



supporting partners

STT47
Oct 5-7, 2021

47th International Congress on Science Technology and Technology-based Innovation

"Sciences for SDGs: Challenges and Solutions"

~PROGRAM BOOK~





ทรงพระเจริญ



PROGRAM BOOK

The 47th International Congress on Science,
Technology and Technology-based Innovation
(STT47)

SCIENCES FOR SDGS:
CHALLENGES AND SOLUTIONS

October 5th-7th, 2021
Kasetsart University, Kamphaeng Saen Campus,
Nakhon Pathom, Thailand
Virtual Conference

Organized by:

The Science Society of Thailand under
the Patronage of His Majesty the King
in Association with
Faculty of Liberal Arts and Science,
Kasetsart University, Kamphaeng Saen Campus

CONTENT

WELCOME MESSAGE FROM THE PRESIDENT OF THE SCIENCE SOCIETY OF THAILAND UNDER THE PATRONAGE OF HIS MAJESTY THE KING	1
WELCOME MESSAGE FROM THE CHAIRPERSON OF THE 47TH INTERNATIONAL CONGRESS ON SCIENCE, TECHNOLOGY AND TECHNOLOGY–BASED INNOVATION	2
WELCOME MESSAGE FROM THE HOST OF THE 47TH INTERNATIONAL CONGRESS ON SCIENCE, TECHNOLOGY AND TECHNOLOGY–BASED INNOVATION	3
HISTORY OF THE CONGRESS ON SCIENCE AND TECHNOLOGY OF THAILAND	4
PROGRAM OVERVIEW	7
KASETSART UNIVERSITY, KAMPHAENG SAEN CAMPUS	8
CONFERENCE ACCESS	12
PROGRAM FOR GRAND OPENING CEREMONY OF STT47	13
PLENARY SPEAKER 1: Prof. Dr. Ben L. Feringa.....	14
PLENARY SPEAKER 2: Prof. Dr. Vinich Promarak.....	15
SHORT SPEECH: Prof. Dr. Christopher Brett.....	16
PROGRAM FOR SESSIONS, SYMPOSIUMS AND MEETINGS	17
OCTOBER 5th, 2021	17
OCTOBER 6th, 2021	26
OCTOBER 7th, 2021	37
ABSTRACTS FOR INVITED SPEAKERS.....	68
ORAL PRESENTATION SESSIONS	148
POSTER PRESENTATION SESSIONS	149
INTERNATIONAL ADVISORY BOARD	165
LOCAL ADVISORY BOARD.....	166
COMMITTEES.....	167

WELCOME MESSAGE FROM THE PRESIDENT OF THE SCIENCE SOCIETY OF THAILAND UNDER THE PATRONAGE OF HIS MAJESTY THE KING



On behalf of the Science Society of Thailand under the Patronage of His Majesty the King, I am delighted to invite you to the 47th International Congress on Science, Technology and Technology-based Innovation, or STT47, which will be held during October 5-7, 2021 in Nakhon Pathom, Thailand. This event is our annual congress, jointly organized by Faculty of Art and Science, Kasetsart University, Kamphaengsaen Campus.

United Nations has recognized the importance of basic sciences and proclaimed 2022 as the International Year of Basic Sciences for Sustainable Development (IYBSSD). The theme of STT47, “Sciences for SDGs: Challenges and Solutions”, is thus timely and vitally important for a better future of humankind and nature. I believe this congress will provide all not only to network regionally and worldwide, but also will lead to a unique opportunity to join forces among scientists in Asia and the world for realizing the role of science in solving global challenges and finding solutions that are sustainable and beneficial to all life on earth.

In addition, the Young Rising Stars of Science award program of the society, firstly launched last year, will continue to attract young talents to attend the STT47 and meet with you all. These students will be our hope to work together and further on to create a better world for everyone. You can help shape them as well as the STT47 through submissions of your research abstracts and presentations at the congress.

I cordially invite you all to join us for the three intensive and interesting days of discussing contemporary scientific and science-related research.

Thank you.

Professor Dr. Supawan Tantayanon

President, the Science Society of Thailand Under the Patronage of His Majesty the King

WELCOME MESSAGE FROM THE CHAIRPERSON OF THE 47TH INTERNATIONAL CONGRESS ON SCIENCE, TECHNOLOGY AND TECHNOLOGY-BASED INNOVATION



The Science Society of Thailand under the Patronage of His Majesty the King is pleased to invite you to join the 47th International Congress on Science, Technology and Technology-based Innovation (STT47), which will be held at Kasetsart University, Kamphaeng Sean, Nakhon Pathom – Virtual Conference, Thailand, during October 5-7, 2021. The opening ceremony will be graciously presided over by Her Royal Highness Princess Maha Chakri Sirindhorn on 5th October, at 9 am.

International Congress on Science, Technology and Technology-based Innovation (STT) is one of the largest annual international scientific meeting with around one thousand local and overseas participants. The aim is to create a scientific forum for national and international scientists and technologists as well as young Thai scientists from diversified fields of science and technology and to open an opportunity to share and exchange their experiences. In this year, there are 5 main sessions including

- Innovation Impacts Driven SDGS
- Mathematics, Statistical science and Computer science “Math Stat Comp For SDGS: Sustainable Solutions”
- Physics “Physics for Life in Space”
- Chemical Sciences “SDG Challenges: Chemical Solutions for Sustainable Society”
- Biological Sciences “Impact of Biological Science Towards SDGS: Active Learning for Biological Science Classes” and “Impact of Biological Science Towards SDGS: Biological Sciences Towards SDGS”

There are also approximately 20 symposiums such as Sustainable Hydrogen Production for Greener Environment and Chemical Products; Metal-Organic Composites in Material Science; Sustainable Use of Marine Biodiversity; Premium Agriculture: A Pathway Toward Sustainable and Inclusive BCG Economy Model; Acceleration of Sustainability towards Biobased Technological Platform Development; included in this event.

