-038, K1-034
11:00-11:30	Session 5 - Metal Materials and Manufacturing Technology	K1-016, K1-022, K1-025, K1-014, K1-012, K1-017, K1-018, K1-042, K1-039, K1-026-A
12:00-12:30	Session 6 - Computational materials Science and Chemical Engineering	K1-048, K1-001, K1-043, K1-032, K1-047, K1-002, K1-040, K1-003, K1-044



Detailed Agenda

* All schedules will process in **Moscow, Russia** local time (GMT+3).

Date / Time	Day 2- Saturday, 27 March

Opening, Keynote & Invited Speeches

Chaired by: Prof. Henni Ouerdane, Skolkovo Institute of Science and Technology, Russia
ZOOM ID: 654 8955 3548 | ZOOM Link: https://zoom.com.cn/j/65489553548

Moscow Time (GMT+3)	Presenter's Local Time	Presenters
13:00-13:10		Opening Remark **Prof. Alexei I. Salimon, Skolkovo Institute of Science and Technology, Russia**
13:10-13:50	10:10-10:50	Keynote Speech I **Prof. Alexander Korsunsky, Trinity College, Oxford University, UK** Speech Tittle: On the Thermokinetics of Additive Manufacturing
13:50-14:30	11:50-12:30	Keynote Speech II **Prof. Carsten Gachot, Vienna University of Technology, Austria** Speech Tittle: How to control Friction and Wear – Tribology in a Nutshell
14:30-14:50	Break	
14:50-15:20	11:50-12:20	Invited Speech I **Prof. Geoffrey Mitchell, Institute Polytechnic of Leiria, Portugal** Speech Title: A System for Printing Properties
15:20-15:50	13:20-13:50	Invited Speech II **Prof. Ramirez-Castellanos Julio, Universidad Complutense, Spain** Speech Title: Cs Aberration Corrected Electron Microscopy of Luminescent Oxides Complex Structure

Detailed Agenda

* All schedules will process in **Moscow, Russia** local time (GMT+3).

Date / Time

Day 3- Sunday, 28 March

Session 1 - Materials Science and Application

ZOOM ID: 654 8955 3548| ZOOM Link: https://zoom.com.cn/j/65489553548

Moscow Time (GMT+3)	Presenters
07:00-07:15	M002
07:15-07:30	M010
07:30-07:45	M0009
07:45-08:00	M0024-A
08:00-08:15	M0025-A
08:15-08:30	M0022-A
08:30-08:45	M0017-A
08:45-09:00	M0019

Session 2 - Mechanical and Manufacturing Engineering

ZOOM ID: 850 299 5314 | ZOOM Link: https://zoom.com.cn/j/8502995314

Moscow Time (GMT+3)	Presenters
07:00-07:15	M007
07:15-07:30	M008
07:30-07:45	M0023
07:45-08:00	M009
08:00-08:15	M0021-A
08:15-08:30	M003

Session 3 - Material Physics and Electronic Technology

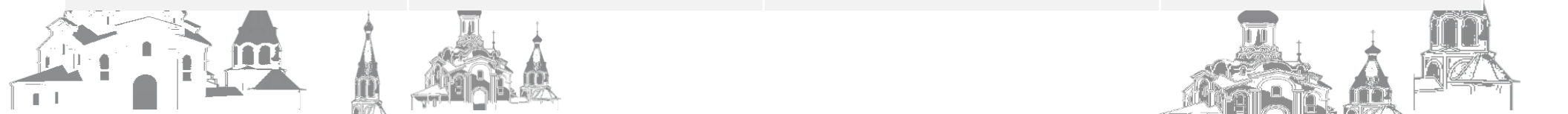
ZOOM ID: 654 8955 3548| ZOOM Link: https://zoom.com.cn/j/65489553548

10:00-10:15	K1-030
10:15-10:30	K1-041
10:30-10:45	K1-029
10:45-11:00	K1-011
11:00-11:15	K1-031
11:15-11:30	K1-037-A
11:30-11:45	K1-028
11:45-12:00	K1-045
12:00-12:15	K1-101

Session 4 - Composite Materials and Building Materials

ZOOM ID: 850 299 5314 | ZOOM Link: https://zoom.com.cn/j/8502995314

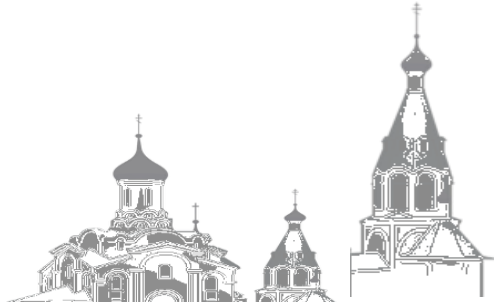
10:00-10:15	K1-009
10:15-10:30	K1-005-A
10:30-10:45	K1-004
10:45-11:00	K1-027
11:00-11:15	K1-033
11:15-11:30	K1-046
11:30-11:45	K1-035
11:45-12:00	K1-038
12:00-12:15	K1-034



Detailed Agenda

Session 5 - Metal Materials and Manufacturing Technology ZOOM ID: 654 8955 3548| ZOOM Link: https://zoom.com.cn/j/65489553548		Session 6 - Computational materials Science and Chemical Engineering ZOOM ID: 850 299 5314 | ZOOM Link: https://zoom.com.cn/j/8502995314	
13:00-13:15	K1-016	13:00-13:15	K1-048
13:15-13:30	K1-022	13:15-13:30	K1-001
13:30-13:45	K1-025	13:30-13:45	K1-043
13:45-14:00	K1-014	13:45-14:00	K1-032
14:00-14:15	K1-012	14:00-14:15	K1-047
14:15-14:30	K1-017	14:15-14:30	K1-002
14:30-14:45	K1-018	14:30-14:45	K1-040
14:45-15:00	K1-042	14:45-15:00	K1-003
15:00-15:15	K1-039	15:00-15:15	K1-044
15:15-15:30	K1-026-A		

Time \ Date	Day 4- Monday, 29 March
09:00-12:30	**Recorded Presentation Display** **ZOOM ID: 654 8955 3548| ZOOM Link: https://zoom.com.cn/j/65489553548** **The authors' presentation will be recorded. If you are interested or missed the certain presentation on 27-28 March, you can enter the recorded presentation display room on 29 March.**



Speakers

* Prof. Alexander Korsunsky

* Trinity College, Oxford University, UK

Keynote Speech I
ZOOM ID: 654 8955 3548
13:10-13:50, 27 March (GMT+3)

Title: On the Thermokinetics of Additive Manufacturing

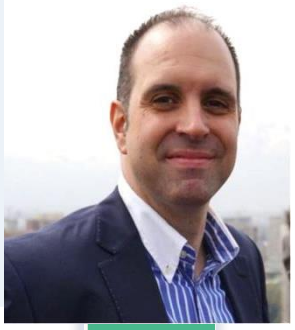
Abstract: Additive Manufacturing (AM) is a synthetic field that combines many different disciplines from 3D vision to laser science, mechatronics, control, and programming. Phase change processes lie at the core of AM and determine the structure and properties of the fabricated parts across multiple length scales. The talk will provide an overview of the thermodynamics and kinetics of phase change in application to AM process and material characterisation, and illustrate these approaches in application to laser powder bed fusion (LPBF) and fused filament fabrication (FFF) of Nylon (PA12).

BIO: Alexander Korsunsky received his degree of Doctor of Philosophy (DPhil) from Merton College, Oxford, following undergraduate education in theoretical physics. His current appointment is Professor of Engineering Science at the University of Oxford and Trinity College. He has given keynote plenaries at major international conferences on engineering and materials. He has developed numerous international links, including visiting professorships at Universitá Roma Tre (Italy), ENSICAEN (France) and National University of Singapore.

Prof Korsunsky's research interests concern developing improved understanding of integrity and reliability of engineered and natural structures and systems, from high-performance metallic alloys to polycrystalline ceramics to natural hard tissue such as human dentin and seashell nacre. Prof Korsunsky co-authored books on fracture mechanics (Springer) and elasticity (CUP), and published over 200 papers in scholarly periodicals on the subjects ranging from neutron and synchrotron X-ray diffraction analysis and the prediction of fatigue strength to micro-cantilever bio-sensors, size effects and scaling transitions in systems and structures.

Support for Prof Korsunsky's research has come from EPSRC and STFC, two major Research Councils in the UK, as well as also from the Royal Society, Royal Academy of Engineering (RAEng), NRF (South Africa), DFG (Germany), CNRS (France) and other international and national research foundations. Prof Korsunsky is a member of the editorial board of Journal of Strain Analysis published by the Institution of Mechanical Engineers, UK (IMechE).

Speakers



* Prof. Carsten Gachot

* Vienna University of Technology, Austria

Keynote Speech II
ZOOM ID: 654 8955 3548
13:50-14:30, 27 March (GMT+3)

Title: How to control Friction and Wear – Tribology in a Nutshell

Abstract: Friction and wear phenomena play an important role in our daily life and are highly affecting the operation of machines in for example automotive, aviation or tool industry. There are many different possibilities how to tackle friction and wear. Novel additives in lubricants such as graphene, MXenes, ionic liquids amongst other materials are of particular interest but also texturing techniques to optimize materials surfaces with respect to friction and wear e. g. laser surface texturing as well as the development of new wear resistant coatings. While some machine components require a friction reduction, others may need high friction to correctly operate such as brakes or tires. This presentation aims at presenting some of the latest research efforts in tribology and where tribology may continue its journey in the future covering aspects of green lubricants, 2D materials or concepts of the digitalization.

