2019 SINGAPORE CONFERENCE ABSTRACT

February 25-28, 2019

National University of Singapore, Singapore

Hosted and Supported by

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Table of Contents

2019 Singapore Conference Introductions

Welcome to CMS-CBEES 2019 conference in Singapore. The conference is held annually with high quality. The objective of the Singapore conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Building Materials and Construction.

2019 4th International Conference on Building Materials and Construction (ICBMC 2019)

Accepted papers will be published in the following Proceeding:

"Materials Science Forum" (ISSN: 1662-9752) and can be indexed by Ei Compendex, Scopus and so on.

Conference website and email: http://www.icbmc.org/; icbmc@cbees.net

CMS Mission

The mission of HKCBEES Chemistry and Materials Society (CMS) is to meet the engineers and the scholars in the Chemistry and Materials discipline. CMS offers a platform for them to communicate and exchange idea. HKCBEES Chemistry and Materials Society hold annually scheduled conferences and workshops on the Chemistry and Materials related topics, it serves as a forum for idea exchange, networking, information sharing and problem solving for the Chemistry and Materials community. HKCBEES Chemistry and Materials Society play an important role in the academic community.

About HKCBEES

The Hong Kong Chemical, Biological & Environmental Engineering Society (HKCBEES) was founded in 2007. It is an independent and scientific research and development organization. The Service can be traced back to the first work in 1999.

HKCBEES plays an influential role in promoting developments in Chemical, Biological & Environmental Theory and Applications in a wide range of ways. The mission of HKCBEES is to foster and conduct collaborative interdisciplinary research in state-of-the-art methodologies and technologies within its areas of expertise.

Good news! To join in HKCBEES member is free now. Please check the information on the website: http://www.cbees.org/list-33-1.html if you are interested in. Any question regarding to membership, please feel free to contact membership@cbees.org.

Organizing Committee

Conference General Co-Chairs
Prof. Low Sui Pheng, National University of Singapore, Singapore
Prof. Walid Larbi, Conservatoire National de Arts et Métiers (CNAM), France
Prof. Zongjin Li, University of Macau (UM), China

Program Co-Chairs
Prof. Tan Kiang Hwee, National University of Singapore, Singapore
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Assoc. Prof. Marina Rynkovskaya, Peoples' Friendship University of Russia, Russia
Assoc. Prof. Toshiaki Sato, Kyushu University, Japan
Assoc. Prof. Kaoru Suehiro, Kyushu University, Japan

Presentation Instructions

Instructions for Oral Presentations

Devices Provided by the Conference Organizer:

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:

PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)
Duration of each Presentation (Tentatively):
Regular Oral Presentation: about **12** Minutes of Presentation and **3** Minutes of Question and Answer
Keynote Speech: about **30** Minutes of Presentation and **5** Minutes of Question and Answer
We would appreciate if all presenters can adhere strictly to this time limit.

Instructions for Poster Presentations

Materials Provided by the Conference Organizer:

The place to put poster

Materials Provided by the Presenters:

Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Best Presentation Award

One Best Oral Presentation will be selected from each presentation session, and the Certificate for Best Oral Presentation will be awarded at the end of each session on February 26 and 27..

Dress Code

Please wear formal clothes or national representative of clothing.

Keynote Speaker Introductions

Keynote Speaker I

Prof. Low Sui Pheng

National University of Singapore, Singapore

Professor Low Sui Pheng is with the Department of Building, National University of Singapore (NUS). He received his PhD, MSc(Eng), BSc (Building)(Hons), and Diploma in Building from University College London, University of Birmingham, NUS and Singapore Polytechnic respectively. He was awarded a higher doctorate, DSc(Civil Engineering), by the University of Birmingham in 2012 for his significant, substantial and sustained contributions to knowledge in the built environment. He is also a Fellow of the Chartered Institute of Building.

Professor Low has served as Vice-Dean and Head in the NUS School of Design and Environment and the NUS Department of Building respectively. He currently teaches project management, quality, productivity and development technology in NUS. A winner of numerous best paper, best reviewer and teaching excellence awards, he has also consulted and researched extensively on project management issues relating to the construction industry. He has published more than 500 journal and conference papers and authored 20 books relating to construction project management. Professor Low is currently the Book Series Editor of Management in the Built Environment published by Springer. A member of the editorial advisory boards of more than 20 leading international refereed journals, he is frequently called upon to serve as external examiner, expert reviewer and independent validator by overseas universities and government agencies. He has been invited to serve in the scientific committees of many international and regional symposiums. Professor Low is presently Director of the Centre for Project Management and Construction Law in NUS.

Topic: "*Singapore's Built Environment: Past, Present and Future*"

Low Sui Pheng

National University of Singapore, Singapore

Abstract- Singapore has come a long way since her independence in 1965. From a small fishing village, Singapore is now one of the most live-able, safe and connected cities of the world. This has been made possible through a construction sector that is forward-looking despite the odds stacked against it over the past few decades. This keynote address traces the history, geography, demographics and economic development phases from the perspective of the built environment (i.e. the past). It presents snippets of the Singapore master plan, the world-class public housing program and transport infrastructure, pointing the way to building a Smart Nation, and yet at the same time safeguarding the heritage values through appropriate preservation and conservation programs (i.e. the present). The keynote address ends with future challenges faced by the built environment through the Construction Industry Transformation Map (i.e. the future).

Keynote Speaker II

Prof. Tan Kiang Hwee

National University of Singapore, Singapore

Professor TAN KIANG HWEE is a faculty member of the Department of Civil and Environmental Engineering at the National University of Singapore (NUS) since July 1981. He obtained his doctorate degree from the University of Tokyo, Japan in 1985. He specialises in the area of structural concrete and composites and has carried out extensive research on external prestressing, fibre-reinforced polymer (FRP) reinforcement, fibre-reinforced concrete, and sustainable concrete and construction.

Professor Tan is a Fellow of the Institution of Engineers, Singapore (IES), Japan Concrete Institute (JCI) and Japan Society of Civil Engineers (JSCE). He is a member of editorial boards for more than ten international journals, including ASCE Journal of Materials in Civil Engineering, ASCE Journal of Composites for Construction, Cement and Concrete Composites, JCI Journal of Advanced Concrete Technology, and others. He is a registered professional engineer and has also been a consultant in structural engineering to several agencies in Singapore.

Topic: "*Structural Application of Fibre Reinforced Concrete in Singapore*"

Tan Kiang Hwee

National University of Singapore, Singapore

Abstract- Fibre reinforced concrete (FRC) is a composite material characterized by an enhanced post-cracking residual tensile strength due to the bridging of the crack faces by the fibres. It is emerging as a cost-effective material in construction due to the improvement in work productivity and product durability. In this presentation, the characteristics of FRC and recent developments in guidelines and standards for the structural applications of FRC is first described. Examples of applications of FRC in tunnel segmental linings, slabs on piles and canal base slab in Singapore are then highlighted. This is followed by recent advanced research works carried out at the National University of Singapore on arching action and moment redistribution, as well as punching in FRC slabs, which provide further information for a more effective use of FRC. In conclusion, FRC has attracted substantial interests in the industry that a working group has been set up by the Singapore Standards Council to draft a standard on the design of FRC structures.

Keynote Speaker III

Prof. Walid Larbi

Conservatoire National de Arts et Métiers (CNAM), Paris, France

Dr. Walid Larbi is a full professor of Mechanic and Civil Engineering at Conservatoire National de Arts et Métiers (CNAM) in Paris (France). He received his Master of advanced studies in dynamic of structures and coupled systems from Ecole Centrale de Paris in 2003, his Ph.D. in Mechanical Engineering from CNAM in 2006 and his Habilitation in Mechanics from the University of Franche-Comté in 2016. He is co-head of the CNAM Civil engineering diploma. He is responsible for training and research development in the field of Construction in Middle East and North Africa.

His researches cover Passive Vibration Control, Acoustic and Vibroacoustics, Fluid-Structure Interaction, Dynamic of structures, Reduced Order Models, Composite and Piezoelectric Materials. Walid Larbi organized in 2017 the twentieth edition of the international conference on composite structures (ICCS20) with more than 600 participants. He has chaired more than 15 sessions in international conferences. He has been invited to serve in the scientific committees of many international congress and he is reviewer of 18 journals. He has authored or co-authored more than 100 journal and conference papers and chapters.

Topic: "*Numerical and Experimental Investigations of Building Acoustics and Noise Reduction*"

Walid Larbi

Conservatoire National de Arts et Métiers (CNAM), Paris, France

Abstract- Building acoustics is an important issue because it is related to human comfort and the quality of the indoor environment. Improving the sound insulation performance of building structures, as a significant way to protect people from the surrounding noise, is therefore of particular importance. The plate-like structure, such as a door, window, floor and wall, is one of the most common types of construction and building. In this Keynote, the experimental and numerical characterization of the acoustic performances of walls and double walls found in building is investigated. First, the acoustic performances of windows in the exterior building façade are evaluated experimentally according to the standard norm ISO 10140. This standard allows the determination of the acoustic performances of the structures by the measurement of the sound reduction index R (called also Sound Transmission Loss STL). In the second part of this work, a finite element formulation for sound transmission through double wall sandwich panels with viscoelastic core, representing a laminated glass windows, is presented. A reduced-order model, based on a normal mode expansion, is then developed. The proposed methodology requires the computation of the eigenmodes of the undamped structure, and the rigid acoustic cavity. Despite its reduced size, this model is proved to be very efficient for simulations of steady-state analyses of structural-acoustic coupled systems with viscoelastic interlayers when appropriate damping terms are inserted into the modal equations of motion. The third part of this presentation concerns the control of sound transmission through double laminated panels with viscoelastic core using semi-passive piezoelectric shunt technique. More specifically, the system consists of two laminated walls, each one composed of three layers and called sandwich panel with an air cavity in between. The external sandwich panel has surface-mounted piezoelectric patches. The piezoelectric elements, connected with resonant shunt circuits, are used for the vibration damping of some specific resonance frequencies of the coupled system in the low-frequency range.

Keynote Speaker IV

Prof. Zongjin Li

University of Macau (UM)

Dr. Zongjin LI is Chair professor at Institute of Applied Physics and Materials Engineering at University of Macau (UM). He joined UM after his service Hong Kong University of Science and Technology from 1994 to 2016. He received his B.E. from Zhejiang University, Hongzhou, China in 1982 and obtained both his M.S. and PhD from Northwestern University, Chicago, U.S.A, in 1990 in 1993, respectively. He is a fellow of American Concrete Institute and a registered professional engineer in Hong Kong, China. He is a member of committees of ISO/TC71, First vice Chair of China Group of RILEM and Founding President of ACI China Chapter.

He has done extensive researches in the area of cement-based materials and non-destructive evaluations. As the chief scientist, he has led a China Key National Basic Research Project (973), 'Basic study on environmentally friendly contemporary concrete', which has made a great contributions to advance concrete technology in China. As the founding chair of Gordon Research Conference, "Advanced Materials for Sustainable Infrastructure Development" in 2014, he has brought the research conference of building materials into a higher scientific level.

He has published 5 technical books, in which 'Advanced Concrete Technology' published by John Wiley has been collected by many national libraries and most major university libraries and used by many universities as text or reference books for civil engineering. He has also published more than 400 technical papers with a SCI H-index of 36 and Scopus H-index of 39. In 2016, he has been selected as the one of the 150 most cited authors in Civil engineering field. He has also been awarded five US and seven Chinese patents. Three of his patents have been developed into commercial products.

He received the Arthur R. Anderson Medal from American Concrete Institute in 2017 and Distinguished Visiting Fellowship Award from British Royal Academy of Engineering in 2014.

Topic: "*Advanced Cement-Based Materials through Nanotechnology*"

Zongjin Li

University of Macau (UM)

Abstract- In this presentation, advanced cement-based materials through application of nanotechnology will be introduced. One example is to use cement to generate 5 nm nanoparticles which is utilized to strengthen the hydrogel. By adding 5-nm inorganic particles in organic matrix, hydrogels with the best all-round performance in the world has been successfully developed in aspects of strength, elastic recovery and ultimate stretch ratio. Also, by adding organic or inorganic nano particles into cement based materials, the flexural strength of the cement-based materials increased significantly. For cement paste, bending strength is increased by three times without lowing the compressive strength. Moreover, with newly developed inorganic-organic combined nano particles, the hydration heat of cement-based materials can be reduced and their toughness will be improved without degrade their compressive properties. Finally, the high modulus concrete developed through the addition of nano particles will be introduced on its optimization in materials formulation, dimension stability behavior and structural performance.

Keynote Speaker V

Prof. Nuno Dinis Cortiços

University of Lisbon, Portugal

Nuno Dinis Cortiços is Professor and Chair on Building's Energy Certification at the Department of Technologies in Architecture, Urbanism and Design at Faculdade de Arquitectura, Universidade de Lisboa; Ph.D in Building Science and active member in Research Centre for Architecture, Urbanism and Design (CIAUD) associated to Fundação para a Ciência e Tecnologia (FCT). As Researcher focuses on building's renovation, autonomous maintenance systems, sensor and nano-technology applied to maintenance, building's performance and renovation's simulations on buildings stock, and maintenance accuracy applied to Unesco heritage; presenting and publishing the outcomes, mainly, at Scopus Conferences and Elsevier Journals. Board technical member at "Building and Environmental"; Architectural Research Centers Consortium, Inc (ARCC); and, European Association for Architectural Education (EAAE). Other accomplishments, Vice-President of the Faculty's Board, responsible for Financial Management and Maintenance; Building Supervisor on quality and warranty; and Team Leader on architecture designs; and, Judicial Technical Consultant on construction quality.