The Congress is highlighted by the Plenary Lecture from the world-reputable scientist and the Honorable Lecture from the 2021 Outstanding Scientist(s) of Thailand. And during the Congress, lectures from several renowned invited speakers, and hundreds of contributed papers from various areas of Science and Technology will be presented orally (onsite or virtual) or in the form of posters. The Congress also includes high school competition of science projects to select the Best of the Best Projects of the year. Exhibition on advanced scientific and technological knowledge or instruments/appliances from various organizations and several suppliers will be displayed.

Looking forward to welcoming you in this STT47 Congress in October 5-7, 2021.

Professor Dr. Somkiat Ngamprasertsith

Chairperson STT47

WELCOME MESSAGE FROM THE HOST OF THE 47TH INTERNATIONAL CONGRESS ON SCIENCE, TECHNOLOGY AND TECHNOLOGY-BASED INNOVATION



On behalf of Kasetsart University, it is a moment of extreme pleasure to welcome participants, organisers and guests of the 47th International Congress on Science, Technology and Technology-based Innovation (STT47).

Every year the Science Society of Thailand under the Patronage of His Majesty the King holds the International Congress on Science, Technology and Technology-based Innovation. The congress contributes a lot to our science communities and also to our world. This year, Kasetsart University corporates with the Science Society of Thailand under the Patronage of His Majesty the King to hold the 47th International Congress on Science, Technology and Technology-based Innovation (STT47). Definitely, this is such an honour for Kasetsart University to be chosen to host the congress. Faculty of Liberal Arts and Science, which is one of the highest potential sections of our university,

is therefore assigned to be responsible for hosting and coordinating the congress. We ensure all participants and guests that the congress is going to be arranged smoothly and efficiently.

I wish this congress enlightens us all and provide us with approaches to deal with the problems of tomorrow.

Thank you to everyone who made this congress possible with their opinions and views.

Dr. Chongrak Wachrinrat

President of Kasetsart University



It is our pleasure and honour to welcome you to Kasetsart University, Kamphaeng Saen Campus on behalf of the Faculty of Liberal Arts and Science to the 47th International Congress on Science, Technology and Technology-based Innovation (STT47).

The congress will give us opportunities to exchange the present and the future knowledge and experiences among national and international expertise scientists and technologists, as well as, the young scientists in various fields of Science, Technology and Technology-based Innovation.

The knowledge of science, technology and technology-based innovation have inspired many. They have become one of the crucial key factors for the world evolution. For all these years, a number of outstanding scientists, and numerous eminent scientists have contributed considerably to the world by presenting and sharing their latest research in this continual engraved congress.

We are grateful to our sponsors, advisory boards, invited speakers, reviewers, authors, and all participants, who have supported our initiative and have assisted in its organisation.

I take this opportunity to thank each and every one of you personally. I hope the congress would shed more light on our world of science, technology and technology-based innovation.

Assistant Professor Dr. Anamai Damnet

Dean of Faculty of Liberal Arts and Science, Kasetsart University, Kamphaeng Saen Campus

HISTORY OF THE CONGRESS ON SCIENCE AND TECHNOLOGY OF THAILAND

International Congress on Science, Technology and Technology-based Innovation (STT), originally named “The Congress on Science and Technology of Thailand” with the same abbreviation of STT, is one of the most important scientific meetings in Thailand. It was firstly organized in 1974 by the Science Society of Thailand (SST) and Chulalongkorn University. Since then, the alternative Universities in Thailand have gone through the bidding for co-organizing the STT in the following years. It is the annual national congress for 45 years. To mark the 72nd Anniversary of the Science Society of Thailand in 2020, the congress has been changed to the international meeting.

The aim is to create scientific forum for national and international scientists and technologists as well as young Thai scientists from diversified fields of science and technology to meet and to provide them the opportunity to share and exchange their knowledge and experiences. It is our annual congress, which originally was the national meeting since 1971, but this year, it is its first time to be held as the international meeting.

Typically, the Congress Plenary Lecture is given by a Nobel Laureate in Science and Technology, followed by an honorable lecture of the Outstanding Scientist of Thailand in that particular year. During the Congress, lectures by several renowned invited speakers, panel discussions and hundreds of contributed papers from various areas of Science and Technology are presented orally or in the form of posters. In addition, the outstanding teacher awards, the young scientist awards, as well as the innovation awards and the national winners of high school student science projects are awarded in the Congress. An exhibition of advanced scientific and technological instruments and appliances from suppliers and enterprises are also the attractive event of the Congress.

