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2018 Bangkok Conference Introductions

Welcome to CMS-CBEES 2018 conference in Bangkok. The conference is held annually with high quality. The objective of the Bangkok conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Chemical Materials and Process.

**2018 4th International Conference on Chemical Materials and Process (ICCMP 2018)**

Accepted papers will be published in one of the following Proceeding:

*MATEC Web of Conferences (ISSN: 2261-236X) which is indexed by Ei Compendex, Inspec, DOAJ, CPCI (Web of Science) and Scopus.*

Conference website and email: [http://www.iccmp.org/; iccmp@cbees.net](http://www.iccmp.org/; iccmp@cbees.net)

**CMS Mission**

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

**About HKCBEES**

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

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

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

Instructions for Oral Presentations

Devices Provided by the Conference Organizer:
Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:
PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)
Duration of each Presentation (Tentatively):
Regular Oral Presentation: about 12 Minutes of Presentation and 3 Minutes of Question and Answer
Keynote Speech: about 30 Minutes of Presentation and 5 Minutes of Question and Answer
Plenary Speech: about 20 Minutes of Presentation and 5 Minutes of Question and Answer
We would appreciate if all presenters can adhere strictly to this time limit.

Instructions for Poster Presentations

Materials Provided by the Conference Organizer:
The place to put poster

Materials Provided by the Presenters:
Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Best Presentation Award
One Best Oral Presentation will be selected from each presentation session, and the Certificate for Best Oral Presentation will be awarded at the end of each session on May 24.

Dress Code
Please wear formal clothes or national representative of clothing.
Keynote & Plenary Speaker Introductions

Keynote Speaker I

Prof. Sarawut Rimdusit
Chulalongkorn University, Bangkok, Thailand

Education:
Ph.D. (Macromolecular Science and Engineering) Department of Macromolecular Science and Engineering, Case Western Reserve University, Cleveland, Ohio, USA, 2000
M.S. (Macromolecular Science and Engineering) Department of Macromolecular Science and Engineering, Case Western Reserve University, Cleveland, Ohio, USA, 1997
B.Eng. (Chemical Engineering (Honor)) Chulalongkorn University, 1992

Research Interest
Polymer Networks (Thermosets and Gels)
Polymer Alloys and Polymer Composites
Topic: “Shape Memory Polymers Based on Polybenzoxazine Alloys and Composites: A Drive towards Recovery Stress Enhancement”

Sarawut Rimdusit

Chulalongkorn University, Bangkok, Thailand

Abstract- One important characteristic of benzoxazine resin (BA-a) is its ability to alloy with various species of resins or polymers. In this research, we have demonstrated an ability of benzoxazine resin to alloy with epoxy and urethane resins to form polymers with shape memory properties. The dual function of benzoxazine resin to act as curing agent of epoxy resin and as a stable or rigid network segment for shape memory epoxy (SMEs) significantly simplifies a formulation of shape memory epoxy systems. The presence of the polybenzoxazine in SMEs was found to significantly enhance their recovery stress values. Moreover, with an addition of suitable amount of reinforcement e.g. silicon carbide whisker (SiCw) or carbon fiber, recovery stress of the resulting shape memory composites in flexural mode as high as 11.2 MPa can be achieved compared to the value of 3.4 MPa of the neat SMEs. Furthermore, the alloys of benzoxazine resin with urethane elastomers were found to provide relatively broad glass transition temperature with multiple-shape memory effects. High values of shape fixity i.e. 70%-96% for the first temporary shape and 83%-99% for the second temporary shape and high shape recovery of 88%-96% for the first temporary shape and 97%-99% for the original shape were also achieved.
Keynote Speaker II

Prof. Jian Chen
Tsinghua University, China

Education and Experience:
Professor Chen Jian received his B.Sc., M.Sc. and Ph.D. in chemical engineering at Department of Chemical Engineering, Tsinghua University in 1985, 1990 and 1994, respectively. He has worked in the department since 1990, becoming Professor of Chemical Engineering in 2001. He worked as a visiting scholar in Schlumberger, Canada in 2002.

Research interests:
Thermodynamics and Separation Engineering
Research interests cover 1) Molecular thermodynamics of fluid properties and phase equilibria for fluids across the critical point, unsymmetrical fluids in size or interaction, fluids with association. 2) Molecular design for solvents based on the quantitative structure-property relationship. 3) Engineering thermodynamics and process design for separation processes such as gas absorption, solvent extraction, and so on.

CO₂ capture technology
Recently CO₂ absorption used for greenhouse gas CO₂ capture and sequestration CCS is the main research area, including molecular design of new capture solvents, thermodynamics and kinetics of vapor-liquid absorption systems, process simulation and optimization, technological design and intensifications.
Topic: “A Biphasic Amine-Sulfolane Solvent CO₂ Capture”

Jian Chen
Tsinghua University, China

Abstract- Carbon capture and storage (CCS) is the most economical and viable technologies to reduce greenhouse gas emission in the future. Amine scrubbing is the most mature method for the separation of CO₂ from flue gas of various industrial processes. But there are still some shortcomings such as high energy consumption and high cost, which restrict its large-scale application.

This work focuses on the study of CO₂ absorption using a biphasic solvents of amines with the addition of a physical solvent as sulfolane. It was found that after CO₂ absorption, with the addition of sulfolane, amines with primary and secondary amino groups such as monoethanolamine (MEA), aminoethyllethanol-amine (AEEA) and diethyltriamine (DETA) could have liquid phase split to lead biphasic solutions after absorption of CO₂, but amines with tertiary and steric-prohibited amino groups such as methyldiethanolamine (MDEA) and 2-amino-2-methylpropanol (AMP) could not form biphasic solutions. It was also found that the addition of sulfolane has no significant effect on the thermodynamics and kinetic properties of the aqueous amine solution, such as the rich loading, the absorption enthalpy and the total mass transfer coefficient. However, it decreases the lean loading of the solution at higher temperature during desorption.

Further measurements were carried out to estimate the energy consumption with the biphasic systems of the aqueous MEA or DETA plus sulfolane solutions. Compared with the conventional 30% MEA solution, the desorption heat of the upper phase of amine - sulfolane biphasic solution remains essentially unchanged, while sensible heats are reduced by 20%. With the heat measurement during the desorption at 373K, the addition of sulfolane could decrease the water vaporization by 50%. The decrease of sensible heat and water vaporization heat leads to a decrease of 22.5% in the overall energy consumption for CO₂ capture.
Keynote Speaker III

Prof. Frank Yang
East Carolina University, USA

Dr. Yu “Frank” Yang is a Professor and Director of Chemistry Graduate Studies at East Carolina University, located in Greenville, North Carolina, USA. Dr. Yang received his Ph.D. in Chemistry from University of Mainz, Germany in 1993. He joined the Department of Chemistry at East Carolina University as an assistant professor in 1997, tenured in 2003, and promoted to full professor in 2007.

Dr. Yang's principal areas of interest and expertise include green chemical processes, environmental chemistry, subcritical water chromatography and extraction. The main goal of Dr. Yang’s research programs is to eliminate or minimize the use of toxic organic solvents in extraction, chromatography, environmental remediation, and other chemical processes. Honors include the University Five-Year Achievement for Excellence in Research Award, the Sigma Xi Helms Research Award, University of North Carolina Board of Governors Distinguished Professor for Teaching Award, Cottrell College Science Awards from Research Corporation, and the Starter Grant Award from the Society for Analytical Chemists of Pittsburgh.
Topic: “Separation Processes Using Subcritical Water Technology”

Frank Yang

East Carolina University, USA

Abstract- Almost all of chemical processes require organic solvents that are expensive, toxic, and their wastes must be properly disposed of. While ambient water is too polar to be used in many chemical processes, the polarity of water is dramatically reduced with increasing temperature. The decreased water’s polarity at higher temperatures causes the solubility of nonpolar compounds in water being enhanced by 4-5 orders of magnitudes when the temperature is raised from ambient to 200-250 °C. The dielectric constant of water at 200-250 °C is equivalent or even lower than that of methanol and acetonitrile. Thus, subcritical water behaves like a polar organic solvent and can replace hazardous organic solvents used in several chemical processes to achieve efficient extraction, chromatographic separation, environmental remediation, and chemical synthesis. The following topics will be addressed in the presentation: Subcritical water extraction, subcritical water chromatography, and environmental remediation using subcritical water. The major advantage of subcritical water technology is the elimination or minimization of toxic extraction fluid, mobile phase organic solvents used in high-performance liquid chromatography, and common organic solvents required for environmental cleanup and chemical synthesis. Therefore, the subcritical water technique offers both economical and environmental benefits.
Keynote Speaker IV

