

2023 Research, Invention, and Innovation Congress (RI2C2023)

(<https://ri2c-kmutnb.com/home.aspx>)

Session: Innovative Sustainable Science (iSS)

Venue: Online Conference at King Mongkut's University of Technology North Bangkok, Thailand

Conference date: 24-25 August 2023

Main topic coverages: Environmental and Energy Technology

The other topics related to Environmental and Energy Technology include, but not limit to

- Energy and renewable energy
- Waste management and waste valorization
- Environment science and pollution management
- Sustainable development and management
- Natural Resource Management and improvement

Innovative Sustainable Science (iSS) Editors

Managing Editor: Malinee Sriariyanun, KMUTNB, Thailand

Editorial members:

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Session Chairs:

1. Atthasit Tawai, KMUTNB, Thailand
2. Marttin Paulraj Gundupalli, University of Alberta, Canada
3. Prapakorn Tantayotai, Srinakarindwirot University, Thailand
4. Diana Jose, KMUTNB, Thailand

Presentation schedule for iSS-Ri2C2023

| iSS No. | Ri2C No. | Title | Authors |
|---|-----------------|--|--|
| 25 August 2023. ISS Section 1, Room 1. Visual platform. Time 9.00-12.30 Session Chairs: Atthasit Tawai Co-chair: Marttin Paulraj Gundupalli | | | |
| 01009 | Iss10 | Optimization of Organosolv Pretreatment with Acid Catalyst to Enhance Enzymatic Saccharification of Corn Husk | Engkarat Buakeaw , Diana Jose, Wawat Rodiahwati, Marttin Paulraj Gundupalli, Keerthi Katam, Prapakorn Tantatotai, Malinee Sriariyanun, and Kraipat Cheenkachorn |
| 01010 | Iss11 | Process Optimization of Deep Eutectic Solvent Pretreatment of Coffee Husk Biomass | Sukunya Areeya , Marttin Paulraj Gundupalli, Babu Dharmalingam, Baranitharan Paramasivam, Prapakorn Tantayotai, Patchanee Yasurin, Elizabeth Jayex Panakkal* |
| 01008 | Iss17 | Oxalic Acid Pretreatment on Enhancement of Enzymatic Saccharification from Napier Grass for Biofuel Production | Danipa Panyarachun , Elizabeth Jayex Panakkal, Atthasit Tawai, Wawat Rodiahwati, Baranitharan Paramasivam, Suvaluk Asavasanti, Kraipat Cheenkachorn* |
| - | Iss01 | The Effects of Combustion Phasing Induced by Water Injection on NOx Performance of GDI Engine at MBT Ignition Timing | Nattapon Boontek , Kampanart Theinnoi, Sak Sittichompoo |
| 01001 | Iss04 | Activity for Diesel Particulate Matter Oxidation of Silver Supported on Al ₂ O ₃ , TiO ₂ , ZnO, and CeO ₂ : The Effect of Oxygen Concentration | Punya Promhuad , Boonlue Sawatmongkhon*, Nuwong Chollacoop, Kampanart Theinnoi, Thawatchai Wongchang, Ekachai Juntasaro |
| 01002 | Iss07 | The Influence of Direct Non-Thermal Plasma Treatment on Soot Characteristics under Low Exhaust Gas Temperature | Teerapong lamcheerangkoon , Nuwong Chollacoop, Boonlue Sawatmongkhon, Thawatchai Wongchang, Kampanart Theinnoi*, Ekachai Juntasaro |
| 01004 | Iss08 | Performance Analysis of Integral Process of Bio-Oil Production, Bio-Oil Upgrading, and Hydrogen Production from Sewage Sludge | Lida Simasatitkul* , Apiwat Lakkhanasombut, Worawit Morin, Supachai Jedsadajerm, Suksun Amornraksa, Karittha Im-orb |
| 01003 | Iss30 | Nano-particle Characteristic Emitted from Gasoline Direct Injection Engine Equipped with Non-Thermal Plasma Device | Pichitpon Neamyoo , Kampanart Theinnoi*, Boonlue Sawatmongkhon, Sak Sittichompoo |
| 02012 | Iss18 | Manganese Constituent in Stainless Steels Oxidized in Oxygen Containing Water Vapor at 800 °C: High Temperature Oxidation and Volatilization | Methanan Sangsuebsri, Suwijak Pokwitidkul, Panya Wiman , Youhei Tanaka, Thammaporn Thublaor* |
| 02003 | Iss02 | Immobilization of Cellulase on Zinc Oxide Deposited on Zeolite Pellets for Enzymatic Saccharification of Cellulose | Tokla EOM , Jantiya Isanapong, Pisisit Kumnorkaew, Krisanavej Songthanasak, Peerapong Pornwongthong* |
| 01007 | Iss32 | Performance Evaluation of Solar Radiation for Food and Agriculture Dryer | Sriwichai Susuk* , Weerayuth Promjan, Natsacha Inchoorun, Rewadee Meesat, Wannee Suttivattanavet, Kusol Iamsub, Soravit Jamjumroon |

