2019 10th International Conference on Environmental Science and Development (ICESD 2019)

13-15 February, 2019

Politecnico di Milano, Milan, Italy

Sponsored and held in

Published and Indexed by

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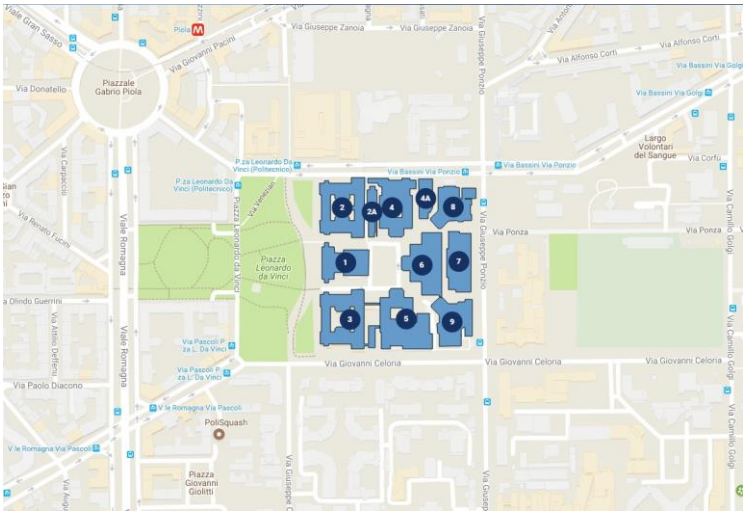
Conference Venue

Politecnico di Milano

Department of Chemistry, Materials and Chemical Engineering "Giulio Natta"

P.zza Leonardo da Vinci 32, Building N. 6 -20133, Milan, Italy



GETTING TO MILANO

As you're likely to land in Malpensa, in Linate or in Orio al Serio airport, you can plan how to reach Milano following these suggestions. Unfortunately there will be no Meet and Greet, but we're sure that if you keep these instructions ready at hand it won't be hard to reach us.

If you land at Linate Airport:

Air Bus to Centrale Railway Station: www.atm-mi.it (http://www.atm.it/en/Pages/default.aspx)

Bus no. 73 to Piazza San Babila: www.atm-mi.it (http://www.atm.it/en/Pages/default.aspx)

If you land at Malpensa Airport:

Malpensa Express Train to Cadorna Railway Station: www.malpensaexpress.it (http://www.malpensaexpress.it/en/)

Malpensa Shuttle to Centrale Railway Station: www.malpensashuttle.it (http://www.malpensashuttle.it/e-index2.php)

If you land at Orio al Serio Airport:

Terravision Bus to Centrale Railway Station: www.terravision.eu/milan_bergamo.html (http://www.terravision.eu/milan_bergamo.html)

Orio shuttle to Centrale Railway Station: www.orioshuttle.com (http://www.orioshuttle.com/_eng/)

GETTING TO THE CAMPUS

LEONARDO CAMPUS

Take the subway (Line 2 - green one) and get off at Piola stop. Leonardo Campus is 2 minutes walk from there.

https://goo.gl/maps/usi6S6sH8nF2

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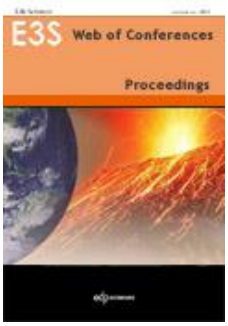
Milan Conference Introductions

Welcome to 2019 HKCBEES Milan conference. This conference is organized by HKCBEES. The objective of the Milan conference is to bring together leading scientists, researchers around the world to discuss the priority topics for Environmental Science and Development in recent years

2019 10th International Conference on Environmental Science and Development (ICESD 2019)

Accepted papers will be published in the following conference proceeding:



E3S Web of Conferences (Open Access proceedings in Environment, Energy and Earth Sciences), which is indexed by Google Scholar, CAS, DOAJ, CPCI (Web of Science), EBSCO, ProQuest, **EI Compendex, Scopus**.

Conference website and email: http://www.icesd.org/; icesd@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 **10** Minutes of Presentation and **5** Minutes of Question and Answer
Keynote Speech: about **35** 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 February 13 and February 14, 2019.

Dress code

Please wear formal clothes or national representative of clothing.

Keynote Speaker Introductions

Keynote Speaker I

Prof. Hartmut Hinz
University of Applied Sciences, Frankfurt, Germany

H. Hinz received the diploma degree in electrical engineering from the University of Applied Sciences, Aachen and the Ruhr University, Bochum in Germany in the years 1990 and 1994 respectively. He received the Ph.D. degree from the Technical University, Darmstadt in Germany in 2000.

Between 1999 and 2009 he was with General Motors Fuel Cell Activities, most recently as project leader for the development of high voltage electrical systems for concept fuel cell. In 2009 he was appointed as a Professor for power electronics at the University of Applied Sciences, Frankfurt in Germany. Since 2011 he is the program director of the study program electrical engineering. Since 2010 he is a visiting Professor (flying faculty) at the Vietnamese-German University in Ho-Chi-Minh City, Vietnam. His research interests are in the areas power electronics, modeling and decentralized power generation.

Topic: ‘Powertrain Electrification – Current Status and Trends’

Abstract—In order to achieve lower fuel consumption and less greenhouse gas emissions, vehicles with improved performance are required. The electrification of the powertrain seems to be the most promising solution for a sustainable and environmentally friendly transport system. The realization of this vision requires an increasing utilization of electrical energy to power traction and ancillary loads in passenger cars. In electrified powertrain applications, the efficiency of the electric path as well as the power and energy density of the used components play important roles to improve the driving range of electric vehicles and to run the engine close to its peak efficiency point in hybrid vehicles.

In this keynote presentation the design and architecture for the range of electrified powertrains from micro hybrid to full electric vehicles are discussed. The main focus is to comprehensively review the state-of-the-art electrified powertrains that have been developed and commercialized in the automotive industry. In particular passenger cars are categorized based on different powertrain configurations and electrification levels. In this context powertrain structures and operating modes are analyzed.

Keynote Speaker II

Prof. Antonio Ficarella
University of Salento, Italy

Prof. Antonio Ficarella is full professor of Energy and Environment Systems at University of Salento (Italy); Director of the Department of Engineering for Innovation (2013-2015). President of the ITS (High Technical Institute) Aerospace Foundation since 2013; Dean of the Faculty of Industrial Engineering (2008-2012).
Member of the Board of Directors of the Aerospace Technological Cluster (DTA, 2009-2015). Member of the Advisory Council for Aeronautics Research in Europe (ACARE) since 2012, and of the Technical Committee of CTNA - Italian Aerospace Technological Cluster since 2012.
Member of the Committee for the Development of Aeronautic Industry since 2014.
National scientific coordinator of the Project of National Interest (PRIN) Cycle-Resolved Emissions Control of Internal Combustion Engines by Means of an Innovative Optical Sensor (2006-2008), of the project of network of laboratories "GREEN ENGINE" (2009-2012), of research unit in the European Project Renewable energy and forest management (European Project INTERREG 2004-2007), and, of the project PON MALET - Development of technologies for propulsion at high altitude and long range of uninhabited aircraft (2011-2015). Scientific coordinator of the MEA project (Energy Hybrid Management for aeronautical applications) since 2013. Scientific coordinator for the University of Salento, since 2016, of the project TECHNOLOGY DEVELOPMENT COMMUNITY, in collaboration with GE Avio and several Italian universities. Shareholder of the spin-off ADVANTECH from 2011.
The scientific activities were developed in the fields of unsteady and two-phase fluid-dynamic inside machines and apparatus, thermo and fluid dynamic applied to industrial processes and aerospace propulsion, Diesel engines, industrial energy applications and related environmental subjects, energy recovery, active control of flows, with regard to the cavitation effects and the spray and combustion behavior.

Topic: ‘Technological and Environmental Challenges for Combustion in Energy and Propulsive Systems’

Abstract—Fast growing multi-disciplinary technologies - such as Micro Electro-Mechanical System (MEMS), additive manufacturing, nanotechnologies, active control of flow, sense and diagnostic - will exert a disruptive influence on long been know phenomena, more specifically combustion, allowing a deeper control of the fundamental physics of oxidation.
Regarding gas-turbines for stationary and propulsion applications, the proposed speech will review the main research areas that actually focus on improvement control and optimization of air - fuel mixing and new concepts of atomizers, analyzing new options and opportunities offered by new technologies. Moreover, the technical and environmental challenges related to control of oxidation processes with lean combustion, combustion instabilities, micro-scale combustion, control using active systems, development of new combustion concepts will be discussed.
Active flow control (AFC) is a technology aimed at altering a natural flow state or development path into a more desired state. The potential benefits of flow control may include improved performance, affordability, fuel consumption economy, and environmental compliance.
Remarkable developments in control technology have considerably expanded due to manufacturing processes that have been developed in recent years to create the micro-electro-mechanical systems that have been used as sensors and actuators.
In Internal Combustion Engines (ICE) achieving maximum fuel economy and minimum emissions potential for a diverse range of application through synergistic integration of building block technologies is playing a role becoming increasingly important - pressure sensing, dilute combustion, homogeneous-charge compression-ignition. Once again, the mentioned multi-disciplinary technologies will exert a strong influence.
The social and environmental sustainability of economic and social development requires appropriate use of energy resources. One of the main source of energy is still based on the use of fuels, mainly of fossil origin but increasingly from renewable sources. Therefore, combustion processes will play - despite everything - a key role in the efficiency of energy use and for the environmental impact of energy systems.

Keynote Speaker III

Assoc. Prof. Valentina Busini
Politecnico di Milano, Italy

Prof. Valentina Busini has her expertise in safety engineering and bioengineering. In particular, with regard to industrial safety, she usually works on the analysis of the consequences of industrial events related to emerging risks, such as the CFD modeling of heavy gas dispersion in complex environments, and the definition of methodologies for the evaluation of industrial accidents triggered by natural events (the so-called NaTech events). As far as bioengineering is concerned, she has focused on the interactions between materials and biomolecules, both for biocompatibility studies and for the development of protein separation processes.

Topic: ‘Odour sampling and source characterization’

Abstract—The presence of industrial activities with a odorogenic impact near residential areas can cause severe annoyance to the population.

The odour sources may be classified as point, area or volume sources, and they can be characterized through different methodologies. Anyway, regardless of the measurement technique adopted (dynamic olfactometry, chemical analysis or electronic nose), the quality of the results obtained is heavily dependent on appropriate sampling, which is one of the main issues related to odour characterization and measurement.

The aim of sampling is to obtain representative information on the typical characteristics of odour sources by means of the collection of a suitable volume fraction of the effluent. Typical characteristics of odour sources include: temporal trend of the emission, including emission peaks; transfer modalities of odorous substances from the source to the atmosphere; geometrical source configuration, i.e., point, surface or volume source.

In the case of surface sources, emissions typically come from extended solid or liquid surfaces. Two different kinds of surface sources may be distinguished: active surface sources, i.e., sources having an outward air flow (e.g., biofilters or aerated heaps); passive surface sources: i.e., sources without outward air flow, the mass flow from the solid or liquid surface to the air (volatilization) is due to phenomena such as equilibrium or convection (natural or forced). Examples are landfill surfaces and wastewater treatment tanks.

Area sources are most commonly sampled using specific enclosure devices (hoods). However, fluxed hoods with different designs and different operating conditions produce results that are not comparable to each other. One of the purposes of the present work is to determine which are the more suitable methodologies to assess the odour emissions from liquid area sources, by means of a thorough study of the models capable of describing the volatilization phenomena of the odoriferous compounds from such sources. Several different models were evaluated for the open field emission, selecting the most appropriate one.


Lunch	**12:00~13:15**

Brief Schedule for Conference

<table>
<tr><td rowspan="4">Day 1</td><td colspan="2">February 13 (Wednesday) 10:00~17:00
Venue: Sala riunioni
Politecnico di Milano – P.zza Leonardo da Vinci 32, Milano – Building nr. 6, Department of Chemistry, Materials and Chemical engineering, Milan, Italy
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<tr><td colspan="2">Opening Remarks 14:00~14:05
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Politecnico di Milano, Italy
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Topic: ‘Powertrain Electrification – Current Status and Trends’
(Prof. Hartmut Hinz, University of Applied Sciences, Frankfurt, Germany)</td></tr>
<tr><td colspan="2">Coffee Break 14:45~15:00</td></tr>
<tr><td>Session 1 15:00~17:15
Venue: Sala Giulio Natta
9 presentations-Topic: “Renewable Energy and Electric Power Engineering”
Session Chair: Prof. Hartmut Hinz</td><td>Session 2 15:00~17:00
Venue: Sala riunioni Lombardi
8 presentations-Topic: “Biomass Resources and Bioenergy”
Session Chair: Prof. Makarand Madhao Ghangrekar</td></tr>
<tr><td rowspan="2">Day 2</td><td colspan="2">February 14 (Thursday) 08:55~18:30
Venue: Outside of Sala Giulio Natta
Politecnico di Milano – P.zza Leonardo da Vinci 32, Milano – Building nr. 6, Department of Chemistry, Materials and Chemical engineering, Milan, Italy
Participants Onsite Registration & Conference Materials Collection & Conference Reports</td></tr>
<tr><td colspan="2">Opening Remarks 08:55~9:00
Prof. Antonio Ficarella
University of Salento, Italy
Keynote Speech II 09:00~09:30
Topic: ‘Technological and Environmental Challenges for Combustion in Energy and Propulsive Systems’
(Prof. Antonio Ficarella, University of Salento, Italy)
Keynote Speech III 09:30~10:10
Topic: ‘Odour sampling and source characterization’
(Assoc. Prof. Valentina Busini, Politecnico di Milano, Italy)</td></tr>
</table>

	Coffee Break & Group Photo Taking 10:10~10:30	
	Session 3 10:30~12:00 **Venue: Sala Giulio Natta** 6 presentations-Topic: "Geosciences and Geology" Session Chair: Assoc. Prof. Rohit Srivastava	**Session 4** 10:30~12:00 **Venue: Sala riunioni Lombardi** 6 presentations-Topic: "Electrochemistry and Chemical Engineering" Session Chair: Prof. Hartmut Hinz
	Lunch 12:00~13:15 **Venue: Sala Biblioteca**	
	Session 5 13:15~15:30 **Venue: Sala Giulio Natta** 9 presentations-Topic: "Energy Engineering and Management" Session Chair: Prof. Hartmut Hinz	**Session 6** 13:15~15:15 **Venue: Sala riunioni Lombardi** 8 presentations-Topic: "Air Pollution and Noise Pollution Management" Session Chair: Prof. Antonio Ficarella
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	Session 7 15:45~18:30 **Venue: Sala Giulio Natta** 11 presentations-Topic: "Resource Science and Environmental Engineering" Session Chair: Prof. Jie Fu	**Session 8** 15:45~18:15 **Venue: Sala riunioni Lombardi** 10 presentations-Topic: "Urban Engineering and Eco-Environmental Management" Session Chair: Assoc. Prof. Wei Po Huang
	Poster Session: 08:55-18:30 **Venue: Sala Giulio/Sala riunioni Lombardi**	
	Dinner 18:30	
Day 3	**February 15, 2019(Friday) 9:00~17:00** **One Day Tour**	

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

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 February 13 and February 14.

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, February 13 (Wednesday)

Time: 15:00~17:15

Venue: Sala Giulio Natta

9 presentations-Topic: "Renewable Energy and Electric Power Engineering"

Session Chair: Prof. Hartmut Hinz

K0003-A Presentation 1 (15:00~15:15)
Hybrid Nuclear-Renewable Energy Systems: Needs and Future
Siddharth Suman
Independent Researcher, India

Abstract—Climate change and energy security have emerged as the biggest concerns of the present century. Renewable energy sources are intermittent, dependent upon geographical location, climatic conditions, and require a very large land footprint. Future of nuclear energy is also uncertain because of public apprehensions and subsequent government policies. To overcome the issues derailing these two virtually carbon-free energy sources, a new hybrid or integrated nuclear-renewable energy system is being proposed and seen as an attractive option. Such integrated energy systems are conceived as a nuclear power reactor coupled with renewable energy generation and industrial processes that may simultaneously tackle the concerns regarding grid flexibility, climate change, energy security, optimal return on invested capital, and settling public concerns. Apart from highlighting the key challenges associated with nuclear energy and renewable energy sources while operating as independent power generation system, the present paper delineates the various aspects associated with integrated nuclear-renewable energy systems. It may be speculated that integrating nuclear energy and renewable energy into a single hybrid energy system, coupled through informatics linkages, would enable to overcome the demerits of these two carbon-free energy sources present while operating as independent power generation system.