BIO: Carsten Gachot received his PhD from the Saarland University in Germany in 2012 where he studied the effects of laser interference patterning on the microstructure and topography of metallic surfaces with a focus on tribological applications under Prof. Dr. Frank Mücklich and Prof. Dr. Martin H. Müser. For this work, Dr. Gachot was awarded by the European Honda initiation grant in 2011. Prof. Gachot was academic visitor at the tribology Group at the Imperial College London and is currently the head of the tribology research Group at the Vienna University of Technology. Additionally, Prof. Gachot is a visiting Professor at the Pontifical Catholic University in Santiago de Chile and chief editor of the peer reviewed journal "Industrial Lubrication and Tribology of the Emerald Publishing Group Leeds UK.

Speakers

* Prof. Geoffrey Mitchell

* Institute Polytechnic of Leiria, Portugal

Invited Speech I
ZOOM ID: 654 8955 3548
14:50-15:20, 27 March (GMT+3)

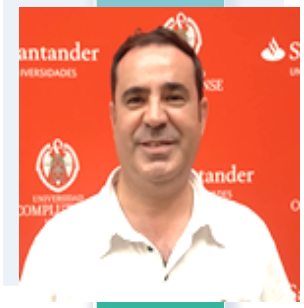
Title: A System for Printing Properties

Abstract: Manufacturing technology produces shaped objects which exhibit specific properties, either as consequence of the design, for example triangle, arches or texture or through the properties of the materials from which it is fabricated. Industry 4.0 merges the digital world with that of manufacturing and this presentation reviews the scope for extending the digital definition of a product to including the description of the properties of the material and the properties of the product. We explore how the current manufacturing technologies achieve this and we high-light the natural hinge in polypropylene products and the feel of fabrics prepared from the same polymer. We will then turn our focus to achieving the same using 3d printing and other direct digital manufacturing processes. We illustrate these concepts with some simple objects and discuss the translation to a practical system.

BIO: Geoffrey Mitchell is Professor and Vice-Director of the Centre for Rapid and Sustainable Product Development at the Polytechnic Institute Leiria in Portugal. Geoffrey Mitchell carried out his doctoral work at the University of Cambridge in the UK and subsequently held a post-doctoral fellowship at Cambridge and a JSPS Fellowship at Hokkaido University in Japan. Prior to his current position he was Professor of Polymer Physics at the University of Reading, UK and from 2005 he was the founding Director of the Centre for Advanced Microscopy at Reading. His research work bridges physics, biology, chemistry and technology and he is a Fellow of both the Institute of Physics and the Royal Society of Chemistry as well as the Royal Society for the Encouragement of Arts, Manufactures and Commerce.

He is a Visiting Member of the Medical Physics and Clinical Engineering Department of the Oxford Universities NHS Foundation Trust. He is the editor of a book “Controlling the Morphology of Polymers Multiple Scales” published by Springer in 2016.

Speakers



* Prof. Ramirez-Castellanos Julio

* Universidad Complutense, Spain

Invited Speech II
ZOOM ID: 654 8955 3548
15:20-15:50, 27 March (GMT+3)

Title: Cs Aberration Corrected Electron Microscopy of Luminescent Oxides Complex Structure

Abstract: Motivated by the rise of functional materials, research in different types of materials such as nanoparticles, rods or complex materials has been growing in recent years. The reduced dimensionality results in the appearance of new physical and chemical properties, such as suprparamagnetism in nanoparticles or new luminescent properties, which are of great interest from the point of view of applications. The nanostructures of semiconductor metal oxides are especially relevant.

BIO: Julio Ramírez-Castellanos graduated with a BAS (Bachelor of Science degree) in Solid State Chemistry at Complutense University of Madrid. His PhD degree was on the synthesis and structural characterization of high Tc superconducting materials. This PhD served as an introduction to many chemical methods needed for the preparation of new materials, and the application of electron microscopy techniques used to characterize and understand the relationships between structure and properties. Dr. Ramirez-Castellanos also visited/worked at/studied at several European research centers, including the Laboratoire de Cristallograhie (CNRS) in Grenoble (FR). He was an active participant in Prof. Maximo Marezio´s working group, under the supervision of Dr. J. J. Capponi. Ramirez-Castellanos also joined at Prof. S. Palmer's group, at Physics Department in Warwick University, Coventry (UK).

For several years after that, he completed research with a postdoctoral fellowship in order to study with Dr. Yoshio Matsui at the National Institute for Materials Science (N.I.M.S) in Tsukuba (JP). Dr. Ramírez-Castellanos completed his research and studies on new functional materials, using a Hitachi H-1500 ultra-high-resolution and ultra-high voltage transmission electron microscope (U-HRTEM), operated at 1300 kV. At the same time, he also collaborated with Prof. Ryozo Yoshizaki at the Applied Physics Institute and Cryogenic Center in the Faculty of Engineering at Tsukuba University (JP).

Session 1

Topic: Materials Science and Application

Zoom ID: 654 8955 3548 | Zoom Link: https://zoom.com.cn/j/6548955 3548

Notes:

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* Please arrive at the conference rooms 5-10 minutes before the session start.
* Timing: a maximum of 15 minutes in total, including 2-3 minutes for Q&A. Please make sure your presentation is well timed.
* Certificate of Presentation will be sent to each presenter's email box after the conference.
* One Best Presentation will be selected from each parallel session and the author of best presentation will be announced at the end of this session.

M002
7:00-7:15

Cellulose Nanofibers/Polycarbonate Nanocomposite
Yeng-Fong Shih, Zhong-Zhe Lai, Wan-Ling Tsai, Jia-Yi Xu and Nian-Yi Wu
Chaoyang University of Technology, Taiwan

Abstract: In this study, cellulose nano-fiber (CNF) was prepared from carrot residues and further surface modification was carried out using suspension polymerization. Subsequently, these CNFs were added to polycarbonate (PC) to prepare a series CNF reinforced nano-composites. TEM results show that the average diameter of the fiber after 2,2,6,6-Tetramethylpiperidinyloxy (TEMPO) radical oxidation is 4.46 nm, and the average diameter of the TEMPO oxidized nano-fiber modified by suspension polymerization is 7.65 nm, which confirms that the carrot fiber has been successfully prepared into nano-scale. The results of FT-IR analysis show that the lignin and impurities on carrot fibers can be removed effectively after alkali treatment. In addition, the absorption peak of the functional group analyzed by FT-IR also confirmed that the TEMPO radical oxidation and suspension polymerization method were successfully carried out. Contact angle analysis results show that the contact angle of the CNF modified by suspension polymerization method was increased, indicating that the hydrophobicity of the fiber has been significantly improved. Moreover, this will lead to the better compatibility between CNF and PC matrix. Mechanical property analysis also shows that the surface modified CNF has a stronger reinforcing effect on PC than the unmodified one. Furthermore, the results show that the dispersion of CNF in the matrix of nano-composite prepared by dilution of masterbatch was better than that of the one prepared by directly adding of CNFs. The better dispersion of CNFs in the PC matrix led to the better mechanical properties. The increment of tensile strength of the nano-composite prepared by dilution of masterbatch can reach to 21.75%. In the analysis of transparency, the transmittance of modified CNF containing nano-composite was larger than that of unmodified CNF containing one. The transmittance of the nano-composites containing modified CNFs was larger than 70%, which was close to that of pure PC.

M010
7:15-7:30

Solidus-Liquidus Lines of Ni-Cu alloys using Molecular Dynamics and Monte Carlo Simulations
S K Deb Nath
Sendaishi Aoba Ku Komegafukuro 2 chome, Japan

Session 1

Abstract: Solidus and liquidus lines separate the solid and liquid phases from the solid-liquid phase of a binary alloy. Using the experimental method, the solidus-liquidus lines of a binary alloy is obtained but it is a complicated procedure. Theoretical approach like CALPHAD is also used to study the phase equilibria of a binary alloy. Using the atomistic approach there are limited number studies of the solid and liquid phases of a binary alloy. To obtain the solidus-liquidus lines of Ni-Cu alloys, firstly we need the melting temperature of Ni which is calculated from the molecular dynamics study. We need the relationship of the Grand potential, Ω as a function of the chemical potential difference, Δμ which is obtained from combined simulation of molecular dynamics (MD) and Monte Carlo (MC) simulation. Details of the above study are discussed inside the manuscript.

M0009
7:30-7:45

Stimulated Axion-like Bipolariton Generation in the Globular Photonic Crystal
Vladimir Filatov, Vladimir Gorelik and Svetlana Pichkurenko
Bauman Moscow State Technical University, Russia

Abstract: Axion is the "dark" particle introduced to the quantum chromodynamics to solve the strong CP-problem. Because of its “dark” nature, there are many indirect evidences, but axion itself have not been registered till now. In the paper, we analyse early experiments to explain it as the first observation of non-elastic two polariton interaction in solid forming the axion-like bipolariton. To amplify the process and get the visible-range bipolaritons, we propose to radiate the opal-like globular photonic crystal by a laser with a wavelength matched to the photonic crystal bandgap edge. This makes the light inside the crystal microcavities to "liquefy" into the drops of the polaritons' Bose-Einstein condensate, so the polariton coupling becomes resonant. This way, the two polariton-into-a bipolariton conversion is the stimulated one, and can be controlled by the laser exposure. The results can be used to get a laboratory source not only for a ”dark light” but also for optical-frequency gravitational waves.

