2018 8th International Conference on Future Environment and Energy (ICFEE 2018)

Phuket, Thailand

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2018 HKCBEES Phuket Conference Introductions

Welcome to 2018 HKCBEES Phuket conference. This conference is organized by HKCBEES. The objective of the Phuket 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 Future Environment and Energy.

2018 8th International Conference on Future Environment and Energy (ICFEE 2018)

Accepted papers will be published into IOP Conference Series: Earth and Environmental Science (EES) (ISSN: 1755-1315), which is indexed by EI Compendex, Scopus, Thomson Reuters (WoS), Inspec,et al.

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

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 **40** Minutes of Presentation and **5** Minutes of Question and Answer

Instructions for Poster Presentation

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 Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on January 10-11, 2018.

Dress code

Please wear formal clothes or national representative of clothing.

Keynote Speaker Introductions

Keynote Speaker I

Prof. Jae K. Park
University of Wisconsin-Madison, USA

Prof. Jae K. Park is a professor of the Civil and Environmental Engineering Department at the University of Wisconsin-Madison since 1988. He received a B.S. in Civil Engineering at Yonsei University in 1977 and a M.S. in Environmental Engineering at Seoul National University in 1979. He worked as a consulting engineer in Korea and Australia for two years after serving two and a half years of military service. He received a Ph.D. in Public Health Engineering at the University of Newcastle upon Tyne, United Kingdom in 1985. He worked as a research associate at the Sanitary and Environmental Health Research Laboratory, University of California, Berkeley from 1985 to 1988.

Since he joined University of Wisconsin-Madison in 1988, he has taught various environmental engineering courses such as water treatment plant design, wastewater treatment plant design, biological treatment, physical/chemical treatment, hazardous waste management, solids and hazardous waste engineering, industrial water pollution control, etc. His research is in the areas of water quality management and river restoration; biological treatment; hazardous waste treatment; mass transport in the environment; fate of organic compounds in water and wastewater treatment processes; computer-aided design of water and wastewater treatment plants; and reuse of scrap vehicle tires as a contaminant sorbent. His research was supported by the National Science Foundation, the Department of Defense, municipalities, private industries, Wisconsin Department of Transportation, Wisconsin Department of Natural Resources, and various research institutes. He has served as the consultant of various governments, research institutes, utilities, universities, and industries all over the world.

Facts are indisputable but when they are used wrongly, the truth can be distorted greatly. Many energy and environmental issues have been exaggerated and even raised a serious public concern. The people tend to believe negative, harmful, cruel, and sympathetic stories more than dull, decent, kind, sweet, and good stories. There are few decisions that satisfy everything. In order to make right decisions, we must rely on science and engineering, and face the reality rather than fiction and unfound fear. Decisions on energy and environmental issues that have been driven by deliberate abuse and exaggeration of facts will be presented and recommendations will be made.

Topic: “Deliberate Distortion of Facts on Environmental and Energy Issues”

Abstract—A Nobel Prize winner in literature, Halldór Laxness said any lie (deliberate abuse of a fact) you are told even deliberately is often a more significant fact than a truth told in all sincerity. Issues associated with environment and energy are intermingled with so many areas that a tiny deliberate misuse of a fact may mislead the public, resulting in a significant impact in decision making. In the viewpoint of prescientific days, “the sun rises in the east” is a fact. But the sun neither rises nor sets. Thus, it can be true or not, depending on how you view it. Due to climate change, we have been experiencing more flood and drought events recently. In order to mitigate this type of natural disasters, the commonly used methods have been dredging or widening of a river, levee and dam construction, flood plain expansion, etc. Because of these measures, the environment will be changed and ecology will be disturbed. These facts are often exaggerated. Thus, the simple statement such as environmental disaster and ecological catastrophe may be true or not depending on how the priority is set. Similarly, a nuclear bomb is lethal but may not be true in case of a nuclear reactor. Nuclear accidents occurred in Chernobyl, Three Mile Island, and Fukushima are the facts. However, this does not mean it is true that nuclear reactors are dangerous without acknowledging the fact that the significant progress has been made in the safety of nuclear reactors and the causes of the accidents are corrected in all nuclear reactors in the world. To make matters worse, politics or ideology may often get involved in decision. We have to decide whether we will worry about nuclear accidents (one out of 0.1~1 million years) or climate change (in this century) because nuclear energy may be a major solution for combating climate change. A few case studies will be presented and recommendations will be made.

Keynote Speaker II

Prof. Orawan Siriratpiriya
Aquatic Resources Research Institute, Chulalongkorn University (ARRIC), Thailand

Prof. Orawan Siriratpiriya

EDUCATION

1990 Cert. in Environmental Management Specialized in Risk Assessment and Analysis, UNEP/Tufts University, USA.

1989 D.Sc. (Soil Management-Waste Disposal/Utilization) The Agricultural University of Norway, NORWAY.

1984 Research Dip. in Environmental Science, The Agricultural University of Norway, NORWAY.

1979 M.Sc. (Environmental Science-Soil) Kasetsart University, Bangkok, THAILAND

1976 B.Ed. (Chemistry-Biology) Chulalongkorn University, Bangkok, THAILAND

RELATED EXPERIENCES

1. Working experience in environmental research as principal investigator, project director/ integrator/manager/coordinator, lecturer and thesis adviser at The Environmental Research Institute, Chulalongkorn University (1979-2014).

2. Expert in Environmental Impact Assessment (License) of Juristic Person 'Chulalongkorn University' (1991-present)

3. United Nations Environment Programme (UNEP) fellowship for International Leadership in Sustainable Environmental Management at Center for Environmental Management, Tufts University, Massachusetts, USA under "Intensive, International Post-Graduate Programme in Environmental Management" (1990).

4. Southeast Asia Programme Officer, The International START (HDP/IGBP/WCRP) Secretariat, Washington DC, USA (1994-1995). [START = Global Change System for Analysis, Research, and Trainning]

5. Thai National Expert for EIA/SEA (Environmental Impact Assessment/Strategic Environmental Assessment) guidelines development in the Mekong River Basin (2002-2003).

6. APRU Fellow, 5th APRU (Association of Pacific Rim Univ.).Fellow Program 2004 on Globalization and the Environment: Multidisciplinary Perspective" at Univ. of California Santa Barbara, Santa Barbara, USA. and Osaka University, Osaka, Japan. (2004)

7. Board member: Solid Waste Management Experts in Asia and Pacific Islands (SWAPI) (2005-present).

8. Board member (Environmental Expert): National Fertilizer Board of Thailand (2009-2014).

9. Editorial Board: Journal of Material Cycles and Waste Management (2010-present).

10. Member: Drafting Committee "State of the 3Rs in Asia and the Pacific", United Nations Centre for Regional Development (UNCRD) and Institute for Global Environmental Strategies (IGES) (2017).

Topic: “Zero Waste as Future Environment”

Abstract—Zero waste is a philosophy that encourages the redesign life cycles of resources related to ethical, economical, efficient and visionary of function in society. The main objective is to guide people in changing lifestyles and practices to emulate sustainable natural cycles where all discarded materials are designed to become resources for others to use or raw materials for others products due to limitation and depletion of natural resources. Zero waste in the manner of materials can be used over and over again e.g. returning organic waste from agriculture to nature instead of being down cycled into lesser products, ultimately becoming waste. Management of waste in harmony with nature need fact finding and realized how natural environment is treated, on the contrary, environmental problem as problems between nature and people. Organic waste as biomass existed widely and no-densely in surrounding environment can be counted as renewable biological organic resource, although the waste are multiple phase and multi component. The direction to create a sustainable society utilized limited natural resources geared to bring up strategic development of waste minimization and utilization e.g. activate energy and material supply, nutrient elements for plant growth, carbon sequestration into the soil, capture CO2 via photosynthesis and accumulation of CO2 as carbon fixed in the plant biomass. Going green liked green productivity is one of fundamentally change the way of design management for sustainable development to serve perpetuates the “cradle-to-grave”. Green productivity as coined by acceptance waste equals food. Environmental sustainability is an expected achievement goal for any development project although sustainability is complex needed multidisciplinary, coherence, innovation, and balance under space and time scale. Interdisciplinary disciplines line in zero waste became a cluster e.g. chemistry, soil science, process control engineering, material science are integrated to clarify and open-ended the value loaded natural environment with transparency and accountability in working process. The achievement in practical zero waste need to strengthen capacity of local community based on the right to know and empower communities to improve their environmental quality with the basic concern on maximize utility of all materials and product as an entry point in the pursuance of good and healthy future environment.

Keynote Speaker III

Prof. Vladan Babovic
National University of Singapore

Prof. Vladan Babovicis a leading scientist in the field of hydroinformatics where he has been spearheading research in data-driven research and computer modeling of hydraulics and hydrological phenomena from early 1990s. In more recent years, his work on flexibility and real options pertaining to decision-making under deep uncertainties in water- and climate-related domains gaining wider recognition. In addition to being a leading researcher and educator, Vladan is a scientist entrepreneur who was instrumental in securing funding and subsequently lead establishment and managed growth of research institutes, 65 million Singapore Delft Water Alliance (SDWA) and NUSDeltares, for both of which he served as a founding Director. Under his leadership SDWA and NUSDeltares were recognized in March 2014 by prestigious Winsemius Awards. Vladan obtained double Ph.D. degrees from UNESCO-IHE and Delft University of Technology, The Netherlands in 1995. In 2001 he obtained a business degree at IMD Lausanne (Switzerland). Prior to joining National University of Singapore, he was Head of Emerging Technologies at Danish Hydraulic Institute (1995-2002) and Senior Research Scientist at WL | Delft Hydraulics (2003-2005).

Topic: "$Sustainable\ Cities = \frac{1}{(Water \times Energy \times Temperature)^{Climate\ Change}}$"

Abstract—Cities critically depend on water and energy, which are closely inter-related: we use energy for water and we use water for energy. For example, we use energy to heat, treat and move water. In addition to using energy for water, we also use water for energy. We use water as a coolant for thermoelectric power plants, and as a critical input for production of biofuels.

Unfortunately, the energy-water relationship introduces vulnerabilities whereby a constraint on one resource introduces constraints in the other. While the energy-water relationship is already under strain today, particularly in cities, trends imply that the strain will be exacerbated unless appropriate action is taken.

And where is temperature in all this? Global warming, the increase of the average temperature of the earth near the surface, is now commonly accepted. Especially in cities the temperature has been rising over the past century. Increased density and area covered by concrete buildings and asphalt roads absorb the sun's heat, and waste heat from air-conditioners, cars and industry cause temperatures to rise more quickly in urban centres than in the surrounding areas.

The hot city phenomenon has far-reaching environmental sustainability and human livability implications, ranging from the aggravation of health problems such as heat stress, increasing the intensity of urban air pollution, and contributing to extreme weather events - in addition to the ever-increasing use of air-conditioners, with impacts for energy supply, burnouts and greenhouse gas emissions.

In this context, the key questions are whether we can develop and deploy next generation blue-green infrastructure based on flexible building designs, environmental, energy and logistical systems to make evolving cities sustainable enough to mitigate the impact of changing climate and growing populations with ever more disposable income. Adaptations that are needed require economic and societal transformation comparable to the industrial revolution. Existing arrangements will be radically altered and new ones created across variety of sectors including water management, building technologies, transportation, information technologies, energy, materials and therefore entire supply chains systems…

To adapt means to be flexible. This in turn implies that we must learn how to incorporate right amount of flexibility in our technical plans and societal arrangements. If we learn how to get it right then the city will attract people from the destructive activities of subsistence agriculture to wealth creating jobs in the city, where advanced environmental technology, efficient transit, ecological housing and dense information systems will enable them to live more lightly on the earth …And if we don't?