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9 presentations-Topic: "Renewable Energy and Electric Power Engineering"

Session Chair: Prof. Hartmut Hinz

K0016 Presentation 2 (15:15~15:30)
The implications of household PV-battery systems for utilities in Thailand
Aksornchan Chaianong, A Bangviwat, and C Menke
The Joint Graduate School of Energy and Environment (JGSEE), King Mongkut's University of Technology Thonburi, Bangkok, Thailand

Abstract—Driven by decreasing PV and battery installation costs and mismatch between household demand and PV generation, household PV-battery systems are going to be deployed in the country and create significant implications for utilities in Thailand. This paper mainly discusses both negative and positive impacts of household PV-battery systems on Thai utilities. The use of household batteries (storing excess generation from PV during daytime and discharging it in the evening) can increase solar capacity values and energy values to power system, mitigate the problem of "duck curve" and decrease PV integration cost. Household customers can consume more PV electricity (increasing PV self-consumption ratio) from the inclusion of batteries. As a result, it leads to higher revenue losses and lower re-sale of exported electricity from PV to distribution utilities, while it is not the case for generation/transmission utilities since re-sale of exported electricity is only relevant to distribution power system and revenue losses of generation/transmission utilities remain unchanged. This is because with household batteries, the level of PV installation is the same (only shifting the consumption of household PV excess generation from daytime to evening). Therefore, it is necessary to precisely quantify each cost and benefit component in order to understand values of household batteries to the power system.

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K1005-A Presentation 3 (15:30~15:45)
Co-production of biodiesel and energy-dense biocrude from oleaginous yeast in a biorefinery model: A sustainable approach
Jayita Chopra and Ramkrishna Sen
Indian Institute of Technology Kharagpur, India

Abstract—The future energy demand necessitates exploration of sustainable and renewable energy routes. Oleaginous yeasts can serve as a potential feedstock for third generation biofuels as it can attain high cell density in a short span and can accumulate lipids up to 50 - 60 % of their dry cell weight. The present study attempts to produce biodiesel via in-situ transesterification of the intracellular yeast lipids with simultaneous production of biocrude, an energy dense biofuel precursor by hydrothermal liquefaction (HTL) of the residual yeast biomass in a biorefinery model. Glycerol, the by-product of biodiesel production was used as a co-solvent in the HTL process. Initially, a maximum biomass concentration of 20 ± 1.3 g/L with a lipid content of 56 ± 2 % w/w was achieved using an optimized media under nutrient limiting condition for the yeast Pichia guilliermondii. Almost 92 % of the lipids were transesterified to their corresponding fatty acid methyl esters (FAME). The composition of FAME was analyzed in a gas chromatograph and was found to be suitable for biodiesel production. The residual partially defatted biomass left after lipid extraction contained good amount of protein, carbohydrate and some polar lipids rendering it an attractive feedstock for HTL. The biocrude was characterized in a GC-MS and was found to be a mixture of esters, acids, aliphatic hydrocarbons and phenolics. It is of utmost importance to estimate the environmental impact of the biorefinery by a life-cycle assessment (LCA) study in order to answer the sustainability question and before implementing in a larger scale. The LCA study was performed using Sima-Pro software to determine the environmental impacts among the boundary conditions in a 'cradle to gate' inventory approach.

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K1007-A Presentation 4 (15:45~16:00)
Substitution effects of wind power in China：Evidence from comparison of coal-field power plants
Hui Li, Hongdian Jiang, Kangyin Dong
Beijing Institute of Technology, China

Abstract—As a clean and renewable energy source, wind power plays a significant role in green electricity transition in China. However, the environmental benefits gained from wind power as an alternative energy resources, which responds to China 13th Five Year Plan for Wind Energy Development are unclear. To provide references for wind power development plan, this study conducts a comparative analysis to investigate the lifecycle difference in environmental effects between wind power and coal-fired power. Then, the substitution effects caused by the growth of wind power are estimated based on emission reduction coefficients. Some key findings are summarized as follows: (1) Energy involved in the entire lifecycle of a wind farm with 49.5 megawatt of installed capacity reach 19 gce/kWh. In terms of energy payback time, wind power claims to be with 3.23 years by offering a net energy benefit within the remaining 16.77 years. From a lifecycle perspective, nearly 80% of energy are used in production and manufacturing, particularly in the use of steel and iron acquisition. Although the highest amount of pollutant emission is from production and manufacturing, the environmental costs of wind farm construction are close to that of production and manufacturing. (2) The emission of 1 kWh of electricity generated by coal-fired power exceeds that of wind power by 700g/kWh. Therefore, at the same lifecycle stage environmental costs per unit of electricity generated by coal are considerably higher than that of wind power. (3) The cumulative substitution amount of carbon dioxide emission reduction of wind power during the period of China's 12th Five Year Plan is estimated to less than 500 million tons, and is expected to reach more than 300 million tons by 2020. Finally, some provide policy implications are highlighted for Chinese government for promoting the growth in wind power industry.

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K5016 Presentation 5 (16:00~16:15)
Electrical Energy Demand in Rural India - A Case Study of Arunachal Pradesh and Uttar Pradesh
Anna-Kaarina Seppälä, N Gaihre and R Pereira
Technical University of Munich, Germany

Abstract—India currently has the biggest unelectrified population in the world. Renewable-based microgrids could provide a sustainable solution to providing universal energy access. However, the potential electricity demand in rural areas is unknown and hard to predict. This data is needed to analyse the purchasing power and potential market for microgrids, and to assess their success rate. This study surveyed 73 households in Arunachal Pradesh and Uttar Pradesh in India, to study the energy need in rural communities. The data shows that many unelectrified households are already using electrical appliances powered by small photovoltaic panels or batteries. The consumption is not income-generating but potential productive use cases are widely present. In Uttar Pradesh, small-scale microgrids are already providing homes with enough power for lighting and mobile chargers. An average unelectrified household was found to consume 2.48 kWhe monthly, and to spend | 155 on energy services. Villagers wish for more appliances and more power, and have the required finances to pay for it.

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K2075-A Presentation 6 (16:15~16:30)
A study on demonstration of gas supply using waste food biogas upgrading process
Hoseong Yoo，Sunmo Jeong, Gaehyun Nam, Juhyun Oh
Korea Gas Technology Corporation, Korea

Abstract—Fossil fuels are primary energy resource for mankind and it is used for all of industry. However, reserves of fossil fuels are limited and dramatically decreasing. Moreover, the emissions of fossil fuels are harmful to environment as they are the main air pollution sources. Hence, almost all countries are researching on alternative sources of energy.
Among renewable energy resources, biogas is one of potential fuel. It is carbon neutral fuel and eco-friendly fuel which is sustainable and clean. Biogas is consistently produced by anaerobic digestion of organic wastes. Biogas produced by anaerobic digestion of waste sludge is generally composed of CH4 (Methane) of 50 ~ 70% and CO2 (Carbon dioxide) of 40 ~ 50%. Although biogas has H2S(Hydrogen sulfide) and other impurities(Siloxane, moisture and etc), it can be energy resource by purification process. The biogas plant market is rapidly growing to 2020. Biogas plant is world-widely developed and operated about biogas purification process, but case of city scale is not enough researched.
Chungju-waste food bioenergy center is waste food to energy plant which can process 80 ton per day. Waste food to biogas plant is integrated with biogas upgrading system and CO2 recovery system to produce both bio-methane and liquid carbon dioxide. PSA(Pressure Swing Adsorption) and membrane process was used to biogas to bio-methane process. Upgraded biogas called Bio-methane which has above 90% of methane and under 10ppm of H2S.
In this study, Waste food biogas plant of city scale was demonstrated to gas supply.

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K2066 Presentation 7 (16:30~16:45)
Performance Evaluation of Low voltage DC Electronic Circuit Breaker
Dae-Won Chung, Geun-young Yoon
Honam University, Korea

Abstract—This paper presents the performance evaluation of low voltage DC electronic circuit breaker for being capable of carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short-circuit.
During the current interruption process the breaker opens causing a dynamic increase in its dielectric strength (a measure of a material's insulation strength or impedance). This causes the resistance of the circuit breaker to increase, which forces a large voltage to develop across the circuit breaker and helps to drive the fault current to zero. These devices are commonly used in power distribution systems (both DC and AC) of all sizes to ensure safety of personnel and plant equipment. Function of a circuit breaker during a fault can be illustrated by a bus to bus fault, where Vdc is the dc voltage source (a combination of generators and batteries), RS and LS represent the source impedance of the power source (resistance and inductance respectively), RL and LL represent the load resistance and inductance (both stray circuit effects and actual load), VB is the voltage across the breaker and I is the current flowing in the circuit. If a short circuit event occurs in this system, the impedance of the circuit is likely to be substantially reduced, and a large fault current can flow. During a fault, the magnitude of the current is only limited by the combined source and fault impedance.
While the interruption speed of a solid state circuit breaker is much faster than a conventional circuit breaker, one major disadvantage is high on-state losses compared to conventional electro-mechanical circuit breakers.
The performance evaluation of an electronic DC circuit breaker, interrupting principle of the DC power circuits, the topology, experimental and field test results as well as system validation with results are presented in this paper

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K2052 Presentation 8 (16:45~17:00)
Performance Evaluation of Low voltage DC Electronic Circuit Breaker
Dae-Won Chung, Geun-young Yoon
Honam University, Korea

Abstract—This paper presents the performance evaluation of low voltage DC electronic circuit breaker for being capable of carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short-circuit.
During the current interruption process the breaker opens causing a dynamic increase in its dielectric strength (a measure of a material's insulation strength or impedance). This causes the resistance of the circuit breaker to increase, which forces a large voltage to develop across the circuit breaker and helps to drive the fault current to zero. These devices are commonly used in power distribution systems (both DC and AC) of all sizes to ensure safety of personnel and plant equipment. Function of a circuit breaker during a fault can be illustrated by a bus to bus fault, where Vdc is the dc voltage source (a combination of generators and batteries), RS and LS represent the source impedance of the power source (resistance and inductance respectively), RL and LL represent the load resistance and inductance (both stray circuit effects and actual load), VB is the voltage across the breaker and I is the current flowing in the circuit. If a short circuit event occurs in this system, the impedance of the circuit is likely to be substantially reduced, and a large fault current can flow. During a fault, the magnitude of the current is only limited by the combined source and fault impedance.
While the interruption speed of a solid state circuit breaker is much faster than a conventional circuit breaker, one major disadvantage is high on-state losses compared to conventional electro-mechanical circuit breakers.
The performance evaluation of an electronic DC circuit breaker, interrupting principle of the DC power circuits, the topology, experimental and field test results as well as system validation with results are presented in this paper.

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9 presentations-Topic: “Renewable Energy and Electric Power Engineering”

Session Chair: Prof. Hartmut Hinz

K2087 Presentation 9 (17:00~17:15)
Analysis of Energy Consumption and Evaluation of Metric Parameters of Routing Protocols in Ad hoc (MANET) Networks using: NS2 Simulator
Anas MOUIZ, A Badri, A Baghdad and A Sahel
EEA & TI Laboratory, Hassan II University of Casablanca, Faculty of Sciences and Techniques (FSTM) , Morocco

Abstract—MANET networks represent a technological revolution in measurement instruments resulting from the convergence of miniaturized electronic systems and wireless communication systems. Despite the many advantages of wireless sensor networks in many areas, they have many problems such as managing the power consumption of mobile devices, selecting the routing protocol, limiting bandwidth and the shortest path. In order to guarantee a good quality of service, to ensure the routing of the information and to prolong the lifetime of the entire network, the analysis of the performances of the protocols is the main step to make before selecting a particular protocol. Therefore, the selected protocol should have the best results in terms of delivery and data integrity. Indeed, the purpose of our experiments is to examine and quantify the effects of various factors and their interactions on the overall performance of ad hoc networks. This article presents a performance analysis of three types of routing protocols namely, OLSR, TORA, and ZRP, which are evaluated and simulated according to a well-defined scenario using the NS2 simulator. The results of the simulation give a better performance of the protocols studied according to the packet delivery rate, the average end-to-end delay, and the throughput.

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8 presentations-Topic: "Biomass Resources and Bioenergy"

Session Chair: Prof. Makarand Madhao Ghangrekar

K5043-A Presentation 1 (15:00~15:15)
Buoy-bead flotation harvesting of the microalgae Chlorella vulgaris using sodium borosilicate microsphere coated with moringa seed: A novel approach
Hao Wen, Xiaotong Zou, Kaiwei Xu, Yanpeng Li
Chang'an University, Xi'an, P. R. China

Abstract—With the continuous improvement of people's living standard, the demand for energy, foods, medicines and many other products is increasing. Microalgae products have attracted lots of attention from researchers due to lower cost and easy cultivation conditions. Chlorella vulgaris is one of the most common energy microalgae with high oil content (>20%), which is also rich in protein, amino acid, unsaturated fatty acid, vitamin can be used for foodstuff, fodder and cosmetics et al. However, the difficulties of algae harvesting have limited the development of algae industry. Flotation is considered as one of the most suitable methods for the large-scale industrial production in collecting energy microalgae. But traditional air flotation method needs surfactant and high energy consumption to supply bubbles. To improve microalgae harvesting efficiency and to reduce the energy consumption and addition of surfactant in the flotation process, a novel buoy-bead flotation approach has been developed for harvesting efficiency using low density microspheres instead of bubbles as carrier to harvest Chlorella vulgaris. The microsphere is made up by sodium borosilicate, the harvesting efficiency could be 64.24%, which can be further increased to 91.1% after coating with moringa seeds extract (MCMSE) at 1.1g/L MCMSE concentration. This is due to the moringa seeds extract can change the microsphere from hydrophilic to hydrophobic, at the same time, moringa seeds extract contains flocculating active substances that lead to microalgae flocculate partly, which can attach to the surface of microsphere in floc instead of single microalgae. Proteins on the surface of the microsphere will inlays with the cell membrane of the microalgae, forming the aggregate between microsphere and microalgae.

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8 presentations-Topic: "Biomass Resources and Bioenergy"

Session Chair: Prof. Makarand Madhao Ghangrekar

K0009-A Presentation 2 (15:15~15:30)
An integrated process for high-density microalgal cultivation and rapid harvesting in pilot-scale photobioreactors
Arun Kumar Mehta, Subhabrata Ray, Gargi Das, Saikat Chakraborty
IIT KHARAGPUR, India

Abstract—The potential of microalgae to support the sustainable availability of algal biofuels and high-value co-products depends on an energy-efficient, cost-effective and scalable process of algal cultivation, rapid harvesting, and recycling of harvested broth.
In this study, microalgae C. sorokiniana was cultivated mixotrophically in the TAP medium using Tris and NH4Cl in a 25 L bubble column PBR at light intensities of 5600, 11000, and 14000 lux and photoperiod of 18:6 (Light: Dark). The reactor was operated in the
semi-batch mode for 138 h, with constant air-flowrate of 2.5 lpm mixed with varying concentrations of CO2 ranging from 0.04% (atmospheric) to 4%. Our experiments show that Tris increases the absorption of CO2 in a culture medium in comparison to NH4Cl. 2% CO2 with Tris was found to be optimum for mixotrophic growth with acetic acid. The optimum light intensity was found to be 11000 lux, above which photo-saturation sets in. Under optimized conditions of 2% CO2 at 11000 lux, the highest biomass yield, total chlorophyll content and final productivity were obtained as 4.20 g/l, 73.30 μg/ml, and 0.67 g/l/day respectively, and the lipid, protein, and carbohydrate contents were 28.73, 50.56, and 7.5 w/w %, respectively. The dissolved oxygen, carbon dioxide and hydrogen ions concentrations, and temperature oscillate in time. FAME analysis confirmed the suitability of the selected strain for biodiesel production.
A rapid, cost-effective harvesting process was developed to harvest the algal biomass with 98% efficiency in 20 min at the cost of $0.065 per kg of dry algal biomass. The harvested broth was recycled multiple times with similar result as obtained using fresh media. This integrated process of high density algal culture followed by rapid, cost-effective harvesting and multiple media recycling offers a promising, scalable and cost-effective technology.