ครั้งที่ ปี / วันที่ เดือน	ชื่อการประชุม	สถาบันเจ้าภาพร่วม	ประธาน (จำนวนผลงานวิจัย)	ประธานในพิธีเปิด
1. พ.ศ. 2514 26-27 พฤศจิกายน	การวิจัยทางวิทยาศาสตร์ กรุงเทพฯ 2514	คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย	ศ.ดร.ประชุมสุข อาชวอำรุง (83 เรื่อง)	-
2. พ.ศ. 2516 30 พฤศจิกายน - 2 ธันวาคม	การวิจัยทางวิทยาศาสตร์ กรุงเทพฯ 2516	คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย	ศ.ดร.ประชุมสุข อาชวอำรุง (219 เรื่อง)	-
3. พ.ศ. 2518 12-13 ธันวาคม	การวิจัยทางวิทยาศาสตร์ กรุงเทพฯ 2518	คณะวิทยาศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยมหิดล	ศ.ดร.กำจร มนูญปิ๋ว (249 เรื่อง)	-
4. พ.ศ. 2520 16-17 ธันวาคม	การวิจัยทางวิทยาศาสตร์ กรุงเทพฯ 2520	คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย	รศ.ดร.กำจัด มงคลกุล (344 เรื่อง)	-
5. พ.ศ. 2521 22-24 ธันวาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาภาคเหนือ	คณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่	ศ.ดร.พรชัย มาตังคสมบัติ (232 เรื่อง)	-
6. พ.ศ. 2522 21-23 ธันวาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาประเทศ	คณะวิทยาศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ บางแสน	ศ.ดร.พรชัย มาตังคสมบัติ (232 เรื่อง)	-
7. พ.ศ. 2523 4-6 ธันวาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาประเทศ	คณะวิทยาศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยมหิดล	รศ.ดร.นัยพินิจ คชภักดี (233 เรื่อง)	สมเด็จพระเจ้าลูกเธอเจ้าฟ้า จุฬาภรณวลัยลักษณ์
8. พ.ศ. 2525 28-30 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาประเทศ	คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย	รศ.ดร.สันต์ พณิชยกุล (245 เรื่อง)	-