Keynote Speaker IV

Prof. Ngai Weng Chan
School of Humanities, Universiti Sains Malaysia, Malaysia

Prof. Ngai Weng Chan is Professor of Physical Geography at the Universiti Sains Malaysia in Penang, Malaysia. His main research areas are Environmental Hazards Management, Hydro-Climatology & Water Resources Management. He is currently Vice-President of the International Water Resources Association, Member of International Association of Hydrological Sciences and Member of International Water Association. He is currently President of Water Watch Penang (WWP), Treasurer of Malaysian Environmental NGOs (MENGOs) and member of Malaysian Water Partnership and Malaysian Water Association. He has completed more than 50 research/consultancy projects and published 26 Books, 59 Chapters in Books, and more than 100 professional papers.

Topic: "Combining Engineering Measures with Social Resilience in Coping with Urban Floods in Malaysia"

Abstract—Flooding is a serious disaster world-wide. The 21st century is increasingly affected by floods as global climate change and land use change escalate side by side. Malaysia is a country routinely affected by the impacts of water-related events, especially floods. In view of increasingly frequent and more severe water-related events, cities need to brace themselves by better coping and adaptation. More importantly, cities need to increase their resilience to face water-related disasters from the perspectives of water, land, energy, food and environmental sustainability. As a country, Malaysia lies in a geologically stable region which is relatively free from natural disasters. However, the country is not totally "free" from natural disasters as it is often hit by floods annually and seasonally. Almost every year, the country suffers from flood disasters that account for a significant number of casualties, disease epidemics, property and crop damage and other intangible losses. This paper examines the incidence of flood occurrence in urban areas, and looks at how cities (and its inhabitants) can adopt the best management methods, and city folks can adopt the most effective coping mechanisms and recover fast. The methodology is based on historical flood analysis, literature review of flood management and secondary data and reports on floods. The results indicate that flood disaster preparedness and recovery in the country are ineffective, flood responses are largely reactive, and the roles of institutions (formal and informal) in flood management are overlapping. There is also no legal and regulatory framework on flood disaster management and governance on floods is also unclear. Results show that the incidence of flood occurrence is increasing in urban areas, but a viable method of control is via the adoption of best management sustainable urban drainage systems (SUDS). City folks were found to adopt various coping mechanisms to face and recover from floods with reliance on social capital high. Overall, technical measures of flood management such as SUDS are found to be effective, aesthetically pleasing and socially acceptable. A holistic strategy combing technical SUDSs and non-technical human aspects of coping and resilience is the key towards effective management of floods in the country.

Keynote Speaker V

Prof. Anja Pfennig
HTW Berlin (University of Applied Sciences Berlin), Germany

Prof. Anja Pfennig was born in Büdelsdorf, Germany in 1970. She studied Minerology at the Rheinische Friedrich Wilhelms University Bonn, Germany, where she graduated in 1997. Her Ph.-D. in the field of ceramic moulds for liquid metal casting was earned in 2001 from the Friedrich Alexander University of Erlangen, Germany. She then worked for Siemens Energy in charge of ceramic shields for stationary gas turbines and transferred to Berlin in 2008 where she conducted scientific research on the oxidation of high temperature materials and corrosion behavior of steels used in Carbon Capture Techniques. 2009 she became full professor at the Applied University Berlin, HTW where she currently teaches material science for engineering students. Anja Pfennigs research interest and expertise is in the field of corrosion fatigue of materials at high temperature and high pressure simulating geothermal environments.

Topic: “Downhole reliability of steels during carbon capture and storage”

Abstract—During Carbon capture and storage (CCS) process gasses are separated from the power plant cleaned, compressed, transported and directly injected to the geological storage site, e.g. abandoned gas storage sites or saline aquifers. Pipe steels suitable for carbon capture and storage technology (CCS) require resistance against the corrosive environment of a potential CCS-site, such as: heat, pressure, salinity of the aquifer, CO2-partial pressure. Therefore samples of different mild and high alloyed stainless potential injection-pipe steels were kept at the same geological conditions as found within an on-shore CCS-sites in the northern German Basin. Corrosion rates obtained at 100 bar are generally much lower than those measured at ambient pressure where martensitic microstructure -heat treated at medium annealing temperatures- offers good corrosion resistance. The carbon content does not show significant influence on the pitting behavior, but generally higher chromium content results in better corrosion resistance.

The corrosion fatigue (CF) of was investigated by means of applying purely alternating axial cyclic load to failure at the same CCS conditions. Generally specimens with polished surface finish exhibited higher CF life range. The application of a protective potential increase the CF life range significantly from 4.7 x 105 (free corrosion potential) to 107 cycles (protective potential range from –450 to –900 mVSHE.

Brief Schedule for Conference

Day 1	**January 10, 2018 (Wednesday)** 9:00~17:00 **Venue: Lobby of the Hotel** Participants Arrival Registration & Conference Materials Collection
	January 10, 2018 (Wednesday) 13:30~18:30 **Venue: Grand Ballroom B** **Opening Remark** 13:30~13:35 Prof. Orawan Siriratpiriya Aquatic Resources Research Institute, Chulalongkorn University (ARRIC), Thailand
	Keynote Speech I 13:35~14:20 Prof. Jae K. Park University of Wisconsin-Madison, USA **Topic: "Deliberate Distortion of Facts on Environmental and Energy Issues"**
	Keynote Speech II 14:20~15:05 Prof. Orawan Siriratpiriya Aquatic Resources Research Institute, Chulalongkorn University, Thailand **Topic: "Zero Waste as Future Environment"**
	Coffee Break & Group Photo Taking 15:05~15:30
	Session 1: 15:30~18:30 **Venue: Grand Ballroom B** 12 presentations-Topic: "Renewable Energy and Technology"
Day 2	**January 11, 2018 (Thursday)** 9:10~18:05 **Venue: Grand Ballroom A, Grand Ballroom B** Arrival Registration, Keynote Speeches and Conference Presentations
	Morning Conference **Venue: Grand Ballroom A**
	Opening Remarks 9:10~9:15 Prof. Orawan Siriratpiriya Aquatic Resources Research Institute, Chulalongkorn University (ARRIC), Thailand
	Keynote Speech Ⅲ 9:15~10:00 Prof. Vladan Babovic National University of Singapore **Topic: "** $Sustainable\ Cities = \frac{1}{(Water \times Energy \times Temperature)^{Climate\ Change}}$ **"**
	Coffee Break & Group Photo Taking 10:00~10:30

<table>
<tr><td rowspan="8"></td><td colspan="2">Keynote Speech IV 10:30~11:15
Prof. Ngai Weng Chan
School of Humanities, Universiti Sains Malaysia, Malaysia
Topic: “Combining Engineering Measures with Social Resilience in Coping with Urban Floods in Malaysia”</td></tr>
<tr><td colspan="2">Keynote Speech V 11:15~12:00
Prof. Anja Pfennig
HTW Berlin (University of Applied Sciences Berlin), Germany
Topic: “Downhole reliability of steels during carbon capture and storage”</td></tr>
<tr><td colspan="2">Lunch 12:00~13:00
Venue: Hotel Restaurant</td></tr>
<tr><td colspan="2">Afternoon Conference
Venue: Grand Ballroom A, Grand Ballroom B</td></tr>
<tr><td>Session 2: 13:00~15:30
Venue: Grand Ballroom A
10 presentations-Topic: “Environmental and Chemical Engineering”</td><td>Session 3: 13:00~15:30
Venue: Grand Ballroom B
10 presentations-Topic: “Resource Management and Sustainable Development”</td></tr>
<tr><td colspan="2">Coffee Break 15:30~15:50</td></tr>
<tr><td>Session 4: 15:50~18:05
Venue: Grand Ballroom A
9 presentations-Topic: “Civil Engineering and Soil Geology”</td><td>Session 5: 15:50~17:50
Venue: Grand Ballroom B
8 presentations-Topic: “Electrochemistry and Heat Transfer”</td></tr>
<tr><td colspan="2">Dinner 18:30
Venue: Hotel Restaurant</td></tr>
<tr><td>Day 3</td><td colspan="2">One Day Tour</td></tr>
</table>

Tips: Please arrive at the conference to upload or copy PPT into the laptop room 10 minutes before the session begins.

Detailed Schedule for Conference

January 10, 2018 (Wednesday) **Venue: Grand Ballroom B**	
13:30~13:35	 **Opening Remarks** Prof. Orawan Siriratpiriya Aquatic Resources Research Institute, Chulalongkorn University (ARRIC)
13:35~14:20	 **Keynote Speech I** Prof. Jae K. Park University of Wisconsin-Madison, USA Topic: "Deliberate Distortion of Facts on Environmental and Energy Issues"
14:20~15:05	 **Keynote Speech II** Prof. Orawan Siriratpiriya Aquatic Resources Research Institute, Chulalongkorn University (ARRIC) Topic: "Zero Waste as Future Environment"
15:05~15:30	**Coffee Break & Group Photo Taking**
15:30~18:30	**Session 1-**12 presentations-Topic: "Renewable Energy and Technology"
January 11, 2018 (Thursday) **Venue: Grand Ballroom A**	
9:10-9:15	 **Opening Remarks** Prof. Orawan Siriratpiriya Aquatic Resources Research Institute, Chulalongkorn University (ARRIC)
9:15-10:00	 **Keynote Speech III** Prof. Vladan Babovic National University of Singapore Topic: $Sustainable\ Cities = \frac{1}{(Water \times Energy \times Temperature)^{Climate\ Change}}$
10:00-10:30	**Coffee Break & Group Photo Taking**
10:30-11:15	 **Keynote Speech IV** Prof. Ngai Weng Chan School of Humanities, Universiti Sains Malaysia, Malaysia Topic: "Combining Engineering Measures with Social Resilience in Coping with Urban Floods in Malaysia"

11:15-12:00	 **Keynote Speech V** Prof. Anja Pfennig HTW Berlin (University of Applied Sciences Berlin), Germany Topic: "Downhole reliability of steels during carbon capture and storage"	
12:00-13:00	**Lunch** **Venue: Hotel Restaurant**	
13:00-15:30	**Session 2-**10 presentations-Topic: "Environmental and Chemical Engineering" **Venue: Grand Ballroom A**	**Session 3-**10 presentations-Topic: "Resource Management and Sustainable Development" **Venue: Grand Ballroom B**
15:30-15:50	**Coffee Break**	
15:50-18:05	**Session 4-**9 presentations-Topic: "Civil Engineering and Soil Geology" **Venue: Grand Ballroom A**	**Session 5-**8 presentations-Topic: "Electrochemistry and Heat Transfer" **Venue: Grand Ballroom B**
18:30	**Dinner** **Venue: Hotel Restaurant**	
Jan.12	**One day Tour**	

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 Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on January 10-11, 2018

Session 1

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

Afternoon January 10, 2018(Wednesday)

Time: 15:30-18:30

Venue: Grand Ballroom B

Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y0057 Presentation 1 (15:30~15:45)

External costs as a measure of environmental impact in the generation of electricity in Poland
W Cel, A Czechowska-Kosacka, Justyna Kujawska and H Waság
Lublin University of Technology, Poland

Abstract—The depletion of natural resources, rising fossil fuel prices and growing environmental awareness, are leading to an increase in the popularity of renewable energy sources. In Poland, the share of energy derived from renewable sources continues to grow and now stands at 12.9% of the country's gross electricity consumption. Energy from renewable sources in Poland is 60€ more expensive per MWh than energy from conventional sources. According to the European Climate and Energy Package, Poland is committed to increasing its share of renewable energy to 15% in 2020, and a further 5% by 2030. It is very important to ensure that the increase in the share of renewable energy will increase the price of energy for the end users. To convince the public of the need to incur greater costs in the purchase of "green" power, we should put forward arguments showing the benefits of its use. The aim of this paper is to demonstrate the viability of support through a system of certification for renewable energy sources and also to estimate the potential increase in energy prices caused by raising RES contribution.