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8 presentations-Topic: "Biomass Resources and Bioenergy"

Session Chair: Prof. Makarand Madhao Ghangrekar

K5046-A Presentation 3 (15:30~15:45)
Efficient harvesting of microalgae utilizing heat-aided air floatation method by response surface methodology
Xiaotong Zou, Kaiwei Xu, Hao Wen, Yanpeng Li
Chang'an University, Xi'an, P. R. China; Ministry of Education, Xi'an 710054, P.R. China

Abstract—Heat-aided pre-flocculation for air flotation is an efficient, cost-effective and environmentally friendly technology for harvesting microalgae biomass. However, the mechanism and optimal conditions of this method remain unclear. In this study, a series of characterization measurements such as FI-TR spectra analyze, Zeta potential, SEM observation, hydrophobic test, were performed to explore the surface properties of these two strains microalgae before and after heating pre-flocculation. The results of FI-TR spectra showed that the heat-aided pretreatment affected the structures of carbohydrates, lipid and protein, and broke down carbon chains of microalgae cell surface into shorter parts. Therefore, the properties of microalgae cell surface can be changed, resulting in the decrease of the microalgae zeta potential absolute values. The hydrophobic test indicated that there was a negative correlation between the absolute values of zeta potential and hydrophobicity efficiencies. With the increase of temperature, the homocharge of microalgae cells decreased, causing that the electrostatic repulsion between cells weakened. The aggregation of microalgae resulted in partial compression of protein molecules at the interface. Compared with C. vulgaris, heat-aided pre-flocculation had a more significant influence on cell surface properties (zeta potential and hydrophobicity) of S. obliquus. Therefore, S. obliquus is more suitable for this harvesting method. In addition, Plackett-Burman design was used to screen the relative importance of key design and operational factors (temperature, agitation speed, flotation time, microalgae concentration and pH value) on the harvesting efficiency. Based on the results of Plackett-Burman design, suggesting that the most significant factors included temperature, agitation speed and flotation time. Box-Behnken design was used to optimize the heat-aided flotation process. The highest harvesting efficiency (about 91.96%) of S. obliquus was achieved at 70℃, 1412 rpm and 13.36 min.

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Session Chair: Prof. Makarand Madhao Ghangrekar

K0008-A Presentation 4 (15:45~16:00)
Temporal Oscillations Enhance Bioethanol Production from Lignocellulosic Sunn Hemp Fibres in Batch Reactors
Souvik K. Paul and Saikat Chakraborty
Indian Institute of Technology Kharagpur, India

Abstract—This work uses Sunn hemp fibre – a new non-food lignocellulosic energy crop, containing cellulose (75.6%), hemicelluloses (10.05%) and lignin (10.32%) – for ionic liquid mediated catalytic hydrolysis in second generation bioethanol production. Biological self-assembly renders the cellulose polymers in plant cell walls resistant to deconstruction to monomeric sugars. Using Sunn hemp fibre as cellulose-rich crystalline lignocellulosic biomass, we experimentally demonstrate how to employ non-equilibrium dissipative chemical structures formed via autocatalytic pathways to rapidly rupture its glycosidic bonds and significantly enhance lignocellulosic biofuel production.
The experiments are carried out with 150 mg of Sunn hemp fibre and 3 gm of [Bmim]Cl in 15 ml glass vials heated in a temperature-controlled oil bath at 110 ℃, and the contents in the vials are mixed with a magnetic stirrer. The cross- catalyst water is added at a rate of 25-75 μl/gm of ionic liquid/h. Chaotic temporal oscillations with fractal dimensions and positive Lyapunov exponents appear at water addition rates ranging from 25 to 42.8 μl/gm of ionic liquid/h for all the product concentrations – glucose, fructose, HMF, Levulinic Acid (LA) and Formic Acid (FA). The addition of 37.5 μl water /gm of ionic liquid/h maximizes product concentrations at 5 hrs with the peak non-equilibrium yields being 69%, 12.6% and 5% for glucose, LA and FA, respectively. Maximum HMF yield of 4.7% is observed at 5 hours for 28.33 μl/gm/h water addition. We show that any further increase in water (cross-catalyst) concentration leads to the disappearance of the temporal oscillations and the onset of equilibrium. The equilibrium yields of glucose, HMF, LA and FA decrease by 9%, 0.5%, 9%, 3.6%, respectively, at water addition rates of 45 μl/gm/h compared to their non-equilibrium yields at 37.5 μl water/gm/h. A maximum bioethanol yield of 30.4% is obtained from microbial fermentation of glucose at 30 ℃ and 40 RPM.

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8 presentations-Topic: "Biomass Resources and Bioenergy"

Session Chair: Prof. Makarand Madhao Ghangrekar

K2081-A Presentation 5 (16:00~16:15)
Investigation the Synthesis of Biodiesel in a Magnetically Driven Reactor
Rachel Murphy, Brian Murphy, J.J. Leahy, Fernando M.F. Rhen
University of Limerick, Ireland

Abstract—Depleting fossil fuel resources and the challenge of achieving acceptable biodiesel yields of greater than 96.5 % (EN 14214) has resulted in the interest of development new experimental biodiesel reactors. One such reactor operating by the use of semi-discontinuous magnetic fields to drive magnetic elements is studied in this work. The
chemical reaction to produce biodiesel involves reacting triglyceride and methanol in the presence of homogeneous catalyst. Immiscibility of the triglyceride and methanol phases necessitates the formation of an emulsion before conversion to biodiesel is possible. The initial slow reaction stage, in which an emulsion is developed, is referred to in the literature as the "mass transfer limited" regime. The emulsion established in the mass transfer limited stage is studied as a function of mixing time and stoichiometric ratio of methanol. Emulsion characterization was performed by means of droplet size distribution analysis where the distribution within a 1 mm3 sample was measured using dark-field imaging. A lognormal distribution was found to best fit the experimental data; for a 6:1 molar ratio of methanol to triglyceride, the lognormal distribution has a typical median value of 9 m with a 2 m standard deviation regardless of mixing time. These results indicate that the equilibrium droplet size distribution is established within a few seconds of mixing time. We use this characterization for estimation of the Gibbs free energy of formation for the emulsion as a function of mixing time and methanol stoichiometric ratio. The Gibbs free energy is correlated with conversion to biodiesel, with respect to the theoretical yield.

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K5047-A Presentation 6 (16:15~16:30)
Different temperature cultivation of microalgae with municipal wastewater for simultaneous nutrient removal and biomass production
Kaiwei Xu, Xiaotong Zou, Hao Wen, Yanpeng Li
Chang'an University, Xi'an, P. R. China; Ministry of Education, Xi'an, P.R. China

Abstract—The production of biodiesel from microalgae cultivation in wastewater has received considerable interest in recent years due to its adaptability and sustainability. In present study, Chlorella vulgaris was cultured in municipal wastewater for simultaneous nutrient removal and biomass production. Under different temperature conditions (high temperature, low temperature, high-low temperature), followed by 12h:12h LD cycles the result showed the highest lipid productivity and dry well weight were 81.4 mg L-1 d-1 and 30.4 mg L-1 d-1 in the high temperature, and most efficient nutrient removals (89.5% COD, 92.4% TN, 89.5% TP) in the high-low temperature. This suggests a feasible way to remove the high nutrient of municipal wastewater with the algal biomass.

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K2050-A Presentation 7 (16:30~16:45)

A comparison between microalgae *Microchloropsis gaditana* and *Pseudochloris wilhelmii* cultivated in oil refinery wastewater from the perspective of biodiesel production

Andrea Budiša, Ines Haberle, **Lucija Konjević**, Maria Blažina, Tamara Djakovac, Biserka Lukarić Špalj and Enis Hrustić

Ruđer Bošković Institute,Croatia, INA d.d.,Croatia

Abstract—Nanoeukaryotic marine algae Microchloropsis gaditana and Pseudochloris wilhelmii were compared from the perspective of lipid production as a source of biodiesel according to their growth properties in 50% oil refinery wastewater at 18°C and 80 μmol photon m-2 s-1. P. wilhelmii grew faster in the exponential phase but after 10 days of growth produced less lipids in biomass (35.5%) than M. gaditana (40.6%). Total lipid yields between the species were similar, whilst both produced fatty acid methyl esters feedstock of somewhat higher quality in lag phase. M. gaditana also showed significantly lower need on phosphorus for the build-up of biomass. This might be an interesting feature for lowering the total costs of biomass production with a high content of lipids of suitable quality for biodiesel production.

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K0010-A Presentation 8 (16:45~17:00)
Microalgal biomass as a sustainable energy source for biodiesel production through biorefinery approach
Srijoni Banerjee and Debabrata Das
Indian Institute of Technology, India

Abstract—In recent years, increasing consumption of conventional energy has caused serious concerns about energy security and environmental degradation. Third generation biofuel production from microalgae has been gaining new dimension in recent years with the focus of the world community to produce biomass and biofuel in a sustainable way without effecting the food chain and existing ecosystem. Microalgal biomass can provide a clean, reliable and secure energy source. CO2 produced from biodiesel burning can be sequestered by microalgae for their growth, which makes microalgal biodiesel production a carbon neutral process. Biodiesel can be produced from microalgal biomass by a sustainable biorefinery approach. Algal biorefinery approach has emerged as a promising concept to explore the possibility of producing more than one product. For commercialization of microalgal biodiesel production positive energy balance, environmental impact assessment of the process and cost analysis are required. Fresh water grown algae Neochloris oleoabundans UTEX 1185 is considered as a potential source for biodiesel production. 52.5% w/w lipid content was achieved from Neochloris oleoabundans UTEX 1185 pretreated wet biomass. 83% of the total lipid was converted into triacylglycerol (TAG) by transesterification reaction using Fe-nanocatalyst. TAG is the main component of biodiesel. FAME analysis and fuel properties indicated suitability of algal lipid for biodiesel production. The energy content the microalgal biodiesel was found to be 8553 ± 56.2 cal/g which is higher than microalgal biomass feedstock (4471.2 ± 95.1 cal/g). 20.2% w/w of carbohydrate present in lipid extracted microalgal biomass can be converted into bioethanol and syngas. ASPEN Plus was used for overall process simulation of biodiesel production from Neochloris oleoabundans UTEX 1185. Cost estimation from the Aspen Process Economic Analyzer (APEA) and environmental impact assessment were also carried out. So, biodiesel production from biomass has a great promise as an alternative energy source for the future.

Session 3

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala Giulio Natta

6 presentations-Topic: “Geosciences and Geology”

Session Chair: Assoc. Prof. Rohit Srivastava

K8009-A Presentation 1 (10:30~10:45)
Variability of Temporal Distribution of Earthquakes
Aleksandre Sborshchikovi, Teimuraz Matcharashvili, Tamaz Chelidze, Natalia Zhukova, Ekaterina Mepharidze
Ivane Javakhishvili Tbilisi State University M Nodia Institute of Geophysics, Georgia

Abstract—In the present research a statistical feature of the temporal distribution of earthquakes of world catalogues was investigated. This process is regarded as one of the most important tasks of geophysics. We could not reach progress in forecasting earthquakes without understanding of how earthquakes' are distributed in time. That is why this question is one of the most important questions in geophysics and many researchers are studying them. As a main data analysis tool, in this research we used simple statistical approach based on the calculation of waiting times (WT) from the time distribution of regular markers. With the help of this method we would like to answer the question of how and when the process of earthquakes time distribution approaches to randomness. To answer this question we use statistical and dynamical, linear and nonlinear analysis methods were carry out.We preferred to develop WT method for not the perfect quality and short seismic data sets which we planned to analyze in this research. We have proceeded to the analysis of earthquakes temporal distribution in different earthquake catalogues. Analysis was carried out for different sub-periods and at different magnitude thresholds. It was found that the process of earthquakes’ time distribution becomes most random-like in periods of relatively decreased local seismic activity. We should mention that the extent of randomness never reaches its maximum in periods immediately prior to strongest earthquakes. Many scientists still regard seismic process as completely random, changes in dynamic structure of which can not be quantified. But our finding of variability of degree of an order in the temporal distribution of earthquakes has of immense importance.
Acknowledgements. This work was supported by Shota Rustaveli National Science Foundation (SRNSF), grant 217838 “Investigation of dynamics of earthquake’s temporal distribution”.

Session 3

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Time: 10:30~12:00

Venue: Sala Giulio Natta

6 presentations-Topic: “Geosciences and Geology”

Session Chair: Assoc. Prof. Rohit Srivastava

K5017-A Presentation 2 (10:45~11:00)
Developing regional clusters to assess flash flood risk and potential actions
Attila Buzási
Budapest University of Technology and Economics

Abstract—Changing climatic patterns through increasing frequency of heat waves and exacerbating precipitation patterns cause harmful effect on built-up environment, society and economic sectors as well. Hungarian settlements are facing negative effects regarding climate change because of their environmental and geographical features in the Carpathian basin. Settlements from all over the country recently turning to develop their own climate strategies and future sustainability plans, therefore adaptation to extreme weather events is a cornerstone of their long-term development patterns. Present research is focusing on assessing flash flood risk of meso-regions (LAU-1 scale) in order to determine the best development action to reduce the risk. For this reason, mathematical-statistical methods are revised to classify LAU-1 units in a glance of extreme weather events. Socio-economic and environmental data are collected from publicly available datasets of the Hungarian Statistical Office due to data availability and comparability. The main aim of present paper is to determine clusters of LAU-1 units with regards to their socio-economic indicators and flash flood risk, moreover to distinguish as accurate development actions to reduce this risk as possible. Outcome of the research is applicable during disaster recovery activities with a strong focus on socio-economic assets, climate vulnerability and future liveability. Summarising, a theoretical-oriented methodology selection and cluster-analysis sections are followed by a strongly practice-centred one with a dedicated aim of future feasibility of the results and conclusion.
The research reported in this paper was supported by the Higher Education Excellence Program of the Ministry of Human Capacities in the frame of the Water sciences & Disaster Prevention research area of the Budapest University of Technology and Economics (BME FIKP-V ÍZ).

Session 3

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala Giulio Natta

6 presentations-Topic: "Geosciences and Geology"

Session Chair: Assoc. Prof. Rohit Srivastava

K8014-A Presentation 3 (11:00~11:15)
Analysis of acoustic emission of forced stick-slip process
Ekaterine Mepharidze, Teimuraz Matcharashvili, Tamaz Chelidze, Natalia Zhukova, Aleksandre Sborshchikovi
Ivane Javakhishvili Tbilisi State University M. Nodia Institute of Geophysics, Georgia

Abstract—In the present research the results of analysis of inter Acoustic Emission (AE) events time interval sequences data sets recorded from slider-spring laboratory set up of stick-slip process under mechanical and electromagnetic periodic forcing were investigated. Our experiment model represents a system of two horizontally oriented saw-cut basalt plates of a complex phenomenon of mass and energy transfer between two surfaces through elastic and inelastic interactions of macroscopic, micro and nano contacts. Acoustic Emission laboratory stick-slip experiments have carried out and investigated under different conditions: three types of stiffness of driving spring (235, 555 and 1700) in the frequency range 5-120 Hz for different voltages applied to a vibrator, (inter AE events time interval sequences were carry out under external mechanical forcing intensity). According laboratory experiments results stick-slip regime was observed at relatively low velocities of movement and at low stiffness. Under higher velocity the transition to inertial periodic oscillations occurs, that was shown the stable sliding with small fluctuations. External force evokes the phase change in dynamical features of stick-slip process. Several statistical and dynamical, linear and nonlinear analysis of AE waiting time data sets were carriy out. For self-similarity analysis were used DFA (Detrend Fluctuation Analysis) methods, Kullback–Leibler Divergence (KLD) methods represent non-symmetric measure of the difference between two probability distributions, Hilbert-Huang Transform (HHT) – is a method of EMD empirical mode decomposition with added noise on IMF – intrinsic mode function for obtaining of instantaneous frequencies, Recurrence Quantification Analysis were carriy out for investigation dynamical structure of complex system. Such processes can be observed in different natural and technical systems, which are subject of intense interdisciplinary investigations.

Session 3

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala Giulio Natta

6 presentations-Topic: "Geosciences and Geology"

Session Chair: Assoc. Prof. Rohit Srivastava

K0002-A Presentation 4 (11:15~11:30)
Effect of thermal pre-treatment on breakage characteristics of limestone
Rohan Bisai, Pal S. K. and Satya Prakash Sahu
Indian Institute of Technology Kharagpur, India

Abstract—Temperature variation is one of the primary factors influencing the physical properties of rocks. The samples were subject to varying duration of immersion in liquid nitrogen (LIN), microwave treatment and measured for their UTS and UCS at normal temperature in an UTM. Combined pre-treatment with microwave treatment followed by dipping in LIN were also explored. The results indicate that the thermal treatment can reduce the energy requirement for crushing of limestone significantly. Studies suggest that as a result of pretreatment the strength of rock decreased and the rate of breakage of rock increased due to the physical property changes of rock.

