2018 X-ACADEMY Bangkok CONFERENCE SCHEDULE

2018 7th International Conference on Advanced Materials and Engineering Materials (ICAMEM 2018)

Bangkok, Thailand

May 17-18, 2018

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Simple Version of the Schedule

ICAMEM2018 CONFERENCE SCHEDULE

May 17, 2018 (Thursday) Lobby of MANDARIN HOTEL BANGKO		
14:00-17:00	Registration	
May 18, 2018 (Friday) Budsaba Room, 1st Floor		
9:00-12:15	Keynote Session & Plenary Session	
	9:00-9:30	Plenary speech 1: Prof. Katsuyuki Kida *Topic: Scanning Hall probe microscopy for stress concentration of steels*
	9:30-10:00	Plenary speech 2: Ass. Prof.LAU, Denvid *Topic: Multiscale modeling of Chitin-based Materials*
10:00-10:15	Tea Break & Photo	
10:15-10:45	Keynote speech 1: Prof. Takumi Konno *Topic: Non-Coulombic Ionic Crystals Showing Unusual Arrangement of Complex Cations and Inorganic Anions*	
10:45-11:15	Keynote speech 2: Prof. Tom Wu *Topic: Photodetection from mid-IR to X-ray using semiconductor heterostructures*	
11:15-11:45	Keynote speech 3: Prof. Junling Wang *Topic: Unique Properties of 2D Ferroelectric CuInP2S6*	
11:45-12:15	Keynote speech 4: Prof. Kheng Lim Goh *Topic: Effective repair strategy for damaged fibre composites in automotives: fundamentals and challenges*	
12:15-13:00	Lunch	
13:00-15:00	Session 1(Budsaba Room)	Session 2(Pornphailin room)
15:00-15:15	Tea Break	
15:15-16:00	Poster Session (Budsaba Room)	Poster Session (Pornphailin room)
16:00-18:00	Session 3(Budsaba Room)	Session 4(Pornphailin room)

Committees

Internation Program Committee Chair (Taiwan)

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Dr. Hui-Mi Hsu, National Ilan University, Taiwan

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Yasin POLAT, Nevşehir Hacı Bektaş Veli University, Turkey

Internation Program Committee Chair (France)

Charafeddine Jama, Université de Lille, France

Venue

Conference venue: MANDARIN HOTEL BANGKOK

Add: 662 Rama IV Road, Bang Rak, Bangkok, 10500 Thailand.

Phone: (662) 238-0230

Fax: (662) 237-1620

Email: mandarin@mandarin-bkk.com

Web: http://www.mandarin-bkk.com/

Note:

1. All the participants are strongly advised to arrive before 8:50, May 18, 2018.

2. Certificate of Participation can be collected at the registration counter.

3. Please copy PPT files of your presentation to the secretary when registration.

4. The organizer doesn't provide accommodation, and we suggest you make an early reservation.

5. If you want to deliver oral presentation but your paper is not in the session list, please contact us by Email: cfp@icamem.org (for ICAMEM2018)

Instruction about Oral Presentation

Devices Provided by the Conference Organizer:

Laptops

Projectors & Screen

Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF files

Duration of each Presentation:

Regular Oral Session: about 7 Minutes of Presentation and 3 Minutes of Q&A.

Plenary Speech

May 18, 2018 (9:00-10:00) at Budsaba room

Plenary Speech 1 9:00-9:30

Prof. Katsuyuki Kida
University of Toyama, Japan

Prof. Katsuyuki Kida was born in 1968 in Osaka, where from 1988 he studied mechanical engineering at Osaka University. 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 completed a Ph.D. course 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 elements used in automobiles such as high-pressure pump of new type diesel engines. He has also continued the fundamental research on contact problems, which received 'The Best Paper Prize (FFEMS PRIZE)' from 'Fatigue & Fracture of Engineering Materials & Structures' journal in 2005 and 'AML-Scientist Award' from 'Advanced Materials Letters' journal in 2011. The awarded papers reported establishing a crack growth mechanism under contact pressure, a problem that had not been solved for over 70 years since S. Way's theory. Prof. Kida has been honored with prestigious 'IAAM Medal' of year 2013 for notable and outstanding research in the field of materials science & technology at 'Advanced Materials World Congress (AMWC 2013, Çeşme, Turkey, 16-19 September, 2013)' from International Association of Advanced Materials. 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 bearing 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)."

Plenary Speech 2 9:30-10:00

Ass. Prof. LAU, Denvid
City University of Hong Kong

Denvid obtained his Bachelor degree with first class honors and Master degree in Civil Engineering from the University of Hong Kong (HKU) in 2004 and 2006 respectively, and got his second Master degree from the Department of Civil and Environmental Engineering (CEE) at Massachusetts Institute of Technology (MIT) in 2009. He then received his Ph.D. in the field of structures and materials from MIT in 2012. Prior to joining the City University of Hong Kong as an assistant professor in August 2012, he worked as a postdoctoral associate at MIT. Denvid got various awards and scholarships during his undergraduate and graduate studies including the Croucher Foundation Scholarship (2006-2009) and the Marvin E. Goody Award (2007). He was named as one of the Harvey Fellows in 2011. His research focuses on the multiscale modeling of organic-inorganic system, moisture-induced debonding, durability of concrete-epoxy system and fiber-reinforced polymer (FRP) composites in structural rehabilitation. To date, Denvid has attracted over HK$9 million fund in total for research and teaching development. He is currently the editorial board member of several international journals including Composites Part B: Engineering, which ranks top 5% in Engineering Multidisciplinary category in ISI. He has published more than 80 referred journal and conference articles and has delivered more than 25 invited talks around the world. Recently, Denvid has been nominated and selected as a Founding Member of the Young Academy of Sciences of Hong Kong (YASHK).

10:00-10:15	Photo & Coffee Break

Keynote Speech

May 18, 2018 (10:15-12:15) at Budsaba room

Keynote Speech 1 10:15-10:45

Prof. Takumi Konno
Osaka University, Japan

Takumi Konno received his Ph.D degree in 1985 from University of Tsukuba. After working at University of Cincinnati as a postdoctoral fellow, he became an assistant professor at University of Tsukuba in 1987. In 1997, he moved to Gunma University as an associate professor and was promoted to a full professor in 1998. He was appointed as a full professor of Osaka University in 2000. He has published more than 200 papers in reputed journals and is now serving as a section editor of Chemistry Letters and a research director of CREST (Japan Science and Technology).

Keynote Speech 2 10:45-11:15

Prof. Tom Wu
University of New South Wales, Sydney

Dr. Tom Wu (吴韬) received his B.S. degree from Zhejiang University in 1995 and Ph.D. degree from the University of Maryland, College Park in 2002. Before joining University of New South Wales (UNSW) in Sydney as a full professor, he worked as a postdoc in Argonne National Laboratory in Chicago, an assistant professor in Nanyang Technological University (NTU) Singapore, and an associate professor in King Abdullah University of Science and Technology (KAUST). Dr. Wu has authored more than 200 peer-reviewed papers in the areas of oxide thin films, nanomaterials, and hybrid perovskites, with a focus on their electronic, magnetic and optical functionalities. He

has citation close to 8000 with a H-index of 49. His group has witnessed the career development of 14 PhD students and 25 postdocs. He also serves as an Associate Editor for ACS Applied Materials & Interfaces.

Keynote Speech 3 11:15-11:45

Prof. Junling Wang

Nanyang Technological University, Singapore

Professor WANG Junling obtained his B.S. degree from Nanjing University in 1999, and Ph.D. degree from University of Maryland, College Park in 2005. After spending 1.5 years at PennState University as a postdoc, he joined Nanyang Technological University, Singapore as an Assistant Professor in 2006. He was promoted to Associate Professor with tenure in 2011 and Professor in 2017. Professor Wang Junling's research activities focus on perovskites with the chemical formula of ABX3. These materials possess a wide range of exotic properties ranging from highly insulating to superconducting, from dielectric to ferroelectric and multiferroic. His recent work also includes 2D layered materials that possess ferroelectric and/or magnetic properties. He has published 130 papers in high impact journals, including Science, Nature Communications, NPG Asia Materials, Advanced Materials, PRB and APL. His work has been cited more than 8800 times.

Keynote Speech 4 11:45-12:15

Prof. Kheng Lim Goh

University of Newcastle, Singapore

Kheng Lim Goh is a Chartered Engineer and Chartered Physicist with the Institute of Mechanical Engineers (UK) and Institute of Physics (UK). His research interest is in the repair of fibre reinforced composites used in aerospace and automotive engineering. He holds the position of Associate Professor at the Newcastle University Singapore and is affiliated to the School of Mechanical and Systems Engineering, Newcastle University

(UK). Professor Goh has authored and co-authored over 70 papers in peer-reviewed journals, books and conferences that cover a wide range of composite materials, together with collaborators from Malaysia, Singapore, UK and Canada. His research theme underlies an understanding of the physical properties of natural and synthetic materials and implications for designing composites for engineering applications and for repairing damaged composites. He is the author of a book on 'Discontinuous-fibre reinforced composites: fundamentals of stress transfer and fracture mechanics' published by Springer

Session List

Session 1

May 18, 2018 (13:00-15:00) at Budsaba room

1. Paper ID: 18
Title: Investigation on thermal absorptivity of PCM matrix material for photovoltaic module temperature reduction
Authors: V. Karthikeyan, Chatchai Sirisamphanwong, Sukruedee Sukchai
Abstract: Photovoltaic (PV) system undertakes challenge from increasing module temperature (Tmod) particularly due to stagnation of thermal energy (TE) on its surface. Efforts on reducing the Tmod is widely experimented in many ways, like incorporating latent heat storage material (PCM) with PV module to reduce the Tmod through radiation and convection mode of heat transfer. This paper concentrates in selecting an effective thermal absorption material for fabrication of PCM matrix and optimizing the critical spacing between the PV module to PCM matrix. The thermal absorptivity of Aluminum (Al) and Copper (Cu) were analyzed with and without absorber coatings at different spacing conditions. It is observed that Al matrix tube with absorber coating is absorbing 3.0 ℃ more than copper at 6mm. Hence further studies on the Tmod reducing will be effective with the use of Al has PCM matrix tube.

2. Paper ID: 30
Title: Considering Cost Balance to Predict Material Demand
Authors: Hui-Hsin Huang
Abstract: The material demand prediction is an important issue no matter in industrial study or in materials and manufacturing technology. This paper stands on the view of point of productivities to consider cost balance when forecasting material demand. The different probability distributions are demonstrated to portray the input(material demand) and output(cost). A case study with its empirical data is released to derive the probability function of cost and estimate the parameters of the proposed model. The proposed model can extend to different distributions depending on different kind of cost or different type of industries and is more widely applicability.

3. Paper ID: 31
Title: Development of Thermal Energy Storage as a Supplemental Heat Source for Solar Dryer
Authors: Malinee Kaewpanha, Wikarn Wansungnern, Sathit Banthuek
Abstract: The current work presents about the development of thermal energy storage (TES) using paraffin wax as a phase change material (PCM). In order to investigate the performance of TES as a supplemental heat source for solar dryer when no sunshine, the TES was connected with solar dryer having maximum capacity for 10 kg of fresh chilies. The TES unit consists of 28.35 kg PCM and copper tube inside the cylindrical tank. The charging process of the TES is carried out with the help of electrical heater. The paraffin wax in the TES starts to melt and absorb the energy till it turns to liquid state. For heat discharging process during the off sunshine hours, air with mass flow rate of 0.0023 kg/s at ambient temperature can be passed through the copper tube in the TES in order to provide hot air for the dryer. From the performance analysis results, it is observed that the temperature of drying chamber can be maintained about 40-50 °C for 3 hours at least after sunset and higher than ambient temperature about 16.72 °C. The novel design of TES successfully increases the performance of the drying systems and reduces the time for drying process.