M0024-A
7:45-8:00

Application of Natural Fibres In Cement-Based Materials
Erika Futami and Payam Shafigh
University of Malaya, Malaysia

Abstract: Plain cementitious materials such as concrete and mortar have high compressive strength, but much lower tensile strength. One of the methods to resolve this weakness is to reinforce these materials by incorporating fibres into their mixture. Steel and plastic fibres are commonly used at actual construction works in the industry these days. The merits of using the fibres into cementitious materials are preventing expansion of cracks by improving tensile strength and bridging effect. In recent years, it is being studied about incorporating natural fibres as an alternative material of artificial fibres to reduce environmental impacts. The usage of natural fibres into the mixture of cement-based materials is generally in the range of 0.5 to 5% by volume. While moderate amount of fibre improves the mechanical and durability properties, it has been reported that the workability and compressive strength decrease as fibre ratio increases. In addition, natural fibre has a feature of improving thermal insulation performance of cement-based materials because of its low thermal conductivity. This study is to investigate the effects of oil palm fibre, a waste from the palm oil industry, on different grades of cement-mortar in terms of mechanical and thermal properties. Natural fibre reinforcement material is one of the effective utilization methods of resources, so it will contribute to sustainable development of the construction industry.

M0025-A
8:00-8:15

Polyurethane Films With Enhanced Water Vapor Permeability And Improved Mechanical Property
Chunhua Zhang and Xinze Yang
Wuhan Textile University, China

Session 1

Abstract: Tetrahydrofuran and acetone was used to regulate the pore morphologies of polyurethane films using tetrahydrofuran/N,N-dimethylformamide and acetone/ N,N-dimethylformamide binary solvent. Macro-void, micro-pore, and potential inter-connected pores were classified according to the cross-sectional FESEM images. The corresponding pore forming mechanisms were proposed and compared. The water vapor permeability was linked with total pore areas of both micro-pores and potential inter-connected pores. Mechanical properties as a function of tetrahydrofuran and acetone were also investigated. Optimized polyurethane coating could be achieved with the addition of 40 wt% tetrahydrofuran and 50 wt% acetone. This provides an alternative approach for the production of polyurethane films with good mechanical property and water vapor permeability.

M0022-A
8:15-8:30

Microencapsulation of Oxalic Acid Dihydrate/Boric Acid Eutectic System With Binary Composite Shell For Thermal Energy Storage

Zhuang Ma, Zhaozheng Song and Qingzhe Jiang
China University of Petroleum, China

Abstract: In this study, oxalic acid dihydrate/boric acid eutectic system (OA-PCMS) was innovatively used as phase change materials, and a novel phase separation method was adopted to achieve the microencapsulation of OA-PCMS by inducing the coacervation of ethyl cellulose (EC) and acrylonitrile-butadiene-styrene (ABS) binary composite shell through polydimethylsiloxane (PDMS). A series of microcapsules were synthesized under three types of EC and different mixing ratios of EC and ABS to explore the optimum conditions. According to the SEM micrographs, the MEPCMM70 was considered as the most suitable one. The chemical compositions and crystalline structures of the MEPCM-M70 were investigated by Fourier-transform infrared spectroscopy (FT-IR) and X-ray powder diffraction (XRD) analysis, respectively. The thermophysical properties and PCM storage properties were researched using differential scanning calorimetry (DSC), which indicated that the latent heat is 159.0 J/g and it possess excellent recyclability. Therefore, microencapsulation of OA-PCMs with binary composite shell for thermal energy storage was achieved. This simple, mild and environmentally friendly microencapsulation technology is also promising for the microencapsulation of other water-soluble phase change materials

M0017-A
8:30-8:45

Dual Drug Delivery of Morusin and 17-AAG Loaded PLGA Nanoparticles for Combination Therapy Against Breast Cancer

Srishti Agarwal, Toru Mizuki and Toru Maekawa
Toyo University, Japan

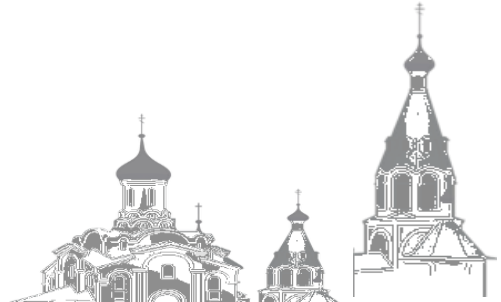
Abstract: Breast cancer and triple negative breast cancer (TNBC) remains the foremost cancer in women because of comprehensive tumor heterogeneity. Existing treatment options comprise of combinatorial chemotherapeutics and mono therapy, which have its own pros and cons like drug toxicity and resistivity. The present study emphasizes the synergistic amalgamation of chemotherapeutic drug, morusin and hsp90 inhibitor, 17-AAG entrapped inside a polymeric Nano carrier against breast cancer cells to accomplish superior efficacy compared to single drug Nano formulations. High cytotoxicity, prolonged drug release and magnified uptake were witnessed in breast cancer and triple negative breast cancer cells compared to normal cells. Hence, this approach postulates a likely strategy to treat resistant and aggressive cancers with the use of dual drug-loaded 17-AAG-MOR PLGA NPs

M0019
8:45-9:00

Cytotoxicity of Ti/SS316/Mg Particles On Human Osteoblasts

Niyou Wang, S Thameem Dheen, Jerry Ying Hsi Fuh and A Senthil Kumar
National University of Singapore, Singapore

Abstract: Daily walking or exercise of the bone implant recipients may generate particles due to wear and tear. Reports have mentioned that particles could circulate in the human body and trigger aseptic loosening, inflammation, and other potential complications. The mechanism of these phenomena remains mostly unclear. This study is to investigate the cytotoxicity of titanium (Ti), stainless steel 316 (SS316), and magnesium (Mg) particles due to these materials are the most commonly used biomaterials based on their adequate mechanical properties and excellent biocompatibility. Human osteoblasts (SAOS2 cells) were exposed directly to different concentrations of Ti/SS316/Mg particle during the direct cytotoxicity test. Together with the previous study, we found out that Ti particles showed cytotoxicity to osteoblasts at different dosages and times, while SS316 particles and Mg particles (low dosage) can reduce the cytotoxicity induced by Ti particles and boost cell viability. Mg particles can be toxic to osteoblast at a higher dosage, while SS316 particles are “safer” than Mg particles at higher dosages. Cell viability and cell morphology of SAOS2 cells under different treatments were observed at 48/72/120 hours. This study found out that cell viability could be enhanced with certain combinations of Ti/SS316/Mg particles, giving us some ideas on designing a proper bone implant. However, how to quantify the particles inside the human body in real-time, and the exact interaction among particles, cells, tissues, and even organs require further research



Session 2

Topic: Mechanical and Manufacturing Engineering

Zoom ID: 621 9203 5016 | Zoom Link: https://zoom.com.cn/j/62192035016

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M007 **7:00-7:15**	Numerical Study of Fragments from Cylindrical Casing with One of End Caps Fully Constrained **Yue-guang Gao**, Shun-shan Feng, Yun Chen, Xiang Xiao, Bo Zhang and Qi Huang Beijing Institute of Technology, China Abstract: In order to study the process and characteristic of the fragments in the warhead with one end cap under full constraint condition, we established a cylindrical casing with two end caps which one of them was fully constrained using the simulation analysis. The result showed that the fragmentation of cylindrical casing with one end full constrained has its own characteristic. The Mach stem was generated when the detonation wave propagated to the fully constrained end cap under the condition of one end detonation, working on unreactive explosives and causing the nearby fragment subjected to nearly 2.5 times the normal pressure to obtain a higher speed. The cylindrical casing first ruptured at the contact surface with the fully constrained end, and then at the end cover of the initiating end, and then the rupture extends to the whole cylindrical casing. The detonation products started to leak out from the rupture. driving fragments to fly, and forming two dense flying areas. The analysis of this paper can provide a reference for the optimal design of this kind of warhead.
M008 **7:15-7:30**	Sequence Learning-Based Schedule Prediction for Flexible Manufacturing Systems Under Uncertainties **Prita Meilanitasari** and Seung-Jun Shin Hanyang University, Korea Abstract: This study presents a method of production schedule prediction for flexible manufacturing systems with consideration of the uncertainty factors including limited machine capacity, diverse processing time and unplanned waiting time. The proposed method can predict product-level schedules using sequence learning, which derives data-learned models to predict production sequence proactively and granularly at the product-level. A decision tree technique is applied to derive such predictive models to pre-trace the locations of individual products allocated to each workstation. A deterministic technique is also applied to estimate waiting and production time per product as well as total production time consumed to fabricate all products assigned by work orders.

Session 2

M0023
7:30-7:45

Study of the Elastic Field Of A Plane Strain Orthotropic Composite Plate Subjected To Uniform Tension

Sankar Kumar Deb Nath
Tohoku University, Japan

Abstract: The expressions of the governing equations and the boundary conditions of an elastic body of orthotropic composite materials for the case of plane stress and plane strain conditions are different and for this reason the solutions would be different from one to another. Earlier the solutions of the present problem were obtained and studied considering plane stress condition. The present problem is solved considering plane strain concept analytically using Fourier series and numerically using Finite difference method (FDM). The different components of stresses at different sections of the plate obtained by the two methods are studied as a comparative manner. The comparative studies of the elastic field of the present problem using analytical and FD methods are carried out to verify the soundness of the present solutions. The theoretical background of the finite element method to solve this problem is in progress.

