UTM
UNIVERSITI TEKNOLOGI MALAYSIA

CONCEPT8

8TH CONFERENCE ON EMERGING ENERGY & PROCESS TECHNOLOGY

27 – 28th NOVEMBER 2019
RESIDENSI UTM
KUALA LUMPUR

Book of Abstracts

Centre of Hydrogen Energy | Universiti Teknologi Malaysia

Foreword from Advisor of CONCEPT 8

Assalamu'alaikum and good day to all.

First and foremost, I would like to welcome all delegates to annual conference on emerging energy and process technology (CONCEPT) for the eighth year. CONCEPT 8 is a platform to postgraduate students, researchers and academicians to exchange ideas for making the renewable energy more meaningful to the industrial people or practitioners. Collaborative research in the renewable energy and process system could enhance the use of renewable energy, in particularly hydrogen as a major source of energy in the near future. CONCEPT 8 emphasizes on safety theme, which I believe it must be embedded in the studies of renewable energy. To all delegates, I hope that you will maximise the benefits of being here and hope to see you again the coming years. Finally, my heartiest congratulations are due to the organizing committee, for working towards to make this event a reality.

Thank You.

Prof. Dr. Arshad Ahmad
Advisor for CONCEPT 8 (2019)
Director, Institute of Future Energy
Universiti Teknologi Malaysia
81310 Johor Bahru

Message from the Chair of CONCEPT 8

Dear colleagues and researchers,

Welcome to Kuala Lumpur.

It is a great pleasure to invite you to our annual conference, The 8th Conference on Emerging Energy & Process Technology (CONCEPT8). This year is the first time, we, the Centre of Hydrogen Energy, Kuala Lumpur, had been given such an opportunity to organize the conference. On behalf of the organizing committee, we would like to extend our warm welcome to all the participants and attendees. Sincere gratitude to our keynote speakers, Prof. Dr. Hamdani@Handani Saidi (Azman Hashim International Business School) Prof. Dr. Masafumi Goto, (Malaysia-Japan International Institute of Technology), and Assoc. Prof. Ts. Dr. Sarifah Fauziah Syed Draman (Universiti Teknologi MARA, Terengganu). CONCEPT8 (2019) is Energy and Chemical Process-based conference focus on three themes; Sustainable Energy, Process System, and Safety. The overarching objectives of this conference to stimulate a broader discussion of current technological innovation and invention and identify potential collaborative research among industry experts, academicians, or students. Experts from different universities have peer-reviewed all papers submitted to this conference before the presentations. The selected article will be published in Scopus-indexed Journals, IOP Conference Series: Materials Science and Engineering.

In closing, I would like to express my sincere appreciation to the organizing committee for the energy and time they have devoted in making this conference a success.

Please enjoy the conference and have a pleasant stay in Kuala Lumpur.

Best wishes,

Roshafima Rasit Ali, PhD
Chair of CONCEPT 8 (2019)
Centre of Hydrogen Energy,
Universiti Teknologi Malaysia
54000 Kuala Lumpur, Malaysia.

Organizing Committee

Advisor	:	Prof. Dr. Arshad Ahmad
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		Mrs. Hairul Mardiah Hamzah

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2. Assoc. Prof. Ir. Dr. Mimi Haryani Hassim
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16. Dr. Mohd Nazlee Faisal bin Md Ghazali
17. Dr. Mohd Zamri Yusop
18. Dr. Muhamad Noorul Anam bin Mohd Norddin
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22. Dr. Nor Ruwaida Jamian
23. Dr. Norafneeza Norazhar
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25. Dr. Nurfatehah Wahyuny Che Jusoh
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27. Dr. Pooria Mozarm Nia
28. Dr. Norhayani Othman
29. Dr. Roshafima Rasit Ali
30. Dr. Sheela A/p Chandren
31. Dr. Susilawati Toemen
32. Dr. Syaza Izyanni Ahmad
33. Dr. Nicole Leong Heng Yeng
34. Dr. Zulhairun Abdul Karim

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   Universiti Teknologi PETRONAS
2. **Assoc. Prof. Dr. Haw Choon Yian**
   Xiamen University
3. **Assoc. Prof. Dr. Juan Joon Ching**
   University of Malaya
4. **Assoc. Prof. Dr. Sarifah Fauziah Syed Draman**
   Universiti Teknologi MARA
5. **Prof. Dr. Setyo Budi Kurniawan**
   Politeknik Perkapalan Negeri Surabaya
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   Universiti Malaysia Pahang
7. **Dr. Chong Fai Kait**
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    Universiti Malaysia Perlis
21. **Mr. Shahrul Nizam Salleh**
    Universiti Teknologi MARA

Schedule

8th Conference on Emerging Energy & Process Technology 2019

CONCEPT 8 (2019)

Venue: Royal Widad Residence @ Reisidensi UTMKL

Date: 27th –28th November 2019

SCHEDULE CONCEPT 8 (2019)

WEDNESDAY 27 NOVEMBER 201	ACTIVITY
07.30 am - 09.00 am	**Registration and Breakfast**
09.00 am - 09.15 am	Safety Briefing
09.15 am - 09.20 am	Doa Recitation
09.25 am – 10.00 am	**Welcoming Remarks: Chairman of CONCEPT8 2019** **Opening Speech: Director of IFE** Venue: Grand Petra 1, Level 2
10.00 am - 10.30 am	**Keynote Speaker 1: Prof. Dr. Hamdani@Handani Bin Saidi** Keynote Title: FEW issues – what are the roles of Chemical Engineers? Chair: Prof. Dr. Aishah Binti Abdul Jalil Venue: Grand Petra 1, Level 2
10.30 am - 11.00 am	**Morning Tea Break** **Venue: Foyer Grand Petra, Level 2**

SESSION 1

2 Parellel session (10mins/presenter + 5 mins QA)

11.00 am - 1.00 pm

Session 1 - P1: Sustainable Energy 1

Venue: Grand Petra 1, Level 2

Session Chairman: Dr. Tuan Amran Tuan Abdullah

Assistant Chairman: Mrs. Ariffi Suraya

Time	Paper Title & Author(s)
11.00 am - 11.15 am	**Estimation of particulate emission generation in palm oil mill boiler** *N. R. Jamian, M. Rashid, M. Syahirah, M. H. Norelyza, M. Dewika, M.P. Khairunnisa, and A. H. M. Ali*
11.15 am - 11.30 am	**Characterization of ozone production from multi-cylinder reactor in non thermal plasma device using multivariable power least squares method** *L. S. Tan, M. T. Lim, and W. Y. Tey*
11.30 am - 11.45 am	**Enhanced Proton Conductivity of Porous UHMWPE membrane with Graphene-based material for Vanadium Redox Flow Battery** *S. Sophia, E. A. Lotf, T. M. Ting, R. R. Ali, A. Ahmad*
11.45 am - 12.00 pm	**Metal Removal from Industrial Waste by Hydrochloric Acid** *W. C. Siaw, Z. F. M. Shadzallia, T. Tsuji and N. A. Manaf*
12.00 pm - 12.15 pm	**Gold Extraction via Cyanide Leaching using Alkali-Based Empty Fruit Bunch Activated Carbon** *N. S. Shafie, N. Zaini and N. F. Ali*
12.15 pm - 12.30 pm	**Electrodeposited graphene-based materials for energy storage application** *P. M. Nia, E. A. Lotf and A. Ahmad*
12.30 pm - 12.45 pm	**Characteristics and carbon dioxide adsorption performance of amine-impregnated KCC-1 with different loading ratio** *M. S. R. M. Nasir, M. P. Khairunnisa, N. W. C. Jusoh, and A. A. Jalil*
12.45 pm - 1.00 pm	**Fabrication and Characterization of PU-g-Poly(HEMA) Film for Clotting Time and Platelet Adhesion** *Z. I. Tarmizi, R. R. Ali, M.M. Nasef, S. M. Noor, A. M. Akim, Z. Eshak and A. Ahmad*

Session 1 - P2: Safety 1 **Venue: Grand Petra 2, Level 2** **Session Chairman: Assoc. Prof. Dr. Wijayanuddin Ali** **Assistant Chairman: Mrs. Nazlina Ya'aini**	
Time	**Paper Title & Author(s)**
11.00 am - 11.15 am	**Bayesian Analysis for Assessing Risks of Rotating Equipment and Its Financial Loss in Petrochemical Industry** *R. Oktarinanda and N. Norazahar*
11.15 am - 11.30 am	**Developing Informative Emergency Evacuation Procedures for Academic Buildings** *S. S. M. Latip and N. Norazahar*
11.30 am - 11.45 am	**Fibrous silica induced narrow band gap TiO_2 catalyst for enhanced visible light-driven photodegradation of methylene blue** *A. A. Fauzi, A. A. Jalil, M. Mohamed, N. A. Naseri, CK. N. L. CK. Hitam, N. F. Khusnun, N. S. Hassan, A. F. A. Rahman, F. F. A. Aziz, and M. S. M. Azmi*
11.45 am - 12.00 pm	**Tailoring amount of TiO2 doped onto fibrous silica ZSM-5 for enhanced photodegradation of paracetamol** *F. F. A. Aziz, A. A. Jalil, C. K. N. L. C. K. Hitam, N. S. Hassan, A. F. A. Rahman and A. A. Fauzi*
12.00 pm - 12.15 pm	**Beneficial interaction of copper oxide and fibrous silica for enhanced photocatalytic desulphurization** *C. K. N. L. C. K. Hitam, A. A. Jalil, N. N. S. M. Shobri, A. A. Fauzi*
12.15 pm - 12.30 pm	**Synthesis of fibrous silica tantalum (FSTa) for photooxidative desulphurization** *M. N. S. Rahim, A. A. Jalil, C. K. N. L. C. K. Hitam*
12.30 pm - 12.45 pm	**Boosted Ag/g-C3N4 prepared under Microwave Irradiation for photocatalytic activity of RhB under visible light** *M. S. Azami, A. A. Jalil, C.R. Mamat, C. K. N. L. C. K. Hitam, N. S. Hassan, I. Hussain, A.A. Fauzi, R.H. Adnan*
12.45 pm - 1.00 pm	**Mechanistic Degradation Routes of Phenol via Photocatalyst: A Review** *W. F. W. Zakaria, A. A. Jalil, I. Hussainand M. Ibrahim*
01.00 pm - 2.30 pm	**Lunch** **Venue: Foyer Grand Petra, Level 2**