Topic: "*Membranes on Ventilated-façades to Improve Thermal Isolation of Residential Buildings*"

Nuno Dinis Cortiços

University of Lisbon, Portugal

Abstract- In EU-27 and US, as other developed countries, 80% and 90% of the residential building stock was built before thermal regulations became mandatory (1990). In 2016, EU-28 households accounted for 24.5% of the total (final) energy consumed: 79.2% for indoor and water heating (94.1% from petroleum derivates); and, 0.3% for cooling (100% electric sources). The latter indicator shows a tendency to follow temperatures' rising, price-cutting on technologies' new generation and the stable economic growth of households.
Researchers concluded, today's indoors consumption for cooling is from 24.38 tWh/a (JRC, 2012) to 47.24 tWh/a (Werner, 2015), depending on source and methodology, leading to a potential increase of 292.34 tWh/a (average), a growth of 619% over the last survey. The relative energy consumption for space cooling rises to 8.7% (785 TW h/a) or 2.5% (2706 TW h/a) if assumed the 2015 values. In EU-28, only 3% of residential building stock is "A" rated on energy efficiency (EPDB), in which 80% will be renovated and 20% replaced by new, until 2050; in line with EU guidelines and targets, for a 90% reduction in GHG emissions, based on the 1990s' values.
The idea is to use tensile membranes, as traditionally used in some streets of countries of Southern Europe, on residential buildings. Wrapping façades, on a new architectonic approach, like in fashion design or interior decoration. The research aims to contribute for a more efficient thermal isolation of the residential stock, by applying a 'second skin,' based on Tensile Membranes Technology, on the building's envelope, to control the temperatures rising, the growth of air-condition energy consumption and reduce GHG emissions. A ventilated-façade solution, made by tensile membranes, can improve thermal isolation by 55%, under solar radiation and a controlled air-speed, kept between 0.5 and 1 m/s. A light-weight solution (irrelevant loads), produced 'off-site' and fast to assemble (even by vertical works). Tested under strong winds conditions, it is safe for goods and others when compared with traditional modular panels.

Keynote Speaker VI

Prof. Ho Chee Cheong

Universiti Tunku Abdul Rahman, Malaysia

Prof. HO Chee-Cheong received his MSc (1999) and PhD (1973) degrees from the University of Bristol, United Kingdom. He started work at the Rubber Research Institute Malaysia in 1973 before joining the University of Malaya in 1975 where he progressed to become a full professor in 1992 and Head of Department in 1994. After his mandatory retirement in 1999, Dr. Ho was appointed R&D Director of a Glove manufacturing company, Thailand (1999 -2002) before returning to academic as the Foundation Dean and professor of a newly established university, AMIST University, Malaysia (2002-2006). He was appointed the first Vice-Chancellor of First City University College, a newly established university in Kuala Lumpur (2015-2017). He is an Adjunct Professor of Universiti Tunku Abdul Rahman, Malaysia since 2008.

Dr. Ho specializes in latex chemistry and technology, particularly in the use of green technologies for latex processing and glove dipping. He was awarded the DSc degree by University of Bristol in 1998 for his contribution to understanding the colloidal and surface properties of natural rubber latex and elucidating its film formation mechanism. He received the Science and Technology Award by the Malaysian Toray Science Foundation in 1997. He was later honoured with the National Science Award for research in 1999 in recognition of his lifelong research work on colloidal systems of values to the Malaysian economy (natural rubber latex, palm oil mill effluent, industrial applications of palm oil emulsion and tin tailings slurry). Dr. Ho is a Past President of the Malaysian Institute of Chemistry and a Senior Fellow of the Academy of Sciences Malaysia. He was elected a Fellow of the ASEAN Academy of Engineering and Technology in 2010 and the Royal Society of Chemistry, UK in 1990.

Topic: "*Innovations in Barrier Device for Infection Control*"

Ho Chee Cheong

Universiti Tunku Abdul Rahman, Malaysia

Abstract- Infection control in healthcare and hospital facilities is of utmost importance in present day context of frequent outbreaks of infectious diseases in a highly mobile and interconnected world. Medical glove is the frontline protection against cross-infection by pathogens among healthcare worker and patients. The wearing of medical gloves by healthcare workers has been made mandatory in the developed countries since the 1980s.

William Haldsted was credited as the first to introduce the use of natural rubber (NR) gloves during surgery in 1889 -1890 at Johns Hopkins Hospital, Baltimore USA [1]. It was mentioned that surgeons at the hospital noticed the number of infection significantly decreased when NR gloves were used during surgery [2]. Those gloves were thick and most probably hand-dipped. Ansell was recorded to be the first to design and built an automatic dipping machine that produced 300 dozen pairs of gloves in eight hours in 1945 [3]. The company introduced disposable surgical gloves in 1964 and went on to become the largest producer of latex glove for house and medical use in those days. The use of medical gloves as a barrier device against infection became mandatory after the emergence of AIDS/HIV pandemic in the 1980s. This had spurred strong demand for medical gloves for healthcare workers. In the ensuing years each outbreak of highly infectious diseases such as the avian flu, SARS and MERS was accompanied by a corresponding spike in demand for medical gloves. The strong demand for medical gloves has driven the glove manufacturing industry to continuously improve its productivity and quality. Many innovative measures have since been incorporated into the dipping process.

Keynote Speaker VII

Prof. Hiroyuki Nakamura

Tokyo Institute of Technology, Japan

Hiroyuki Nakamura was received his PhD from Tohoku University under the supervision of Professor Yoshinori Yamamoto in 1996. He became an assistant professor at Kyushu University (1995-1997) and at Tohoku University (1997-2002). He worked as a visiting assistant professor at University of Pittsburgh with Professor D. Curran (2000-2001). In 2002, he was appointed as an associate professor at Gakushuin University and promoted as a professor in 2006. In 2013, he was appointed as a professor at Tokyo Institute of Technology. He received the Chemical Society of Japan Award for Young Chemists in 1999 and the Incentive Award of the Japanese Society for Molecular Target Therapy of Cancer in 2007. He became president of the Japanese Society of Neutron Capture Therapy in 2015. His research interests include synthetic methodology, medicinal chemistry, chemical biology, photodynamic therapy, and neutron capture therapy.

Topic: "*Boron Neutron Capture Therapy: Current Status and Future Aspect"*

Hiroyuki Nakamura

Tokyo Institute of Technology, Japan

Abstract- Boron neutron capture therapy (BNCT) has been attracting growing interest as one of the minimally invasive cancer therapies. BNCT uses the nuclear reaction between low-energy thermal neutron (0.025 eV) and boron-10 (10B), and the generated α-particle and lithium nuclei are high linear energy transfer (LET) particles (2.4 MeV) that are sufficiently powerful to kill cells. Therefore, selective delivery of 10B atoms to tumor is essential for effective BNCT. Mercaptoundecahydrododecaborate (Na2[B12H11SH]) and L-p-boronophenylalanine (L-BPA) have been used in BNCT for many years. L-BPA, in particular, has been widely used for the treatment of not only melanoma but also brain tumor and head and neck cancer because it can be taken up selectively by tumor cells through an amino acid transporter. The accelerator-based BNCT is now undergoing phase II clinical study for the treatment of brain tumor and head and neck cancer patients in Japan. However, development of new boron carriers is still strong requirements for patients who are not able to be treated with L-BPA.

Serum albumin, a major plasma protein constituent, is composed approximately 55% of the human plasma protein. Albumin accumulates in malignant and inflamed tissues due to enhanced permeability and retention (EPR) effect. Furthermore, it has been observed that tumor is the major site of serum albumin catabolism, thus serum albumin has been extensively investigated as a versatile carrier for therapeutic and diagnostic agents, including diabetes, cancer, rheumatoid arthritis and infectious diseases. For example, Abraxane®, an albumin-paclitaxel nanoparticle, is the most advanced drug delivery product first approved by FDA in 2005 for the treatment of metastatic breast cancer. We developed maleimide-functionalized closo-dodecaborate (MID) for conjugating bovine serum albumin (BSA) as new boron delivery system. The highly boronated BSA showed high and selective accumulation in tumor. Significant tumor growth inhibition was observed in colon 26 tumor-bearing mice subjected to thermal neutron irradiation.

Keynote Speaker VIII

Prof. Shen-Ming Chen

National Taipei University of Technology, Taiwan

Prof. Shen-Ming Chen (h-index > 60) received his PhD degrees in chemistry from National Taiwan University, Taipei, Taiwan. He was a visiting postdoctoral fellow with the Institute of Inorganic Chemistry, Friedrich-Alexander University Erlangen-Nuremberg, Germany in 1997. He joined Department of Chemical Engineering, National Taipei Institute of Technology, Taipei, Taiwan in 1985. He had been an associate professor of Department of Chemical Engineering, National Taipei Institute of Technology, Taipei, Taiwan from 1991 to 1997. Since August 1997, he has been a full professor of Department of Chemical Engineering and Biotechnology, National Taipei University of Technology. He has been the Dean (Curator) of library, National Taipei University of Technology, Taiwan from 2000 to 2006 and the Director of Extracurricular Activity, office of student affairs, National Taipei University of Technology, Taiwan from 1995 to 2000.

Prof. Shen-Ming Chen has published over 500 research and review papers in internationalSCI journals. Some of their papers have been selected as the most cited papers in theJournal of Electroanalytical Chemistry and Biosensor & Bioelectronics. He received threetimes Distinguish Professor awards. He also received three times Outstanding Research Award from National Taipei University of Technology, Taiwan. He have edited or attended two books for NOVA publications titled “Nanostructured Materials for Electrochemical Biosensors” and “Biosensors: Properties, Materials and Applications” and contributed four book chapters.

Topic: "*Design and Synthesis of Nanostructured Binary Metal Oxides for Electrocatalysis, Electroanalysis and Biosensors*"

Shen-Ming Chen

National Taipei University of Technology, Taiwan

Abstract- Development of nanostructured materials with superior morphology by simple methodology has incessantly received a significant scientific interest due to their unique physical and chemical properties for the applications in electrochemical sensors and biosensors. Binary metal oxides, particularly, metal molybdates and tungstates possess enormous attentions due to their high electrical conductivity, excellent structural stability and reproducibility compared to single one. In this regard, we fabricated different metal molybdates and tungstates with well-defined morphology and utilized as chemical sensors and biosensors in real environment and biological fluids. For occasion, two-dimensional plate-like tin molybdate was fabricated via simple co-precipitation route and employed as an electrochemical for the detection of neurotoxicity drug clioquinol. Highly sensitive and selective electrochemical sensor for the identification of postharvest scald inhibitor diphenylamine was developed using seed-like strontium molybdate modified electrode. A flower-like neodymium molybdate was prepared and studied towards the selective electrochemical sensor for the antibiotic drug nitrofurantoin. The CoWO4 nanospheres was prepared by low temperature chemical synthesis method and evaluated towards the sensitive detection of glucose biosensor. A novel nickel tungstate was synthesized using simple hydrothermal treatment without using any surfactant or templates and investigated for its electrochemical properties for the detection of glucose biosensor. Well-crystalline 2D cerium tungstate nanosheets were prepared by a simple wet chemical approach and used as an excellent electron mediator for the fabrication of nitrite sensor. A novel ruthenium nanoparticles decorated tungsten oxide based sensor was developed and its catalytic behavior was demonstrated towards the oxidation of hydrazine. The aforementioned nanomaterials were furnished a good electrocatalytic activity with appreciable stability towards the chemical sensors and biosensors when compared with the previously reported sensors. The analytical parameters such as linear response range, sensitivity, limit of detection and reproducibility of the devices also been carried out and compared with the current state of the art.