M009
7:45-8:00

Effect of current Carrying Length in Electric Pulse Aided Deformation

A. Subrahmanyam, M. Dakaiah, Rahul Kumar Verma and N. Venkata Reddy
Indian Institute of Technology (IIT) Hyderabad, India

Abstract: Application of electric pulses during plastic deformation of a metal results in reduction of flow stress. Almost all the studies on electric pulse aided tensile tests, current is applied through the entire specimen and it contributes to higher joule heating. In this work, electric pulse-aided tensile tests are carried out on modified specimens with a provision to apply the electric current only through center portion of gauge length to reduce the overall joule heating. Results show that, current carrying length has significant effect on stress-drop and specimen with higher current carrying length experienced higher temperature because of accumulation of heat.

M0021-A
8:00-8:15

The Effect of Lithium Batteries Usage in Electricity Vehicle Prior to Indonesia's Nickel Ore Reserve By 2050

Leonardus Hamonangan Sijabat, Maximillian Eureka Dondo, **Resky Agaslian Pramadin** and Bambang Priyono
University of Indonesia – Jakarta, Indonesia

Abstract: Good Ni production planning is needed to optimize the existing potential. Production planning is carried out by adjusting the volume of output from the smelter with the Ni reserves. Although Indonesia has Ni reserves estimated at 4.5 billion tonnes, not all can be extracted. This is because the potential location is difficult to reach, which causes Ni's economic value to be high. Indonesia's inability to plan and manage Ni potential will create problems when facing an explosion in battery demand in the 2025 to 2050 range for electric vehicles

M003
8:15-8:30

Real-time Digital Fringe Projection Measurement for Detecting Back Shape in Scoliosis

Hung-Ju Chung, Shuo-Chih Chien, Ching-Hua Lu and **Cheng-Yang Liu**
National Yang-Ming University, Taiwan

Abstract: The purpose of this study is to develop low-cost real-time digital fringe projection measurement to detect the three-dimensional shape of the back in patients with scoliosis. The measurement system consists of a digital projector and a digital camera. The seven fringe patterns are used to illuminate a patient's back while the digital images are captured by a camera. The height of the back shape is calculated using the seven-step phase-shifting calculation and path-independent phase unwrapping. The back topography with an accuracy of 1 mm can help the clinician to estimate the spinal deformity at baseline and monitor variations over time. The measurement results can be applied to clinical use and reduce the dependence on serial radiography for monitoring spinal deformity.

Session 3

Topic: Material Physics and Electronic Technology
Session Chair: Prof. Pranut Potiyaraj, Chulalongkorn University, Thailand
ZOOM ID: 654 8955 3548| ZOOM Link: https://zoom.com.cn/j/65489553548

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K1-030
10:00-10:15

Electrical Breakdown Voltage Of Palm Oil And Nano Graphene Filler In Nanofluids Application On Transformer Insulating Oil

Kanin Wajanasoonthon, Tanakon Wongwattanasatian and Amnart Suksri
Khon Kaen University, Thailand

Abstract: Generally, power transformers have been using mineral oil as a liquid insulator due to its availability and excellent dielectric property. However, petroleum sources are depleting, which implies that mineral oil is going to be limited in availability. So, this research is to investigate on vegetable oil with nano graphene filler as a substitution. Vegetable insulating oil is considered as environment-friendly insulating oil due to their superiority of biodegradable, nature-friendly, high fire-point, and good level of breakdown voltage (BV). Nevertheless, vegetable insulating oil have high viscosity, leading to a slow flow rate on the cooling performance of power transformers. To solve this problem, a process of transesterification was used to produce palm oil methyl ester (POME) from a refined bleached deodorized palm olein (RBDPO) to reduce its viscosity. RBDPO and POME were used as two kinds of fluid-based to combine with graphene nanoparticles (GNPs). Electrical breakdown voltage tests were performed by the IEC60156 standard. The results shown that POME have higher BV than RBDPO but adding GNPs may lead to lower BV even with a small amount of concentration. Nevertheless, every nanofluid has a higher BV than 30 kV.

K1-041
10:15-10:30

Investigation of Single Layer and Bilayer of Plasma Transferred Arc (PTA) Coatings of Fe-Cr-V Powder

Saifon Srisaart, Karuna Tuchinda and Tharanon Usana-Ampaipong
King Mongkut's University of Technology North Bangkok, Thailand

Abstract: This paper presented an investigation of single layer and bilayer of PTA coating of two different Fe-Cr-V powder commercially available and an improvement of the surface hardness by adding 35% of WC. In case of single layer, the microstructure was uniform across the thickness also the hardness, while microstructure of the bilayer was obviously separated between interlayer and topcoat. The bilayer coating microstructure was changed and

approaching the topcoat the microstructure was similar to single layer. The hardness of bilayer was decreased due to the dilution. After adding WC into the powder, the microstructure was changed and it could be seen that WC particles distributed across the coating. The hardness was increased due to dilution of some WC. Moreover, in all cases, PTA process offered coating with no crack and no re-precipitated with only small pores. However, adding WC could result in bigger pore size.

K1-029
10:30-10:45

Electrode Shape Design and Current Density Distribution for Stable Plasma Beam Incinerator

Grich Kongphet, Tanakorn Wongwuttanasatian and Amnart Suksri
Khon Kaen University, Thailand

Abstract: This paper proposed the electrode shape design of a plasma incinerator for producing a stable plasma beam. Due to the accumulation of waste from the hospital in Thailand is increasing rapidly from epidermic recently. Plasma incinerator can be used to incinerate the infectious waste resulting from COVID-19 such as face mask and medical rubber gloves. Four shapes of electrodes were designed, they were simulated by a computer program to compare the current density at the electrode tip area. The simulation results are then used as a preliminary information to construct and test using three different materials. They are tungsten, graphite, and copper. Test results showed that the proposed electrode designed based on current density distribution values agrees well with the constructed electrodes tip design. The longest plasma beam produced a flame length of 31 mm and a width of 7 mm. Each designed electrode tip was then examined by Scanning Electron Microscope for the surface deterioration after it has been tested. Tungsten electrode has found to be the best corrosion resistance, largest plasma beam size as well as the stable plasma beam.

K1-011
10:45-11:00

Effect of Silver Doping in the Structural and Optical Properties of Hematite (α-Fe2O3) Synthesized via Chemical Precipitation Method

Aldrin A. Tan, Aldwin Christian T. Lacuesta, Mon Bryan Z. Gili and Rinlee Butch M. Cervera
University of the Philippines, Philippines

Abstract: Hematite (α-Fe2O3) is a low-cost n-type semiconductor with significant absorption of visible light owing to its low bandgap energy of 2.1 eV. The wide applications of hematite in renewable energy and environmental remediation continuously entice more studies. However, the low absorbance of solar energy in the UV-range significantly limits the efficiency of many photocatalytic materials. In this study, we tried to dope α-Fe2O3 with silver via chemical precipitation method to lower the bandgap energy and widen its absorbance. The effects of doping hematite with Ag on the structure, morphology, elemental composition, and optical absorbance were determined by characterizing the samples via X-ray diffractometry (XRD), scanning electron microscopy (SEM), energy dispersive X-ray (EDX) analysis, and UV-Vis spectroscopy, respectively. It was observed from the XRD patterns that the α-Fe2O3 crystallizes in hexagonal structure with lattice parameters a = 5.0380 Å and c = 13.7720 Å for the pure α-Fe2O3. Doping with 0.1M and 0.2M AgNO3 leads to a greater value of the lattice parameters indicating successful doping. SEM images show that the hematite formed was composed of particles with irregular shapes that have sizes in the range 0.865-0.883 μm. Excess silver particles were deposited on the surface of hematite. UV-Vis spectra show that there is a red-shift in the absorption band of the Ag-doped hematite. A notable decrease in the bandgap energy of the undoped α-Fe2O3 was observed from ~2.2eV to ~2.0eV with the increase in the amount of the dopant in the hematite as determined using Tauc's plot.

Session 3

K1-031
11:00-11:15

A Study On An Impact Of Tower Surge Impedance Against Lightning Surge Phenomena
Chakkri Satchathampitak, Rongrit Chatthaworn and Amnart Suksri
Khon Kaen University, Thailand

Abstract: Lightning strikes creates damages to the electrical power system utilization and equipment. To reduce the effect of lightning strikes in the tower transmission, the ground resistance of the tower must be kept to a low value of less than 5 Ω. This research is a study of tower surge impedance using a conductor line connected by parallel two overhead ground wire at the top of the tower transmission line. The additional of ground wire which is connected from the top of the tower uses copper and aluminum for the simulation. Calculation of tower surge impedance using finite element method by COMSOL in 3D simulation based on traditional electromagnetism equations. Surge impedance values were calculated, and it was found that the calculation results obtained with less than 0.5 % error when using finite element method. Copper conductor was found to have reduced the effects of lightning strikes at the tower transmission line when compare with aluminum conductor.