Mineral processing is the process of separating valuable minerals from gangue. In comminution processes a significant proportion of the input energy is used for crushing and grinding. Presently the average energy efficiency in a comminution process is something below 5 per cent. This calls for urgent development of an alternative way which is capable of meeting long-pending goal of improvement of energy efficiency in comminution operation. Several methods for pre-treatment of rocks are being investigated all over the world for improving the energy efficiency in comminution processes. These include microwave heating, high voltage pulse breakage and thermal breakage etc. If the operations are done in mineral processing plant under thermal condition including microwave treatment, cryogenic treatment using liquid nitrogen then maybe there are some changes in energy required section due to the changing of physical properties of rock. So a proper treatment of rock through temperature variation may be investigated to reduce the required energy for comminution. Scanning electron microscope (SEM) test was also used to measure the surface micro cracks of rock samples before and after pre-treatment. The results can be analyzed to deduce the influence of heat treatment on the breakage characteristics of the rock.

Session 3

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala Giulio Natta

6 presentations-Topic: “Geosciences and Geology”

Session Chair: Assoc. Prof. Rohit Srivastava

K2067-A Presentation 5 (11:30~11:45)
Fractal Features of the Porous Structure in the matrix-pore type Carbonate Reservoirs
Shanglin Yao, Mei Wu, Hong'en Dou
Research Institute of Petroleum Exploration and Development, PetroChina, China

Abstract—The pore space of the reservoir rock has good fractal features, and the fractal dimension of the porous structure can be used to describe the complexity of the porous structure quantitatively. Based on the fractal geometry theory, in combination with capillary pressure data of the carbonate rock measured by the constant-rate mercury injection test, this paper develops the mathematical model which can help us calculate the fractal dimension of the core. The calculation results show that, the fractal dimension of the porous structure calculated by this model can better reflect the actual porous structure of the carbonate reservoir. The bigger the fractal dimension of the carbonate core, the weaker the heterogeneity of the micro porous structure, and the smaller the core permeability. The larger the displacement pressure, the smaller the corresponding maximum radius of the connected throat radius, indicating that the proportion of large pore throat decreases, and the worse the porous structures.

Session 3

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Time: 10:30~12:00

Venue: Sala Giulio Natta

6 presentations-Topic: “Geosciences and Geology”

Session Chair: Assoc. Prof. Rohit Srivastava

K5018-A Presentation 6 (11:45~12:00)
Effect of temperature on the geological sequestration of CO2 in a layered carbonate formation
Ram Kumar, S. W. Campbell and J. A. Cunningham
University of South Florida, Tampa, USA

Abstract—Geological sequestration of CO2 is one of the most promising technologies for large-scale CO2 mitigation. To assess the suitability of a potential CO2 storage site, we must understand the thermodynamics and kinetics of the CO2-brine-rock system under the relevant conditions. Temperature plays significant role in geochemistry. It also alters phase equilibria in a multicomponent system and has ability to impact the reactive transport processes in the conditions of geological carbon storage. In this study, we have assessed the effect of formation temperature on geological storage in a heterogeneous carbonate formation. The objectives of the numerical study are to quantitatively estimate the effect of temperature on 1) storage efficiency; 2) solubility trapping of CO2 3) change in pH of residual brine; 4) changes in the mineralogy and porosity.
Using TOUGHREACT 3.3 (a reactive transport simulator), we have estimated the changes in physical and chemical properties of a layered carbonate formation as a function of temperature.Mineralogy and physical properties of the aquifer are based on the Dollar Bay formation, a limestone dolomitic aquifer located within the South Florida Basin. We ran simulations for seven values of temperature, 35, 45, 55, 65, 75, 85 and 95 ℃.
Results from the study suggest that density of CO2 decreases with increase in temperature which leads to higher buoyancy at elevated temperatures. Therefore, storage efficiency of the aquifer decreases as temperature increases. For instance, an increase in temperature from 35 to 95 ℃ results in 62% decrease in storage efficiency. However, solubility trapping of CO2 increases with increase in temperature. After the simulation period, pH drop was slightly more in case of higher temperature conditions. Temperature effect on porosity change was minimal and non-significant.
The study can be helpful in screening a reservoir for geological carbon storage based on initial formation temperature.

Session 4

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala riunioni Lombardi

6 presentations-Topic: "Electrochemistry and Chemical Engineering"

Session Chair: Prof. Hartmut Hinz

K0025-A Presentation 1 (10:30~10:45)
Green synthesis of silver nanoparticles from Carica papaya leaves as cathode catalyst to enhance the performance of microbial fuel cell
Aswani K Viswanath, G. D. Bhowmick, **Makarand Madhao Ghangrekar,** A. Mitra
Indian Institute of Technology Kharagpur, India

Abstract—In the present world where depletion of non-renewable resources and global warming poses a significant threat to the existence of all living species, the need to develop clean and renewable energy sources cannot be understated anymore. One of the noblest researches that had been going on in the recent decades, is to liberate usable energy from organic wastewater by treating it simultaneously using Microbial Fuel Cell (MFC) technology. It utilizes the capacity of micro-organisms to breakdown the macromolecules in wastewater, thereby purifying it, while releasing utilizable energy from it in the form of electricity. Though one of the major challenge for the practical applications of MFC, is finding a suitable catalyst for the efficient oxygen reduction reaction (ORR) at the cathodic side. In the present study, silver (Ag) nanoparticles are extracted from Carica papaya leaves by green synthesis and this extracted Ag nanoparticles are used as a potential ORR cathode catalyst, under loading rate of 2 mg.cm−2 of cathode surface area, to enhance the performance of the MFC. Characterisation of the obtained Ag nanoparticles by green synthesis was done by Scanning electron microscopy–energy dispersive X-ray spectrometry (SEM–EDX) analysis, Fourier transform infrared (FTIR) analysis, Transmission electron microscopy (TEM) and X-ray diffraction (XRD) analysis of Ag nanoparticles. The results of MFC with Ag nanoparticles as cathode catalyst was compared with the MFC without any cathode catalyst (control MFC). A maximum power density of 10.18 W.m-3 was obtained in MFC with Ag nanoparticle as cathode catalyst, which was almost twice as that of MFC without catalyst (4.68 W.m-3). Also, the MFC with catalyst exhibited a coulombic efficiency of 32 % which was considerably higher than control MFC. This study demonstrated the application of Ag nanoparticle extracted by green synthesis as an excellent ORR catalyst for MFC technology for its field scale real life applications.

Session 4

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala riunioni Lombardi

6 presentations-Topic: “Electrochemistry and Chemical Engineering”

Session Chair: Prof. Hartmut Hinz

K2070-A Presentation 2 (10:45~11:00)
Electrospun carbon nanofibers with macropores opening on the surfaces for high-performance Li-O2 battery cathode
Hieu Trung Bui, Do Youb Kim, Jungdon Suk, Dong Wook Kim, Yongku Kang
Department of Advanced Materials and Chemical Engineering, Korea University of Science and Technology, Korea

Abstract—A template and electrospinning synthesis method was developed to generate macropores inside carbon nanofibers (MCNF) with surface openings for Li-O2 battery cathode. The process involved electrospinning a mixture of polyacrylonitrile (PAN) and cross-linked polystyrene (PS) colloids. During carbonization of electrospun PAN-PS nanofibers, the PS template decomposed and opening-macropores were created inside the CNF which might provide more sites for Li-O2 reaction. Subsequently, the MCNF mats could be directly used as the Li-O2 battery cathode without any binders. The electrochemical performance of the MCNF such as discharge capacity, cyclability and O2 efficiency were examined. The Li-O2 cell using the MCNF cathode exhibited much higher specific discharge capacity of 9000 mAh g-1 than a cell using the CNF cathode (4000 mAh g-1) at a current density of 200 mA g-1. Unexpectedly, the cell with MCNF cathode could maintain for 260 cycles at current density of 500 mA g-1 and cut-off specific capacity of 1000 mAh g-1. Furthermore, Pt nanowires was deposited onto MCNF via the formic acid reduction method (denoted as PtNW_MCNF). We found that the PtNR decorated on the surface of the MCNF resulted in the formation of poorly crystalline Li2O2 layer on the PtNR-MCNF cathode, which reduced the discharge and charge overpotentials. These results suggest a convenient and efficient way to improve the potential application of the carbon nanofiber as cathode for Li-O2 battery.

Session 4

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala riunioni Lombardi

6 presentations-Topic: “Electrochemistry and Chemical Engineering”

Session Chair: Prof. Hartmut Hinz

K2054-A Presentation 3 (11:00~11:15)
Wireless sensors Powered by Disposable Paper based Microbial fuel cells
Ramya Veerubhotla, Sudip Nag, Debabrata Das
IIT Kharagpur, India

Abstract—Microbial fuel cells (MFCs) harness the chemical energy present in the wastewater in the form of bioelectricity using electrogenic bacteria. When such devices are integrated onto a paper platform, it confers advantages such as flexibility, versatility, disposability and ease of scale-up. In this study, we demonstrate a unique paper based microbial fuel cell which yields a power density of 25 W/m3 using Shewanella putrefaciens as the biocatalyst. This environment friendly bio-battery deploys carbon based paper electrodes and it does not contain any expensive membranes. The device instantly generates an OCV of 0.6 V and a current of 40 μA when as low as 400 μL of bacterial culture is injected. However, various point-of-care diagnostic devices and wireless sensors need power supply in the range of few hundred μW to mW to function. Although, multiple devices can be stacked to boost the power output, translating the research to power practical applications would require a customized Power Management System (PMS) to boost, store and deliver power. Hence, this study, illustrates the use of an MPPT coupled DC-DC booster in conjunction with a stack of paper based microbial fuel cells to power a temperature sensor and transmit the signal wirelessly to a mobile phone. The PMS stores the charge into a super capacitor and it was solely used to drive the wireless sensor. We envisage that such systems can be used as an eco-friendly alternate to batteries to sustain portable power needs of various sensors in resource limited settings.

Session 4

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala riunioni Lombardi

6 presentations-Topic: “Electrochemistry and Chemical Engineering”

Session Chair: Prof. Hartmut Hinz

K2077-A Presentation 4 (11:15~11:30)
Degradation in mechanical properties of LDPE in simulated aquatic environment
Ved Prakash Ranjan, Dr. Sudha Goel
IIT Kharagpur, Civil Engineering Department, West Bengal, India

Abstract—The occurrence of plastic particles in the aquatic environment has been increasing in the past several years. Plastics are a common and persistent problem in the sea, beaches, and marine environment and act as carriers of persistent organic pollutants due to their hydrophobic nature. Microplastics are formed after deterioration and degradation of larger plastic materials. Most studies regarding the degradation of different type of plastics materials have been conducted under natural or accelerated weathering conditions but there is no clarity about the impact of individual factors on the degradation of plastics. In this study, LDPE strips were exposed to UV irradiation in two different salt solutions of ionic strength 0.6M (similar to seawater), 0.017M (similar to potable water), and salt solution with zero salinity (double distilled water) for different periods of time (7, 15, 40 days). Changes in mechanical properties of LDPE strips were analyzed using a universal testing machine (UTM). Tensile strength, percentage elongation, load at break and Young’s modulus of sample were measured at different time intervals. Initial tensile strength of unexposed LDPE strip was found to be 23.8 N/mm2, while after 40 days of exposure the tensile strength of LDPE strip in zero salinity, salt solution of ionic strength 0.017 M, and salt solution of ionic strength 0.6 M were found to be 10.53, 18.74 and 20.9 N/mm2, respectively. Reduction in tensile strength shows that mechanical properties deteriorated as the medium changes from high ionic strength solution to no ionic strength solution. In addition, it shows that deionized water is more aggressive than either tap water or saline water.

Session 4

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Time: 10:30~12:00

Venue: Sala riunioni Lombardi

6 presentations-Topic: “Electrochemistry and Chemical Engineering”

Session Chair: Prof. Hartmut Hinz

K2048-A Presentation 5 (11:30~11:45)
Cooling performance improvement of hot stamping tool for patchwork blank
Sungho Yun, Junho Kwon, Kang Sub Song, Hyun Ho Shin and Yongchan Kim
Korea University, Seoul, Korea

Abstract—Hot stamping is a light-weight technology to reduce the weight by decreasing the thickness as increasing the strength of the boron steel. In hot stamping for a patchwork blank, the patch requires higher cooling capacity than the blank in order to improve the cooling performance because the thicker patch cools slower than the blank. In this study, a mixed cooling channel (MCC) type is proposed in order to improve the cooling performance of the hot stamping die for the patchwork blank. The cooling performance of the MCC type is compared with that of conventional types such as the straight cooling channel (SCC) type and the conformal cooling channel (CCC) type. Transient thermo-fluid simulations including three domains of the hot stamping die, patchwork blank, and cooling channel are carried out. As a result, the mass flow rate ratio in the MCC type of 10% shows optimum value owing to the highest cooling capacity and the lowest average temperature of the working surface. Moreover, at the same mass flow rate condition, the cooling capacity of the MCC type shows 9.7% higher than that of the SCC type and 5.0% higher than that of the CCC type.

Session 4

Morning, February 14 (Thursday)

Time: 10:30~12:00

Venue: Sala riunioni Lombardi

6 presentations-Topic: “Electrochemistry and Chemical Engineering”

Session Chair: Prof. Hartmut Hinz

K0013 Presentation 6 (11:45~12:00)
The Effect of growth rate on free-standing GaN substrates homoepitaxy by metal-organic vapor phase epitaxy
Tsung-Yen Liu, Shih-Ming Huang, Joseph Tung-Chieh Chang, Wen-Jung Chuang, Ken-Chuan Lu, Chieh-Hsiung Kuan1 and Ray-Ming Lin
Graduate Institute of Photonics and Optoelectronics, National Taiwan University, Taiwan

Abstract—The effects on thin film surface morphology of growth rate condition on freestanding GaN substrates were investigated. GaN/GaN homojunction epitaxy was grown via metal-organic vapor phase epitaxy (MOVPE) and GaN substrates were fabricated by laser liftoff of a 430um thick film grown by hydride vapor phase epitaxy (HVPE). Using three growth rate conditions 1.5um/hr, 3um/hr, and 4um/hr to grow 3um thick GaN, for every 1um thick increase, the surface morphology will be recorded by the optical microscope, full width at half maximum (FWHM) data by x-ray diffractometer (XRD) and Raman shift. The optical microscope picture shows that at 3um/hr growth rate there has been the smoothest surface morphology and when growing to 2um, thick GaN the symmetric (002) FWHM was reduced 50.4arcsecwhile asymmetric (102) was reduced 18arcsec than free-standing GaN substrate before epitaxy, respectively. And using three conditions to measure the same Raman shift means these conditions will not produce different strain inside but some compress strain comparing with free-standing GaN substrates.

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K0022 Presentation 1 (13:15~13:30)
Studies on a solar assisted CO2 based trigeneration system for milk processing: Performance comparison between throttle valve and ejector expansion valve
V Ravindra, M Ramgopal
Indian Institute of Technology, Kharagpur, India

Abstract—In this study, a transcritical CO2 based solar assisted trigeneration system for a dairy farm is analyzed. Performance comparison is made between an ejector based system (C1) and a conventional throttle valve based system (C2). A mathematical model of the system operating under steady state conditions is developed in Engineering Equation Solver (EES). The results are presented based on the consideration that the evaporator load for chilling of milk exactly matches with heating load in the process heat exchanger for pasteurization of milk. A parabolic trough collector is assumed to be used to heat the working fluid and an auxiliary heater is used to supplement the solar heat. The operating parameters are adjusted in such a manner that net power produced is always positive. The effects of turbine inlet temperature, ambient temperature, turbine inlet pressure and process heat exchanger pressure on overall COP, cooling COP and power cycle efficiency are analyzed. It is observed that compressor power input required in C1 configuration is about 45% lower than that required in C2 configuration. Increase in turbine inlet temperature marginally affects the power cycle efficiency for both the configurations. Cooling COP reduces significantly with increase in ambient temperature for both the configurations. This study provides a basis for the feasibility of trigeneration systems in dairy application where simultaneous heating and cooling are required in addition to small amount of electricity for parasitic loads such as lights, fans etc.