Brief Schedule for Conference

<table>
<tr><td>Day 1</td><td colspan="2">February 25 (Monday) 10:00~17:00
Venue: Thyme (Second Floor)
Arrival Registration</td></tr>
<tr><td rowspan="11">Day 2</td><td colspan="2">February 26 (Tuesday) 9:00~17:00
Venue: Thyme (Second Floor)+ Clove (Second Floor) +Lemongrass (Second Floor)
Arrival Registration, Keynote Speeches and Conference Presentations</td></tr>
<tr><td colspan="2">Morning Conference</td></tr>
<tr><td colspan="2">Venue: Clove (Second Floor)+Lemongrass (Second Floor)
Opening Remark 9:00~9:05
Prof. Low Sui Pheng, National University of Singapore, Singapore
Keynote Speech I 9:05~9:40
Prof. Zongjin Li, University of Macau (UM)
Keynote Speech II 9:40~10:15
Prof. Low Sui Pheng, National University of Singapore, Singapore
Coffee Break & Group Photo Taking 10:15~10:35
Keynote Speech III 10:35~11:10
Prof. Shen-Ming Chen, National Taipei University of Technology, Taiwan
Keynote Speech IV 11:10~11:45
Prof. Ho Chee Cheong, Universiti Tunku Abdul Rahman, Malaysia</td></tr>
<tr><td colspan="2">Lunch: 12:00~13:30
Venue: Lobby of Clove(Second Floor)</td></tr>
<tr><td colspan="2">Afternoon Conference</td></tr>
<tr><td>Session 1: 13:30~15:30
Venue: Clove (Second Floor)
8 presentations-Topic: “Building Materials”</td><td>Session 3: 13:30~15:30
Venue: Lemongrass (Second Floor)
8 Presentations-Topic: “Concrete Technology and Structural Engineering”</td></tr>
<tr><td colspan="2">Coffee Break 15:30-15:45</td></tr>
<tr><td>Session 2: Poster Session: 15:45-16:45
Venue: Clove (Second Floor)
8 presentations</td><td>Session 4: 15:45-17:00
Venue: Lemongrass (Second Floor)
5 Presentations-Topic: “Concrete Technology and Structural Engineering”</td></tr>
<tr><td colspan="2">Dinner: 17:10 Venue: Kent Ridge Guild House</td></tr>
<tr><td rowspan="4">Day 3</td><td colspan="2">February 27 (Wednesday) 9:00~17:30
Venue: Clove (Second Floor)+Lemongrass (Second Floor)
Arrival Registration, Keynote Speeches and Conference Presentations</td></tr>
<tr><td colspan="2">Morning Conference</td></tr>
<tr><td colspan="2">Venue: Clove (Second Floor)+Lemongrass (Second Floor)
Keynote Speech I 9:00~9:35
Prof. Tan Kiang Hwee, National University of Singapore, Singapore
Keynote Speech II 9:35~10:10
Prof. Hiroyuki Nakamura, Tokyo Institute of Technology, Japan
Coffee Break & Group Photo Taking 10:10~10:30</td></tr>
</table>

	Keynote Speech III 10:30~11:05 Prof. Nuno Dinis Cortiços, University of Lisbon, Portugal **Keynote Speech IV** 11:05~11:40 Prof. Walid Larbi, Conservatoire National de Arts et Métiers (CNAM), Paris, France	
	Lunch: 12:00~13:30 **Venue:** ***Lobby of Clove(Second floor)***	
	Afternoon Conference	
	Session 5: 13:30-15:00 **Venue*: Clove (Second Floor)*** 6 presentations-Topic: "Construction Engineering and Management"	**Session 7**: 13:30-15:15 **Venue*: Lemongrass (Second Floor)*** 7 presentations-Topic: "Chemical Engineering and Technology"
	Coffee Break 15:15-15:30	
	Session 6: 15:30-16:45 **Venue*: Clove (Second Floor)*** 5 presentations-Topic: "Construction Engineering and Management"	**Session 8**: 15:30-17:30 **Venue*: Lemongrass (Second Floor)*** 8 presentations-Topic: "Chemical Engineering and Technology"
	Dinner: 17:30 **Venue:** ***Kent Ridge Guild House***	
Day 4	**February 28 (Thursday)** 9:00~18:00 One-day Visit	

Tip: Please arrive at the Conference Room 10 minutes before the session begins, and upload PPT/ PDF file into the conference laptop.

Detailed Schedule for Conference

February 25 (Monday)

Venue: *Thyme (Second Floor)*

10:00~17:00	**Arrival Registration**

Note: (1) The registration can also be done at any time during the conference.
(2) The organizer doesn't provide accommodation, and we suggest you make an early reservation.
(3) One Best Oral Presentation will be selected from each oral presentation session. The Certificates for Best Oral Presentation will be awarded at the end of the session on February 26 and 27, 2018.

February 26 (Tuesday)

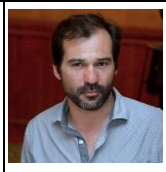
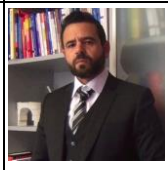
Venue: *Clove (Second Floor) + Lemongrass (Second Floor)*

9:00~9:05		**Opening Remark** Prof. Low Sui Pheng, National University of Singapore, Singapore
9:05~9:40		**Keynote Speech I** Prof. Zongjin Li, University of Macau (UM) Topic: "Advanced Cement-Based Materials through Nanotechnology"
9:40~10:15		**Keynote Speech II** Prof. Low Sui Pheng, National University of Singapore, Singapore Topic: "Singapore's Built Environment: Past, Present and Future"
10:15~10:35		**Coffee Break & Group Photo Taking**
10:35~11:10		**Keynote Speech III** Prof. Shen-Ming Chen, National Taipei University of Technology, Taiwan Topic: "Design and Synthesis of Nanostructured Binary Metal Oxides for Electrocatalysis, Electroanalysis and Biosensors"
11:10~11:45		**Keynote Speech IV** Prof. Ho Chee Cheong, Universiti Tunku Abdul Rahman, Malaysia Topic: "Innovations in Barrier Device for Infection Control"
12:00~13:30		**Lunch**
13:30~15:30		**Session 1:** 8 presentations-Topic: "Building Materials"
13:30-15:30		**Session 3:** 8 presentations-Topic: "Concrete Technology and Structural Engineering"

15:30~15:45	**Coffee Break**
15:45~16:45	**Session 2:** Poster Session: 8 presentations
15:45-17:00	**Session 4:** 5 presentations-Topic: “Concrete Technology and Structural Engineering”
17:10	**Dinner**

February 27 (Wednesday)

Venue: *Clove (Second Floor) + Lemongrass (Second Floor)*

9:00~9:35		**Keynote Speech I** Prof. Tan Kiang Hwee, National University of Singapore, Singapore Topic: “Structural Application of Fibre Reinforced Concrete in Singapore”
9:35~10:10		**Keynote Speech II** Prof. Hiroyuki Nakamura, Tokyo Institute of Technology, Japan Topic: “Boron Neutron Capture Therapy: Current Status and Future Aspect”
10:10~10:30	**Coffee Break & Group Photo Taking**	
10:30~11:05		**Keynote Speech III** Prof. Nuno Dinis Corti ços, University of Lisbon, Portugal Topic: “Membranes on Ventilated-Fa çades to Improve Thermal Isolation of Residential Buildings”
11:05~11:40		**Keynote Speech IV** Prof. Walid Larbi, Conservatoire National de Arts et M étiers (CNAM), Paris, France Topic: “Numerical and Experimental Investigations of Building Acoustics and Noise Reduction”
12:00~13:30	**Lunch**	
13:30~15:00	**Session 5:** 5 presentations-Topic: “Construction Engineering and Management”	
13:30-15:15	**Session 7:** 7 presentations-Topic: “Chemical Engineering and Technology”	
15:15-15:30	**Coffee Break**	
15:30-16:45	**Session 6:** 5 presentations-Topic: “Construction Engineering and Management”	
15:30-17:30	**Session 8:** 8 presentations-Topic: “Chemical Engineering and Technology”	
17:30	**Dinner**	

Session 1

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest you attend the whole session.

Afternoon, February 26, 2019 (Tuesday)

Time: 13:30~15:30

Venue: *Clove (Second Floor)*

Session 1: 8 presentations- Topic: "Building Materials"

Session Chair: Prof. Ho Chee Cheong

S0010 Presentation 1 (13:30-13:45)	Improving the Strength and Engineering Properties of Alkali-Activated Slag –Rice Husk Ash Paste at the Early Ages with Addition of Various Magnesium Oxide Content Chao-Lung Hwang, **Duy-Hai Vo**, Mitiku Damtie Yehualaw and Vu-An Tran The University of Danang, Vietnam ***Abstract***—The aim of this study is to evaluate the effect of MgO on alkali-activated slag- rice husk ash paste. The mixtures were prepared with GGBFS replaced with10% RHA and modified by 2.5%, 5% and 7.5% MgO. Then these mixtures were compared to the reference mixture (without RHA and MgO content). The properties of paste were tested by flow, compressive strength, thermal conductivity and UPV analysis. In terms of finding, using RHA and MgO remarkably reduced the workability of AASR paste. In additions, the mere use of 10% RHA slightly reduced the strength of paste. However, adding MgO significantly accelerated the hydration of AASR samples in the early age and improved the strength and engineering properties of AASR paste samples.
S0028 Presentation 2 (13:45-14:00)	Influence of Coating on Mechanical Performance of Lap-Spliced Carbon Fiber-Textile Reinforced Mortar (TRM) **Gia Toai Truong**, Ngoc Hieu Dinh, Sang-Hyun Park, Seung-Jae Lee, Joo-Young Kim and Kyoung-Kyu Choi Soongsil University, South Korea ***Abstract*—**In this study, the effect of coating methods in the lap splice area on mechanical performance of lap-spliced carbon textile reinforced

	mortar (TRM) composites was investigated. The coating methods included textile reinforcement coated with epoxy, textile reinforcement coated with aluminum oxide powder and epoxy, and textile reinforcement coated with aluminum oxide powder, epoxy, and carbon fiber fabrics. It appears that the coated specimens showed higher peak strength and ultimate strain than those of the uncoated one.
S0045 Presentation 3 (14:00-14:15)	Material Expression on Huizhou Contemporary Regional Architecture **Wei Huang** Tongji University, China ***Abstract*—**Building materials are not only the material basis of construction, but also an important carrier of regional architectural culture. With the development of The Times, building materials have also changed. How to use traditional and modern materials to show the regionality and contemporaneity of architecture is an unavoidable problem in the development of regional architecture and the goal of architectural creation. Taking Huizhou contemporary regional architecture as examples, this paper discusses the material expression of Huizhou contemporary regional architecture through three ways: the modern expression of traditional materials, the regional expression of modern materials and the juxtaposition of old and new materials.
S0050 Presentation 4 (14:15-14:30)	Preparation and Drilling Performance of Orderly Arranged Diamond Bit **Liang Xu**, Yibo Liu, Xiaoli Luo, Wenkai He andwei Deng Beijing Gang Yan Diamond Products Company, China ***Abstract*—**This paper introduces the application of orderly arranged diamond bit and the technology of realizing diamond orderly arrangement in bit. Two kinds of conventional bits and one bit with diamond orderly arrangement were used in the test to drill reinforced concrete. By experimental results: under the same conditions (same matrix, same diamond grade and concentration), the drilling speed of orderly arranged diamond bit is increased by 13.1%, the life is increased by 11.5%, compared with the conventional diamond bit. The drilling speed of orderly arranged diamond bit is increased by 15.8%, the life is increased by 8.9%, compared with the conventional bit which the matrix is same but the diamond concentration is 5% higher. On the basis of saving diamond and reducing cost of bit, orderly arrangement can still improve the efficiency and life of drill bit, it embodies the superiority of diamond bit with diamond orderly arrangement.
S1002 Presentation 5 (14:30-14:45)	Low Temperature Cement Synthesis: Calcium Sulfoaluminate-Belite from Industrial Wastes **Maneerat Thala** and Kedsarin Pimraksa Chiang Mai university, Thailand ***Abstract***—This study aimed to synthesis low temperature cement: Calcium

	Sulfoaluminate-Belite (CSˆAB) using industrial waste as starting material viz., fly ash, bottom ash, and FGD-gypsum together with calcined clay. Commercial grade of $Ca(OH)_2$ and $Al(OH)_3$ are also used as corrective materials. The synthesis method was hydrothermal-calcination. The designed cement phases were calculated basing on Bogue equation. This study varied proportion of starting materials in order to obtain high level of ye'elimite phase and followed the strength development of the synthesized product. The main phases after synthesis were ye'elimite and anhydrite. Belite was also formed as a minority. CSˆAB was mixed with 20wt% of FGD-gypsum and 0.6 of water to solid ratio to study its hydration. The compressive strength was 22.9 MPa at 7 days.
S1005 Presentation 6 (14:45-15:00)	Moisture-Density Relationship of Bottom Ash, Lime Stabilized Bangkok Clay as a Potential Pavement Material in Thailand **Akanksha Bhurtel** and Amin Eisazadeh Thammasat University, Thailand ***Abstract***—Expansive clayey soils like Bangkok clay can shrink and swell with water contact. Therefore, the presence of such soils tends to damage the road conditions with a higher frequency of rainfall in Thailand. The presence of expansive clayey soil has brought the concept of stabilization of such roads with any other stronger materials. This paper shows the test results on the moisture-density relationship of bottom ash and lime stabilized Clayey soil to use as a pavement material in Thailand. In this study, a waste material produced from coal combustion called bottom ash was used as a replacement material and quicklime as a binding material. During the tests 10%, 20%, 30% and 50% bottom ash and 4%, 8%,12% Lime were used. The result shows a decrease in Maximum Dry Density and increase in Optimum Moisture Content with an increase in each amount of replacement material.
S1020 Presentation 7 (15:00-15:15)	Improve Light Weight Concrete Characteristics by Adding Paraffin Wax as Moisture Proof Shamel Abdul Raheem, **Baydaa Hussain Maula**, Majeed Abdul Saheb Hameed and Qais Mikhael Bahnam Middle Technical University, Iraq ***Abstract***—The development of structural materials used in building process is certainly subjected to the local and temporal potentials and to how the extent to which the human thought made in the scientific and industrial field. Where the constructional methods that depend on pottery bricks were and still essentially adopted. The advanced human thought attempted making more efforts to find constructional materials of certain specifications. Porous concrete Light Weight Concrete (LWC) is considered a good alternative constructional material in addition to its light weight and good thermal isolation. It is used currently in Iraq as concrete block to form breakers only. This research includes essential information

	about LWC and developing it through adding paraffin wax to generate a material of high moisture isolation, low absorption rate and high bearing for compressive forces especially after overflowing it with wax.
S1025 Presentation 8 (15:15-15:30)	The Influence of Chemical Additives on Strength of Wood-Cement Composite ZAPRUDNOV Vyacheslav, SANAEV Victor, KARPACHEV Sergey, **LEVUSHKIN Dmitry** and GORBACHEVA Galina Mytischi Branch of Bauman Moscow State Technical University, Russia ***Abstract***—The strength and strains of the wood-cement composite primarily depend on the main technological factors such as the used type of binder and wood filler, the method of wood filler preparation, the method of molding, the conditions of hardening. The aim of this work is an experimental study of the chemical additives influence on wood filler to localize the harmful effects of water-soluble wood substances on the processes of hydration and hardening of cement. Using the additives, it is possible to achieve satisfactory strength parameters even on green wood. The maximum strength was obtained when complex chemical additives were applied. The most effective additives involved calcium chloride, liquid glass, aluminum sulfate, lime and ethanolamines. The optimal consumption and ratio of the complex additives components costs also depend on the degree of preliminary wood exposure.