Afternoon January 10, 2018(Wednesday)

Time: 15:30-18:30

Venue: Grand Ballroom B

Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y0021 Presentation 2 (15:45~16:00)

Wind speed and power characteristics of Kalasin province, Thailand
Supachai Polnumtiang and Kiatfa Tangchaichit
Mechanical Engineering, Faculty of Engineering, Khon Kaen University, Thailand

Abstract—This paper presents a wind energy assessment of Kalasin province in the Upper North-Eastern region of Thailand. Four year wind data were recorded continuously from January 2012 to December 2015 at different heights of 60, 90 and 120 m above ground level (AGL). The mean wind speeds were found to be 3.14, 3.63 and 3.94 m/s at 60, 90 and 120 m AGL, respectively. The majority of wind directions for this region are distributed from the East to South directions. The highest wind power density was observed in the summer season, followed by winter and rainy seasons, in order. Four commercial wind turbines were selected to estimate energy yield output using the WAsP 10.0 software application; the results show that VESTAS with rated power of 2.0 MW was estimated to give 2,747 MWh/year with the highest capacity factor of 15.68%.

Afternoon January 10, 2018(Wednesday)

Time: 15:30-18:30

Venue: Grand Ballroom B

Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y2003 Presentation 3 (16:00~16:15)

An economic evaluation of onshore and floating liquefied natural gas receiving terminals: the case study of indonesia

M J Giranza and **A Bergmann**
Centre of Energy, Petroleum, Mineral Law, and Policy, University of Dundee, United Kingdom

Abstract—Indonesia has abundant natural gas resources, however the primary fuel used for electricity generation is coal and oil. Insufficient natural gas infrastructure with-in the country acts as a barrier to increased natural gas usage. In Indonesia LNG is the most efficient and effective method for distributing natural gas given the difficult geographical conditions, the world's largest archipelago and located in a deep sea area. The Government is planning to initiate natural gas imports by 2019 to meet the country's energy demands. In order to allocate adequate amounts of natural gas across the geographic regions Indonesia must build more LNG regasification terminals. The Indonesia government has not yet determined if the additional regasification terminals will be floating or land-based facilities. This paper assesses the two options and identifies which facility attains greater profitability. The financial analysis of investing in the Sorong LNG regasification terminal project is conducted using NPV, IRR, and sensitivity analysis. This analysis demonstrates that FSRU facilities have greater economic viability than onshore LNG regasification facilities. The FSRU project earns greater than a 12% IRR as compared to a negative IRR earned by an onshore project. The government can make the onshore projects viable by increasing the sales fee from US$10.00/MMBTU to US$10.60/MMBTU.

Afternoon January 10, 2018(Wednesday)

Time: 15:30-18:30

Venue: Grand Ballroom B

Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y0048 Presentation 4 (16:15~16:30)

Design and fabrication of solar updraft tower and estimation of power generation; initially focused on Bangladesh

Fayrouz Ayub, Saarah Akhand, Arafat Sultan Khan, **Golam Saklayen**
Faculty of Mechanical Engineering, Military Institute of Science & Technology, Bangladesh

Abstract—In our studies we focused on area of sourcing, converting and delivering sustainable energy, concentrating at the potential role of solar power. Power generation through a solar updraft tower (SUT) has been a promising approach for sustainable generation of renewable energy. Developing nations are faced with many challenges. Conventional sources are insufficient to meet the increasing demand of a developing, industrious nation (e.g. Bangladesh). Our project aims in reducing electricity crisis and forming a solution for our country, Bangladesh. The electricity generated can be supplied to the national grid. This will mean reduced cost for the government in the long run and also allow the government to reduce its dependency on costly and unsustainable fossil fuel. This cost reduction benefit can be passed on to the public as reduced energy cost or preferably through nationwide energy infrastructure development. This technology will not only help with the energy concern of Bangladesh but also will help to improve the situations of other developing countries alike Bangladesh. All in all implementing this technology will pave the way towards a better world and form a part of an integrated ecosystem of sustainable energy technology.

Afternoon January 10, 2018(Wednesday)

Time: 15:30-18:30

Venue: Grand Ballroom B

Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y3008 Presentation 5 (16:30~16:45)

Sustainability aspects of biofuel production
L Pawłowski, W Cel and K Wójcik Oliveira
Faculty of Environmental Engineering, Lublin University of Technology, Poland

Abstract—Increasing temperature on Earth, caused by a growing emission of greenhouse gases into the atmosphere, constitutes one of the most important challenges faced by the humanity in the current century. Terrestrial ecosystems, being recognized as an important component of the carbon cycle, have gained importance owing to its potential to sequester carbon. Sequestration of carbon dioxide is a chance to improve the balance of greenhouse gases. Increasing CO_2 absorption by terrestrial ecosystems through intensification of photosynthesis and, consequently, increasing plant biomass production, is one way to reduce the atmospheric CO_2 emissions. Sequestration of CO_2 by terrestrial ecosystems is not yet fully utilized method of mitigating CO_2 emission to the atmosphere.

Afternoon January 10, 2018(Wednesday)

Time: 15:30-18:30

Venue: Grand Ballroom B

Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y0013 Presentation 6 (16:45~17:00)

Performance and Simulation of a Stand-alone Parabolic Trough Solar Thermal Power Plant
Sanan T. Mohammad, Hussain H. Al-Kayiem, Morteza Khalaji Assadi, Syed I. U. H. Gilani and Ayad K. Khlief
Mechanical Engineering Department, Universiti Teknologi PETRONAS, Malaysia

Abstract—In this paper, a Simulink® Thermolib Model has been established for simulation performance evaluation of Stand-alone Parabolic Trough Solar Thermal Power Plant in Universiti Teknologi PETRONAS, Malaysia. This paper proposes a design of 1.2 kW parabolic trough power plant. The model is capable to predict temperatures at any system outlet in the plant, as well as the power output produced. The conditions that are taken into account as input to the model are: local solar radiation and ambient temperatures, which have been measured during the year. Other parameters that have been input to the model are the collector's sizes, location in terms of latitude and altitude. Lastly, the results are presented in graphical manner to describe the analysed variations of various outputs of the solar fields obtained, and help to predict the performance of the plant. The developed model allows an initial evaluation of the viability and technical feasibility of any similar solar thermal power plant.

Afternoon January 10, 2018(Wednesday)

Time: 15:30-18:30

Venue: Grand Ballroom B

Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y0047 Presentation 7 (17:00~17:15)

Upgrading lignin-derived bio-oil over a noble catalyst (Pt/C) in ethanol/formic acid media

Mohammad Nazrul Islam, Golam Taki, Md Masud Rana, Seong-Jae Park, Jeong-Hun Park
Department of Environment and Energy Engineering, Chonnam National University, Republic of Korea

Abstract—Bio-oil, a renewable fuel derived from waste biomass is potentially good alternatives for conventional fossil fuels and attracts much attention due to its carbon neutrality in the carbon cycle. In this study, lignin was depolymerized into bio-oil in water-ethanol (1:1 v/v) media under subcritical condition (350 ℃) and then upgraded this bio-oil with Pt/C as a catalyst and formic acid as an in-situ hydrogen source for hydrodeoxygenation in supercritical ethanol. Upgraded bio-oil qualities, such as composition and heating value were improved by hydrogenolysis with Pt/C in ethanol-formic acid media (1:1 v/v). The oxygen content decreased in the bio-oil from 28% to 21%, while carbon content increased by ~10% (71% in the upgraded bio-oil), resulted in a higher heating value of 32 MJ/kg compared to that of original bio-oil (27 MJ/kg). A significant amount of esters, ketones and saturated phenols were observed in the upgraded bio-oil which might be resulted from unstable/unsaturated compounds (e.g. phenols, acetic acid and vanillin). However, a group of undesirable products includes acids and amines still exist in the bio-oil which needs to further decompose due to their high oxygen content.

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Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y0051 Presentation 8 (17:15~17:30)

Effect of pH on Bio-oil Production from Kraft Lignin in Hydrothermal Liquefaction Process

G Taki, M N Islam, M M Rana, S-J Park, J-H Park
Department of Environment and Energy Engineering, Chonnam National University, South Korea

Abstract—In the lignocellulosic biomass, lignin is found on the earth as the second most abundant amorphous natural macromolecule. Usually, it produces as a residue in the Kraft pulping process and burns to generate energy. In this study, the effect of pH on bio-oil production was investigated in hydrothermal media with a batch-type reactor. The pH of hydrothermal media was adjusted by adding HCl or NaOH. The results showed that the yields of bio-oil were varied from 33.6 wt.% to 47.8 wt.% with increasing of pH from 3 to 11. The highest amount of bio-crude oil was produced with pH 9 (37.2 wt.%). In contrast, the significant amount of water-soluble organics was produced in alkali condition (13.2 wt.%). A similar trend of higher heating value (HHV) also observed while it was increased from 27 MJ/kg to 29.6 MJ/kg (bio-crude oil) with pH. The composition of monomeric product profoundly was also influenced by reaction medium pH. The GC-MS results showed that the bio-crude oil composition dominated by anisole, guaiacol, catechol and water-soluble products dominated by catechol, syringol type phenolic monomers. The overall study suggests that the yields and quality of bio-oil depend on reaction medium pH and alkali conditions are more significant rather than acidic and neutral conditions.

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Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y0019 Presentation 9 (17:30~17:45)

Study on Numerical Simulation of Wind Turbine
Yan Shu, **Guo Yutong**, Zhao Jiayu, Shi Shaoping and Liu Xin
Huaneng Clean Energy Research Institute, China

Abstract—Wake effect may decrease the overall power output of the wind farm. It is necessary to study the wind turbine wake, which would benefit wind turbine micro-sitting selection optimization. In order to improve the accuracy of wind turbine wake simulation, dynamic mesh method based on CFD (computational fluid dynamics) is proposed. Simulation comparison tests between dynamic meshing method and actuator disk method have been done with a 1.5MW wind turbine. The result shows that with the effect of the rotating blades being considered, dynamic meshing method can capture the characteristics such as vortexes, velocity distribution, flow recovery rate, and the wake radius along the axis direction of wind turbine wake more accurately.

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Session Chair: Prof. Orawan Siriratpiriya

Y0046 Presentation 10 (17:45~18:00)

Thermodynamics Analysis of Binary Plant Generating Power from Low-Temperature Geothermal Resource

A Maksuwan
Department of Environmental Science and Technology, Faculty of Science and Technology, Pathumwan Institute of Technology, Thailand

Abstract—The purpose in this research was to predict tendency of increase Carnot efficiency of the binary plant generating power from low-temperature geothermal resource. Low-temperature geothermal resources or less, are usually exploited by means of binary-type energy conversion systems. The maximum efficiency is analyzed for electricity production of the binary plant generating power from low-temperature geothermal resource becomes important. By using model of the heat exchanger equivalent to a power plant together with the calculation of the combined heat and power (CHP) generation. The CHP was solved in detail with appropriate boundary originating an idea from the effect of temperature of source fluid inlet-outlet and cooling fluid supply. The Carnot efficiency from the CHP calculation was compared between condition of increase temperature of source fluid inlet-outlet and decrease temperature of cooling fluid supply. Result in this research show that the Carnot efficiency for binary plant generating power from low-temperature geothermal resource has tendency increase by decrease temperature of cooling fluid supply.