| | | | |
|--|-------|---|--|
| 01005 | Iss23 | Spirulina Cultivation Using Biogas CO ₂ as the Carbon Source: Preliminary Study on Biomass Growth and Productivity | Raj Kumar Oruganti , Madhu Kumar Kumara, Rakesh Tejavath, Malinee Sriariyanun, Debraj Bhattacharyya* |
| 01006 | Iss03 | Design and Development of Performance Rating Apparatus for Cold Room Refrigeration Unit Using Cooling-Load Balance Method | Arruck Tragangoon , Khemapat Tontiwattanukul, Montri Ngamprukvanit, Chayanon Serttikul* |
| 25 August 2023. ISS Section 2, Room 1. Visual platform. Time 13.00-17.30 Session Chairs: Prapakorn Tantayotai Co-chair: Diana Jose | | | |
| 02001 | Iss22 | The Relationship Between Environmental Technology Patenting and Environmental Performance Index in Countries: What Does It Mean and How Can We Measure It | Tatyana Maximova*, Dmitry Verziin , Min Zhang |
| 02002 | Iss25 | Economic Assessment of Medium and Large-Scale Landfill Mining Business: Case Study Thailand | Anupong Muttaraid , Sirintornthep Towprayoon, Chart Chiemchaisri, Thapat Silalertruksa, Komsilp Wangyao* |
| 02013 | Iss26 | Machine Learning Techniques for the Design and Optimization of Polymer Composites: A Review | J. Maniraj , Felix Sahayaraj Arockiasamy *, C. Ram Kumar, D. Ashok Kumar, I. Jenish, Indran Suyambulingam, Sanjay Mavinkere Rangappa, Suchart Siengchin |
| 02014 | Iss27 | Sustainable Smart Polymer Composite Materials: A Comprehensive Review | A.Felix Sahayaraj* , S. Dhamotharan, D. Sandeep, P. Ramachandran, I. Jenish, Divya Divakaran, Indran Suyambulingam, M. R. Sanjay, Suchart Siengchin |
| - | Iss31 | Mechanical properties of pyrolysis carbon black in rubber compound application | Teerapat Anupabphan* , Noppakun Kaewdam, Bancha Seataew, Torlab Nangnoi, Napan Narischat, Chonlakarn Wongkhorsub |
| 02015 | Iss28 | Understanding the Environmental Distribution and Potential Health Risks of Pollutants from Deodorant Products: A Review | Meenakshi Kakara , Srideep Dasari, Marttin Paulraj Gundupalli, Tawiwan Kangsadan, Keerthi Katam* |
| 02016 | Iss21 | Pharmaceuticals and Agro-Chemicals in Groundwater of Hyderabad, India | Kalyani Subbalakshmi Golakoti , Sneha Maloth, Madhu Kumar Kumara, Murali Krishna Sabavath, Sukanya Areeya, Debraj Bhattacharyya, Keerthi Katam* |
| 02017 | Iss29 | A Comparison of Fiber Types in Community for Mist Collection | Thana Ananacha, Onvalee Amornleetrakul* |
| 02008 | Iss05 | Utilization of Nongkhai Black Jasmine Rice Bran Oils for Development of Functional Drink Emulsion | Ketinun Kittipongpittaya* , Teerawan Suwan, Piyarach Kullamethee, Premsak Puangploy, Pattaranan Yimchom, Tanyaporn Intaratul |
| 02007 | Iss19 | Cider Production from King Mandarin (Citrus nobilis Lour.) and Its Antioxidant Activity | Hao Thien Vo , Bich Ngoc Thi Bui, Chau Minh Luu, Thanh Ngoc Nguyen, Long Dang Hoang Bui, Nhi Yen Thi Tran, Phat Tan Dao, Phong Xuan Huynh* |
| 02006 | Iss20 | Antidiabetic Activity and Molecular Docking Analysis of Milky Mushroom (Calocybe indica) Grown on the Renewable Substrate | Anne Sahithi Somavarapu Thomas , Vijaya Lakshmi Murugan Kavitha, Jayapriya Sekar, Mahalakshmi Velmurugan, Malinee Sriariyanun, and Vinodhini Shanmugam* |
| 02005 | Iss24 | Levan Production in Shake Flask and Fermenter - Influence of Feeding | Bhuvaneshwari Veerapandian , Saravanan Ramiah Shanmugam, |