SESSION 2

2 Parellel session (10mins/presenter + 5 mins QA)

2.30 pm - 4.30 pm

Session 2 – P1: Sustainable Energy 2

Venue: Grand Petra 1, Level 2

Session Chairman: Dr. Roshafima Rasit Ali

Assistant Chairman: Mrs. Hairul Mardiah Hamzah

Time	Paper Title & Author(s)
2.30 pm – 2.45 pm	**Effect of transition metals (Mo, Mn and Co) on mesoporous ZSM-5 catalyst activity in Carbon dioxide reforming of methane** *H. U. Hambali, A. A. Jalil, A. A. Abdulrasheed, T. J. Siang, A. F. A. Rahman, N. A. A. Fatah, M. A. H. Aziz and I. Hussain*
2.45 pm - 3.00 pm	**Hydroconversion of n-hexane over Pt-supported on fibrous zeolite mordenite catalysts: effect of transition metals on acidity and activity** *M. Ibrahim, A. A. Jalil and M. Izan*
3.00 pm - 3.15 pm	**Thermodynamic sensitivity analysis of CO2 reforming of methane based on equilibrium predictions** *A. Abdulrasheed, A. A. Jalil, T. J. Siang and H. U. Hambali*
3.15 pm – 3.30 pm	**Recent progress on conversion of cellulose into renewable chemicals and fuels by supported metal catalysis** *N. S. Hassan and A. A. Jalil*
3.30 pm – 3.45 pm	**Shape selective alkylation of benzene with methanol over different zeolite catalysts** *A. F. A. Rahman, A. A. Jalil, M. Mohamed, N. A. A. Fatah, and H. U. Hambali*
3.45 pm - 4.00 pm	**A recent progress on catalyst development for CO_2 methanation** *N. A. A. Fatah, A. A. Jalil, A. F. A. Rahman, M. Ibrahim, and H. U. Hambali*
4.00 pm - 4.15 pm	**Toluene side chain alkylation with methanol over silica catalyst** *M. A. H. Aziz, A. A. Jalil, A. F. A. Rahman, N. A. A. Fatah, S. M. Izan, I. Hussain, and H. U. Hambali*
4.15 pm - 4.30 pm	**Dendritic Mesoporous Ni/KCC-1 for Partial Oxidation of Methane to Syngas** *T.J. Siang, and A.A. Jalil*

Session 2 - P2: Sustainable Energy 3 **Venue: Grand Petra 2, Level 2** **Session Chairman: Dr. Nurfatehah Wahyuny Che Jusoh** **Assistant Chairman: Ms. Saidatul Sophia Md Sha'rani**	
2.30 pm – 2.45 pm	**Renewable Biogas from Anaerobic Digestion of Biomass: Life Cycle Assessment Perspectives** *R. Abu, M. A. A. Aziz, C. H. C. Hassan and Z. Z. Noor*
2.45 pm - 3.00 pm	**Heterogeneous catalyst application in biodiesel production: Needs to focus on cost effective and reusable catalysts** *P. A. Jeremia, A. A. Jalil and M. A. Olutoye*
3.00 pm - 3.15 pm	**Catalytic Cracking of High-Density Polyethylene Pyrolysis Vapor over Zeolite ZSM-5 towards Production of Diesel** *N. F. A. Ghaffar, A. Johari and T. A. T. Abdullah*
3.15 pm – 3.30 pm	**Simulation of slagging behavior of food waste biomass** *A. F. A. Zamli, M. T. Lim, W. M. W. M. Faizal*
3.30 pm – 3.45 pm	**Technical and economic aspects of hydrogen productions and applications: A review** *M. S. M. Resali and N. Muda*
3.45 pm - 4.00 pm	**Role of pH in the green synthesized of silver nanoparticles on Kappaphycus alvarezii via ultrasound irradiation and their antibacterial efficacy study** *K. Shameli, M. Faried, M. Miyake, H. Umakoshi and N. A. Ismail*
4.00 pm - 4.15 pm	**A viable system for CO_2 methanation over fibrous silica ZSM-5 for substitute natural gas** *I. Hussain, A. A. Jalil, M.S. Azami, H. U. Hambali, W. Fadlun, M. A. H. Aziz*
4.15 pm - 4.30 pm	**Analysis on Physiochemical Properties of Cellulose Fiber from Rice Straw Waste** *M. Yusefi, R. R. Ali, E.C. Abdullah, K. Shameli*
4.30 pm - 5.00 pm	**Afternoon Tea Break** **Venue: Foyer Grand Petra, Level 2**
5.00 pm – 7.00 pm	**Team Building Game** **Venue: Gurney Bowl (Gurney Mall @ Residensi UTMKL, Level 6)**

THURSDAY 28 NOVEMBER 2019	ACTIVITY
7.30 am – 9.00 am	**Registration and Breakfast**
09.00 am – 9.30 am	**Keynote Speaker 2: Prof. Dr. Masafumi Goto** Keynote Title: Vicissitudes in R&D on BIOMASS-based New Energy - My Little Experience Chair: Assoc. Prof. Ir. Dr. Mimi Haryani Hassim Venue: Grand Petra 1, Level 2
9.30 am - 10.00 am	**Keynote Speaker 1: Assoc. Prof. Dr. Sarifah Fauziah** Keynote Title: Phytoremediation Technology: An alternative technique for ex mining lake water treatment Chair: Dr. Norafneeza Norazhar Venue: Grand Petra 1, Level 2
10.00 am – 10.30 am	**Morning Tea Break** **Venue: Foyer Grand Petra, Level 2**

SESSION 3

2 Parellel session (15mins/presenter + 5 mins QA and Poster) and Poster Presentation

10.30 am - 12.00 pm

Session 2 - P1: Safety 2

Venue: Grand Petra 1, Level 2

Session Chairman: Assoc. Prof. Adnan Bin Ripin

Assistant Chairman: Nur Fatimah Binti Azmi

Time	Paper Title & Author(s)
10.30 am - 10.45 am	**The Readiness of Community-Based Emergency Response Management in Pasir Gudang, Johor** *N. A. Ahmad, K. Kidam, R. Mohsin*
10.45 am – 11.00 am	**Application of grey model GM (1, 1) to human and organizational failure in chemical process industry** *M. Yusuf, T. A. T. Abdullah, K. Kidam and Ali Al-shanini*
11.00 am – 11.15 am	**The Verification result of Permit to Work Assessment in Occupational Accident using Fault Tree Analysis** *N. Jusoh, M. W. Ali, T. A. T. Abdullah, A. Husain*

11.15 am – 11.30 am	**Parametric study of CO_2 separation using carbon molecular sieve, zeolite and silica gel** *A. A. Noraini and A. Ahmad*
11.30 am – 11.45 am	**Experimental study of acoustic cavitation bubbles characteristic under influence of ultrasonic wave** *N. A. H. Hadi and A. Ahmad*
11.45 am – 12.00 pm	**Triggering Factors of Accidents in Chemical Industry Identified from Cases Occurred from 1999 to 2019** *N. M. Ajib and A. Ahmad*

Session 3 - P2: Poster Presentation
Venue: Foyer, Level 2

Poster ID	Paper Title & Author(s)
P-01014	**Enhanced Proton Conductivity of Porous PBI Membrane by Phytic Acid Doping for High Temperature Polymer Electrolyte Membrane Fuel Cell (HT-PEMFC)** *N. A. B. Daud, E. A. Lotf, M. M. Nasef, A. Ahmad, R. R. Ali*
P-01015	**Characterization of grafted porous Polyvinylidine Fluoride membrane functionalized with Graphene Oxide** *N. F. Emelin, E. A. Lotf, S. Sophia, T. M Ting, P. M. Nia, N. W. C. Jusoh, A. Ahmad*
P-01016	**Facile Electrosynthesis of Fe_3O_4 Nanoparticles Mediated with Sodium Alginate For Paracetamol Degradation** *A. Masudi, N. W. C. Jusoh, A. A. Jalil*
P-01023	**Radiation induced graft polymerization of amine-containing monomer onto polyethylene coated propylene for CO_2 adsorption** *N. A. Zubair, M. M. Nasef, T M. Teo and E. C. Abdullah*
P-01024	**Aerogel containing amine functionalized poly(GMA)-grafted chitosan for CO_2 adsorption** *N. A. Zubair, M. M. Nasef, E. C. Abdullah, E. A. Lotf, A. Ahmad*
P-01027	**Silver Nanoparticles on Pullulan derived via Gamma Irradiation Method: A Preliminary Analysis** *M. S.N. Salleh, R. R. Ali, K. Shameli, M. Y. Hamzah and J. C. Zhe*
P-01030	**Pullulan mediated zinc oxide microparticles: Effect of synthesis temperature** *E. D. M. Isa, N. W. C. Jusoh, R. Hazan and K. Shameli*
P-01031	**Effect of size and shape dependent of synthesized copper nanoparticle using natural honey** *N. A. Ismail, K. Shameli, N. W. Che. Jusoh and R. R. Ali*

P-01032	**Photocatalytic Degradation of Malachite Green Dye by Plant-mediated Biosynthesized Zinc Oxide Nanoparticles** *S. N. A. M. Sukri, E. D. M. Isa, K. Shameli*
P-01034	**Green Synthesis of Gold Nanoparticles using aqueous Extract of *Clitoria Ternatea* Flower** *J. Z. Chan, R R. Ali, K Shameli, M. S. N. Salleh, K. X. Lee, E. D. M Isa*
P-02005	**Effect of Internal Configuration on the Performance of Pressure Swing Adsorption Column** *S. A. Bakhtiar, A. A. Norani, A. Ahmad*
P-03012	**An Index to Reflect the Safety Risks of Ageing Process Plant** *M. H. H. M. Ridzuan, N. A. Norazhar, A. Ahmad*
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1.00 pm – 2.00 pm	**Lunch** **Venue: Foyer Grand Petra, Level 2**

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ABSTRACT

KEYNOTE SPEAKER I

FEW issues – what are the roles of Chemical Engineers?