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Session 1: 12 presentations- Topic: “Renewable Energy and Technology”

Session Chair: Prof. Orawan Siriratpiriya

Y0054 Presentation 11 (18:00~18:15)

Techno Economical Study of PV-Diesel Power System for a Remote Island in Indonesia: A Case Study of Miangas Island

M Rumbayan and K Nagasaka
Faculty of Engineering, Sam Ratulangi University, Manado, Indonesia

Abstract—The purpose of this study is to conduct the techno economical study of PC-Diesel power system based on renewable energy available locally in a remote island. This research is a case study for Miangas island which is the border island between Indonesia and Philipines. It is located in Talaud Island regency of North Sulawesi province of Indonesia. The monthly average daily radiation in Miangas island is 5.52 kWh/m2.The research methods used are data collection and data analysis using software HOMER. Based on the simulation result, the techno economic study of PV-Diesel power plant system based on energy demand in Miangas island can be obtained. The Cost of Energy (COE), Net Present Cost (NPC) and operating cost for proposed hybrid PV-Diesel power generation can be assessed for the design power systems uses Canadian solar Max Power C56x-325P of 150 KW PV, 18 string of Surette 6CS25P, Diesel Generator 50 kW and converter Magnum MS4448PAE 25 kW. The annual electricity production from the PV Diesel system for Miangas island is 309.589 kWh in which 80.7% electricity comes from PV, 19.3% electricity comes from diesel with the 109.063 kWh excess electricity. The cost of generating electrical energy in the term of cost of energy (COE), Net Present Cost (NPC) and operating cost are 0.318 US$/kWh, 719.673 US$ and 36.857 US$ respectively.

Afternoon January 10, 2018(Wednesday)

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Session 1: 12 presentations- Topic: "Renewable Energy and Technology"

Session Chair: Prof. Orawan Siriratpiriya

Y0056 Presentation 12 (18:15~18:30)

Use of ICT for sustainable transportation
P Agarwal and M. A. Alam
Department of Computer Science and Engineering, India.

Abstract—The world is experiencing an unfettered growth in terms of development but shrinking the way these developments are leading to the societal, economic and environmental changes and chaos. Sustainability is the answer and needs to be addressed effectively. ICT (Information and Communications Technology) has revolutionized the way things can change. This paper deals with sustainable transportation. Sustainable transport system is a sub topic of a bigger issue "Sustainable Development". So what does this imply ?ICT, can indeed enable the designing of smarter cities that offer a better quality of life for their residents while being more sustainable and cost effective. It is not just the citizens of a country but also the government that can gain benefit from initiatives and meet the objectives faster. This paper digs into the traditional transport systems and the sustainable transport system which we thrive for. Green vehicles/ Electric Vehicles/ Driverless cars/ Hybrid vehicles are the need of the hour. This paper extensively explores the issues and inventions that can lead to sustainable transportation. It further explores the problems associated with them and their solutions. These solutions cover the major aspects of sustainability like meticulous planning, correct usage of ICT and a well drafted and implemented governance framework.

Session 2

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

Afternoon, January 11, 2018 (Thursday)

Time: 13:00-15:30

Venue: Grand Ballroom A

Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y0061 Presentation 1 (13:00~13:15)

Possibility of forming artificial soil based on drilling waste and sewage sludge

J Kujawska, M Pawłowska and H Wasag
Institute of Renewable Energy Engineering, Faculty of Environmental Engineering, Lublin University of Technology, Poland

Abstract—Land redevelopment is necessary due to the amount of a degraded area. Depositing waste on the small area of landfills is harmful for the environment. New methods of managing and utilizing waste are being sought in order to minimize the deposition of waste. In small amounts, many types of waste can be treated as a substrate or material improving physicochemical properties of soils, and hence can be used in reclamation of degraded lands.
The study analysed the effect of different doses of sewage sludge (35%, 17.5%) with addition (2.5% and 5%) of drilling waste on the properties of degraded soils. The results show that created mixtures improve the sorption properties of soil. The mixtures contain the optimal the ratio of nutrient elements for growth of plants is N:P:K.

Afternoon, January 11, 2018 (Thursday)

Time: 13:00-15:30

Venue: Grand Ballroom A

Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y0006 Presentation 2 (13:15~13:30)

Decision making tools for selecting sustainable wastewater treatment technologies in Thailand

Praewa Wongburi and Jae K. Park
Faculty of Environment and Resource Studies, Mahidol University, Thailand

Abstract—Wastewater consists of valuable resources that could be recovered or reused. Still it is under threat because of ineffective wastewater management and systems. In Thailand, less than 25% of wastewater generated may be treated while then rest is inadequately treated and sent back directly into waterbodies or the environment. Furthermore, the technologies that have been applied may be inefficient and unsustainable. Efficiency, sustainability, and simplicity are important concepts when designing an appropriate wastewater treatment system in developing countries. The objectives of this study were to review and evaluate wastewater treatment technologies and propose a method to improve or select an appropriate technology. An expert system in Excel® program was developed to determine the best solution. Sensitivity analysis was applied to compare and assess uncertainty factors. Due to the different conditions of each area, the key factor of interest was varied. Furthermore, Robust Decision Making tool was applied to determine the best way to improve existing wastewater treatment facility and to choose the most appropriate wastewater treatment technology.

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Venue: Grand Ballroom A

Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y0012 Presentation 3 (13:30~13:45)

Progresses in Polystyrene Biodegradation and Prospects for Solutions to Plastic Waste Pollution

Shan-Shan Yang, Anja Malawi Brandon, De-Feng Xing, Jun Yang, Ji-Wei Pang, Craig S. Criddle, Nan-Qi Ren, Wei-Min Wu
Harbin Institute of Technology, PR China

Abstract—Petroleum-based plastic pollution has been a global environmental concern for decades. The obvious contrast between the remarkable durability of the plastics and their short service time leads to the increasing accumulation of plastic wastes in the environment. A cost-effective, sustainable strategy to solve the problem should focus on source control and clean up. Polystyrene (PS) wastes, a recalcitrant plastic polymer, are among the wide spread man-made plastic pollutants. Destruction of PS wastes can be achieved using various abiotic methods such as incineration but such methods release potential air pollution and generation of hazardous by-products. Biodegradation and bioremediation has been proposed for years. Since the 1970's, the microbial biodegradation of plastics, including PS, has been evaluated with mixed and isolated cultures from different sources such as activated sludge, trash, soil, and manure. To date, PS biodegradation by these microbial cultures is still quite slow. Recently, the larvae of yellow mealworms (*Tenebrio molitor* Linnaeus) have demonstrated promising PS biodegradation performance. Mealworms have demonstrated the ability to chew and ingest PS foam as food and are capable of degrading and mineralizing PS into CO_2 via microbe-dependent activities within the gut in less than the 12-15 hrs gut retention time. These research results have revealed a potential for microbial biodegradation and bioremediation of plastic pollutants.

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Venue: Grand Ballroom A

Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y0037 Presentation 4 (13:45~14:00)

Biosorption of Heavy Metals: Current Status and Outlook for Industrial Applications

Shahram Amirnia, Takashi Asaeda
Department of Environmental Science, Saitama University, Saitama City, Japan

Abstract—Treatment of Heavy metals in industrial effluents to safe levels is an expensive process and causes extra costs of operation for industry. Therefore, search for economically appealing alternatives to conventional metal removal methods is of great importance. There is a growing attention in the literature focusing on the use of waste biomaterials to remove heavy metals from contaminated waters. Numerous types of biomaterials have been examined by researchers for their metal adsorptive properties and different types of biomass have shown different levels of metal uptakes; however, despite their proven performance and cost-effectiveness, application of biosorption technique in large-scale systems has still remained a challenge.

In this presentation, we aim to comprehensively review and discuss the past, current status, advances, and challenges for biosorption processes, and also address the deficiencies pertaining to scaling up of biosorption as an emerging and reliable alternative to physico-chemical methods for heavy metal removal from industrial wastewaters.

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Venue: Grand Ballroom A

Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y1004 Presentation 5 (14:00~14:15)

Biogas Production from Water Hyacinth (Eichhornia Crassipes): The Effect of F/M Ratio
W D Nugraha, Syafrudin, L L Pradita, H H A Matin and Budiyono
Department of Environmental Engineering, Diponegoro University, Indonesia

Abstract—Distribution of water hyacinth (Eichhornia crassipes), generally considered as a water weed, that has been a problem which can harm the environment, irrigation system, and agriculture. However water hyacinth can be used in biogas production because it has large enough amount of hemicellulose contents. The purpose of this study was to know the effect of F/M ratio to biogas production from water hyacinth waste with Liquid Anaerobic Digestion (L-AD) method. A series of laboratory experiments using biodigester were performed in batch anaerobic operation at room temperature. F/M ratio that used in each reactor was 39.76; 20.03; 13.32; and 10.01. Degradation process was done in 60 days. The result showed that F/M ratio effects to the biogas production. The best performance of biogas production from this research will be obtained if F/M ratio is in the range of 10,01-20,03 (correspond to 25%-50% of rumen fluid) with water hyacinth as the main substrate.

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Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y0040 Presentation 6 (14:15~14:30)

Comparison of Cu^{2+} and Zn^{2+} thermalcatalyst in treating diazo dye

Yen-Yie Lau, **Yee-Shian Wong**, Soon-An Ong, Nabilah Aminah Lutpi and Li-Ngee Ho
School of Environmental Engineering, Universiti Malaysia Perlis, Malaysia

Abstract—This research demonstrates the comparison between copper (II) sulphate ($CuSO_4$) and zinc oxide (ZnO) as thermalcatalysts in thermolysis process for the treatment of diazo reactive black 5 (RB 5) wastewater. $CuSO_4$ was found to be the most effective thermalcatalyst in comparison to ZnO. The color removal efficiency of RB 5 catalysed by $CuSO_4$ and ZnO were 91.55 % at pH 9.5 and 7.36 % at pH 2, respectively. From the UV-Vis wavelength scan, $CuSO_4$ catalyst is able to cleave the molecular structure bonding more efficiently compared to ZnO. ZnO which only show a slight decay on the main chemical network strands : azo bond, naphthalene and benzene rings whereas $CuSO_4$ catalyst is able to fragment azo bond and naphthalene more effectively. The degradation reactions of $CuSO_4$ and ZnO as thermalcatalysts in thermolysis process were compared.

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Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y0058 Presentation 7 (14:30~14:45)

The influence of reaction time on hydrogen sulphide removal from air by means of Fe(III)-EDTA/Fiban catalysts

H Wasag, W Cel, M Chomczynska, J Kujawska
Faculty of Environmental Engineering, Lublin University of Technology, Poland

Abstract—The paper deals with a new method of hydrogen sulphide removal from air by its filtration and selective catalytic oxidation with the use of fibrous carriers of Fe(III)-EDTA complex. The basis of these filtering materials includes fibrous ion exchangers with the complex immobilized on their functional groups. It has been established that the degree of catalytic hydrogen sulphide decomposition depends on the reaction time. Thus, the required degree of hydrogen sulphide removal from air could be easily controlled by applying appropriate thickness of the filtering layer under a given filtering velocity. It allows applying very thin filtering layers of the Fe(III)-EDTA/Fiban AK-22 or Fiban A-6 catalysts. The obtained results of the research confirm the applicability of these materials for deep air purification from hydrogen sulphide.