ครั้งที่ ปี / วันที่ เดือน	ชื่อการประชุม	สถาบันเจ้าภาพร่วม	ประธาน (จำนวนผลงานวิจัย)	ประธานในพิธีเปิด
9. พ.ศ. 2526 27-29 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาภาค ตะวันออกเฉียงเหนือ	คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น	รศ.ดร.สันต์ พณิชยกุล (174 เรื่อง)	รัฐมนตรีว่าการ กระทรวงวิทยาศาสตร์ เทคโนโลยีและการพลังงาน (ฯพณฯ ดำรง ลัทธพิพัฒน์) นายกรัฐมนตรี (พลเอก เปรม ติณสูลานนท์)
10. พ.ศ. 2527 25-27 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีแห่ง ประเทศไทย	คณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่	ศ.ดร.มนตรี จุฬารัตนกุล (280 เรื่อง)	สมเด็จพระเจ้าลูกเธอเจ้าฟ้า จุฬาภรณวลัยลักษณ์
11. พ.ศ. 2528 24-26 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีแห่ง ประเทศไทย	คณะวิทยาศาสตร์ มหาวิทยาลัยเกษตรศาสตร์	ศ.ดร.มนตรี จุฬารัตนกุล (251 เรื่อง)	สมเด็จพระบรมโอรสาธิราชฯ สยามมกุฎราชกุมาร
12. พ.ศ. 2529 20-22 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีแห่ง ประเทศไทย	คณะวิทยาศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ ประสานมิตร	รศ.ดร.ภิญโญ พานิชพันธ์ (277 เรื่อง)	สมเด็จพระเจ้าลูกเธอเจ้าฟ้า จุฬาภรณวลัยลักษณ์
13. พ.ศ. 2530 20-22 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีแห่ง ประเทศไทย	คณะวิทยาศาสตร์ มหาวิทยาลัยสงขลานครินทร์ วิทยาเขตหาดใหญ่	รศ.ดร.ภิญโญ พานิชพันธ์ (420 เรื่อง)	สมเด็จพระเจ้าลูกเธอเจ้าฟ้า จุฬาภรณวลัยลักษณ์
14. พ.ศ. 2531 19-21 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีแห่ง ประเทศไทย	คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย	ศ.ดร.จรียา บรอดเคลแมน (259 เรื่อง)	นายกรัฐมนตรี (พลเอกชาติชาย ชุณหะวัณ)
15. พ.ศ. 2532 18-20 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อ การพัฒนาทรัพยากรภาคเหนือ	คณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่	ศ.ดร.จรียา บรอดเคลแมน (394 เรื่อง)	ผู้แทนสมเด็จพระเจ้าลูกเธอเจ้า ฟ้าจุฬาภรณวลัยลักษณ์
16. พ.ศ. 2533 25-27 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาประเทศ	คณะวิทยาศาสตร์ สถาบันเทคโนโลยี พระจอมเกล้า เจ้าคุณทหารลาดกระบัง	ศ.ดร.วิชัย ธีวตระกูล (369 เรื่อง)	-
17. พ.ศ. 2534 24-26 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาทรัพยากร ภาคเหนือ	คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น	ศ.ดร.วิชัย ธีวตระกูล (349 เรื่อง)	-
18. พ.ศ. 2535 27-29 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาประเทศ	คณะวิทยาศาสตร์ มหาวิทยาลัยเกษตรศาสตร์ ณ ศูนย์การประชุมแห่งชาติสิริกิติ์	ศ.ดร.สุชาติ อุปลัมภ์ (297 เรื่อง)	-
19. พ.ศ. 2536 27-29 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาชายฝั่ง	คณะวิทยาศาสตร์ มหาวิทยาลัยสงขลานครินทร์ ณ โรงแรมดุสิต เจ.บี.หาดใหญ่	ศ.ดร.สุชาติ อุปลัมภ์ (438 เรื่อง)	-
20. พ.ศ. 2537 19-21 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อ การพัฒนาเศรษฐกิจ สังคม และ สิ่งแวดล้อม	คณะวิทยาศาสตร์และเทคโนโลยี มหาวิทยาลัยธรรมศาสตร์ ณ เซ็นทรัลพลาซ่า	ศ.ดร.สมศักดิ์ พันธุ์วัฒนา (252 เรื่อง)	นายกรัฐมนตรี (นายชวน หลีกภัย)
21. พ.ศ. 2538 25-27 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาอุตสาหกรรม	คณะวิทยาศาสตร์ มหาวิทยาลัยบูรพา ณ โรงแรมแอมบาสซาเออร์ซีที จอมเทียน ชลบุรี	ศ.ดร.สมศักดิ์ พันธุ์วัฒนา (354 เรื่อง)	นายกสภาฯมหาวิทยาลัยบูรพา (นายเกษม จาติกวณิช)
22. พ.ศ. 2539 16-18 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อพัฒนาทรัพยากรมนุษย์	คณะวิทยาศาสตร์ มหาวิทยาลัยรามคำแหง ณ บางกอกคอนเวนชั่นเซ็นเตอร์ เซ็นทรัลพลาซ่า ลาดพร้าว	รศ.ดร.พิณทิพย์ รื่นวงษา (333 เรื่อง)	ผู้ว่าราชการกรุงเทพมหานคร (ดร.พิจิตต์ รัตกุล)
23. พ.ศ. 2540 20-22 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อพัฒนาคุณภาพชีวิตใน ภูมิภาค	คณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่ ณ โรงแรมโลดัล ปางสวนแก้ว	รศ.ดร.พิณทิพย์ รื่นวงษา (495 เรื่อง)	รัฐมนตรีว่าการ กระทรวงวิทยาศาสตร์ เทคโนโลยีและสิ่งแวดล้อม (นายยิ่งพันธ์ มนะสิการ)
24. พ.ศ. 2541 19-21 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาเศรษฐกิจที่มั่นคง	คณะวิทยาศาสตร์ มหาวิทยาลัยมหิดล ณ ศูนย์การประชุมแห่งชาติสิริกิติ์	ผศ.ดร.ทิพาพร ลิมปเสนีย์ (463 เรื่อง)	นายกรัฐมนตรี (นายชวน หลีกภัย)
25. พ.ศ. 2542 20-22 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อ การพัฒนาทรัพยากรท้องถิ่น	คณะวิทยาศาสตร์ มหาวิทยาลัยนครสวรรค์ ณ โรงแรมอมรินทร์ลากูน พิษณุโลก	ผศ.ดร.ทิพาพร ลิมปเสนีย์ (581 เรื่อง)	รัฐมนตรีว่าการ กระทรวงวิทยาศาสตร์ เทคโนโลยีและสิ่งแวดล้อม (ดร.อาทิตย์ อุไรรัตน์)
26. พ.ศ. 2543 18-20 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีสู่ สหัสวรรษใหม่	คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ณ ศูนย์การประชุมแห่งชาติสิริกิติ์	รศ.ดร.ศุภวรรณ ดันตยานนท์ (739 เรื่อง)	-
27. พ.ศ. 2544 16-18 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการฟื้นฟูเศรษฐกิจไทย	มหาวิทยาลัยสงขลานครินทร์ โรงแรม ลี การ์เดนส์ พลาซ่า	รศ.ดร.ศุภวรรณ ดันตยานนท์ (921 เรื่อง)	ผู้ว่าราชการจังหวัดสงขลา
28. พ.ศ. 2545 24-26 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาเศรษฐกิจที่ยั่งยืน	คณะวิทยาศาสตร์ประยุกต์ สถาบันเทคโนโลยี พระจอมเกล้าพระนครเหนือ ณ ศูนย์การประชุมแห่งชาติสิริกิติ์	รศ.ดร.สุรินทร์ เหล่าสุขสถิตย์ (834 เรื่อง)	สมเด็จพระเจ้าพี่นางเธอ เจ้าฟ้ากัลยาณิวัฒนา กรมหลวง นราธิวาสราชนครินทร์