15:30-15:45	**Coffee Break**

Session 2

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest you attend the whole session.

Afternoon, February 26, 2019 (Tuesday)

Time: 15:45-16:45

Venue: *Clove (Second Floor)*

Poster Session: 8 presentations

S2002 Poster 1	Electron Transfer Property along Alkyl Chain Length of Small Molecular Electrolytes Based on Viologen Ditosylate in Polymer Solar Cells **Ho Cheol Jin**, Dong Geun Kim, Ratna Dewi Maduwu, Sabrina Aufar Salma, Jun Ho Lee, Mi Jin Jeong, Hyun Sung Kim and Joo Hyun Kim Pukyong National University, South Korea Abstract—For high-performance polymer solar cells, it is important to transfer photogenerated electrons to the cathode. One effective method is to insert an appropriate electrolyte into the electron transfer layer. Through our prior work, a viologen derivative was chosen as the electrolyte suitable for the electron transfer layer (ETL). Herein, We synthesized 1,1'-bis(1-butyl)-4,4′-bipyridine-1,1′-diium benzenesulfonate (V-C4-OTs), 1,1'-bis(1-hexyl)-4,4′-bipyridine-1,1′-diium benzenesulfonate (V-C6-OTs), and 1,1'-bis(1-dodecyl)-4,4′-bipyridine-1,1′-diium benzenesulfonate (V-C12-OTs) by simple quaternization to see how the alkyl chain length affects the electron transfer property in polymer solar cells. Photogenerated current Density (Jph) and incident photon-to-electron conversion efficiency (IPCE) were investigated by simulating a device fabricated with the composition of ITO / ZnO / ETL / Donor:Acceptor / MoO_3¬ / Ag under 1.0 sun simulated illumination. Work function (WF) of ETL coated ITO / ZnO was also investigated using Kelvin probe microscopy (KPM) measurements to understand the reason for the change in Jph and IPCE along alkyl chain length. The improved Jph and IPCE can be related with a reduction of a Schottky barrier which is induced by a decrease in energy level difference between lowest unoccupied molecular orbital (LUMO) of Acceptor and work function (WF) of ETL coated ITO/ZnO. Very interestingly, the tendency of Jph and IPCE along alkyl chain length of each electrolyte matched a reduction of the Schottky barrier well.
S2009	Study on Process Parameters for Hydrochloric Acid Leaching of

Poster 2	Low-Grade Ilmenite **Hongmin Youn** and Sunjung Kim University of Ulsan, South Korea Abstract—Titanium (Ti) hydrometallurgically extracted from ilmenite has been widely used in many industries such as aircraft, health care, architecture, and national defense. Ti has a larger specific strength than iron, and is more resistant than stainless steel against corrosion. Low-grade ilmenite ore including 40-45% titanium dioxide (TiO_2) has been mostly used for its wet smelting in industry. However, ilmenite ore with less than 40% TiO_2 has been considered economically useless in the aspect of industrial mass production. In this study, we propose a hydrometallurgical method of raising the grade of 20%-TiO_2-containing ilmenite to higher than 50% using hydrochloric acid leaching and ilmenite-particle size control. Selective separation of iron from ilmenite is also introduced by applying a reducing agent like oxalic acid.
S3003 Poster 3	Synthesis of Triphenylphosphine Oxide-Quinoxaline Molecules as Electron-Transport Layers for Perovskite Light-Emitting Diodes **Jun Tae Kim**, Bo Ram Lee and Dong Wook Chang Pukyong National University, South Korea ***Abstract***—New electron transport materials have been designed and synthesized by using Suzuki coupling reaction for Perovskite light-emitting diodes (PeLEDs). These electron transport materials, (4-(2,3-diphenylquinoxalin-5-yl)phenyl)diphenylphosphine oxide (QxTPPO) and (4-(dibenzo[a,c]phenazin-10-yl)phenyl)diphenylphosphine oxide (BPhTPPO), were comprised of two electron-withdrawing moieties such as quinoxaline and phosphine oxide. Tripehnylphosphine oxdie was directly linked with quinoxaline derivatives. Tripehnylphosphine oxdies were known to be able to improve the electron mobility. The photophysical and electrochemical properties of QxTPPO and BPhTPPO were investigated through UV-vis, photoluminescence and cyclic voltammetry. They exhibit appropriate highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital LUMO energy level and proper optical band gap to be used as electron transporting layers in PeLEDs. The absorption and emission spectra of QxTPPO and BPhTPPO was obtained chloroform solution at room temperature. Both materials exhibit strong absorption peak 265 nm of QxTPPO and 255 nm of BPhTPPO in chloroform solution. The fluorescence emission peaks were observed at 422.5 and 437 nm respectively. HOMO and LUMO energy level of QxTPPO and BPhTPPO were figured out as -6.21 and -3.00 eV, and -6.20 and -3.19 eV, respectively. This study can offer meaningful insight into the molecular design as well as structure-property relationships of the triphenylphosphoine-quinoxaline based small molecules for PeLEDs.
S3012	Synthesis and Characterization of Solution-Stable PEDOT Coated

Poster 4	Sulfonated Polystyrene Copolymer PEDOT:P(SS-co-St) Particles for NIR Shielding Film **Soeun Im**, Chanil Park, Jooyoung Kim and Jung Hyun Kim Yonsei University, South Korea ***Abstract***—We synthesized sulfonated polystyrene copolymers coated with poly(3,4-ethylenedioxythiophene)(PEDOT) as efficient heat shielding agents, which exhibit strong near-infrared absorption, have high solid content, and stable solution stability. The P(SS-co-St) copolymers were successfully synthesized via radical solution polymerization, and PEDOT:P(SS-co-St) was synthesized via Fe+-catalyzed oxidative polymerization. PEDOT:P(SS-co-St) was examined using nuclear magnetic resonance and Fourier transform infrared spectroscopy. The particle size and morphology of PEDOT:P(SS-co-St) were examined using transmission electron microscopy, dynamic light scattering, and zeta potential measurements. The best NIR shielding efficiency of the film is 92.0% with 40% transmittance. Therefore, PEDOT:P(SS-co-St) is currently one of the best candidates for a heat insulating material in a semi-transparent heat insulation coated window due to its relatively stable solution stability.
S3002 Poster 5	Synthesis and Lithium Ion Conduction of Silica Aerogel Single-Ion Conductors **Ho Kyun Jung** and U Hyeok Choi Pukyong National University, South Korea ***Abstract***—In recent years, solid polymer electrolytes (SPEs) for safe lithium batteries have been studied as a candidate to replace liquid electrolytes having obstacles, such as a low lithium-ion transference number (< 0.5), limiting power density and recharging rates, and Li dendrite growth, making safety issues of flammability and explosion. To overcome these disadvantages, of considerable interest are single-ion conducting SPEs, where anions are covalently attached to polymers, thereby achieving a high lithium transference number (~1). Herein, we synthesize lithium single-ion conducting poly(acrylic acid)- or poly bis(trifluoromethanesulfonyl)imide-based polymer electrolytes combining with an inorganic robust and highly porous silica aerogel as a matrix. Such an organic-inorganic hybrid composite SPE makes it possible to provide high ionic conductivity and outstanding mechanical properties, preventing lithium dendrite growth. Their chemical structure and ionic conductivity are investigated using FTIR and AC impedance spectroscopy.
S0033 Poster 6	Influence on texture development in the solid state welded pure Ti Gyeongwoo Kim and **Kukhyun Song** Chosun University, South Korea ***Abstract***—This study was carried out to evaluate the effect of developed

	grain orientation in the welds, so called texture, during the solid state welding. For this goal, the friction welding and Pure Ti (Commercial purity, Grade 2) as a process and experimental material were introduced respectively. Firstly, friction welding was conducted at a tool rotation speed of 1600 RPM, a friction force of 20 kgf/cm2 and an upset length of 2-4 mm, respectively. To evaluate the grain boundary characteristic distribution of the welds (base material, thermo-mechanically affected zone and welded zone), electron backscattering diffraction (EBSD) method was introduced. In case of mechanical properties, Vickers micro-hardness and tensile tests as a general evaluation method were introduced. As a result, the grain size of the welded zone was significantly refined to 0.8 microns from 11 microns in base material. Moreover, the grain orientation was notably changed from <0002>//WD in base material to <01-10>//WD in friction welded zone, respectively, which affects the more increase in micro-hardness. In particular, the grains with the texture component of <0002>//WD showed the 10% higher micro-hardness value relative to the result acquired by the relationship between grain size and micro-hardness in the welds. Therefore, the development of the grain orientation is contributable to the increase in mechanical properties of the welds as well.
S3004 Poster 7	Synthesis of D-A Type Conjugated Polymers with Strong Electron-Withdrawing Cyano and Fluorine Groups for Polymer Solar Cells **Mun Ho Yang**, Joo Hyun Kim and Dong Wook Chang Pukyong National University, South Korea ***Abstract***—We synthesized D-A type conjugated polymers for photovoltaic applications. For the synthesis of target polymers, the electron-donating benzodithiophene (BDT) unit was connected to the electron-withdrawing quinoxaline (Qx) by using palladium-catalyzed Stille coupling reaction. We selected cyano group and fluorine moieties as the electron-accepting substituents, and they were incorporated into Qx unit in polymer backbone to reduce bandgap and highest occupied molecular orbital (HOMO) energy level of polymers. The lowlying HOMO energy level and reduced bandgap are strongly correlated with the improved open circuit voltage (Voc) and short circuit current (Jsc), respectgively. In addition, the existance of several alkyl chains in both BDT and Qx units, the polymers exhibtited good solubility in common organic solvents. The optical and electrochemical properties were investigated by using UV-Vis and cyclic voltammetry measurements. Furthermore, the photovoltaic proeprties of polymers were examined by fabricationg inverted type of polymer solar cells (PSCs) with the structure of of ITO/ZnO/active layer(polymer:$PC_{71}BM$)/MoO_3/Ag. This study can offer meaningful insight for the logical design and structure-property relationships of D-A type conjugated polymers with the strong electron-withdrawing substituents for PSCs.
S0021	Influence of Bottom Ashes from Biomass on Compressive

Poster 8	Strength of Concretes **Ulewicz Malgorzata** and JURA Jakub Czestochowa University of Technology, Poland ***Abstract***—The preliminary results of utilization of bottom ash from combustion of biomass for the produce of concrete has been presented. Currently, this waste are deposited in industrial waste landfills. The chemical composition of waste materials was determined using X-ray fluorescence (spectrometer ARL Advant 'XP). Concrete were made using CEM I 42.5 R (Cemex) and sand - gravel mix aggregate. The obtained concrete were subjected to microscopic examination (LEO Electron Microscopy Ltd.) and their compressive strength (PN-EN-196-1) and absorbability (PN-85/B-04500) were identified. The obtained results showed, the replacement of the natural aggregates by bottom ash from combustion of biomass reduce consumption of raw materials and will have a good influence on the environment.

Session 3

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest you attend the whole session.