4. Paper ID: 34
Title: Lead (II) removal from contaminated soils by electrokinetic remediation coupled with modified eggshell waste
Authors: André Ribeiro, André Mota, Margarida Soares, Carlos Castro, Cândida Vilarinho, Jorge Araújo, Joana Carvalho
Abstract: Electrokinetic remediation deserves particular attention in soil treatment due to its peculiar advantages, including the capability of treating fine and low permeability materials, and achieving consolidation, dewatering and removal of salts and inorganic contaminants like heavy metals in a single stage. In this study, the remediation of artificially lead (II) contaminated soil by electrokinetic process, coupled with Eggshell Inorganic Fraction Powder (EGGIF) permeable reactive barrier (PRB), was investigated. An electric field of 2 V –cm was applied and was used an EGGIF/soil ratio of 30 g-kg of contaminated soil for the preparation of the permeable reactive barrier (PRB) in each test. It was obtained high removal rates of lead in both experiments, especially near the cathode. In the normalized distance to cathode of 0.2 it was achieved a maximum removal rate of lead (II) of 68, 78 and 83% in initial lead (II) concentration of 500 mg -1, 200 mg -1 and 100 mg -1, respectively. EGGIF (Eggshell Inorganic Fraction) proved that can be used as permeable reactive barrier (PRB) since in all the performed tests were achieved adsorptions yields higher than 90%.

5. Paper ID: 37
Title: Preparation of Activated Carbon-Based Catalyst from Candlenut Shell Impregnated with KOH for Biodiesel Production
Authors: TASLIM, OKTA BANI 1,b , IRIANY, NOVI ARYANI, GAPENDA SARI KABAN
Abstract: Candlenut shell is an agricultural waste which can be processed into low-cost

active carbon. Activated carbon cannot be used directly as a heterogeneous catalyst in transesterification of biodiesel because of its low alkalinity, thus treatment is required. In this study, the carbonization of candlenut shells was conducted at 500°C for 4 h. The activated carbon obtained was modified by impregnation with potassium hydroxide (KOH) solution. KOH concentration used was 50g/150 ml aqua des and impregnation time was 24 h. The impregnated activated carbon was characterized by Scanning Electron Microscopy - energy dispersive spectroscopy (SEM-EDS), Fourier Transform Infrared (FTIR) spectroscopy, and was further tested as a heterogeneous catalyst for biodiesel production.

6. Paper ID: 43
Title: Study of the optoelectronic properties of hybrid heterojunction
Authors: R. Yatskiv, S. Tiagulskyi, J. Grym, N. Basinova
Abstract: Unique properties of ZnO and the ease of the growth of its nanostructures make this material extremely attractive for a variety of optoelectronic applications. To fully exploit the potential of ZnO, there is one essential problem which must be solved: the preparation of a high-quality rectifying junction. The lack of p-type electrical conductivity in ZnO emphasizes the importance of the study of hybrid heterojunctions. One of the key issues in these heterojunctions is to understand the charge transport mechanism. In this work we presented systematically analysis of the charge transport mechanism in hybrid heterojunctions formed by a single ZnO nanorod or the array of nanorods and p-type GaN substrate or CuO nanorods.

7. Paper ID: 44
Title: Empirical model of Operating Temperature and Pressure Effect towards Pure and Binary O 2 / N 2 Gas Permeability in Polysulfone Membrane
Authors: Serene Sow Mun LOCK, Kok Keong LAU, Irene Sow Mei LOCK, Azmi Mohd SHARIFF, Yin Fong YEONG, Faizan AHMAD
Abstract: Oxygen (O 2) enriched air combustion via adaption of polymeric membranes has been proposed to be a feasible alternative to increase combustion proficiency while minimizing the emission of greenhouse gases into the atmosphere. Nonetheless, majority of techno-economic assessment on the O 2 enriched combustion evolving membrane separation process are confined to assumption of constant membrane permeance. In reality, it is well known that membrane permeance is highly dependent upon the temperature and pressure to which it is operated. Therefore, in this work, an empirical model, which includes the effect of temperature and pressure to permeance, has been evaluated based on own experimental work using polysulfone membrane. The empirical model has been further validated with published experimental results. It is found that the model is able to provide an excellent characterization of the membrane permeance across a wide range of operating conditions for both pure and binary gas with determination coefficient of minimally 0.99.

8. Paper ID: 45
Title: Omni-friendly Candlelight OLED
Authors: Jwo-Huei Jou, Deepak Kumar Dubey

Abstract: Improper exposure to intensive electric light may cause damage to retina, suppress melatonin generation, disrupt ecosystems, discolor artifacts, and pollute the night skies. Blue light including short wavelength emissions were identified to be the major culprit. We will present herein a deep-blue light less candlelight-style organic light emitting diode (OLED), which shows a much lower melatonin suppression sensitivity (MSS) and a much larger maximum permissible exposure-limit (MPE), especially as compared against those of the cold white counterparts of the CFL, LED and OLED. This candlelight OLED can also exhibit high device efficiency. Moreover, it attracts much less insects at night, proving to be ecoloigically-friendly.

9. Paper ID: 46
Title: Highly efficient for fully printable organic-inorganic hybrid bulk heterojunction thin-film solar cells
Authors: Takehito Kato, Yuki Kurokawa, Sakio Nakamura
Abstract: Photovoltaic cells, which are expected to serve as a clean and renewable energy source, are among the most abundant technologies for energy on Earth besides hydropower and wind power. On the other hand, organic-inorganic hybrid thin-film solar cells constructed using polythiophene derivatives and metal alkoxides constitute promising and novel organic-inorganic hybrid devices. This time, we presented a three-component layer as the photoactive layer using the phase-separation assistant material. As a result, the three-component bulk heterojunction solar cell with the p-type semiconducting polymer / TiOx / fullerene derivative structure as a photoactive layer exhibited higher current density than the conventional two-component solar cell. We will discuss this result and the phase separation structure of the photoactive layer at the conference.

10. Paper ID: 49
Title: Micro-crack Analyses of Chromium Steel JIS-SCr 420 for Helical Gear Transmission
Authors: Visanu Boonmag, Ongarj Wisesook, Aphinan Phukaoluan, Ganwarich Pluphrach
Abstract: This research aims to investigate micro-crack on a failed for helical gear transmission which was to adjust the engine to increased horsepower. The helical gears made are from chromium steel JIS-SCr 420. The spectrophotometer test machine was used to detect chemical composition, Mechanical properties were evaluated by Vickers hardness and microstructural analysis with an optical microscope, which the crack of the surface layer and energy dispersive spectroscopy using a scanning electron microscope. The results showed that the fracture characteristic of the helical gear's surface was expected to beach marks and break away. It can be seen that the mixing failure area of oxide inclusion with carbide surrounding before the liquid state of material will be solidified which caused the failure cause of this helical gear. The summary analysis results can be accorded with the assumption of this research and which help prolong service life of the component.

11.Paper ID: 54
Title: Patterned Photonic Nitrocellulose for High-Throughput Bioassays
Authors: Junjie Chi, Hong Liu

Abstract: Cellulose and its derivatives like nitrocellulose and acetylcellulose have been utilized in analytical chemistry and bioassays for hundreds years, such as litmus paper, chromatographic paper and immunochromatographic test strip. Paper-based devices/chips attracted attention of researchers since the first paper chip reported by Whitesides. The paper chips based on microfabrication technique make a great difference of point-of-care testing, which is low-cost, rapid and portable. However, the traditional paper substrates still have drawbacks. The random structure of the paper cannot approve high reproducibility and the brightener causes high background signal. Here, we proposed photonic nitrocellulose based on self-assembly technique which is more cost-effective than microfabrication technique for bioassays. Integrated the ordered inverse opal structure and the fluorescence enhancement effect of the photonic nitrocellulose, we could detect antigens and nucleic acids with high reproducibility and sensitivity. In addition, with the easy fabrication of photonic nitrocellulose arrays, we realized high-throughput detection.

12.Paper ID: 63
Title: Simulation of CO2 Adsorption to Enhance Adsorbent Material Efficiency
Authors: Supawon Sangsuradet, Patcharin Worathanakul
Abstract: Computer simulation techniques have gained many attentions. The objective of this research was to study influence of the exchangeable cations of Group 1A (Li+, Na+, K+, Rb+, Cs+) on the CO2 adsorption in the system using Grand Canonical Monte Carlo (GCMC) simulation. In this simulation, zeolite is a simulation box. The interaction potential simulation with Lennnard- Jones potential showed that Li+ and CO2 had the greatest molecular attraction with Li+ having the highest number of CO2 molecules in the simulation box. The number of CO2 /molecules in the simulation box are as followed with Li+ > Na+ > K+ > Rb+ > Cs+.

Session 2

May 18, 2018 (13:00-15:00) at Pornphailin room

1.Paper ID: AM835
Title: ICAMEM2018
Authors: Juan Antonio ZAPIEN
Abstract: The power of SE to provide non-imaging subwavelength scale information is well known in the semiconductor industry where it has been used to determine optical critical dimension (OCD) characterization of purposely made 1D gratings using the Rigorous Coupled-Wave Analysis (RCWA) technique. However, RCWA presents difficulties for the modeling of 2D and plasmonic structures. Our group has provided the first systematic demonstration of a suitable alternative to RCWA for the optical characterization of such complex samples by SE using the Finite-Difference Time-Domain (FDTD) method. This approach provide numerical results with precision equivalent to ~

1/2-monolayer thickness sensitivity and provide an alterative computational technique that can extend the application of SE to provide detailed information on complex samples including photonic and plasmonic subwavelength structures of interest for sensing and energy applications. Including our works on self-assembled nanolasers and organic solar cells.

2. Paper ID: 17
Title: Determination of Material Property for Non-Pneumatic Tire Spokes by Inverse Method
Authors: Ravivat Rugsaj, Chakrit Suvanjumrat
Abstract: The radial spokes of non-pneumatic tire have been developed to absorb impacts. In order to obtain its property for the further developments, it had to cut into the curve beam specimens. The 3-point bending was selected to test referring to ASTM D790. Subsequently, the finite element method was employed to simulate the 3-point bending test of specimens. The inverse method was used to determine the modulus of elasticity for specimen material. The gradient based on optimization scheme was used to optimize the modulus of elasticity by the input and output condition which was the vertical deflection and force, respectively. The optimized process was terminated at the desirable force tolerance of 0.00071 N. The elastic modulus of spoke was implemented in the finite element model of the 3-point bending test. There was found that the simulation result of vertical displacement obtained an average error of 4.87% by comparing with physical experiment

3. Paper ID: 19
Title: Material Characteristic for Capability Analysis of Solid Tire by Finite Element Method
Authors: Juthanee Phromjan, Chakrit Suvanjumrat
Abstract: The natural rubber compound of each layer of solid tire had determined the mechanical properties in tension. It was found that the stress-strain relation of each material tire layer was fitted very well with the Ogden constitutive model. The R2 which was 0.986, 0.996 and 0.985 represented the certain curve fitting on the internal, middle and tread layer of solid tire, respectively. Subsequently, the Ogden model was implemented in the finite element model of the rubber specimen and solid tire. The finite element analysis results obtained an average error of 18.00% and 14.63% for the specimen and solid tire model by comparing to the physical experiment, respectively. Particularly, the mechanical properties of the natural compounds could be used to predict the ultimate compression load for the solid tire failure.

4. Paper ID: 23
Title: Effect of Air Entraining Agent on Uniaxial Tensile Properties of PVA-ECC
Authors: Jincai Zhu, Zigeng Wang, Yue Li, Zhanguo Li
Abstract: In this paper, polyvinyl alcohol (PVA) fiber reinforced ECC (Engineered Cementitious Composites) mortar was selected as the research object. The effect of air entraining agent on the tensile properties of PVA-ECC was studied by uniaxial tensile test

with different dosages. The results showed that the tensile strength reduced by adding air entraining agent. When the amount of fly ash increased with adding a large amount of air entraining, the tensile strain reduced. In addition, the tensile strain of the cementitious material with no fly ash increased when incorporating air entraining agent.