Prof. Paisan Kittisupakorn
Chulalongkorn University, Thailand

Head of Department of Chemical Engineering
Education
Ph.D. (Chemical Engineering), Imperial College, London, UK, 1995
M. Eng. (Chemical Engineering), Imperial College, London, UK, 1992
B.Eng. (Chemical Engineering), Chulalongkorn University, Bangkok, Thailand, 1990

Areas of Interest
Control and Systems Engineering
Process Design and Optimization
Cleaner Technology
Product Development

Paisan Kittisupakorn
Chulalongkorn University, Thailand

Abstract- As a heat exchanger is normally used to transfers thermal energy from a high temperature stream to a low temperature stream, it is considered to carry out heat recovery of waste heat stream in many industrial processes. In this work, a thermoelectric heat exchanger for liquid to liquid application is designed and devised as well as experimentally tested in heat recovery of a waste heat stream. An additional function of partially converting a thermal energy into an electrical energy is evaluated as well. This heat exchanger has a potential to recovery heat out of hot liquid to warm cold liquid and reduce heat loss released to the environment. In this paper, some of the thermal energy that transfers through this unit is directly converted into electrical energy by using integrated thermoelectric generators (TEGs). An equipment in the form of countercurrent heat exchanger equipped with integrated TEGs and heat source was installed and tested. The results showed that the efficiency of the heat exchanger increases with temperature and the number of inserted TEGs. Moreover, the maximum power generated by TEG materials installed inside countercurrent heat exchanger is more than 1,500 mW with TEG efficiency about 0.3%. The maximum heat exchanger efficiency is 39%.
Keynote Speaker V

Prof. Guo-Xin Jin
Fudan University, China

Dr. Guo-Xin Jin was born in April 1959. He studied chemistry at Nanjing University and received his M.S. in organic chemistry in 1984 and his Ph.D. degree in inorganic Chemistry in 1987 at the same University. After post-doctor stay at University of Bayreuth with Prof. M. Herberhold (Alexander von Humboldt Fellow) in Germany, in 1996 he joined the Changchun Institute of Applied Chemistry, Chinese Academy of Sciences to start his independent research and became professor. He moved to Shanghai and works in Chemistry Department of Fudan University as a Cheung Kong Professor in 2001 and he is also chair professor in Inorganic Chemistry Institute. Jin is the Associate Editor of Dalton Transaction, and also joined the editorial board of some professional journals, such as Coordination Chemistry Reviews, Organometallics, Journal of Organometallic Chemistry, Chinese Journal of Inorganic Chemistry, Chinese Journal of Applied Chemistry and Chinese Science Bulletin. Jin's research interests are catalysts for olefin polymerization and organometallic complexes. He has published more than 300 papers, reviews, and communications, and have 7 US Patents, 41 China Patents.

Topic: “To Be Added”
Prof. Hongqi Sun  
Edith Cowan University, Australia

**Dr. Sun** became a Full Professor of Chemical Engineering at Edith Cowan University (Australia) in November 2017. Before he joined ECU in 2016 as an Associate Professor through the campaign of Vice-Chancellor’s Professorial Research Fellowship, he had worked at Curtin University for over seven years, beginning with a Research Fellow position (2009) to Curtin Research Fellow (2013) and then to Senior Research Fellow (2015). He remains an Adjunct Professor position at Curtin University.

His research focuses on synthesis of nanostructured catalyst materials, such as shape-controlled metals or oxides, nanocarbons, arrays and quantum dots for solar energy utilization and environmental remediation. So far he has published over 140 refereed journal papers and received over 6700 citations and achieved an h-index of 50 (Data from Google Scholar in April 2018). He has also secured over three million dollars funding including three ARC discovery projects, four CRC projects and two fellowships. He serves as an Associate Editor of RSC Advances and Journal of Advanced Oxidation Technologies, assessor of ARC, committee member of international conferences, and referee of international journals.
Abstract- Energy crisis and environmental pollution have become the most serious barriers to the further sustainable developments of human beings. TiO$_2$-based photocatalysis has demonstrated promising potentials for dealing with both issues. For example, photocatalysis process can carry out hydrogen evolution or CO$_2$ reduction to secure a prominent position among all the renewable energy technologies. Recently, as the alternative to metal-based semiconductors, an emerging carbon-based photocatalyst, namely graphitic carbon nitride (g-C$_3$N$_4$), has been intensively used for photocatalytic reactions in energy and environmental applications. However a number of shortcomings still exist, such as less active sites, a high charge recombination rate as well as a low visible light harvesting ability. Such demerits of g-C$_3$N$_4$ have imposed severe restrictions to its further applications. Therefore, considerable efforts have been devoted to modifying pristine g-C$_3$N$_4$ for enhancing the photocatalytic performance. In this talk, an overview of recent research progresses on modification of pristine carbon nitride for energy applications is first provided in-detail. Discussion on the morphology, copolymerization, doping, hybridization and sensitization will be then made. After that the potential applications in another area, i.e. photodegradation or energy storage using modified g-C$_3$N$_4$ are also briefly introduced. At last, perspectives in future research or application opportunities using carbon based photocatalyst are proposed.
# Brief Schedule for Conference

## Day 1

**May 23, 2018 (Wednesday)**

10:00–17:00

_Venue: 11<sup>th</sup> floor, 100<sup>th</sup> Building, Faculty of Engineering (Room 1101)_

Arrival Registration

May 24, 2018 (Thursday)

9:00–18:00

_Venue: 11<sup>th</sup> floor, 100<sup>th</sup> Building, Faculty of Engineering (Room 1101&1106)_

Arrival Registration, Keynote & Plenary Speeches, and Conference Presentations

## Morning Conference

_Venue: 11<sup>th</sup> floor, 100<sup>th</sup> Building, Faculty of Engineering (Room 1106)_

**Opening Remark**

9:00–9:05

Prof. Paisan Kittisupakorn, Chulalongkorn University, Thailand

**Keynote Speech I**

9:05–9:40

Prof. Sarawut Rimdusit, Chulalongkorn University, Bangkok, Thailand

**Keynote Speech II**

9:40–10:15

Prof. Jian Chen, Tsinghua University, China

**Coffee Break & Group Photo Taking**

10:15–10:35

**Keynote Speech III**

10:35–11:10

Prof. Frank Yang, East Carolina University, USA

**Keynote Speech IV**

11:10–11:45

Prof. Paisan Kittisupakorn, Chulalongkorn University, Thailand

**Keynote Speech V**

11:45–12:20

Prof. Guo-Xin Jin, Fudan University, China

**Lunch:** 12:20–13:30

_Venue: 11<sup>th</sup> floor, 100<sup>th</sup> Building, Faculty of Engineering (Room 1106)_

## Afternoon Conference

**Plenary Speech I**

13:30–13:55

Prof. Hongqi Sun, Edith Cowan University, Australia

**Session 1:** 13:55–15:55

_Venue: 11<sup>th</sup> floor, 100<sup>th</sup> Building, Faculty of Engineering (Room 1106)_

8 presentations-Topic: “Material Science and Engineering”

**Coffee Break**

15:55–16:15

**Session 3:** 16:15–17:45

_Venue: 11<sup>th</sup> floor, 100<sup>th</sup> Building, Faculty of Engineering (Room 1106)_

6 presentations-Topic: “Environmental and Energy Engineering”

**Session 4:** 16:15–18:00

_Venue: 11<sup>th</sup> floor, 100<sup>th</sup> Building, Faculty of Engineering (Room 1101)_

7 presentations-Topic: “Chemistry and Fluids”
2018 BANGKOK CONFERENCE

Poster Session 9:00–17:45

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)

Dinner: 18:00

May 25, 2018 (Friday) 9:00–17:00

One-day Visit

Venue: Chamchuri Square

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

Detailed Schedule for Conference

May 23, 2018 (Wednesday)

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

10:00–17:00 Arrival Registration

Note: (1) The registration can also be done at any time during the conference.
(2) The organizer doesn’t provide accommodation, and we suggest you make an early reservation.
(3) One Best Oral Presentation will be selected from each oral presentation session. The Certificates for Best Oral Presentation will be awarded at the end of the session on May 24, 2018.