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K0005-A Presentation 2 (13:30~13:45)
CCS/H2 Chain Options for Germany – a Stakeholder-based Economic and Sociological Approach
Sabrina Glanza and **Franziska M. Hoffartb**
Ruhr-University Bochum, Germany

Abstract—A transformation towards a low-carbon economy calls for serious changes over all sectors. In the en-ergy sector, this transformation includes a modification of infrastructure for clean and green technologies. We argue, that for the implementation of these large-scale infrastructure projects, policy recommendations should focus on feasible instead of optimal strategies including the perspective of different disciplines and stakeholders. In this context, we assume that public acceptance and the influence of different stakeholder groups play a crucial role for the decision-making and hence, the successful implementation of large-scale projects.

In the presentation, we show how to include these elements from an economic and a sociological perspective using the ACT project ELEGANCY as an example. ELEGANCY aims to accelerate the implementation of a full chain CCS/H2 infrastructure to decarbonize the European energy system. To assess the infrastructure options for Germany, we apply a macroeconomic scenario approach and a sociological acceptance analysis.

The scenario approach is based on the idea of system thinking and multiple futures. It enables to deal with uncertainty and complexity related to the development of the energy, policy and investment environment. Scenarios allow to include different perspectives and distil key influence factors and stakeholders and thus provide a suitable framework to identify the most realistic infrastructure option in terms of political and economic realizability.

In the empirical acceptance analysis, stakeholders are interviewed that are located at interfaces be-tween research, politics, industry and society. In these interviews, attitudes, interests and motivations as well as knowledge and experience regarding social perception of a CCS/H2-chain are reflected. As a result, the evaluation of the infrastructure options from the experts' perspectives is analyzed to identify the most realistic one in terms of social acceptance.

We conclude our presentation with the combination of our first results of the macroeconomic scenarios and the interview-based public acceptance analysis.

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K0032-A Presentation 3 (13:45~14:00)
Development of correlations for air side heat transfer and pressure drop of fin-and-tube heat exchangers used in domestic, frost-free refrigerators
Aaditya Saikiran Pegallapati, Tushar Kumar, Maddali Ramgopal
Indian Institute of Technology Kharagpur, India

Abstract—Domestic frost-free refrigerators employ a wide variety of fin-and-tube heat exchanger geometries varying in their number of tube rows, find pitch, tube length etc. In this paper a computational fluid dynamics (CFD) method is used to develop heat transfer and pressure drop correlations for a typical fin-and-tube heat exchanger used in domestic, frost-free refrigerators. Nine different heat exchanger geometries varying in their number of tube rows (3, 5, 7) and fin pitches (5mm, 7.5mm, 10mm, 15mm) are modelled in ANSYS Fluent for five different inlet velocity conditions (0.5m/s, 0.7m/s, 1m/s, 1.3m/s, 1.7m/s) constituting a total of forty-five simulations. The distributions of temperature, velocity and pressure throughout the heat exchanger geometry are obtained. The effect of air inlet velocity on pressure drop, total heat transfer and air exit temperature are studied. From the data generated computationally, empirical correlations for Colburn j-factor and friction factor are developed as functions of Reynolds number, number of tube rows and the finning factor (the ratio of total outer surface area and tube outer surface area). The developed correlations are compared with correlations available in the literature. It is observed that the available correlations marginally underpredict the Colburn j-factor and friction factor. Also, the effect of number of tube rows on Colburn j-factor is neglected in the earlier works which has been considered for the correlation developed in the present study.

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K1009 Presentation 4 (14:00~14:15)
Cost Benefit Analysis of a Net-Zero Energy House in Qatar
S Gowid, **Farayi Musharavati**, A Hamouda
Qatar University, Doha, Qatar

Abstract—In response to local and global energy and health challenges, this paper presents the design and cost benefit of Net-Zero Energy Housing (NZEH) in Qatar. Thus, this work determines whether the benefits outweigh the cost of the implementation of NZEH. There is uncertainty over the reliability of the presented cost benefit data in other countries as cost benefits differ from one place to another. A lack of empirical evidence has increased this uncertainty; particularly, a lack of evidence on the costs and benefits of a net zero and low emission housing option to private households. These costs include the cost of renewable energy technologies. This paper aims to bridge the research gap by applying cost benefit methods. Thermal insulation, solar power generation and solar water heating systems were modelled and lifecycle costing was applied to explore the costs and benefits across 25 years for net zero emission new house scenarios in Qatar. The average typical residential villa energy use establishes a baseline for determining energy and cost savings. A cost-benefit analysis was first performed at the subsystem level, house level and then at the country level and the results were in favour of the implementation of NZEH. Solar photovoltaic and solar water heating subsystems are designed in order to meet the hot water and electricity requirements of a typical villa. Thermal insulation was found to be non-beneficial due to the low electricity tariff in Qatar. Annual savings of 299 Qatari Riyals (QAR) per villa and 21 million QAR at the country level could be achieved if NZE housing is implemented. This is in addition to the numerous benefits of the utilization of clean and sustainable energy.

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K2076-A Presentation 5 (14:15~14:30)
Upgradation of urban biomass as solid fuel (hydrochar) by hydrothermal carbonisation process
Hari Bhakta Sharma, Sagarika Panigrahi, Brajesh K. Dubey
Indian Institute of Technology Kharagpur, India

Abstract—Municipal generated urban biomass has a massive potential to be used as a renewable energy source, on the contrary, it is managed as waste. In this study, hydrothermal carbonization (HTC) was used to upgrade urban biomass as a solid fuel using an autoclave reactor at the temperature of 200℃ for a different residence time of 2, 4 and 8 h. With the increase in reaction severity oxygenated functional (–OH) group decreased. With increase in the reaction time, carbon content increased, while significant decrease in the oxygen content was observed. Volatile matter decreased at higher reaction severity, while fixed carbon got increased. Calorific value of the hydrochar was in a range of 17.72- 20.16 MJ/kg which is comparable to brown coal as compared to 15.37 MJ/kg of untreated urban biomass. Hydrochar yield decreased from 61.8 % at operating temperature – time of 200˚C- 2h to 51.50% at 200˚C -8 h. Van Krevelen plot using H/C and O/C demonstrates improvement in the coalification process mainly governed by decarboxylation and dehydration reactions. Fuel ratio (Fixed Carbon/Volatile matter) for the hydrocahr prepared at 2h was 0.36 and that prepared at 8h was 0.43, which for raw sample was 0.08. Hydrochar prepared at 200˚C - 8h have higher ignition (318.4℃) and burnout temperature (440.1˚ C) making fuel of better quality as compared to hydrochar prepared at 200˚C – 2 h. Hydrochar prepared at 200˚C – 8 h are preferred for a fuel application owing to its low activation energy (25.5 kJ/mol).

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K2049-A Presentation 6 (14:30~14:45)
Retrofitting of a heritage building – technical and legal constraints, possible to achieve economic effect

Dorota Anna Krawczyk,
Bialystok University of Technology, Poland

Abstract—Retrofitting of existing buildings can result in energy savings, although it is difficult to predict real benefits. As showed on the example of the Polish school theoretical effect of improvements (59-71%) could differ significantly from the achieved reduction in energy consumption (33%). Situation is much more complicated if we consider ancient buildings. They are often high energy consuming structures, however some technical and legal constraints could hinder a process of modernization. This paper discusses issues connected with retrofitting of an old factory building that has been adopted for a school, apartments and offices several years ago. Possible to apply improvements regarding the structure, HVAC systems were discusses, with emphasizing main technical problems as well as legal ones resulting from a heritage conservator's recommendations. Part of requirements leads to a significant increase of investment costs, whereas others make few improvements not possible, for example isolation of external walls. Ecological effect of retrofitting was estimated as 51% of CO2 emission reduction.

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K2079-A Presentation 7 (14:45~15:00)
Characteristics of char produced from co-pyrolysis of waste low-density polyethylene and eucalyptus wood as an alternative energy source
Biswajit Samal, Brajesh Dubey, Jayanta Bhattacharya
Indian Institute of Technology, Kharagpur, India

Abstract—Managing large amount of waste plastics is a serious concern for the protection of global environment. Pyrolysis based processing of the plastic wastes can lead to a resource to recover valuable energy from such rich hydrocarbons. This study focuses on the variation of thermal characteristics of solid residue (char) produced from co-pyrolysis of waste low density polyethylene (LDPE) and biomass (Eucalyptus) with changing pyrolysis temperature and relative proportion of raw materials in the feed. Slow pyrolysis was carried out in a stainless-steel pyrolysis reactor with varying temperatures from 300 ˚C to 550 ˚C and having residence time of 120 minutes with weight fractions of LDPE and Eucalyptus biomass as 1:2 (R1) and 1:3 (R2). It was found that the yield of char decreased with increase in temperature with maximum yield obtained at 300˚C for R2. Density of the char gradually increased with pyrolysis temperature possibly due to the thermal decarboxylation and the release of volatiles, with highest density of 0.5 g/cc obtained at 550 ˚C with R2. On the other hand with increase in temperature, biomass moisture and volatile fraction decreased due to dehydration and conversion of aliphatic hydrocarbons to stable aromatic hydrocarbons, respectively. Increase in fixed carbon and ash content in the char was noticed due to the increase in relative concentration of carbon, minerals and additives in the char with rise in temperature. With the increased content of LDPE in the feed, calorific value and H/C ratio of resulting char were also found to increase. Therefore, the char produced from this process can be a potential alternative to the current societal dependency on the conventional fossil fuels.

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K0037 Presentation 8 (15:00~15:15)
Building energy consumption prediction with principal component analysis and artificial neural network **Mengxuan Sun**, Zhao JL, Shang HD
University of Essex, Colchester, UK

Abstract—The implementation of the smart grid will greatly improve the efficiency of energy supply by detecting, predicting, and reacting to real-time local changes of energy uses. To this end, energy usage prediction of household buildings is critically important to facilitate the implementation of smart grid. This study used a single house as a prototype, employed different observed features, advanced data analysis approach, and artificial neural network model to predict real-time dynamics of house energy usage. Data analysis revealed that among the 26 observed features, only the top ten most important features were helpful and could maximize the neural network model performance. The resultant model has the great predictive capability on energy usage, thus provided a promising framework to improve the smart grid implementation.

Session 5

Afternoon, February 14 (Thursday)

Time: 13:15~15:30

Venue: Sala Giulio Natta

9 presentations-Topic: "Energy Engineering and Management"

Session Chair: Prof. Hartmut Hinz

K2080-A Presentation 9 (15:15~15:30)
Influence of Process Parameters on the Characteristics of the Char-Composite Produced by the Co-Pyrolysis of Eucalyptus Wood and Waste Polystyrene
Kumar Raja Vanapalli, Jayanta Bhattacharya, Brajesh Dubey
Indian Institute of technology, Kharagpur, India

Abstract—Co-pyrolysis of biomass and waste plastic can be an alternate solution to the plastic waste disposal and associated environmental problems, while providing economically valuable byproducts. The aim of this study is to investigate the influence of temperature, and proportion of plastic with biomass on the physicochemical properties of the char-composite produced through the co-pyrolysis process. For this purpose, Eucalyptus wood and waste plastic viz. polystyrene (PS) were co-pyrolyzed in a designed stainless steel pyrolysis reactor under N2 environment at four different temperatures (300 ℃, 400 ℃, 500 ℃ and 600 ℃) for a duration of 120 min with varying biomass and waste plastic weight ratio in the feed (2:1 & 3:1). The pH, electrical conductivity, cation exchange capacity (CEC) and functional groups (FTIR) were determined to understand the chemical and surface charge properties. Scanning electron microscopy (SEM) and X-ray diffraction (XRD) were done to study the surface morphological characteristics and crystallinity index of the material. pH and conductivity of the samples were observed to increase due to the relative increase in ash content, while the CEC decreased due to the loss of polar carboxyl and hydroxyl groups with an increase in the pyrolysis temperature. The FTIR analysis of the char showed decrease in aliphatic compounds and increase in aromatic compounds and short chain alkenes with the increase in pyrolytic temperature. SEM analysis showed that there is a deposition of pyrolyzed plastic products over the micro porous char surface during the pyrolysis process at lower temperatures, and an increased char pore size with the rise in temperature up to 500 ℃. XRD results indicated decrease in the crystallinity of the material which may be due to degradation of cellulose with rise in the pyrolysis temperature. So, co-pyrolytic char can be a valuable resource, providing a viable plastic waste management option.

Session 6

Afternoon, February 14 (Thursday)

Time: 13:15~15:15

Venue: Sala riunioni Lombardi

8 presentations-Topic: "Air Pollution and Noise Pollution Management"

Session Chair: Prof. Antonio Ficarella

K0004-A Presentation 1 (13:15~13:30)
Removal of Air pollutant from the off gases in a Submerged Self-Priming Venturi Scrubber
Manisha Bal, B. C. Meikap
Indian Institute of Technology (IIT) Kharagpur, West Bengal, India.

Abstract—Hydrogen chloride is the most common acid gas emitted by the industries. HCl gas is listed as Title III hazardous air pollutant. It causes severe threat to the human health as well as environment. So, removal of HCl from flue gases is very imperative. In the present study, submerged self-priming venturi scrubber is chosen to remove the HCl gas with water as a scrubbing liquid. Venturi scrubber is the most popular device for the removal of gaseous pollutants. Main mechanism behind the venturi scrubber is the polluted gas stream enters at converging section which accelerated to maximum velocity at throat section. Very interesting thing in case of submerged condition, venturi scrubber is submerged inside the liquid tank and liquid is entered at throat section because of suction created due to large pressure drop generated at the throat section. Maximized throat gas velocity atomizes the entered liquid into number of tiny droplets. Gaseous pollutant HCl is absorbed from gas to liquid droplets inside the venturi scrubber due to interaction between the gas and water. Experiments were conducted at different throat gas velocity, water level and inlet concentration of HCl to enhance the HCl removal efficiency. The effect of throat gas velocity, inlet concentration of HCl and water level on removal efficiency of venturi scrubber has been evaluated. Present system yielded very high removal efficiency for the scrubbing of HCl gas which is more than 90%. It is also concluded that the removal efficiency of HCl increases with increasing throat gas velocity, inlet HCl concentration and water level height.

Session 6

Afternoon, February 14 (Thursday)

Time: 13:15~15:15

Venue: Sala riunioni Lombardi

8 presentations-Topic: "Air Pollution and Noise Pollution Management"

Session Chair: Prof. Antonio Ficarella

K5040 Presentation 2 (13:30~13:45)
IAQ in conference room whit surveys
Katarzyna Gładyszewska-Fiedoruk
Bialystok University of Technology, Białystok, Poland

Abstract—The work presents three basic air pollutants in the room, degrading the indoor air quality. The only source of pollution in the analysed room are people. The research was carried out in a building located in north-eastern Poland, in a temperate climate, in an area where the outside air is very clean. That is why air exchange is often carried out by opening windows (natural ventilation). That was also the case during the described experiment. In the room during the experiment there were 55 people, all of them doing the same physical activity, sitting work. The temperature and relative humidity of the air, the concentration of carbon dioxide in the room and the sound level were analysed. During the experiment, questionnaire surveys were also conducted. Respondents answered the same set of questions at the beginning and at the end of the meeting. The IAQ was low during measurements. Carbon dioxide concentration ranged from 1700-2000 ppm. The temperature was too low (18-19oC). The smell for the respondents was not perceptible. The noise during measurements ranged within 50 dB. It was a parameter that aroused the greatest dissatisfaction among the surveyed. They didn't pay attention to a low temperature.

Session 6

Afternoon, February 14 (Thursday)

Time: 13:15~15:15

Venue: Sala riunioni Lombardi

8 presentations-Topic: "Air Pollution and Noise Pollution Management"

Session Chair: Prof. Antonio Ficarella

K5042 Presentation 3 (13:45~14:00)
Hourly profiles of air pollution variation in selected cities, towns and villages in Poland
Robert Cichowicz and **Artur Stelegowski**
Lodz University of Technology, Poland

Abstract—Concentration of air pollution in urbanized and agricultural areas is related to the activity of various economy sectors (the so-called SNAP categories). Therefore, the change in the emission of pollutants by an anthropogenic source should result in a change in the air pollution level in the selected area. To better understand the nature of changes in air pollution concentration in urban and agricultural areas, an analysis of data of five-year (2012-2016) air quality measurements, carried out at selected automatic air quality monitoring stations in Poland, Europe. The data came from stations located in 5 regions (Lower Silesia, Greater Poland, Lodz, Masovia and Lublin) in central Poland. The average hourly concentrations in selected areas in cities, towns and villages were compared with the hourly emission factors of power generation sector (SNAP1), residential and commercial combustion sector (SNAP2) and road transport sector (SNAP7). The hourly profiles of air pollution level were expressed by means of the "imission factor", as analogous to the hourly profiles of the "emission factor" that is being used in the LOTOS-EUROS and the CHIMERE chemistry-transport models.