K1-037-A
11:15-11:30

Synthesis Of High Quality Vanadium Dioxide Thin Films And The Applications In Manipulating Terahertz Waves
Min Gao
University of Electronic Science and Technology of China, China

Abstract: Vanadium dioxide (VO2) is a strong-correlated metal−oxide with a sharp metal−insulator transition (MIT). During the MIT, the optical properties of VO2, especially in the terahertz (THz) frequency, has abrupt changes, which make it a promising material for THz optics. However, Synthesizing high quality VO2 films with a sharp and large optical change across MIT is a challenge because of the difficulty in controlling the oxygen stoichiometry of vanadium oxide. Herein, a unique moisture-assisted chemical solution approach has been developed to successfully manipulate the oxygen stoichiometry, which enhance the MIT performance of VO2 films. A sharp phase transition width with large resistance change has been achieved. Utilizing this growth method, a steep transition at a lower transition temperature and a large THz modulation ratio up to 77% could be observed by doping Co ions into VO2 films, which is significant for the applications of VO2 films in THz devices.

K1-028
11:30-11:45

An Improvement on Tracking Resistance of Silicone Rubber Filled with Micro-Wollastonite/Gehlenite Synthesized by Solid-State Reaction
Pattarabordee Khaigunha, Tanakorn Wongwuttanasatian and Amnart Suksri
Khon Kaen University, Thailand

Abstract: Enhancement of the room temperature vulcanization silicone rubber (RTV) tracking resistance with various filler loadings of synthesized wollastonite against electrical surface tracking was prepared. The X-ray diffraction (XRD), Scanning electron microscope (SEM), and X-ray fluorescent (XRF) techniques were involved in characterizing the synthesized substances. The test method IEC-60587 standard was employed to evaluate the surface tracking resistance. The results obtained from the XRF technique confirmed that the raw materials could be synthesized for wollastonite, while the XRD and SEM techniques revealed the formation of wollastonite (CaSiO3) associated with gehlenite (Ca2Al2SiO7). Moreover, it was found that the electrical surface tracking resistance of composite insulation takes a long time to track when the filler loading is increased more than 5 phr.

K1-045
11:45-12:00

Effect of Reaction Time on the Morphology of CuO Nanostructured Electrode for Pseudocapacitor Application
Salvacion Orgen and Mary Donnabelle Balela
University of the Philippines Diliman, Philippines

Session 3

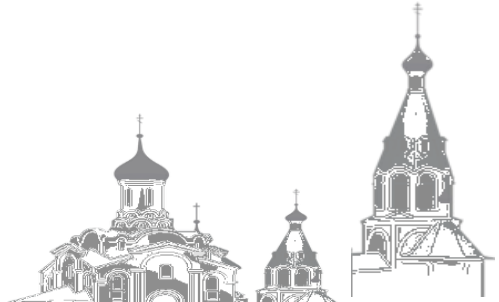
Abstract: CuO nanostructured electrodes were successfully synthesized via a chemical bath deposition at room temperature for pseudocapacitor application. Changing the reaction time leads to the formation of different morphological nanostructures such as uniformed nanoneedles, nanotubes, nanosheets, and microflowers during oxidation. The electrodes were electrochemically characterized via cyclic voltammetry and galvanostatic charge-discharge using 6 M KOH electrolyte at different scan rates of 2-50 mV/s and current densities of 2-5 mA/cm2, respectively. The electrodes exhibited good electrochemical performance with specific capacitance ranging from 88-231 mF/cm2 at 2 mV/s.

K1-101
12:00-12:15

Effect of Vulcanization Processes on Properties of Natural Rubber/Cellulose Composites

Yanika Poonpipat, **Tanabadee Boonmalert**, Paweena Prapainainar and Peerapan Dittanet
Kasetsart University, Thailand

Abstract: The effect of vulcanization processes and surface treatment of cellulose were investigated on mechanical and thermal properties of cellulose/natural rubber (NR) composites. From curing systems including electron beam irradiation vulcanization and sulphur vulcanization, the study measured the impact on mechanical properties, degradation temperature, crosslink density, and morphological properties of cellulose/natural rubber composites. The incorporation of both untreated and treated cellulose at various concentrations (5, 10, 15 and 20 phr) into natural rubber was found to significantly improve the mechanical properties of natural rubber. Notably, with addition of treated cellulose in NR, the tensile strength (as high as 14.2 MPa) and modulus were considerably higher than that of the untreated cellulose (1.6 to 2.0 MPa). SEM morphological analysis revealed a well dispersion of cellulose particles in NR matrix. Addition of cellulose slightly decreased the onset of degradation temperature of NR, however, the degradable temperature was found to be unchanged.

Session 4

Topic: Composite Materials and Building Materials

Session Chair: Assoc. Prof. Andrzej Katunin, Silesian University of Technology, Poland

ZOOM ID: 850 299 5314 | ZOOM Link: https://zoom.com.cn/j/8502995314

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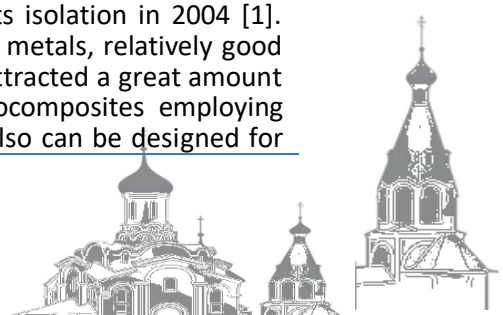
K1-009 **10:00-10:15**	Mechanical Properties of Hot-pressed B4C-TiB2 Composites Synthesized from B4C-TiO2 and B4C-TiC **Zhao Shumao**, Zhao Lingran Northeastern University, China Abstract: In this study, B4C-TiB2 ceramic composites were manufactured by hot pressing method. The raw materials for the in-situ synthesis of TiB2 were TiO2 and TiC. After being sintered at 1900oC for 60min under a pressure of 30MPa, compact composites samples with a TiB2 volume fraction range from 0 to 11.05% were prepared. The relative density, fracture toughness and flexural strength of different sample were tested. Microstructures on the fracture surface were studied by SEM. The result shows that B4C-TiB2 ceramic composites sintered from B4C-TiC had a better mechanical property than the one sintered from B4C-TiO2. When the content of TiB2 (reacted from TiC) was 11.05vol.%, the strength and toughness of B4C-TiB2 ceramics can reach 598MPa and 6.45MPa·m1/2. The toughening mechanisms of B4C-TiB2 composites include micro-crack toughening and energy consumption by the pulling out process of second phase.
K1-005-A **10:15-10:30**	Hurdles And Challenges In Manufacturing Conductive Nanocomposites Using Graphene/Derivative Masterbatches **Hassaan A. Butt** and Stepan V. Lomov, Iskander S. Akhatov and Sergey G. Abaimov Skolkovo Institute of Science and Technology, Russia Abstract: Graphene itself has been the focus of a large amount of research work since its isolation in 2004 [1]. Exhibiting properties such as electrical and thermal conductivity at degrees coinciding with metals, relatively good thermal and chemical stability as well as remarkable mechanical properties, graphene has attracted a great amount of attention for use as a reinforcement in polymer matrix nanocomposites [1-6]. Nanocomposites employing graphene as reinforcement particles not only show enhanced mechanical properties, but also can be designed for

functional usage such as detectors, electrically conductive polymers and deformation sensors [7-10].

K1-004
10:30-10:45

Evaluation of Carbon Nanotubes Asphalt Modification using the Superpave Criteria

Mohammad Ali Khasawneh, Khalid Ghuzlan and Nada Bani Melhem
Prince Mohammad Bin Fahd University, Kingdom of Saudi Arabia

Abstract: Rutting, fatigue cracking and low temperature cracking are the most important distresses in asphalt pavements as a result of changes in rheological properties of asphalt binder. Many types of modifiers were used to enhance asphalt behavior at both low and high temperatures. In this study, carbon nanotubes (CNT) were used as one of many nanomaterials that take a large attention in the latest research related to asphalt modification against different types of distresses. Effect of CNT on rheological properties of asphalt binder was investigated by testing unmodified and CNT modified asphalt binders using two of Superpave devices: Dynamic Shear Rheometer (DSR) and Bending Beam Rheometer (BBR). Penetration, softening point, flash point and rotational viscosity (RV) tests were carried out as well. CNT was added in 0.1%, 0.5% and 1% by weight of asphalt binder. It was found that adding CNT in 0.5% and 1% increase stiffness of asphalt and consequently asphalt pavement rutting resistance. On the other hand, this increase in stiffness affected pavement behavior adversely which is not desirable for fatigue and low temperature cracking. However, Superpave specifications were still satisfied and asphalt binder's relaxation properties were improved upon CNT modification. It was eventually found that 0.5% of CNT is the optimum percentage for the best performance.

K1-027
10:45-11:00

How Efficient are LC3 and GGBFS-contained Mortar Mixtures Submerged Into Na2SO4 Solution Against External Sulfate Attack At An Early Age?