May 24, 2018 (Thursday)

Venue: 11th floor, 100th Building, Faculty of Engineering

(Room 1101&1106)

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<th>9:00–9:05</th>
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<td>Prof. Paisan Kittisupakorn</td>
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<td>Chulalongkorn University, Thailand</td>
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<th>9:05–9:40</th>
<th>Keynote Speech I</th>
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<td>Prof. Sarawut Rimdusit</td>
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<td>Chulalongkorn University, Thailand</td>
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<td>Topic: “Shape Memory Polymers Based on Polybenzoxazine Alloys and Composites: A Drive towards Recovery Stress Enhancement”</td>
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<td>9:40–10:15</td>
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<td>15:55–16:15</td>
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<td>16:15–18:00</td>
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<td>18:00</td>
<td>Dinner</td>
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Session 1

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

Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)

Session 1: 8 presentations- Topic: “Material Science and Engineering”

Session Chair: Prof. Sarawut Rimdusit

C0009 Presentation 1 (13:55~14:10)

Development of Rigid Polyurethane Foam (RPUF) for Imitation Wood Blown by Distilled Water and Cyclopentane (CP)

Ratchanon Boonachathong, Bordin Kaewnok, Halim Widjaja, and Suksun Amornraksa

King Mongkut’s University of Technology North Bangkok, Thailand

Abstract—Rigid polyurethane foam (RPUF) used for imitation wood is typically prepared by using 1-dichloro-1-fluoroethane (HCFC-141b) as a blowing agent. However, this chemical is a hydrofluorocarbon which severely causes ozone depletion to the atmosphere. In this study, a more environmental-friendly RPUF was prepared by using distilled water and cyclopentane (CP) as alternative blowing agent. Several properties of the prepared RPUF were investigated and measured such as density (kg/m3), surface hardness (Durometer, type D), and glass transition temperature (°C) using differential scanning calorimeter (DSC). It was found that when the amount of blowing agents decreased, the foam density was increased as well as the surface hardness. The developed RPUF with CP co-blown has higher surface hardness and glass transition temperature compare to pure water-blown RPUF at the same density (353 kg/m3). And the new RPUF produced has a good potential to substitute for a conventional RPUF.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)

Session 1: 8 presentations- Topic: “Material Science and Engineering”

Session Chair: Prof. Sarawut Rimdusit

C0010 Presentation 2 (14:10~14:25)
Characterization of Gelatin/CMC Scaffolds by Electrospinning and Comparison with Freeze Dry Techniques

Kaona Jongwuttanaruk
Pathumwan Institute of Technology, Thailand

Abstract—Gelatin/CMC mixture was used to produce nanofiber scaffold in order to analyze fiber’s physical characteristic. The gelatin solution made from dissolving gelatin in water which serves as solvent for the solution because water is a great solvent for gelatin. However, the solution used in fiber production with electrospinning, this research used organic solvent, 2,2,2-trifluoroethanol, which is also a good solvent for gelatin and hence produces good raw material for fiber production using electrospinning. However, since CMC was unable to dissolved under organic solvent like 2,2,2-trifluoroethanol, it was dissolved in water instead. The weight ratios of the gelatin/CMC mixture are 100/0, 90/10, 80/20, 70/30 and 60/40, respectively. Whereas higher or lower concentration of the solution resulted in failure to produce the fiber by using electrospinning. After nanofiber was produced, the size of the fiber was between 36-563 nm and this research also found that the scaffold of the 60/40 mixture occurred the smallest fiber with average fiber size of 41 nm which contained white granules in its structure. Water absorption analysis of fiber revealed that 100/0 mixture scaffold had the highest rate of absorption which was 11.79% and average lower swelling ratio of 62.7% in comparison with swelling ratio of the scaffold from freeze dry technique.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)

Session 1: 8 presentations- Topic: “Material Science and Engineering”

Session Chair: Prof. Sarawut Rimdusit

C0012 Presentation 3 (14:25~14:40)

Characterization of Gelatin-Carboxymethylcellulose Scaffolds

Fasai Wiwatwongwana

Pathumwan Institute of Technology, Thailand

Abstract—Scaffold is a biocompatible material that helps relieve patients with skin loss symptoms caused by, for example, burns and ulcer. The scaffold also provides suitable condition at the wounded site and promotes faster healing process. In this research, gelatin was selected for scaffold fabrication with additional Carboxymethylcellulose (CMC) for the structural strengthening where freeze drying method was used to form the porous structure. The scaffold was fabricated in various gelatin-CMC ratio for the investigation which was 100:0, 90:10, 80:20, 70:30 and 60:40. The material behavior of this scaffold is likely to be a foam-like hyperelastic material. Therefore, large deformation theory was applied to achieve the engineering stress constitutive equation in forms of Blatz-Ko model. The large deformation theory has been used to derive the constitutive equation to obtain the engineering stress equation in the form of Blatz-Ko hyperelastic model. The mechanical characterization of the scaffold was done by performing compressive test using universal testing machine (UTM). The data obtained from the UTM were used to plot the stress-strain relation. The identification of shear modulus of the scaffold was done using curve fitting method where it is approximately 7% according to the Blatz-Ko model description that it is suitable for infinitesimal strain theory. The physical characterization was done by using scanning electron microscopy (SEM) to investigate pore size of scaffolds. The results obtained showed the appropriate pore size of the scaffold with average pore size of 130 µm to 180 µm.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)

Session 1: 8 presentations- Topic: “Material Science and Engineering”

Session Chair: Prof. Sarawut Rimdusit

C0013 Presentation 4 (14:40~14:55)

The Antibacterial and Antioxidant Activity of Centella Asiatica Chloroform Extract -Loaded Gelatin Nanoparticles

Kittiya Kesornbuakao, Patchanee Yasurin, Suksun Amornraksa, Malinee Sriariyanun and Suvaluk Asavasanti

King Mongkut’s University of Technology North Bangkok, Thailand

Abstract—Nanoencapsulation of Centella asiatica (CA) crude chloroform extract seems to be an attractive approach that may improve drug bioavailability and drug delivery system. In the study, CA extract-loaded gelatin nanoparticles (CGNP) were developed by gelatin one-step and two-step desolvation methods, using three different ratios between CA crude chloroform extract and gelatin (1:2, 1:3, and 1:4 w/w). The antibacterial and antioxidants activities of CGNP and CA were compared. The antioxidant activity of CGNP and CA was evaluated by using DPPH radical scavenging assay and feric reducing antioxidant power (FRAP) assay. Results showed an enhancement of CGNP antibacterial activity against food borne pathogen. The highest inhibition diameters and FRAP determined from CGNP prepared by one-step at 1:4 ratios (1.03±0.39 cm and 1.23±019 mmol Fe2+/mg dried weight, respectively). However, CGNP was no significant difference in DPPH radical scavenging activity compared to CA. These results provide useful information for developing effective nanoencapsulation of CA as effective natural ingredient.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)

Session 1: 8 presentations- Topic: “Material Science and Engineering”

Session Chair: Prof. Sarawut Rimdusit

C0015 Presentation 5 (14:55~15:10)

Preparation of Microcrystalline Cellulose from Water Hyacinth Reinforced Polylactic Acid Biocomposite Film

Teerapa Semachai, Panitnad Chandranupap and Pravitra Chandranupap

King Mongkut's University of Technology North Bangkok, Thailand

Abstract—In this work, we successfully mixed polylactic acid (PLA) with microcrystalline cellulose (MCC) from water hyacinth. The MCC was prepared by treating water hyacinth fiber (WHF). Then hydrochloric acid was used to hydrolyse treated fiber to MCC. X-rays diffraction (XRD) showed that the MCC produced has 73.28 per cent crystallinity. Internal mixing was used to combine composites between MCC and PLA. Percentage of MCC were 1, 5, 10 and 15, respectively. Fourier transform infrared (FT-IR) spectroscopy indicated that the interaction between MCC and PLA are only mechanically interaction. Tensile testing of this composite (ASTM D638) revealed that tensile strength and percentage of elongation at break decreased but the increase of young’s modulus. The morphological analysis was observed thru composites fractured surface by Scanning Electron Microscope (SEM). They showed a void between cellulosic fiber and PLA when high amount of MCC conformed with tensile results.
**Afternoon, May 24, 2018 (Thursday)**

**Time:** 13:55~15:55

**Venue:** 11<sup>th</sup> floor, 100<sup>th</sup> Building, Faculty of Engineering (Room 1106)

**Session 1:** 8 presentations- Topic: “Material Science and Engineering”

**Session Chair:** Prof. Sarawut Rimdusit

C0019 Presentation 6 (15:10~15:25)

Synthesis of pH-Sensitive Nanoparticles Based on Poly(Methylmethacrylate–Co-Methacrylic Acid) with Triggered Release of Bromothymol Blue Payloads