5. Paper ID: 26
Title: Applying Artificial Intelligence to Improve Ultrasonic Pulse Velocity Test Using Support Vector Machine
Authors: LOAN NGO, YU-REN WANG
Abstract: In the construction industry, to evaluate the compressive strength of concrete, destructive and non-destructive testing methods are used. Non-destructive testing methods are preferable due to the fact that those methods do not destroy concrete samples. However, they usually give larger percentage of error than using destructive tests. Among the non-destructive testing methods, the ultrasonic pulse velocity test is the popular one because it is economic and very simple in operation. Using the ultrasonic pulse velocity test gives about 20% MAPE comparing to destructive test results. This paper aims to improve the ultrasonic pulse velocity test results in estimating the compressive strength of concrete by adapting artificial intelligent. To establish a better prediction model for the ultrasonic pulse velocity test, data collected from 312 cylinder of concrete samples are used to develop and validate the model. Incorporating with support vector machine, the input data is under the effect of the ultrasonic pulse velocity test; the actual compressive strengths are set as the target output data to train the model. Linear and non-linear regression models are considered. The results show that MAPEs for the linear and nonlinear regression models are 11.17% and 17.66% respectively. The MAPE for the support vector machine models is 10.495%. These research results can provide valuable information when using the ultrasonic pulse velocity test to estimate the compressive strength of concrete.

6. Paper ID: 27
Title: Study on Axial Compression Test of Corroded Reinforced Concrete Columns Reinforced by MPC Bonding CFRP
Authors: Chang Zhao, Yue Li, Zigeng Wang, Zhanguo Li
Abstract: In this paper, reinforced concrete was first reinforced by magnesium phosphate cement (MPC) bonding carbon fiber sheets (CFRP). The axial compression test was conducted to evaluate the property of the MPC-CFRP reinforcement corroded reinforced concrete column. The results showed that the MPC-CFRP reinforcement corroded reinforced concrete columns had better structural bearing capacity and ductility in the process of compression failure.

7. Paper ID: 28
Title: Study on the improvement of water resistance of magnesium phosphate cement by steel slag
Authors: Mengyang Xie, Zhanguo LI, LI Yue, Zigeng Wang
Abstract: Steel slag powder was used as a mixed material of magnesium phosphate cement (MPC) to improve its mechanical water resistance. The mechanism of steel slag

on MPC was studied through the composition and microstructure test of MPC hydration products. The results showed that the strength of magnesium phosphate cement gradually decreased with the increase of immersion time after adding steel slag. Adding 15% steel slag could improve the water resistance of MPC, make the structure compact and reduce the strength loss rate.

8. Paper ID: 42

Title: Improvement in Low Temperature Cracking Properties of Reclaimed Binder Using Waste Engine Oil

Authors: Hassan Farooq Afridi, Arshad Hussain, Syed. Tariq Shah

Abstract: Low-Temperature pavement crack are common Pavement distress associated with higher percentages of Rap in asphalt mixes in colder areas. Higher Rap percentages makes the asphalt binder Stiffer which causes low temperature cracking. One of the approach to reduce the impact of higher Rap content on the mix is by using recycling agent or softening agent. recycling agent or softening agent are added to aged asphalt binder to restores its property physically and rheologically.

In this study 4 and 8 percent of waste engine oil is manually mixed with 25 and 50 percent of Rap at 155°c using glass rod. Optimum percentage of Reclaimed binder and waste engine oil(WEO) was selected using Penetration approach. The blend of 25 percent Rap and 4 percent waste engine oil was selected based on similarity of its penetration value to grade 60-70 asphalt binder. Moreover, the selected blend of 25 percent Rap and 4 percent waste engine oil was simulated for short term ageing in lab using rolling thin film oven and RTFO aged was further aged in Pressure Ageing vessel(PAV) for 20 Hours at 100°C for long term. the residue of PAV was tested further for low temperature cracks using bending beam rheometer. It was concluded from test that 4 percent of waste engine oil can softened reclaimed asphalt pavement up to 25 percent.

9. Paper ID: 56

Title: Effect of Alkaline Activators to Engineering Properties of Geopolymer – based Materials Synthesized from Red Mud

Authors: LE Van Quang, DO Quang Minh, HOANG Minh Duc, PHAM Vo Thi Ha Quyen, BUI Thu Ha, NGUYEN Hoc Thang

Abstract: Geopolymer is an inorganic polymer material formed from alumino-silicate structures. Geopolymer has many outstanding functions in comparison with ordinary materials such as high mechanical strength, high heat and chemical resistance, and lightweight property. The engineering properties of geopolymer-based materials depend on raw materials and synthesized conditions. In which, the aluminosilicate materials having high activity and consisting of many alkaline activators have the possibility of increasing pH in geopolymer paste. In the solution of paste, aluminosilicate compounds are solubilized and then react with alkali-activated ions to form geopolymeric networks. The geopolymer can be synthesized in many different conditions depending on factors of temperature, pressure, and curing conditions. In this study, red mud (RM) was used as the main alumino resource for geopolymerization process. RM is a solid waste residue being left from the mining process of bauxite ores with caustic soda for alumina

production. Its disposal remains a global issue in terms of environmental concerns. Formation of RM-based geopolymer was affected by many factors, in which, the alkaline activators are the most important factor. This research was conducted with sodium hydroxide and sodium silicate solutions to elucidate the effect of alkaline activator ratio to the engineering properties of RM-based geopolymers. The results showed that the RM-based geopolymer used sodium silicate solution has more outstanding properties than RM-based geopolymer using sodium hydroxide solution.

10. Paper ID:57

Title: Evaluation on Roles of Activated Silicon and Aluminum Oxides for Formation of Geopolymer from Red Mud and Silica Fume

Authors: LE Van Quang, DO Quang Minh, HOANG Minh Duc, DANG Thanh Phong, BUI Thu Ha, NGUYEN Hoc Thang

Abstract: In this study, the alkaline solutions (NaOH) with concentration from 1M to 10M, red mud (RM) and silica fume (SF) were used as reactors in geopolymer reactions. RM contains 7.40% SiO_2 and 13.65% Al_2O_3, SF has 94.50% SiO_2, but only the activated oxides can participate into the geopolymer reactions. The activity of the oxides was investigated by measuring the dissolution of RM and SF in different concentrations of NaOH. Characteristics of the geopolymer samples were tested for compressive strength and softening-coefficient, its microstructure was analyzed by using X – ray diffraction (XRD). The experimental results were indicated that activated SiO_2 is the highest exist in SF. In the structure of geopolymers, the silica can be bonded directly to each other (Si-Si) or linked through “most” oxygen (Si-O-Si) to form independent polymer chains, while aluminum themselves cannot create independent polymer chains, it only can be replaced the Si atomic in Si-O-Si polymer chains (Si-O-Al), instead.

11. Paper ID:61

Title: Leaching Behavior and Immobilization of Heavy Metals in Geopolymer Synthesized from Red Mud and Fly Ash

Authors: NGUYEN Hoc Thang, BUI Thu Ha, PHAM Vo Thi Ha Quyen, DO Quang Minh, HOANG Minh Duc, LE Van Quang

Abstract: Fly ash is an industrial waste from coal-fired thermal power plants whereas red mud is an industrial waste generated during aluminum production from bauxite. If both fly ash and red mud are not properly managed, they could cause negative impact on the environment. This study utilized red mud and fly ash in combination with sodium silicate solution to produce a geopolymer-based material which can be used as building materials. This study focussed on the leachability of heavy metals in the raw materials and the geopolymer as this would be significant in assessing the environmental impact of the product. Leachability of heavy metals such as Cu, Zn, Cd, Pb, Fe, and Cr was evaluated based on European standard (EN 124572 – 2, EU CEN TC292/ CEN TC 308) with pH values at 7. The results showed that raw materials (red mud and fly ash) have higher leachability than geopolymer specimens. And the values of leaching tests for heavy metals in the geopolymer - based materials belonged to limits of EULFD and USEPA.

12. Paper ID:74
Title: Novel Materials Synthesized from Red Mud, Bagasse, and Bentonite for Gas Treatment by CO2 Absorption
Authors: NGUYEN Hoc Thang, PHAM Vo Thi Ha Quyen, DANG Thanh Phong, BUI Thu Ha, NGUYEN Ngoc Hoa, PHAM Trung Kien
Abstract: Carbon dioxide (CO2) is a gas which causes both impact to atmosphere (one of greenhouse gases) and decrease heating value of gaseous fuel (such as natural gas, biogas, landfill and sewage gas). Hence, there are many investigations to find solutions for gas treatment and carbon dioxide absorption from researchers. Catalyst or synthesized materials is to optimize processes of CO2 treatment and absorption to obtain the best benefit for factories and community. This study utilized industrial wastes of red mud and bagasse in combination with bentonite to synthesis the novel material (absorbent) responding requirements for the process of gas treatment. More specially, raw materials are impacting negatively on the environment. In which, red mud is solid waste of Bayer process from bauxite mining which is being the hard problem to have solutions for its management and utilization and bagasse is industrial waste of sugar factories. Wet pressing method was applied to form the absorbent samples by mixing red mud, bagasse, bentonite, and water in mixtures. The samples were put in furnace for heating process at 3000C for 2 hours. The final samples were characterized for microstructure using X-ray diffraction (XRD) and tested for gas absorption capacity of carbon dioxide. The results showed a potential application of the novel absorbent materials for gas treatment.

15:00-15:15	Coffee Break

Poster Session

May 18, 2018 (15:15-16:00) at Budsaba room

1. Paper ID: 39
Title: The Synthesis and Characterizations of Aluminums Doped Barium Ferrite (BaAlFe11O19)
Authors: Wattanasak Srisiri, Arkom Kaewrawang
Abstract: Aluminums doped barium ferrite (BaAlFe11O19) was synthesized by sol gel

process at annealing temperatures, Ta, of 700 - 1000 oC and annealing time, ta, of 2 hr. The trend of saturation magnetization, s, and the product of the magnetization and external magnetic fields, Hmax, increases from Ta = 700 - 900 oC, then decreases. The maximum value of Hmax and coercivity, Hc, are 13194.74 Oeemu/g and 20.33 emu/g, respectively, at Ta = 900 oC. The Hc increases from Ta = 700 - 1000 oC and its maximum value is 4448.80 Oe at 1000 oC. The trend of the crystallize size, <D>, increases from Ta = 700 - 900 oC then they are constant until Ta = 1000 oC. The maximum of <D> is 679.18 Å at 950 oC.

2.Paper ID: 55
Title: Fabrication processes of SOI structure for optical nonreciprocal devices
Authors: Salinee Choowitsakunlert, Kenji Takagiwa, Takuya Kobashigawa, Nariaki Hosoya, ardchawadee Silapunt, Hideki Yokoi
Abstract: Fabrication processes of a magneto-optic waveguide with a Si guiding layer for an optical isolator employing a nonreciprocal guided-radiation mode conversion are investigated. The optical isolator is constructed on a silicon-on-insulator (SOI) structure. The magneto-optic waveguide is fabricated by bonding the Si guiding layer with a cerium-substituted yttrium iron garnet (Ce:YIG). The relationship of waveguide geometric parameters is determined at a wavelength of 1550 nm. The results show that larger tolerance for isolator operation can be obtained at smaller gaps between Si and Ce:YIG. Bonding processes including photosensitive adhesive bonding and surface activated bonding are then compared. It is found that the surface activated bonding process is easier to control and more promising than the photosensitive adhesive bonding.