Session 6

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Venue: Sala riunioni Lombardi

8 presentations-Topic: "Air Pollution and Noise Pollution Management"

Session Chair: Prof. Antonio Ficarella

K5023 Presentation 4 (14:00~14:15)
Data-Driven NO_2-Forecasting based on Mobile Measurements
Enes Esatbeyoglu, Andreas Sass, Oliver Cassebaum and Sandro Schulze
Volkswagen Ag Group Research, Germany

Abstract—The temporal and spatial prediction of nitrogen dioxide (NO2) is very essential because of its harmful impacts on the environment. Its forecasting would help, for example, to regulate predictively the traffic flow. Traditionally, air quality measurements are performed at fixed locations or dedicated mobile laboratories. In this work, we installed a measurement technology in a vehicle and connected it to the vehicle measuring system in order to be able to evaluate further parameters. To this end, we selected one route profile and continuously measured the NO2 concentration in real-time traffic. We have driven this route profile several times in succession. The rationale of this approach is the idea that several vehicles are equipped with the same measurement technology and drive on the same route profile within the same time. The contribution of this work is to forecast the NO2 concentration for a given route profile under constant weather conditions based on mobile measurements. To this end, we divided the recorded data into training and test data and investigated five different approaches for forecasting the NO2 concentration on the respective route profile. Among other aspects, we used cross-validation methods in order to assess the prediction quality. Results show that sliding-window approaches using the averaging of previous rounds are most suitable for predicting NO2 concentration. Furthermore, our data reveal that the prediction quality is improved when the test data immediately follow the training data.

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8 presentations-Topic: "Air Pollution and Noise Pollution Management"

Session Chair: Prof. Antonio Ficarella

K2073-A Presentation 5 (14:15~14:30)
Personal concentrations and mass exposures of fine PM during long haul journeys on Indian national highways
Soma Sekhara Rao Kolluru, Aditya Kumar Patraab, Shubha Verma
School of Environmental Science and Engineering, Indian Institute of Technology Kharagpur, India

Abstract—National highways (NH) are the vital road networks which link multiple locations of India. NH are only 1.7% of the whole road network, but carries ~40% of the total road traffic. Until now, utmost importance is given to the personal exposure studies which were confined to cities. Higher traffic density and congestions are the principle causes for the build-up of higher pollutant concentrations in cities. On the contrary, the NH are characterized by free flowing traffic and fewer traffic congestions, but it involves longer travel time than city travel. Therefore, there is a need to quantify the pollutant concentrations during the travel on NH. To fill this research gap, our study aims to measure in-vehicle PM2.5 concentrations and total mass exposures during long commutes on NH of length 400 km. We measured the PM2.5 concentrations inside three most preferred travel modes on NH: Bus, Open Window Car (Car OW) and Closed Window Car with air-condition (Car CW). Mean concentrations were highest inside Car OW (154.05±40.51μg m-3) and lowest inside Car CW (79.06±18.05 μg m-3). Concentrations were higher during morning journeys in Bus (morning: 136.09±42.75 μg m-3 vs. evening: 109.22±30.85μg m-3) and Car OW (morning: 181.62±42.27μg m-3 vs. evening: 126.47±38.74μg m-3). The total mass exposures followed the trend: Bus (5380 μg) > Car OW (1625 μg) > Car CW (1370 μg). Car CW users experienced both the least concentrations and mass exposures. For curtailing adverse health effects relating to long distance journeys, these findings indicate that management of exposures needs to consider mass exposures in addition to pollutant concentrations. This information can be useful for increasing environmental awareness among the passengers and for framing better pollution control strategies on highways.

Session 6

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Venue: Sala riunioni Lombardi

8 presentations-Topic: "Air Pollution and Noise Pollution Management"

Session Chair: Prof. Antonio Ficarella

K5007-A Presentation 6 (14:30~14:45)
A comprehensive study of Tropospheric Ozone levels in Bangalore, India
Aman Saxena and Rahul Tarak
Senior Research Associate, Creative Synergies Group

Abstract—Increased pollution in Bangalore, India has resulted in higher levels of carbon and nitrogen oxides that subsequently lead to higher concentrations of ground level and tropospheric ozone. There is a significant dearth of objective physically measured data related to these ozone concentrations. This paper addresses the void by conducting a comprehensive investigation of the tropospheric ozone concentration vertical profile over Bangalore India – one of the fastest growing cities in India. This data is not only a significant contribution to the scientific repository but it could also significantly impact public policy related to urban planning and epidemiology.

Session 6

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Time: 13:15~15:15

Venue: Sala riunioni Lombardi

8 presentations-Topic: "Air Pollution and Noise Pollution Management"

Session Chair: Prof. Antonio Ficarella

K8034 Presentation 7 (14:45~15:00)
Impact of air transport on the noise level in the city of Burgas
Stela Todorova and Kaloyan Haralampiev
Management and Marketing Department, University of Agriculture, Bulgaria

Abstract—Aviation, as every type of transport, is responsible for a number of negative external effects to the environment. The main goal of this study is to reveal the relation between the noise level in the urban areas near to the Sofia airport and the air traffic. Our main research tasks are: to make a literature review of the problem; to gather data for the noise levels; to gather data for the air traffic; to choose relevant statistical methods and models for the revealing of the relation between the noise level and air traffic; to draw conclusions and to make recommendations about the noise pollution in the vicinity of Sofia Airport. The data are on monthly basis and cover the period from January 2015 to December 2017, i.e. 36 months. In our regression model we use four traffic indicators as independent variables: aircraft movements; passengers; freight and mail. In the established regression model we introduce 'the time' as an additional factor, which provides concrete practical advantages. Our results show that only one independent variable (Aircraft movements) affects the Twenty-four hours average equivalent level of noise due to flights. Aircraft movements are the most important factor and we expect their increasing in the future. This will lead to increased noise levels.

Session 6

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8 presentations-Topic: “Air Pollution and Noise Pollution Management”

Session Chair: Prof. Antonio Ficarella

K2039-A Presentation 8 (15:00~15:15)
Optimization of Process Variables for the Removal of Carbon dioxide from Flue Gas Using a Submerged Self Priming Venturi Scrubber
Manisha Bal1, **Remya Çhinnamma Jos**e, B. C. Meikap
Indian Institute of Technology (IIT) Kharagpur, India.

Abstract—Carbon dioxide (CO2) is the major source of carbon which sustains life on earth whose level is controlled by photosynthesis but with industrialization the concentration of CO2 in the atmosphere has alarmingly increased from 280 ppm to 410 ppm causing air pollution. The obvious reason for this is deforestation and excessive burning of fossil fuels, prime sources of industrial CO2 emissions are the flue gases of thermal power plants and process industries. It is one of the most significant long lived green house gases and has led to global warming and acid rain and consequently to the dangerous climate change and ocean acidification respectively. Accordingly it is indisputable that CO2 emissions have to be controlled. In the present study, a self priming submerged venturi scrubber is used to remove CO2 from flue gas using sodium hydroxide as the scrubbing liquid and Response Surface Methodology (RSM) with central composite design is chosen to observe the effect of the process parameters on its removal efficiency. Experiments were conducted by varying the throat gas velocity, liquid level in the outer cylinder and CO2 concentration in the inlet. The ANOVA test confirmed the significant effect of the three parameters on the removal efficiency and a quadratic equation was obtained which predicted the removal efficiency effectively. The suitability of the developed model was judged by the higher R square value which was obtained from the regression analysis. From the investigation it has been found that the throat gas velocity had the most significant effect and inlet concentration of CO2 comparatively had a lesser effect on the CO2 removal efficiency.

Session 7

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Time: 15:45~18:30

Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K5032 Presentation 1 (15:45~16:00)
Particle Morphomics by High-Throughput Dynamic Image Analysis
Jie Fu
Fudan University, China

Abstract—A novel omics method referred to as "particle morphomics" has been proposed in this study. The dynamic image information of more than 2,000,000 particles per sample including sediments, soils and dusts were collected by a Sympatec GmbH QICPIC particle size and shape analyzer, and the morphological descriptors of each particle such as equivalent diameter, sphericity, aspect ratio and convexity were extracted as the "particle morphome". Various multivariate analyses were employed to process the high-throughput data of particle morphome including analyses of alpha and beta diversities, similarity, correlation, network, redundancy, discretion and principal coordinate. The outcome of particle morphomics estimated the morphological diversity and sketched the profile of morphological structure, which can be used to develop a morphological fingerprint for specific particle samples. The distribution and properties of particle assemblages of specific morphology can also be evaluated by particle selection with respect to filter criteria. More importantly, the particle morphomics may be extended to investigate and explain the biogeochemical and environmental processes involved with particle morphology if linked with external variables.

Session 7

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Venue: Sala Giulio Natta

11 presentations-Topic: “Resource Science and Environmental Engineering”

Session Chair: Prof. Jie Fu

K5003 Presentation 2 (16:00~16:15)
Data Preparation for GIS based Land Suitability Modelling: A Stepped Approach
Shabir Hussain Khahro, Abd Nasir Matori, Imtiaz Ahmed Chandio, Mir Aftab Hussain Talpur
Prince Sultan University, Riyadh, Saudi Arabia

Abstract—The land suitability analysis of any facility has become a complex affair. Each aspect of the landscape has inherent properties that are, to some extent, appropriate or inappropriate for planned activities. Compliance with government guidelines, installation guidelines and customer needs has made this task more complex. Land-use suitability analysis is identifying the most suitable spatial pattern for future land uses according to specific requirements, preferences, or predictors of some activity. Land-use suitability can mean different things to different experts depending on the purpose. Geographic Information System (GIS) has proven to be a key tool in addressing these land compatibility issues. GIS is a science of analysing position information that can count several numbers of these parameters at the same time, and it can be used to identify and analyse earth compatibility for all types of physical planning. A spatial aptitude model generally corresponds to the scientific question "Where is the best location for a particular facility or business? Therefore, this paper aims to provide an intensified approach to prepare datasets and layers for such land suitability problems using GIS. This paper will be valuable to land managers in land-use planning for any facility.

Session 7

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Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K5025-A Presentation 3 (16:15~16:30)
Selective Catalytic Reduction of NOx by NH3 in the presence of oxygen over spinel supported Mn-based catalyst
Kui-Hao Chuang and Pei-Chen Lai
Central Taiwan University of Science and Technology, Taiwan

Abstract—This study presents an investigation into the selective catalytic reduction (SCR) of NOx with ammonia over mesoporous spinel-supported manganese metal catalysts. CuFe2O4 supports were firstly synthesized by solution combustion. The catalysts were examined for the SCR of NO by NH3 in a fixed-bed flow reactor under the following reaction conditions: 500 ppm NO, 6 % O2, 500 ppm NH3 in N2. Experimental results of NO reduction indicated that the Mn/ CuFe2O4, which obtained a 45% NO conversion at 200 ℃ at a gas hourly space velocity of 60,000 h−1. However, a decrease in NO conversion was clearly observed above 250 ℃ for Mn/ CuFe2O4 catalysts due to low thermal stability.

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Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K5035-A Presentation 4 (16:30~16:45)
Assessment of the Biochar impact on the Adsorption behavior of Imidacloprid onto Hebei rotary tilled and no till soils
Jean Yves Uwamungu and Chunsheng Hu
Chinese Academy of Sciences, Shijiazhuang, China

Abstract—The use of pesticides is highly increasing, and measures must be taken in order to prevent from the soil and groundwater pollution. The primary objective dealt with the investigation of the biochar effect on the Imidacloprid adsorption behavior onto no-till and rotary tilled soils. Laboratory batch experiments were designed to study the Imidacloprid adsorption. Kinetic and equilibrium data were processed to understand the adsorption mechanism of Imidacloprid by biochar-affected soils; dynamic and thermodynamic adsorption experiments were conducted to characterize this adsorption. The adsorption process quickly reached the equilibrium in 30 min, the adsorption process time shortened while adding Biochar. The kinetic and thermodynamic data showed that the adsorption of Imidacloprid onto both soils could be described by a pseudo-second-order kinetic and Freundlich models, respectively. The saturated adsorption capacity weakened as temperature increased, suggesting an exothermic process; 1.794044- 0.1168 mgg-1 and 1.54289-0.10273 mgg-1, for no-till and rotary tilled soils, respectively. The thermodynamic parameter analysis showed that adsorption was mainly a physical process. It was concluded that the Imidacloprid adsorption capacity was found to be greater onto no-till than onto rotary tilled soil with or without biochar, which will lead in a leaching potential if more pesticides are used.

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Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K5051-A Presentation 5 (16:45~17:00)
The effect of SRT, HRT and biomass concentration on elimination of micropollutants with activated sludge
Rana Hatoum, Olivier Potier, Thibault Roques-Carmes, Cécile Lemaitre, Tayssir Hamieh, Joumana Toufaily, Harald Horn, Ewa Borowska
University of Lorraine, France

Abstract—The aim of this work was to investigate the relation between the operational parameters of biological treatment- sludge retention time (SRT), hydraulic retention time (HRT), biomass concentration - and degradation efficiency of selected micropollutants (MPs) in Sequencing Batch Reactors (SBRs). Following MPs were studied: caffeine, sulfamethoxazole, benzotriazole, erythromycin, roxithromycin, diclofenac and carbamazepine. Seven experimental scenarios were applied to SBRs which varied in SRT (3 d, 10 d, 20 d) and HRT (4 h, 8 h, 12 h). The influence of biomass concentration on MPs removal was measured for 3, 5 and 8 gTSS L-1. Concentrations of MPs were analyzed in liquid phase during treatment by liquid chromatography–tandem mass spectrometry (LC–MS/MS) and kinetics parameters were determined. Results showed that the removal rate constants (k') were slightly affected by studied SRTs and HRTs. What is more interesting, our results clearly indicated that low biomass concentration (in the range of 3-5 g L-1) affects the kinetics strongly, and the assumption of biomass as not-limiting factor in this concentration range is not entirely correct. Therefore, the use of the popular pseudo-first order approach in literature is questionable in certain conditions.

Session 7

Afternoon, February 14 (Thursday)

Time: 15:45~18:30

Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K8005 Presentation 6 (17:00~17:15)
Dewatering sludge using alum and nitrogen gas
Mamdouh Yousef Saleh, Medhat Hosny Elzahar and Shymaa Mohamed Eldosoky
Port Said University, Egypt

Abstract—In most cases, the associated processing cost of dewatering sludge increase with the solid particles concentration. All experiments in this study were conducted on biological sludge type. The technology used was faster in time and less in cost compared to other methods, in addition, it helps to reduce the greenhouse gases. The experiment was carried out in three stages, first the bubbling pressure was used to dissolve N2 gas into the sludge, second alum was added to accelerate the process of coagulation of the sludge particles and facilitate their flotation, and third nitrogen gas was used to help floating the sludge particles and reduce the processing time because the nitrogen gas from the inert gases. The conclusions of this experiment were as follows, first, the best conditions were obtained when the bubbling pressure was 0.6 bar. Second, the best Alum dose was determined to help the sludge agglomerate and float. During the experiment the best alum dose was 80 mg / L. It increased concentration of the sludge by 7-8 times. Third, the economic dose of nitrogen gas was 60 mg / L with separation efficiency of 85%. The sludge concentration of was about 8-9 times. That happened due to the gas released tiny bubbles which adhere to the suspended matter causing them to float to the surface of the water where it could be then removed.