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ABSTRACT - Nothing more challenging to solve now and in the future other than issues related to food, energy and water (FEW). Water is most abundance element on earth. It is estimated that the volume of water is 1.4 billion km^3, however 97.5 % of it is sea water and only 0.3% is fresh water available for human consumption. Other forms of fresh water are ice, underground water and polluted river and lakes. Water crisis has led to human suffering in the form of water borne diseases, shortage of supply for human consumption, flood and draught. Like human, food depends on water to grow. Global climate change has drastically altered the weather pattern. Extreme cold in winter and very hot in summer has resulted in abnormal water distribution. Floods and draught affect agriculture which is vital for food production. Climate change has been attributed to pollution. Deforestation, internal combustion engines, greenhouse gas emission, industrial pollution and ineffective management of water and wastes have further threatened the survival of human race. The current energy generation for stationary and mobile application from fossil fuel is not only polluting, causing extreme change in weather pattern and altering the normality of water cycle crucially needed for human consumption and food production; it is not secured and not sustainable. Unfortunately, countries in the world are in the mood of business as usual – burning dirty coal, fossil fuel, shale oil and incinerate solid waste openly. The use of renewable energy (solar, hydrogen, hydro and other sources) remains elusive. What is needed to solve FEW issues? What are our roles as Engineers specifically Chemical Engineers in solving this vicious circle? Are we waiting for the point of no return?

KEYNOTE SPEAKER II

Vicissitudes in R&D on BIOMASS-based New Energy - My Little Experience

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ABSTRACT - It was back in mid 1980s when I first involved in a project, which was focused on production of renewable energy from biomass. This project, "Biomass to Methane" was initiated in the USA as a result of the 2nd oil shock which occurred in 1979. The main objective of the project was to convert cultivated biomass to methane for commercial use in town gas. Napier grass (Florida), Sorghum (Texas) and Giant kelp (California) were the biomass selected by each project team. However, the project had diminished and eventually was terminated in about ten years as the world oil crisis eased drastically. After a blank period due to shift in my research interests to marine environment protection (still relevant to energy as some projects were on bioremediation of spilled crude oil in the ocean), I returned to R&D on commercial applications of of biogas production from food waste. Ours was one of the first efforts in Japan on a next generation anaerobic digestion because the new legislation "Food Waste Recycle Act" was about to be enacted in 2000. We developed and built several small – middle scale anaerobic digestion systems and a large-scale anaerobic digestion system for commercial use between late 1990s and mid 2000s. Hot water boiler or micro-gas turbine power generator was our choice of utilization of recovered biogas. We also conducted NEDO (New Energy Development Organization, Japan) and Ministry of Environment, Japan projects on better utilization of biogas; we tried power generation by Fuel Cell and demonstrated it was technically possible and practical, but unfortunately, it was economically infeasible as a waste biomass treatment system due to the high costs of fuel cells in those days. Apart from biogas, I was also involved in NEDO projects on other resource of bio-energy; Bio-hydrogen. The first project was on Photosynthetic Production of Bio-hydrogen by Non-sulfur Purple Photosynthetic Bacteria. Again, we demonstrated that photosynthetic production of bio-hydrogen from wastewater was technically possible, but we could not improve the conversion efficiency to make our processes economically competitive. Then we conducted 2-stage Fermentative Production of Bio-hydrogen and Bio-methane from Waste Biomass project by NEDO grant in late 2000s. My last Bio-energy-relevant endeavor in Japan before joining MJIIT in Malaysia was Bio-ethanol Production in NEDO project. The project was formulated around application of the new super "Arming" yeast to establish Consolidated Biomass Processing (CBP). My little experience in Biomass Energy includes some side trips such as Non-catalytic BDF Production by Superheated Methanol Vapor (a National Agricultural Research Organization, NARO, project) and Microbial Bio-Fuel Cell development.

KEYNOTE SPEAKER III

Phytoremediation Technology: An alternative technique for ex-mining lake water treatment

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ABSTRACT - In this study, the authors report an alternative treatment technique in improving water quality of Tasik Puteri, Bukit Besi, Terengganu, Malaysia using phytoremediation technology. Tasik Puteri is man-made lake resulted from an iron mining operation in Bukit Besi around the 1960s. Result obtained for Tasik Puteri water is an acidic due to acid main drainage (AMD) factor. The source of AMD is the high solubility of ion Fe^{2+} that confirmed by heavy metal studies using Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES). AMD produced because of the oxidation of pyrite (FeS_2) which is identified as one of the main iron ore in Bukit Besi mining operation. The oxidation process produces $FeSO_4$ and sulfuric acid. The dissolved Fe^{2+} ion represent an increase in acidity of water. Dependant on oxygen concentration, pH and bacterial activity, Fe^{2+} ion will oxidize to Fe^{3+} ion in water while simultaneously lowering pH. Therefore, the primary aim is to treat the soluble Fe^{3+} ion using phytoremediation technology. Based on literature, bacteria at the root of the selected plants also were able to convert from Fe^{2+} ion to Fe^{3+} ion and formed a chemical compound. Then, Fe^{3+} ion in the chemical compound was deactivated using adsorption process of citric acid modified cellulose (CAMC). A simulation using molecular modelling was demonstrated the interaction between CAMC and Fe^{3+} ions as complement to this study. An integrated technique involve phytoremediation and adsorption process, namely as phyto-adsorption was proposed. The phyto-adsorption in remediation of acid mine drainage at Tasik Puteri, Bukit Besi can be positively an innovative technique. Furthermore, this integrated process can enhance the capability of dissolved Fe removal from ex mining lake water.

01000 – SUSTAINABLE ENERGY

01001

Thermodynamic sensitivity analysis of CO2 reforming of methane based on equilibrium predictions

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ABSTRACT - Thermodynamic sensitivity analysis was conducted to evaluate the selectivity dry reforming of methane (DRM) with respect to other competing side reactions in terms of Gibbs energy minimization and equilibrium reactor compositions. Spontaneity of each reaction was evaluated by their corresponding changes in Gibbs energy as a function of reactor temperature from 100 – 1000 °C. At temperatures above 700 °C, all reactions considered with the exception of the Boudouard reaction are spontaneous due to their negative deltaG values. Equilibrium compositions were computed for 40 kmol of feed ($CO_2 + CH_4$) to determine its sensitivity to occurrence of reverse water-gas-shift (RWGS) reaction and changes in feed CO_2/CH_4 ratio. The presence of RWGS reaction results to higher reactant conversion accompanied by severer carbon formation. The H_2/CO ratio was however not affected by its occurrence. At CO_2/CH_4 feed ratio of 2, the product ratio was barely affected and at minimal carbon formation while CO_2/CH_4 ratio value of 0.5 produced a lot of carbon especially at high temperatures due to the prevalence of CH_4 cracking. DRM is thus more preferable at temperatures above 700 °C, devoid of RWGS and high feed CH_4.

01002

Recent progress on conversion of cellulose into renewable chemicals and fuels by supported metal catalysis

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ABSTRACT - In recent years, the development of biomass as an alternative energy source has been explored for the production of energy, chemicals and transportation fuels. Cellulose is an abundant, low-cost and renewable energy source that can be transformed into solid, liquid and gas products by pyrolysis. The sustainable, low cost and efficient catalysts are needed for catalytic cellulose pyrolysis. Among heterogeneous catalysts, supported metal catalysts have been extensively studied which demonstrated

distinct reactivity and/or selectivity in a variety of chemical reactions. This review provides a summary of the cellulose conversion by supported metal catalysts into value added chemicals and fuels.

01003

Shape selective alkylation of benzene with methanol over different zeolite catalysts

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ABSTRACT - Benzene methylation is an important process for removing excess benzene in petrochemical industries to produce value-added products such as toluene and xylene. In this study, the performance of three types of zeolites, which is ZSM-5 (HZ), zeolite Y (HY) and zeolite β (Hβ) were investigated as catalyst in the benzene methylation reaction. The catalysts were characterized by N_2 adsorption-desorption and FTIR. The N_2 adsorption-desorption verified that the mesopores volume of the catalysts was in the following order: HB > HY > HZ. While, the FTIR-lutidine revealed that the HB possessed the highest amount of Brönsted acid sites followed by HZ and HY. The catalytic testing at 573 K showed that HZ gave good performance in benzene methylation with 55.2% and 22.1% yield of toluene and xylene, respectively. It is suggested that HZ catalyst with moderate amount of Brönsted acid sites and smallest mesopores volume appear to be effective for shape selective synthesis of toluene and xylene. In addition, pore structure of HZ also contributed to the high catalytic activity of benzene methylation.

01004

A recent progress on catalyst development for CO_2 methanation

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ABSTRACT – The catalytic CO_2 methanation has been an indispensable reaction to transform toxic CO_2 into methane which can be use as energy carrier or valuable chemical. The application of heterogeneous catalyst in CO_2 methanation plays a significant roles due to its effectiveness and stability which led to lower costs for large scale production. Thus, the exploration on active catalyst for the reaction continue to receive attentions from researchers. In this updated review, a comprehensive overview of recent publications in last five years are presented. This article expatiated the recent developments on crucial catalyst components such as active metals, promoters and support material during CO_2 methanation during state-of-art experimental. Besides, the advancements recorded in catalyst morphology control and

its impact towards the catalytic methanation is further stated and elaborated. Finally, the future prospect and development in CO_2 methanation are discussed.