3.Paper ID: 73
Title: Collection of Silicone Nanoparticles in Ingot Growing Process and Analysis of Particle Characteristics
Authors: Junghyun Kim, Jiho Ahn, Hee Yong Kang, Gyo Woo Lee2
Abstract: This study was conducted to investigate the characteristics of silicon nanoparticles using waste vapors generated from a single-crystal silicon ingot growth furnace and to study their potential applications. The silicon vapors generated in the silicon ingot growth furnace were collected in the form of nanoparticles, and SEM, EDS, BET and XRD analyzes were performed to analyze the characteristics of the collected particles. The particles were in the form of agglomerated nanoparticles with a specific surface area of 176 ㎡ / g and were amorphous SiOx particles with low crystallinity. In the future, we plan to study the application fields of the collected nanoparticles.

4.Paper ID: AM816
Title: A Study on Proposal of Flank Wear Criterion by Using a Built-in Current Sensor when Manufacturing the Mold Materials in a Smart Machine Tool
Authors: Seung-Yub Baek, Sung-Taek Jung, Jin-Ho Chu, Dae-Yu Park
Abstract: Recently, it has been increased with respect to the safe and reliable operations in industry of machine tools and intelligent of the machine tool has consistently been developing in term of an unmanned manufacturing. For such realization, diagnosis

monitoring of machining must be carried out while being processed in real-time. When tool wear is reached to criteria of flank wear and crater wear, the tools must be changed to new tools for improving the manless rate of operation. However, time of tool change was when spark generated because of wear about 0.3 mm on a flank face during manufacturing in the field. So, built-in sensor system in a smart machine tool must be necessary for high efficiency unmanned of manufacturing. As mentioned earlier, the various technique for measuring the tool wear was already defined such as sensing of acoustic emissions, vibrations, sounds, currents, cutting force, and other. The representative one of measuring method is current signal, which is used as a representative index of tool state. In this study, we carried out the proposal of tool wear criterion by using built-in wireless current signal system when manufacturing the mold materials of KP-4M and it was investigated via smart machine tools.

5.Paper ID: AM817
Title: A Study on Fabrication of Ultra-Precision Diamond Tool and Length Optimization for Improving the Stability
Authors: Seung Yub Baek, Jin Ho Chu, Sung Taek Jung
Abstract: A tool for fabricating micro/nano patterns was utilized in space optics, virtual reality, augmented reality, and semiconductor industry. Nowadays, demand of manufacturing technique for ultra-precision is continuously increasing virtual reality and augmented reality industry across the board and core technique for manufacturing next generation lens is cutting tool fabricating technique with nano scale. In particular, tools of micro/nano size for ultra-precision machining was made by using an ultra-precision grinding, but it was difficult to fabricate tools which have under micro scale. Recently, results of studies with many researchers were pulsed laser ablation, electric discharge machining and precision grinding. However, previous studies are unsuitable in making tools of micro/nano scale. Due to unique physical properties of diamond, it can be easily controlled by using focused ion beam. The surface properties of the diamond layer are affected because of the amorphous damage caused by the FIB gallium ions collision, implantation and these effects can make to be able to control the geometry of cutting tool. In this study, we carried out in fabricating diamond tools under micro scale by using FIB milling through various process studies and determined in order to optimize the length of unstable tool.

6.Paper ID: AM820
Title: Influence of Emulsifiers on Physical Properties of Oil/water Emulsions Containing Ostrich Oil
Authors: Juthaporn Ponphaiboon, Sontaya Limmatvapirat, Chutima Limmatvapirat
Abstract: The fabrication of oil/water (O/W) emulsions in order to prepare the spray-dried encapsulated bioactive ostrich oil emulsions can be useful for increasing stability of commercial products. In this study, O/W emulsions were stabilized with mixed emulsifiers (Span and Tween) or soy lecithin. The effects of emulsifiers on the physical properties of emulsions containing ostrich oil were investigated. Results showed that the addition of a mixture of Span and Tween emulsifiers at concentrations between 5 and 15% w/w

reduced the droplet size of the emulsions but did not decrease the zeta potential in the emulsion system. The smallest droplet size of 5.01±0.43 m was obtained from the emulsion containing 15% w/w mixture of Span 20 and Tween 80. The zeta potential values of all emulsions containing a mixture of Span and Tween emulsifiers in the concentration range of 5 to 20% w/w were between -23 and -55 mV. In addition, the viscosity of these emulsions increased with increases in the concentrations of both emulsifiers. The stable 20% w/w ostrich oil emulsion stabilized with 15% w/w Span 20/Tween 80 presented viscosity equal to 69.56±1.82 cP. For 10% w/w ostrich oil emulsions stabilized with lecithin, the droplet size and zeta potential of the emulsions tended to decrease with increasing lecithin concentrations. An emulsion containing 10% w/w lecithin exhibited the smallest droplet size (3.93±0.11 m). The zeta potential values of all emulsions composed of 1-15% w/w lecithin were between -33 and –66 mV and the viscosity of these emulsions increased with increases in the concentrations of lecithin. The stable 10% w/w ostrich oil emulsion stabilized with 10% w/w lecithin exhibited a high viscosity of 172.50±1.01cP. In summary, 10% w/w lecithin provides better emulsion stability than 15% w/w Span 20/Tween 80. These results therefore reveal important parameters for the fabrication of stable O/W emulsions containing ostrich oil.

7.Paper ID: 107

Title: A Novel Electrochemical Sensor for the Simultaneous Determination of Fat-Soluble Vitamins Using a Screen-Printed Graphene/Nafion Electrode

Authors: Jeerakit Thangphatthanarungruang, Aroonsri Ngamaroonchote, Rawiwan Laocharoensuk, Chuleekorn Chotsuwan, Weena Siangproh

Abstract: In this work, a novel electrochemical sensor was proposed for the simultaneous determination of fat-soluble vitamins (A, D, E, K) using a screen-printed graphene/Nafion electrode (SPGNE). The scanning electron microscopy was used for morphological characterization of the electrode surface. The electrochemical behaviors of fat-soluble vitamins have been studied in a mixture of ethanol and sodium perchlorate monohydrate using square-wave voltammetry (SWV). The results obtained indicated that the oxidation peak of each fat-soluble vitamin appeared at different potentials leading to the possibility for the simultaneous detection. The influences of experimental parameters such as the effects of proportions of ethanol, potential increment, amplitude, frequency and quiet time were examined. Under the optimized conditions, the linearity between oxidative currents and concentrations of fat-soluble vitamins ranged from 0.1 μg mL-1 to 5 μg mL-1 for vitamin A, 0.08 μg mL-1 to 5 μg mL-1 for vitamin D and E, and 0.2 μg mL-1 to 1.6 μg mL-1 for total vitamin K, with the limits of detection of 0.018, 0.013, 0.012 and 0.004 μg mL-1, respectively. These developed sensors provide high sensitivity in detection and offer high potential to apply them for the simultaneous determination of fat-soluble vitamins in dietary supplements.

8.Paper ID: 109
Title: Novel Process for preparing Core-Shell type hybridized nanoparticles for polymer electrolyte membrane
Authors: Akito Masuhara, Keiji Shito, Yuki Takahashi, Satoshi Sekine, Kazuki Koseki, Keisuke Tabata, Tomohiro Nohara, Toshihiko Arita
Abstract: We designed a novel polymer electrolyte membrane (PEM) for PEFC using inexpensive materials and fabricating precise nanostructures. Hence, we have focused on general inorganic filler filling method, which has advantage on improvement of heat resistance and gas barrier properties of the membrane. Novel model PEM consists of silica nanoparticles (NPs) with proton conductive polymer layer prepared by Reversible Addition-Fragmentation chain Transfer Polymerization with Particles (RAFT PwP) on its surface. RAFT PwP can prepare precisely adsorbed hydrophilic polymer layer on particles surface, 2D ion-conductive channel consist of weak acids can be effectively prepared. RAFT PwP of acrylic acid and styrene with spherical silica NPs successfully synthesized, and coated poly(acrylic acid) and polystyrene block copolymers (PAA-b-PS) on the spherical silica filler particles (silica@PAA-b-PS)

9.Paper ID: 110
Title: Controlled radical polymerizations with particles (CRPwP) for mass production of high-performance block-copolymer-coated nanofillers
Authors: Toshihiko Arita, Akito Masuhara
Abstract: Composites of polymer and nanofillers (nanoparticles) have been paid great attention because of their potential to exhibit trade-off functions of polymers and fillers simultaneously. It is different from conventional fillers, nano-sized filler having difficulties on uniform dispersion in polymers. Among lots of efforts have been done to solve the difficulties, polymer-grafting on the surface of nanofillers is one of the most promising techniques. The method has been successful to stabilize nanofillers dispersion in polymers, however, the method cannot be free from the immobilizing process of grafting points. The process needs several numbers of chemical operations therefore it has disadvantage on cost. Here, the author suggests more facile, cheap and fascinating procedure to coat nanofillers by (brush-like structured) polymers. The method consists of only one pot synthesis. In this study, numbers of block copolymer-covered nanofillers have been synthesized by reversible addition-fragmentation chain-transfer polymerization with particles (RAFT PwP).

10.Paper ID: 99
Title: Mechanical properties and thermal conductivity of lightweight clay bricks fabricated with a powdered marble dust additive
Authors: Sutas Janbuala, Mana Eambua, Arpapan Satayavibul, Watcharakhon Nethan
Abstract: The objective of this study was to recycle powdered marble dust to improve mechanical properties and thermal conductivity of lightweight clay bricks. Varying amounts of powdered marble dust (10, 20, 30, and 40 vol.%) were added to a lightweight clay brick at the firing temperatures of 900, 1000, and 1100 °C. When higher quantities of

powdered marble dust were added, the values of porosity and water absorption increased while those of thermal conductivity and bulk density decreased. The decrease in apparent porosity and water absorption were also affected by the increase in firing temperature. The most desirable properties of the clay bricks were obtained for the powdered marble dust content of 40 vol.% and firing temperature 900 °C: bulk density of 1.20 g/cm3, compressive strength 9.2 MPa, thermal conductivity 0.32 W/m.K, and water absorption 22.5%.

11.Paper ID: 108
Title: High Density Polyethylene/Date Palm Fiber Composites: Effect of Fiber Loadings on The Dynamic Mechanical Thermal Properties
Authors: ACHMAD Chafidz, FAISAL RM, LILIS Kistriyani, AJENG Y.D. Lestari, DHONI Hartanto, MUHAMMAD Rizal
Abstract: The increasing environmental issues has resulted in the trend of the use of renewable or natural source (*green*) fillers in the polymer composites fabrication. Among these *green* fillers is called natural fibers or plant fibers. One particular plant fibers that became the topic of the present work is date palm fiber (DPF). In the present work, DPF at different loadings (i.e. 0, 5, 10, 20, 30 wt%) were incorporated (as fillers) in the high density polyethylene (HDPE) matrix to fabricate HDPE/DPF composites. Further, we have investigated the effect of DPF loadings on the dynamic mechanical thermal properties of the composites. The dynamic mechanical thermal analysis (DMTA) results exhibited that the storage modulus of the composites increased with increasing DPF loadings. Additionally, all the storage modulus values of the composites were higher than the neat HDPE in all temperature ranges. For example, at temperature of 60°C, the storage modulus enhancement of the composites as compared to the neat HDPE were about 26, 76, 134, and 225% for 5, 10, 20, 30 wt% of DPF loadings, respectively. Additionally, the relationship between the DPF loadings (wt%) and temperature (°C) on the storage modulus of the HDPE/DPF composites was modeled using a logarithmic equation. Based on the data plotting between the experimental data and modeled data, the logarithmic equation was found to be fitted with the experimental data satisfactory.

