CMPSE2020 CONFERENCE SCHEDULE

2020 4th International Conference on Composite Material, Polymer Science and Engineering(CMPSE2020)

Webinar

December 7, 2020

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Simple Version of the Schedule

CMPSE2020 WEBINAR					
Programme detail on December 07, 2020(Monday)					
South Korea & Japan (Standard Time)	China & Malaysia	USA	Bulgaria	Russia	Hungary
11:00-17:00	10:00-16:00	December 06 21:00-3:00	4:00-10:00	5:00-11:00	3:00-9:00
KeynoteSession (Standard Time)					
11:00-11:30	Keynote Speech 1 -Prof. Suresh G. Advani	Speech Title: Emerging Role of Process Models and Simulations in Composites Manufacturing			
11:30-12:00	Keynote Speech 2 - Prof. Katsuyuki Kida	Speech Title: Fracture mechanics for design of silicon nitride ball bearings			
12:00-12:30	Keynote Speech 3 - Prof. Norazman Bin Mohamad Nor	Speech Title: Sustainable Bamboocrete Panel for Green Building			
12:30-13:00	Keynote Speech 4 - Prof. Han-Yong Jeon	Speech Title: Applicability Review of Degradable Resin Based Green Geosynthetics and Suggestion of Degradability Evaluation for Environmental Conservation			
13:00-13:30	Keynote Speech 5 - Assoc. Prof. Mohammed Alias Yusof	Speech Title: Development of Blast Resistant Glass Using Green Manufacturing Process			
13:30-14:00	Keynote Speech 6 - Ass. Prof. Koshiro Mizobe	Speech Title: Effect of thermal and tribological conditions on fracture of polymer bearings made by various forming methods			
14:00-14:30	Keynote Speech 7 - Prof. Tateo Usui	Speech Title: Will be notified soon			
14:30-14:40	Photo & Break Time				
14:40-17:00	Session				

Note:

1. All the participants are strongly advised to attend 10 minutes before the Webinar is start.
2. Zoom ID and instructions will also be sent 7 days before the conference.
3. The standard time for all programs is South Korea Time
4. If you want to deliver oral presentation but your paper is not in the session list, please contact us by Email: contact@cmpse.org (for CMPSE2020)

Instruction about Oral Presentation

Materials Provided by the Presenters:

PowerPoint or PDF files

Duration of each Presentation:

Regular Oral Session: about **10** Minutes of Presentation and **2** Minutes of Q&A

Keynote speech 1

December 7, 2020 (11:00-11:30)

Prof. Suresh G. Advani

The University of Delaware, USA

Speech Title: Emerging Role of Process Models and Simulations in Composites Manufacturing

Suresh G. Advani is the George W. Laird Professor of Mechanical Engineering and Associate Director, Center for Composite Materials at the University of Delaware. He also has Courtesy appointments of Distinguished Professor at Ecole Centrale de Nantes in France and Indian Institute of Technology, Mumbai in India. He received his B. Tech degree from IITb in 1982 and Ph. D from University of Illinois at Urbana-Champaign in 1987. His research interests are in modeling rheology; fluid mechanics and heat transfer as applied to composite processing and alternate energy sources such as fuel cells and hydrogen storage. Advani has graduated over 100 Ph.D. and Masters students and published over 350 journal papers and delivered over 150 invited lectures. He is the lead author of a text on Process Modeling in Composite Manufacturing Processes and Simulation Software for Liquid Molding called LIMS. Professor Advani is a Fellow of American Society of Mechanical Engineers and is the North American Editor for the journal Composites Part A: Applied Science and Manufacturing. Professor Advani recently received the Outstanding Researcher Award from American Society of Composites and Educator of the year award from Society of Plastic Engineers. He also served as the Chair of Mechanical Engineering Department at the University of Delaware from 2012 to 2017.