01005

Toluene side chain alkylation with methanol over silica catalyst

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ABSTRACT – MSN and SiO^2 catalyst were investigated on side chain toluene alkylation with methanol reaction. Characterization of the catalyst were carried out by XRD, N_2 physisorption analysis, FTIR spectroscopy. A pyrrole adsorption FTIR study reveals shifting of perturbed NH stretching increasing slightly in MSN compared to SiO_2 catalyst revealed that MSN possessed higher basic sites than SiO_2. N_2 adsorption desorption isotherm analysis showed that MSN possessed higher surface area than SiO_2 as well as increased the amount of mesopores in catalyst. The catalytic side chain toluene alkylation with methanol reaction was conducted in the range of 523K-673K under atmospheric pressure. MSN exhibits the highest catalytic performance compared to SiO_2 catalyst.

01006

Effect of transition metals (Mo, Mn and Co) on mesoporous ZSM-5 catalyst activity in Carbon dioxide reforming of methane

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ABSTRACT – This paper investigates the effect of transition metals (Mo, Mn and Co) on mesoporous ZSM-5 catalyst support in CO2 reforming of methane reaction. The mesoporous ZSM-5 support was synthesized by micro emulsion technique and the metals were loaded by wet impregnation method. The characterization observations revealed that Co loaded mesoporous ZSM-5 catalyst had higher surface area in comparison to other catalysts, which could favour well dispersion and wider utilization of active

component. The Co loaded catalyst exhibited the highest methane and carbon dioxide conversions of 69 % and 65 % respectively at 850˚C. The Co species were more active to decompose CH_4 and CO_2 compared to Mo and Mn loaded catalysts. Hence, loading Co on mesoporous ZSM-5 produce an active catalyst in CO_2 reforming methane reaction.

01007

Dendritic Mesoporous Ni/KCC-1 for Partial Oxidation of Methane to Syngas

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ABSTRACT – Depletion of fossil fuel for global energy system and increasing concern on global warming have driven the exploration of alternative and sustainable energy source in realms of academia and industry. This study aims to investigate the physicochemical features of Ni/KCC-1 catalyst and evaluate its catalytic performance for POM reaction. N_2 physisorption and XRD analyses confirmed the structural integrity of KCC-1 framework after NiO addition while the growth of Si–O–Ni bonds in KCC-1 structure was corroborated by the FTIR results. The FESEM and TEM images for KCC-1 not only affirm the successful formation of bicontinuous lamellar morphology but also reveal that the three-dimensional spherical structure was originally developed from the centre of microsphere into all axial. The combustion-reforming pathway was determined during reaction run and the H_2/CO ratio ranging of 1.68 to 2.54 was appropriate for synthetic fuel production via FTS.

01008

Hydroconversion of n-hexane over Pt-supported on fibrous zeolite mordenite catalysts: effect of transition metals on acidity and activity

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ABSTRACT – The effect of incorporation of either Zr, Co, Mo or Zn on Pt/HM@KCC-1 was investigated for the hydroconversion of *n*-hexane in a pulsed micro-reactor at a temperature range 423-623 K. The acidity of all studied catalysts was investigated using pyridine adsorption and Fourier Transform Infrared

Spectroscopy. The FTIR-pyridine study showed that the catalysts possessed different concentration and strength of both Lewis and Bronsted acid sites. It was revealed that the moderate acid sites distribution on PtZr/HM@KCC-1 and PtZn/HM@KCC-1 facilitated the isomerization of the intermediate hexane while the strong acid sites on the other catalysts were selective towards cracking reaction. The trend for the bimetallic catalysts in hydroisomerization is in the order: PtZr/HM@KCC-1>PtZn/HM@KCC-1>PtMo/HM@KCC-1>PtCo/HM@KCC-1. The highest activity for hydrocracking and hydrogenolysis were exhibited by PtMo/HM@KCC-1 and PtCo/HM@KCC-1 respectively. The PtZr/HM@KCC-1 exhibited the highest isomerization activity particularly due to the distinct characteristics of moderate acidity and abundant Lewis acid sites capable of generating protonic acid sites by the hydrogen-spill over phenomena.

01010

Metal Removal from Industrial Waste by Hydrochloric Acid

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ABSTRACT – Leaching of metals (i.e., Cr, Ni, Mn, Fe and B) from industrial waste in hydrochloric acid, HCl solution was studied. The effects of HCl concentration (2-6 M), temperature (30-70 °C), liquid to solid ratio (10-30) and leaching time (60-300 mins) on the removal percentage of metal impurities were investigated using response surface methodology (RSM) with central composite design (CCD). The ANOVA study concluded that the quadratic model was fitted well to the 27 experimental runs based on p-value (<0.0001), R2 (0.9876) and Adj-R2 (0.9731). This study also revealed that the liquid to solid ratio was the most significant factor for the leaching of metal impurities compared to HCl concentration. However, temperature and leaching time showed no significant impact on the leaching rate of metal impurities. Under suitable conditions, a high removal percentage of metal (88 %) was readily achieved at condition of 6 M HCl at 70 °C with liquid to solid ratio of 10 over a leaching period of 70 mins.

01011

Effect of glycidyl methacrylate and vinyl benzyl chloride in fibrous polymer towards the CO_2 adsorption performance

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ABSTRACT – In this study, ligands originated from glycidyl methacrylate (GMA) and vinyl benzyl chloride (VBC) monomers were grafted onto fibrous polyethylene/polypropylene (PE/PP) substrate and the resulting grafted copolymers were functionalized with ethylenediamine (EDA). The changes in the chemical structure and crystallinity of the aminated adsorbents were evaluated using Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD), respectively. The PE/PP-*g*-PGMA-EDA adsorbent showed a CO_2 adsorption capacity of 1.73 mmol/g from pure gas, which is 87% lower than that of PE/PP-*g*-PVBC-EDA (3.24 mmol/g) at 30 bars despite the higher density in the former adsorbent. The effect of temperature, selectivity and CO_2 gas composition was further investigated for the PE/PP-*g*-PVBC-EDA adsorbent.

01012

Gold Extraction via Cyanide Leaching using Alkali-Based Empty Fruit Bunch Activated Carbon

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ABSTRACT – This research is carried out to extend the knowledge on the modernized method by modifying the physical and structural properties of the low-cost and high accessible of Malaysian abundant agricultural waste, which is empty fruit bunch (EFB) for gold adsorption process. To complete this aim, EFB is being modified by using an alkaline-based chemical to improve the surface area, porosity volume and surface chemistry of sorbents. The structural of the empty fruit bunch is characterized by using characterization techniques such as Thermogravimetric analysis (TGA) and Energy-Dispersive X-ray spectroscopy. Then, the gold solution is prepared by mixing gold with a sodium cyanide solution to undergone leaching process for 24 hours which was then used for the adsorption experimental. The performance of alkali-based EFB-AC to separate gold from cyanide leaching solution was further study on the effect of contact time, pH and agitation rate. The gold adsorption capacity achieves by the alkali-based EFB-AC is measured by calculating the difference between initial and final gold concentrations using Atomic Absorption Spectrometry (AAS). The optimum finding of contact time, pH, and agitation rate were found to be 2.5 hours, pH of 10 and 60 rpm, respectively. This study has revealed that the alkali-based EFB-AC has potential to extract gold as an alternative activated carbon in gold adsorption process.

01013

Renewable Biogas from Anaerobic Digestion of Biomass: Life Cycle Assessment Perspectives

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ABSTRACT – In accordance to steady economic and population growth, the production of organic waste in Malaysia is currently estimated to reach 9 Mt/y by year 2020 on the basis current generation rate of 1 kg^{-1} $person^{-1}$. Component of these wastes however can be used to generate biogas, not only to decrease waste-related issues, but also to produce renewable energy, reuse nutrients, and reduce greenhouse gases and air contaminating emissions. Currently the growing interest of resource recovery and waste/energy integration through biogas generation from municipal waste by Anaerobic Digestion method is being extensively investigated. However due to Anaerobic Digestion process vary especially between different facilities; apparently proactive assessment on the status of biogas production and its effect to environment through life cycle assessment seems vital. The common inventories accounted include transportation, operational machineries, fugitive emissions during maturation and curing as well as when biogas substitutes other energy carriers. The objectives of this review are to contribute to the understanding to the environmental life cycle impacts from system producing biogas from organic waste using Anaerobic Digestion. It can be concluded that Life Cycle Assessment on Anaerobic Digestion plants varies largely, and the environmental performance is affected by the system boundaries setting, databases used and the application of different life cycle impact assessment methods. Therefore it should according to all assessed guidelines to be addressed which to avoid biased comparisons on climate performance between different alternatives.

01014

Enhanced Proton Conductivity of Porous PBI Membrane by Phytic Acid Doping for High Temperature Polymer Electrolyte Membrane Fuel Cell (HT-PEMFC)

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ABSTRACT – This study will provide various condition for acid doped PBI membrane which giving the best proton conductivity result and better performance for HT-PEMFC. A highly phosphonated polymer membrane based on acid-base complex membrane system was introduced where phytic acid was chosen as a co-dopant acid of PA due to its properties of having high phosphate group content and ability to participate in H bonding interactions with the functionalities in PBI matrix. By introducing this PBI/phytic acid membrane will help to overcome the issues arise from PBI/PA membrane system especially on acid leaching problem. In this study, a simple and cost-effective technique on porous PBI membrane fabrication and acid doping condition was employed to search an optimum acid-doping level and to further improve the stability and durability of the membrane.

01015

Synthesis and Characterization of Grafted Porous Membrane Functionalized with Graphene Oxide for Vanadium Redox Flow Battery

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ABSTRACT – Graphene oxide (GO) was functionalized onto both sides of grafted porous polyethylene/polypropylene (PEPP) membrane sheet through sonication and simple immersion. Graphene oxide is a trending material in the field due to its excellent properties such as highly resistance to alkaline/acidic and strong mechanical strength, low cost and easily accessible. The functionalized grafted PEPP from sonication showed new peaks at 17246cm^{-1} and 1649cm^{-1} which corresponding to C=O and sp^2-hybridized C bond from the GO which indicated functionalization of PEPP membrane was a success.