12.Paper ID: 130
Title: Calcium Carbonate Reinforced Polypropylene Nanocomposites: Effect of Nano-filler Loadings on The Melt Rheological Properties
Authors: ACHMAD Chafidz, AJENG Y.D. Lestari, LUCKY Setyaningsih, WIDI Astuti, MUHAMMAD Rizal
Abstract: In recent years, polymer-based nanocomposites have been investigated by many researchers due to their enhanced properties. Different types of nano-materials have been used to produce polymer nanocomposites. One of them is nano-CaCO3. In the present work, nano-CaCO3 material reinforced polypropylene (PP) nanocomposites have been fabricated by melt compounding the PP pellets and nano-CaCO3 masterbatch. The effect of four different loadings of nano-CaCO3 (0, 5, 10, 15 wt%) on the melt rheological properties of the nanocomposites has been investigated. The morphology of the nanocomposites was analyzed by a Field Emission Scanning Electron Microscopy

(FESEM) to study the dispersion state and distribution of nano-CaCO3 particles in PP matrix. Whereas, the melt rheological behavior of the nanocomposites was analyzed by an oscillatory rheometer. The FESEM micrographs showed that the nano-CaCO3 particles were well dispersed and distributed in the PP matrix. Additionally, the melt rheological analysis results showed that the complex viscosity of all nanocomposites samples were higher than that of neat PP and increased with increasing nano-CaCO3 loadings. Furthermore, the complex viscosity data from the rheological test has been fitted by Carreau-Yasuda equation and it was found to be well fitted.

13.Paper ID: 134
Title: Enhancing Mechanical Properties of Polyvinyl Alcohol Fiber Reinforced High Density Polyethylene Composites
Authors: ACHMAD Chafidz, ARIANY Zulkania, TINTIN Mutiara, PRIMA A. Handayani, MUHAMMAD Rizal
Abstract: In this work, high density polyethylene (HDPE)/polyvinyl alcohol (PVA) fiber composites have been fabricated via melt compounding by employing a twin-screw extruder. The resulted composites samples of four different PVA loadings (i.e. 0, 5, 10, 20 wt%) were then characterized via tensile test to investigate the effect of PVA loadings on their mechanical properties (i.e. modulus elasticity, tensile strength, toughness, and strain at break). Additionally, the surface morphologies of the composites (i.e. cryo-fractured and tensile fractured samples) were also studied by using a scanning electron microscopy (SEM). The SEM micrographs on the cryo-fractured sample showed that PVA fibers were perfectly embedded and well blended in HDPE matrix. Whereas, the SEM images of tensile-fractured samples showed that there was a fibrillation effect on the neat HDPE, while in the composites sample, there was an evident of broken fibers. Additionally, from the tensile test results, the modulus elasticity of the composites has increased by approximately 16, 39, and 81% (as compared to the neat HDPE) for PVAC-5, PVAC-10, and PVAC-20, respectively. Whereas, the toughness and strain at break of the composites have decreased.

Poster Session

May 18, 2018 (15:15-16:00) at Pornphailin room

1. Paper ID: 14
Title: Anti-microbial and Self-cleaning of Natural Rubber Latex Gloves by Adding Mangosteen Peel Powder
Authors: Wasan Moopayuk, Nuchnapa Tangboriboon
Abstract: Mangosteen peel powder is one of the most important bio-antioxidants. Adding mangosteen peel powder as filler into natural rubber latex compound for latex glove film formation via dipping process can help the green anti-microbial properties. The physical (smoothness and thickness of film) and mechanical properties (tensile strength

and elongation at break) of latex film are still good. Therefore, adding mangosteen peel powder into natural rubber latex gloves can reduce the anti-allergic and antimicrobial on the film surface. Mangosteen peel powder ground by rapid mill is fine particle and high surface area 2.4216 m2/g suitable for homogeneous and compatible for adding into natural rubber latex compound. Ceramic hand mold was dipped into the Ca(NO3)2 coagulant only 3 seconds, then dipped into the natural rubber latex compounds added mangosteen peel powder for 15 seconds, withdrawn hand mold slowly, cured in the oven at 120°C for 30 min, then dried at room temperature, and casted it off the hand mold. The obtained natural latex glove films added mangosteen peel powder are smooth, clear, and thin film surface, the highest elongation at break 803.2711 ± 31.6477%, good tensile strength 30.2933 ± 6.0218 MPa, dense film without water leakage, and good contact angle.

2. Paper ID: 35
Title: Drug Delivery of Adding Mangosteen Seed Oil into Natural Rubber Latex Patch
Authors: Wasan Moopayuk, Nuchnapa Tangboriboon
Abstract: Osteoarthritis is an important disease of elderly people. Mangosteen seed powder is one candidate to be used as a biomaterial like commercial glucosamine due to chemical composition and chemical structure. It can be added into natural rubber patches acted as transdermal or drug delivery on skin to relieve pain. The obtained rubber patches added mangosteen seed powder are low wetting contact angle 80.8° and high mechanical properties (44.1385±1.2698 MPa tensile strength and 818.6967±76.4477% elongation at break).

3. Paper ID: 65
Title: Influence of Sintering Temperature on Structure and Electrical Properties of Modified-BNKT Lead-Free Piezoelectric Ceramics
Authors: Pharatree Jaita, Supalak Manotham, Narumon Lertcumfu
Abstract: In this research, the effects of sintering temperature on phase structure, densification, microstructure, and electrical properties of modified-BNKT ceramics were investigated. Conventional sintering of lead-free 0.97Bi0.5(Na0.80K0.20)0.5TiO3-0.03(Ba0.70Sr0.30)O3 or 0.97BNKT-0.03BSrT ceramic was investigated to clarify the optimal sintering temperature for densification and electrical properties. All ceramics were prepared by a conventional mixed oxide and sintered at various temperatures from 1100 to 1150 C. XRD pattern indicated all ceramics exhibited a single perovskite without any secondary phases. The maximum density of 5.80 g/cm3 with relative density of 99.32% were observed for the ceramic sintered at 1125 C. Grain size tended to increase with increasing the sintering temperature. The good dielectric (Td = 121 C, Tm = 320 C and max = 4982) and ferroelectric properties (Pr = 16.66 μC/cm2, Ec = 17.85 kV/cm and Rsq = 0.74) were obtained for the ceramic sintered at optimum sintering temperature of 1125 C.

4. Paper ID: 69
Title: Effects of Sintering Temperatures on Structural, Electrical and Mechanical Properties of BNKT Piezoelectric Ceramics

Authors: Supalak Manotham, Pichitchai Butnoi, Narumon Lertcumfu, Pharatree Jaita
Abstract: This research investigated the effects of sintering temperatures on the structural, dielectric, ferroelectric, piezoelectric and mechanical properties of lead-free Bismuth Sodium Potassium Titanate (BNKT) piezoelectric ceramics. The BNKT ceramics were prepared by solid-state mixed oxide method and sintering at temperature ranging from 1100 to 1150°C for 2 h. All ceramics sample showed highly density and reach a maximum at sintering temperature 1125°C of 5.81 g/cm3. X-ray diffraction patterns exhibited pure perovskite structure with coexisting of rhombohedral-tetragonal phases for all compositions. The microstructure was characterized by Scanning Electron Microscope (SEM), from SEM image the ceramics showed cubic-like grain shape. The average grain size increased with increasing sintering temperature. The dielectric permittivity showed the optimum sintering at 1125°C with reach a maximum dielectric constant of 4,194. Furthermore, at sintering temperature 1125°C present highest strain (Smax = 0.14%) with a large normalized strain coefficient (d*33 = Smax/Emax) of 233 pm/V.

5. Paper ID: 76
Title: Various-shaped Cu2O nanoframe/g-C3N4 for photocatalytic CO2 reduction
Authors: Po-Ya Chang, I-Hsiang Tseng
Abstract: Cu2O is suitable for CO2 reduction as its conduction band(CB) is higher than the reduction potential of CO2. To decrease the rate of photogenerated electron-hole recombination, incorporating n-type g-C3N4 assisted the electron transfer to reactants. The nanoframe of Cu2O supplied more adsorbed and activated sites for CO2 reduction. We directly pyrolyzed melamine to form g-C3N4. In-situ chemical method was applied to synthesize Cu2O nanoframe/g-C3N4 and the concentration of hydroxylamine hydrochloride(NH2OH·HCl) was tuned to form Cu2O nanoparticle/g-C3N4 with different shapes. The etching agent of hydrochloric acid (HCl) was added to obtain Cu2O nanoframe/g-C3N4. The amount of CO generated from photocatalytic CO2 reduction was an indicator to evaluate the photocatalytic activity. Cu2O nanoframe/g-C3N4 did show better performance comparing with reference Cu2O nanoparticle/g-C3N4. The mechanism is still under investigation.

6. Paper ID: 77
Title: Effects of Processing Parameters on Microstructure and Properties of Aluminum-Silicon Alloy ADC12
Authors: Kasem Charoenrut, Chaiyasit Banjongprasert
Abstract: Aluminum-Silicon Alloy, ADC12 is one of the most popular alloys for pressure die casting due to its high castability and high productivity. ADC12 is a hypoeutectic aluminum-silicon alloy that contains 10-12wt% of Si and has an occasional problem for a mechanical properties failure such as crack and shrinkage porosity. This study presents the investigation of the microstructure of ADC12 parts produced by pressured die casting with different process parameters and chemical compositions. The microstructure was observed using optical microscopy (OM) and scanning electron microscopy (SEM) with energy – dispersive x-ray (EDX) and electron backscatter diffraction (EBSD) to determine

phases, grain, and crystallographic information in order to understand the microstructural evolution after die casting with different process conditions. Changes in casting pressure and a reduction of iron content contributed to enhanced mechanical properties and less shrinkage porosity. This was due to different processing parameters, mainly casting pressure. The average grain size of aluminum matrix was also reduced due to a higher pressure during casting with a moderately fast cooling rate.

7. Paper ID: AM831

Title: Alkaline stability of polyaniline synthesized using pulsed inductively coupled plasma device

Authors: Sasikan Suwanprateep, Vimolvan Pimpan, Rattachat Mongkolnavin

Abstract: The stability of polyaniline synthesized using pulsed inductively coupled plasma device was studied in alkaline media. Polyaniline was exposed to potassium hydroxide at 25oC and 90oC for various time intervals up to 4 months. An increase in %mass loss, the decreases in the absorbance intensities of polyaniline characteristic bands in FT-IR and UV-Visible spectra and the reduction of the conductivity with increasing exposure time to alkaline solution and/or temperature indicated the increases in the conversion of polyaniline into its base form and the degradation of its structure. The results also suggested that the temperature was the main factor affecting its conductivity in alkaline stability since exposing at 25oC and 90oC caused the conductivity to decrease from 4.53x10-8 S.cm-1 to 1.74x10-8 S.cm-1 and 8.15x10-9 S.cm-1 in 4 months, respectively. Therefore, this polyaniline synthesized via this system may be suitable for the applications at room temperature where alkaline stability is needed.

8. Paper ID: 131

Title: Flexural Strength and Viscoelastic Properties of Acrylic Resin Denture Base Material Containing Silver Nanoparticle Synthesized from Fingerroot Aqueous Extract

Authors: Jitpimon Siripanth, Panjaporn Wongwitthayakool

Abstract: Silver nanoparticle (AgNP) synthesized using aqueous extract of Fingerroot (Boesenbergia rotunda) as reducing and stabilizing agent was incorporated in heat cured acrylic resin PMMA with different concentrations (i.e. 0, 0.025, 0.05, 0.075 and 0.1 wt.%). Flexural strength of AgNP/PMMA denture base was investigated with three-point bending method using Universal tensile tester. Viscoelastic behavior of filled PMMA was studied using the dynamic mechanical analyzer (DMA) over a wide range of frequencies. The flexural strength of AgNP filled acrylic denture base materials were not statistically significantly different with the increase in concentrations of AgNP. The dynamic mechanical analysis showed the frequency dependence of storage modulus (G'), loss modulus (G''), and damping factor (tanδ)

9. Paper ID: 127

Title: Thermal Properties of Acrylic Resin Denture Base Material Containing Silver Nanoparticle Synthesized from Aqueous Extract of Boesenbergia Rotunda

Authors: Panjaporn Wongwitthayakool, Matsayapan Pudla

Abstract: Silver nanoparticles (AgNPs) were synthesized by bioreduction method using

aqueous extracts of Boesenbergia rotunda as reducing and stabilizing agents. Ultraviolet-Visible (UV-Vis) spectrophotometer was utilized to monitor the qualitative formation of AgNPs. The UV-Vis spectrum showed that the spherical AgNPs with diameter of 20-40 nm were formed. The antifugal activity of synthesized AgNPs have been investigated using Candida albicans, which is found that the synthesized AgNPs can be used as effective growth inhibitors. The influence of the incorporation of prepared AgNPs on thermal properties of the acrylic dentures was investigated. Glass transition temperature of filled acrylic resins was studies using the dynamic mechanical analyzer (DMA). The temperature sweeps were performed with tension mode. Thermogravimetry analysis (TGA) was used to examine effect of AgNP concentration and thermocycling (1250, 2500, 5000, and 10000 cycles) on thermal stability of AgNP filled acrylic resins. Glass transition temperature (Tg) of the acrylic resins slightly increase with increasing AgNP contents. TGA results indicated that AgNP retarded thermal degradation of PMMA, and thermocycling did not affect thermal stability of AgNP filled PMMA.