ครั้งที่ ปี / วันที่ เดือน	ชื่อการประชุม	สถาบันเจ้าภาพร่วม	ประธาน (จำนวนผลงานวิจัย)	ประธานในพิธีเปิด
29. พ.ศ. 2546 20-22 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาท้องถิ่น	คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น ณ ศูนย์ประชุมอเนกประสงค์กาญจนาภิเษก	รศ.ดร.สุรินทร์ เหล่าสุขสถิตย์ (1039 เรื่อง)	รองนายกรัฐมนตรี (นายสุวิทย์ คุณกิตติ)
30. พ.ศ. 2547 19-21 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อสังคมและเศรษฐกิจ ฐานความรู้	คณะวิทยาศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ ณ ศูนย์แสดงสินค้าและ การประชุมอิมแพ็ค เมืองทองธานี	รศ.ดร.สุรินทร์ เหล่าสุขสถิตย์ (854 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
31. พ.ศ. 2548 18-20 ตุลาคม	วิทยาศาสตร์และเทคโนโลยี เพื่อการพัฒนาที่ยั่งยืน	เทคโนโลยีธานี มหาวิทยาลัยเทคโนโลยีสุรนารี	รศ.ดร.สุรินทร์ เหล่าสุขสถิตย์ (1021 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
32. พ.ศ. 2549 10-12 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีเพื่อ การเศรษฐกิจพอเพียง เฉลิมฉลองการครองสิริราช สมบัติ ครบ 60 ปี ของ พระบาทสมเด็จพระเจ้าอยู่หัว	คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ศูนย์การประชุมแห่งชาติสิริกิติ์	รศ.ดร.นภาพร นพรัตน์นารถ (927 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
33. พ.ศ. 2550 18-20 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีเพื่อ โลกยั่งยืน เฉลิมฉลองมหามงคล เฉลิมพระชนมพรรษาครบ 80 พรรษาของพระบาทสมเด็จพระ เจ้าอยู่หัว	มหาวิทยาลัยวลัยลักษณ์ จังหวัดนครศรีธรรมราช	รศ.ดร.นภาพร นพรัตน์นารถ (802 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
34. พ.ศ. 2551 31 ตุลาคม - 2 พฤศจิกายน	วิทยาศาสตร์และเทคโนโลยี สำหรับโลกแห่งความท้าทาย	คณะวิทยาศาสตร์ สถาบันเทคโนโลยี พระจอมเกล้าเจ้าคุณทหารลาดกระบัง	รศ.ดร.นภาพร นพรัตน์นารถ (777 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
35. พ.ศ. 2552 15-17 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีเพื่อ อนาคตที่ดีขึ้น	คณะวิทยาศาสตร์ มหาวิทยาลัยบูรพา	รศ.ดร.นภาพร นพรัตน์นารถ (854 เรื่อง)	ฯพณฯ องคมนตรี นายอำพล เสนาณรงค์
36. พ.ศ. 2553 26-28 ตุลาคม	วิทยาศาสตร์และเทคโนโลยีเพื่อ สังคมที่ดีขึ้น	คณะวิทยาศาสตร์และเทคโนโลยี มหาวิทยาลัยธรรมศาสตร์	รศ.ดร.ธาวรัตน์ ศุภศิริ (582 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
37. พ.ศ. 2554 10-12 ตุลาคม	วิทยาศาสตร์สร้างสรรค์ เพื่อ สรรค์สร้างอนาคต	คณะวิทยาศาสตร์ มหาวิทยาลัยมหิดล	รศ.ดร.ธาวรัตน์ ศุภศิริ (699 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
38. พ.ศ. 2555 17-19 ตุลาคม	วิทยาศาสตร์เพื่ออนาคตของมวล มนุษยชาติ	คณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่	รศ.ดร.ธาวรัตน์ ศุภศิริ (690 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
39. พ.ศ. 2556 21-23 ตุลาคม	นวัตกรรมวิทยาศาสตร์ เพื่อชีวิต ที่ดีขึ้น	คณะวิทยาศาสตร์ มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี	รศ.ดร.ธาวรัตน์ ศุภศิริ (495 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
40. พ.ศ. 2557 2-4 ธันวาคม	วิทยาศาสตร์และเทคโนโลยีสู่วิถี พัฒนาอาเซียน	คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น	ศ.ดร. เบี่ยมสุข พงษ์สวัสดิ์ (543 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
41. พ.ศ. 2558 6-8 พฤศจิกายน	ประตูอาเซียนด้วยวิทยาศาสตร์ และเทคโนโลยี	มหาวิทยาลัยเทคโนโลยีสุรนารี	ศ.ดร. เบี่ยมสุข พงษ์สวัสดิ์ (384 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
42. พ.ศ. 2559 30 พฤศจิกายน - 2 ธันวาคม	ศาสตร์แห่งแผ่นดิน สุนวัตกรรม เพื่ออนาคตที่ยั่งยืน	คณะวิทยาศาสตร์ มหาวิทยาลัยเกษตรศาสตร์ ณ เซ็นทาราแกรนด์ แอท เซ็นทรัลพลาซ่า ลาดพร้าว	ศ.ดร. เบี่ยมสุข พงษ์สวัสดิ์ (290 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
43. พ.ศ. 2560 17-19 ตุลาคม	เข้าใจวิทยาศาสตร์ เข้าถึง เทคโนโลยี สร้างนวัตกรรม นำ สังคมยั่งยืน	คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ณ อาคารจามจุรี 10 จุฬาลงกรณ์มหาวิทยาลัย	ศ.ดร. เบี่ยมสุข พงษ์สวัสดิ์ (327 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
44. พ.ศ. 2561 29-31 ตุลาคม	วิทยาศาสตร์ และเทคโนโลยีใน ยุคพลิกผัน	สมาคมวิทยาศาสตร์แห่งประเทศไทยในพระ บรมราชูปถัมภ์ ณ ศูนย์นิทรรศการและการ ประชุมไบเทค	รศ.ดร.สายรุพ ชัยวานิชศิริ (270 เรื่อง)	สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี
45. พ.ศ. 2562 7-9 ตุลาคม	ต้นกล้านวัตกรรมสู่การพัฒนาที่ ยั่งยืน	สำนักวิชาวิทยาศาสตร์ มหาวิทยาลัยแม่ฟ้าหลวง	รศ.ดร.สายรุพ ชัยวานิชศิริ (338 เรื่อง)	สมเด็จพระกนิษฐาธิราชเจ้า กรมสมเด็จพระเทพ รัตนราชสุดาฯ สยามบรมราช กุมารี
46. พ.ศ. 2563 5-7 ตุลาคม	Power of Science to Achieve SDGs	คณะวิทยาศาสตร์ มหาวิทยาลัยรามคำแหง	ศ.ดร.สมเกียรติ งามประเสริฐสิทธิ์ (426 เรื่อง)	สมเด็จพระกนิษฐาธิราชเจ้า กรมสมเด็จพระเทพ รัตนราชสุดาฯ สยามบรมราช กุมารี