01016

Facile Electrosynthesis of Fe_3O_4 Nanoparticles Mediated with Sodium Alginate For Paracetamol Degradation

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ABSTRACT – High purity of Fe_3O_4 was prepared by electrochemical method in different concentration of sodium alginate (SA) as natural capping agent. The content of SA influenced the particle size and surface interaction to Fe_3O_4 as confirmed by X-ray diffraction (XRD) and Fourier Transform Infrared (FTIR). The highest photocatalytic activity was obtained for Fe_3O_4 synthesized with 0.05% SA with initial concentration of 15 mg/L Paracetamol. This result contributed to electrochemical advancement to produce Fe_3O_4 using green chemicals.

01017

Enhanced Proton Conductivity of Porous UHMWPE membrane with Graphene-based material for Vanadium Redox Flow Battery

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ABSTRACT – Porous membrane with enhanced proton conductivity is designed and prepared for vanadium redox flow battery (VRFB). The membrane is composed of ultra height molecular weight polyethylene (UHMWPE) grafted with polyvinylbenylchloride (PVBC) at different degree of grafting and functionalized with graphene oxide (UHMWPE-g-PVB*GO*) under ultrasonication. The functionalization of the GO on the porous substrates is confirmed by fourier transform infrared (FTIR) and Raman analysis. UHMWPE-g-PVB*GO* membranes exhibited ~37% higher proton conductivity compared to pristine UHMWPE upon modification at 30 °C and 100% RH. In relation to the degree of grafting, higher degree of grafting possessed higher proton conductivity value for the porous membrane.

01018

Heterogeneous catalyst application in biodiesel production: Needs to focus on cost effective and reusable catalysts

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ABSTRACT – Application of heterogeneous catalyst in the field of renewable energy to produce renewable fuel has been in existence and well researched. Majority of recent heterogeneous catalysts produced focus on optimizing yield of biodiesel from a single feedstock without concerted efforts to consider the cost of production. They are mostly developed and produced from synthetic chemicals with their attendants high cost of production. The present review summarizes the needs to produce heterogeneous solid catalyst from wastes and natural resources like clay which is available in all parts of the world.

01019

Electrodeposited graphene-based materials for energy storage application

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ABSTRACT – In the current study, by a one-step electrodeposition process, optimized reduced graphene oxide were prepared as a charge storage electrode through simple and straightforward procedure. Raman spectroscopy, Fourier-transform infrared spectroscopy and electrochemical impedance spectroscopy were carried out to characterize the prepared materials. Cyclic voltammetry was carried out to investigate the electrochemical response of the prepared electrodes as well as charge-discharge curves. The obtained date showed that the as-prepared low-cost graphene-based material shows promising features for supercapacitor application.

01020

Catalytic Cracking of High-Density Polyethylene Pyrolysis Vapor over Zeolite ZSM-5 towards Production of Diesel

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ABSTRACT – Pyrolysis of high-density polyethylene using ZSM-5 catalyst has been investigated using two-staged reactors consisting of a pyrolysis reactor and a catalytic fixed bed reactor. The effect of the heating rate of the pyrolysis reactor and reaction time were studied on the yield of products and the quality of pyrolytic oil products. The quality of pyrolytic oil produced was evaluated based on the gross calorific values (GCV), and the paraffin, olefin, naphthenic and aromatic (PONA) compounds distribution, which are the parameters that can be used to compare with conventional fuel. The highest yield of oil product was obtained at a reaction time of 75 minutes, where it was 61.05 wt.%, with solid product yield of 0.41wt.% and gas product yield of 38.54wt.%, at a heating rate of 2oC/min. The GCV of oil products were within the range of that of conventional diesel (44 – 45 MJ/kg). The pyrolytic oil products contained mainly C10 to C24 hydrocarbon compounds, which were diesel range hydrocarbon. In terms of the PONA distribution, the composition of paraffin was larger for most of the products, while the composition of naphthenes and aromatic were relatively small with respect to the range for conventional diesel.

01021

Low-cost Perfluorinated Sulfonic Acid Membranes for Vanadium Redox

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ABSTRACT – The performance and cost of the membranes have always been crucial for the utilization of the electrochemical energy devices. This article represents the properties and the performance of two commercially available and low-cost perfluorinated sulfonic acid membranes of GN115 and GN212C for application in vanadium redox flow battery (VRFB) in comparison with Nafion117 (N117) membrane. The vanadium (IV) permeability of GN115 membrane was found to be close to N117 unlike GN212C membrane which showed 4 times higher vanadium (IV) permeability than N117 under similar conditions. Both GN115 and GN212C membranes showed isotropic conductivity and higher values than N117. The battery test results indicated that the high coulombic efficiency (CE) and high voltage efficiency (VE) followed the vanadium (IV) permeability and proton conductivity trends. Both membranes revealed outstanding stability in long-term charge-discharge testing under various current densities. Energy efficiency was found to be higher than N117 with values of 76.6% and 76.8% for GN115 and GN212C, respectively. The overall results suggest that both lower cost membranes have a strong potential for VRFB application as the single cell performance results were close to N117. The high value of proton conductivity of GN212C membrane compensates its vanadium (IV) permeability leaving reasonable battery performance.

01022

Characterization of ozone production from multi-cylinder reactor in non-thermal plasma device using multivariable power least squares method

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ABSTRACT – Other than usage for environmental remediation, ozone is also increasingly studied for its potential in combustion enhancement. In this study, the characterization of the ozone production at varied voltage, duty cycle and cylinder configuration for reactor was conducted using multivariable power least squares method (MPLSM). This method is used because a previous characterization using response surface methodology (RSM) showed a biasness towards one of reactor. The regressed equation using MPLSM method indicated voltage as the dominant factor in the production of ozone compared to the effect of duty cycle. The correlations generated from MPLSM for both reactor configurations predicted

the ozone concentration results close within the prediction target range. As such, MPLSM could be considered as an alternative method to be used for correlations of non-polynomial results.

01023

Radiation induced graft polymerization of amine-containing monomer onto polyethylene coated propylene for CO_2 adsorption

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ABSTRACT – Modification of polyethylene coated polypropylene by radiation-induced graft copolymerisation (RIGP) of N-vinylformamide followed by hydrolysis was studied to produce polyvinylamine (PVAm) containing adsorbent for CO_2 adsorption. A number of grafting parameters such as irradiation dose, monomer concentrations, reaction temperature and reaction time were investigated to obtain desired degree of grafting (DOG). The DOG was found to be a function of reaction parameters and achieved a maximum value of 180% at 40 wt% of NVF concentration in toluene, 300 kGy dose, 70°C temperature and 3 h reaction time. The hydrolysis of formamide groups in the grafted substrates into amine functionalities was carried out in the basic medium. Fourier-transform infrared spectroscopy (FTIR) and scanning electronmicroscopy (SEM) were used to evaluate the morphological and structural changes that occurred in the grafted substrates. The CO_2 adsorption capacity of PVAm modified adsorbent was brought to be a function of DOG, which is corresponding to the amine content after hydrolysis. The adsorbent showed the highest CO_2 adsorption capacity of 1.32 mmol/g when tested with gas composition of 40% CO_2 and 60% nitrogen at room temperature.

01024

Aerogel containing amine functionalized poly(GMA)-grafted chitosan for CO_2 adsorption

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ABSTRACT – Aerogel containing amine functionalised poly(GMA)-grafted chitosan was developed for the first time as adsorbent for CO_2 capturing. Graft copolymerization of GMA onto chitosan (CTS) was carried out using ammonium persulfate (APS) as initiator followed by amination reaction through ring-opening of the epoxy group of GMA. Amine functionalization improves the adsorbates–adsorbent interaction by introducing the amine group which has strong affinity towards CO_2, thus enhances the gas adsorption. The functionalized wet gel was then dried using freeze drying technique to yield functionalized aerogels with ordered porous structures. Fourier transform infrared spectroscopy confirmed that the grafting and the amination reaction was successful. From the nitrogen sorption analysis, the BET surface areas were obtained for CTS, CTS-GMA, and CTS-GMA-TEPA where surface area of 41.63, 65.51 and 78.20 $m^2 g^{-1}$ were observed respectively. The adsorption capacity of CO_2 gas by amine functionalized chitosan aerogels is 1.82 mmol g^{-1} which significantly higher in comparison to the adsorption capacity of pristine CTS aerogel.

01025

Functionalization of polyethylene coated polypropylene fibrous polymer with monoethanolamine for CO_2 adsorption by using gravimetric sorption system

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ABSTRACT – The aim of this study is to investigate the CO_2 adsorption performance of poly (vinyl benzyl chloride) (PVBC) grafted on polyethylene coated polypropylene (PE/PP) fibrous polymer substrate and followed by amination with monoethanolamine (MEA) by using gravimetric sorption system. The chemical structural and morphological changes in the aminated adsorbents were evaluated using Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD), respectively. The amination was carried out using three different compositions of MEA (50%, 80% and 100%) to optimize the yield of amine content with water as the solvent. The highest percent of amination obtained was 70.68% with the following order: 100% > 80% > 50% of MEA composition. CO_2 adsorption capacity performance at 30 bars also follow the same trend with the highest capacity gives 1.64 mmol/g when tested with pure CO_2 gas with flow rate of 500 ml/min.