10. Paper ID: 111

Title: Effect of Welding Consumables on Dissimilar AISI304/ AISI1015 Steels Butt Joint Properties

Authors: Surat Triwanapong, Kittipong Kimapong

Abstract: The butt joint of dissimilar AISI304/AISI1015 steels was produced by a Shielded Metal Arc Welding (SMAW) with 3 types of the covered electrodes and the welding current of 80-120 A. The investigation of joint properties for the impact strength, the hardness, and the microstructure, was performed. The SMAW butt joint that was welded by the E312 covered electrode and 100A welding current showed the highest impact strength of 112 J. The chromium was the important reinforced element affected to increase in the hardness and the impact strength of the joint by forming and dispersing the chromium carbide in the weld metals. Interface structure of the carbon steel/the weld metal clearly showed a small combined area of the metals in opposition to the interface structure of the stainless steel/ the weld metal which had a large combined area of the metals.

11. Paper ID: 112

Title: SMAW Electrodes Selection for Producing Hard-faced Layer on FC25 Cast Iron Surface

Authors: Pramot Poonnayom, Kittipong Kimapong

Abstract: A shielded metal arc welding (SMAW) using various covered electrodes applied to produce a hard-faced weld metal on FC25 gray cast iron bare surface. It found that all welding parameters such as 3 electrode types and welding currents of 90-130 A were able to produce a sound weld metal without a defect that could deteriorate the joint strength. The white cast layer thickness that was formed at the interface between the weld metal and the base metal was increased when increasing in the welding current and the alloying element in the electrode. Impact strength tended to increase when the alloying element such as chromium (Cr), molybdenum (Mo), and manganese (Mn) was

existed, and it showed the maximum impact strength when H600 electrode was applied. In a comparison of microstructure characteristics of the joints, the joint that showed the maximum impact strength had the formation of fine needle-like grain in the weld.

12. Paper ID: 121

Title: Experimental Investigation of Cut Profile in the Electrochemical Drilling of Titanium Alloy

Authors: Ornsurang Netprasert, Noppakao Chimyo, Suphaphich Phimphun, Jantakarn Sukjan, Viboon Tangwarodomnukun, Chaiya Dumkum

Abstract: Electrochemical machining process is an advanced material removal technique offering high precision and introducing no heat damage to the work material. The shape and size of machined area are highly dependent on some process parameters such as voltage, electrolyte and inter-electrode gap. To further enable a more insight into the process performance, this paper investigates the influences of applied voltage, electrolyte concentration and inter-electrode gap on the shape and sizes of hole produced by the electrochemical drilling process. Titanium alloy (Ti-6Al-4V) was used as a work sample in this study as it has been extensively used in many advanced applications. The experimental result indicated that the use of high voltage and high electrolyte concentration can enlarge and deepen hole in the workpiece, while the inter-electrode gap provided less effect to the hole features. The maximum hole depth can reach 300 µm within 60 seconds when the applied voltage of 30 V, the inter-electrode gap of 10 µm and the electrolyte concentration of 10%wt were used. However, with this setup, the obtained cut profile became a non-uniform V-shaped hole. The use of lower voltage was instead recommended to yield a better cut quality with U-shaped profile.

13. Paper ID: 122

Title: Laser Micromachining of Titanium Alloy in Water with Different Temperatures

Authors: Taweeporn Wuttisarn, Viboon Tangwarodomnukun, Chaiya Dumkum

Abstract: Underwater laser machining process has been employed as an alternative process to ablate materials with minimum thermal damage. Though many studies provide comprehensive investigations to enable the understanding of laser-water-material interactions during the laser ablation process in water, the effect of water temperature on the ablation performance has not been revealed yet. To cope with this challenge, this paper presents the roles of water temperature on cut dimensions in the underwater laser micromachining of titanium alloy (Ti-6Al-4V). The effects of laser power, traverse speed and number of laser passes were also examined in this study, where groove width and depth were measured and analyzed. The experimental results showed that a deep cut can be produced by using slow traverse speed with multiple-pass technique. However, using too high laser power can cause a shallow cut due to the large formation of recast in the laser-ablated area. According to the findings of this study, the laser energy density of about 750 J/mm2 can provide the deepest cut among the other conditions examined in this study.

14. Paper ID: 124
Title: Improvement Filler-Rubber Interaction and Mechanical Properties of Silica/NR Vulcanizates by Using Masterbatch Processing
Authors: Waraphorn Buakhlee, Pimsiree Suwanna, Wirunya Keawwattana
Abstract: Due to the dispersion of silica and reducing filler-filler interaction, the improvement of filler-rubber interaction was enhanced the physical properties of silica/NR compounds. This research was then focused on the production of silica masterbatches with surface treatment by surfactant to enhance the silica dispersion. The silica dispersion examined by scanning electron microscopy (SEM) and the mechanical properties of vulcanizates prepared from the masterbatches were compared with those prepared by a conventional direct mixing method. The mechanical properties of silica/NR masterbatches exhibited greater modulus, tensile strength and hardness compared to the corresponding conventional mixes. A better silica/NR interaction of silica/NR masterbatch was achieved confirming by higher the bound rubber content and lower Payne effect, leading to the greater mechanical properties.

Session 3

May 18, 2018 (16:00-18:00) at Budsaba room

1. Paper ID: 71
Title: STUDY ON THE POTENTIAL OF FABRICATED NON-BIODEGRADABLE PLASTIC WASTE (N-BPW) LINER AS ALTERNATIVE TO CONVENTIONAL GEOMEMBRANE
Authors: NUR AZWA MUHAMAD BASHAR, ALINA ALIAS, TAY CHIA
Abstract: This study investigates the potential application of Non-Biodegradable plastic waste (N-BPW) from household (plastic food packaging (PFP)) namely plastic snack packaging (PSP) and plastic bread packaging (PBP) as an alternative to conventional liner material in landfill. The samples were prepared into a single and fabricated layer. The fabricated layers were prepared by applying hot-pressing technique to joint between layers. Then the prepared liners were tested for its chemical and physical properties through Ultimate Tensile Strength Test (UTS) and Fourier Transforms Infrared Spectroscopy (FTIR). The tested samples were compared with conventional geomembrane. Obtained results from FTIR showed that proposed PFP had 70% similar characteristics to geomembrane. In addition, the fabricated samples can sustain high maximum load as compared to conventional geomembrane based on UTS. The proposed liners offer an option to the landfill operators in choosing a good reusable material at a lower cost, solved N-BPW landfilling problems and has great potential to promote as an alternative landfill liner.

2. Paper ID: 81
Title: Effect of cold plasma process parameters of organosilicon coatings on corrosion protection of carbon steel

Authors: Maryem Esbayou, Fouad Bentiss, Abdelhamid Nyassi, Charafeddine Jama
Abstract: Organosilicon films were deposited on carbon steel using plasma enhanced chemical vapor deposition (PECVD) process prepared from cold plasma polymerization of 1,1,3,3-tetramethyldisiloxane (TMDSO). The effect of different surface pretreatments was investigated using amorphous phosphatation, argon and nitrogen plasma. Several surface characterization techniques using FTIR, NMR, SEM, contact angle, cross-cut and profilometry were used. The protection efficiency against corrosion of the deposited films has been demonstrated by coupling different electrochemical techniques such as open circuit potential (OCP) and electrochemical impedance spectroscopy (EIS) in 3 wt% NaCl. The films showed good barrier against corrosion even after long immersion times.

3. Paper ID: 82
Title: Design and Analysis of a Wind Turbine Blade with Dimples to Enhance the Efficiency through CFD with ANSYS R16.0
Authors: M. Rajaram Narayanan, S. Nallusamy
Abstract: In the global scenario, wind turbines and their aerodynamics are always subjected to constant research for increasing their efficiency which converts the abundant wind energy into usable electrical energy. In this research, an attempt is made to increase the efficiency through the changes in surface topology of wind turbines through computational fluid dynamics. Dimples on the other hand are very efficient in reducing air drag as is it evident from the reduction of drag and increase in lift in golf balls. The predominant factors influencing the efficiency of the wind turbines are lift and drag which are to be maximized and minimized respectively. In this research, surface of turbine blades are integrated with dimples of various sizes and arrangements and are analyzed using computational fluid dynamics to obtain an optimum combination. The analysis result shows that there is an increase in power with about 15% increase in efficiency. Hence, integration of dimples on the surface of wind turbine blades has helped in increasing the overall efficiency of the wind turbine.

4. Paper ID: 83
Title: Strain gradient fracture in a flexoelectric double cantilever beam
Authors: R. P. Joseph, B. Wang, B. Samali
Abstract: The recent trends towards the miniaturization of devices promote ever increasing demand of the piezoelectric material at smaller scale. Apart from the classical strain-electric field relation (piezoelectric effect), there exists a size-dependent electromechanical coupling due to strain gradient at micro/nano scale, termed as flexoelectricity. Fracture analysis of the flexoelectric materials is, therefore, one of the essential studies to be done in further establishing their applications. This research explores the fracture behavior of a flexoelectric double cantilever beam (DCB) based on strain gradient theory since DCB is one of the most commonly used specimens to determine the fracture toughness of different materials. Some of the prominent effects at micro/nano scale such as surface effects (surface residual stress, surface elasticity and surface piezoelectricity) and the large deformations are also included in modeling and analysis. The governing equation and the relevant boundary conditions are

obtained through a variational principle approach in which the contribution of classical and non-classical terms is separatly highlighted and explained. Two electrical boundary conditions i.e. open circuit and short boundary condition are studied and compared. The boundary value problems (with different boundary conditions) are solved by means of a numerical method of three-stage Lobatto IIIa collocation formula; a preferred method in the case of boundary value problems. The material properties of PZT-5H are considered while the strain gradient and flexoelectric effect are defined by means of the material length scale parameter l and strain field-strain gradient coupling coefficient m respectively. Firstly, the bending behavior of a gradient cantilever beam is investigated which shows the flexoelectric beam to exhibit a stiffer response in comparison with the classical piezoelectric one. Negative voltage tends to diminish the beam stiffness and vice versa since the negative voltage induces a compressive force which makes the beam to behave softer. Next, the end point vertical deflection cantilever beam (Ymax) is used to evaluate the strain energy release rate of the DCB by the following relation; G = F (dYmax/bda), where b and a represent the width and length of a cantilever beam respectively. As l and m increases, the strain energy release rate of the flexoelectric DCB is decreased and the results of classical piezoelectric DCB are recovered when l and m are zero. The effect of surface residual stress is found to be most prominent among all surface effects with the positive surface residual stress enhances the stress energy release rate and vice versa. This softening response of the beam is attributed to the sign of curvature during the beam bending. The flexoelectric DCB with the open circuit boundary condition is investigated to be stiffer than the short circuit boundary condition. Unlike classical studies, it is explored that the contribution of the uncracked part of the DCB is substantial in the determination of its fracture properties and it must not be ignored even in the case of slender beams.