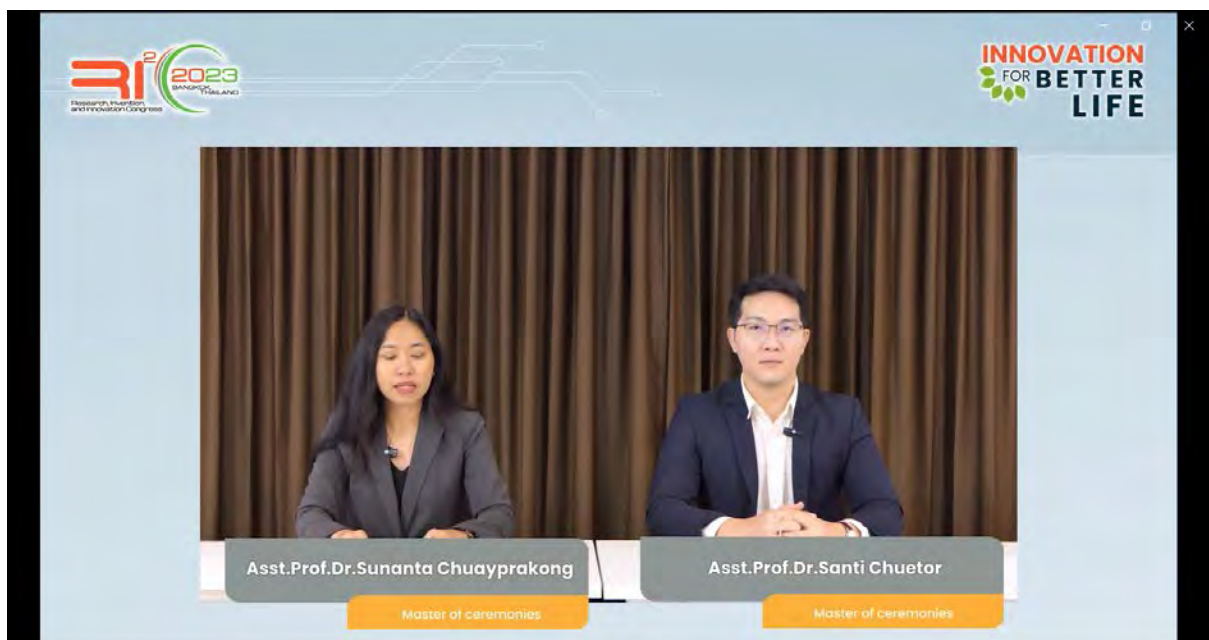
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|-------|-------|---|---|
| | | Strategy on Levan Yield and Molecular Weight Distribution | Srividhya Krishnan, Subramaniyasharma Sivaraman, Malinee Sriariyanun, Ponnusami Venkatachalam* |
| 01011 | Iss12 | Conversion of lignocellulose residue obtained from biorefinery stream to electricity by microbial fuel cell | Keerthi Katam, Maythee Saisriyoot, Supacharee Roddecha, Peerapong Pornwongthong, Malinee Sriariyanun * |
| 02004 | Iss13 | Climate-Conscious Food Preserving Technologies for Food Waste Prevention | Yousif Alhammadi, Doris Ying Ying Tang , Kit Wayne Chew, Suksun Amornraksa, Pau Loke Show* |
| 02011 | Iss14 | Ultrasound-Assisted Food Processing: A Mini Review of Mechanisms, Applications, and Challenges | Mahra Alshehhi, Guowei Wu , Tawian Kangsadan, Kit Wayne Chew*, Pau Loke Show* |
| 02009 | Iss15 | The Future of Food Preservation: Active Packaging with Controlled Release Systems | Khadija Farousha, Pei En Tham , Kit Wayne Chew, Suksun Amornraksa, Pau Loke Show* |
| 02010 | Iss16 | From Kimchi to Kefir: An Exploration of Probiotics, Benefits, and Future | Malak AbuZaid , Sook Sin Chan, Kit Wayne Chew, Atthasit Tawai, Pau Loke Show* |

*Presenter names are highlighted in Bold.

The 4th Research, Invention, and Innovation Congress (RI²C 2023)

Session of Opening Ceremony & Keynote Lecture

Thursday, 24 August 2023 (9:00 a.m. – 3:30 p.m.)





RI² 2023
 Research, Innovation and Innovation Congress
 BANGKOK THAILAND

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ET'RI Science and Technology Research Institute