PROGRAM OVERVIEW

Code	Session/Symposium	October 5, 2021		October 6, 2021		October 7, 2021	
		AM	PM	AM	PM	AM	PM
	Grand Opening Ceremony (Facebook Live / Youtube Live)	Time: 8:00-11:00	Time: 11:00-12:30				
	Prayer Session						
A	SESSION A INNOVATION IMPACT DRIVEN EDGES		Time: 13:30-17:15				
B	SESSION B SMART STAT COMP FOR SUGS SUSTAINABLE SOLUTIONS			Time: 8:30-11:10			
C	SESSION C PHYSICS FOR LIFE IN SPACE		Time: 13:30-16:25				
D	SESSION D-SOIG CHALLENGES: CHEMICAL SOLUTIONS FOR SUSTAINABLE		Time: 13:30-15:00				
E1	SESSION E1-IMPACT OF BIOLOGICAL SCIENCE TOWARDS SUGS: ACTIVE			Time: 9:00-11:50			
E2	SESSION E2-IMPACT OF BIOLOGICAL SCIENCE TOWARDS SUGS: SUGS		Time: 13:30-16:00	Time: 9:00-11:30			
SIMP_A	SYMPOSIUM A: ACCELERATION OF SUSTAINABILITY TOWARDS BIOBASED			Time: 8:30-11:10			
SIMP_B	SYMPOSIUM B: CHALLENGES OF QUANTUM SCIENCE AND TECHNOLOGY						
SIMP_C	SYMPOSIUM C: CONSERVATION AND RESTORATION IN A CHANGING WORLD		Time: 13:30-17:10	Time: 8:30-10:15			
SIMP_D	SYMPOSIUM D: CRYSTALLOGRAPHY						
SIMP_E	SYMPOSIUM E: ENVIRONMENTAL (ECOLOGICAL) IMPACT OF		Time: 13:30-15:45			Time: 8:30-9:45	
SIMP_F	SYMPOSIUM F: FOREST BIODIVERSITY, CLIMATE CHANGE, AND						
SIMP_G	SYMPOSIUM G: HOW CHEMISTRY CAN RESOLVE FOR COVID-19 PANDEMIC						
SIMP_H	SYMPOSIUM H: METAL-ORGANIC COMPOSITES IN MATERIAL SCIENCE						
SIMP_I	SYMPOSIUM I: PREMIUM AGRICULTURE: A PATHWAY TOWARD						
SIMP_J	SYMPOSIUM J: SUSTAINABLE HYDROGEN PRODUCTION FOR GREENER						
SIMP_K	SYMPOSIUM K: SUSTAINABLE USE OF MARINE BIODIVERSITY						
SIMP_L	SYMPOSIUM L: THE SUSTAINABLE TOURISM REVIEW IN A POST-PANDEMIC						
SIMP_M	SYMPOSIUM M: TUBERCULOSES OLD DISEASE, NEW APPROACHES						
SIMP_N	SYMPOSIUM N: SOLUTIONS FOR TOMORROW: DOWN SUSTAINABILITY TO		Time: 13:30-16:30				
SIMP_O	SYMPOSIUM O: SYMPOSIUM ON SCIENCE EDUCATION FOR SUSTAINABILITY		Time: 13:30-16:00				
SIMP_P	SYMPOSIUM P: SUSTAINABLE FOOD SYSTEMS FOR GOOD HEALTH AND		Time: 13:30-15:30				
SIMP_Q	SYMPOSIUM Q: ADVANCE IN SCIENCE AND TECHNOLOGY TO ACCELERATE						
SIMP_R	SYMPOSIUM R: GREEN AND SUSTAINABLE CHEMISTRY OPPORTUNITIES						
SIMP_S	SYMPOSIUM S: RECENT ADVANCES IN SYNTHETIC BIOLOGY AND GENOME						
	Annual Meeting of the SCDOCC						
	Meeting of the STI48 Committee						
	Council of Science Deans of Thailand's Meeting						
	Head of Department Meeting (Physics)		Time: 13:30-16:00				
	Head of Department Meeting (Chemistry)		Time: 13:30-16:00				
	Head of Department Meeting (Biology)		Time: 13:30-16:00				
	Head of Department Meeting (COP MARKT)		Time: 13:30-16:00				
	WRSS (Poster Session)						
	WRSS (Poster Session)						
	WRSS (Oral Session)						
	WRSS / WRSS (Awarding Session) [Facebook Live / Youtube Live]						
	TYSA						