**Goragot Supanakorn** and Duangporn Polpanich

National Nanotechnology Center (Nanotec), Thailand

*Abstract*—pH-sensitive polymeric nanoparticles (pH-NPs) are paid much attention. The controlled release and protection properties of loaded compounds of interest upon changing environment pH make them very advantageous in biomedical and biotechnology fields. In this study, poly(methyl methacrylate-co-methacrylic acid) (PMMA-co-MAA) nanoparticles loaded with a pH indicator bromothymol blue (BB) were prepared using solvent evaporation technique. Effects of initial content of PMMA-co-MAA and cystamine dihydrochloride (CYS) crosslinker on particle size, loading and encapsulation efficiencies (LE and EE) were systematically studied. At neutral pH, both un-crosslinked and crosslinked pH-NPs exhibited good colloidal stability with hydrodynamic size in range of 290 – 400 nm. Results from Transmission Electron Microscope (TEM) revealed that the prepared nanoparticles were spherical and relatively uniform size distribution. It was found that adding CYS enhanced EE of the particles. Releasing of BB from pH-NPs upon changing pH was detected using UV spectroscopy at 200 - 800 nm. Their color of the prepared pH-NPs was changed from yellow to blue by changing pH from pH 7 to pH 13. Advanced researches are ongoing to provide more evidence to confirm the possibility for using these nanoparticle as simple colorimetric bacterial detection.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)

Session 1: 8 presentations- Topic: “Material Science and Engineering”

Session Chair: Prof. Sarawut Rimdusit

C3004 Presentation 7 (15:25~15:40)

Study of the Mix Cement Properties of Mortar Cement Used in Masonry and Plaster from the Waste Biscuit Firing of Ceramic

Wiwat Klangvijit and Krissadang Sookramoon

Vallaya Alongkorn Rajabhat University, Thailand

Abstract—The purpose of this study is to study the characteristics of cement mixes and to find out the right qualities according to Mortar Cement in terms of flow formation period compressive strength. This work was tested for the properties of cement Mortar at Research and Development Department, Department of Concrete Testing, Royal Irrigation Thailand in ASATM C 91-97C, and ASTM C 807-89 standard. The results of the study indicated that the formula of Mortar Cement A1 flow characteristics 112, the formation time was 45 minutes and the compression strength was on the average of 39.35 MPa. Mortar Cement A2 flow characteristics 112 formation time was 45 minutes, compression strength was on the average of 25.35 MPa. Mortar Cement A3 properties of flow 118, formation time was 60 minutes, Compression strength was on the average of 17.73 MPa. Mortar Cement A4 features of flow 113, formation time was 55 minutes, compression strength was on the average of 15.33 MPa. Mortar cement A5 features of the flow 114, formation time was 55 minutes compression strength was on the average of average 15.30 MPa. From the experimental result, we found that the best formulation is Mortar Cement A1, which has the highest characteristics in every property. From this study Molar cement, a material in the pozzolanic group, it is suitable for production and development in repairing old buildings or historic site. Mortar Concrete has less expansion but high density of water slow rate of development due to slow reaction with water. However, the compressive strength in the back is the same, the old work with the repair parts do not crack because of the surface tension, the material caused by rapid dehydration.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)

Session 1: 8 presentations- Topic: “Material Science and Engineering”

Session Chair: Prof. Sarawut Rimdusit

C0032 Presentation 8 (15:40~15:55)

Wave Absorption and Thermal Stability of Nickel Coated Al₂O₃ Core-Shell Composite Powder

Hu Wei and Cheng Li

Nanjing University of Aeronautics and Astronautics, China

Abstract—As a composite cermet material, the nickel coating on the surface of alumina particles has important application value because of its good electromagnetic wave absorption performance. In this study, nickel was deposited on the surface of alumina nanopowders by hydrothermal method and sintering method. The results show that the XRD results of nickel alumina show that Ni-Al₂O₃ nanoparticles has FCC face-centered cubic structure. The grain size is about 50 nm. The absorption characteristics of electromagnetic waves were measured at 2-18 GHz by HP 8722 es microwave network analyzer. The results show that Ni-Al₂O₃ nanoparticles has certain wave-absorbing properties.

15:55-16:15 Coffee Break
Session 2

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

Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 2: 8 presentations- Topic: “Applied Chemistry”

Session Chair: Prof. Frank Yang

C0020 Presentation 1 (13:55~14:10)

Chemical Profiling Analysis and Identification the Bioactivities of Herbal Compress Extracts

Sumitta Chotikamas, Kraipat Cheenkachorn, Boochita Wongpanit, Prapakorn Tantayotai, and Malinee Sriariyanun

King Mongkut’s University of Technology North Bangkok, Thailand

Abstract—The traditional Thai herbal compress is composed of six different types of herbs including Ginger (Zingiber cassumunar), Turmeric (Curcuma longa Linn.), Soap Pod (Acacia concinna), Kaffir lime (Citrus hystrix), Lemongrass (Cymbopogon citratus), and Tamarind (Tamarindus indica Linn.). Herbal compress is used in treatment of Thai traditional massage to relieve the body pain and muscle strains. The objective of this work is to perform chemical profiling and extraction modelling of herbal compress obtained from solvent extraction method. The kinetic models, The second order and Fick’s second law, representing the extraction behaviors of bioactive compounds were constructed to fit with experimental data of solvent extraction. Under tested condition, the extraction equilibrium was reached after 360 min and the second-order model gives the best fit for the experimental data with high coefficients of correlation ($R^2 = 0.9927$). Additionally, chemical profiling analysis showed that the amounts and variations of bioactive components in drying-pretreated herbal compress were more abundant than that of untreated sample. This finding could be applied further for preparation and production of traditional Thai herbal compress in the industrial scale.
Study of Mathematical Models in Hot Air Drying of Herbs in Herbal Compress Ball

Boochita Wongpanit, Sumitta Chotikamas, Supacharee Roddecha, Prapakorn Tantayotai and Malinee Sriariyanun

King Mongkut’s University of Technology North Bangkok, Thailand

Abstract—Herbal compress ball is currently one of important products of Thailand for exporting sales worldwide. It is used in Thai traditional medical treatment and spa to reduce muscle pain and relaxation. This research aimed to generate the mathematical models representing the behaviors of herbs in hot air drying to extend shelf life for exporting sales. Here, six types of herbs, including Prai (Zingiber cassumunar Roxb.), Turmeric (Curcuma longa Linn.), Lemongrass (Cymbopogon citratus), Kaffir lime (Citrus hystrix), Soap Pod leaves (Acacia concinna) and Tamarind Leaves (Tamarindus indica Linn.) were dried in different temperature at 60, 70, and 80 °C. Fours drying models, Page, Henderson and Pabis, and Logarithmic and Fick’s second law equation were applied with experimental data of drying herbs to predict the rate of diffusion of water. The results showed that the Page model is the most suitable model due to the highest decision coefficient ($R^2$) but the lowest Root Mean Square Error (RMSE). The effective moisture diffusivity ($D_{eff}$) of the herbs in herbal compress ball was increased with increased the drying temperature. The size of the herb particle translated inversely with effective moisture diffusivity ($D_{eff}$) value.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 2: 8 presentations- Topic: “Applied Chemistry”

Session Chair: Prof. Frank Yang

C0031 Presentation 3 (14:25~14:40)

Investigating the Potential Use of Ionic Liquids in Pretreatment Application for Water Desalination

Hadil Abu Khalifeh, Enas Nashef, Asiya Nazir, Noora Al Mansoori, Ibrahim Yousef and Awatif Sharhabiel

Abu Dhabi University, United Arab Emirates

Abstract—The world has been noticing a quickening advancement over the last decades in terms of irrigated agriculture, social, industrial, and economical perspectives; followed by a huge increment in the water demand. Therefore, desalination is used all over the world to reduce worldwide water shortage; however, the traditional techniques lead to fossil fuel depletion and global warming. Therefore, scientists are investigating new green and environment-friendly methods to be used by the desalination plants to reduce CO₂ emissions and save the natural resources. In this study, the feasibility of using ionic liquids (ILs) as potential means for pre-treatment of seawater desalination was examined. The main aim of this work was to examine the ability of ILs in extracting salts from saline water. As a first step, the solubility of NaCl, MgCl₂, and CaCl₂ in different ILs at different temperatures were analyzed. The solubility of the salts in ILs increased in most cases with temperature increments; however, the presence of emulsion was seen in a few cases. The highest measured concentration of NaCl was 6,639 ppm at 60 °C in 1,3-Dimethylimidazolium dimethyl phosphate.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 2: 8 presentations- Topic: “Applied Chemistry”

Session Chair: Prof. Frank Yang

C3007 Presentation 4 (14:40~14:55)

Destruction of Polychlorinated Biphenyls under Subcritical Water Conditions in the Presence of Hydrogen Peroxide or Sodium Hydroxide