KMUTNB

Assoc. Prof. Dr. Eugene Kowch
 University of Calgary, Canada

RI² 2023
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 BANGKOK THAILAND

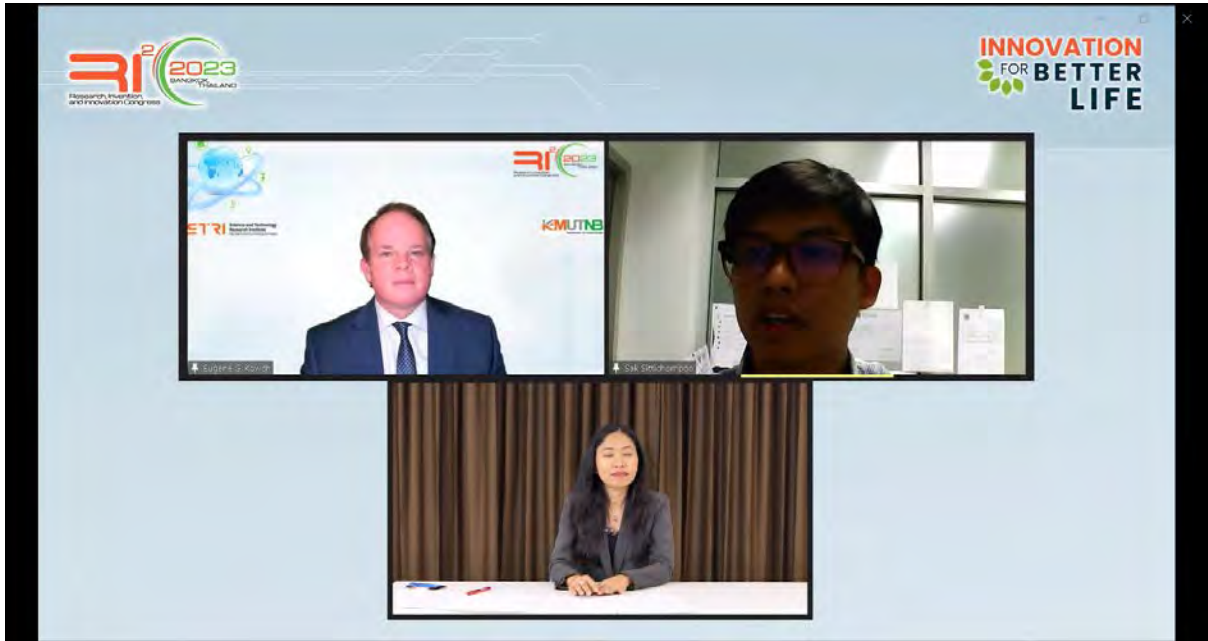
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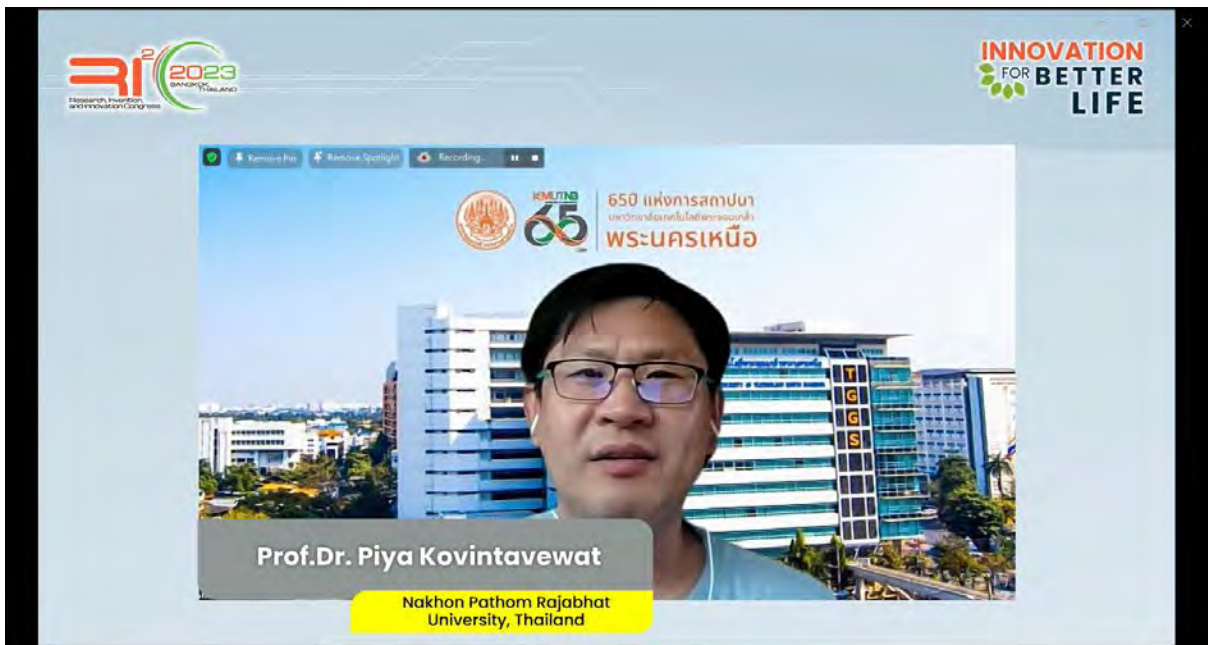


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Dr. Siwarutt Boonyarattanakalin

SMS Corporation Co., Ltd., Thailand



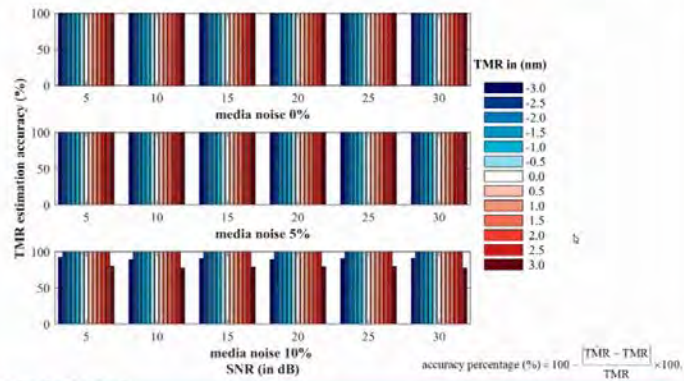


Prof. Dr. Piya Kovintavewat

Faculty of Public Health
 Mahachulalongkornrajavidyalaya
 University, Thailand

TMR Estimation Accuracy

มหาวิทยาลัยราชภัฏรำไพพรรณี
 Rajabhat Ramkhamhaeng University



Prof. Dr. Piya Kovintavewat

49



Piya Kovintavewat

Titipong L



Prof. Dr. Gui Yun Tian

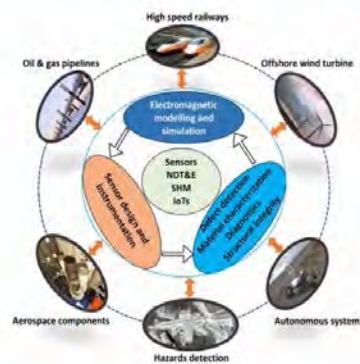
Newcastle University, UK

Introduction of Newcastle ISC and Sensor Team

Intelligent Sensing and Communications (ISC)