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Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K8023-A Presentation 7 (17:15~17:30)
Bacterial source identification in a south Indian river using next-generation sequencing
Michela Catena and Parvathi Ammini
Yale University, United States

Abstract—Public health depends largely on water quality, particularly on the microbial quality of water since bacterial contamination causes disease outbreaks and has the potential to lead to serious epidemics. Identifying specific sources of pollution – in particular, differentiating between human and animal origins – is essential to facilitate water quality maintenance, public health risk assessment, and environmental pollution management. Microbial source tracking (MST) methodology is used to detect microbial contamination in human-frequented water bodies. It comprises a suite of microbial and molecular techniques used to trace fecal water pollution to its source. The underlying logic
behind MST is that some pathogenic bacteria are commonly found in the guts of certain hosts, and the presence of these bacteria in environmental water indicates the fecal contamination of that specific host. Microbial community analysis is an emerging MST technique involving next-generation sequencing (NGS), in which the entire microbial community of a water sample is compared to the microbial communities of individual fecal sources. This study employs microbial community analysis with NGS to identify the source of bacterial pollution in a south Indian river over the course of 6 months. I compared the feces of dogs, cows, goats, and humans, solid waste seepage, raw human sewage, and slaughterhouse waste and found that most of the study sites were contaminated with human sewage. Determination of this source provides valuable information to public health officials and environmental managers, allowing them to properly allocate tools, resources, and energy to better manage both the water and the pollution to improve water quality and
public health.

Session 7

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Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K8029-A Presentation 8 (17:30~17:45)
Biochemical and stability analysis of variations of indigenous Brassica juncea genotypes in different agro-climatic environmental conditions of Pakistan
Faiza Nawaz, Hakim Khan,Naushad Ali Turi, Sidra Pervez
Hazara University Mansehra Pakistan, Pakistan

Abstract—Plants evaluation based on the stability and biochemical analysis identified the genetic differences of plants, this identification is very important for Researchers and farmers for the crops cultivation in diverse environments. Hence, present research was planned to evaluate the biochemical summarising of indigenous genotypes of Brassica juncea. Twenty-five genotypes of B. juncea with 1 check cultivar were collected from different areas of Pakistan. ANOVA and RCBD experiments were conducted for stability and NIR spectroscopy for biochemical examination. High significant differences in studied traits G x L x Y were formed by ANOVA analysis. Nonsignificant result was found for L with (cv) coefficient of variance was 3.37 for flower completion days, seed/silique 7.05, protein concentration 4.25, glucosinolates 5.06 and 4.57 for erucic acid concentration. Stasitical analysis for stability examination presented that 1611, 1616 and 1617 were most stable genotypes in different climatic areas as they showed the less regression coefficient b value and deviation from regression S2d. present studies exposed that selected genotypes found stable in diverse extreme climatic conditions like increse temperature and humidity and for some other abiotic factors and this harsh climate has no effect on the biochemistry of studied genotypes.

Session 7

Afternoon, February 14 (Thursday)

Time: 15:45~18:30

Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K8007-A Presentation 9 (17:45~18:00)
Effect of land use on water/sediment quality in Qaroun and Wadi El-Rayan Lakes
Dr. Ahmed Mohamed El-Zeiny and Hala A. Effat
National Authority for Remote Sensing and Space Sciences (NARSS), Egypt

Abstract—Present study explores the change of water/ sediment quality in Qaroun and Wadi El-Rayan Lakes as a result of land use type in the area surrounding the Lakes. Landsat-8 image dated 2016 was processed to produce land use/cover map and spectral derived indices. Four main land use classes were produced; urban, vegetation, water and bare land. Urban class represents all residential and industrial areas. Vegetation comprises old cultivations, newly reclaimed areas and harvested lands. Water includes irrigation and drainage canals, lakes and seepages. Desert and non-inhabited lands were classified as bare land. Water/sediment quality parameters were analyzed in 21 surface water and 21 bottom sediment samples collected from Qaroun and Wadi El-Rayan Lakes to assess the anthropogenic impacts and different land uses on the Lakes. Water quality investigations (DO, EC, RES, turbidity and pH) showed that the negative effect of various Land Uses (residential areas, cultivations, industries) was maximal in Qaroun Lake and minimal in Wadi El-Rayan Lake. The same distribution was also recorded in regard of organic carbon in sediment which showed noticeable high levels in Qaroun Lake (0.10-3.86 % with mean 6.02 %) than El-Rayan Lake (0.07-1.78 % with mean 0.45 %) due to the high levels of pollution in Qaroun Lake. The chemical analyses of cations in sediment showed a fluctuation within the two Lakes as a response to the agricultural and sewage water discharges. This indicates to the extensive effect of domestic wastewater on levels of Ca and Na in Qaroun Lake sediments and influence of agricultural wastewater discharge on levels of K on El-Rayan Lake sediments.

Session 7

Afternoon, February 14 (Thursday)

Time: 15:45~18:30

Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K2056-A Presentation 10 (18:00~18:15)
Kinetic studies and adsorption isotherms for the removal of heavy metals Nickel (II) by eco-friendly biosorbent green algae Spirogyra quadrata
Suleman Shahzad, Faizan Naeem, Atif Yaqub
Government College University, Pakistan

Abstract—Contamination of the water bodies with heavy metals ions being added from industrial activities has posed a serious threat to inhabiting life forms, both in aquatic as well as terrestrial environments which create an acute need to develop effective technology for the removal of such pollutants. In the present study, green filamentous algae, Spirogyra quadrata, was employed for biosorption of Nickel [Ni (II)] to remove these pollutants from aqueous medium. Various physico-chemical parameters were optimized; optimum pH for the biosorption of Ni (II) was found to be 4 (qmax = 27.34 mg/L); optimum biomass concentration was found to be 10 mg/L for Nickel [Ni (II)] metal ions; optimum time required for the biosorption of Ni (II) was 90. Various adsorption isotherm models were employed, such as Langmuir, Freundlich, and Temkin; Langmuir model was found to be most suitable which shows monolayer sorption. Pseudo-second order kinetic model was also employed to elucidate the kinetics of the process. FTIR (Fourier Transform Infra-red Spectroscopy) was also performed which revealed the presence of possible electronegative functional groups on the surface of algal wall responsible for cation binding, such as Ni (II).

Session 7

Afternoon, February 14 (Thursday)

Time: 15:45~18:30

Venue: Sala Giulio Natta

11 presentations-Topic: "Resource Science and Environmental Engineering"

Session Chair: Prof. Jie Fu

K5077 Presentation 11 (18:15~18:30)
Study of monsoonal features using regional climate model over heterogeneous monsoon dominated region
Dr. Rohit Srivastava and Ruchita Shah
Pandit Deendayal Petroleum University, India

Abstract—Global warming is an increase in average global temperature of the earth which lead to climate change. Heterogeneity in the earth-atmosphere system becomes difficult to capture at low resolution (1°x1°) by satellite. Such features may be captured by using high resolution model such as regional climate model (0.5°x 0.5°). This type of study is quite important for a monsoon dominated country like India where Indo-Gangetic Plains (IGP) faces highest heterogeneity due to its geographic location. Present study compares high resolution model features with satellite data over IGP for monsoon season during a normal rainfall year 2010 to understand the actual performance of model. Almost whole IGP simulates relative humidity with wide range (~50-~100%), whereas satellite shows it with narrow range (~60-~80%) during September, 2010. Thus model is able to pick the features which were missed by satellite. Hence further model simulation extends over India and adjoining oceanic regions which simulates data of southwest monsoon with high (~70-~100%) relative humidity, high (~0.4-~0.7) cloud fraction and low (~80-~200 W/m2) outgoing longwave radiation over Arabian Sea during June, 2010. Such type of study can be useful to understand heterogeneity at regional scale with the help of high resolution model generated data.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: "Urban Engineering and Eco-Environmental Management"

Session Chair: Assoc. Prof. Wei Po Huang

K5036 Presentation 1 (15:45~16:00)
Hydraulic Simulation of Waterbird Habitat Reconstruction
Wei Po Huang, C Y Ku L K Chien and C J Ye
National Taiwan Ocean Univ., Taiwan

Abstract—Cigu wetland consists of industrial salt ponds and lagoon is situated at the coast in the southwestern of Taiwan which is demarcated as Coastal Nature Reserve. The salt ponds experienced declines in bird species diversity and population compared with those within the lagoon area due to the deeper water depths. Different kinds of measures to alter water depths of salt ponds by filling soil are proposed. The hydrodynamic simulations were conducted for studying the hydrodynamic response to proposed reconstruction alternatives. The potential waterbird abundance was then estimated for the alternative recommendation. The methodology proposed in this study can reduce the risk of unexpected results by implementing the reconstruction project directly.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: “Urban Engineering and Eco-Environmental Management”

Session Chair: Assoc. Prof. Wei Po Huang

K5011 Presentation 2 (16:00~16:15)
Study on the Construction Mode of Ecological and Sustainable Rain Flood in New Urban Area of China
Caixia Kang, Qing Lu, Zhiheng Zhang, Qian Zhao and Huihui Nan
Urban Space Planning and Architectural Design co., LTD., China

Abstract—In the background of the urbanization process has exceeded 58% of China and expansion of the construction land expansion, as a future appropriate residential development and ahead of the key area of urban rain flood management, this research expounds the new cities and new district how to follow the principle of ecological priority in different application field, and how to use land for urban green space and ecological protection for elastic development and rain flood management. The study of the new cities' eco-rain flood management model is of great significance for the governance and sustainable development of urban diseases in China.By combining natural ways with artificial measures, planning is carried out in advance.On the premise of ensuring the safety of urban drainage and waterlogging prevention, the accumulation, infiltration and purification of rainwater in urban areas can be realized to the maximum extent, and the utilization of rainwater resources and ecological environment protection can be promoted in new cities. To make plan ahead,to avoid the problems of rain and flood in existing urban areas, and improve the livable quality of new cities greatly.New ways of thinking and construction guidance are proposed for ecological livable construction and flexible rain flood management of new urban areas in China.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: "Urban Engineering and Eco-Environmental Management"

Session Chair: Assoc. Prof. Wei Po Huang

K5060 Presentation 3 (16:15~16:30)
Importance of Community Engagement in Landscape Planning and Landscape Design Process: Example of Turkey
Pinar Gultekin and Kıymet UZUN YÜKSEL
Düzce University, Türkiye

Abstract—Participation is the most important factor to consider development of countries and related this to processes of community democratization. If the participation is defined in the general framework; to involve in processes of decision making, implementation or monitoring of a matter to be participated in one, couple or all of them to include the creation of ideas, share opinion and disseminate information by persons or institutions who are the affected related matter directly or indirectly. Public participation is also provides long-term sustainable solutions about decision-making processes and implementation stages, through stakeholders in the context of the structural environment.

Community participation is significant about environmental project is planned and designed that directly consider people to have a voice on the environment where they live. Besides, to collect environmental data bases of natural, social and structural, determine problems and potentials around the environment is about community contribution to majorly supported by engagement. To promote and disseminate public engagement can be made by the government, but also can be contributed by private institutions, organizations and nongovernmental organizations. Paying regard to Landscape Convention defines the landscape is fundamental component of their identity, culture, social and economic developments as the main factor of all citizens' life qualities.

The articles of agreement's is prepared to consider convention on access to information, public participation in decision making and access to justice in environmental matters. For this reason, the concept of landscape should be integrated in to planning and design at all stages from national decisions to street scale by taking the planning and design as a whole from the upper scale to the lower scale in terms of life quality – satisfaction and welfare level.

In this study, different scale and various level of participation in planning and designing projects from Turkey were examined. At this national level projects, subject of public

participation is come into prominence with strategic plans. At this the level of participation, stakeholders diversities and phases of Project were evaluated and as a result to bring forward a proposal about bringing participation forefront, awareness raising and adaptation with public and private sectors in processes of landscape planning and designing.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: "Urban Engineering and Eco-Environmental Management"

Session Chair: Assoc. Prof. Wei Po Huang

K8024-A Presentation 4 (16:30~16:45)

The Effect of Different Patterns of Buildings Design for a Resilient City to Face the Challenges in Climate Change in an Arid Environment

Suaad RIDHA

Mustansiriyah University, Baghdad-Iraq

Abstract—Achieving sustainability in the cities is one of the priority objectives that the researchers are currently seeking, especially in a hot and dry environment. Many factors effect directly to achieve a design for resilient cities that facing climate change. The studies on improving the human thermal comfort and promoting the sustainable construction are Inadequate and limited especially in an arid climate the reasons may be due to the poor preparedness for a sustainable environment or the necessity to increase environmental awareness and the need to keep abreast of technological development in urban design. The aim of this paper is to investigate the influence of different design of buildings on improving thermal comfort, particularly in the hot and dry environment by suggestion a new design for a city with different patterns of buildings design. A new design has been proposed based on several factors such as sky view factor, aspect ratio, street orientation, and the effect of vegetation. The researcher created a design of a city on the hottest day in summer in Baghdad city.to face the changes in extreme weather in an arid climate. The evaluation was performed on the hottest day in summer. The mean radiant temperature, specific humidity, air temperature, have been analyzed using ENVI-met software. Thermal comfort is evaluated using the Predicted Mean Vote (PMV). The results showed that the factors considered in this study play an important role in the design of sustainable cities in an arid climate. Also, the research explains how the urban factors such as the aspect ratio, vegetation, shadings, and the geometry of the canyon are essential elements that urban planners and cities may take into account, especially for new urban developments in a hot, arid climate.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: "Urban Engineering and Eco-Environmental Management"

Session Chair: Assoc. Prof. Wei Po Huang

K2083 Presentation 5 (16:45~17:00)
Smart Autonomous Flexing Modules: A shading system that acknowledges the materials' performative capacities
Samar ElTahhan, Tarek Farghaly and Hassan Abdelsalam
Alexandria University, Egypt

Abstract—As an alternative for the energy consuming and complex mechanical architectural responsive systems, a seamless approach is emerging employing performative shape changing materials in creating autonomous systems which rely solely on the material's performative capacities and molecular intrinsic attributes. This paper introduces two designs for smart autonomous shading systems that are implemented within building envelopes. In fact, they incorporate the shape changing smart material; shape memory polymer (SMP) in which its shape changing effect is triggered by temperature increase in a self-propelled manner. Laboratory experimentations are conducted to test both designs utilising SMP sample representing shading surfaces that can be attached to the building. The surfaces are flat; closing (providing shade) when the temperature is 35 degree Celsius or more and bend to open (allowing light penetration) when it is 25 degree Celsius or less. The experimentation verifies the notion behind the designs as a promising green alternative exhibiting preliminary success. This experiment is an exploratory trial towards investigating the possibilities of the applications of shape changing smart materials architecturally driven by the primal aim of saving energy.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: "Urban Engineering and Eco-Environmental Management"

Session Chair: Assoc. Prof. Wei Po Huang

K5004 Presentation 6 (17:00~17:15)
Enhancing One Stop Center in the Malaysian Planning System
Marlyana Azyyati Marzukhi, O Dasimah, O L H Leh and J Azfarnizam
Universiti Teknologi MARA, Malaysia

Abstract—Malaysia has been experiencing rapid development since its independence in 1957, which has transformed its economic base from agriculture to industry. Rapid urbanisation has itself led to the continued rise of economic growth and the need for obtaining permissions from the relevant authorities to ensure an effective and efficient planning system. This effort is evidenced by the improvement of mechanism delivery system of planning and building plan process, known as One Stop Centre (OSC). The Ministry of Urban Wellbeing, Housing and Local Government initiated OSC on the 13th April 2007 to improve the planning delivery system and procedures at all local planning authorities by coordinating and shortening the approval process. However, relatively little is known about the effectiveness of OSC and the understanding of its roles among the stakeholders in the local authority. Therefore, a questionnaires survey has been conducted to forty-seven (47) respondents and interviews with the public that involved in the process. The respondents have mostly felt that the ineffectiveness of the planning and building plan approval process was due to the incomplete documents submitted to the OSC, lack of knowledge among the Professional Submitting Person (PSP) and the incapability of staffs in handling development applications. Hence, the findings present a synthesis of results for town planners, architects, developers and government agencies to have a better understanding of OSC. Thus, the knowledge serves as a basis for future strategic planning decisions and guidance in the delivery system in Malaysia.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: "Urban Engineering and Eco-Environmental Management"

Session Chair: Assoc. Prof. Wei Po Huang

K2051 Presentation 7 (17:15~17:30)
The Mathematical Model of Autonomous System on Renewable Sources for Recreation and Relaxation of the Big Cities' Population
Inga Zicmane, Kristina Berzina, **Tatjana Lomane,** Ilga Zicmane and Natalija Berzina-Novikova
Riga Technical University, Faculty of Power and Electrical Engineering, Riga, Latvia