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Venue: Grand Ballroom A

Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y3001 Presentation 8 (14:45~15:00)

Sorption characteristics of cadmium in a silty loam soil of Mae Ku creek, Tak Province, Thailand

P Thunyawatcharakul and S Chotpantarat
Chulalongkorn University, Thailand

Abstract—Mae Sot is a district in Tak province, the northern part of Thailand where has encountered with cadmium (Cd) contaminated in soils. Exposure of Cd can lead to severe health effect, for examples, bone softening, osteoporosis, renal dysfunction, and Itai-Itai disease. This study aims at elucidating sorption behavior of Cd in the contaminated soil collected from Mae Ku creek, Mae Sot district, Thailand. Batch sorption experiment was conducted in order to investigate sorption characteristics of Cd onto the contaminated soil. The soil sample taken from the study area consists of 26% sand, 16% silt 58% clay, which categorized as a silty loam, based on USDA classification. Soil pH is slightly alkaline (pH~7.1) and organic matter in the soil is 2.93%. The initial concentration in the batch sorption experiment was in the range from 0- 200 ppm. The result from the batch sorption experiment showed that soil sample can adsorb Cd up to 173.5 ppm and the sorption behavior of the soil sample can be well described by Freundlich isotherm, indicating the multilayer sorption (R^2 = 0.9964), with Freundlich constants of 0.312 and 1.756 L g^{-1} for 1/n and K_f, respectively.

Afternoon, January 11, 2018 (Thursday)

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Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y3006 Presentation 9 (15:00~15:15)

Fabricaiton and characterization of poly(ethylene glycol)-polyimide copolymer hollow fiber membranes for separating carbon dioxide

Sang Yong Nam, Jin Woo Jo and Ji Hyun Kim
Department of Materials Engineering and Convergence Technology, Engineering Research Institute, Gyeongsang National University, Korea

Abstract—Polymer membrane for separating carbon dioxide has been developed and attracted attention because of global warming. Among various polymer membranes materials, Polyimide (PI) has excellent thermal and mechanical properties, good chemical stability and high gas transport property. Many researchers have studied gas transport property of polyimide membrane for gas separation However, polymer membrane still have low performance compared with ceramic membrane and absorption process. Many researchers have been studied to complement this weakness. Improved permeability of membranes can be achieved by controlling diffusivity and solubility. The moieties with high fractional free volume (FFV) such as cardo fluorene and durene group can improve diffusivity. Poly(ethylene glycol)(PEG), rubbery polymer, can improve solubility. In this work, we synthesized PI-PEG copolymer to improve solubility. Diamines containing cardo fluorene and durene group were used to obtain polyimide having the high FFV. Finally, chemical structure, thermal property (thermal degradation and glass transition temperature) were investigated and PI-PEG copolymer membrane formed via immersion precipitation process and then membrane morphology was observed and gas transport property of PI-PEG membrane was investigated.

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Session 2: 10 presentations- Topic: "Environmental and Chemical Engineering"

Session Chair: Prof. Anja Pfennig

Y3002 Presentation 10 (15:15~15:30)

Surface coating with polyelectrolytes nanolayers: a novel approach to mitigate membrane fouling

Viktor Kochkodan, Olga Kochkodan, Muataz Hussein
Qatar Energy and Environment Research Institute, Hamad bin Khalifa University (HBKU), Qatar

Abstract—The main problem arising upon water treatment and desalination with pressure driven membrane processes such as microfiltration, ultrafiltration, nanofiltration and reverse osmosis is membrane fouling that seriously hampers the application of the membrane technologies. The surface coating of the membranes via layer-by-layer deposition of polyelectrolytes is a simple and flexible technique to improve the membrane fouling resistance.

In this study composite polyamide membranes NF-90, NF-270 and BW-30 were modified via LbL approach using electrostatic deposition of polyelectrolyte multilayers made from various polycationic and polyanionic polymers of different molecular weights. Four anionic polyelectrolytes such as: poly(sodium 4-styrene sulfonate), poly(vinylsulfonic acid, sodium salt), poly(4-styrene sulfonic acid-co-maleic acid) sodium salt, poly(acrylic acid) sodium salt and three cationic polyelectrolytes such as poly(diallyldimethylammonium chloride), poly(ethylenimine) and poly(hexamethylene biguanide were used for modification. The surface morphology of the prepared composite membranes were studied using atomic force microscopy. An effect of deposition time, a number of polyelectrolyte layers, chemical nature and molecular weight of used polyelectrolytes on degree of membrane modification has been evaluated. The antimicrobial properties of the modified membranes towards Pseudomonas aeruginosa (P. aeruginosa) bacteria have been studied using confocal imaging of the bacteria's growth on the membrane surface. A possible mechanism of the bactericidal action of the modified membranes has been discussed. An enhanced performance of the modified membrane samples was shown during treatment of sea water in the non-continuous regime.

Session 3

Afternoon, January 11, 2018 (Thursday)

Time: 13:00-15:30

Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0064 Presentation 1 (13:00~13:15)

Detection of Leaks in Water Distribution System using Non-Destructive Techniques
H Aslam, M Kaur, S Sasi, **Md M Mortula**, S Yehia, T Ali
American University of Sharjah, UAE

Abstract—Water is scarce and needs to be conserved. A considerable amount of water which flows in the water distribution systems was found to be lost due to pipe leaks. Consequently, innovations in methods of pipe leakage detections for early recognition and repair of these leaks is vital to ensure minimum wastage of water in distribution systems. A major component of detection of pipe leaks is the ability to accurately locate the leak location in pipes through minimum invasion. Therefore, this paper studies the leak detection abilities of the three NDT's: Ground Penetration Radar (GPR) and spectrometer and aims at determining whether these instruments are effective in identifying the leak. An experimental setup was constructed to simulate the underground conditions of water distribution systems. After analysing the experimental data, it was concluded that both the GPR and the spectrometer were effective in detecting leaks in the pipes. However, the results obtained from the spectrometer were not very differentiating in terms of observing the leaks in comparison to the results obtained from the GPR. In addition to this, it was concluded that both instruments could not be used if the water from the leaks had reached on the surface, resulting in surface ponding.

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Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0041 Presentation 2 (13:15~13:30)

River Aquifer Interaction in Lower Gandak Command Area in Bihar, India
Vivekanand Singh, Chandan Raj and Biswajit Chakraborty
Dept. of Civil Engg., National Institute of Technology Patna, India

Abstract—In this paper, the quantification of the interaction of aquifer and river during various stages of river Gandak has been carried out. A groundwater flow model, MODFLOW, has been used to quantify the interaction of river Gandak and the adjacent aquifer in all months of the year. The model has been calibrated with the observed water level data of the existing wells. Calibrated model was used to simulate the groundwater flow in the study area and the flows from river Gandak to adjacent aquifer and vice-versa. Results show that the river Gandak is recharging adjacent aquifer during the months May to October and again during January to February. In the months March, April, November and December aquifer is contributing water to Gandak River. It was found that the quantity of inflow/outflow from river Gandak is proportional to the difference of water level in river and aquifer. Further, a relationship for the interaction of Gandak River and adjacent aquifer has also been developed to find the aquifer recharge with rise in river stage in the study area.

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Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0030 Presentation 3 (13:30~13:45)

Modeling air concentration over macro roughness conditions by Artificial Intelligence techniques

T Roshni and S Pagliara
National Institute of Technology Patna, India

Abstract—Aeration is improved in rivers by the turbulence created in the flow over macro and intermediate roughness conditions. Macro and intermediate roughness flow conditions are generated by flows over block ramps or rock chutes. The measurements are taken in uniform flow region. Efficacy of soft computing methods in modeling hydraulic parameters are not common so far. In this study, modeling efficiencies of MPMR model and FFNN model are found for estimating the air concentration over block ramps under macro roughness conditions. The experimental data are used for training and testing phases. Potential capability of MPMR and FFNN model in estimating air concentration are proved through this study.

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Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0002 Presentation 4 (13:45~14:00)

Research roadmap for the creation of the digital multi-utility: Extracting value from concurrently collected high resolution water and energy data

R. A. Stewart
Griffith School of Engineering, Cities Research Institute, Griffith University, Queensland, Australia

Abstract—Imagine a future where Google or another technology company is the retailer of water, wastewater, electricity and gas services, for your home or business. At first thought this concept seems confounding but in reality this future is not too far away, as integrated digital metering, advanced communications and big data analytics paves the way for the creation of global multi-utility retailer companies servicing millions if not billions of customers. For the customer, there are a number of benefits of the digital multi-utility retailer. However, several impediments will prevent or slow the introduction of the digital multi-utility retailer. While numerous impediments are evident, none are insurmountable and can be overcome with appropriate government championing and regulation, targeted research and development (R&D), pilot implementation trials, robust software engineering, and passionate business entrepreneurship. This research creates a comprehensive research roadmap of R&D activities that must be addressed to realise the full applications and benefits of the digital multi-utility service provider. The R&D strategic roadmap covered in the paper discusses the following key areas: (1) regulatory and market transformation; (2) standardization and interoperability; (3) digital multi-utility transformation strategic planning; (4) fit-for-purpose communication systems; (5) data storage, management and mining; (6) big data analytics, machine learning and computational tools; (7) designing minimum energy devices; (8) digital multi-utility system production, installation and operational costs; (9) re-engineering multi-utility operational processes; (10) digital multi-utility metering and communications technologies; (11) societal readiness preparation; (12) cyber-security and privacy; (13) demonstration and commercial cases of digital multi-utility applications; (14) water-energy nexus pattern analysis and relationships; and (15) legal aspects.

Afternoon, January 11, 2018 (Thursday)

Time: 13:00-15:30

Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0059 Presentation 5 (14:00~14:15)

Recovery of phosphorus compounds from thermally-processed wastes
A Czechowska-Kosacka, L Pawłowski, G Niedbala, W Cel
Institute of Environmental Protection Engineering, Faculty of Environmental Engineering, Lublin University of Technology, Poland

Abstract—Depletion of phosphorus deposits is one of the most serious global problems, which may soon lead to a crisis in food production. It is estimated that if the current living standard is maintained, the available reserves will be depleted in 130 years. Considering the principle of sustainable development, searching for alternative phosphorus sources is extremely important. The work presented the results of the research on the possibility of utilizing wastes as a source of phosphorus. The studies were conducted on poultry manure. The physicochemical properties of phosporus-rich wastes were determined as well. The fertilizing properties of ashes from poultry manure combustion – obtained from different systems, i.e. caged and barn production. The assimilability of phosphorus from the obtained ashes was determined. Potential applications of phosphorus-rich ashes were proposed as well.

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Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0039 Presentation 6 (14:15~14:30)

The effects of domestic energy consumption on urban development using system dynamics

M Dehghani Saryazdi, N Homaei, **A Arjmand** and R Samizadeh
Alzahra University, Iran

Abstract—In developed countries, people have learned to follow efficient consumption patterns, while in developing countries, such as Iran, these patterns are not well executed. A large amount of energy is almost consumed in buildings and houses and though the consumption patterns varies in different societies, various energy policies are required to meet the consumption challenges. So far, several papers and more than ten case studies have worked on the relationship between domestic energy consumption and urban development, however these researches did not analyzed the impact of energy consumption on urban development. Therefore, this paper attempts to examine the interactions between the energy consumption and urban development by using system dynamics as the most widely used methods for complex problems. The proposed approach demonstrates the interactions using causal loop and flow diagrams and finally, suitable strategies will be proposed for urban development through simulations of different scenarios.