Islam Orynbassarov, Chang-Seon Shon, Jong Ryeol Kim, Umut Bektimirova and Aidyn Tugelbayev
Nazarbayev University, Kazakhstan

Abstract: Ordinary Portland cement (OPC) is one of the most widely used construction materials in civil engineering infrastructure construction but it is susceptible to sulfate attack. One of the ways to improve the sulfate resistance of an OPC mortar/concrete is to replace a certain amount of OPC with different pozzolanic materials such as ground granulated blast furnace slag (GGBFS) and metakaolin. The use of pozzolanic materials to mortar/concrete not only enhances durability but also reduces carbon dioxide (CO2) emission due to the less usage of OPC at the initial construction state. As considering these aspects, limestone calcined clay cement (LC3) has been developed in recent decades. However, the influence of LC3 on sulfate attack resistance has not been fully evaluated. Therefore, this study investigated the efficiency of LC3 mortar mixtures against sulfate attack at an early age (approximately 4.5 months) after two different curing periods, namely 1-day and 3-day curing, since the strength of the LC3 mixture is lower than OPC mixtures. To evaluate the synergistic effect of a combination of LC3 and GGBFS on the sulfate resistance, the LC3 and OPC mixtures containing 25% GGBFS were also assessed in terms of density, porosity, compressive strength, volumetric expansion, and weight changes. The experiment results show that the expansion of the LC3 mixture regardless of the addition of GGBFS and an initial curing strength made a plateau after a rapid increase up to 7 days, while the expansion of the OPC mixture kept increasing throughout the period. Furthermore, the addition of GGBFS to OPC or LC3 mixture provides the synergistic effect on reducing the expansion due to sulfate attack. Therefore, if LC3 mixture has high initial strength (min. 15 MPa) and dense microstructure to minimize the penetration of sulfate ion into the mixture, it is expected that LC3 mixture is more efficient than OPC mixture against the sulfate attack.

Session 4

K1-033
11:00-11:15

Experimental Study To Investigate Dune Sand Improvement By Adding Fine Waste Materials
Mohsin Usman Qureshi, Ghassan Alkindi and Maryam Alsaidi
Sohar University, Oman

Abstract: Dune sands are poorly graded collapsible soils lacking fines. This experimental study explored the possibility of sustainable invigoration of fine waste materials in dune sand to improve the geotechnical properties. The fine wastes used in this study are reservoir sediments and marble waste powder. The fine waste powder was mixed with dune sand at different percentages (5, 10, 25, 50%) to study the gradation, void ratio and, compaction characteristics. A machine is also manufactured to elucidate the maximum void ratio using a developed and manufactured linear-axis 3D clay printer arm. The geotechnical properties of sand-waste mixes delineated in this study reveals the enhancement in compaction and gradation characteristics of dune sand. According to the results, the binary mixture of dune sand with 25% of marble waste and 50% of reservoir sediment gives the highest maximum dry density. Thus, for improving dune sand's geotechnical characteristics, the addition of fine marble waste and reservoir sediment to the dune sand is an environment-friendly solution.

K1-046
11:15-11:30

Investigation of Mechanical Behavior of Layered Metal-Rubber Composites Based on Steel and Aluminum Alloy
Svetlana Kuteneva, Sergei Gladkovsky, Pavel Nedzvetsky and Valeriya Veselova
Institute of Engineering Science of RAS, Ural Branch, Russia

Abstract: Metal-polymer composites are advanced materials for the aerospace, automotive and railway industry where details and elements of construction are affected by impact, cyclic and vibration loads. In the present work layered composites based on steel, aluminum alloy and rubber as intermediate layers were obtained by cold and hot bonding using adhesives. Adhesive lap-shear bond strength of layered composites fabricated by various techniques was determined using tensile shear test. To evaluate the mechanical behavior of layered metal-rubber composites under simulated operational conditions static, dynamic and cyclic, three points bending tests were carried out. The results of mechanical tests of these composites indicated that hot bonding is the most preferred fabrication method for the formation of increased mechanical characteristics.

K1-035
11:30-11:45

Novel Development Of The Structural, Optical, And Electrical Properties Of Pedot:Pss Conducting Polymer Thin Film For Energy Applications
Samar Aboulhadeed, Mohsen Ghali and Mohamad Ayad
Egypt-Japan University of Science and Technology (Ejust), Alexandria, Egypt

Abstract: We report on a novel development of the structural, optical and electrical properties of poly(3,4-ethylenedioxythiophene)-poly(styrenesulfonate) (PEDOT:PSS) conducting polymer thin films. The PEDOT:PSS thin films were deposited by a controlled thin film applicator and their physical properties were found to be effectively modified by isopropanol. The deposited films were investigated by several techniques including X-ray Diffraction (XRD), UV–vis, Hall-effect and Scanning Probe Microscopy (SPM). Interestingly, by optimizing the PEDOTS:PSS/isopropanol volume ratio (v:v), we find that the film charge carriers type can be switched from p to n-type with a high bulk carriers concentration reaching 6×1017 cm-3. Moreover, the film surface roughness becomes smoother and reaching a small value of only 1.9 nm. Such development of the PEDOT:PSS film properties makes it very promising to act as an electron transport layer for different energy applications like thin film solar cells and/or as efficient thermoelectric material.

Session 4

K1-038
11:45-12:00

Complete Experimental Investigation for Short Polypropylene Fiber Reinforced Cement Mortars
Nikolaos D. Nikoloutsopoulos, **Zacharias G. Pandermarakis**, Aikaterini Papadioti and Panagiotis Douvis
Region of Attica, Directorate of Environment and Climate Change, Athens, Greece

Abstract: In this study we investigate the addition of polypropylene (PP) fibers in cement mortars for a wide volume percentage range. These fibers are dispersed easily in fresh mortar and create a dense network whereas have as result the cracking reduction during dry shrinkage and the improvement of post peak response. A modified superplasticizer by lignosulfonate polymers basis was used, that keeps at low level the water to cement ratio and thus resulting to an improved mortar's workability. Compressive strength, three-point flexural strength, drying shrinkage of hardened mortar, flow table test and air content of fresh mortar were studied in a range of volume percentages. Their experimental response was approximated by suitable attached theoretical models. The investigation and their comparison were done with unreinforced specimens as reference samples. From results elaboration it is concluded that the addition of PP fibers in cementitious mortars improves mortars post-peak response but weaken their compressive and flexural strengths and worsen their workability

K1-034
12:00-12:15

The Structural Properties of Black Silicon Layers
AYVAZYAN Gagik
National Polytechnic University of Armenia, Armenia

Abstract: Black silicon (b-Si) is a surface modification of monocrystalline Si consisting of a high-density array of needle-like nanostructures, created in a self-organized process. This material possesses many attractive properties, such as low reflectance, a large and chemically active surface area, super hydrophobicity, and high luminescence efficiency. Consequently, b-Si has been applied to a wide range of optoelectronic applications. Various applications make different demands on the structure and morphology of b-Si layers. The structure of b-Si layers, established by Reactive Ion Etching (RIE) method from in SF6/O2 gas mixture on poly- and monocrystalline Si wafers, are investigated. It was shown that structural properties of b-Si layers are strongly dependent on the pressure, gas flow rate and etching time of RIE process. The needles of b-Si layers on monocrystalline wafers are longer and have regular shapes.

Session 5

Topic: Metal Materials and Manufacturing Technology

Session Chair: Assoc. Prof. Famiza Binti Abdul Latif, Universiti Teknologi MARA, Malaysia

ZOOM ID: 654 8955 3548| ZOOM Link: https://zoom.com.cn/j/65489553548

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K1-016 **13:00-13:15**	Compressive Behavior Of ME20M Magnesium Alloy At Low Temperatures **Jin Wang**, Yang Wang and Ziran Li University of Science and Technology of China, China Abstract: The compressive behavior of ME20M alloy along rolling direction (RD) at a wide strain rates under low temperatures is investigated in this paper. Compressive stress-strain results reveal that the effect of strain rate on yield strength and flow stress is not obvious, especially at low temperatures. Moreover, the temperature plays an important role in compressive responses. SEM observations indicate that brittle fracture is the main fracture mode at low strain rate, and ductile fracture occurs in the failure of the alloy at high strain rate.
K1-022 **13:15-13:30**	Anomalous Temperature Dependences of Kinematic Viscosity in a Multicomponent Metal Melts **V.S. Tsepelev**, Yu.N. Starodubtsev and Ye.A. Kochetkova Ural Federal University, Russia Abstract: The temperature dependence of the kinematic viscosity was determined in the Fe84.5Cu0.6Nb0.5Si1.5B8.6P4C0.3 melt, which has an anomaly in the temperature range 1700–1900 K. The cluster sizes participating in the viscous flow were calculated using the transition state theory. It is shown that the activation energy Ea is directly proportional to the natural logarithm of the cluster size d, and the melt viscosity decreases with increasing cluster size. In the anomalous region at heating, the activation energy first decreases and then increases. This behavior was associated with the cluster dissolution and the subsequent formation of new clusters with a different size and chemical composition. Upon cooling, the viscosity corresponds to the melt structure formed at the maximum heating temperature.

Session 5

K1-025
13:30-13:45

Analysis of Multiple Indicators of Ion Nitrided Layers of BH11 Steel
Nikolay T. Tontchev, Angel P. Zumbilev, **Emil H. Yankov** and Ilia A. Zumbilev
University of Ruse, Bulgaria

Abstract: In modern scientific and engineering expertise there are a few methods for graphical computational analysis related to decision making. However, few of them are devoted to materials science and the determination of the complex of properties separately and simultaneously. This research proposes a decision analysis approach tested for the basic properties of BH11 steel. With the help of the approach the tendencies as technological regimes in the change of the microhardness Hv, the relative wear resistance Kv and the connected nitride zone δnz are established. A model for the phase composition is derived, which interprets all observed trends and technological regimes for the relatively minimal and relatively maximal studied values. Thus, the efficiency of the technology in processing the considered steel is associated with the structure and properties of ion nitrided layers, which as a research is the main task of materials science.