Keynote speech 2

December 7, 2020 (11:30-12:00)

Prof. Katsuyuki Kida

Solid Mechanics Laboratory, University of Toyama, Japan

Speech Title: Fracture mechanics for design of silicon nitride ball bearings

Professor Katsuyuki Kida was born in 1968 in Osaka, where he studied mechanical engineering at Osaka University from 1988. Apart from course work, he studied rolling contact fatigue (RCF) occurring in TiC and TiN coated steels using both X-ray diffraction and scanning acoustic microscopy. After graduation he pursued his academic career and obtained a Ph.D. in engineering mechanics in 2000, investigating RCF problems of all-Si3N4 bearings. By observing cracking and flaking failure under RCF, he succeeded in explaining the material`s features from the viewpoint of fracture mechanics. From 2000 he focused his work on investigating the contact problems of several materials used in machine elements. He has also continued fundamental research on contact problems, for which he received 'The Best Paper Prize (FFEMS PRIZE)' from 'Fatigue & Fracture of Engineering Materials & Structures' journal in 2005. The awarded papers reported establishing a crack growth mechanism under contact pressure, a problem previously unsolved for over 70 years since S. Way's proposed theory. His research interests now include the development of three dimensional scanning Hall-probe microscope technologies, fatigue phenomena in polymer bearing, crack growth mechanism under contact stresses and refinement of high-carbon steels. He holds and has held a number of prestigious leadership roles in academy-industry corroboration programs: refinement of steels, new joint system in humanoid robots and fatigue of polymer bearings in "Strategic Fundamental Technologies Strengthening Assistance Programs" (Ministry of Economics, Trade and Industry, Japan, 2009-2013); scanning Hall-probe microscopy in "Fundamental Studies on Technologies for Steel Materials with Enhanced Strength and Functions" (Consortium of the JRCM, Japan, 2008-2012); and ceramic bearing elements in the project supported by "Japanese Energy and Industrial Technology Development Organization" (NEDO, Japan, 2007-2011)." As a chairperson of department of mechanical engineering in University of Toyama, Professor Kida is heading education and research projects (2019-).

Keynote speech 3

December 7, 2020 (12:00-12:30)

Prof. Dr.-Ing. Norazman Bin Mohamad Nor
National Defence University of Malaysia, Malaysia

Speech Title: Sustainable Bamboocrete Panel for Green Building

Brig Gen Norazman Mohamad Nor (Rtd). Graduated from University of Texas, USA in 1986 with BSc in Civil Engineering & Mathematics. Served in the Royal Engineer Regiment of the Malaysian Army (1986-2019). He obtained his MSc from University of Science Malaysia in 1995. He pursues his PhD at Cranfield University, UK in 1997 and was conferred with the doctorate in 2000. Currently, as a Professor in Engineering holding the post of Deputy Vice Chancellor (Research and Innovation) in National Defence University of Malaysia (UPNM). His current active researches include design of portable structural elements using advance and sustainable materials, innovation in blast protective structure and heat resistance wall, and military operational research. Professor Norazman is a Professional Engineer registered with Board of Engineer Malaysia, Fellow Institute of Engineer Malaysia, and an Associate ASEAN Engineer.

Keynote speech 4

December 7, 2020 (12:30-13:00)

Prof. Han-Yong Jeon
Department of Chemical Engineering, Inha University, Incheon, South Korea

Speech Title: Applicability Review of Degradable Resin Based Green Geosynthetics and Suggestion of Degradability Evaluation for Environmental Conservation

Prof. Han-Yong Jeon, geosynthetics/technical organic materials researcher and he was the 32nd President of Korean Fiber Society (2015) and 6th President of Korean Geosynthetic Society(201-2013). He has published more than 947 proceedings in domestic and international conferences. He wrote 25 texts including 'GEOSYNTHETICS' and also published 168 papers in domestic & international journals. He has awards of Marquis Who'sWho-Science and Engineering in 2003~2018 and "Top 100 Scientists in the World" of 2005/2011/2013 by IBC(International Biographical Centre, UK). Also, he got the 33rd Academy Award of Korean Fiber Society in 2006 and "Excellent Paper Award of 2012" by The Korean Federation of Science and Technology Societies.