Afternoon, January 11, 2018 (Thursday)

Time: 13:00-15:30

Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0020 Presentation 7 (14:30~14:45)

A Comparative of Life Cycle Assessment of a Conventional Van and a Battery Electric Van for an Online Shopping System in Thailand

J Koiwanit and C Hamontree
Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Thailand

Abstract—The transportation sector is responsible for one of the main emitters of large quantities of pollutions to the atmosphere, which impacts local, regional or global environment receptors. In Thailand, many retail chains have been trying to launch many campaigns and projects to reduce GHG emissions together with offering the best convenience services to serve customers' needs. By promoting an online shopping system for the workplace, this will mitigate even more of the air pollutants than the conventional online shopping system, where the products are delivered to customer's doorsteps. This study aims to investigate and compare the impact of different vehicle technologies for an online shopping using Life Cycle Assessment (LCA) methodology especially in the vehicle use phase. The observed results showed that the electric van has the potential of reducing emissions and consequently showed lower impacts in most impact categories.

Afternoon, January 11, 2018 (Thursday)

Time: 13:00-15:30

Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0055 Presentation 8 (14:45~15:00)

A Comparative Assessment of Life-Cycle Greenhouse Gas Emissions from Hypothetical Electric Airport Transportation Services in Thailand

J Koiwanit
Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, Thailand

Abstract—Global warming is an increase of average temperature in the atmosphere, which causes adverse effects on the environment. Carbon dioxide (CO_2) from transportation sector is one of the main contributors of the overall greenhouse gases (GHG). To cope with this issue, electric car services are increasingly seen as popular alternative modes of green transportation especially for urban cities as it is more flexible, more environmentally-friendly, and less expensive than the use of conventional vehicles. The study analyses and compare the hypothetical electric car systems from airport transportation services. CML 2001, the life cycle impact assessment (LCIA) method, is applied to convert life cycle inventory data into environmental impacts. The observed results showed that the electric shuttle bus had the highest impact in global warming potential (GWP) compared to other transportation types. Alternatively, this LCA study that evaluated different transportations provided important information for decision makers on quantifying the differences between each scenario.

Afternoon, January 11, 2018 (Thursday)

Time: 13:00-15:30

Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0060 Presentation 9 (15:00~15:15)

Mitigation of greenhouse gases emissions impact and their influence on terrestrial ecosystem
K W ójcik Oliveira and G Niedbała
Lublin University of Technology, Poland

Abstract—Nowadays, one of the most important challenges faced by the humanity in the current century is the increasing temperature on Earth, caused by a growing emission of greenhouse gases into the atmosphere. Terrestrial ecosystems, as an important component of the carbon cycle, play an important role in the sequestration of carbon, which is a chance to improve the balance of greenhouse gases. Increasing CO_2 absorption by terrestrial ecosystems is one way to reduce the atmospheric CO_2 emissions. Sequestration of CO_2 by terrestrial ecosystems is not yet fully utilized method of mitigating CO_2 emission to the atmosphere. Terrestrial ecosystems, especially forests, are essential for the regulation of CO_2 content in the atmosphere and more attention should be paid to seeking the natural processes of CO_2 sequestration.

Afternoon, January 11, 2018 (Thursday)

Time: 13:00-15:30

Venue: Grand Ballroom B

Session 3: 10 presentations- Topic: "Resource Management and Sustainable Development"

Session Chair: Prof. Ngai Weng Chan

Y0042 Presentation 10 (15:15~15:30)

South Korean's willingness to pay for replacing coal-fired power plant with gas power plant with a view from particulate matter emissions reduction

Hyo-Jin Kim, Seul-Ye Lim, and Seung-Hoon Yoo
Seoul National University of Science & Technology, Seoul, Korea

Abstract—The coal-fired power plant is known to discharge 1,350 times more PM_{10} and 1,840 times more $PM_{2.5}$ than the gas power plant which uses clean fuel, natural gas (NG) in South Korea. Nevertheless, in 2016, coal-fired power plant accounted for 40% of the total power generation, and gas power plant took only 20%. In this regard, the Korean government is considering a policy to replace some amount of coal used for the generation with NG to reduce particulate matter (PM) emissions. However, the cost of gas generation is about 1.25 times higher than that of coal-fired generation. Thus, the policy-makers demand information on the public willingness to pay (WTP) for the replacement to mitigate PM emissions. This paper attempts to assess the public WTP for replacing consumption of one kWh of electricity generated from the coal-fired power plant with that produced from gas power plant using the contingent valuation (CV) method. To this end, a CV survey of 1,000 South Korean households was conducted employing a dichotomous choice (DC) question of asking whether they are willing to pay a specified amount for the replacement or not. Furthermore, a spike model was adopted to handle the DC data with a number of zero WTP observations. Given that the average price for electricity is KRW 121.52 (USD 0.11) per kWh, the estimated mean additional WTP was KRW 31.27 (USD 0.03) per kWh. The costs of gas and coal-fired generation are KRW 100.13 and 78.05, respectively, per kWh. The difference between the two is KRW 22.08 per kWh, which is smaller than the mean additional WTP (KRW 31.27 per kWh). This vividly portrays that South Korean households are ready to shoulder a significant financial burden that is more than rising costs arising from the replacement to decrease PM emissions. It is concluded that the replacement is supported by the public.


Coffee Break	**15:30-15:50**

Session 4

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: "Civil Engineering and Soil Geology"

Session Chair: Prof. Jae K. Park

S0004 Presentation 1 (15:50~16:05)

The Potential Usefulness of Recycled Aggregates and Pozzolana in Producing Green Concrete in Sudan

Eltahir Elshiekh and **Salma Mahmoud**
SUDAN UNIVERSITY OF SCIENCE & TECHNOLOGY, SUDAN

Abstract—Concrete is one of the most widely used resources in the building industry yet it is criticized for being environmentally-unfriendly due to its destructive resource-consuming nature and severe environmental impact. The emission of huge amounts of CO2 during the cement production process, the significant reduction in the naturally occurring amounts of aggregates and the disposal of construction and demolition waste are few examples to count. Green Concrete is thought to offer a solution leading to sustainable construction. Attempts in the use of different substituent or recycled materials gave good indications for the production of green concrete worldwide. This study tested the potential usefulness of recycled aggregates and locally available natural Pozzolana to produce green concrete in Sudan.

Five scenarios were investigated (1) a standard mix (2) a mix with 100% recycled aggregates to replace the coarse aggregates, (3) 100% recycled aggregates and 10% Pozzolana, (4) 100% recycles aggregates and 20% Pozzolana , (5) 100% recycled aggregates and 30% Pozzolana. The fresh and hardened concrete mixtures were tested for workability, durability and compressive strength at the age of 7 and 28 days respectively.

Variable results for the different scenarios were obtained but the optimum results were achieved with the mix that contained 100% replaced aggregates and 10% pozzolana. These results were considered promising giving reasonable indicators for the potential usefulness of recycled aggregates and the local Pozzolana in producing green concrete. It is thus recommended to repeat the mix design considering different percentages of the recycled aggregates or the Pozzolana in the mix.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: "Civil Engineering and Soil Geology"

Session Chair: Prof. Jae K. Park

S0005 Presentation 2(16:05~16:20)

Proposal of ground subsidence risk rating(GSR) due to excavation in order to prediction of ground subsidence

Myeong Hyeok Ihm and Eugene Jang
Daejeon University, Republic of Korea

Abstract—Throughout studying geotechnical field related to excavation work among dozens of influence factors related to the ground subsidence through case study and literature analysis. As a result Park et al. (2017) selected as 7 categories and 22 factors for the ground subsidence influence factors. The factors of the ground subsidence determined in the study were classified into 7 categories: Existence of the cavity, soil and rock, soil, rock, hydrogeology, external influence, and monitoring ground subsidence during construction. In case of existence of the cavity, influence factors are classified as depth of oveburden and thickness of overburden. In case of soil and rock, it is classified as depth of boundary and orientation of boundary(strike and dip). In case of soil, it is classified as type, shear strength, relative density, dry unit weight, water content by weight and liquid limit. In case of the rock, it is classified as rock types, distance from main fracture and RQD. In case of hydrogeology, it is classified to intensity of rainfall, depth and distance from main channel, coefficient of permeability and fluctuation of groundwater table. In case of external influence, it is classified to as depth of excavation and distance from the retaining wall, method to handle groundwater during excavation, existence of artificial facilities and loss of soil particles through the earth retaining wall. Finally, in case of monitoring ground subsidence during construction, measuring settlement during construction is important factor. The 22 most important factors affecting the ground subsidence are listed in order of importance. The most important order is groundwater level fluctuation, monitoring during excavation, kind of soil, type of rock, groundwater treatment during excavation, distance between main channel , soil depth and thickness, soil shear strength, RQD, liquid limit, relative density, permeability coefficient, distance between excavation depth and retaining wall, water content, distance from stream, existence of artificial facilities, rainfall intensity, soil gravity loss, orientation and depth of soil and rock interface, and dry unit weight of soil. In the preparation of the GSR sheet, a total of 22 influence factors were grouped into seven influential factor groups, and the top five influential factor groups corresponding to 94% of the seven influential factor groups were selected as the five essential factors. The score of each item was calculated by the number of citations in the GSR sheet.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: “Civil Engineering and Soil Geology”

Session Chair: Prof. Jae K. Park

S0009 Presentation 3 (16:20~16:35)

Study on Improvement of Vibration Compaction Performance of Fresh Mortar
Daiki Takehisa, Ichio Ide, Shin-Ichiro Hashimoto and Shigeyuki Date
Tokai Univeristy, Japan

Abstract—An influence of the difference in the particle size distribution of fine aggregate in mortar on plastic viscosity and packing properties under shaking was investigated. Furthermore, these effects on bleeding rate and liquefaction of fine aggregate with moisture by vibration were also investigated. As a result, if there is no significant difference in the shape and surface texture of the fine aggregate, the influence of fine aggregate type on the plastic viscosity under the vibration was relatively small, and the influence of particle size distribution on the filling property of mortar was also small. The mortar having a large plastic viscosity under vibration in each particle size distribution has a small bleeding amount. Bleeding also showed a close relationship with the time until liquefaction occurred when vibrating fine aggregate containing water.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: "Civil Engineering and Soil Geology"

Session Chair: Prof. Jae K. Park

S0012 Presentation 4 (16:35~16:50)

Study on the relationship between microstructure and strength of stabilized/solidified silt
Xiaobin Zhang and Zhiduo Zhu
Southeast University, China

Abstract—Silt is a kind of material with poor engineering properties, and stabilization/solidification is an effective method to improve its engineering properties. In order to explore the effect and mechanism of silt stabilization, three kinds of admixtures (lime, cement + lime and SEU-2) are chosen to stabilize silt. Unconfined compressive strength and scanning electron microscopy (SEM) tests of stabilized silt are carried out, and then the image processing analysis software Image-Pro Plus is used to quantitatively measure the values of some main microstructure parameters from SEM images. Stepwise regression method is used to select five main microstructure parameters and establish the regression equation between microstructure parameters and strength. Based on the regression equation the mechanism of silt stabilization is discussed from the point of microstructure change. This study will help to better understand the mechanism of silt stabilization.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: "Civil Engineering and Soil Geology"