Afternoon, February 26, 2019 (Tuesday)

Time: 13:30~15:30

Venue: *Lemongrass (Second Floor)*

Session 3: 8 presentations- Topic: "Concrete Technology and Structural Engineering"

Session Chair: Prof. Shen-Ming Chen

S0042 Presentation 1 (13:30-13:45)	Influence of the Bauschinger Effect on the Distribution of Residual Stresses in a Thin Hollow Hyperbolic Disc under External Pressure **ALEXANDROV Sergei**, LYAMINA Elena and JENG Yeau-Ren Ton Duc Thang University, Vietnam ***Abstract*—**There are materials whose forward flow curve is practically independent of plastic strain (perfect plasticity) but the Bauschinger effect reduces the elastic range with flow reversal. A new model that is capable of describing such behavior of material under plane stress conditions has been recently proposed. An important class of structures in which the state of stress can often be accurately approximated by plane stress conditions is thin hollow discs. It is therefore of interest to use the new model for determining the distribution of residual stresses in thin discs subject to various loading conditions, followed by unloading. This paper presents a solution for the residual stresses and strains in a hollow hyperbolic disc loading by external pressure, followed by unloading.
S0043 Presentation 2 (13:45-14:00)	Evaluation for RC Column Confined Partially with Externally FRP Wrapping Sheet using Nonlinear FE Analysis **Yasmeen Taleb Obaidat** Jordan University of Science and Technology, Jordan ***Abstract*** — Little research has been carried out in validating, fiber reinforced polymer (FRP) concrete strengthened column and the effective using partial wrapping. Also the effect of several parameter on strengthen column using the partial wrapping sheet of desired width and thickness around column have not been found out. To this end, a nonlinear 3D finite

	element model has been developed in current study for CFRP strengthened reinforced concrete column to simulate the behavior accompanied by the effect of partial wrapping with emphasis on load capacity and failure mode. The finite element simulation of CFRP strengthened RC columns is performed using commercial finite element program ABAQUS. Modelling was conducted on reinforced concrete columns with dimensions of 160 x 250 x 960 mm. The finite element model incorporates the nonlinear material behavior of concrete, bilinear stress-strain curve of steel and linear elastic behavior of CFRP material. The concrete was modeled using a plastic damage model. The performance of the FE model was studied by simulating experimental columns from the literature. The load, and strain of CFRP obtained from the FE study were compared with the corresponding experimental results. The FEM results agreed well with the experiments. In addition, to enhance our understanding of the behavior of strengthened reinforced concrete column capacity using partial wrapping the effect of changing the spacing between the CFRP sheets and number of layers were examined. The increase number of layers and decrease spacing give a higher ultimate load capacity, and delay the failure.
S0053 Presentation 3 (14:00-14:15)	An Experiment Investigation on Physical and Mechanical Properties of High Strength Concrete with Suitable Admixture B C Gayana, **M Shashanka**, Avinash Rao and K Ram Chandar National Institute of Technology Karnataka, India ***Abstract***—Concrete is an essential construction material. Even-though conventional concrete performs and satisfy the structures under normal conditions, a few special situations require very high compressive strength of concrete. An experimental investigation is done to develop high strength concrete with suitable admixtures and steel fibers. The properties of fresh and hardened concrete with alccofine as partial replacement for binder and poly-carboxylate ether (Glenium 8233) and steel fibers is investigated for the workability and mechanical properties i.e., compressive, splitting tensile and flexural strength of concrete. Based on the results, the strength increased with the addition of alccofine compared to the control mix. Hence, by optimum percentage of alccofine, high strength of concrete of 112 MPa can be obtained.
S1029 Presentation 4 (14:15-14:30)	Numerical Analysis of Punching Shear Failure of Self-Compacting Fiber Reinforced Concrete (SCFRC) Ribbed Slabs **Nurulain Hanida Mohamad Fodzi** and Mohd Hisbany Mohd Hashim Universiti Teknologi Mara, Malaysia ***Abstract***—This paper deals with behavior and capacity of punching shear resistance for ribbed slabs produce from self-compacting fiber reinforced concrete (SCFRC) by application of nonlinear finite element method. The analysis will be achieve by using ABAQUS software. The nonlinear finite element analysis by ABAQUS will be compare with the experimental

	results. Results and conclusions may be useful for establishing recommendation and need to be acknowledge.
S0058 Presentation 5 (14:30-14:45)	Utilization of Glass Sludge Waste in Concrete **Khaled M. Amtered El-Abidi**, Noor Faisal Abas and Alonge O. Richard Universiti Sains Malaysia, Malaysia ***Abstract*** — Environmental challenges have led to some many environmental policies locally and internationally. This also cut across many industries and manufacturing companies, professionals and researchers alike. In the construction industry, efforts are being made to limit the environmental impact of cement production and minimize the use of cement in the production of concrete. Hence, this research study focus on the use of waste glass sludge (WGS) as cement replacement at different percentage of 0%, 5%,10%, 20% and30% of cement replacement. The mechanical engineering properties of the concrete made of waste glass sludge was tested over a period of four targeted ages of 7 days, 28days, 56days and 90 days. The findings show that WGS enhance the compressive and flexural strength of concrete and this is based on the higher rate of pozzolanic reaction of WGS silica mineral. Also, it was also observed that there is a positive impact of the WGS on the UPV of the concrete at the age of 28days. This indicates that WGS can be utilized as supplementary cementitious material in the production of concrete hence contributes to the environment positively
S1030 Presentation 6 (14:45-15:00)	Structural Effect of Using Steel Fiber Reinforcement on the Punching Shear of Self-Compacting Fiber Reinforced Concrete (SCFRC) Ribbed Slabs **Nurulain Hanida Mohamad Fodzi** and Mohd Hisbany Mohd Hashim Universiti Teknologi Mara, Malaysia ***Abstract***—Ribbed slab is an ideal structure for architects and contractors. It has an attractive soffit appearance and also giving economical value when it is come in weight and material saving. Placing and finishing of concrete slab normally influence about 30% - 35% of overall cost of flooring system. Ribbed slab or also known as one-way joist slab system consist of regularly spaced concrete joist or ribs spanning in one direction, a reinforced concrete slab cast integrally with the ribs and beam span between the columns, perpendicular to the ribs. However the complexity of the structure itself has become an issue due to honeycomb and poor workmanship. To overcome this problem, the use of Self Compacting Steel Fiber Reinforcement Concrete (SCFRC) could improve the workmanship quality and to minimize the occurrence of honeycomb in concrete. Steel fiber in concrete improved the resistance of reinforced structural members cracking, deflection and other serviceability condition. Thus, this alternative approach will be the main focus in this study.Punching shear strength in reinforced concrete slabs subjected to concentrated loads has

	received a lot of emphasis due to its importance in the structural system, this failure may take place due to in conservative design of slab overloading and deterioration of strength in concrete and reinforcement. The continuous improvement of the technology of SCFRC and the better knowledge on the mechanical behavior of this SCFRC ribbed slab are contributing to a larger field application of SCFRC. Determination of punching shear strength has received considerable attention by the engineering profession in recent years.
S1031 Presentation 7 (15:00-15:15)	Effect of Elevated Temperature on Bond Strength of Concrete **Muhammad Harunur Rashid**, Md. Maruf Molla and Imam Muhammad Taki Khulna University of Engineering & Technology, Bangladesh ***Abstract***—In the case of exposure of reinforced concrete structure to accidental fire, an assessment of its residual capacity is needed. Bond strength of concrete was observed under elevated temperatures (150 °, 250 °, 350 ° and 500 ℃) in this study. Cylindrical specimens were prepared for pull-out tests to find out the bond behavior and to observe the mechanical properties of concrete. All the specimens were 100 mm diameter and 200 mm height. The pull-out specimens contain a 10 mm steel bar at its center. The specimens were tested at 52 days age following a 28 days water curing. Samples were preheated for 3 hours at 100OC temperature and then put into the furnace for 1 hour at the target temperature. Samples were tested before preheating as controlled specimens. In case of mechanical properties and the bond strength of concrete, there were no remarkable changes due to elevated temperature up to 150 ℃. However, the mechanical properties and bond strength were decreased gradually after 150 ℃ temperature. Maximum reduction of bond strength observed was 52.13% and 49.8% at 500 ℃ for testing within 1 hour and after 24 hours of heating respectively when compared to the controlled specimens. Bond strength was found to reduce at a greater rate than compressive strength due to the elevated temperature.
S0039 Presentation 8 (15:15-15:30)	Load Effect Impact on the Exploitation of Concrete Machine Foundations Used in the Gas and Oil Industry **Sebastian Demczynski**, Patryk Ziolkowski and Maciej Niedostatkiewicz IMP PAN, Poland ***Abstract***—Machine foundations is a critical topic in the gas and oil industry, which design and exploitation require extensive technical knowledge. Machine foundations are the constructions which are intended for mounting on it a specific type of machine. The foundation has to transfer dynamic and static load from machine to the ground. The primary difference between machine foundations and building foundations is that the machine foundations are a separate structure, even if they are inside the building. Failures of machine foundations can be very dangerous due to its

	carry loads from machines in operation. There is also an economic aspect because every break in the operation of industrial machines is expensive, especially in the gas and oil industry, where technological processes are complex and multi-stage. Repairs to concrete machine foundations are problematic, so the capability to predict what exactly affects failures seems extremely necessary. The failure of concrete machine foundations depends on many factors that are not fully understood. Modern achievements of science and technology, especially machine learning techniques may allow determining what affects the failure rate. This paper presents an analysis with the use of machine-learning techniques to predict in which way loads can affect the failure of foundations. This study examines whether and what relations exist between variables describing loads about the machine concrete failures occurrence. The analysis concerned some variables such as cross-section reinforcement amount, the grate load, measured concrete strength, motor short circuit moment load, the engine unit and rotor with shaft load, the pump unit and rotor with shaft load, the weight of the foundation, total load with foundation self-weight. The primary parameter of concern is the failure occurrence rate.

15:30-15:45	Coffee Break

Session 4

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest you attend the whole session.

Afternoon, February 26, 2019 (Tuesday)

Time: 15:45~17:00

Venue: *Lemongrass (Second Floor)*

Session 4: 5 presentations- Topic: "Concrete Technology and Structural Engineering"

Session Chair: Prof. Zongjin Li

S0013 Presentation 1 (15:45-16:00)	Influence of Dowel Effect for the Simulation of Reinforced Concrete Structures **Ludovic Jason**, Luc Davenne and Can Turgut SEMT, CEA DEN, Universit éParis Saclay, France ***Abstract*—**Dowel effect is one of the phenomena, with the aggregate interlock, which is responsible for the increase in the shear resistance of reinforced concrete structures subjected to cracking. It is associated with the behavior of steel reinforcements crossed by a crack and its interaction with the surrounding concrete. Even if this effect is largely used in literature to explain the differences between experiments and simulations, its real consequences on the structural behavior is not so clear, with contradictory conclusions in previous published studies. The objective of this contribution is to evaluate if particular numerical tools needs to be taken into account to correctly capture the behavior of reinforced concrete structures subjected to shear concrete cracks. Two different tests cases are simulated to highlight the dowel effect at two different scales: the laboratory local scale with the simulation of a classical "dowel" test, which aims at quantifying the dowel effect through a shear force – shear displacement curve, and a structural scale with a continuous deep beam. From the analysis of the simulations using damage mechanics, it is shown that: At the local scale, dowel effect is obviously predominant (as the test is designed to describe this effect) and the usual simulation tools may not be sufficient to correctly capture the local behaviors. In particular, simulations

	using 3D, 1D truss and 1D beam elements for steel in 3D concrete are compared. It is shown that the necessary fine mesh density and the very local behavior around the reinforcement bar prevent from using simplified "engineering" hypothesis (truss or beam elements for reinforcements) without further improvements. The influence of the concrete constitutive law is also underlined. At the structural scale, contrary to the laboratory one, it seems possible to correctly capture the mechanical behavior with classical simulation tools. A parametric study is proposed to prioritize the main influent parameters (boundary conditions, mesh, constitutive law, type of finite elements for steel…). From this parametric study, an adapted methodology is finally suggested to correctly simulate the main characteristics of the structural behavior, even in cases of main cracks in concrete.
S0020 Presentation 2 (16:00-16:15)	Bond Behavior of Low-activated High Aluminate Concrete with Reinforcement under Cyclic Load **Yu-Cheng Kan**, Kuang-Chih Pei and Wei-Lin Hsu Chaoyang University of Technology, Taiwan ***Abstract***—The bond behavior of reinforcement and low-activated concrete (LAC) was investigated in this study. The acoustic emission monitoring was also engaged while the specimen being loaded to figure out the inside fracture. Static loading and dynamic loading were applied for both of the LAC and normal concrete in the pull-out tests. The upper load was applied starting from 30% of the static ultimate load Pu with a 10% increment until the failure. The loading frequencies for the test were 0.5 Hz、1.0 Hz and 2.0 Hz. The bond stiffness after each stage of dynamical loads was examined. Test results reveal that the LAC performs higher compressive strength than normal concrete for a given W/C ratio. But, the bond strength of LAC seems not promotes correspondingly. It may be attributed to the conversion effect of high alumina contain in LAC, which leads to more voids inside the concrete.
S0024 Presentation 3 (16:15-16:30)	A Deployable Brace Model with Joint Clearance and Strut Eccentricity in Seismic Design **Minghao Hu**, Pu Yang and Daniel McCrum Chongqing University, Chongqing China ***Abstract*—**The paper discusses seismic performance of deployable brace member as well as its application in single-story single-bay frame by using finite element method in OpenSees Navigator. Even though deployable structure has wide applications in engineering area, it is almost blank for earthquake (seismic) engineering. A finite element deployable brace model consisting two identical struts and a revolute joint is built in this paper. The model considers joint clearance and initial eccentricity to accord practical situation. Hysteresis analysis has been done on the brace model as well as its application. The results show deployable structure provides sufficient