Keynote speech 5

December 7, 2020 (13:00-13:30)

Assoc. Prof. Ir. Dr. Mohammed Alias Yusof
National Defense University of Malaysia, Malaysia

Speech Title: Development of Blast Resistant Glass Using Green Manufacturing Process

Ir. Dr. Mohammed Alias Yusof is an Associate Professor in the Department of Civil Engineering, Universiti Pertahanan Nasional, Malaysia. He graduated with B. Eng (Hons) degree in Civil Engineering from Universiti Teknologi Malaysia (UTM) in 2002, a MSc. degree in Integrated Construction Project Management from Universiti Teknologi Mara (UiTM) in 2005 and PhD degree in Civil Engineering from Universiti Pertahanan Nasional Malaysia in 2013. He is a Professional Engineer registered with the Board of Engineer Malaysia. His main research interests are in the blast resistant materials such as concrete,

glass, and also military and commercial explosives. He has developed a blast resistant concrete and had obtained the patent for the blast resistant concrete panel from Intellectual Properties Corporation of Malaysia (MyIPO) in 2016. He is knowledgeable in commercial and military explosives and had attended several courses in Explosives Engineering at Royal Military College of Science, Cranfield University, United Kingdom, and also at Wessex Institute of Technology, United Kingdom. In 2017, he has been awarded an honorary scientist by Venus International Foundation, Chennai, India for his valuable contribution in the field of blast resistant materials and also explosives.

Keynote speech 6

December 7, 2020 (13:30-14:00)

Ass. Prof. Koshiro Mizobe
Department of Mechanical and Intellectual Systems Engineering, University of Toyama, Japan

Speech Title: Effect of thermal and tribological conditions on fracture of polymer bearings made by various forming methods

Koshiro Mizobe is an assistant professor in the Department of Mechanical Engineering at the University of Toyama, Japan. He has published over 50 papers in various research fields including: evaluation of stress intensity factors, repeated heating, homology evaluation of microstructure, and polymer bearings. Koshiro studied mechanical engineering at Kyushu University, Japan, graduating in 2013. He studied the repeated quenching refinement method of high-carbon chromium steels in his PhD course. For this work he received the Research Fellowship for Young Scientists in 2013-2014 from the Japan Society for the Promotion of Science as well as Top Young Researcher Award in

2012 from Kyushu University. Since 2015 he has been an assistant professor in the Department of Mechanical Engineering at the University of Toyama. He has won some best paper awards from international committees (ICMDME, CMPSE and ICMTM) and received some grants (25th ISIJ research promotion grant from the Iron and Steel Institute of Japan and research promotion grant from JKA). His current research topics with a brief explanation are as follows. Repeated heating method Martensitic high-carbon high-strength bearing steel is one of the main alloys used for rolling contact applications where high wear resistance is required. Refining the prior austenite grain size through repeated heating is a process commonly used to enhance the material's strength. He studied the effect of repeated heating on the microstructure near inclusions through the rolling bending fatigue tests. Development of hybrid polymer bearings Koshiro is focusing on polymer bearings because it is suitable for the no lubricant situation and the corrosive situations. In particular, he focuses on PEEK which is a tough semi-crystalline thermoplastic polymer and PTFE which has low friction coefficient. Now, he develops the combination of PEEK races-PTFE retainer bearings.

Keynote speech 7

December 7, 2020 (14:00-14:30)

Prof. Tateo Usui

Emeritus Professor, Osaka University, Japan

Visiting Professor, Federal University of Ouro Preto, Brazil

Advisory Board Member for "The Research and Development of Ironmaking Process Using Ferro-coke," NEDO, Japan

Speech Title: Will be notified soon

Tateo Usui, 74, was educated at Osaka University; Graduated from Osaka University,

Department of Metallurgy, in March, 1969 and Graduated from Graduate School of Engineering, Osaka University, Department of Metallurgy, in March, 1974 and at the same time got the degree of Doctor of Engineering from Osaka University.