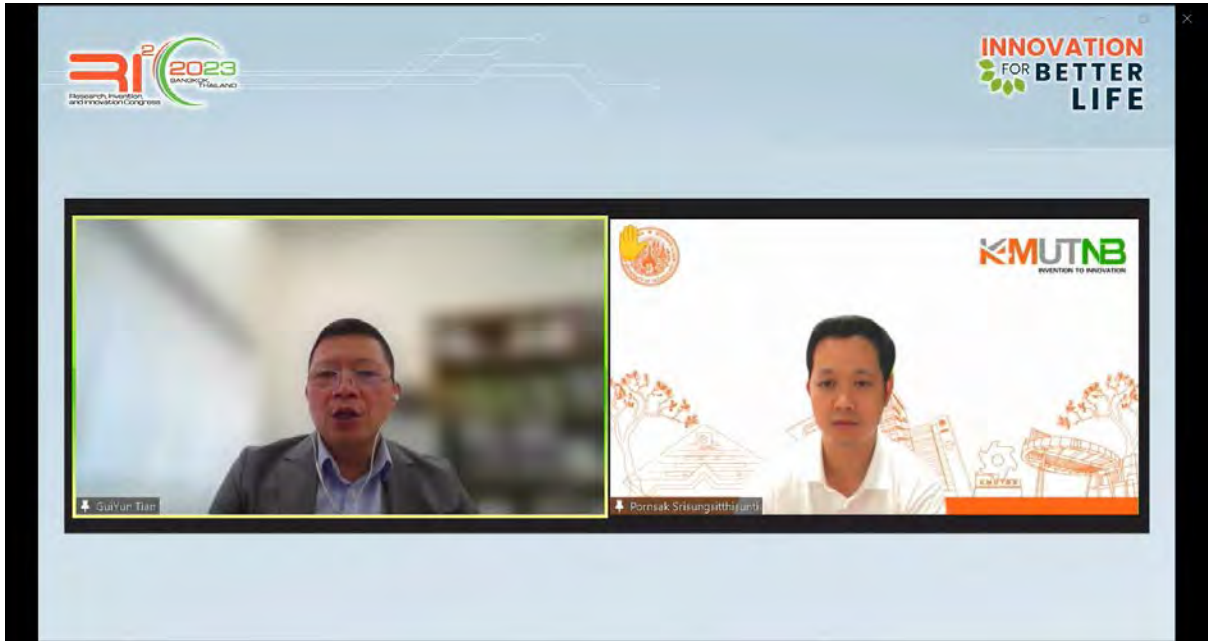
We focus on a broad range of **communications, sensors and signal processing** involving the introduction and development of new advanced theoretical and practical algorithms.

We derive innovative methods for the advancement of knowledge and a better understanding of the technical concepts of current and future communications, sensors and signal processing systems



Prof. Dr. Gui Yun Tian

Newcastle University, UK



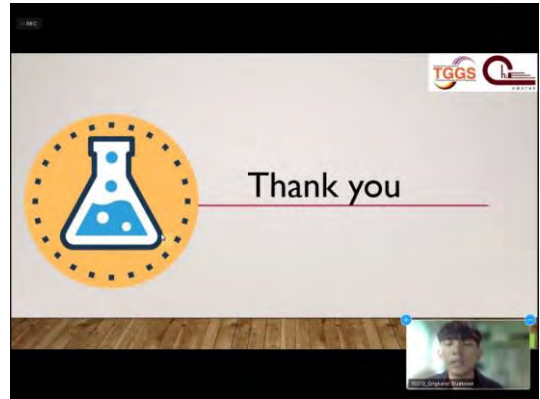
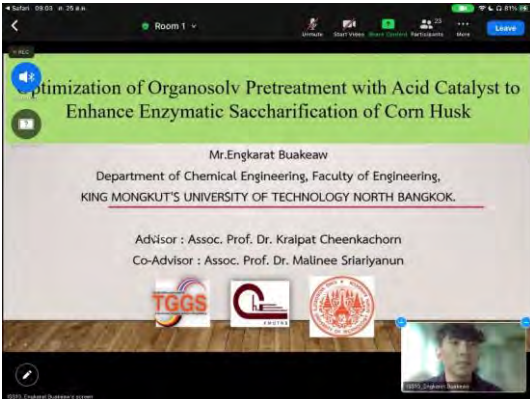
Presentation Photo

25 August 2023. ISS Section 1, Room 1. Visual platform. Time 9.00-12.30

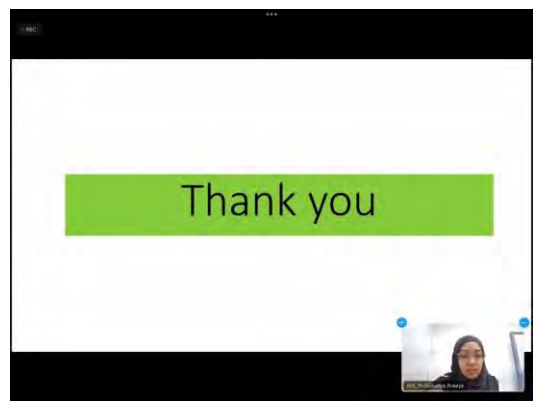
Session Chairs: Atthasit Tawai

Co-chair: Marttin Paulraj Gundupalli

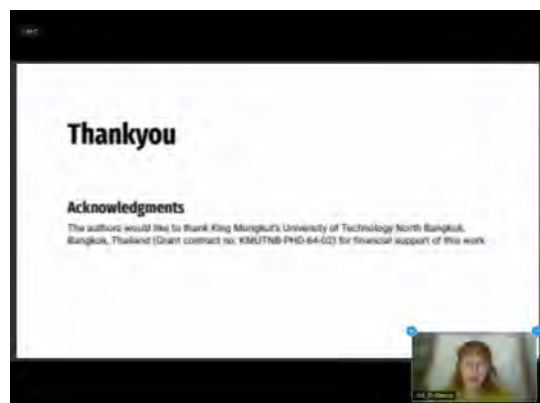
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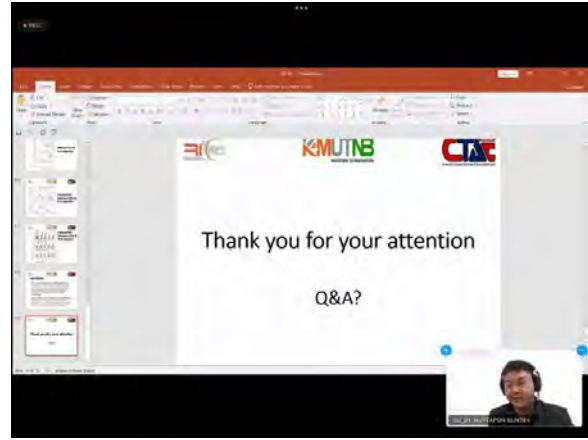
- ISS_11 (01010)