KASETSART UNIVERSITY, KAMPHAENG SAEN CAMPUS





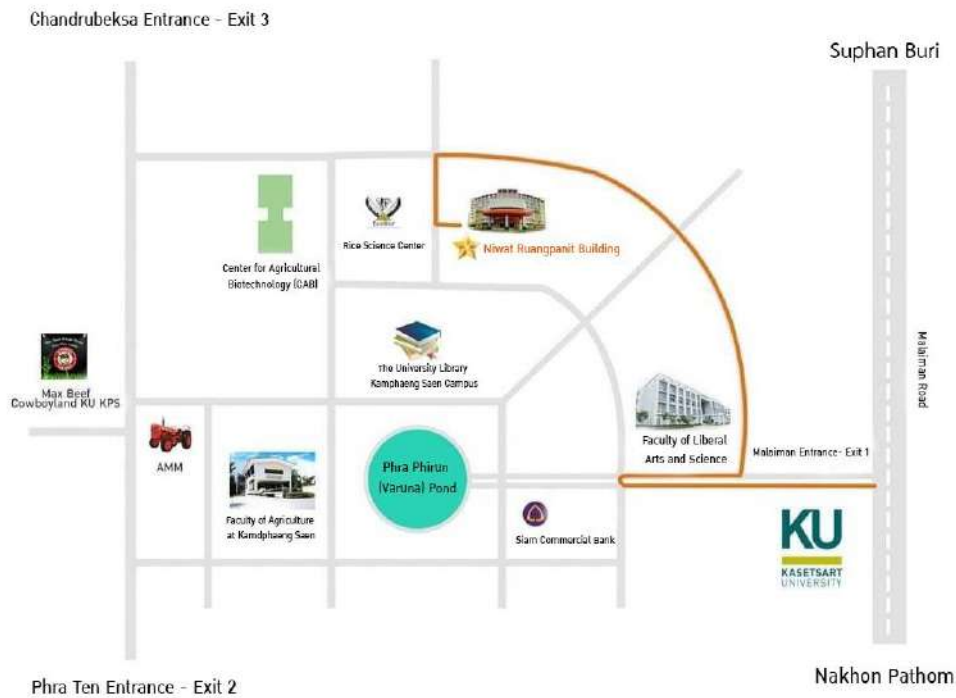




CONFERENCE ACCESS



Niwat Ruangpanit Building





PROGRAM FOR GRAND OPENING CEREMONY OF STT47

OCTOBER 5th, 2021

**Anamai Damnet Grand Ballroom, Niwat Ruangpanit Building
Kasetsart University, Kamphaeng Saen Campus, Nakorn Phatom, Thailand
[Zoom Meeting: <https://us02web.zoom.us/j/85470660727>]**

Time	Events
8:00	All guests log in to virtual Opening Ceremony of STT47 Congress
8:45	VDO presentation on Kasetsart University
9:00	<ul style="list-style-type: none"> - Her Royal Highness Princess Maha Chakri Sirindhorn graciously presides over the opening ceremony of virtual STT47 Congress - Report on the society activities by Prof. Dr. Supawan Tantayanont, President of the Science Society of Thailand - Report on the STT47 Congress by Prof. Dr. Somkiat Ngamprasertsith, Chairman of STT47 Congress - Welcoming address by Dr. Chongrak Wachrinrat, President of Kasetsart University - Grand Opening Address by Her Royal Highness Princess Maha Chakri Sirindhorn
9:20	<ul style="list-style-type: none"> - Asst. Prof. Dr. Anamai Damnet, Dean of Faculty of Liberal Art and Science, Kasetsart University, Kamphaeng Saen Campus introduces Plenary lecturers: Plenary lecturer 1: Prof. Dr. Ben L. Feringa, 2016 Nobel Laureate in Chemistry Plenary lecturer 2: Prof. Dr. Vinich Promarak, 2021 Outstanding Scientist Short speech: Prof. Dr. Christopher Brett, President of International Union of Pure and Applied Chemistry (IUPAC)
9:25-9:55	Plenary Lecture 1: "The Art of Building Small " by Prof. Dr. Ben L. Feringa
10:00-10:20	Plenary lecture 2: "Efficient Solution-Processable Emissive Materials for Simple Structured Organic Light-Emitting Diodes (OLED)" by Prof. Dr. Vinich Promarak
10:25-10:35	Short speech: "IUPAC and Its Role as A Global Resource for Chemistry" by Prof. Dr. Christopher Brett
10:40	Her Royal Highness Princess Maha Chakri Sirindhorn graciously leaves STT47 Congress

PLENARY SPEAKER 1: Prof. Dr. Ben L. Feringa

THE ART OF BUILDING SMALL

Ben L. Feringa*

Stratingh Institute for Chemistry, University of Groningen,
Nijenborgh 4, 9747 AG Groningen, The Netherlands

*e-mail: b.l.feringa@rug.nl



Abstract:

Beyond the current frontiers of chemical sciences there is vast uncharted territory to control dynamic function based on molecular and supramolecular approaches. Far beyond Nature's design, the creative power of synthetic chemistry provides unlimited opportunities to realize our own molecular world as we experience every day with products ranging from pharmaceuticals to displays. Some challenges and opportunities for the future of society will be discussed. In the art of building small we explore the fascinating field of molecular nanoscience. Among the major challenges ahead in the design of complex artificial molecular systems is the control over dynamic functions and responsive far-from-equilibrium behaviour. A major goal is to gain control over translational and rotary motion. The focus is on my journey in the world of molecular switches and motors creating opportunities for smart medicines, molecular machines or responsive materials.