He started his carrier as Assistant Professor from April, 1974, in the same laboratory chaired by (late) Prof. Munekazu Ohmi, Department of Metallurgy, Faculty of Engineering, Osaka University. After the retirement of Prof. Ohmi in March, 1986, the laboratory was chaired by (late) Prof. Zen-ichiro Morita (the 38th President of ISIJ from April 1990 till March 1992) in November, 1988. After the retirement of Prof. Morita in March, 1994, the same laboratory was chaired by Prof. Usui in November, 1995. After his retirement from Osaka University in March, 2010, the title of Emeritus Professor of Osaka University was given to Prof. Usui. He started his second carrier as full Professor, Department of Mechanical Engineering, Fukui University of Technology from April, 2010 till March, 2012. From April, 2012 till March, 2017, the title of Guest Professor in Joining and Welding Research Institute, Osaka University was given to Prof. Usui. He started his third carrier as Visiting Professor, Federal University of Ouro Preto, Brazil, from September, 2013 until now.

In April, 1968, he started research activity as a graduation thesis on Unsteady Flow Dynamics in Prof. Ohmi's laboratory, and continued the topics in his Master and Doctor courses; in the meanwhile, he also started the topics on the rate enhancement of iron oxide reduction under pulsating flow. Based on these research activities, he got the degree of Doctor of Engineering, Prize of JSME 1) from JSME on "Theoretical Treatment of Pulsating Turbulent Pipe Flow," in April, 1977 and Nishiyama Commemorative Prize 2) from ISIJ on "Transport Phenomena and Reduction Rate Analysis of Iron Oxide Pellet," in April, 1986. His life work research activities more than 50 years are summarized as follows:

(1) Fluid Dynamics, Heat and Mass Transfer Analyses in and around a single particle, in a packed bed and a reactor

(2) Reduction Behavior of Iron Ore Agglomerates (Pellets and Sinter) and Kinetic Analyses of their Reaction Rates

(3) Experimental and Kinetic Analyses on Pre-reduction of Iron Oxide Pellets with Coal Carbonization Gas for Minimizing the Amounts of Coal Used in an In-bath Smelting

Reduction Total Process

(4) Basic Studies on Reduction of Carbon Composite Iron Oxide Pellets using Coke, Semi-char (from Coal), and Semi-charcoal (from Wood) in order to clarify the Rate Enhancement Effect of Residual Volatile Matter

(5) Experimental Studies on Gas-Solid-Liquid Transport Phenomena in the Lower Part of a Blast Furnace by using Cold Models

(6) Basic Studies on Impurity Concentration Control and Purification of Metals for Pig Iron Pre-treatment, Steelmaking Reaction, and Resource-making from Slag and Wastes

(7) Experimental and Thermodynamical Studies on Environmental Problems, such as CO_2 Emission Control in Steelmaker and Dioxin Emission Control in Sinter Plants and Combustion Furnaces

(8) Analysis and Control of Carburizing Reaction Rate as well as Basic Studies for Minimizing Hydrocarbon Volume in Carburizing Process of Steel

As a result, he got another various Prizes, such as

3) Gakujutsu Kouseki Prize (for distinguished services on Academic Activity) from ISIJ on "Ironmaking and Steelmaking in Consideration of Resources and Environment," in March, 2006

4) Best Paper Prize from High Temperature Society of Japan (this is old name for "Smart Processing Society for Materials, Environment & Energy, Japan") on "Dioxin Emission Control in Combustion Furnace," in May, 2008

5) The Poster Award for 17th IFHTSE Congress, 2008 from The Japan Society for Heat Treatment on "Relationship between Vacuum Carburizing Conditions and Surface Carbon Concentration of SNCM815," in October, 2008

6) Technical Paper Prize from JSEM on "Simple Removal Method of Dioxin from Exhaust Gases and Liquids," in August, 2009

7) Tanigawa – Harris Prize (for distinguished services on Academic Activity in High Temperature Metallurgy) from JIM on "Metals Processing mainly on Ironmaking and Steelmaking in Consideration of Resources and Environment," in March, 2011