- ISS_17 (01008)



- ISS_01





- ISS_04 (01001)



- ISS_07 (01002)

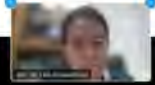


- ISS_08 (01004)

Performance analysis of integral process of bio-oil production, bio-oil upgrading, and hydrogen production from sewage sludge

Eida Srisattikhai¹, Aravit Lakkhanamonon¹, Riwat Mani¹, Supachai Inthakajorn¹, Sahas Amornwong¹, Kanittha Inanab¹
¹Department of Industrial Chemistry, Faculty of Applied Science, King Mongkut's University of Technology North Bangkok, Thailand
²The German International Thai German University School of Engineering (IGGSE), King Mongkut's University of Technology North Bangkok, Thailand
³Program in Food Process Engineering, Faculty of Food Industry, King Mongkut's Institute of Technology Ladkrabang, Thailand

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- ISS_30 (01003)






Nano-particle Characteristic Emitted from Gasoline Direct Injection Engine Equipped with Non-Thermal Plasma Device

Pichitpon Neamyou¹, Kampanart Theinnoi¹, Boonlue Sawatmongkhon¹, Sak Sittichompoor¹

¹Research Centre for Combustion Technology and Alternative Energy (CTAE)
 Science and Technology Research Institute
 King Mongkut's University of Technology North Bangkok

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ANY QUESTIONS?

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- ISS_18 (02012)



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Manganese Constituent in Stainless Steels Oxidized in Oxygen Containing Water Vapor at 800 °C: High Temperature Oxidation and Volatilization

Methanan Sangsuebsri¹, Suwijak Pokwitdikul¹, Panya Wiman¹,
 Youhei Tanaka² and Thammaporn Thublaor¹

¹High Temperature Corrosion Research Center, Department of Materials and Production Technology Engineering, Faculty of Engineering, KasuTUS, Thailand
²Division of Materials Science and Engineering, Graduate School of Engineering, Materials Institute of Technology, Japan

24 - 25 AUGUST, 2023
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Thank you for your attention

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- ISS_02 (02003)

RIIC 2023
65th Anniversary
NSTDA

The 4th Research, Invention, and Innovation Congress

Immobilization of Cellulase on Zinc Oxide Deposited on Zeolite Pellets for Enzymatic Saccharification of Cellulose

Advisor: Asst. Prof. Dr. Peerapong Pornwongthong
Co-advisor: Asst. Prof. Dr. Jantiya Isanapong
Co-advisor: Dr. Pisist Kumnorkaew

Presented by : Mr. Tokla E... Ph.D. Candidate

Questions
Answers

- ISS_32 (01007)

Performance Evaluation of Solar Dryer for Food and Agriculture

Sriwichai Susuk

Thailand Institute of Scientific and Technological Research (TISTR)

The END

- ISS_23 (01005)

Spirulina cultivation using biogas CO₂ as the carbon source: Preliminary study on biomass growth and productivity

Raj Kumar Oruganti¹, Madhu Kumar Kumara¹, Rakesh Tejavathi¹, Malinee Sriariyanun², and Debraj Bhattacharyya¹

¹Department of Civil Engineering, Indian Institute of Technology Hyderabad, Sangareddy, Telangana, India – 502284

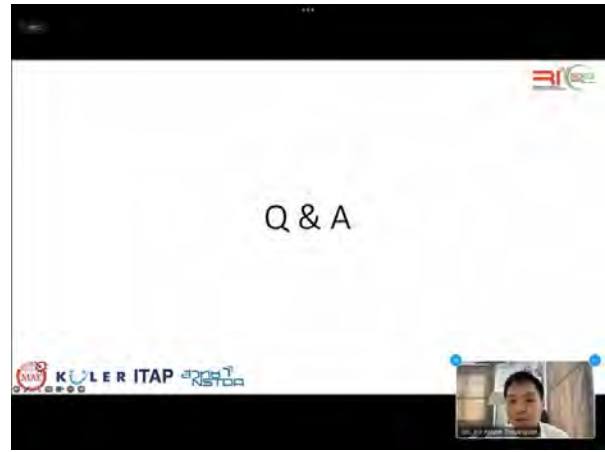
²Biorefinery and Process Automation Engineering Center, Department of Chemical and Process Engineering, The Sirindhorn Thai-German International Graduate School of Engineering, King Mongkut's University of Technology North Bangkok, Thailand

Paper Id: ISS_23

The 4th Research, Invention, and Innovation Congress

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- ISS_03 (01006)