Ninad Doctor and Yu Yang

East Carolina University, Greenville, North Carolina, USA

Abstract—Polychlorinated biphenyls (PCBs) are toxic pollutants that need to be cleaned and removed from our environment. In this work we have investigated the destruction of PCBs using microwave heating, conventional heating PCBs in water-hydrogen peroxide or water-sodium hydroxide systems. After heating, liquid-liquid extraction of the reaction mixtures was conducted prior to GC analysis. Our results revealed that the degradation efficiency obtained by microwave heating ranged from 18% to 53%. Fortunately, PCB-118, PCB-156, and PCB-180 congeners were effectively degraded in subcritical water with hydrogen peroxide or sodium hydroxide. Higher concentration of hydrogen peroxide and longer heating time increased PCB degradation. Over 91% PCB degradation was achieved for all three PCB congeners after 6 hours of heating at 350 °C with 30% hydrogen peroxide in water. The concentration of sodium hydroxide in water had only a mild influence on PCB degradation. However, high temperature significantly enhanced the efficiency of PCB degradation in water-sodium hydroxide system. All three PCB congeners investigated were completely destroyed after heating in 0.2% sodium hydroxide at 350 °C for an hour.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 2: 8 presentations- Topic: “Applied Chemistry”

Session Chair: Prof. Frank Yang

C0033 Presentation 5 (14:55~15:10)

Effect of Roasting and Kneading on Antioxidant Activity and Consumer Acceptance towards Asiatic Pennywort Tea

Rungnattakan Ploenkutham, Preeyapa Sripromma, Suksan Amornraksa, Patchanee Yasurin and Aussama Soontrunnarudrungsri

King Mongkut’s University of Technology North Bangkok, Thailand

Abstract—Nowadays, population have more age and longer life than ancient people which the World Health Organization (WHO) reported that the proportion of the global population will become ‘Aging Society’ during healthier lifestyles, new advance technologies especially in medical manufacture. This study was aimed to study attitude, behavior and opinion of elderly people towards herbal tea products and to optimize preparation, procedure and process of Asiatic Pennywort tea. According of the study, there are 100% of Thai people ever consume herbs and herbal tea, they consume as beverage. Half of consumer surveys are no chronic health conditions. Safety of product is the most factors that effect to purchasing decision. The consumers are agree (73%) in nutrition value that presented on label as it’s clamed on the package. Result from this study shown that roasted and kneading process is highest mean score from consumer’s preference 7.07±1.51 (P<0.05) that this method is significantly different in total phenolic content and Ferric reducing antioxidant potential assay but not in DPPH radical scavenging which is highest mean of second significantly level.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 2: 8 presentations- Topic: “Applied Chemistry”

Session Chair: Prof. Frank Yang

C3003 Presentation 6 (15:10~15:25)

Effect of Polymer Degradation on Polymer Flooding in a Homogeneous Reservoir

Xiankang Xin, Gaoming Yu, Ruicheng Ma, Linkai Li, Weiying Wang, Zhongzhi Zhang, Li Wang, Yadi Gu, Keliu Wu and Zhangxin Chen

China University of Petroleum, China

Abstract—In this paper, physical and numerical simulations were applied to investigate the polymer degradation performance and its effect on polymer enhanced oil recovery (EOR) efficiency in homogeneous reservoirs. Physical experiments were conducted to determine basic physicochemical properties of the polymer, including viscosity, rheology, and degradation. A new numerical method was proposed, and an in-house simulator was designed to further explore polymer degradation. The results of the physical experiments illustrated that polymer could increase polymer solution viscosity significantly, and the relationship between polymer solution viscosity and polymer concentration exhibited a clear exponential relationship. However, the viscosity of a polymer solution with the same polymer concentration decreased with an increase in the shear rate, showing shear thinning performance. Moreover, the viscosity decreased with an increase in time, which was caused by polymer degradation. The validation of the designed simulator was improved when compared to the simulation results using ECLIPSE V2013.1 software. The difference between 0 and 0.1 day^-1 in the polymer degradation rate showed a decrease of 6% in oil recovery after 2,000 days, according to simulation results, which demonstrated that polymer degradation had an adverse effect on polymer flooding efficiency.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 2: 8 presentations- Topic: “Applied Chemistry”

Session Chair: Prof. Frank Yang

M1001 Presentation 7 (15:25~15:40)

Sappan (Caesalpinia Sappan) Seeds in the Control of Cockroach (Periplenata Americana)

Liwayway H. Acero, Ma. Eliza P. Cruz and Fedeliz S. Tuy

San Beda University Manila Philippines, Philippines

Abstract—Cesalpina sappan has been known in tropical countries, as one of herbal plant use in rural areas. The heartwood is utilized as firewood. There are studies on its medicinal use, but its potential as control to cockroach is not yet explored. This research was undertaken to determine what concentration of seed ethanol extract (SSEE) will control cockroach. Result of this study is beneficial to rural and urban areas where cockroaches are abundant. It is most beneficial in places where Sappan seeds are just thrown away, which can be used as potential source of insecticide from plants. Experimental research method with four treatments and 80 experimental animals was used. SSEE was macerated in 95% ethanol. Eighty cockroaches were assigned in four groups/treatments, with 20 cockroaches per treatment. They were exposed to different concentrations as; T-0% SSEE, T1, 25% SSEE, T2, 50% SSEE, and T3, 75% SSEE. Gathered data was analyzed using Analysis of Variance (ANOVA) and Fisher Least Significant Difference test (LSD). Findings of the study revealed that highest percentage of mortality after 48 hours observation, was obtained from treatment three (75 %percent SSEE). Based on this result Sappan seeds ethanol extract has a significant potential in the control of cockroaches specifically at higher concentration.
Afternoon, May 24, 2018 (Thursday)

Time: 13:55~15:55

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 2: 8 presentations- Topic: “Applied Chemistry”

Session Chair: Prof. Frank Yang

M2001 Presentation 8 (15:40~15:55)

Termiticidal Potential of Sappan (Caesalpinia Sappan) Seeds

Liwayway H. Acero, Ma. Eliza P. Cruz and Fedeliz S. Tuy

San Beda University Manila Philippines, Philippines

Abstract—Termites (Coptotermes formosanus) has been known as household destructive insect in rural and urban areas. It feed on wooden scaffoldings and infrastructures of houses and buildings. Cesalpina sappan grows in tropical countries, and is known as one of herbal plant use in rural areas. The heartwood is utilized as firewood. Researches on its medicinal use, was already explored, but no study on its potential as control to termites is conducted. This research was undertaken to determine what concentration of Sappan seed ethanol extract (SSEE) will kill termites. Houses and buildings in rural and urban areas infested with termites will be benefited with the result of this study. It is most beneficial in places where Sappan seeds are just thrown away, which can be used as potential source of insecticide from plants. Experimental research method with four treatments and 80 experimental animals was used. SSEE was macerated in 95% ethanol. Eighty termites were assigned in four groups/treatments, with 20 termites per treatment. They were exposed to different concentrations as; T-0% SSEE, T1, 10% SSEE, T2, 20% SSEE and T3, 30% SSEE. Gathered data was analyzed using Analysis of Variance (ANOVA) and Fisher Least Significant Difference test (LSD). Findings of the study revealed that highest percentage of mortality after 1 hour observation, was obtained from treatment 3 (30% percent SSEE). Based on this result Sappan seeds ethanol extract has a significant potential in the control of termites specifically at 30% concentration.
Session 3

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

Afternoon, May 24, 2018 (Thursday)

Time: 16:15~17:45

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)


Session Chair: Prof. Hongqi Sun

C0016 Presentation 1 (16:15~16:30)

Strategies for Promoting Steelmaking Slag Resourcezation in Taiwan

Ching-jung Chang
Chung Hua University, Taiwan

Abstract—Because of the world ever-growing pursuit of economic growth, natural resources have been overly exploited and squandered. Such actions have created a negative effect on the environment and led to resource depletion. These problems subsequently garnered the government attention for waste reuse, in which they began to promote sustainable circulation and reuse of resources to lower natural resource consumptions. Accordingly, the concept of the “3 R’s,” namely, reduce, recycle, and reuse was introduced. However, the said concept merely adopts a unidirectional, cradle-to-grave-based treatment and fails to consider the effects of waste on the economy and society. Taiwan produces approximately 20 million tonnes of waste annually, roughly 40% of which are slags. The illegal dumping and burying of slags have negatively influenced Taiwan’s environment, economy, and society. Thus, the present study revolutionized the 3R concept by introducing the cradle to cradle concept. Producers are recommended to consider product features and slag usage options during the steelmaking process. Transparent productions, effective management, scientific treatments, and systematic inspections are employed to bring slags into industrial circulations, facilitating the recycling and reuse of resources.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~17:45