Session Chair: Prof. Jae K. Park

S0006 Presentation 5 (16:50~17:05)

A Study on the Post Occupancy Evaluation in Support of Residential Renovation for the Disabled

Kyooil Lee and Younghwan Lee
Sahmyook UNIV., Republic of Korea

Abstract—This study analyzes the effects according to disability type, renovation space, and indoor living style through the post-occupancy evaluation of households supported by home renovation, focusing on the indoor living type rather than the renovation method limited to the existing home renovation according to the disability type. The purpose of this study is to make efficient use of public goods of the government by proposing detailed standards factors to consider when selecting facilities in outdoor space supported by home renovation. The field survey was practiced on 105 residents who supported by Seoul Government. In access path, which is the only outdoor space in the residential environment, it is necessary to install safety grab bar remove floor-level changes.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: "Civil Engineering and Soil Geology"

Session Chair: Prof. Jae K. Park

Y0025 Presentation 6 (17:05~17:20)

Thermal Conductivity in Soil: Theoretical approach by 3D Infinite Resistance Grid Model

A Changjan and N Intaravicha
Department of Environmental Science and Technology, Faculty of Science and Technology, Pathumwan Institute of Technology, Thailand

Abstract—Thermal conductivity in soil was elementary characteristic of soil that conduct heat, measured in terms of Fourier's Law for heat conduction and useful application in many fields: such as Utilizing underground cable for transmission and distribution systems, the rate of cooling of the cable depends on the thermal properties of the soil surrounding the cable. In this paper, we investigated thermal conductivity in soil by infinite three dimensions (3D) electrical resistance circuit concept. Infinite resistance grid 3D was the grid of resistors that extends to infinity in all directions. Model of thermal conductivity in soil of this research was generated from this concept: comparison between electrical resistance and thermal resistance in soil. Finally, we investigated the analytical form of thermal conductivity in soil which helpful for engineering and science students that could exhibit education with a principle of physics that applied to real situations.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: "Civil Engineering and Soil Geology"

Session Chair: Prof. Jae K. Park

S0001 Presentation 7 (17:20~17:35)

Microscopic geometrical characteristics of the granular system and the evolution rules under complex loads

HOU Ming-xun, TANG Meng-xiong, HU He-song, MO Hai-hong, CHEN Qiao-song

Guangzhou Institute of Building Science, China

Abstract—An accurate quantification of the grains' arrangement and structure is the key to establish the relationship between microscopic and macroscopic properties for granular media, which is also of vital importance for precisely predicting macro-deformation and mechanical behavior using the system's microscopic properties. In order to further reveal the structural characteristics of the granular media, a special loading device was designed and developed; then, the polycarbonate disk grains with the diameters of 3 mm and 5 mm were prepared for photo-elastic tests under complex loads. The relationship of the distribution frequency of the contact angle between grains with grain scale, grain combination as well as the magnitude and direction of the external load was explored. Results reveal that: (1) for granular media consisting of a single component, the geometrical structure shows obvious initial anisotropy without the application of load, the initial structure determines the transfer of force in the granular system; during the shearing process, the frequency distribution of the contact angle increased significantly along the directions of great main stresses but decreased along the directions of small main stresses. (2) for the mixed granular system consisting of grains with two different diameters, the anisotropy was not obvious, whether under initial conditions or under compression and shearing loads.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: "Civil Engineering and Soil Geology"

Session Chair: Prof. Jae K. Park

S0002 Presentation 8 (17:35~17:50)

A numerical approach for the analytical solution of the general temperature field for the final disposal of High-Level Radioactive Waste

Cheng-Wei Wu, Chao-Shi Chen, **Tzu-Ming Lin**, Justin Chang and Chia-Huei Tu
National Cheng Kung University, China

Abstract—After numerous years of international research and development, there is a broad technical consensus that deep geological disposal is the method for the management of High-Level Radioactive Waste (HLRW). Deep geological disposal offers relatively enough space to accommodate the large volume of HLRW accumulated over the years will provide safety of to humankind and the environment for now and far into the future.

This paper presents the methodology that the analytical solution of the general temperature field of the HLRW underground disposal repository can be approximately obtained by performing the calculations of Gaussian numerical integration and Gaussian quadrature. The process of the calculations has been compiled to the MATLAB codes by the authors. The verification of the results confirms that the method of this study is feasible and accurate.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-18:05

Venue: Grand Ballroom A

Session 4: 9 presentations- Topic: "Civil Engineering and Soil Geology"

Session Chair: Prof. Jae K. Park

S0013 Presentation 9 (17:50~18:05)

Stabilization of heavy metal contaminated mine tailings using natural waste
Deok Hyun Moon, Inseong Hwang, Won Sik Shin, Minho Lee, Jeong-Hun Park
Department of Environmental Engineering, Chosun University, Republic of Korea

Abstract—Heavy metal contamination is a serious problem in the Republic of Korea. One of the major sources for heavy metal contamination comes from the areas surrounding the mines. In the past after ore dressing, mine tailings were buried in the mountains without proper control. Even though the mine tailings were stored in a mine tailing dam, sometimes the loss of mine tailings occurred due to heavy rains and landslides. This leads to significant heavy metal contaminated field and rice paddy soil located near mine sites. There are approximately 2,600 abandoned mines and 50% of them are linked to serious heavy metal release problems. Moreover, there are approximately 600 active mines that also need proper treatment for mine tailings. In this study, the stabilization process was applied to immobilize heavy metals (Pb and Zn) in contaminated mine tailings. The stabilization process has been effectively used to remediate heavy metal contaminated waste and soils. In this study, waste oyster shells (WOS) and starfish were used as stabilizing agents. Moreover, calcined oyster shells (COS) which are more reactive were also used to immobilize Pb and Zn in the contaminated mine tailings. The stabilizing agent treatment dosage ranged from 0 to 10 wt% and the treated samples were cured for 28 days. The stabilization effectiveness was evaluated by the toxicity characteristic leaching procedure (TCLP) test. The stabilization treatment results showed that the TCLP Pb and Zn leachability decreased upon increasing dosage of waste resources. The COS treatment outperformed the WOS and starfish treatments. In order to pass the TCLP Pb regulatory limit of 5 ppm, only 2 wt% COS was required. Because there is no established TCLP Zn regulatory limit, the TCLP Zn leachability results were not evaluated with respect to any standard. However, a gradual decrease in TCLP Zn leachability was obtained upon an increase in dosage of stabilizing agents.

Session 5

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-17:50

Venue: Grand Ballroom B

Session 5: 8 presentations- Topic: "Electrochemistry and Heat Transfer"

Session Chair: Prof. Vladan Babovic

Y0045 Presentation 1 (15:50~16:05)

Electricity Generation and Community Wastewater Treatment by Microbial Fuel Cells (MFCs)

S Rakthai, R Potchanakunakorn, A Changjan, N Intaravicha, P Pramuanl, P Srigobue, S Soponsathien, C Kongson and A Maksuwan
Department of Environmental Science and Technology, Faculty of Science and Technology, Pathumwan Institute of Technology, Thailand

Abstract—The attractive solution to the pressing issues of energy production and community wastewater treatment was using of Microbial Fuel Cells (MFCs). The objective of this research was to study the efficiency of electricity generation and community wastewater treatment of MFCs. This study used an experimental method completely randomized design (CRD), which consisted of two treatment factors (4x5 factorial design). The first factor was different solution containing organic matter (T) and consisting of 4 level factors including T_1 (tap water), T_2 (tap water with soil), T_3 (50 % V/V community wastewater with soil), and T_4 (100% community wastewater with soil). The second factor was the time (t), consisting of 5 level factors t_1 (day 1), t_2 (day 2), t_3 (day 3), t_4 (day 4), and t_5 (day 5). There were 4 experimental models depending on containing organic matter (T_1-T_4). The parameter measured consisted of Open Circuit Voltage (OCV), Chemical Oxygen Demand (COD), Total Dissolve Solid (TDS), acidity (pH), Electric Conductivity (EC) and number of bacteria. Data were analysed by ANOVA, followed by Duncan test. The results of this study showed that, the T_3 was the highest voltage at 0.816 V ($P<0.05$) and T_4, T_2, and T_1 were 0.800, 0.797 and 0.747 V, respectively. TheT_3 was the lowest COD at 24.120 mg/L and T_4 was 38.067 mg/L ($P<0.05$). The best model for electricity generation and community wastewater treatment by Microbial Fuel Cells was T_3. This model generated highest voltage at 0.816 V, and reduction of COD at 46.215%.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-17:50

Venue: Grand Ballroom B

Session 5: 8 presentations- Topic: "Electrochemistry and Heat Transfer"

Session Chair: Prof. Vladan Babovic

Y0023 Presentation 2 (16:05~16:20)

The Development of Microbial Fuel Cells (MFCs) By Haplusterts Soil (Samo - Thod series)
N Intaravicha and A Changjan
Department of Environmental Science and Technology, Faculty of Science and Technology, Pathumwan Institute of Technology, Thailand

Abstract—In this paper, we investigated on simultaneous electric energy production and organic matter was removed from synthetic wastewater by Microbial Fuel Cells (MFCs). Single chamber MFCs was made up by Haplusterts great group soil (Samo - Thod soil group) in trial design 3 x 3 factorial design in Completely Randomize Design (CRD) which 3 levels synthetic wastewater; 0, 200 and 400 mg/l of glucose and 3 levels of flooding time: 1, 3 and 5 days. The results showed the interaction significant with decreasing sugar from synthesis wastewater and Open Circuit Voltage (OCV). The maximum OCV of 200 and 400 mg/l of glucose in 3 flooding days were 131 and 142 mV and decreasing to 110 and 126 mV in 5 flooding days, respectively. The highest percent of decreased glucose approached to 80% in 5 flooding days of 0.4 g/l of glucose. The findings suggested that not only MFCs were a significantly to reduce organic matter in wastewater but also generated electric energy in the same time.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-17:50

Venue: Grand Ballroom B

Session 5: 8 presentations- Topic: "Electrochemistry and Heat Transfer"

Session Chair: Prof. Vladan Babovic

Y0014 Presentation 3 (16:20~16:35)

A Novel, Graft Copolymer Approach for Color-tunable, Mesoporous Bragg Stack Layers and Its Applications for Energy Device

Chang Soo Lee, Jae Hun Lee, Byeong Ju Park, and Jong Hak Kim
Department of Chemical and Biomolecular Engineering, Yonsei University, Korea

Abstract—We present a novel approach to synthesize the mesoporous Bragg stack (BS) layers *via* amphiphilic graft copolymer approach, based on the self-assembly in organic solvent. The graft copolymer, PVC-*g*-POEM, was synthesized by grafting hydrophilic poly(oxyethylene methacrylate) (POEM) on the backbone of poly(vinyl chloride) (PVC). The organized mesoporous-TiO_2 (OM-TiO_2) and -SiO_2 (OM-SiO_2) was prepared by inducing the self-assembly of PVC-*g*-POEM in THF/H_2O, which derived the formation of micelle with PVC core and POEM shell. Therefore, the pore size, or porosity, of OM-TiO_2 and OM-SiO_2 was easily controlled from 20 nm to 70 nm by modifying the content of POEM in PVC-*g*-POEM copolymer. The BS layers were constructed through the alternating deposition of OM-TiO_2 and OM-SiO_2 on the non-conducting side of counter electrode in dye-sensitized solar cells. The reflectance peak of BS layers was easily tuned according to the porosity of OM-TiO_2 layers due to the different refractive index. The morphology and properties of BS-functionalized eletrodes were confirmed by field emission-scanning electron microscopy (FE-SEM), spectroscopic ellipsometry, and UV-visible light reflectance spectroscopy. The energy efficiency of BS-functionalized electrode with solid-state electrolyte was 7.1 % at 100 mW cm^{-2}, which was 49 % enhanced performance compared with conventional DSSC with nanogel electrolyte.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-17:50