01026

Simulation of slagging behavior of food waste biomass

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ABSTRACT – To address issues related to climate change, the conventional use of fossil fuels has begun to shift towards alternative, renewable sources of fuel such as biomass in the form of waste, residues from the agricultural or plantation industry. However, the combustion of biomass causes several operational issues, such as higher slagging and fouling propensities, and high particulate matter emissions. These issues are caused by the composition of the biomass and sometimes higher alkali metal contents in the biomass. Biomass such as food waste (FW) have low alkali metal contents but less are used for generating heat and power compared with other biomass. In Kuala Lumpur alone 3000-3500 tonnes of municipal solid waste (MSW) are generated every day and 37-70 % of it are from FW. In this preliminary study, the amount of ash and slag from FW and treated FW with different composition are also estimated using FactSage and validated with ashing experiments. Both methods enable furnace operators to estimate the chemical composition and slag propensity, permitting them sufficient time to adjust the furnace operating conditions correspondingly.

01027

Silver Nanoparticles on Pullulan derived via Gamma Irradiation Method: A Preliminary Analysis

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ABSTRACT – Radiation induced technique was employed during the synthesis of silver nanopartides (AgNPs) on pullulan. In this study, the Ag-NPs on pullulan by γ irradiated process is performed to reduce Ag+ ions at the ambient temperature without using excessive reducing agents or producing unwanted by-products of the reductant. Moreover, reducing agent can be uniformly distributed in the solution and AgNPs are produced in highly pure and stable form. The results from ultraviolet-visible spectroscopy (UV-vis) and XRD demonstrated that the silver nanoparticles can be synthesize using pullulan. This can be confirmed by absorption band of UV-vis spectrum at 420 nm as well as the XRD pattern at (1 1 1), (2 0 0), (2 2 0), and (3 1 1) planes of silver. In addition, the pullulan also acts as a reducing and stabilizing agent. TEM images showed formed AgNPs are spherical in shape with smooth edges. The TEM also revealed that the increasing radiation dose decreases the particle size and increase the rate of reduction. It was found

that the mean diameter of silver nanoparticles was about 3.98 -14.87 nm. In addition, the size of the AgNPs is believed can be tuned by controlling the radiation doses.

01028

Characteristics and carbon dioxide adsorption performance of amine-impregnated KCC-1 with different loading ratio

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ABSTRACT – With our climate condition worsening day by day, the effort to mitigate this effect has been intensified. One of the ways to curb this issue is by reducing the release of carbon dioxide (CO_2) to the atmosphere via CO_2 capture. Among all the material used for CO_2 capture, amine-impregnated porous silica was observed to be a promising adsorbent. Research has shown its potential, but the accessibility issues caused by its narrow pore opening limits its capabilities. KCC-1, the latest member of the porous silica family, possesses unique fibrous morphology that can solve this problem. In this paper, a series of Tetraethylenepentamine (TEPA)-impregnated KCC-1 (KCC-1/TEPA) synthesized at three different loading ratio (KCC-1 to TEPA 2:1, 1:1 and 1:2) is reported. Characteristics study was conducted to determine the effect of loading ratio on its properties, and its CO_2 adsorption capacity was evaluated. FTIR peaks at 3430 cm^{-1}, 3300 cm^{-1}, 2950 cm^{-1}, 2841 cm^{-1}, 1658 cm^{-1}, 1565 cm^{-1} and 1465 cm^{-1} revealed that the impregnation was successful, while XRD diffractogram indicated that its crystallinity remains intact. KCC-1/T1:2 reported the highest CO_2 adsorption value among all three impregnated sample with 141 mg/g, while KCC-1/T2:1 recorded the lowest (82 mg/g). The adsorption process shows high coefficient of determination (R^2) with Langmuir isotherm with 0.9993 and maximum adsorption quantity, Q_m of 147.0588 mg/g. Results indicated that increasing TEPA loading ratio increases the number of active site for CO2 to attached, hence lead to increase CO_2 capture. Overall, it was shown that amount of CO2 adsorbed is related to the amount of TEPA loaded to the sorbent.

01029

Pullulan mediated zinc oxide microparticles: Effect of synthesis temperature

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ABSTRACT – Zinc oxide (ZnO) has been gaining a lot of attention compared to the other semiconductor metal oxide. This is due to their favorable properties such as chemical stability, high electrochemical coupling coefficient, broad range of absorption radiation and high photostability. It also has wide band gap energy (3.37 eV), large exciton-binding energy (60 meV) and high thermal and mechanical stability at room temperature. Besides these desirable properties, the synthesis of ZnO has been widely studied as it is easy to synthesized and its properties such as band gap, shape and size can be controlled through synthesis parameters and methods. In this study, zinc oxide microparticles (ZnO-MCs) is produced with pullulan as mediator via precipitation method. The effect of synthesis temperature on the properties of synthesized ZnO-MCs were also studied. Based on the result obtained, all synthesized ZnO-MCs exhibited hexagonal wurtzite structure. As the synthesis temperature increases, the particles morphology changes from large spherical shape to flower-like morphology. Furthermore, the particle size also decreases with increasing temperature. This result is supported by surface area and pore analysis where the surface area ranging from 6.22 to 22.78 $m^2 g^{-1}$ was obtained as the pullulan amount increases. All these results indicate that synthesis method and parameters will affect the properties of synthesized ZnO-MCs.

01030

Effect of size and shape dependent of synthesized copper nanoparticle using natural honey

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ABSTRACT – A study on the effect of size and shape of copper nanoparticles (Cu-NPs) by varying the amount of honey has been done using a facile green synthesis method with the presence of ultrasonic assistance. Several amount of different % w/v of honey (1%, 5%, 10%, 15% and 20% w/v) that contain carbohydrate which are mainly glucose and fructose, and other polyhydroxyl groups act as stabilizing agent and a weak reducing agent supported by ascorbic acid were used to produce the Cu-NPs. The synthesized Cu-NPs were characterized using UV-visible, XRD and HRTEM to prove the size and shape of the nanoparticles. The best amount of honey used to produce Cu-NPs with uniform particle size and shape is at 15 % w/v. The size is around 3-4 nm and it shows a spherical shape with less agglomeration using HRTEM analysis image. UV-visible supported the results from the HRTEM. And XRD shows good diffraction pattern for pure Cu-NPs. It proves that honey has the ability to act as stabilizing agent in controlling the size and shape of nanoparticles.

01031

Technical and economic aspects of hydrogen productions and applications: A review

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ABSTRACT – Hydrogen is considered as one of the best candidates to replace the fossil fuel and it is a promising carrier which can be generated from the renewable energy source. The main reason why hydrogen has been hailed as the key to a future clean energy because it can be produced from variety of sources, satisfied all the needs of energy and contribute less pollution. Sustainable hydrogen is capable to transform the global transportation energy economy from one dependent on oil to that based. The rationale behind these efforts is that hydrogen-powered fuel cell vehicles produce effectively zero emissions while hydrocarbon-based automobile are significant source of air pollution. Besides transportation area, fuel cells are able to reduce emissions in other applications such as the residential or commercial distributed electricity generation. Hydrogen paired with electricity can create an integrated energy system based on distributed power generation and use. This paper is an introduction overview to the hydrogen production and its applications. It investigate the possibility to produce hydrogen from a renewable sources, particularly on solar PV, and the hydrogen production to supply to a various applications. This paper also investigate the technical and economic aspects related to the use of hydrogen, especially on both energy and environmental impacts as decisional matter.

01032

Photocatalytic Degradation of Malachite Green Dye by Plant-mediated Biosynthesized Zinc Oxide Nanoparticles

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ABSTRACT – Photocatalytic activity of ZnO-NPs was tested by degradation of malachite green dye under UV light irradiation. The ZnO-NPs were biosynthesized using *Punica granatum* (pomegranate) fruit peels extract as the reducing and stabilizing agents. Simple sol-gel method and combustion in different temperatures (400, 500, 600 and 700°C) were carried out to obtain pure ZnO-NPs with high photocatalytic properties. Results obtained from degradation studies of malachite green dye shown that ZnO-NPs annealed in 700°C had the highest removal efficiency at about 99% in less than 1 hour. This proves that biosynthesized ZnO-NPs have a high potential to be used as a photocatalyst to degrade textile dyes in a short time for wastewater treatments.

01033

Fabrication and Characterization of PU-g-Poly(HEMA) Film for Clotting Time and Platelet Adhesion

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ABSTRACT – This paper describes a fabrication of Poly(HEMA) grafted on PU film prepared by radiation-induced grafting (RIG) copolymerization method using electron beam irradiation for the first time. This method was well known to be fast technique, clean method without involve any chemical initiator, chemically bond the materials, and at the same time is a sterile technique suitable for further potential of biomedical application. This PU-g-Poly(HEMA) films was analysed using Fourier-transform infrared coupled with attenuated total reflection (FTIR-ATR), Scanning Electron Microscope (SEM), water contact angle analysis, platelet adhesion and clotting time measurement. As the results, Poly(HEMA) was confirmed successful grafted on PU based on the shifting of the functional group, lowering the water contact angle from 78.28° to 70.02° with a bit changes in surface morphology. This means that PU-g-Poly(HEMA) was improved its hydrophilicity, thus significantly reduced the platelet adhesion and maintain the normal range of time taken for blood to clot. Therefore, the present PU-g-Poly(HEMA) films which has improved hydrophilicity, was also compatible with blood, may be potential candidates in the biomedical devices or new biomaterial useful for future tissue engineering fields.

01034

Green Synthesis of Gold Nanoparticles using aqueous Extract of *Clitoria Ternatea* Flower

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ABSTRACT – The synthesis of gold nanoparticles (Au-NPs) is being accomplished by the reduction of aqueous gold metal ions, gold(III) chloride trihydrate ($HAuCl_4.3H_2O$) reacted with the aqueous flower extract of *Clitoria Ternatea* (CT). CT flower extract play an important role in synthesizing Au-NPs. It acts as a reducing (Au^{3+} to Au) and stabilizing agent that can eliminate the usage of chemicals during the production of Au-NPs. Besides that, it also reduces the production of unwanted by-products which would cause hazardous to the surrounding and environment. In this study, an absorption peak of Au-NPs is

observed at the range of 540-550 nm from ultraviolet-visible spectroscopy (UV-vis) analysis. Furthermore, the diffraction peaks at 2θ = 38.44°, 44.41°, 65.03° and 77.58° respectively which correspond to face-centered cubic structure with (111), (200), (220) and (311) plane confirm the successful synthesis of Au-NPs. According to transmission electron microscopy (TEM), majority of Au-NPs are spherical in shape and having the mean particles size distribution of 18.16 nm with a standard deviation of 4.67 nm.