	lateral stiffness and ductility. Strut eccentricity is the key factor affecting the capacity of the strut and buckling strength, while joint clearance also has influence on the strut capacity and energy dissipation.
S0034 Presentation 4 (16:30-16:45)	Flexural Behavior of the Square Steel Pipe(SPSR400) Beams by Different Support Conditions of the Both Ends **Jun-Seop Lee**, Kyung-Jae Shin , Jong-Hun Woo, Dae-Geun Kim and Min-Ki Lee Kyungpook National University, South Korea ***Abstract*—**The behavior of beams with different support condition was investigated through three-point bending test for the purpose of studying difference of maximum load and catenary action of a beam. Beams are made of SPSR400 which has 245MPa of nominal yield strength and 400MPa of nominal tensile strength. The parameters of the supports condition are simple support and rotationally semi-rigid connection with different horizontal reaction strength applied by anchors. The support boundary conditions of beams were classified into three types; (1) simply supported with no anchors(S-0), (2) embedded anchors with 50mm depth of 10mm(M-A50), and (3) embedded anchors with 80mm depth of 10mm(M-A80). Both ends of the beams were connected by fillet welded angles and supported on a rigid concrete wall through anchors. The test result shows how much the load carrying capacity is increased by catenary action after large deflection at the center of the beam. First peak loads from each types are the loads when first plastic hinge occurs at the mid-span. There were no significant differences among the first peak loads measured from three types. After that, tensile force at anchors due to catenary action increased the load carrying capacity by approximately 55%, which is called as the second peak load. However, second peak load happens when the anchors at a support fully resist a tensile force, therefore it doesn't happen with type (1) and (2). In conclusion, support boundary conditions of a beam don't have an effect on the first collapse load, but the second collapse load is increased as embedded length of an anchor becomes deeper.
S0038 Presentation 5 (16:45-17:00)	Mechanical Behaviour of Composite Material Based on Mortar/natural fibers (fique "furcraea andina") Meshes as External Reinforcement of Concrete Beams Alvaro Puentes, José Soto, German Díaz-Ram írez and **Ricardo Cruz Hern ández** Universidad Industrial de Santander, Colombia ***Abstract*—**This work shows the effect of an external reinforcement of concrete beams using a composite material based on woven meshes obtained from natural fibers of fique "furcraea andina" embedded in a Portland cement mortar. Fique is an endemic plant of the Colombian Andean region. The woven meshes tensile resistance was obtained according to the ASTM D-4632 standard. Flat orthogonal woven meshes

	were characterized, made with 18.8 tex linear density yarns, separated 3, 5 and 8 mm in warp and weft directions, likewise, the concrete beams rupture module was evaluated according to the ASTM C78 standard. Beams were tested, both without mesh reinforcement and with external reinforcement. Beams were reinforced on one, three and four of their faces. A commercial epoxy adhesive was used to glue the composite material to the concrete beams and their behaviour were tested with and without the application of the epoxy. The four faces reinforced composite beam showed an increase of 80% of its bending resistance compared to the beam without any additional reinforcement, showing a greater ductility and better mechanical behaviour. The results of this study demonstrate the effectiveness of the use of fique meshes as alternative reinforcement agents for cementitious compounds in structural elements, opening the way for future investigations into the use of natural fibers in construction alternative materials.

Session 5

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest you attend the whole session.

Afternoon, February 27, 2019 (Wednesday)

Time: 13:30-15:00

Venue: *Clove (Second Floor)*

Session 5: 6 presentations- Topic: "Construction Engineering and Management"

Session Chair: Prof. Nuno Dinis Cortiços

S0009 Presentation 1 (13:30-13:45)	Digitisation of Standard Penetration Test Gandhimathi.A, **Vigneshkumar.P** and Palanisamy.P Kumaraguru College of Technology,Coimbatore,India ***Abstract*—**Standard Penetration Test(SPT) is available for determining the Safe Bearing Capacity of soil. This equipment confirms to IS 2131-1981. During the test 65kg hammer is lifted and dropped at an height of 75cm for more than 50 times. Atleast 8 persons are required. It is very difficult to handle the equipment and also balancing the tripod is very difficult.Electric motor is used for lifting and dropping the hammer. The motor is connected to the gear box and engine. It is operated by the microcontroller. The no of blows is recorded in the digital format.In this project it can save the time, manpower, and cost of labors and also the accurate results can received. The tripod of the equipment is made up of Mild steel (Fe250),and other parts are made up of hardened steel(EN 8).In our institution the SPT equipment is available and it is manually operated. It is very difficult for the operation. In slight modification the equipment is modified to fulfill this project
S0018 Presentation 2 (13:45-14:00)	Mechanical Properties of High Tension Bolt(F10T) at Elevated Temperature **Hye-Min Shin**, Kyung-Jae Shin, Hee-Du Lee, So-Yeong Kim, Su-Woong Lee and Ye-Jin Jang Kyungpook National University, South Korea *Abstract*—Fire resistance performance design to select and apply refractory members to fire growth has been adopted in consideration of recent architectural form and characteristics. Nevertheless, the fire resistance

	performance design of Korea is decided by material properties of structural members based on Eurocode[1]. Also, research on the properties of steel based on fire resistance design is insufficient. Especially, compared to the study on the structural steel, the study on the material test at the high temperature for the bolts used in the joints is insufficient. Therefore, this study carried out tests to investigate changing mechanical properties of high-tension bolt (F10T), which is used in bolt joint, with elevated temperature. Coupon test specimens for F10T bolts were tested according to ASTM E8M[2]. Tensile test at various high temperatures (room temperature, 400℃, 500℃, 600℃, 700℃, and 800℃) was performed pursuant to ASTM 21M-09[3]. The test result clearly showed reduction of yield strength, tensile strength, and modulus of elasticity at elevated temperatures for all steels, and F10T manifested larger elongation at elevated temperatures. The strength reduction of test specimens at elevated temperatures manifested a similar trend to abroad research results.
S0016 Presentation 3 (14:00-14:15)	Site Suitability Anaysis For Photovoltaic Power Plant Using Gis Gandhimathi .A, Ramaraj.M and **Kailainathan M.** Kumaraguru College Of Technology,Coimbatore Tamilnadu, India ***Abstract*—**Among the various renewable energy resources, solar energy potential is vastly and freely available in our country. Solar energy offers a clean, climate-friendly, abundant and inexhaustible energy resource to mankind. The costs of solar energy have been falling rapidly and are entering new areas of competitiveness. Solar Thermal Electricity (STE) and Solar Photo Voltaic Electricity (SPV) are becoming competitive against conventional electricity generation in tropical countries. In conventional methods, site selection based on integrating various performance indicators such as Temperature, DNI, Sunshine hours, Slope, Aspect and Landuse are difficult. GIS provides an integrated approach to combine several factors and provides different scenarios for decision making. This paper describes the suitable site selection for installation of photovoltaic power plants using GIS. It involves three stages: the first stage requires the selection of study area based on power crisis in different districts. The second stage includes preparation of the layers such as Direct Normal Irradiance, Temperature, Sun Shine Hours Land use / land cover, Slope and Aspect for study area and at final stage weights for each layer is calculated with the help of Analytical Hierarchy Process and suitable sites for installation of photovoltaic power plants are derived using suitability analysis in GIS environment.
S0032 Presentation 4 (14:15-14:30)	A Study on Protective Reuse of Traditional Architecture in Lhasa **Qing Qin**, Yang Chen and Haiyue Zhang Xi'an Jiaotong University, China ***Abstract*—**Traditional Tibetan architecture in Lhasa has a unique position in the world. Under the special social background of economic development demand and tourism, it has gradually become a pillar industry, and how to rationally protect and reuse this traditional

	architecture has become an urgent problem that must be solved. Based on the traditional architectural patterns, regional characteristics and modern needs of Lhasa, this paper discusses the strategies for the protection and reuse of architectural heritage, the specific methods of reuse and their advantages and disadvantages, in order to provide a reference for the protection of traditional buildings and the inheritance of culture in Tibet.
S0035 Presentation 5 (14:30-14:45)	Robotic Fabrication under Industrialization Thinking-Digital Experiments of Hubei University of Technology **Liu Cheng** and Zou Yiquan Huazhong University of Science and Technology, China ***Abstract*—**Standardized production in the industrialized age is the driving force of technological innovation. Nowadays, personalized construction and mass customization through numerical robot control technology has become the driving force for the development of architectural industrialization in the new era. As robots are involved in architecture, the way of construction has been changed. The design-construction process has been accomplished by the control of the machine code, which has made a profound impact on the traditional industrialization of construction. Taking the three digital construction experiments of Hubei University of Technology as examples, this paper further elaborates that the digital construction technology represented by robots is an important way and means to realize the upgrading of traditional construction industry from different angles.
S1027 Presentation 6 (14:45-15:00)	An Image Mosaicking Method for Tunnel Lining Inspection **Cuong Nguyen Kim**, Kei Kawamura, Masando Shiozaki, and Amir Tarighat Miewn trung university of civil engineering, Vietnam ***Abstract***—The paper proposes an image mosaicking method for tunnel lining inspection. The conventional methods only used the cost value of the pixel being processed based on similarity metric to estimate an image-matching location. To improve the image-mosaicking efficiency, the curvatures of the cost curve at candidate matching points are adapted. Moreover, experimental results for an actual tunnel demonstrate that the curvature measurement can select the precise matching points accurately for assisting defect inspection..

15:15-15:30	**Coffee Break**

Session 6

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest you attend the whole session.

Afternoon, February 27, 2019 (Wednesday)

Time: 15:30-16:45

Venue: *Clove (Second Floor)*

Session 6: 5 presentations- Topic: "Construction Engineering and Management"

Session Chair: Prof. Tan Kiang Hwee

S0051 Presentation 1 (15:30-15:45)	Damage Detection Approach for a Mooring Line on an Offshore Structure Using Convolutional Auto-Encoder **Kanghyeok Lee**, Minwoong Jung and Do Hyoung Shin Inha University, Korea ***Abstract***—This study presents a machine learning-based approach to detect damage in mooring lines supporting a floating offshore platform that is installed to collect submarine crude oil. The proposed approach for damage detection using a convolutional auto-encoder can be implemented in three steps: data acquisition, model learning, and model update. The time series data used for damage detection are measured from the environment and the floating offshore platform but not mooring lines due to affordability and efficiency of both installation and maintenance of the sensors on the offshore structure. Therefore, it is expected that the approach proposed in this study can be applied using only data obtained from the structure in an actual environment.
S0054 Presentation 2 (15:45-16:00)	Developing Indicators of Green Initiation and Green Design of Green Supply Chain Management in Construction Industry: A Literature Review **Mochamad Agung Wibowo**, Naniek Utami Handayani, Nur Farida and Asri Nurdiana Diponegoro University, Indonesia Abstract—Project is a set of interrelated activities and requires skills from different professions, and also project is involved the various of stakeholders in each phase of the Project Life Cycle. Implementation of Green Supply Chain in construction projects meant to bring the concept of

	eco-friendly in every process from the initiation phase, planning phase, the construction phase, and the operation and maintenance phase. It is necessary to identify indicators of green initiation and green design and how to explain the relationship between the role of initiation by the owner and the design process by a design consultant. This study aims to identify the indicators of green initiation and green design concept as part of Green Supply Chain. The method used for this study is a descriptive research that identifies and develop a framework for implementing green initiation and green design in construction industry that consists of concept, dimensions, elements, and indicators. GSCM in construction projects was determined by 9 indicators in the green initiation phase and 40 indicators in the green design phase. The success of green concept in construction project is very determined from these two phases as the beginning of the process, and the most important parties are the owners and design consultants.
S1010 Presentation 3 (16:00-16:15)	Conical Round Tubes - Preliminary Tests for Use on Lighting Columns **Robert Kruzel** Czestochowa University of Technology, Poland ***Abstract***—Conical pipes belong to a group of economical profiles, which find broad application in various metal products. Until now the conical pipes are manufactured by following methods: rolling on two-high mill in impressions with varying depth on the rolls perimeter; forging in lever swaging machine, formation in combined process of drawing and rolling, and rolling on skew rolling mill. Manufacturing of conical pipes belong to complicated engineering processes, and used until now methods do not allow to meet demand for conical pipes – especially the long ones with large crosswise dimensions, e.g. pipes for lamp posts. This situation makes it reasonable to look for new processes with wider engineering possibilities when compared with till now known methods. It seems that the process of conical pipe envelope formation will allow to wide conical pipes assortment.
S1011 Presentation 4 (16:15-16:30)	An Experimental Study on Ffect of Lime and Geogrid in Pavement Thickness Gandhimathi A and **Aravind R** Kumaraguru College of Technology, Coimbatore, India ***Abstract***—Soil stabilization is a process by which the strength, stiffness and bearing capacity of road foundations are improved by either mechanical or chemical means. Structures need a stable foundation for their proper construction and lifelong durability. Foundation needs to rest on soil ultimately, transferring whole load to the soil. If weak soil base is used for construction, with passage of time it compacts and consolidates, which results in differential settlement of structure. It may result in cracks in structure which can have catastrophic affect too. To avoid these future problems in weak soil, stabilized soil should be considered. The soil

	sample is collected from "Alandurai". The soil properties are identified by conducting different laboratory tests such as Sieve grain analysis, Atterberg limits, Specific gravity using Pycnometer, Standard Proctor tests, California Bearing ratio test. From the tests results soil is classified as Fine grained red soil. The most commonly found soil around the sample soil collected. The stability of the soil is found using C.B.R test. Natural soil is both a complex and variable material. Yet because of its universal availability and its low cost winning it offers great opportunities for skilful use as an engineering material. However the soil at any particular locality is unsuited, wholly or partially, to the requirements of the construction engineer. A basic decision must therefore be made whether to accept the site material as it is and design to standards sufficient to meet the restrictions imposed by its existing quality. Remove the site material and replace with a superior material. Alter the properties of existing soil so as to create a new site material capable of better meeting the requirements of the task in hand. Lime and Geogrid were selected for the stabilisation of soil.1 to 6 percent of Lime are added and its optimal value is identified. Apparently CBR tests are done after introducing Geogrid and stability of the soil is identified. Analysis the performance of thickness of pavement in conventional soil, Lime stabilised soil and geogrid reinforced soil. Cost Estimation of the pavement is done and difference in the cost is identified.
S1023 Presentation 5 (16:30-16:45)	Nanotechnology in Civil Engineering Construction **Ahmed A. Ali** Kufa University, Iraq ***Abstract***—The material behaviour of any construction depends mainly on structural elements, the later performance be subjected to the mechanical behaviour of its materials which are effective on a micro and nano-scale . The talent to target material improvement at the nano-structural level guarantees to convey the innovative of material conduct and performance expected to enhance essentially the mechanical performance, volume change properties, durability, and sustainability. The investigation of the utilization of nanotechnology in the construction development and building structures is a standout amongst the most unmistakable needs of the exploration network. This study presented an overall facts and explanations of nanotechnology and displayed a specific literature on the application of nanotechnology in the construction field , more particularly in concrete manufacture ,steel ,wood and glass. The utilization of nanotechnology in civil engineering is quiet in premature steps arrange. The generation techniques, contaminations caused to human wellbeing, fabricating troubles, execution are the issues to be tended to with the end goal to utilize the nanotechnology in construction field

Session 7

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest you attend the whole session.