Abstract—Urbanization is a worldwide historical process that is related to the deep transformation of the existing cities and settlements. Among the negative factors of urbanization, the following ones can be outlined: an active increase in environmental pollution by means of industrial emissions and waste, the lag of technological and sanitary welfare, as well as engineering communications, utilities and services from the housing stock growth, increase in level of city noise. Apart from the ever-increasing pollution levels of air, water and soil, an increased sociability aspect common for the urban community takes place. Despite the constantly accelerating pace of life, a presence of hypodynamy can be distinguished, which influences the formation of cardiovascular disease. The purpose of this publication is to develop a mathematical model of a modular autonomous house, which purpose is the removal of an emotional overload and stress of urban residents. The aim is to develop a system that would be supplied solely by renewable energy sources. Design of engineering communication and supply systems (including lighting, ventilation, light and music background, etc.) will be taken into account.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: “Urban Engineering and Eco-Environmental Management”

Session Chair: Assoc. Prof. Wei Po Huang

K5031 Presentation 8 (17:30~17:45)
Public participation as a tool for preserving the environment
Hen Friman, Yafa Sitbon, Ifaa Banner and Yulia Einav
Faculty of Engineering H.I.T - Holon Institute of Technology, Israel

Abstract—Environmental Education is the key for creating a clean energy future for not only the nation, but the world. World Energy Consumption relies heavily on coal, oil, and natural gas. Fossil fuels are non-renewable, that is, they rely on finite resources that will eventually dwindle, becoming too expensive or too environmentally damaging to retrieve. In contrast, renewable energy resources, such as wind and solar energy, are constantly replenished and will never run out. Due to the rising need for professionals and academics with a background and understanding in the Energy field, Holon Institute of Technology (HIT) developed an integral system of environmental education and training and a new program at the Faculty of Electrical Engineering. The Renewable Energy program gives the students technical and practical aspects of energy use (technology and methodology of the study) and energy efficiency. The program also deals with minimizing the environmental impacts of energy use, as well as with energy economy and environmental policy. This article presents a new challenge. Teach environmental issues with language difficulties. Israeli Hebrew speaker students, teach environmental education in Arab school with Arabic speaker pupils'.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: "Urban Engineering and Eco-Environmental Management"

Session Chair: Assoc. Prof. Wei Po Huang

K5061-A Presentation 9 (17:45~18:00)
Importance of Environmental Educat Ion for "Environmentally Responsible Citizens in Turkey
Yasar GÜLTEKİN,Pınar GÜLTEKİN, Gülcan CANİK
Düzce University, Türkiye

Abstract—In the 21th century, population is increasing so rapidly. The natural resources are becoming exhausted proportional with this. Because of this reason, importance of natural resources management and sustainability are also increasing. For this purpose, it has become inevitable to ensure that people are more conscious and more protective of nature. The thing to do is make people sensitive about using natural resources by education. This can be achieved through environmental education. In this context, important agreements and contracts in the field of environment and sustainability, which have been made in national and international fields, have been examined. Curriculums of Secondary Schools that provide education at secondary level in Ministry of National Education and State/Private Universities in Council of Higher Education have been investigated. In this respect, using Ministry of National Education website, within secondary education programmes, Anatolian High School, Anatolian High School with preparatory class, Science High School, Social Sciences High School, Anatolian Religious Vocational School, International Anatolian Religious Vocational School, Vocational and Technical Anatolian High School's weekly schedules which have been applied from 2018-2019 academic year have been examined. Turkey have 186 Universities as from 2017.Of these, 119 are State Universities, 67 are Foundation Universities. In the scope of the research, curriculums of Departments of Landscape Architecture, Environmental Engineering, Forest Engineering, City and Regional Planning, Agricultural Engineering have been observed and the existence of courses related to environmental protection and education have been researched. Furthermore, other public and private institutions and organizations which give environmental and nature education on the level of secondary education and higher education in Turkey have also been examined. In consequence of this research, importance of environmental education have been emphasized, environmental education given ecologically based at secondary and higher education level have been evaluated, suggestions for raising citizens with environmental awareness have been developed.

Session 8

Afternoon, February 14 (Thursday)

Time: 15:45~18:15

Venue: Sala riunioni Lombardi

10 presentations-Topic: "Urban Engineering and Eco-Environmental Management"

Session Chair: Assoc. Prof. Wei Po Huang

K5026-A Presentation 10 (18:00~18:15)
Lakeside tourism and adaptation in a changing climate
Mária Szalmáné Csete
Department of Environmental Economics, Budapest University of Technology and Economics, Hungary

Abstract—Water is the indispensable resource of lakeside tourism that can deal with new challenges due to the possible impacts of climate change. Hungary is a landlocked country thus all its four significant lakes (Lake Balaton, Lake Velence, Lake Tisza and Lake Fertő) are popular tourism destinations. Lake Tisza is a special lake considering that it is an artificial lake (Kiskörе reservoir) that also has significant ecotourism attractiveness. It also has a unique natural, social and economic characteristics. Water-related tourism has favourable social aspects and the deregulated usage of watercraft carries a high risk in this area. According to the potential effects of climate change adaptation is necessary to be able to cope with the new challenges that can be more complex in a special socio-economic environment and resource dependent sector as lakeside tourism. A set of preparation and adaptation tools can show a rather heterogeneous picture. Its basics are the human resource, the development of awareness, technological and technical innovations, the appropriate selection of management tools and compliance with the external regulatory environment. Based on the international literature review, a number of adaptation and preparation types can be identified which, from the point of view of tourism, can be used to assess the preparation and adaptation possibilities of the Lake Tisza tourism.
The main objective of the examinations is to evaluate the preparation and adaptation options in the light of tourism development efforts at Lake Tisza, in particular with regard to potential interrelations with disaster risk analysis. The research reported in this abstract was supported by the Higher Education Excellence Program of the Ministry of Human Capacities in the frame of the Water sciences & Disaster Prevention research area of the Budapest University of Technology and Economics (BME FIKP-V ŹE).

Poster Session

Afternoon, February 14 (Thursday)

Time: 08:15-18:30

Venue: Sala Giulio Natta/ Sala riunioni Lombardi

K5041 Presentation 1
Guidelines for the stable development of public bus transport in the city of Sofia
Svetla Tzvetkova
University of National and World Economy, Sofia, Bulgaria

Abstract—The stable development of public bus transport includes the improvement of the social, economic and ecological aspects of its activity or increasing its social effectiveness through improving the quality of offered transport services, reducing energy consumption, using energy sources more effectively and reducing the harmful effects on the environment. Public bus transport is the most commonly used type of ground transport in the city of Sofia; in recent years, unfortunately, the quality of its services has dropped and its harmful influence on the environment has grown. This is primarily caused by obsolete vehicles and the lack of adequate measures for improving its social and economic effectiveness. The present article substantiates the necessity for its future stable development and outlines the measures for improving the quality of the transport services it offers as well as reducing harmful emissions. In order to support the study's topicality, it should also be pointed out that similar goals and objectives set in the Declaration for reducing harmful emissions, creating conditions for the use of renewable energy and attracting green investments, which Sofia joined during the World Conference for Climate Change held in Paris in December 2015.

Poster Session

Afternoon, February 14 (Thursday)

Time: 08:15-18:30

Venue: Sala Giulio Natta/ Sala riunioni Lombardi

K5021 Presentation 2
Form Follows Environmental Energy: Ecological Heat In Contemporary Vernacular Architecture
Meiting HE and Linxue LI
Tongji University, China

Abstract—The aesthetic of architecture changes with the history, and its evolution is a dynamic, humane and regional process. The contemporary China is in the double transition periods of traditional and modern, modern and postmodern, therefore the value of architecture lost its order caused by the overlapping and conflicting of different values in different periods, either external "image" or intrinsic "meaning", are in a state of disorder. With the advent of modernization, traditional architecture seems to be gradually forgotten and abandoned. However, many traditional villages still circulate the environmental wisdom that contemporary architects still use in their designs. Most of the traditional houses all over the world use local building material, make full use of renewable energy, using the natural energy of natural climate actively such as light, heat, wind to adapt to the climate environment, with good adaptability to the local climate, topography and, is a model of passive building technology. This article attempts from Three angles to explore, which are the diagram and theory, simulation software, and environment measurement of Chinese traditional village. Through the above research, we try to find the coupling between traditional local-style dwelling houses and modern residence in the design.

Poster Session

Afternoon, February 14 (Thursday)

Time: 08:15-18:30

Venue: Sala Giulio Natta/ Sala riunioni Lombardi

K5050 Presentation 3
The Necessity to Improve the Competitive Power of "Bulgarian State Railways - Cargo Freights" Ltd.
S Tzvetkova and E Savova
University of National and World Economy, Sofia, Bulgaria

Abstract—"Bulgarian State Railways - Cargo Freights" Ltd. is the leading association on the Bulgarian market for carrying out railway cargo freights. In recent years, however, the freight volume has decreased and the company has reported negative financial indicators. The changes that have occurred in Bulgarian economy, the market's liberalization, the impossibility for making investments, the obsolete rolling stock, the deteriorating quality of transport services and the reduced competitive power are among the main reasons for that. The substantiated necessity for increasing the freight volume, improving the financial indicators and retaining the market share is the main motive for writing this paper. To that end, factors from the internal and external environments have been analyzed through the implementation of PESTEL, 5 FORCES and SWOT analyses. For research purposes, a qualitative assessment has been made through a questionnaire survey among consumers of the service. The following conclusions have been drawn: strong competitiveness on the market; unsatisfactory quality; low competitive power; impossibility for carrying out investment policies due to lack of free financial resources. In order to improve competitive power, authors recommend: implementing immediate measures for improving techno-economic indicators by optimizing activities and processes, identifying the excess capacity of non-operating assets and human resources.

Poster Session

Afternoon, February 14 (Thursday)

Time: 08:15-18:30

Venue: Sala Giulio Natta/ Sala riunioni Lombardi

K2042-A Presentation 4
Examination of Sustainability Pricibles in Toki Housing: Example of Yozgat Province
SİNEM TAPKI, BEGÜM DEMİROĞLU, AYŞEGÜL KOÇ ÜNLÜSOY , **Elif ÖZTÜRK**
BOZOK UNIVERSITY,TURKEY

Abstract—In the comparison of energy consumption on the world, the most densely used dwellings which have a significant percentage are at the top of the building classes. Today, new settlements are not the places where natural resources are consumed rapidly; It should be considered as habitable and viable spaces where natural resources are preserved and protected while using natural resources. In Turkey since the mid-20th century experienced rapid and unplanned urbanization, population growth and urban migration have cities grown. This growth of the cities is still unhealthy today with the migration from rural to urban areas. Cities need healthy housing settlements to accommodate this rapid migration. The reasons such as acceleration of migration, rapid population growth, and developing economic conditions constitute the uninhabited living environments and residences incompatible with cultural and construction forms. Public housing projects are big projects in urban scale. Satisfaction levels of the users will affect the city life considerably because it includes large masses. In addition to meeting the optimal needs of its users, public housing should offer social - psychological healthy environment, quality of life and sustainable environment. TOKI has been more successful than the previous housing construction (cooperative, build-sell) in the construction of qualified residential areas and residential areas' environments. Opportunity to own housing in the long term, social facilities and environmental arrangements; It has made public housing settlements become a center of attraction for the people living in the area. Today, TOKI continues to build houses in many regions. The features of dwellings built by TOKI such as fast construction and the ability of users to pay for their housing in the long term constitutes the traits of attraction in house acquisition by most people. Besides these features, the projects constituting few nonspecific plan typology having high density in vertical height with low energy efficiency can not succeed. As a consequence, the sustainability principles cannot be provided properly. The evaluation of the mass housing projects and applications in terms of energy efficiency is aimed in the scope of the study. The suggestions aiming adaptation of the energy efficiency methods for mass housing projects are presented in the light of the revealed results. The increase of the mass housing applications and expenses of heating, cooling and

lightening depending on the climate regions points out the environment and energy problems. Today it is known that the reason of the boost of mass housing projects is the active role of Mass Housing Management (TOKI). The usage of clean and renewable energy sources in the face of ignored environment and energy problems in the rapid development of mass housing applications is counted of a contemporary approach. The wind energy as a clean and renewable energy is seen as a significant potential in our country. The excessive energy consumption is studied as a housing typology in this study. In this point, it is crucial that the energy efficiency strategies are included in creating a sustainable future and life space dwelling production process and the optimization of energy demand in these process. The selected housing areas are investigated through literature reviews, observations and interviews in terms of geographic, social and cultural aspects. The acquired results are aimed to constitute a knowledge base for future mass housing designs to be able to reach more qualified and sustainable designs and applications with usage of renewal energy while satisfying the rapidly developing housing needs.

Poster Session

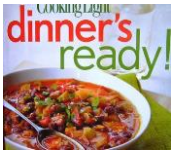
Afternoon, February 14 (Thursday)

Time: 08:15-18:30

Venue: Sala Giulio Natta/ Sala riunioni Lombardi

K5065 Presentation 5
Methodological guidelines for the sustainable development of the Bulgarian touristic resorts through reducing the harmful impact of transport
Velikova Elenita
UNWE, Sofia, Bulgaria

Abstract—The achievement of sustainable development of Bulgarian tourist resorts is questionable after the European Commission has put Bulgaria's two-month ultimatum to prove that it can deal with the problem of dirty air. Tourism is a sector that is accused of violating sustainable development due to its many negative environmental impacts. A significant part of the harmful impact is due to the transport used to reach the desired destination and the movement itself. Sustainable development is a key objective of the EU and Bulgaria should not lag behind in terms of the essential indicators for its achievement. This publication aims to propose effective measures to reduce the harmful impact of passenger transport on the environment by establishing sustainable transport practices in touristic resorts. The environmental component of sustainable development is among its main priorities. Based on expert analysis of Bulgarian touristic resorts, our own research and experience in the studied subject will offer effective measures to increase their sustainability by reducing the harmful impact of transport on the environment.



Dinner	**18:30**

One Day Visit

February 15, 2019. (Friday) 9:00~17:00

(Tip: Please arrive at "Politecnico di Milano" at 8:50 a.m. The following places are for references, and the final schedule should be adjusted to the actual notice.)

1. (9:00-12:00am) Morning Vist

Visit Milan Cathedral

Milan Cathedral, is the cathedral church of Milan, Lombardy, Italy. Dedicated to St Mary of the Nativity (Santa Maria Nascente), it is the seat of the Archbishop of Milan, currently Archbishop Mario Delpini. The cathedral took nearly six centuries to complete. It is the largest church in Italy (the larger St. Peter's Basilica is in the State of Vatican City), the third largest in Europe and the fourth largest in the world.

Visit Castello Sforzesco

Sforza Castle (Italian: Castello Sforzesco) is in Milan, northern Italy. It was built in the 15th century by Francesco Sforza, Duke of Milan, on the remnants of a 14th-century fortification. Later renovated and enlarged, in the 16th and 17th centuries it was one of the largest citadels in Europe. Extensively rebuilt by Luca Beltrami in 1891–1905, it now houses several of the city's museums and art collections.

2. (12:00-13:30) Lunch time

3. (14:00-16:30) Afternoon visit

Visit Teatro alla Scala

The theatre was inaugurated on 3 August 1778 and was originally known as the Nuovo Regio Ducale Teatro alla Scala (New Royal-Ducal Theatre alla Scala). The premiere performance was Antonio Salieri's Europa riconosciuta.
Most of Italy's greatest operatic artists, and many of the finest singers from around the world, have appeared at La Scala. The theatre is regarded as one of the leading opera and ballet theatres in the world and is home to the La Scala Theatre Chorus, La Scala Theatre Ballet and La Scala Theatre Orchestra. The theatre also has an associate school, known as the La Scala Theatre Academy (Italian: Accademia Teatro alla Scala), which offers professional training in music, dance, stage craft and stage management.

Visit Galleria Vittorio Emanuele II

The Galleria Vittorio Emanuele II is Italy's oldest active shopping mall and a major landmark of Milan, Italy. Housed within a four-story double arcade in the center of town,the Galleria is named after Victor Emmanuel II, the first king of the Kingdom of Italy. It was designed in 1861 and built by architect Giuseppe Mengoni between 1865 and 1867.

4. (16:30) Back to Politecnico di Milano.

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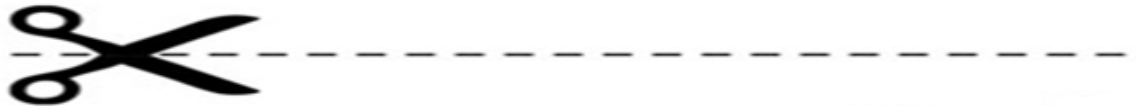

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