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)


Session Chair: Prof. Hongqi Sun

C2003 Presentation 2 (16:30~16:45)

Syngas from Updraft Gasifier Incineration for Internal Combustion Engine Power Generation in Klongluang PathumThani Thailand

Krissadang Sookramoon

Vallaya Alongkorn Rajabhat University Under the Royal Patronage, Thailand

Abstract—This paper presents the internal combustion engine power generation using syngas from the updraft biomass gasifier as a fuel. 3 types of fuel such as Golden shower tree wood chip, charcoal, and gasohol 91 were tested for the engine running. The experiment was performed on July 25-26, 2017 at Faculty of Industrial Technology Vallaya Alongkorn Rajabhat University Pathum Tani Thailand. Data on the performance of the engines fueled with producer gas and gasohol 91 is presented. The experiment was carried out by using a four-stroke 13 HP gasoline engine coupled with a generator as a load in producing electricity. The carburetor was modified for fuel gas running by loading 7 kg/batch of Golden shower chips and charcoal for syngas producing and the engine performance was measured. The results showed that, the engine power was 110.125 W, 115.425 W, and 128.038 W, while using a golden shower chip, charcoal, and gasohol 91 as the fuel, respectively. The generator efficiency is 80% therefore the generator power reduces 20%. The test indicated that golden shower chips could produce higher quality of syngas than charcoal but the engine power has less power than fueled with gasohol 91.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~17:45

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)


Session Chair: Prof. Hongqi Sun

C2005 Presentation 3 (16:45~17:00)

Extraction and Characterization of Omega-3 Fatty Acid from Catfish Using Enzymatic Hydrolysis Technique

Nur Izzati Iberahim, Yeoh Jia Yin and Khairunissa Syairah Ahmad Sohaimi

Universiti Malaysia Perlis, Malaysia

Abstract—Extraction of Omega-3 fatty acid from Catfish using enzymatic hydrolysis techniques are expected to be more economically possible techniques due to the uses of enzyme with the characteristic of reusable, environmental friendly and less energy required for large-scale production. Malaysian like to consume Catfish in their daily diet. Thus, it is very popular among farmers in Malaysia. Omega-3 polyunsaturated fatty acid have many benefit to human health. Based on research, EPA and DHA can reduce the risk of heart disease by regulate the blood coagulation. The main purpose of this research is to extract the Omega-3 polyunsaturated fatty acid by using enzymatic hydrolysis method. Enzymatic extraction technique by using Alcalase was used to extract the Catfish oil. Then, lipase was used to concentrate the omega-3 polyunsaturated fatty acid. Peroxide value and acid value were used to determine the Catfish oil quality. Optimization using DOE verify that the highest percentage of oil yields at 51°C, 0.91% enzyme concentration and 155 minute incubation time. Finally, there are two types of omega-3 polyunsaturated fatty acid can be found in Catfish oil which is EPA and ALA.
C3006 Presentation 4 (17:00~17:15)

A Novel Global Warming Solution: Use of Flue Gas to Produce Urea

Sumaita Moshiur Rahman, Saniha Aysha Ajith, Zaina Rashed Aldhaheri, Salma Omer Saeed, Laila M Owda and Omar Chaalal

Abu Dhabi University, United Arab Emirates

Abstract—Urea is a nitrogenous organic compound which is widely used as a fertilizer and in the agricultural industry. On an industrial scale, urea can be manufactured from the reaction of carbon dioxide and ammonia. The goal of this research is to design a plant that produces 46.84 ton /hr. urea from the raw materials carbon dioxide and ammonia. The quantities of carbon dioxide and ammonia consumed in the process were 37.32ton/hr. and 28. 84 ton /hr. respectively. The carbon dioxide is obtained using a sustainable approach from the waste products, the flue gas, of a nearby power plant. In the first step of the process, carbon dioxide is extracted in an absorption column that uses ammonia and stripping columns from the flue gases emitted from a power plant. This ensures that the whole production process is environmentally sustainable and contributes in the reduction of carbon dioxide that causes of global warming.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~17:45

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)


Session Chair: Prof. Hongqi Sun

M0005 Presentation 5 (17:15~17:30)

Linear Programming Model for the Measurement of Environmental Performance in Wine Industry—Concepts and Empirical Results

Shiang Chen and Jung-Hua Wu
National Cheng Kung University, Taiwan

Abstract—In Taiwan we are currently facing serious air pollution problems, PM2.5 airborne particles not only endanger the human body, leading to coughing, asthma, chronic bronchial and other respiratory diseases, but it is also carcinogenic, our basic rights for survival has been seriously threatened. According to the latest study by the Environmental Protection Agency, the industrial sector accounts for about 66% of the sources of air pollution in Taiwan. The winemaking industry, with raw materials has several stages of production; it must use electricity, water, oil, diesel, gasoline, and steam as energy. The final product is not only wine, but also the discharge wastewater, lees, CO$_2$, waste gas, etc. Different process methods will produce different energy consumption results, thus providing the possibility of CO$_2$ reduction. This study takes the winemaking industry as a case study, trying to find out how to achieve a concept of “win-win situation“ for both sides of carbon reduction and economy development. First, aiming at the policy of energy saving and carbon-reduction inventory of winery, trying to find out the source of pollution and the change of pollution source during 2008-2016, and then according to the data, the empirical results are analysed. Finally, a linear programming model proposed for the production planning of winemaking processes to achieve maximum operational profit while reducing CO$_2$ emissions. The options considered in this research are levy the carbon tax in different prices to decrease CO$_2$ emissions; installation of new equipment to enhance capacity; switching production schedule that emits less CO$_2$. The objective of the linear programming model is to determine suitable CO$_2$ mitigation options for a given reduction target while meeting the demand of each final product, quality specifications, and simultaneously maximizing profit. In this research, How to achieve the optimal production goals: minimizing the cost & energy consumption, and the maximum production value become the optimal production objection.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~17:45

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1106)


Session Chair: Prof. Hongqi Sun

M0007 Presentation 6 (17:30~17:45)

Analysis of Energy Consumption of Indonesian Flat Glass Industry PT. X Based on Green Industry Standards

Reviana Revitasari and Bambang Heru Susanto

Universitas Indonesia, Indonesia

Abstract—The natural resource consumption is higher along with the increasing needs of people in various sectors, which affect the environment directly or indirectly. Especially for energy consumption, the supply and availability of fossil energy, as a non-renewable energy, are increasingly depleted and not guaranteed in the long run, coupled with the issue of emissions generated. The industrial sector as a driver of the national economy, including the flat glass industry as a case study, is an energy intensive sector. Almost 83% of its energy consumption used for operating the furnaces as the main production unit with temperature up to 1700°C continuously about 15 years. The increasing of effectiveness and efficiency of energy consumption in the glass manufacturing process will affect significantly to sustainable production in PT. X and gives many other valuable impacts to the economic growth, environment, and society. So, this study analyzes about the energy consumption in PT. X based on Green Industry Standards, believed as a proper strategy, the benchmark of some standards or related regulations for energy consumption in several countries, and the opportunity of the green industry concept implementation in the glass manufacturing process. The methods were studied of literature, plant observation, interview, and data calculation manually and using spreadsheets. The results indicate that the Flat Glass Industry PT. X requires the improvement to increase the effectiveness and efficiency of energy consumption to get the sustainable production.
Session 4

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

Afternoon, May 24, 2018 (Thursday)

Time: 16:15~18:00

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 4: 7 presentations- Topic: “Chemistry and Fluids”

Session Chair: Prof. Jian Chen

C0003 Presentation 1 (16:15~16:30)