01035

Role of pH in the green synthesized of silver nanoparticles on *Kappaphycus alvarezii* via ultrasound irradiation and their antibacterial efficacy study

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ABSTRACT – In this study, a simple and green method to synthesize silver nanoparticles (Ag-NPs) in aqueous solution via sonochemical irradiation through reduction of silver nitrate ($AgNO_3$) with *Kappaphycus alvarezii* (*K. alvarezii*) under alkaline condition has been developed. Ultrafine Ag-NPs were obtained after incresing irradiation time in the present of sodium hydroxide (NaOH, 0.5 M) and gradual increase in silver nitrate ($AgNO_3$, 10 mM) solution drop by drop. The effect of alkaline solution was carried out at ambient temperature until 14 hours. The *K. alvarezii*/Ag-NPs were characterized by UV-vis, XRD, TEM, FESEM-EDX, Zeta potential, and FT-IR studies. UV-vis spectroscopy showed that the surface plasmon resonance increased following the increasing sonochemical radiation time from 406-416 nm. The XRD study obviously indicated the crystalline nature of the Ag-NPs. In addition, TEM images are found that the Ag-NPs is in spherical shape with an average diameter of 10.55–15.75 nm and supported by FESEM images. The elemental atom has been confirmed under EDX that silver atom has high ratio percentage. The Zeta potential concluded that Ag-NPs is high stability. The FT-IR spectrum gives adequate evidences for the implication of in stabilizing of the Ag-NPs on seaweed *K. alvarezii* by van der Waals forces. Finally, the application of *K. alvarezii*/Ag-NPs has been evaluated on gram-positive and Gram-negative bacteria and concluded an antibacterial efficacy of the Ag-NPs.

02000 – PROCESS SYSTEM

02001

A viable system for CO_2 methanation over fibrous silica ZSM-5 for substitute natural gas

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ABSTRACT – Catalytic CO2 methanation offers an attractive and sustainable way for the production of substituted natural gas (SNG), which may be used as a clean alternative energy source for fossil fuels. A metal-free fibrous silica ZSM-5 catalyst (FS@ZSM-5) was synthesized via the microemulsion system to conduct catalytic CO2 methanation. The FESEM, BET, and FTIR characterization techniques were used to investigate surface morphology, the pore structure of the catalysts. It was noticed that the commercial ZSM-5 showed the CH4 selectivity of 37% with a rate of methane formation 0.067 mmol m-2s-1. While FS@ZSM-5 exhibited high CH4 selectivity of 66 % with rate of methane formation 0.108 mmol m-2s-1 using same conditions (T = 500 oC and GHSV = 36,000 mL h−1 g−1). Therefore, the FS@ZSM-5 was proved the best catalyst during CO2 methanation activity.

02002

Analysis on Physiochemical Properties of Cellulose Fiber from Rice Straw Waste

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ABSTRACT – Green biobased polymeric membranes are being increasingly studied for different applications. In this study, freeze dried cellulose fiber with 35% yield was isolated from rice straw. The cellulose fiber was obtained through bleaching and delignification of the rice straw waste using soxhlet instrument and facile method of alkali treatment, respectively. The cellulose fiber was analysed through X-ray powder diffraction (XRD), fourier-transform infrared spectroscopy (FTIR), zeta potential analyzer and scanning electron microscope (SEM). Compared to the straw, all physiochemical properties of treated cellulose fiber increased with almost twofold of crystallinity (64%) and zeta potential up to -33.61 mV. FTIR revealed the sequence treatments on the straw was successful to obtain cellulose fiber with high purity. In addition, the morphological study illustrated cellulose fiber with organized structure.

02003

Estimation of Particulate Emission Generation in Palm Oil Mill Boiler

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ABSTRACT – The palm oil industries in Malaysia has been positively growth throughout the year, for it sustainable approach in terms of production and environmental protection. However, this industry also producing considerable amount of particulate emission from the process of burning its biomass waste of palm fibre and shell in the boiler. This study present a method to estimate the particulate emission that are being generated from the boiler. The method were done by analyzing the proximate analysis value of the ash content of palm fibre and shell found in this study. The particulate emission were physically collected from five palm oil mill boiler with boiler capacity ranging from 18-45 tonne/hour. The particulate stack fly ash was collected from the stack gas downstream of a multi-cyclones particulate arrestor according to the USEPA method. Meanwhile the sample of palm fibre and shell were collected to determine the proximate value. The estimation were then being further analyzed according to the particulate emission that were obtained by the real-stack sampling. In summary, it can be estimated that 26% of the ash generated from the combustion of palm fibre and shell in palm oil mill boiler are being released at the stack.

02005

Effect of Internal Configuration on the Performance of Pressure Swing Adsorption Column

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ABSTRACT – Pressure Swing Adsorption (PSA) is a promising separation technique, used for purification of natural gas. One of the important aspects in establishing high efficiency process is the adsorption column internal configuration, as it influences both the flow conditions and adsorption characteristics. This study investigated the characteristics of a PSA column packed with the carbon molecular sieve used for removing CO2 from a natural gas mixture. The simulation study was implemented using a Computational Fluid Dynamics software, COMSOL. The effects of different length of adsorbent, different velocity and different temperature on the adsorption time was investigated. The optimum adsorption time was determined by the purity of CH4 at the outlet of the column.

02006

Parametric study of CO_2 separation using carbon molecular sieve, zeolite and silica gel

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ABSTRACT – Performances of Pressure swing adsorption (PSA) dependent on the type of adsorbent and efficiency of the regeneration cycle. In this work, a model describing CO_2 mixture flow, mass and heat transfer with multi-component adsorption model are developed in Aspen Adsorption environment to compare the performance of PSA cycles with three different adsorbents (CMS 3K, zeolite 13x and silica gel). Adsorption capacity of CO_2 for three adsorbents was found to be in order of: CMS>zeolite>silica gel. The PSA performances were evaluated based on the purity, recovery and productivity of the CO_2 separation. Subsequently, parametric study on feed flowrate and pressure has been performed to help effectively improve the PSA performances.

02007

Experimental study of acoustic cavitation bubbles characteristic under influence of ultrasonic wave

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ABSTRACT – Sonochemistry application in various of field especially in sonochemical engineering processes are constantly increasing and have been vigorously studied in recent years. In these applications, a detail understanding on the characteristic and behavior of acoustic cavitation bubble is crucial. However, acoustic bubbles behave differently in each liquid. Certain acoustic bubbles show dramatic transition during sonication and have complex interaction in a liquid mixture, thus making it more difficult to observes in a consistent and thorough manner. In response to this problem, our study will investigate separately acoustic cavitation bubble form in sonicated water, ethanol and combination mixture of ethanol-water. Each liquid was irradiated at 20 kHz with transducer attach to the bottom of an acrylic vessel. To visualize acoustic bubbles clearly, a high-speed video camera was used to capture acoustic bubbles image. Image Processing Toolbox in MATLAB was used for image processing and analysis. Experimental result reveals that acoustic cavitation bubbles in a mixture of ethanol-water have the largest radius, volume and higher buoyancy force compare to pure ethanol and water. Results obtained coincided well with theory, which indicated that sonicated mixture containing alcohol provide resistance to gas transfer across liquid/bubble interface, leading to an increased bubble radius and hence the buoyancy force.

03000 – SAFETY

03001

Bayesian Analysis for Assessing Risks of Rotating Equipment and Its Financial Loss in Petrochemical Industry

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ABSTRACT – Petrochemical industry has many hazards because of harmful materials and rotating equipment. Exposure of workers to hazards contribute to high numbers of accidents at the workplace. Accidents at the workplace could be caused by lack of knowledge and training for handling equipment safely. Risk assessment is a practical technique to identify hazards and assess risks associated with equipment at the workplace. This paper presents the use of Bayesian analysis for assessing risks of rotating equipment and its financial loss specifically in petrochemical industry. The objective is to develop a cause-and-effect relationship that contribute to financial loss to both petrochemical engineering and insurance companies. The study will develop a Bayesian Network to identify the cause-and-effect and the probability of failure of a pump considering human factors. The study has three phases to be conducted. The first phase is defining the risk assessment based on both engineering and insurance company perspectives. The second phase develops the Bayesian Network using the HUGIN software to show the cause-and-effect relationships of human factors and equipment. Finally, the third phase determines the probability of failure of handling pump considering the human factors. It is expected that the study will illustrate the probability of failure of pump during maintenance activities which can cause financial loss.

03002

Developing Informative Emergency Evacuation Procedures for Academic Buildings

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ABSTRACT – Emergencies pose high risks which can cause injuries and fatalities to people, as well as damaging properties and environment. Many researchers studied on the emergency evacuation to provide a safe and efficient evacuation plan for buildings. In any buildings, the emergency evacuation plan should have facilities for assisting occupants to evacuate, such as detectors, alarms, signage leading to assembly points, and both primary and alternative routes. All occupants should participate in the fire drills and the emergency evacuation exercises. During emergencies, the occupants could easily get panic due

to uncertainty. Therefore, this paper proposes an algorithm that can assist occupants to evacuate the building safely. The algorithm will then be implemented in the MATLAB® software. Block N01 of Universiti Teknologi Malaysia (UTM) will be selected for testing the use of algorithm. Information of hazard and escalating events, safe routes, and location of assembly points will be included in the algorithm. The algorithm will be shared with the occupants of N01 as part of data collection. Data will be analysed focusing on the interaction between the occupants and the algorithm in MATLAB. It is expected that the algorithm could provide information of a safe route to occupants during the emergency situation.