Afternoon, February 27, 2019(Wednesday)

Time: 13:30~15:15

Venue: *Lemongrass (Second Floor)*

Session 7: 7 presentations- Topic: "Chemical Engineering and Technology"

Session Chair: Prof. Walid Larbi

S1019 Presentation 1 (13:30-13:45)	A Comparative Study on Human urine and Septage Supernatant by Struvite precipitation **Gandhimathi A** and Sneha M Kumaraguru College of Technology, India ***Abstract***—Sustainable and closed-loop nutrient cycling require the recovery of valuable resources from wastewater. In comparison, source separated urine allows resource recovery from a highly concentrated nutrient stream, resulting in a more sustainable and efficient recovery practice. Different methods was studied in lab scale, but struvite precipitation was adopted. In this study the human urine sample was collected from men's restroom and the septage supernatant was pumped out from women's restroom septic tank inside the campus. Struvite precipitation was determined by crystal growth phases in- order to recover the by-product phosphate from human urine and septage supernatant. Human Urine resulted in higher efficiency than septage supernatant. Phosphorous was extracted from struvite precipitation and was used for the plant cultivation inside our campus premesis.
S2001 Presentation 2 (13:45-14:00)	Determination of Titratable Acidity in Coffee by Using a Flow-Based Titration Setup with a Mobile Phone **Sarawut Somnam**, Miki Kanna, Pattamaporn Thongkaew and Rujira Pieangjai Chiang Mai Rajabhat University, Thailand ***Abstract***—The acidity is one of the key components of the coffee quality which could be analyzed by titration. However, the end point observation with bear eyes might error because of the color of coffee. Although this problem could be solved by using of pH meter, but the

	calibration and maintenance processes including the cost of device may be the disadvantages. In this work, a mobile phone was employed to assess the primitive color (red(R), green(G), blue(B)) data from the change in color of indicator, and then used the gained RGB values to construct a titration curve. The caption of digital image was carried out under the controlling of light intensity and focus range in a home-made detection box. In addition, to provide more comfortable and reduce the operation time, flow-based analysis was also applied to the setup for the signal monitoring procedure. A good precision with %RSD less than 1 (n=11) and detection time of 25 sec were achieved. From the analyses of coffee beans; i.e. green beans, light/medium/dark roasts, gave the all results according to the potentiometric standard method.
S2005 Presentation 3 (14:00-14:15)	Enhanced Capacitive Performance of CoO-Modified NimoO_4 Nanohybrid on Ni Foam as Advanced Electrodes for Asymmetric Supercapacitors **Pengxi Li** Southeast University, China Abstract—A three-dimensional criss-crossed CoO-modified $NiMoO_4$ nanohybrid on Ni foam was designed and synthesized to enhance the specific capacitance of $NiMoO_4$ via two-step hydrothermal strategies. The $NiMoO_4$/CoO nanohybrid demonstrates a higher specific surface area (55 m2 g-1) than that of simplex $NiMoO_4$(25 m^2 g^{-1}), which could reduce impedance and improve capacitance. With the modification of CoO nanostars, the specific capacitance is obviously improved from 1.99 F cm^{-2} (1331 F g^{-1}) of $NiMoO_4$ to 5.36 F cm^{-2} (2332 F g^{-1}) of $NiMoO_4$/CoO nanohybrid at 2 mA cm-2 in 6 M KOH electrolyte. Besides, the as-gained NiMoO4/CoO nanohybrid shows an excellent life span with 98% capacitance retention after 2000 cycles at 20 mA cm^{-2}. Furthermore, an asymmetric all-solid-state supercapacitor employing $NiMoO_4$/CoO hybrid and exfoliated graphite carbon paper exhibits a maximum energy density of 71.4 W h kg^{-1} at a power density of 750 W kg^{-1} as well as a considerable cycling durability of 87.1% after 2000 cycles at 5 A g^{-1}. These results reveal that the $NiMoO_4$/CoO on Ni foam as binder-free electrode can provide greatly enhanced electrochemical performance and show promising application as an electrode material for energy storage.
S2006 Presentation 4 (14:15-14:30)	Removal of Bisphenol-A from Aqueous Solution Using Polymeric Resin Impregnated with Phosphorous Based Extractant **Sakshi Batra** and Dipaloy Datta Malaviya National Institute of Technology, India Abstract—A study was conducted for the adsorption of Bisphenol A (BPA) from aqueous solution using solvent impregnated resin (Amberlite XAD-7 was impregnated with trioctylphosphine oxide). FTIR, FE-SEM and EDX analysis characterized this prepared resin. Various parameters like contact time, the mass of adsorbent, BPA initial concentration, and the

	temperature was studied. For impregnated resin percentage removal was obtained 88.09% within 120 min. For BPA adsorption, optimum adsorbent dosage was found to be 8 $g \cdot L^{-1}$. Adsorption of BPA decreased with increase in temperature. Different models like Langmuir, Freundlich and Temkin models were used to predict the equilibrium points. Kinetics of BPA adsorption was predicted using pseudo-first order, pseudo-second order, and intraparticle diffusion models.
S2007 Presentation 5 (14:30-14:45)	Efficient and Stable Carbon-coated Nickel Foam Electrodes for High Performance Supercapacitors **Chaohui Ruan** Southeast University, China Abstract—Polyaniline carbon-coated nickel foam (PANI@C@NF) hybrid was developed as supercapacitor electorde material by incorporating PANI into modified nickel foam which completely coated by carbon layers. In this article, carbon-coated nickel foam was prepared by a simple method, hydrothermal-carbonization coating process, meanwhile, PANI lamina were grown homogeneity on carbon layer via the electrodeposition method. We optimized the experimental conditions that ensure the carbon layer of C@NF is flawless and shows perfect isolation effect. PANI lamina coated on surface of nickel also reveals isolation effect. Consequently, PANI@C@NF electrodes can be stable in neutral and even acid environment, the experimental results indicate that nickel leaching can be effectively avoided at PANI@C@NF electrodes, having great significance for promoting the application of NF in the field of supercapacitors. The hybrid has a specific capacitance about 610 mF cm^{-2} at 1.0 A cm^{-2} in 0.5 M H_2SO_4 within the potential window of -0.2–0.6V, and has high rate capability as well as good cycling stability. At a current density of 10 mA cm^{-2}, its capacitance is 57.5% of that at a current density of 1 mA cm^{-2} in 0.5 M H_2SO_4, in addition the material remains 58.09% of initial capacitance after 1000 cycles of charging–discharging test. All-solid-state symmetrical supercapacitor based on PANI@C@NF electrodes achieves high energy density and an expanded voltage window of 1.8 V, indicating potential application for energy storage.
S2008 Presentation 6 (14:45-15:00)	Removal of Reactive Dye Using Solvent Impregnated Resin **Anjali Awasthi**, Sakshi Batra and Dipaloy Datta Malaviya National Institute of Technology, India Abstract—In this study, Reactive Blue-13 dye removed by solvent impregnated resin (Amberlite XAD-7 impregnated with Aliquat-336) at different operation conditions. Batch adsorption studies were dispensed out to gauge the effect of solution pH, dosages, kinetic, temperature, concentration and NaCl salt on the adsorption capacity of the adsorbents. Three kinetic models were chosen to suit the kinetic data; pseudo first order, second order, and intraparticle diffusion. It had been determined

	that RB-13 dye adsorption followed pseudo-second-order kinetics. Adsorbent SIR was characterized by Fourier transform infrared spectroscopy (FTIR), SEM and EDX. Solvent impregnated resin (SIR) was regenerated with 80% (v/v) ethanol aqueous solution for reuse.
S2010 Presentation 7 (15:00-15:15)	Modification of the Nano-sized Zeolite LTA to Improve its Distrubion in Mixed Matrix Membrane for Gas Separation Application **Nazila Esmaeili**, Evan. Gray and Jim Webb Griffith University, Australia Abstract—In this research, synthesised nano-sized zeolite NaA, with a particle size of 50-120 nm, was modified by 3-Aminopropyl (diethoxy)methylsilane (APDEMS). Mixed matrix membranes were fabricated by incorporating the unmodified and modified zeolite nano particles into a polyvinyl acetate matrix and the resultant mixed matrix membrane was investigated to determine the effect of silanation on the nano particle morphology and distribution throughout the polymeric phase. X-ray diffraction, fourier transform infrared spectroscopy, solid state nuclear magnetic resonance spectroscopy, thermogravimetric analysis and scanning electron microscopy were performed on both the unmodified and modified zeolite nano particles to investigate the effects of the modification. The fabricated membranes were characterized by scanning electron microscopy and thermogravimetric analysis to investigate the morphology and thermal stability of the membranes. Gas permeation measurements were performed on the membranes with modified and unmodified zeolite filler using hydrogen, helium, carbon dioxide and nitrogen pure gases to evaluate any changes in permeation due to the modification of the zeolite.

15:15-15:30	**Coffee Break**

Session 8

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest you attend the whole session.

Afternoon, February 27, 2019(Wednesday)

Time: 15:30-17:30

Venue: *Lemongrass (Second Floor)*

Session 8: 8 presentations-Topic "Chemical Engineering and Technology"

Session Chair: Prof. Hiroyuki Nakamura

S2011 Presentation 1 (15:30-15:45)	Development of a Thermodynamically-Consistent Alpha Function For The Patel-Teja-Valderrama Equation of State **Allan Paolo Almajose** and Maria Lourdes P Dalida University of the Philippines, Philippines ***Abstract***—A new, four-parameter alpha function with thermodynamically consistent parameter values is developed for predicting vapor pressures using the Patel-Teja-Valderrama equation of state. The form of the alpha function was derived by keeping in mind the thermodynamic consistency rules as provided by the limiting conditions in the determination of the generalized parameters in a generic cubic equation of state. Using MATLAB, codes executing a nonlinear program that would minimize errors between DIPPR-estimated vapor pressures between the triple point until the critical point from the alpha function's vapor pressure prediction has been developed. Thermodynamically consistent parameters were calculated by setting up nonlinear constraints for the derivatives, assuring a monotonically decreasing behavior for the function. The performance of the model was compared with five other models commonly used in industries and process simulation programs and is found to provide better accuracy in comparison when working with polar fluids. Further, its performance is found to be comparable to some models when estimating nonpolar and light fluids. The statistical analyses used to verify the performance of the model in comparison with the other models used in literature include the calculation of the r-squared, adjusted r-squared, predicted r-squared, absolute average deviation, root mean square errors, and by visual inspection. The study also included the determination of thermodynamically consistent parameter values for twenty different fluids commonly used in process simulations.