5. Paper ID: 84

Title: Design and Performance Analysis of Vehicle Tyre Pattern Material using Finite Element Analysis and ANSYS R16.2

Authors: S. Nallusamy, M. Rajaram Narayanan, R. Suganthini Rekha

Abstract: As it stands now, rubber has been the main material used in the making of pneumatic vehicle tyres. Speed of the vehicle depends on many factors like steering geometry, inflation pressure, vehicle load, road temperature and environmental conditions. The main aim of this research is to develop a finite element approach and computationally evaluate the performance of a steady-state rolling tyre by changing the tyre tread patterns. The tyre normally composed of rubber and body-ply was investigated with regards to the effect of the inflation pressure. Tyre modeling using six different types of patterns was completed by using Creo parametric 3D modeling software and then the tyre was discretized into small elements through ANSYS R16.2. The rim area of the tyre was fixed and pressure was applied to the inside surface of the rim. Finite element analysis was completed by using ANSYS R16.2 and equivalent stress, contact stress and contact pressure were found out to identify the best tyre pattern. From the final results it was observed that, Pattern-I had good agreement of results as

compared to other type of patterns which showed medium frictional stress and contact pressure.

6. Paper ID: AM807
Title: A Computational Study on Tensioned Fabric Structure in the form of Richmond's
Authors: YEE Hooi Min, ARABI Natasha Zureena, ABD MALEK Nurul Afiqah, ROHIM Rohamezan, YUSUFF Amer
Abstract: Computational form-finding analysis need to be carried out for tensioned fabric structure in order to determine the initial equilibrium shape under prescribed pre-stress and boundary condition. Tensioned fabric structure is highly suited to be used for realizing surfaces of complex or new forms. However, research study on a new form as a tensioned fabric structure has not attracted much attention. Alternative source of inspiration of minimal surface which could be adopted as form for tensioned fabric structure is very crucial. The aim of this study is to investigate initial equilibrium shape of tensioned fabric structures in the form of Richmond's minimal surfaces using nonlinear analysis method. The study proposes an alternative choice for engineer to consider the Richmond's minimal surface with r=0.24, t =1.31; r =0.34, t =1.21and r =0.44, t =1.11 applied in tensioned fabric structure. The results on parameter range in Richmond's minimal surface can serve as a reference for proper selection of surface parameter for achieving a structurally viable surface.

7. Paper ID: AM812
Title: Printed PZT thick films implemented for functionalized gas sensors
Authors: RUA-TABORDA Maria Isabel, SANTAWITEE Onuma, PHONGPHUT Angkana, CHAYASOMBAT Bralee, THANACHAYANONT Chanchana, PRICHANONT Seerong, ELISSALDE Catherine, BERNARD Jérome, DEBEDA Hélène
Abstract: Attractive for MEMS, PZT thick films are often microstructured on Si supporting platforms to span the gap between ceramics and thin film technologies. Printing process might lead to lower cost than ceramic process to open routes for MEMS applications. In this paper processing by screen-printing of Au/PZT/Au thick-films supported on alumina or completely released from the substrate are described. Investigations of the film microstructures nevertheless show lower densification than those of bulk ceramics. Prior to selective coating deposition, routes to improve the reduction of the film's porosity are proposed.

8. Paper ID: AM845
Title: Electronic Structure and Optical Property of Al/Ga co-doped ZnO by Using Density Functional Theory and the Hubbard-U Method
Authors: Yi-Ying Liao, Chieh-Cheng Chen, Hsuan-Chung Wu
Abstract: First-principles calculations based on density functional theory have been carried out to understand the mechanism of aluminum and gallium codoped n-type ZnO semiconductors. In this work, we used 3 × 3 × 3 supercell ZnO with 108 atoms, the calculated Al and Ga monodoped ZnO structures and Al/Ga-codoped ZnO (AGZO) structures. The results showed that has the lowest formation energy at the farthest distance between Al and Ga atoms, indicating that Al and Ga atoms tend to disperse. For

all of doping models, doped Al, Ga, or both these elements in ZnO resulted in this compound exhibiting n-type conduction, and the optical band gaps were larger than that of pure ZnO.For identical concentrations of Ga and Al dopants, Ga atoms supply more free carriers than Al atoms in AGZO; thus, the Ga atoms enhance the electrical conductivity. However, the presence of Al impurities improves the transmittance.The average transmittance in both the visible and UV ranges of Al/Ga-doped ZnO exceeds that of ZnO.

9. Paper ID: AM856
Title: Rolling contact fatigue life of 13Cr-2Ni-2Mo stainless steels which are surface treated by induction heating (IH) and wide peening cleaning (WPC)
Authors: Takuto YAMADA, Koshiro MIZOBE, Katsuyuki KIDA
Abstract: A new surface treatment, wide peening cleaning (WPC), was developed to improve fatigue strength of steels using shot peening and sandblast technologies. The combination of induction heating (IH) and WPC is expected to introduce higher compressive stress on the steels than single IH or single WPC. We investigated effect of IH and WPC on rolling contact fatigue life of 13Cr-2Ni-2Mo stainless steel. Vickers hardness and residual stress measurements, and RCF life evaluation using the Weibull distribution were carried out. It was found that the residual stress was introduced by WPC near the surface to improve life fatigue.

10. Paper ID: 93
Title: Characteristics of SAC305 Lead-Free Powder Prepared by Centrifugal Atomization
Authors: Nipon Denmud, Thawatchai Plookphol
Abstract: Centrifugal atomization apparatus was constructed to produce solder alloy powder with high quality. In this work, SAC305 alloy was atomized to study the effects of processing parameters, including atomizer disk surface condition and oxygen content in the atomizer chamber on the mean particle size, size distribution, production yield, and morphology of the produced SAC305 powder. The results showed that the atomizer disk surface coated with tin alloy gave the produced powder with smaller mean size, narrower size distribution and higher production yield, in comparison with the uncoated disk. This is due to a good wettability between the molten SAC305 and atomizer disk surface and the sufficient time for alloy droplets to be solidified. The shapes of SAC305 powder were sphere, teardrop, oval, and ligament, depending on the oxygen content in the atomizer chamber during atomization. The shape of produced powder was almost perfectly spherical when the oxygen content was decreased down to 0.5 vol.%. Moreover, with decreasing the oxygen content in the atomizer chamber, the produced SAC305 powder would contain oxygen content on its surface lower than 100 ppm.

11. Paper ID: 105
Title: Crack Reduction in Tabbing and Stringing Processes for Solar Cells
Authors: Atcharapha Kongwiriyaphaisan, Viboon Tangwarodomnukun
Abstract: Wafer cracking is considered to be an important loss in solar cell manufacturing as it crucially affects the production yield as well as the efficiency of solar cells fabricated. There is a certain chance of cracking in wafer when the substrate undergoes some

thermal and/or mechanical loads during its fabrication. This research therefore aims to decrease the solar cells cracking in tabbing and stringing processes as the two processes are responsible for a great number of cracks in the substrate. A set of experiments was performed in this study, where soldering temperature and time were tested and the amount of cracks in solar cells was quantified. The findings showed that the use of 185°C soldering temperature with the soldering time of 1,200 ms can reduce the number of cracks in the tabbing and stringing of silicon solar cells. With this setup, the adhesion force between tabbing ribbons and substrate surface can also be promoted, thus preventing the delamination problem in the cell panels.

12. Paper ID: 129

Title: Synthesis of Nano-sized Materials using Novel Water Assisted Solid State Reaction Method

Authors: Kenji Toda, Tatsuro Kaneko, Takuya Hasegawa, Mizuki Watanabe, Yusuke Abe1, Takeshi Kuroi, Mineo Sato, Kazuyoshi Uematsu, Sun Woog Kim, Yoshiaki Kudo, Takaki Masaki, Dae Ho Yoon

Abstract: A solid-state reaction method is an important ceramic synthesis processing technique because of low cost and good simplicity. Ionic-diffusion during a conventional solid state reaction is very slow at around room temperature. Rapid progress of the solid state reaction required to fulfill two conditions of "Thermodynamics" and "Kinetics". Therefore, the solid-state reaction method requires a high temperature heating to synthesize high purity ceramic materials. Such a high temperature process leads to increase in the processing cost and irregular particle morphology of the obtained powders. Recently, we have proposed the novel soft chemical synthesis method, water assisted solid state reaction (WASSR) method.[1-8] This method is very simple and could synthesize various ceramic materials just by mixing or storing of raw materials added a small amount of water in a reactor at low temperature below 373 K. For example, (Cs,Rb)VO_3 can be synthesized at room temperature just by mixing the (Cs,Rb)$_2CO_3$ and V_2O_5 raw materials. Furthermore, we have been also successfully synthesized various vanadates ($Rb_3V_5O_{14}$, $BiVO_4$, YVO_4:Eu), silicates (Li_2SiO_3, Ba_2SiO_4:Eu) and phosphates (Li_3PO_4, $LaPO_4$:Ce,Tb) by the WASSR method. Typical particle sizes (under 100 nm) of the samples prepared by the WASSR method were smaller than that (2 – 10 micrometer size) of the sample prepared by the conventional solid state reaction method. Most probable mechanism is new type water accelerated solid acid-base reaction on the surface. In this paper, we study the synthesis of ceramic materials using our proposed WASSR method.

13. Paper ID: AM876
Title: Tensile Behavior of Composite Concrete Reinforced Sugar Palm Fiber
Authors: Riana Herlina Lumingkewas, Rahmat Setyadi, Rachmi Yanita, Syahrial Akbar, Akhmad Herman Yuwono
Abstract: The objective of this research is to assess the benefit brought by fibers content, and fiber length on the splitting tensile behavior of sugar palm fibers reinforced concrete composites. Three fiber lengths of 5, 20, and 40 mm in four-fiber content, namely 1%, 2%, 3%, and 4% by a mass ratio fiber per cement, were utilized in this investigation. The values of tensile strength and density are reported for ages up to 28 days. The result observes that the addition of sugar palm fibers increased the tensile strength of concrete and the density of sugar palm fiber in concrete decreases with the addition of sugar palm fiber. The mix of 1% fiber content and 20 mm length fiber gave higher tensile strength compared to other mixes.

Session 4

May 18, 2018 (16:00-18:00) at Pornphailin room

1. Paper ID:59
Title: Evaluation of Flexural and Compressive Strength of E glass/Jute and E glass/Banana Hybrid Epoxy Hollow Composite Shafts
Authors: Srinivas Shenoy Heckadka, Suhas Yeshwant Nayak, Vishal Shenoy P, Nishank Minil Amin
Abstract: In this study hybrid composite hollow shaft for applications with dominant flexural and compressive load is developed. Numerical analysis is carried out to understand the failure of the proposed shafts. Azzi-Tsai-Hill failure theory is used to check for failure before fabricating the shafts. To validate the results of numerical analysis, two different hybrid composite shafts were fabricated on a filament winding set-up. A stacking sequence of [90 /0 /90 /0 /90] was used during fabrication. Hybridization was achieved by winding alternate layers of synthetic and natural fibers with epoxy, starting with E glass as the first layer followed by jute fibers while in the second shaft; banana fibers replaced the jute fibers. Compression and flexural tests were conducted on the hybrid shafts according to ASTM standards. Test results indicate that composite shafts having jute fiber along with E glass fiber could take more load, both in compression and in flexural loading conditions.