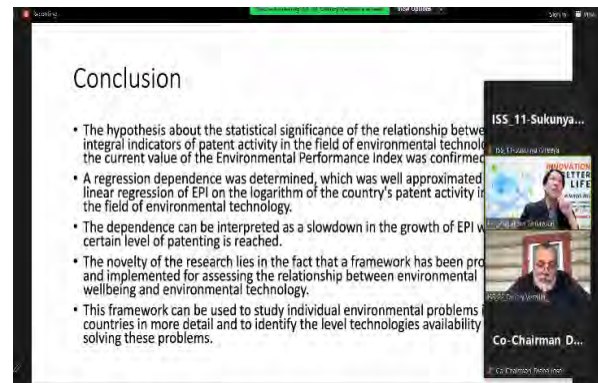


25 August 2023. ISS Section 2, Room 1. Visual platform. Time 13.00-17.30

Session Chairs: Prapakorn Tantayotai

Co-chair: Diana Jose

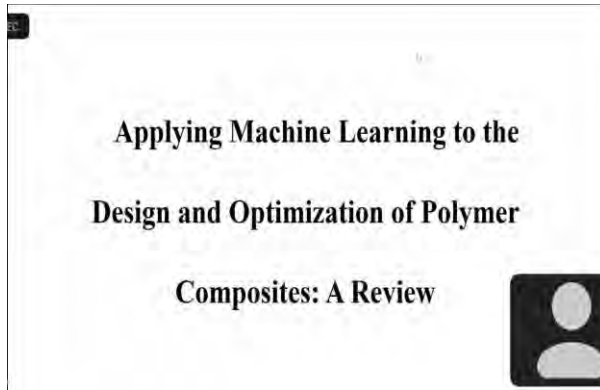
- ISS_22 (02001)



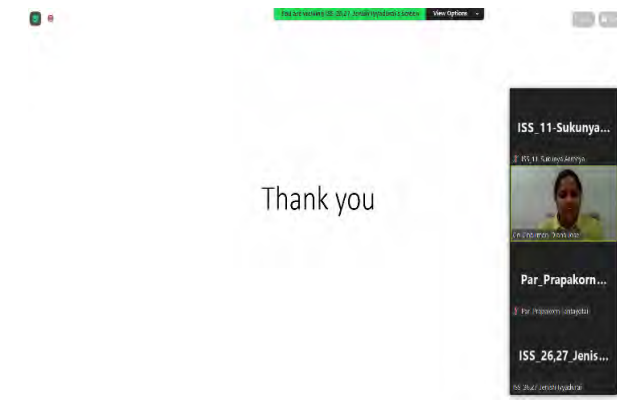
- ISS_25 (02002)



- ISS_26 (02013)



- ISS_27 (02014)



- ISS_31



- ISS_28 (02015)

REC

UNDERSTANDING THE ENVIRONMENTAL DISTRIBUTION AND POTENTIAL HEALTH RISKS OF POLLUTANTS FROM DEODORANT PRODUCTS: A REVIEW

Meenakshi Kakara, Srideep Dasari, Marttin Paulraj Gundupalli, Tawiwan Kangsadan, And Keerthi Katam

Presenter
K. Meenakshi
Department of Civil Engineering
École Centrale School of Engineering, Mahindra University
Telangana, India

ISS 28

The 4th Research, Invention, and Innovation Congress (RI/C 2023)

REC

Conclusion

- Common substances like benzyl alcohol, diethyl phthalate, and ethanol may cause skin irritation, allergic responses, respiratory irritation, and, in certain circumstances, impacts on reproductive hormones.
- Furthermore, these substances are not confined to a specific environmental compartment.
- When applied, they can enter the atmosphere and then travel through several different channels to get to water and soil.
- While some substances naturally degrade, others **linger** in the environment for extended periods, which can cause bioaccumulation and subsequent human exposure via the food chain.
- More research** is needed to investigate the **long-term effects** of exposure, particularly among vulnerable populations.
- Manufacturers, regulators, and consumers must prioritize** the use of safer ingredients to encourage the development and adoption of **environmentally friendly formulations**.

ISS 28

The 4th Research, Invention, and Innovation Congress (RI/C 2023)

- ISS_21 (02016)

REC

Pharmaceuticals and Agro-chemicals in groundwater of Hyderabad, India

Presenter
Kalyani Subba Lakshmi
Department of Civil Engineering
École Centrale School of Engineering, Mahindra University
Hyderabad, Telangana, India

Advisors

| | |
|---|---|
| Dr. Keerthi Katam Assistant Professor Mahindra University | Dr. Debraj Bhattacharyya Associate Professor Indian Institute of Technology Hyderabad |
|---|---|

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4th Research, Invention, and Innovation Congress (RI/C 2023)

REC

Thank you

ISS 21

4th Research, Invention, and Innovation Congress (RI/C 2023)

- ISS_29 (02017)

REC

A Comparison of Fiber Types in Community for Mist Collection

Thana Ananacha and Onvalee Amornletrakul

Faculty of Architecture and Design, King Mongkut's University of Technology, Bangkok, Thailand

ISS10_Engkarat Buakeaw's screen

INNOVATION
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REC

Thank You!

The working group would like to thank Electricity Generating Authority of Thailand (EGAT) for providing financial support for research work.