8) Yamaoka Prize (for distinguished Group Research Activities) from ISIJ in Ironmaking Field, 6 times, in 1986, 1993, 1995, 2003, 2013, as a member and in 2007 as the chairman

9) Kusumoto Prize (for the Best Student in each Department) from Osaka University, in March, 1969

10) Osaka University Prize (for outstanding services on Academic Activity) from Osaka University, in January, 2007

11) Nishiyama Medal from ISIJ on "Iron and Steel Processing in Consideration of Resources and Environment," in March, 2019

12) Fray International Sustainability Award from FLOGEN Star OUTREACH, in October, 2019

13) Iron and Steel Merit Award from ISIJ on "Fundamental Studies on Ironmaking and Steel Processing in Consideration of Resources and Environment," in March, 2020

14) Merit Award from JSRPIM, in October, 2020

His Distinguished Activities are as follows:

(1) Chairman of Research Group in ISIJ on Iron Ore Sintering Process for Limonite Ore, twice, in 2000 – 2001 and 2001 – 2005

(2) Chairman of ICSTI'06 (The 4th International Conference of Science and Technology on Ironmaking), in 2003 – 2007

(3) Chairman of the High Temperature Process Division in ISIJ, in 2005 – 2007

(4) Chairman of ISISD 2010 (International Symposium on Ironmaking for Sustainable Development), 2009 - 2010

14:30-14:40	Photo & Break

Paper Session List

December 7, 2020 (14:40-17:00)

Paper Session

1. Paper ID: MP405

Title: Chloride Ingress Control and Promotion of Internal Curing in Concrete Using Superabsorbent Polymer

Authors: Ariel Verzosa Melendres, Napoleon Solo Dela Cruz, Araceli Magsino Monsada, Rolan Pepito Vera Cruz

Abstract: Chloride ingress into concrete from the surrounding environment can result in the corrosion of the embedded steel reinforcement and cause damage to the concrete. Superabsorbent polymer (SAP) with fine particle size was incorporated into the structure of concrete for controlling the chloride ingress and improving its compressive strength via promotion of internal curing. The SAP used in this study was evaluated for its absorbency property when exposed to cementitious environment such as aqueous solution of Ca(OH)2 and cement slurry. The results were compared to that in sodium chloride solution, the environment where absorbency of most of the SAP found in the market are well studied. Results showed that although SAP absorbency decreased with increasing concentration of Ca(OH)2 and cement, the results suggest that water containing cementitious materials are able to be absorbed by SAP. Chloride ingress into 28-day cured concrete specimens were determined using Rapid Chloride Penetration Test (RCPT) method employing 60V DC driving force. Concrete samples with size of 50 mm height x 100 mm diameter were prepared using a M25 mix design with 0.4 and 0.45 water to cement ratios and different percentages of SAP such as 0.05%, 0.1% and 0.15% with respect to cement mass. Results showed that concrete with 0.15% SAP gave the best result with 14% less chloride permeability than concrete with no SAP for a 0.4 water to cement ratio. Concrete samples for compressive strength tests with size of 200 mm height x 100 mm diameter were prepared using the same mix design and percentages of SAP and cured for 28 days. Results showed that the best results for compressive strength was found at 0.1% SAP at a 0.4 water to cement ratio which can be attributed to internal curing provided by SAP.

2. Paper ID: MP406

Title: Failure mechanism and energy absorption of foam filled hybrid aluminum-glass/epoxy tubes under three-point bending

Authors: Asad A. Khalid

Abstract: Experimental work has been performed on the behaviour of glass/epoxy, aluminum, and aluminum-glass/epoxy empty and polyurethane foam filled tubes subjected to three-point bending. Tubes were of circular and square cross section area.

Hand layup method was used to fabricate the tubes. Each tube is made of six layers. Inner diameter and total length of the tubes were 50 mm and 250 mm respectively. Bending load-displacement response, crush force efficiency, and absorbed energy were drawn and discussed. Effect of foam filler, material of the tube and stacking sequence on the maximum bending load was investigated. Energy absorption was determined and discussed. failure mode was investigated. It has been found that the polyurethane foam filler increased the maximum bending load and the energy absorption of the circular and square cross section area tubes. Using hybrid aluminum-glass/ epoxy enhanced the bending load and absorbed energy of the aluminum tubes. Cracks were observed at the upper and lower surfaces at the centre of the glass/epoxy tubes. While the aluminum tubes deformed significantly with either no cracking or with one crack appeared at the centre of the top surface of the tube.