S2012 Presentation 2 (15:45-16:00)	Syngas Production via Steam Combined CO_2 Reforming of Methane under Microwave Heating **Hoang Minh Nguyen**, Gia Hung Pham, Robert Vagnoni and Shaomin Liu Curtin University, Australia ***Abstract***—Microwave (MW) energy is cost-effective in comparison with the conventional heating system. MW reactor can provide more potential in syngas production due to the flexibility to control the reactor size suitable for floating production, storage and offloading vessels (FPSOVs) to efficiently use these remote and stranded gas reserves via Fischer-Tropsch synthesis. The CoMo catalyst supported on Al_2O_3 was prepared for steam combined dry (CO_2) reforming of methane (SDR) and delivered high catalytic activity for reforming reactions by a virtue of its intrinsic ability to absorb MW wave without a need to mix with an extra MW acceptor such as carbon. The expected syngas ratio (H_2/CO) for liquid fuels production via Fischer-Tropsch (F-T) synthesis was simply adjusted by controlling the inlet amount of steam to carbon ratio (S/C). The H_2/CO ratio of higher than unity is obtained with the inlet S/C ratio ≥ 0.1 at a MW power of 200 W. Compared to carbon-based catalysts, the CoMo/Al_2O_3 catalysts exhibited a better catalytic stability over 16 h time-on-stream (TOS) of SDR reaction under MW irradiation.
S2023 Presentation 3 (16:00-16:15)	Application of Non Ionic Surfactant – Alkylpolyglucoside as Chemical Flooding **Agnesya Putri Gustianthy**, Yuni Krisyuningsih Krisnandi and Usman T Pertamina (Persero) / Universitas Indonesia, Indonesia ***Abstract***—Alkylpolyglucosides (APG) is an environment-friendly surfactant prepared from renewable raw materials namely glucose and fatty alcohol in catalysis system of *p-Toluenesulfonic acid*. This surfactant is nonionic surfactant which has not effect on hard water and pH changes, thus makes it potential to be used as a chemical flooding surfactant. APG was prepared by using fatty alcohol varying in chain length from 1-dodecanol (C12) and 1-tetradecanol (C14). This paper discusses the effect of alkyl chain length of APG as hydrofobic side to their physical properties such as interfacial tension, and capability as chemical flooding surfactant for oil recovery in capillary pressure test. As results, it is shown that at the same concentration,APG with 1-tetradecanol (APG-C14) as a chain length has lower interfacial tension than APG-C12, having critical micelle concentration of 3 %. Both surfactant then were tested for Jirak field oil recovery in capillary presure test. It reveals that the increase of alkyl chain length of APG causes an increase in oil recovery (%), 13.797 % of APG-C14 and 10.733% of APG-C12. To conclude,APG with long alkyl chain length potentially become chemical flooding surfactant for oil recovery.
S2024	Economic, Environmental and Social Benefits of Wind Power and Natural

Presentation 4 (16:15-16:30)	Gas Based Hydrogen Supply Infrastructure: Application to Jeju Island, Korea **Chanhee You**, Minsoo Kim and Jiyong Kim Incheon National University, South Korea ***Abstract***—Hydrogen is one of the most attractive alternatives to the current carbon-based energy system, since it can be produced from diverse resources and used as a carbon-free energy source from the end-user perspective. We aim to present analyze a hydrogen supply infrastructure, which includes all the life stage from production, transport, storage to final distribution (fueling station). In particular, we consider two types of resources for hydrogen productions (renewable wind power and conventional natural gas) to comparatively analyze the capability of the hydrogen supply systems from the economic, environmental and social perspectives. To achieve the goal, rigorous process models for the involved processes (steam methane reforming for hydrogen production from natural gas, wind turbine for electricity generation, water electrolysis, hydrogen storage and hydrogen transport mode) using commercial process simulators. To demonstrate the capability of the proposed system, we conducted a design problem of the hydrogen supply infrastructure in Jeju Island, Korea. Within the case study, three scenarios were generated by combining different hydrogen production options; 1) the wind power-based hydrogen production 2) the natural gas-based hydrogen production and 3) the integrated hydrogen production. As a result, we discussed the optimal hydrogen supply system from the life cycle perspective by identifying technical bottlenecks, major cost-drivers and CO_2 burdens.
S3005 Presentation 5 (16:30-16:45)	Photodegradation Products of Lignin and their Usage in Redox-Flow Batteries **Philipp Nothdurft**, W. Schlemmer, S. Spirk, I. Mühlbacher and W. Kern Montanuniversity of Leoben, Austria ***Abstract***—During the Kraft process, pulp is separated into cellulose as primary and the so called black liquor as secondary material. While cellulose is further processed, the black liquor - with main components hemicellulose, lignin and other extractives - is utilized to generate heat /electricity, to reduce water emissions and to recover /reuse process chemicals. Here, lignin as the most important renewable source of aromatics on the planet is used as feedstock for the production of redox active components via photodegradation. Upon illumination, specific bonds are cleaved and the obtained smaller fragments can act as redox active substances or can be converted into these by chemical transformation. UV-irradiation experiments were performed with and without the addition of TiO_2. Zeta-potential, UV-VIS measurements and measurements of the pH value

	were carried out to observe changes during illumination. GC/MS analysis was used to determine the molecular fragments of lignin after UV-illumination while cyclic voltammetry investigations were performed to evaluate the redox potential thereof. In addition, vanillin – a degradation product of lignin - was used as precursor compound to generate redox-active substances by Daikin reaction. These substances were further applied in a redox-flow battery set-up. The electrochemical stability and potential of the redox-flow battery are presented.
S2025 Presentation 6 (16:45-17:00)	Landfill Gas Utilization for High-Value Chemicals Production: Process Design And Techno-Economic Analysis **Junyoung Lee**, Thai Ngan Do, Changsu Kim and Jiyong Kim Incheon National University, South Korea ***Abstract***—Greenhouse gas emission (GHG), which is the primary reason for climate change, has been steadily increasing that drives to search for technical frameworks to capture and utilize it, namely carbon capture and utilization (CCU). Therein, the landfill gas (LFG), which is from natural degradation of municipal solid waste (MSW), is considered as one of the major GHG sources as consisting mainly of methane and carbon dioxide (CO_2). It can take environmental and economic advantage to utilize LFG as raw material to produce energy and high-value chemicals (e.g. methanol, dimethyl ether, and olefin, etc.). In this paper, we aim to develop new systems which convert LFG to high-value chemicals comprised of integrated processes of reforming, synthesis and separation. By developing rigorous process models using commercial simulation software, Aspen Plus, we comparatively analyzed technical (e.g. overall conversion and energy efficiency), environmental and economic performances. As a result, we discussed the optimal process configuration from LFG to high-value chemicals by identifying technical bottlenecks and major cost-drivers.
S3007 Presentation 7 (17:00-17:15)	Separation of Benzene and Cyclohexane by Liquid–Liquid Extraction by Mixing Ionic Liquid and Organic Solvent **Mohamed Kamel Hadj-Kali**, M. Zulhaziman M. Salleh, M. A. Hashim and Emad Ali King Saud University, Saudi Arabia ***Abstract***—In petrochemical process, the hydrogenation of benzene into cyclohexane usually produces benzene–cyclohexane mixture. The unreacted benzene in the reactor effluent must be removed to produce pure cyclohexane. However, it is difficult to separate the mixture through distillation as both compounds have close boiling points. Moreover, the feasibility of other separation methods is restricted by the concentration of benzene in the mixture, in which, there has been no industrial process available for the concentrations less than 20 wt %. In our recent study, the

	individual extractive performance of four-selected ionic liquids (ILs) for this separation has been reported [1]. The present work is a continuation, where the extractive performance of these ILs was enhanced by applying the principle of solvent binary mixture. Ethylene glycol (EG) and dimethylformamide (DMF) were selected as the co-solvents to enhance the performance of 1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide (C2mimTf2N) and 1-ethyl-3-methylimidazolium thiocyanate (C2mimSCN), respectively. The binary mixing ratio of {IL + organic solvent} were optimized through the ideal mixing equation and validated experimentally. Finally, the pseudo-ternary systems of {C2mimTf2N + EG} + benzene + cyclohexane; and {C2mimSCN + DMF} + benzene + cyclohexane were experimentally measured. The non-random two-liquid (NRTL) model was successfully employed to correlate the experimental tie-lines. The extractive performance of each pseudo-ternary system was compared with the corresponding ternary systems that used the pure solvents. Interestingly, EG was discovered as a good diluting agent with C2mimTf2N, indicating a potential cost saving at industrial scale. Solvent binary mixture has been proven as a newly efficient and versatile method.
S3010 Presentation 8 (17:15-17:30)	Multicolored Red Fluorescent Protein Alc Orange, Akane family Induced by Stepwise Förster Resonance Energy Transfer like Photonic Cycle **Yuko Kato**, Koji Yoshida, Yoshihito Ohba, Ikki Fujimoto, Shu Nakachi, Yukimitsu Imahara, Kenichiro Nakashima and Toshio Yamaguchi Fukuoka University, Japan ***Abstract***—Akane is photoconvertible fluorescent protein in octocoral. We present a new fluorescent protein emitting multicolored fluoresce as blue (473 nm), green (494 nm), yellow (537 nm), orange (573 nm), red (596 nm) and deep red (630 nm). New native RFP (Red Fluorescent Protein) named Alc Orange, Akane family from Scleronephthya sp. aff. gracillima (Alcyonacea, Octocorallia) was caught in Kochi Prefecture, Japan. The possible mechanism underlying multi colors fluorescence was investigated. FRET (Förster Resonance Energy Transfer) was detected within the Alc Orange. The FRET distance as (r_0) was calculated to be 2.83 nm. Another FRET distance (r_0) was 3.60 nm in Alc Orange. The FRET pair of the Alc Orange would be green and red forms within the chromophore of the Alc Orange. Furthermore, there are monomer and dimer at 33 and 68 kDa, respectively, in SDS-PAGE as homo FRET. The new native RFP molecule showed stepwise FRET from 434 nm to 630 nm continuously near 200 nm, with photo irradiation and proton transfer. The photonic cycle concept is suggested.

One Day Visit

February 28, 2019(Thursday) 9:00-18:00

(Tips: Please arrive at Bay Hotel Singaporebefore 8:30 a.m. The following schedule is only for participants who registered the visit & tour. The following places are for references, and the final schedule should be adjusted to the actual notice.)

1. (9:00) Assemble at Bay Hotel Singapore

2. Visit Merlion Park

Merlion Park, is a Singapore landmark and major tourist attraction, located at One Fullerton, Singapore, near the Central Business District (CBD). The Merlion is a mythical creature with a lion's head and the body of a fish that is widely used as a mascot and national personification of Singapore. Two Merlion statues are located at the park. The original Merlion structure measures 8.6 meters tall and spouts water from its mouth. It has subsequently been joined by a Merlion cub, which is located near the original statue and measures just 2 metres tall.The park was first designed by the Singapore Tourism Board (STB) in 1964 as an emblem of Singapore.

3. Visit St Andrew's Cathedral

St Andrew's Cathedral In the mid-1980‘s, St. Andrew‘s Cathedral was restored and renovated to its present. Though there are many changes in the liturgical space, they made every effort to respect the Victorian period during which the Cathedral was designed. Restoration architects, Bawlf, Cooper & Associates completed the design work. The decorative panels are designed by Nicholas Bawlf and based on the Book of Kells. The Cathedral‘s altar is of particular significance. It was built by acclaimed West Coast native artist Charles Elliot. The top of the altar is yellow cedar, weighing about 400 pounds, which rests on two traditional native —bent boxes. Each box has a different picture carved on each of its four sides, representing different events in the life of Christ or stories from Scripture. These altar panels are rotated several times a year, to coincide with the events in the Church‘s liturgical year. The lectern was carved by native artist Roy Henry Vickers. It has a carving of Christ on the front, symbolizing both death and resurrection, the red side being the crucified Christ wearing the crown of thorns and the black side being the risen Christ. A new icon of the Holy Family was formally installed on September 8, 2007. The icon, which is 7 feet high by 5 feet wide, is the largest ever written by iconographer Andr éPrevost of Manitoba.

4. Visit Chinatown in Singapore

Chinatown in Singapore is a sharp contrastto the rest of the city, with low rise buildings and culture bursting out onto the streets, from the fragrant smells of traditional cuisine to the bold red and gold tones that run through the neighbourhood. This is an area that ‘s proud of its heritage, and has it very much on display. There are ornate Chinese, Buddhist and Hindu temples, museums galore and plenty of opportunities to soak up the bustling streets lined with old shophouses.

5. Visit Gardens by the Bay

Gardens by the Bay is an independent organization responsible for developing and managing one of Asia ‘s foremost garden destinations. The Gardens is led by a multidisciplinary team of professionals who have been involved in the greening of Singapore and had worked alongside international and local experts to develop the Gardens. It has an in-house team of skilled landscape designers, horticulturists, arborists, engineers, plant health, garden and turf management experts, as well as plant research and orchid breeding professionals, who leverage on the extensive global network of plant sources cultivated during the development days, to continuously curate and grow the Gardens. Guided by its vision to be a world of gardens for all to own, enjoy and cherish, Gardens by the Bay has earned numerous awards and accolades including the World Building of the Year in 2012, the President ‘s Design Award (Singapore) in 2013, the Outstanding Achievement Award by the Themed Entertainment Association in 2014, the Largest Glass Greenhouse (Flower Dome) in the Guinness World Records for 2015, and the TripAdvisor Certificate of Excellence in 2016. These achievements are testament to the ongoing excellence of the Gardens and spur the team towards attaining greater success.

6. Visit Gothic Quarter

Little India, an ethnic district in Singapore. It is located east of the Singapore River—across from Chinatown, located west of the river—and north of Kampong Glam. Both areas are part of the urban planning area of Rochor. Little India is commonly known as Tekkain the Indian Singapore an community.

Conference Venue

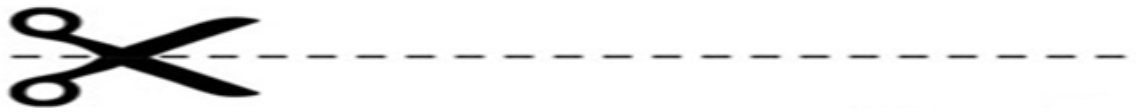
Shaw Foundation Alumni House

(National University of Singapore)

Address: 11 Kent Ridge Drive, Singapore 119244

As a focal point for alumni activities organised by the NUS Office of Alumni Relations, the Shaw Foundation Alumni House plays host to a variety of exciting events and programmes throughout the year. Opened in March 2009, the building houses an auditorium, several seminar rooms, food and beverage outlets, and an Alumni Service Centre to meet the social, business and professional needs of alumni. Whether you need to organise small meetings, full day seminars for a few hundred attendees,or networking events where participants can walk around and interact freely, we have the perfect venue for you. Managed by the NUS Office of Alumni Relations, the Shaw Foundation Alumni House boasts a seamless combination of lush gardens, beautiful interiors and state-of-the-art audio and video systems, making it your choice venue for special events.

Note



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