Venue: Grand Ballroom B

Session 5: 8 presentations- Topic: "Electrochemistry and Heat Transfer"

Session Chair: Prof. Vladan Babovic

Y0015 Presentation 4(16:35~16:50)

Graft copolymer/homopolymer blend template for bimodal porous TiO2 photoanode of solar energy conversion device

Jin Kyu Kim, Jung Yup Lim, Cheol Hun Park, Jong Hak Kim
Department of chemical and Biomolecular Engineering, Yonsei University, Republic of Korea

Abstract—Bimodal porous TiO_2(BP-TiO_2) comprising of mesopores and macropores with excelling light-scattering ability and large surface area was synthesized *via* facile one-pot method applying the self-assembly of hydrophilically surface-altered TiO_2 nanoparticles and a hydrophobic poly(vinyl chloride) (PVC) homopolymer/amphiphilic poly(vinyl chloride)-*g*-poly(oxyethylene methacrylate) (PVC-*g*-POEM) graft copolymer. The preferential confinement of PVC homopolymer in the PVC domains of the PVC-*g*-POEM graft copolymer as well as the slective interaction of hydrophilic TiO_2 nanoparticles with hydrophilic POEM domains resulted in the synthesis of dual pores (i.e., mesopores and macropores). The sizes and number of macropores was facially controlled by the increased hydrophobic domain sizes resulting from the addition of PVC homopolymer, which depended on the MW and added amount of the PVC homopolymer. The presence of macropores functioned as light scattering centers and highly enhanced light-harvesting efficiency. The dye-sensitized solar cells(DSSCs) with polymer electrolyte and BP-TiO_2 exhibited the highest solar energy conversion efficiency (7.6%) at 100 $mWcm^{-2}$, which was much higher than those of nanocrystalline(NC)-TiO_2 prepared with commercial Dyesol paste (4.9 %) and mesoporous(MP)-TiO_2 prepared with PVC-*g*-POEM (5.8 %). In addition, The electron transport properties and charge transfer resistance of BP-TiO_2 cells was comparable to those of MP-TiO_2 cells.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-17:50

Venue: Grand Ballroom B

Session 5: 8 presentations- Topic: "Electrochemistry and Heat Transfer"

Session Chair: Prof. Vladan Babovic

Y0018 Presentation 5 (16:50~17:05)

Graft Copolymer Approach for the Synthesis of Mesoporous WO_3 in Energy Device

Na Un Kim, Min Su Park, Jung Pyo Jung, and Jong Hak Kim
Department of Chemical and Biomolecular Engineering, Yonsei University, Korea

Abstract—In this work, we report a graft copolymer-assisted synthesis approach for preparation of WO_3 mesoporous thin films with a large surface area and excellent electrochemical properties on transparent conducting oxide (TCO). The morphology of WO_3 mesoporous nanostructures and the particle size were successfully controlled by tuning the interaction of the polymer/sol−gel hybrids. The photoelectrochemical (PEC) performance of WO_3 mesoporous photoanodes with various morphologies (plate-like, rod-like and spherical WO_3) and the WO_3/$BiVO_4$ heterojunctions were characterized by measuring the photocurrents with/without hole scavengers. When the WO_3 single junction is used for the PEC reaction, the morphological changes of the mesoporous WO_3 film can strongly influence the charge separation/collection efficiency within the WO3 layer. Notably, it was also shown that the photocurrent of WO_3/$BiVO_4$ was not dependent on the thickness of WO_3 film when the charge collection is fast enough, suggesting that slow charge flow from $BiVO_4$ to the WO3 layer at the interface becomes a bottleneck factor.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-17:50

Venue: Grand Ballroom B

Session 5: 8 presentations- Topic: "Electrochemistry and Heat Transfer"

Session Chair: Prof. Vladan Babovic

Y0016 Presentation 6 (17:05~17:20)

Heat transfer rate comparative study on Inconel electrodeposited copper nanowires for energy efficiency

Min Seok Kim, Shaislamov Ulugbek, Heon Ju Lee and Soo Seok Choi
Jeju National University, Republic of Korea

Abstract—It is very important for all power station to have high energy efficiency. The U-tubes electrodeposited nanowires increase the contact area between heat source and fluids and it made heat transfer more efficient. In this experimental work, copper nanowires were fabricated on the Inconel plate with voltage of 0.5 or 0.6 V and duration time 5, 10 or 15 minutes. We observed the sample through SEM images and compare the effect of nanowires on temperature rising. We found a little difference of temperature rising with normal Inconel plate and the sample that nanowires is electrodeposited.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-17:50

Venue: Grand Ballroom B

Session 5: 8 presentations- Topic: "Electrochemistry and Heat Transfer"

Session Chair: Prof. Vladan Babovic

Y0017 Presentation 7 (17:20~17:35)

Numerical Simulation of Heat Transfer in Film Boiling by ANSYS

Yong Hee Lee and Sooseok Choi
Department of Nuclear and Energy Engineering, Jeju National University, Korea

Abstract—Film boiling is a post critical heat flux (CHF) phenomenon with a hot surface that is covered with a vapor film. The film boiling should be avoided to sustain a good efficiency in the power generating. In this study, the analysis of heat transfer in film boiling was carried out for increasing energy conversion efficiency by the commercial CFD code, ANSYS. As a result of the simulation, the vapor film is minimized before the bubble fall from the vapor film. At that point the Nusselt number is maximized. In addition the radiation heat flux has the ratio of 5.6% compared to the total heat flux at minimum thickness of the vapor film, while it has the ratio of 9.3% at maximum thickness of the vapor film.

Afternoon, January 11, 2018 (Thursday)

Time: 15:50-17:50

Venue: Grand Ballroom B

Session 5: 8 presentations- Topic: "Electrochemistry and Heat Transfer"

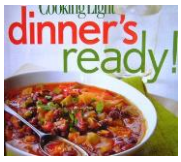
Session Chair: Prof. Vladan Babovic

Y3005 Presentation 8 (17:35~17:50)

Measurement of Local Bubble Parameters in a Two-Phase Flow System under Subcooled Boiling Conditions

G. H. Boo, **S. H. Kim**, J. W. Yoo, and Y. G. Lee
Jeju National University, Republic of Korea

Abstract—The subcooled flow boiling is a phenomenon of great importance in various energy conversion systems. In this study, an experimental investigation was performed to measure the local bubble parameters in steam-water subcooled boiling flow in a vertical channel at low heat and mass flux conditions. The test section is a vertical concentric annulus in which the electric heater rod is installed at the center of the flow channel. The total axial length of the test section is 2.664 m and the effective heated section is 2 m in length. The inner diameter and outer diameters of the annulus is 10 mm and 30 mm, respectively. The optical fiber probes were used to measure various local bubble parameters in the subcooled flow boiling. The local void fraction, mean bubble velocity, interfacial area density and Sauter mean diameter were measured at four elevations, and the radial profiles of them were obtained at 10 points by traversing the tip of optical probes. The high-speed camera also was applied for visualization of flow structures at three elevations. In the experiments, the flow conditions were set for the heat flux of 370 kW/m^2, the mass flux of 430 ~ 680 kg/m^{2}s and the inlet subcooling of 12 ~ 18 K at pressure of 114 ~ 152 kPa. It is expected that the obtained datasets will be useful for assessment of boiling models implemented in a CFD-scale analysis code.



Dinner	**18:30**

One Day Tour in Phuket

January 12, 2018 (Friday)

Phuket is one of the southern **provinces (changwat) of Thailand**. It consists of the island of Phuket, **the country's largest island**, and another 32 smaller islands off its coast. It lies off the west coast of **Thailand** in the **Andaman Sea**. Phuket Island is connected by the Sarasin Bridge to **Phang Nga** Province to the north. The next nearest province is **Krabi**, to the east across **Phang Nga Bay**.

Phuket Province has an area of 576 square kilometres (222 sq mi), somewhat less than that of **Singapore**, and is the second-smallest province of Thailand. It formerly derived its wealth from **tin** and **rubber**, and enjoys a rich and colorful history. The island was on one of the major trading routes between **India** and **China**, and was frequently mentioned in foreign ship logs of Portuguese, French, Dutch, and English traders. The region now derives much of its income from **tourism**.

Many of the outlying islands are very popular destinations for tourists, divers and snorkelers, including the **Phi Phi Islands** and the **Similan Islands**.

The Phi Phi Islands are an island group in Thailand, between the large island of Phuket and the west Strait of Malacca coast of the mainland. The islands are administratively part of Krabi province. Ko Phi Phi Don meaning "island" in the Thai language) is the largest island of the group, and is the most populated island of the group, although the beaches of the second largest island, Ko Phi Phi Lee (or "Ko Phi Phi Leh"), are visited by many people as well. The rest of the islands in the group, including Bida Nok, Bida Noi, and Bamboo Island (Ko Mai Phai), are not much more than large limestone rocks jutting out of the sea. The Islands are reachable by speedboats or Long-tail boats most often from Krabi Town or from various piers in Phuket Province.

Patong refers to the beach and town on Phuket's west coast. It is the main tourist resort on the island of Phuket, and is the center of Phuket's nightlife and shopping. The beach became popular with Western tourists, especially Europeans, in the late-1980s. It has numerous hotels and the area has expanded into a tourist Mecca.

The exact tour route will be adjusted according to the situation on Jan. 12, 2018

Conference Venue

The Royal Paradise Hotel & Spa
www.royalparadise.com

Address: 135/23, 123/15-16 Rat-U-Tit 200 Pee Road Patong beach, Phuket 83150
Tel: (66) 76 340 666
Fax: (66) 76 340565
E-mail: sales@royalparadise.com

Play on the beach, swim in the pool, relax in the spa and dine on the finest cuisine. Located in the vibrant heart of Patong, The Royal Paradise Hotel & Spa is a contemporary hotel ideal for holidaymakers. Welcome to Phuket, and our paradise playground.

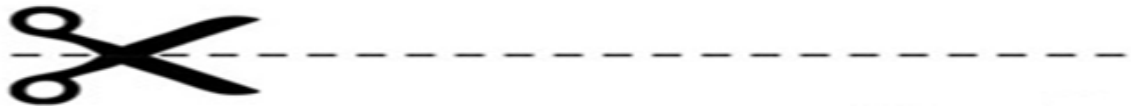
The Royal Paradise Hotel & Spa is located in famous Patong Beach on the tropical island of Phuket. Centrally located, the hotel offers easy access to the vibrant entertainment & shopping district, with the stunning Patong Beach and a variety of memorable tourist attractions just a short walk away.

Ideal for families as well as a group of friend and independent travelers, the hotel features 350 guest rooms with a classic Thai design, a variety of international restaurants, a free form swimming pool and an invigorating spa all at your fingertips. The Royal Paradise Hotel & Spa's elegant Thai charm with panoramic views over Patong and the Andaman Sea will leave you breathless.

The organizer won't provide accomodation, we suggest you make an early reservation, since January is peak season in Phuket. Thank you!

Note

Note



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