K1-014
13:45-14:00

Effect of Scan Strategy On Mechanical Properties Of Ti–6al–4v Alloy Manufactured By Direct Energy Deposition
M.O. Gushchina, Y.O. Kuzminova, S.A. Evlashin, K.D. Babkin, V.D. Andreeva and E.V. Zemlyakov
State Marine Technical University, Saint Petersburg, Russian Federation

Abstract: Direct Energy Deposition (DED) is an Additive Manufacturing method which allows to repair the broken parts and builds of the meter-scale samples. However, the printing of large parts is associated to dealing with huge residual stresses and martensite phase formation, which can change the geometry of final samples or initiate the crack. The last factor is especially important for titanium alloys printing process. In this work, we investigated the effect of DED thermal history on the obtained structural and mechanical properties of Ti-6Al-4V. It was demonstrated that printing with long pauses leads to formation of α' phase leading to the embrittlement of the sample. Continuous printing with small pauses between tracks, leads to the formation of the dual α+β structure. As a result of the study, titanium printing in continuous regimes does not require additional heat treatment and demonstrates good mechanical properties. This study shows the importance of thermal history for printing the large samples.

K1-012
14:00-14:15

Using the Design of Experiment Method to Develop an Energy Loss Model for Non-Oriented Electrical Steel Alloys
Veronica Manescu (Paltanea), Gheorghe Paltanea, Horia Gavrila and Iosif Vasile Nemoianu
University Politehnica of Bucharest, Romania

Abstract: The main scope of the paper is to prove that apply the Design of Experiment (DoE) method and to develop a predictive model of energy losses for non-oriented electrical steels. The aim This approach permits us to determine a mathematical model, which is the predicted response (energy losses) as a function of input data (strip width and peak magnetic polarization) and experimental results. The presented DoE model is based on a classical central composite design of type 2n + 2n + 1 with two-levels (n = 2) and as a consequence only nine experimental points are necessary. The equation system that is associated with the model, generates a surface response equation, which permits the energy loss computation for different values of width strip and peak magnetic polarization. The DoE model was implemented, using different software packages as MathCad, Excel and OriginPro 2018, in the case of two types of electrical steels namely NO20 and M300-35A alloys that are used in small size electrical machines. In this case, the strain hardening phenomena at the cut edge becomes important, due to its negative impact on energy

	losses. The computed results were compared with the experimental data and errors lower than 5 % were determined.
K1-017 **14:15-14:30**	Effect of Moisture on 3D Printer PLA Filament Drying Processes Khompee Limpadapun and **Jenjira Sukmanee** King Mongkut's University of Technology North Bangkok Rayong Campus, Thailand Abstract: This study investigated characteristics of moisture desorption for polylactic acid (PLA) filaments. The filaments tend to absorb moisture from humid air, led to moisten filaments. The absorption of even small amounts of moisture, by filaments during storage and/or 3D printing, are the factors for degrading the quality of final parts in the manufacturing processes. In order to achieve various moisture concentrations in an experiment, the filament are subjected to 0.75, 1.3 and 1.87 wt.% for humid conditions. Moreover, the different times and temperatures of warm air-drying processes are used to reduce the moisture with 1, 2, 3, 4, 5 and 6 hours, and 40, 50 and 60 °C. The experimental result showed that the moisture from the polylactic acid (PLA) filaments can be discovered the moisture by using 60 degrees of temperature in 5 hours warm air-drying process.
K1-018 **14:30-14:45**	Study Of The Diffusible Hydrogen Content Affected From The Welding Electrode Humidity **Anupong Areerak**, Ramil Kesvarakul, Washira Chaysuwan, Khompee Limpadapun and Jenjira Sukmanee Rajapark Institute, Thailand Abstract: The influences of moisture corruption and drying considerations on diffusible hydrogen were examined in this study. Two trials were carried out on an arc welding procedure, with the first being an assessment of the results of moisture contamination and the second being a test of the impact of welding constraints on diffusible hydrogen content. For example, the dispersible hydrogen found in welds was likened to the hydrogen levels of different unused electrodes. To calculate the proper drying constraints (Time and Temperature) for an applicable moisture contamination level in the weld electrode, an empirical equation was devised. For electrodes with a small diameter and welding parameter limits typically used for out-of-position welding, the equation is appropriate.
K1-042 **14:45-15:00**	Peculiarities of Structure and Physical-Mechanical Properties of High-Strength Cr-Mo Pipe Steel Applicative Mainly in a Sour Environment **Evgeniia Putilova**, Kristina Kryucheva and Sergey Zadvorkin Institute of Engineering Science, Ural Branch of the Russian Academy of Sciences, Russia Abstract: This paper demonstrates the results of the study of microstructure and physical-mechanical properties of the high-strength economically alloyed Fe-Cr-Mo steel, developed by RosNITI JSC for the production of the oil country tubular goods (OCTG) (casing and tubing). The main requirement for this steel is to provide simultaneous increased strength and resistance to sulfide stress cracking (SSC). It was shown that this problem could be solved by special heat treatment. As a result, the structure of this steel consists of a secondary sorbite with a lower dislocation density. Hardening is provided by dispersion-strengthened V, Nb carbides.
K1-039 **15:00-15:15**	The Influence of Cold rolling on the Microstructure, Phase and Mechanical Properties of New Ti-13Nb-1.5Ta-3Mo Alloy **Adam Otabil**, Mohamed El-Hofy and Mohamed Gepreel Egypt Japan University of Science and Technology, Egypt

Abstract: In this paper, a new metastable Titanium alloy in the Ti-Nb-Ta-Mo system has been successfully produced using both the d-electron and Moeq concept. The influence of cold rolling on the microstructure and hardness was investigated. The alloy was fabricated by arc melting, cold rolled up to 90% and characterized using X-ray diffraction (XRD), optical microscope and Vickers microhardness. The XRD peaks depicted both β and α″ phases in all the cold rolled specimens. The hardness of the alloy increased with increasing cold rolling reduction thickness. An excellent plasticity (65%) and maximum compressive strength (2.9 GPa) was achieved with low young modulus (13.5 GPa) with no failure or crack on the alloy. Also, the alloy demonstrated a high compressive true strength coefficient (k ≈1426 MPa) along with improved strain hardening index (n ≈ 0.41). Based on the XRD, optical microscope and micro-hardness indentation micrograhs, the deformation mechanism of Ti-13Nb-1.5Ta-3Mo was found to be a combination of stress induced transformation, mechanical twinning and slipping.

K1-026-A
15:15-15:30

Single Track Formation Analysis In Selective Laser Melting Of Niti Powder

Stanislav Chernyshikhin and Igor Shishkovsky
Skolkovo Institute of Science and Technology, Russia

Abstract: During the last decades, the number of implantology surgeries has remarkably increased. Among the materials used for implants, nickel-titanium attracts a lot of attention due to its unique shape memory effect and superelasticity. The manufacturing of nitinol biomimetic implants by additive manufacturing methods such as selective laser melting (SLM) has many advantages in comparison with classical methods. Researchers found a few combinations of printing parameters, but a reliable approach was not established. The present research is focused on analyzation and optimization of the SLM process of nitinol. Single tracks of various scanning speed and laser power were printed using SLM 3D printer Trumpf Tru Print 1000. The selected printing parameters cover most of the combinations reported in the literature. Cross-sections of printed single tracks were examined to study the effect of parameters on the melt pool formation. The Computational Fluid Dynamics (CFD) approach along with OpenFOAM software was used for numerical simulation of the melt pool during interaction of laser with nitinol powder. The results demonstrate that single track characterization provides significant information about optimal parameters for the SLM process. This approach is useful to narrow down the window of the printing parameters. Further experiments will involve microhardness tests of the single track cross-sections and printing of volumetric nitinol samples.

Session 6

Topic: Computational materials Science and Chemical Engineering

Session Chair: Prof. Nilgun BAYDOGAN, Istanbul Technical University, Turkey

ZOOM ID: 850 299 5314 | ZOOM Link: https://zoom.com.cn/j/8502995314

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K1-048 **13:00-13:15**	Assessment of Shellac and Lemongrass Oil Blend as Edible Coating to Prolong Shelf Life of Pili Nut (Canarium ovatum) **Anna Pamela De Jesus,** Mark Paul Selda Rivarez, Ranzivelle Marianne Roxas-Villanueva and Marvin Herrera University of the Philippines Los Baños, Philippines Abstract: Shelf life in ground and tree nuts are often assessed based on aesthetic appearance, nut integrity, color and most importantly, taste and edibleness. Nuts with considerable level of rancidity and free fatty acids due to degradation of oils indicate expiration or decay. We prepared a shellac-lemongrass oil blend coating using food-grade ingredients and assessed its potential to extend shelf life of Pili nut (Canarium ovatum) kernels. A glossy, hard but considerably brittle coating for the pili kernels were prepared with varying numbers of layers. On average, the mass of coating added per dip is 0.10 g, and the thickness of 5 layers of coating is 0.3 mm. The obtained reflectance spectra of the coated pili kernels implied the translucent nature of the coating, but becomes opaque as the number of layers are increased. Peroxide value (PV) and free fatty acid value (FFAV), were also measured at 10 days after application of coating. PV was lowest in the nuts with 5 coating layers, while this treatment did not reduce FFAV. These results indicate the effectiveness of our coatings in preventing peroxide production probably by blocking oxygen penetration and ultraviolet exposure, which are important triggers production of peroxide and other free radicals. Further tests and time-series experiments are planned to assess the dynamics of peroxide levels and the overall potential of our coating technology for Pili nut.
K1-001 **13:15-13:30**	Artificial Neural Network (ANN) Approach to Predict LWST Values from Friction and Texture Measurements **Mohammad Ali Khasawneh**, Mohammad F. Aljarrah and Nael Alsaleh Prince Mohammad Bin Fahd University, Kingdom of Saudi Arabia Abstract: The paper aims to find whether friction values namely skid numbers obtained by the Locked-Wheel Skid Trailer (LWST) device can be predicted using values obtained by the Dynamic Friction Tester (DFT) and the Circular

Texture Meter (CTM). The last two measure the coefficient of dynamic friction (called DFTx) at different speeds (labeled x) and the Mean Profile Depth (MPD), they also measure the International Friction Index (IFI) parameters F60 and Sp. Artificial Neural Network (ANN) software was used to investigate the relationships. Twelve (12) different models were proposed with different input parameters and the best model giving the highest coefficient of determination (R2) was discussed in this paper. The results show that the most influential factors on LWST friction values are MPD, DFT0, DFT50, and DFT64 and MPD was the strongest among them. In addition, results show that the ANN approach is very efficient in predicting the LWST friction values for both training and validation sets with R2 values of 79% and 83%, respectively. It was also shown that the IFI parameters were relatively less influential on LWST values than DFT and MPD measurements.