03003

Fibrous silica induced narrow band gap TiO_2 catalyst for enhanced visible light-driven photodegradation of methylene blue

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ABSTRACT – Fibrous silica titania (FST) was synthesized via hydrothermal method and tested on photodegradation of methylene blue (MB). The catalyst was characterized using field emission scanning electron microscopy (FESEM), Fourier transform infrared (FTIR) spectroscopy and ultraviolet-visible diffuse reflectance spectroscopy (UV-Vis DRS). The photocatalytic activity was performed under different reaction condition such as catalyst dosage, MB initial concentration and pH before the kinetics was studied. FST showed the highest photodegradation percentage (99.9%) than TiO_2 using 0.25 g L^{-1} of catalyst dosage at pH 5 and 10 mg L^{-1} of MB initial concentration for 2 h. The FST provided high surface area, more active site (Si-O-Ti) and lower band gap, which improved their performance towards photodegradation of MB under visible light. The kinetics study indicated that the photodegradation of MB well fitted by pseudo-first order Langmuir-Hinshelwood model. It is suggested that this catalyst has potential use for wastewater treatment as well as for other applications.

03004

Tailoring amount of TiO_2 doped onto fibrous silica ZSM-5 for enhanced photodegradation of paracetamol

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ABSTRACT – Photocatalytic degradation of paracetamol has received much attention due to its low energy consumption, high efficiency and safety to environment. A simple electrolysis system was used to

synthesis a series of titania (1-5 wt%) supported on fibrous silica ZSM-5 (TiO_2/FZ). The FESEM images showed the cockscomb-like surface of FZ was preserved even after the addition of TiO_2. FTIR results confirmed that TiO_2 is successfully incorporated with FZ through the Si-O-Ti bonds. The adsorption edge of TiO_2 shifted to the higher wavelength after supported on FZ and lowering the band gap of TiO_2. The photodegradation of paracetamol was resulted in the following order: 3 wt% TiO_2/FZ (90%) > 5 wt% TiO_2/FZ (71%) > 1 wt% TiO_2/FZ (65%). 3 wt% TiO_2/FZ exhibits excellent photodegradation of paracetamol owing to the highest number of Si-O-Ti bonds and lowest band gap. The result obtained give new insight for other wastewater treatment processes over photodegradation of various pollutants.

03005

Beneficial interaction of copper oxide and fibrous silica for enhanced photocatalytic desulphurization

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ABSTRACT – Photocatalytic desulphurization (PDS) is considered as a promising technique to remove hazardous sulphur compounds from fuel oil due to its high catalytic activity, safety, low energy consumption, and low cost. In this work, fibrous silica KCC-1 was synthesized by hydrothermal method followed by incorporation of CuO by electrolysis. The catalyst was used for PDS of dibenzothiophene (DBT). The presence of bicontinuous concentric lamellar morphology with uniform spherical shape was confirmed by FESEM analysis. The phase and crystallinity of the catalysts was investigated by XRD, while the band gap energy was determined by UV-Vis DRS. The PDS performance of CuO/KCC-1 was compared with KCC-1, CuO/SiO_2 and SiO_2. It was observed that the photoactivity of CuO/KCC-1 was higher than other catalysts, which is mainly due to its fibrous morphology and appropriate band gap energy, as well as synergistic role of both CuO and KCC-1.

03006

Synthesis of fibrous silica tantalum (FSTa) for photooxidative desulphurization

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ABSTRACT – The photooxidative desulphurization (PODS) of dibenzothiophene (DBT) was examined under visible light using fibrous silica tantalum (FSTa), tantalum oxide doped fibrous silica (Ta/KCC-1) and commercial tantalum oxide (Ta_2O_5). FSTa was synthetized using hydrothermal method, while Ta/KCC-1

was obtained via a wet impregnation method. The catalysts were examined by field emission scanning electron microscopy (FESEM), X-ray Diffraction (XRD) and UV-Vis diffuse reflectance spectroscopy (UV-Vis DRS). It was shown that the FSTa possesses the highest photocatalytic performance, due to its fibrous structure, well-dispersion of Ta, as well as its narrower band gap. These traits impact on the photocatalysis by promoting the deposition of the DBT on the catalyst, allowing the efficient transfer of charge carrier and preventing the electron-hole recombination.

03007

Boosted Ag/g-C_3N_4 prepared under Microwave Irradiation for photocatalytic activity of RhB under visible light

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ABSTRACT – The effluent of Rhodamine B (RhB) from industries causes a high impact toward contamination of the environment. Photocatalytic degradation has become a promising destructive technique to remove those dye from industrial. In this study, Silver/graphitic carbon nitride (Ag/g-C_3N_4) prepared using simplistic preparation using microwave irradiation in its place of no rmal calcination under furnace as heating media. The prepared photocatalyst was characterized by using Fourier transform infrared (FTIR), N_2 adsorption-desorption, ultraviolet-visible diffuse reflectance spectra (UV-VIS/DRS). The deposited of Ag on g-C_3N_4 surface photocatalyst enhanced capability to extend the adsorption of visible light region. The texture of g-C_3N_4 affected after deposited with Ag and the bandgap energy of Ag/g-C_3N_4 narrowed from 2.7 eV to 2.31 eV significantly boosting and improved the efficiency of degradation RhB under visible light irradiation. The additional Ag on g-C_3N_4 revealed highest performance (98%) using RhB solution after exposed under visible light for 180 min. As a result, this works can give benefit to purify the effluent of toxic dyes as wastewater treatment.

03008

Mechanistic Degradation Routes of Phenol *via* Photocatalyst: A Review

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ABSTRACT – The existence of phenolic compound in the aquatic ecosystem, categorized as emerging contaminants, has evoked a problem in the scientific community over the past few years. Recently, water purification processes by photocatalytic heterogeneous application has gained wide attention owing to its effectiveness in degrading and mineralizing the recalcitrant organic compounds as well as the possibility of utilizing the solar UV and visible-light spectrum. Titania has been dignified as potential candidate in this application due to cost effectiveness, inert nature and photostability. A substantial number of studies has concentrated on improving TiO_2 photocatalysis through metal, non-metal and ion doping modifications. In this review, we summarized the recent works for degradation of phenolic compound in the presence of titanium dioxide (TiO_2) and mechanistic discussion (illustrating the intermediates products).

03009

The Readiness of Community-Based Emergency Response Management in Pasir Gudang, Johor

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ABSTRACT – In Malaysia, the current practice and resilience of community-based emergency response are still indefinite, thus contribute to the loopholes of emergency response readiness. The National Disaster Management Strategy of Malaysia, for example, has conducted a mastery plan to make sure the safer environment and community. Therefore, the community's readiness for emergency action in Pasir Gudang should be emphasized. It is suggested that the community should be awareness, have a knowlege, skills and programs dictated to local communities in the emergency areas. The objectives of this review are to contribute to a community-based approach towards developing an integrated emergency response management plan in the Pasir Gudang area. It is an essential element to prevent the risk of major harm and loss from any emergency. Besides, it builds resilient communities, ensuring the sustainable safety of locals, industry and the whole community. This article conducts a literature review on the readiness of community-based emergency response plan in Pasir Gudang.

03010

Application of grey model GM (1, 1) to human and organizational failure in chemical process industry

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ABSTRACT – Current status of chemical process industry (CPI) has been showed that the accident rate in CPI has not decreasing in spite of all the efforts have been spent to make it safe and loss prevention. Effective accident prediction in chemical process industry is an important component of risk management during plant operations and decision-making process. This study outlines the application of gray (1, 1) model to predict the human and organizational factors us a major contributors of acci dent occurrence in CPI. Grey forecasting model has been successfully employed met this objective requirement and the result shows the GM (1, 1) proposed in this study has a higher forecast precision and excellent applicability.

03011

The Verification Result of Permit to Work Assessment in Occupational Accident using Fault Tree Analysis

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ABSTRACT – As stated in the Part 1 write-up of the PTW element assessment beginning with Hazardous Activity, Worksite Inspection, Supporting Document, Work Description and Close Out which has significant and distinct impact on occupational accident. Hence the next step to confirm the results of this study using Fault Tree Analysis. As it is known, the FTA is used to find the cause of an event on a matter calculated by the likelihood of the event being a Top Event. FTA is a relati vely well-known technique used to find the probability of failure of a system and from FTA results is similar to the SEM AMOS decision which is Hazardous Activity followed by Worksite Inspection to Close Out element which is the element that causes Permit to Work failure to cause occupational accident at the Petrochemical Plants.

03012

An Index to Reflect the Safety Risks of Ageing Process Plant

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ABSTRACT – Process safety management involves many different tasks in daily plant operation, plays pivotal role in ensuring smooth operation and safety of a process plant. Despite the complexities of the design and operational aspects of chemical process plants, a quick index that provides a snapshot of the plant safety condition is often needed for making preliminary assessment. A number of indices have been developed. These are compared and contrasts, and wherever appropriate, features that are relevant to

ageing plant issues are highlighted. Based on these assessments, a comprehensive framework is proposed with emphasis on ageing facilities. The model takes into considerations variety of issues relevant to process safety management.

03013

Triggering Factors of Accidents in Chemical Industry Identified from Cases Occurred from 1999 to 2019

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ABSTRACT – An analysis of 89 comprehensive accident investigation reports for the period from 1999 to 2019, extracted from the U.S. Chemical Safety and Hazard Investigation Board is presented. The sites involved are categorically assessed and summarised to provide the overall impression on nature of accidents involving chemical plants. The categories include the type of industry, consequences, causes of accidents, ageing related accidents, accidents for ageing categorisation, ageing mechanism and obsolescence categorisation. The output from the study reveals that organization and management play a vital role in controlling accidents or losses to occur in a company. Besides, it also indicates the contribution of ageing mechanisms or factor for accidents to initiate or happen.

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