2. Paper ID: 60
Title: Fabrication and Testing of Glass/Banana Hybridized Epoxy Mono Composite Leaf Spring under Static Loading
Authors: Srinivas Shenoy Heckadka, Suhas Yeshwant Nayak, Navaneeth Krishna Vernekar

Abstract: This study makes use of E glass fiber and Banana fiber woven mats for the development of the hybrid composite mono leaf spring. Six composite laminates for selecting the optimum stack sequence were fabricated, four hybrids and two standalone using epoxy as matrix. From the flexural tests, two hybrid combinations were selected for fabricating the mono leaf spring. Among the hybrid composites, the one with three layers of glass fabric on the outside displayed maximum bending strength of 99.6 MPa. Composite mono leaf spring with three layers of glass fabric on the outside exhibited lower deflection when compared to conventional leaf spring. Results indicate that mono composite leaf spring has the potential to be used as an alternative to conventional leaf spring with continual research.

3. Paper ID: 62
Title: Testing and Characterization of Simply Supported Pultruded FRP Angle Beams Using Bending Tests
Authors: Jaksada Thumrongvut
Abstract: Structural performance and buckling behaviors of pultruded fiber-reinforced polymer (PFRP) angle profile beams under three-point bending tests are presented in this paper. The angle specimens were evaluated to investigate the effect of unbraced length of the beams on the buckling responses and critical buckling loads. In total, sixteen specimens, including eight span-to-width ratios (L/b) were tested. The dimension of the angle profile was commercially available 76x6.4 mm. The span-to-width ratios of the specimens were in the range of approximately 13 to 59. The constituent materials used for the angle profiles consist of unidirectional E-glass fibers and polyester resin. From the bending tests, the load-deformation relationships and failure modes of angle beams were reported. The experimental results indicated that the critical buckling load decreases as the span-to-width ratio increases. The degree of flexural-torsional buckling is directly related to span-to-width ratio. Furthermore, the comparison between the critical buckling loads obtained from experimental study and prediction using methods provided in AISC-LRFD design equation for PFRP angle profile beams showed an unsatisfactory correlation of the critical buckling loads.

4. Paper ID: 78
Title: Study of An Iterative Solution for Boltzmann Transport Equation and Calculation of Thermal Conductivity
Authors: Chhengrot Sion, Chung-Hao Hsu
Abstract: Many methods have been developed to predict the thermal conductivity of the material. Heat transport is complex and it contains many unknown variables, which makes the thermal conductivity hard to define. The iterative solution of Boltzmann transport equation (BTE) can make the numerical calculation and the nanoscale study of heat transfer possible. Here, we review how to apply the iterative method to solve BTE and many linear systems. This method can compute a sequence of progressively accurate iteration to approximate the solution of BTE.

5. Paper ID: AM822
Title: Trials of Developing a Magnetic Aluminum Metal Matrix Composite through Friction Stir Spot Forming
Authors: Hamed Mofidi Tabatabaei, Tetta Tajima, Tadashi Nishihara

Abstract: In present study, possibility of developing a new magnetic aluminum-based composite material by using principles of friction stir forming (FSF) is studied. Friction stir forming is a new materials forming technique which uses frictional heat to plasticize and plastically deform the alloy. Local magnetizing and local hardening of A6061 aluminum alloy is discussed by attempts of embedding and dispersing iron oxide powder and steel balls into A6061 aluminum alloy through spotted friction stir forming. Experiments revealed that FSF can be used to mechanically interlock steel balls and iron oxide with aluminum alloy and develop an aluminum metal matrix composite with improved magnetic properties. Results are discussed in terms of microstructural observation, hardness and magnetic properties.

6. Paper ID: AM823
Title: Problems of sodium using in pulsating heat pipe made from fused silica
Authors: Radovan Nosek, Tatiana Liptáková, Libor Trško, Zuzana Kolkova, Milan Malcho, Anna Kiiljan
Abstract: Heat pipe is a high efficiency heat transfer element, depends on the evaporation, condensation and circulation of inside working fluid. The working fluid of a high temperature pulsating heat pipe is generally alkali metals, and sodium heat pipe can operate in range of 500-1100°C.
In order to investigate terminal velocity of working fluid, the glass pulsating heat pipe was produced for experimental purposes. The experiment was carried out, in order to simulate real operating conditions in range of 500-1100°C. Sudden boiling of liquid sodium (b.p. = 883°C at 1 atm) inside the all quartz-made heat pipe results in high-temperature reaction of sodium vapour with the inner wall surface. The reaction became more aggressive with increasing vapour temperature and resulted in heat pipe explosion. The evaluation of damage character is analysed in this paper.

7. Paper ID: AM824
Title: Study on the connecting length of CFRP
Authors: Xiongfei Liu, Yue Li, Zhanguo Li
Abstract: The paper studied the varying mode of shear stress in the connecting zone of CFRP. Using epoxy resin (EP) as bond material, performance of specimens with different connecting length of CFRP was tested to obtain the conclusion. CFRP-confined concrete column was tested subsequently to verify the conclusion. The results show that: (1) The binding properties of modified epoxy resin with CFRP is good; (2) As the connecting length increased, the ultimate tensile strength of CFRP increased as well in the range of the experiment parameters; (3) Tensile strength of CFRP can reach the ultimate strength when the connecting length is 90mm;(4) The connecting length of 90mm of CFRP meet the reinforcement requirements.

8. Paper ID: AM825
Title: Milling abilities of electroplated diamond milling tools with Ni-B and Ni-Cr-C substrates
Authors: Ching An Huang, Su Wei Yang
Abstract: Electroplated diamond milling tools were prepared with Ni-B and Ni-Cr-C substrates, respectively, through composite electroplating on a medium carbon steel rod. Fabrication of electroplated Ni-B-diamond and Ni-Cr-C-diamond milling tools were be

introduced in this paper. Prior composite electroplating, a Ni undercoat with a thickness of 60μm was electroplated on the steel rod. The Ni-B-diamond composite electroplating was conducted in the Ni-Watt plating bath with an addition of 3 g/L TMAB and 300 g/L diamond particles with a size between 30 and 40 μm. Co-electrodeposition of Cr-C-diamond was performed in a trivalent Cr plating bath. Some of electroplated Ni-B-diamond and Ni-Cr-C-diamond milling tools were annealed at temperatures up to 5000C. Milling abilities of prepared electroplated diamond milling tools were evaluated by their milling length in Al2O3 plates on which a milling depth of 5 mm was conducted. Experimental results a Ni-B-diamond composite coating with high density and 10-layered diamond particles can be obtained through composite electroplating in the plating bath by means of intermittent stirring. A relatively high milling length of electroplated Ni-B-diamond milling tool was found after the tool was annealed higher than 3000C. However, the milling ability of 5000C-annealed electroplated Ni-Cr-C-diamond milling tool is obviously higher than that of annealed electroplated Ni-B-diamond one.

9. Paper ID: AM830
Title: The Impact of Temperatures on the Stability of Rocks Surrounding a Single Fracture
Authors: ZHANG Yan, LI Ning, DAI Jun
Abstract: Research on the influence of temperature and the accompanying stress on the stability of the rocks surrounding an underground tunnel has become ever more important. This paper constructs a geometric model of a single-fracture tunnel by combining a high-temperature underground tunnel as the object of study with an example that uses a high-temperature tunnel segment in the water diversion tunnel of a hydropower station in Xinjiang. Based on the relevant theoretical analysis, with the consideration of different working conditions, a numerical experimental analysis was conducted to determine the two-dimensional transient temperature field distribution of the tunnel rock mass by using a numerical analysis software. The experimental data was consistent with the measured data. The calculated results show the following: a. when the temperature difference is greater, the stress concentration is higher near the fracture of the surrounding rock; and b. the degree of the stress concentration in the crack tip region is not positively correlated to the distance, and there is a sensitive region where the stress varies.

10. Paper ID: AM857
Title: Failure observation of 3D-printed thrust bearing specimens at cross section observations in dry conditions
Authors: Koshiro Mizobe, Masahiro Inagaki, Katsuyuki KIDA
Abstract: 3D printing methods were developed and they become popular recently. 3D printing can easily make complex and seamless parts, however, the questions about their strength arise. In particular, the strength of the places where the lamination layer joins is important. We performed rolling contact fatigue (RCF) tests in dry conditions using 3D-printed bearing race, and observed the fracture behavior and cracks. It was found that the main crack is correlated to stress moving direction.

11. Paper ID: AM860
Title: Characteristic of Fixture with Fruit Tree Branch for Insect Capture using Flexible Materials
Authors: Ji-Hee Woo, Dimas Harris Sean Keefe, Pandu Sandi Pratama, Eun-Suk Lee, Yeong-Jo Moon, Seong-Won Chung, Jong-Min Park, Won-Sik Choi
Abstract: Apple tree need protection against pest and insect during it grows period. Pest and insect can cause disturbance to growth and quality of the apple fruit. Usually string is used to manage the tree and controlling the insect. However, the usage of string is not effective. Tree branch is still growth out of control and insect extend the destruction. This research propose new tool that could control the tree branches and insect. To clarify the strength of the tool, before its production, the structure analysis was done. The tool was analyzed by Ansys R15.0. ABS and nylon was considered as the tool materials. The result show that the maximum deformation of ABS material is 7.6129e-2 mm and the maximum stress of ABS material is 6.2849 MPa. Thus, the maximum deformation of Nylon material is 5.7691e-2 mm and the maximum stress of nylon material is 8.5092 MPa occurred at inner circle of insect capture tool. The frame safety factor of the ABS material is 10.103, the frame safety factor of the nylon material is 13.062, and the hook safety factor is 20.912. Simulation data is show that the product is safe if the tool is produced by ABS material or nylon material since safety factor values are higher than 1. However, the nylon material is safer that ABS material since it has a higher safety factor.

12. Paper ID: 120
Title: Influence of replacement rate of fine aggregate by blast furnace slag sand on fresh properties of mortar
Authors: Daiki Takehisa
Abstract: For enlarging and promoting usage of blast furnace slag sand and improving construction performance of concrete with it, the behavior of the mortar under both static and dynamic, using vibrator, conditions were confirmed from the viewpoint of plastic viscosity, filling property and bleeding rate. As the results, within the scope of this experiment, by investigating the mixing ratio at which the plastic viscosity changes from the vibration plasticity viscosity obtained by the feather penetration type viscosity measurement test, it was considered that the appropriate fine aggregate mixing ratio can be estimated. Furthermore, the pore water pressure was measured for a sample in which the mixing ratio of the fine aggregate was changed, and the possibility of evaluating the fresh properties from the tendency of disappearance of pore water pressure after stopping the vibration was indicated.

13. Paper ID: 132
Title: The Use of Factorial Design to Improve a Harmony Search Algorithm to Synthesize Heat-Integrated Distillation Sequences
Authors: Somboon Sukpancharoen, Thongchai Rohitatisha Srinophakun
Abstract: Optimization problems often involve a large number of design variables, and the exact influence of each of these variables upon the objective function can become rather complex; there may exist local optima for the objective function, but for the typical heat-integrated distillation sequence, the matter of interest is solely the global optimum. Therefore, it is necessary to create a stochastic algorithm method which can

synthesize distillation systems with multiple components. The encoding process employs and integer number series which allows the system flow sheet structure to be portrayed and then managed. Within this portrayal, the broad synthesis problem takes the form of an implicit MILP (mixed-integer linear programming) problem. This study considers the attributes of six well-known optimization algorithms: Harmony Search algorithm (HS), Artificial Bee Colony (ABC), Bat Algorithm (BA), Crow Search Optimization (CSO), Grew Wolf Optimization (GWO) and Monarch Butterfly Optimization (MBO). The optimal variables which influence the harmony search algorithm can be determined through full factorial design analysis. These variables can then be employed in the search to discover the optimal heat-integrated distillation sequence. The study investigates the attributes of the optimal configuration solution, in terms of harmony size (HS), required number of iterations, harmony memory considering the rate(HMCR), and pitch adjustment rate(PAR). The study then adopts the HS algorithm which is duly improved in order to address the problem. In comparison with alternative techniques, HS is more effective and more robust than other approaches.

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