3. Paper ID: MP407

Title: Investigation of the recyclability and compostability of biopolymers contaminated by petroleum-based polymers

Authors: Daniel GERE, Ferenc Ronkay, Tibor CZIGANY

Abstract: Nowadays, there is a growing demand for products made with the use of renewable resources that decompose into environmentally friendly components. As a result, more and more research is focused on developing biopolymers that degrade at the end of their lifetime under appropriate composting conditions. Poly(butylene adipate-co-terephthalate) (PBAT) is one of the most popular biodegradable biopolymers used in the packaging industry to produce films. In the case of petroleum-based polymers, most films are made from low-density polyethylene (LDPE).

However, the selective waste collection system is not yet prepared to collect biodegradable polymers separately from others, so different types of polymers can be mixed in the waste stream. This is also confirmed by the fact that some publications have already investigated the effect of biopolymer impurities on the recycling of petroleum-based polymers [1, 2].

The presence of contaminants can cause several problems during the recycling and composting of polymer blends. Due to non-biodegradable materials, the quality of compost deteriorates, and the time and cost of processing waste can increase significantly. Polymer blends are generally immiscible, resulting in the formation of an “island-sea” type morphological structure, resulting in the deterioration of mechanical properties.

Therefore, our goal was to investigate the mechanical and morphological properties and the biodegradability of different PBAT and LDPE blends. The aim of the manuscript is not to develop a new blend to improve the properties of PBAT or LDPE but to analyze the influence of contamination in the polymer waste stream on the recycling process.

In our experiments, we investigated the effect of biopolymer contaminants in petroleum-based polymers and also petroleum-based polymer impurities in biopolymers. We made different compounds from LDPE and PBAT by extrusion, and then specimens by film blowing from the compounds. We investigated the mechanical properties and the phase morphology of the samples and the compostability of the regranulates. LDPE and PBAT were thermodynamically immiscible. Therefore we observed a typical "island-sea" type morphology in SEM micrographs. Mechanical properties deteriorated with an increasing proportion of contaminants. PBAT-based samples were wholly degraded in 42 days, regardless of the degree of LDPE "contaminants".

4. Paper ID: MP411

Title: Simulation of Multilayer Nanosystems Interface Formation Process for Spintronics

Authors: Alexander Vakhrushev, Alexey Fedotov, Anatolie Sidorenko

Abstract: Modeling the processes of forming contact regions (interface) of the multilayer niobium-cobalt nanosystem is carried out. The morphology and composition of a multilayer nanosystem interface is investigated. The layer boundaries morphology is shown to depend on the deposition substrate temperature and, largely, is determined by preparing the surface for deposition. The work considers the deposition surface modification by removing its defects. Simulation showed that surface preparation significantly affects the morphology and composition of a multilayer nanosystem interface, depending on the type of deposited atoms and atoms forming the deposition surface.

5. Paper ID: 11

Title: Investigation of the mechanical behavior of natural vegetable fibers used in composite materials for structural strengthening

Authors: Jules Assih, Ivelina Ivanova, Flaviu FRIGURA-ILIASA

Abstract: This research aims to study the mechanical properties of industrial hemp fibers and to promote their use as a reinforcing composite material for reinforced concrete structures. Natural hemp fibers are of great interest due to the following advantages, which have: low cost, high strength-to-weight ratio, low density and non-corrosive properties. The use of plant fiber composite materials has increased significantly in

recent years as a result of reduction of the negative impact on the environment, as well as due to the tendency to use renewable resources and their possibility for recycling. They cause fewer health and environmental problems than synthetic fibers. Natural fibers, in addition to environmental aspects, have advantages such as low densities, ie. have low weight, interesting specific properties comparable to those of synthetic fiber materials, and last but not least low cost. Composites based on natural plant fibers can be used to reinforce or repair reinforced concrete structures, as shown by research on flax fiber composites. These biocomposites materials have very good resistance to bending and significantly increase the rigidity of the structure. The results show that the hemp fiber reinforcement has significant effects in the strengthening and increase from 5% to 35 % in flexural strength.