- ISS_05 (02008)

REC

Utilization of Nongkhai black jasmine rice bran oils for development of functional drink emulsion

Ketinun Kittipongpittaya*, Teerawan Siwan, Piyaruch Kullamethee, Prensak Puangploy, Pattaranan Yimchom, and Tanyaporn Intaratul
Department of Agro-industry Technology and Management,
Faculty of Agro-industry, KMUTNB, Prachinburi, Thailand

ISS05_Ketinun Kittipongpittaya

REC

Thank you

ISS05_Ketinun Kittipongpittaya

- ISS_19 (02007)

REC

Cider Production from King Mandarin (*Citrus Nobilis L. Obseck*) and Its Antioxidant Activity

ISS2023-19 - Vo Thien Hao's screen

REC

THANKS FOR YOUR ATTENTIONS

- ISS_20 (02006)

REC

Antidiabetic activity and molecular docking analysis of milky mushroom (*Calocybe indica*) grown on the economical substrate

Anne Sahithi Somavarapu Thomas, Vijaya Lakshmi Murugan Kavitha, Jayapriya Sekar, Mahalakshmi Velmarugan, Malinee Sriariyanun and Vinodhini Shanmugam*

Institute of Brain Science (IBS), TICET Biopark, Chennai, Tamilnadu, India
Department of Biotechnology, J.K.M College for Women, Vellore, Tamilnadu, India
Biorefinery and Process Automation Engineering Center, Department of Chemical and Process Engineering, The Srinakharinwirot University
International Thai-German Graduate School of Engineering, King Mongkut's University of Technology North Bangkok, Bangkok, Thailand

Paper ID- iSS20

ISS_20

REC

Antidiabetic activity and molecular docking analysis of milky mushroom (*Calocybe indica*) grown on the economical substrate

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ISS_20

- ISS_24 (02005)

REC **SASTRA**
DEEMED UNIVERSITY

Levan production in shake flask and fermenter – influence of feeding strategy on levan yield and molecular weight distribution

Bhuvaneshwari Veerapandian¹, Saravanan Ramiah Shanmugam², Srividhya Krishnan¹, Subramaniam Sharma Sivaraman¹, Malinee Sriariyanun³, and Pornusami Venkatachalam¹

1. Biomass conversion and Bioproducts Laboratory, Center for Bioenergy, School of Chemical & Biotechnology, SASTRA Deemed University, Thirumalaisudram, Tamil Nadu, India
2. Department of Biosystems Engineering, Auburn University, Auburn, AL, USA 36849
3. Biorefinery and Process Automation Engineering Center, Department of Chemical and Process Engineering, The Sirindhorn National Graduate School of Engineering, King Mongkut's University of Technology North Bangkok,

Presented by
V. Bhuvaneshwari (First author)
School of Chemical & Biotechnology
SASTRA Deemed University, TN, India

ISS_24_Bhuvaneshwari V

Thank You

ISS_11-Sukunya...

03:13

- ISS_12 (01011)

REC **RI 2023**

Conversion of lignocellulose residue obtained from biorefinery stream to electricity by microbial fuel cell

Keerthi Katam, Maythee Saisriyoot, Supacharee Roddech, Peerapong Pornwongthong, and Malinee Sriariyanun

29 Aug 2023

KMUTNB TGGS Thai-German Graduate School of Engineering Mahindra University

ISS10_Engkarat Buak

Thanks to my lab members in Bioprocess Engineering Lab, TGGS, KMUTNB and our partners

ISS_11-Sukunya...

TIME'S UP!

- ISS_13 (02004)

REC **Food Science and Engineering**

Climate-Conscious Food Preserving Technologies for Food Waste Prevention

Presented By/ Author
Yousif Alhammadi
Khalifa University of Science and Technology

Co-Authors:
Doris Ying Ying Tang, University of Nottingham Malaysia
Kit Wayne Chew, Nanyang Technological University
Pau Loke Show, Khalifa University of Science and Technology

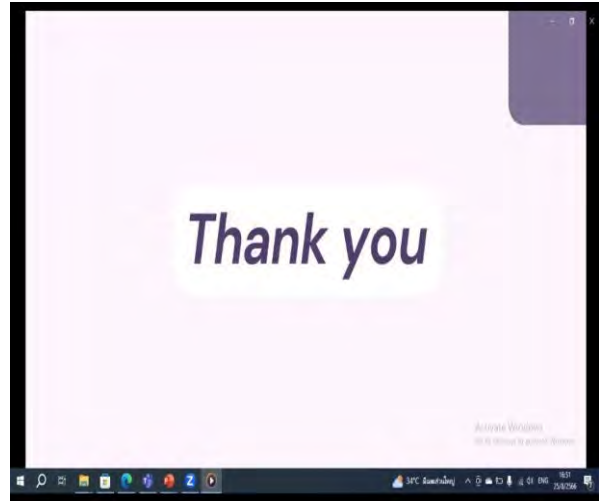
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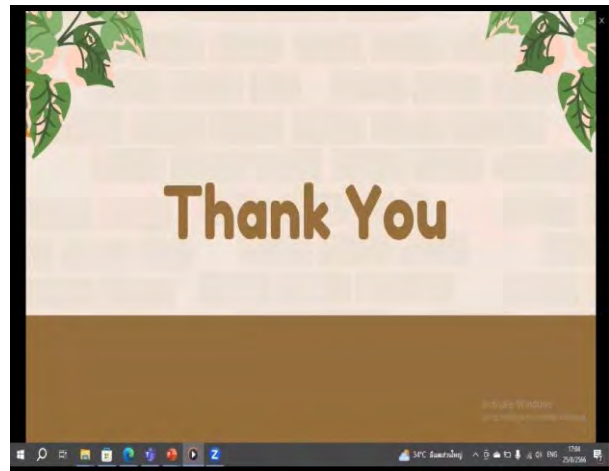
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- ISS_14 (02011)



- ISS_15 (02009)



- ISS_16 (02010)