Structural Transformation in 1D Mercury(II) Halide Coordination Polymer

Pradhumna Mahat Chhetri and Jhy-Der Chen

Chung-Yuan Christian University, Taiwan

Abstract—One-dimensional (1D) isostructural complexes [Hg(L)X$_2$]$_n$ ($X$ = Cl, 1; Br, 2; I, 3) having zigzag chains are obtained by the solvothermal reactions of HgX$_2$ with 2,2’-(1,2-phenylene)-bis(N-pyridin-3-yl)acetamide, L, and 3·MeOH and 3·MeCN, with helical chains are obtained by the layering reaction. In marked contrast to 1 and 2, the iodide containing 3 is able to exhibit reversible structural transformation with 3·MeOH and 3·MeCN by adsorption and desorption of methanol and acetonitrile, suggesting the importance of N–H---X and Hg---X interactions in structural transformation. Moreover, complexes 3·MeOH and 3·MeCN exhibit reversible crystal to crystal transformation triggered by solvent exchange. Complexes 3, 3·MeOH and 3·MeCN represent a unique example that the solvents show a significant effect on folding and unfolding of the HgI$_2$ single-stranded helical coordination polymers.
Abstract—Ten coordination polymers constructed from divalent metal salts, polycarboxylic acids and bis-pyridyl-bis-amide ligands with different donor atom positions and flexibility, \([\text{[Ni(L}^1\text{)(3,5-PDA)(H}_2\text{O}]_3\cdot 2\text{H}_2\text{O}]_n \ (\text{L}^1 = \text{N,N’-di(3-pyridyl)suberoamide, 3,5-H}_2\text{PDA} = 3,5\text{-pyridinedicarboxylic acid})\), 1, \([\text{[Ni}_2(\text{L}^1)_2(1,3,5\text{-HBTC})(\text{H}_2\text{O})_4]\cdot \text{H}_2\text{O}]_n \ (1,3,5\text{-H}_3\text{BTC} = 1,3,5\text{-benzenetricarboxylic acid})\), 2, \([\text{[Ni}(\text{L}^2)(5\text{-tert-IPA})(\text{H}_2\text{O})_2\cdot 2\text{H}_2\text{O}]_n \ (\text{L}^2 = \text{N,N’-di(3-pyridyl)adipoamide, 5-tert-H}_2\text{IPA = 5-tert-butylisophthalic acid})\), 3, \([\text{[Ni}(\text{L}^3)_1(5\text{-tert-IPA})_n(\text{L}^3 = \text{N,N’-di(4-pyridyl)adipoamide})\), 4, 
\([\text{Co}(\text{L}^4)(1,3,5\text{-HBTC})(\text{H}_2\text{O})]_n\), 5, \([\text{Co}_3(\text{L}^4)_3(1,3,5\text{-BTC})(\text{H}_2\text{O})_2\cdot 6\text{H}_2\text{O}]_n\), 6, 
\([\text{Cu}(\text{L}^5)(\text{AIPA})]_n \ (\text{L}^5 = \text{N,N’-bis(3-pyridinyl)terephthalamide, H}_2\text{AIPA} = 5\text{-acetamido isophthalic acid})\), 7, \([\text{[Cu}(\text{L}^6)_0\text{(AIPA)})\cdot \text{MeOH}]_n\), 8, \([\text{[Zn}(\text{L}^7)(\text{AIPA})\cdot 2\text{H}_2\text{O}]_n\), 9, 
\([\text{[Zn}(\text{L}^8)(\text{AIPA})\cdot 2\text{H}_2\text{O}]_n\), 10, are reported, which were structurally characterized by using single crystal X-ray diffraction. Complex 1 forms a 1D chain and 2 is a two-fold interpenetrated 2D layer with the sq1 topology, while 3 is a 2D layer with the hcp topology and 4 shows a self-catenated 3D framework with the rare \((4^2\cdot 6^3\cdot 8)\)-hxg-d-5-C2/c topology. Different Co/1,3,5-HBTC ratios were used to prepare 5 and 6, affording a 2D layer with the sq1 topology and a 2D layer with the \((4\cdot 8^5)_2(4^2\cdot 8^3)_2(8)\) topology that can be further simplified to a hcp topology. While complex 7 is a 2D layer with the \((4^2\cdot 6^3\cdot 8)(4^2\cdot 6\cdot 3,5L2\) topology and 8 is a 2-fold interpenetrated 3D framework with the pcu topology, complexes 9 and 10 are self-catenated 3D frameworks with the \((4^{24}\cdot 6^3)\)-8T2 and the \((4^4\cdot 6^{10}\cdot 8)\)-mab topologies, respectively. The effects of the identity of the metal center as well as the ligand isomerism and flexibility of the spacer ligands on the structural diversity of these divalent coordination polymers are discussed. The luminescent properties of 9 and 10 and their photocatalytic effects on the degradation of dye are also investigated.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~18:00

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 4: 7 presentations- Topic: “Chemistry and Fluids”

Session Chair: Prof. Jian Chen

C0007 Presentation 3 (16:45~17:00)

Temperature Property of Pollutant Emissions Induced by Two Impinging Flames of Propane

Huaxian Wan, Haobo Wang, Jie Ji, Zihe Gao and Yongming Zhang

University of Science and Technology of China, China

Abstract—When an uncontrollable fire along with pollutant emissions and high temperatures is erupted in a building, the ceiling-mounted thermal and smoke actuated detectors are required to be activated simultaneously to achieve quick energy detecting, cooling and controlling. Finding the optimal spacing between detectors is a rather complicated problem for multiple impinging flames with interaction. In view of the need to raise the energy detecting, a series of experiments was conducted to study the ceiling gas temperature decay profile induced by two impinging flames. Propane with the luminous flame and large pollutant emissions was used as the fuel. The heat release rate (HRR), burner edge spacing and ceiling height above the burner surface were varied. The ceiling gas temperatures along the direction of changing spacing were measured to determine the impingement point position and temperature decay profile. Results showed that there is only one peak ceiling gas temperature with small spacings, while two peak temperatures are presented with large spacings. The impingement point position is dependent on the HRR, spacing and ceiling height, while the maximum gas temperature is weakly affected by the spacing. The horizontal ceiling gas temperature decays slower with increasing the HRR. The present work will help to improve the understanding of multiple impinging flames and provide beneficial guidance in installations of the heat and smoke detection and alarm systems.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~18:00

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 4: 7 presentations- Topic: “Chemistry and Fluids”

Session Chair: Prof. Jian Chen

C0008 Presentation 4 (17:00~17:15)

Thermodynamic Stability of Bulk and Surface Phases for Alkali Metal Oxides

Yang-Xin Yu

Tsinghua University, Beijing, China

Abstract—The metal–air battery has great potential with a specific energy density comparable to that of gasoline. Several alkali metal oxide phases involved in the charge–discharge process influence the overall performance of the batteries significantly. In order to determine the stabilities of the metal oxides, density functional theory and phonon models were used to analyze the values of various thermodynamic functions for the alkali metal oxides at different temperatures and oxygen fugacities. This study also systematically examined the surface thermodynamic properties of oxides of alkali metals. The surface relaxation, surface reconstruction, surface energy, and surface work functions of their low-index surface were studied using density functional theory. The results show that different surfaces of each alkali metal oxide can be ranked in ascending order of surface energy as: (111) < (110) < (211) < (221) < (210) < (100). For each surface type, the alkali metal oxides can be ranked in Li < Na < K < Rb. Phase diagrams describing the surface transformation and thermodynamics of these oxides were derived from the relative energy levels of their surfaces. Among all surface types of the alkali metal oxides, the (111) surface exhibits the lowest energy at normal temperatures and oxygen fugacities. Our work is benefit to improve battery design and performance in large battery applications under various conditions.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~18:00

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 4: 7 presentations- Topic: “Chemistry and Fluids”

Session Chair: Prof. Jian Chen

C0011 Presentation 5 (17:15~17:30)

A Numerical Study of the Influence Tunnel Slope and Length on Chimney Effect in Inclined Road Tunnel Fires

Meijuan Ye, Jie Ji, Zihe Gao, Yong Jiang and Dechuang Zhou

University of Science and Technology of China, China

Abstract—Full-scale CFD simulations were presented to study the effect of stack effect on burning behaviors of fires in inclined tunnels. The tunnel slope and length were changed to produce a desired stratified ceiling jet layer. Methanol with low soot emissions was used as the fuel. The calculation parameters used have been verified by comparing with small size experiments of inclined tunnel fire. The grid dependency of the calculating results were also confirmed in detail. The smoke flow pattern transition from two-way flow to one-way flow was observed through the temperature field in the entire fire affected area. The upstream vortex was the result of the competition of the air flow induced by the chimney effect and the smoke flow. The maximum temperature rise of the smoke layer and its position, temperature decay properties from the plume impingement point in the upward and downward direction were investigated and empirical correlations were developed by taking into account the tunnel slope, tunnel length, heat release rate and using dimensional analysis. The results indicated that the gas temperature decays faster along the ceiling for tunnels with higher slope and length. Backing-up distance of smoke layer to air supply side was also investigated by dimensional analysis and compared with previous model. Results showed the former model overestimated the backing-up distance of long tunnels.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~18:00

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 4: 7 presentations- Topic: “Chemistry and Fluids”

Session Chair: Prof. Jian Chen

C0028 Presentation 6 (17:30~17:45)

Electrostatic Force between Two Dielectric Particles in Electrorheological Fluids: beyond Spherical Particles