6. Paper ID: 12

Title: Effect of the silsesquioxanes structure on the mechanical properties of the silsesquioxanes

Authors: Jong Tae Leem, Woo Jin Kim, Woong Cheol Seok, Ju Hui Kang, Ho Jun Song and Sangkug Lee

Abstract: IT devices such as smartphones are equipped with a “cover window” made of glass. The cover window protects the display substrate from external impact. With the development of the foldable display, the cover window is required not only high hardness, but also a flexibility. Recently, in cover window materials, organic-inorganic hybrid materials have received great attention due to their high performance properties: high hardness, flexibility and thermal stability.

Silsesquioxanes are a representative structure of organic-inorganic hybrid materials. Silsesquioxanes have a structure of [SiO1.5R]n with Si-O-Si as a back-bone. Internally, silsesquioxanes have inorganic structure of Si-O-Si and are externally surrounded by organic chain. So, silsesquioxanes have various advantages over existing inorganic particles such as enhanced solubility and miscibility in various solvent and polymer. In addition, silsesquioxanes can realize excellent properties such as high hardness as well as excellent thermal stability.

In this study, we synthesized two types of silsesquioxanes using by sol-gel reaction. The synthesized silsesquioxanes have polyhedral oligomeric silsesquioxane (POSS) structure and a ladder-like polysilsesquioxanes (PSQ) structure. The synthesized structures were analyzed through GPC and NMR. At analyzing thermal properties, silsesquioxanes showed high thermal stability over 400℃. Also, PSQ showed high pencil hardness of 9H

and high flexibility due to its high molecular weight and unique double-stranded structure. On the other hand, POSS structure showed a decrease in pencil hardness and flexibility due to aggregation phenomenon.

7. Paper ID: 15

Title: Chemical Activation of Garcinia Mangostana Mangosteen Shell with Acid-Base for Hexavalent Chromium Adsorption

Authors: Panida Charnkeitkong, Siriporn Sripiboon

Abstract: This study investigates the potential for using mangosteen shell which is an agricultural waste to chemically activate using potassium hydroxide (KOH) or phosphoric acid (H3PO4) and then carbonized for 120 min at 673 K, to adsorb hexavalent chromium (Cr6+) from solution. The high iodine number and methylene blue number on the base-activation as a good adsorbent that a high surface area of this activated carbonaceous material is effective in removing Cr6+, with adsorption increasing with temperature, adsorption time, and initial feed concentration. With decreasing solution pH, the maximum of Cr6+ adsorption capacity and removal at a pH of 2.0 was achieved.

8. Paper ID: MP415

Title: Evaluation of Internal Crack growth of PPS Thrust Bearings under Rolling Contact Fatigue in Water

Authors: Shintaro Kanagawa, Takahiro Matsueda, Katsuyuki Kida, Yuji Kashima

Abstract: In this study, in order to evaluate the progress of internal cracks in PPS thrust bearings under rolling contact fatigue in water, cracks were observed by a full-cross-section observation method using a lathe machining. “Main subsurface crack” initiated at the surface toward the inside, then grew in a direction parallel to the surface. They connected with many “Semi-circular cracks” initiating at the surface from the opposite side to the inside, to from a semi-ellipsoidal flaking damage. It was found that the “Semi-circular cracks” and the “Main subsurface crack” dominated the flaking destruction.