K1-043
13:30-13:45

Electrochemical Fabrication of Porous Interconnected Copper Foam

Mary Donnabelle Balela, Reginald Masirag, Francis Jr. Pacariem and Juicel Marie Taguinod
University of the Philippines, Philippines

Abstract: An interconnected copper network or copper foam was successfully fabricated by electrochemical deposition using polyethylene glycol (PEG) and sodium bromide (NaBr) as additives. Both the amount of PEG and the current density were varied to obtain a Cu foam with the smallest pore diameter and wall thickness. The increasing amount of PEG resulted in a decrease in pore diameter. However, the wall thickness of the Cu network was increased. At 800 mg/L PEG and 20 mM NaBr, the average pore size of the foam was about 11.03 µm. Dendritic formation was also observed on the walls of the Cu foam. Further, higher current density resulted in increased dendritic growth. X-ray diffraction confirms that the Cu foam was spontaneously oxidized in air, leading to the formation of cuprous oxide (Cu2O).

K1-032
13:45-14:00

Influence of Materials and their Constitutive Laws on the Stress Fields produced in the Residual Limb of a Transfemoral Amputation

Armando Ramalho, Miguel Ferraz, Marcelo Gaspar and Carlos Capela
Polytechnic Institute of Castelo Branco, Portugal

Abstract: Current research uses a finite element analysis to characterize the effect of the materials mechanical and tribological properties on the interaction between the biological tissues of a transfemoral amputation and the combined prosthesis. Considering that both friction and mechanical properties influence the stress distribution between different interfaces, these were analyzed on the contacts of the prosthesis and the liner, the liner and the soft tissues and, finally, the soft tissues and the cortical bone. This is of significant importance, as it has been acknowledged that the shear stress distribution at these interfaces significantly impacts the patients' comfort. These shear stresses have also been reported as one of the leading causes of pressure ulcers in osteotomized patients. Finally, this research discusses the influence of the soft tissues and the liner constitutive law in the stress field generated at the biological tissues. In particular, for the liner, the results using a linear elastic model are compared with those using the Mooney-Rivlin hyperelastic model. The results using a linear elastic model are compared with the Neo-Hookean and Ogden models' results for the soft tissues.

K1-047
14:00-14:15

Kapok-Cotton Carbon Sponges for Oil Recovery

Wayne Christian P. Datiles, Marvin U. Herrera, Ronniel D. Manalo, Monet Concepcion Maguyon-Detras, Cybelle Concepcion M. Futalan and Mary Donnabelle Balela
University of the Philippines Diliman, Philippines

Abstract: Carbonized natural fibers show great promise as sorbents because of their low fabrication costs, high

surface area, high sorption capacity, and improved oil selectivity. Pyrolysis was performed on cotton and kapok fiber blends to produce carbon fiber sorbents. The carbon sponges showed improved mechanical properties with the addition of cotton. Pure carbonized kapok fibers were quite brittle, leading to challenges in recovery after use. The static water contact angle of carbonized kapok fibers, carbonized kapok-cotton blend (50K50C), and carbonized cotton fibers were determined to be 137.0°, 135.0°, and 135.9° respectively. This was an observed improvement from 127.9° for raw kapok and 0° for raw cotton. Sorption experiments revealed that the 50K50C fibers have sorption capacities about 25-27 times its original weight at 27.77 g/g, 25.72 g/g, and 26.01 g/g for motor oil, palm oil, and diesel, respectively.

K1-002
14:15-14:30

Dummy Regression to Predict Resilient Modulus of Cohesive Subgrade Soils
Mohammad Ali Khasawneh and Rabea Saleh AL-Jarazi
Prince Mohammad Bin Fahd University, Kingdom of Saudi Arabia

Abstract: Owing to a significant contribution of resilient modulus of subgrade soils in the overall performance of roads or railways, it is crucial to provide the best prediction of it. In other words, regarding road pavements, the behavior of pavements depends on the resilient deformations. This paper presents a new predictive equation for the resilient modulus of cohesive subgrade soils (A-4a and A-6a) using dummy regression. The results show that resilient modulus (MR) values exhibited a slight increase as the confining pressure increases. A-4a compacted at Optimum Moisture Content (OMC) found to attain higher values when compared to other conditions and different soils. A prediction model using dummy variables is proposed and shown to be able to predict the resilient modulus of cohesive subgrade soils over a range of stress states and water contents.

K1-040
14:30-14:45

Effects Of Influent Concentration And Flow Rate On The Sorption Of Diesel Molecules On Kapok Fibers At Dynamic Conditions
Marvin Herrera, Ronniel Manalo, Monet Maguyon-Detras and Mary Donnabelle Balela
University of the Philippines Los Banos, Philippines

Abstract: Kapok fibers were used as filtering medium in a column-type filtration set-up to separate diesel from water molecules in dynamic conditions. The amount of diesel flowing out the filtration system with respect to time was monitored. The times wherein the diesel first came out the filtering system (breakthrough time) were shorter at higher influent concentration and faster flow rate. Meanwhile, the total sorbed diesel molecules in the filtering system were higher at higher influent concentration while invariant with flow rate. The shorter breakthrough time was associated with the higher amount of diesel molecules that could be sorbed at a shorter time and the rate at which the overall processes of sorption-desorption-resorption proceeded. On the other hand, the sorption capacity of the system was viewed to be affected by the amount of moving diesel molecules that would interact with the kapok fibers and/or surface-sorbed diesel molecules but not by the contact time.

K1-003
14:45-15:00

The Prediction of Permanent Deformation of Fine-Grained Soils using Multiple Linear Regression: Dummy Variables
Mohammad Ali Khasawneh and Rabea Saleh AL-Jarazi
Prince Mohammad Bin Fahd University, Kingdom of Saudi Arabia

Abstract: Under repeated traffic loading, knowledge and understanding of cumulative permanent deformation and failure mechanisms for subgrade soils (fine-grained soils) are crucial for the proper design and maintenance planning of pavement structures. In other words, considering the great contribution of subgrade soils to the overall

performance of pavement structures, it is crucial to provide the best prediction of permanent deformation behavior. This paper presents a new predictive equation for the permanent deformation of fine-grained soils (A-4a and A-6a soils) utilizing the dummy-variable multiple linear regression technique. The permanent deformation (PD) results revealed that A-4a at OMC exhibited the least plastic deformation versus the highest plastic deformation assigned to A-6a compacted at 2% wet of OMC. The results obtained could be used to help engineers in characterizing fine-grained materials. As per the statistical analysis carried out in this study, the dummy regression for permanent deformation did not greatly improve the prediction power of the model.

Preparation of Calcium Stearate-Coated Kapok Fibers for Oil Sorption

Aimee Lorraine Blaquera, Marvin Herrera, Ronniel Manalo, Monet Concepcion Maguyon-Detras, Cybelle Concepcion Futalan and Mary Donnabelle Balela
University of the Philippines Diliman, Quezon City, Philippines

K1-044
15:00-15:15

Abstract: Kapok fiber has been known for its hydrophobic-oleophilic characteristics and exhibits a great potential as oil sorbent. Methods in enhancing its hydrophobicity have been explored to improve its sorption performance in oil-in-water applications. This study investigates the oil sorption performance and hydrophobicity of kapok fibers coated with calcium stearate, a known waterproofing agent. The calcium stearate solution was prepared by mixing known amounts of stearic acid and calcium chloride in an ethanol solution. This was followed by hydrolysis using 0.12 M sodium hydroxide solution. The calcium stearate-coated kapok fibers exhibited higher hydrophobicity compared to raw kapok fibers with a water contact angle of ~137°. It achieved the hi

Time Zone Reference

Time Zone			
Armenia	GMT+4	Philippines	GMT+8
Austria	GMT+1	Portugal	GMT 0
Bulgaria	GMT+2	Poland	GMT+1
China	GMT+8	Romania	GMT+2
Egypt	GMT+2	Russia (Moscow)	GMT+3
Greece	GMT+2	Saudi Arabia (Riyadh)	GMT+3
India	GMT+5	Spain	GMT+1
Indonesia (Western)	GMT +7	Thailand	GMT +7
Japan	GMT +9	Turkey	GMT+3
Kazakhstan (Astana)	GMT+6	UK	GMT 0
Oman	GMT+4		