Hongzhe TANG, Li GAN and Wei AN

Beihang University, China

Abstract—In an effort to increase the shear yield stress of dielectric electrorheological fluids, we focus on the electrostatic force of different forms of particles in a dielectric polarization model. By solving Laplace’s equation and applying the multiple image method and the finite element method, the analytical and numerical solutions of the electrostatic force of a two-sphere structure have been studied. The results suggest that when the dielectric mismatch factor is large and when the positions of the two spheres are nearly in contact with each other, most of the analytical solutions either over- or underestimate the force. Additionally, the structure of particles beyond the spherical form is considered. Three example cases are studied to shed light on how different geometries of particles may affect the electrostatic force, thereby influencing the shear yield stress of the fluid.
Afternoon, May 24, 2018 (Thursday)

Time: 16:15~18:00

Venue: 11th floor, 100th Building, Faculty of Engineering (Room 1101)

Session 4: 7 presentations- Topic: “Chemistry and Fluids”

Session Chair: Prof. Jian Chen

C0034 Presentation 7 (17:45~18:00)

Scale-up of Solid-Liquid Mixing Based on Constant Power/Volume and Equal Blend Time Using Visimix Simulation

Waliyuddin Sammadikun and Megawati Megawati

Universitas Negeri Semarang, Indonesia

Abstract—Mixing in stirred tank is one of the important process in many area of chemical industries. For instance pharmaceutical, drug, ink, paint and other industries. Solid-liquid suspension is produced for 80% of all mixing industries such as leaching process, crystallization process, catalytic reactions, precipitation, coagulation, dissolution and other applications. Two main objectives in solid-liquid mixing namely, avoid settling of solid particles on the tank bottom and ensure the solid particles are uniformly distributed. many factors that can affect the quality of solid-liquid mixing, they are tank geometry, impeller geometry and speed, baffles, density and rheological properties of liquid. Scale-up of solid-liquid mixing is important to conduct before making it on commercial scale. Two parameters namely power per volume and equal blend time can be used as scale-up parameters. Before scaling up the process to industrial scale, an engineer must know the condition of the mixture between both of two. VisiMix can be used to simulate scale-up of solid-liquid mixing process. Simulation helps engineer to know the condition in large scale without doing some experiments and cost efficiently. The simulation start from keep the ratio of impeller to tank between lab-scale and industrial scale remains the same, then change the condition operation of mixing. Scale-up of solid-liquid mixing based on power per unit volume is more recomended than equal blend time due to the degree of uniformity of solid phase in liquid
Poster Session

May 24, 2018 Thursday

Time: 9:00~17:45

Venue: 11th floor, 100th Buiding, Faculty of Engineering (Room 1106)

Poster Session: 1 presentation

C2004 Poster 1

Application of Conductive Complex Polymer Films as Sensitive Layers for Sensors

Krutovertsev Sergey, Ivanova Olga, Krutovertseva Larisa and Tarasova Alla

JSC “Ecological sensors and systems”, Russia

Abstract—The films of conductive organic polymers doped with active substances represent a great interest as sensitive layers of chemical sensors. The simplicity of synthesis and the possibility of controlling the structure and properties of polyaniline (PANi) within broad limits both by changing the film formation conditions and by introducing various modifying additives into the film determine the continuous interest in this compound. One of the main advantages of the sensors based on films of conductive polymers consists in the possibility of the functioning at room temperature. In addition, through altering the structure and composition of the polymer one can enhance substantially the selectivity and sensitivity of such sensors with respect to various gases. An important problem, which has to be resolved in this context, is ensuring long-term stability of the properties of the initial polymer matrix.

Heteropolycompounds (HPCs) attract a special attention among various substances that can be used as the sensor’s components of active layer, thanks to unique combination of their various physical and chemical properties. HPCs are classified as complex polyoxocompounds. These compounds can act as reversible reagents in the reactions of ligand exchange and redox transformations, accompanied by changes in current carrier concentration or catalysts of such transformations that can be used in chemical sensors. HPCs can be incorporated directly into the initial matrix of basic sorbent to improve sensitivity and selectivity to active gases.

The problem of long-time stability of chemical sensors sensitive layers remains important factor. It was shown that heteropolyanion composition has a considerable influence on sensor characteristics of doped films. We compared the properties of pure and Dawson-type HPC doped PANi films obtained by electrochemical synthesis. Composite nanostructured films were deposited by electrochemical method on test structures with a pair of interdigital metal electrodes formed at their surface. The sensor’s active area was 4.0 x 4.0 mm, and electrode gap was equal 0.08 mm. PANi was modified in the course of synthesis.
Heteropolycompounds with composition of $\text{H}_6\text{P}_2\text{W}_{18}\text{O}_{62}$ and $(\text{NH}_4)_9\text{P}_2\text{W}_3\text{Mo}_{15}\text{O}_{62}$ were incorporated into the initial solutions.

The study showed that the measurement conditions affect markedly the behavior of sensors, which can be improved by choosing of the right procedure of measurements which takes into account of applied voltage, environment temperature and humidity. Morphology of the layers’ surface, infrared spectra, adsorption activity and gas sensitivity were studied.
One Day Visit
May 25, 2018 (Friday) 9:00~17:00

(Tips: Please arrive at Chulalongkorn University before 9:00 a.m. The following schedule is only for participants who registered the visit & tour. The following places are for references, and the final schedule should be adjusted to the actual notice.)

1. (9:00) Assemble at Chulalongkorn University, 11th floor, 100th Building, Faculty of Engineering (Room 1101)

2. Walking Tour to Department Library, Faculty Library, University Tour, Bangkok Art and Culture Center, MBK Hall in Chulalongkorn University

Chulalongkorn University, is a public and autonomous research university in Bangkok, Thailand. The university was originally founded by King Chulalongkorn's reign as a school for training royal pages and civil servants in 1899 (B.E. 2442) at the Grand Palace of Thailand. It was later established as a national university in 1917, making it the oldest institute of higher education in Thailand.

3. Have lunch together

4. Visit Wat Benchamabophit Dusitvanaram

Wat Benchamabophit Dusitvanaram is a Buddhist temple (wat) in the Dusit district of Bangkok, Thailand. Also known as the marble temple, it is one of Bangkok's most beautiful temples and a major tourist attraction. It typifies Bangkok's ornate style of high gables, stepped-out roofs and elaborate finials.
5. Visit Wat Arun (Temple of Dawn)

Wat Arun (Temple of Dawn) is a Buddhist temple (wat) in Bangkok Yai district of Bangkok, Thailand, on the Thonburi west bank of the Chao Phraya River. The temple derives its name from the Hindu god Aruna, often personified as the radiations of the rising sun. Wat Arun is among the best known of Thailand's landmarks and the first light of the morning reflects off the surface of the temple with pearly iridescence.

Although the temple had existed since at least the seventeenth century, its distinctive prang (spires) were built in the early nineteenth century during the reign of King Rama II.

6. Visit Temple of the Golden Buddha (Wat Traimit)

The Golden Buddha, officially titled Phra Phuttha Maha Suwana Patimakon, is a gold statue, with a weight of 5.5 tons (5,500 kilograms). It is located in the temple of Wat Traimit, Bangkok, Thailand. At one point in its history the statue was covered with a layer of stucco and coloured glass to conceal its true value, and it remained in this condition for almost 200 years, ending up at what was then a pagoda of minor significance. During relocation of the statue in 1955, the plaster was chipped off and the gold revealed.

7. (17:00) Back to Chulalongkorn University
Chulalongkorn University, abbreviated either CU or Chula, is a public and autonomous research university in Bangkok, Thailand. It is ranked as Thailand's No. 1 university from various organizers such as QS world university ranking, Round university ranking, Center for world university ranking etc. The university was established in 1917, making it the oldest institute of higher education in Thailand.

The university began taking shape during King Chulalongkorn's reign when he founded the Royal Pages School in 1902 at The Grand Palace of Thailand. During the reign of his son, King Vajiravudh, the Royal Pages School became the Civil Service College of King Chulalongkorn. The Rockefeller Foundation was instrumental in helping the college from its academic foundation. On March 26, 1917, King Vajiravudh renamed the college to "Chulalongkorn University".

Chulalongkorn University is a comprehensive and research-intensive university. It is also ranked as the top university in Thailand in many aspects of qualities covering the quality of the university itself, quality of students, quality of research, quality in particular subjects, university reputation, environmental management systems. According to QS university ranking 2016. CU is placed 252nd in the world, 45th in Asia, 1st in Thailand, and 151-200 in the graduate employability ranking.
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Thank you for taking time to participate in this conference evaluation. Your comments will enable us to execute future conferences better and tailor them to your needs!