9. Paper ID: 16

Title: Effect of Cement Grouts Containing Irradiated Polyethylene Terephthalate on Properties of Semi-Flexible Mixtures

Authors: Muhammad Imran Khan, Lim Shwe Wen, Muslich Hartadi Sutanto, Madzlan Bin Napiah

Abstract: Seme-flexible pavement surface is a hybrid type of pavement surface which combines the effect of both asphalt mix skeleton and cement grout. The current study

investigates the influence of cement grouts containing irradiated waste polyethylene terephthalate (PET) on the performance of semi-flexible mixtures. The ordinary Portland cement was partially replaced by regular and irradiated PET as well as with fly ash (FA) in cement grouts. The air voids analysis, degree of grout saturation, Marshal stability, indirect tensile strength (ITS) and tensile strength ratio (TSR) of semi-flexible specimens were evaluated. The semi-flexible mixtures showed superior performance in terms of strength properties. The results indicate that with the irradiation process more waste PET (almost double) can be recycled as compared to regular waste PET in cement grouts for semi-flexible pavement surfaces. This approach will lead to sustainable solution of recycling waste PET in highway materials for the construction of hybrid type of pavement surface.

10. Paper ID: MP414

Title: Determination of Total Petroleum Hydrocarbons Concentration in Coastal Seawater of Teluk Batik Beach, Perak, Malaysia

Authors: Khalid Sayed, Lavania Baloo, Shamsudeen Temitope Yekeen, Mubarak Usman Kankia, Ahmad H. Jagaba

Abstract: The study aims to determine Total Petroleum Hydrocarbon (TPH) status in seawater from Teluk Batik beach seawater. In July 2018, the Hong Kong fishing vessel sunk two nautical miles off Pematang Damar Laut, a coastal village within the town of George Town, Penang Malaysia, which also impacted the coastline of Perak State. Approximately six tons of diesel and hundreds of liters of fuel oil drifted from the Penang sea to the Perak coast. On further subsequent wave action the TPH concentrations in seawater fluctuated over time. In the coastal water of Teluk Batik Beach, Perak, Malaysia, grab samples were taken from surface seawater for determining the TPH concentrations in November and December 2019. The TPH in seawater was determined by the extractable solvent (Hexane) and the additional petroleum hydrocarbons by the Infrared (IR) method. The values of TPH ranged from 91 to 503 mg/L. Compared to the standards in Malaysian waters, the TPH levels found in this study were high, indicating serious pollution of TPH in the area under study.

11. Paper ID: MP416

Title: Preparation of hexagonal boron nitride@ZnFe2O4 hybrid particles and its effect on flame retardancy of polyvinyl alcohol

Authors: Xiaodong Wang, Yanjun Yin, Mingling Li, Yuan Hu

Abstract: In this study, an ecofriendly flame retardant was synthesized by hydrothermal

method. The structure and morphology of h-BN@ZnFe2O4 were characterized by TEM, XPS, and XRD. PVA nanocomposites were prepared by adding h-BN@ZnFe2O4 as filler into PVA. The effect of h-BN@ZnFe2O4 on the flame retardant properties of PVA composites was studied and the flame retardant mechanism was also analyzed. The results showed that the peak heat release rate of PVA nanocomposites was slightly lower than that of pure PVA and the amount of CO, CO2, and hydrocarbons produced by the pyrolysis of PVA nanocomposites is less than that of pure PVA. The fire safety of PVA composites was improved, which was mainly due to the barrier effect of the two-dimensional nanosheet structure of h-BN and the formation of a carbon layer catalyzed by ZnFe2O4 to enhance the shielding effect.

12. **Paper ID: MP409**

Title: The effect of arc length on heat exchange and electric power consumption in electric arc steel-making furnaces(EAF).

Authors: Makarov Anatoliy Nikolaevich, Singh Kapil Dev

Abstract: The effect of arc length on heat exchange and specific power consumption in electric arc steel-making furnaces was studied. A modern electric arc steel-making furnace (EAF) with a capacity of 100-tons of metal, EAF-100, was used as the study model. With an increase in the arc length from 300 to 425 mm, that is, by 1.42 times and with a constant height of the slag layer, the thermal radiation fluxes of arcs on the walls increased by 1.3-1.6 times whereas the arc efficiency decreased by 30% and the specific power consumption increased by 25-30%.

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