Information on <http://www.benferinga.com>

PLENARY SPEAKER 2: Prof. Dr. Vinich Promarak

EFFICIENT SOLUTION-PROCESSABLE EMISSIVE MATERIALS FOR SIMPLE STRUCTURED ORGANIC LIGHT-EMITTING DIODES (OLED)

Vinich Promarak*

Department of Materials Science and Engineering,
School of Molecular Science and Engineering,
Vidyasirimedhi Institute of Science and Technology (VISTEC),
Rayong, 21210 Thailand
*e-mail: vinich.p@vistec.ac.th; pvinich@gmail.com



Abstract:

OLED is a flat-lighting device composed of an organic layer that emits lights in response to an applied electrical current. OLEDs have many essential characteristics, such as self-luminescence, high flexibility, high resolution, and low power consumption, giving them vital advantages over existing display and lighting technology. Nowadays, OLEDs have become part of our daily life as they are already being integrated into various applications. Despite such tremendous progress, the development of some aspects of the OLEDs (materials and devices) is still necessary to bring this technology to the next level, such as flexible and foldable OLED devices. The currently used OLEDs are mainly manufactured with small-molecule emissive materials and sophisticated device architectures using vacuum evaporation processes, which are best suited for small dimension displays (smartphones and watches), and why the mid- to large-panel OLEDs are still expensive. However, the possibility to fabricate such devices on flexible substrates by simple, low-cost solution printing technologies (inkjet, slot-die, roll-to-roll, etc.) becomes more problematic. Therefore, the development of solution-processable and cost-effective emissive materials with high device performance is an important task to address.

In this presentation, the study and development of novel solution-processable emissive materials in which the essential elemental functions of an OLED, namely an intense solid-state light emission, electron/hole injection and transport capabilities, and solution-processability, would be incorporated by design into a single molecular architecture, will be illustrated. Several examples of solution-processable emissive materials will be discussed in terms of the structure-property relationships, with particular attention to the molecular design that affects the device performance. The optimized molecular design of these emissive materials has also allowed the construction of simple architected solution-processed white light-emitting OLEDs (WOLEDs) with high electroluminescent performance and superior stability of white light emission.

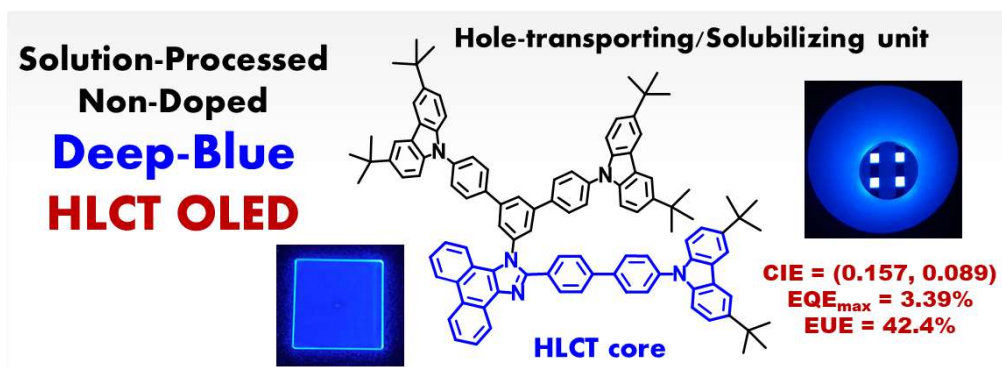


Figure. Solution-processed non-doped deep blue hybridized local and charge transfer (HLCT) excited state fluorescence molecule and device

SHORT SPEECH: Prof. Dr. Christopher Brett

IUPAC AND ITS ROLE AS A GLOBAL RESOURCE FOR CHEMISTRY

Christopher Brett^{1,2*}

¹ Department of Chemistry, University of Coimbra, Coimbra, 3004-535, Portugal

² IUPAC, 79 T.W. Alexander Drive, Research Commons Building 4501, Suite 190, Research Triangle Park, NC 27709, USA

*e-mail: cbrett@iupac.org



PROGRAM FOR SESSIONS, SYMPOSIUMS AND MEETINGS

OCTOBER 5th, 2021

Session:	POSTER PRESENTATION		
Link ZOOM:	https://zoom.us/j/92401135175		
Time	ID	Speaker	Title
11:00-12:30	-	-	Poster Presentation

Session:	SESSION A - INNOVATION IMPACTS DRIVEN SDGS		
Link ZOOM:	https://zoom.us/j/98815789296		
Chair person:	Dr. Mati Horprathum		
Time	ID	Speaker	Title
13:30-14:00	A_INV001	Teerakiat Kerdcharoen	INTERNET OF THINGS FROM FARM TO FORK
14:00-14:30	A_INV002	Takao Yasui	NANOWIRE MICROFLUIDICS FOR EARLY DISEASE DIAGNOSIS
14:30-15:00	A_INV003	Kazuki Nagashima	DIRECTING CHEMICAL REACTION PATHWAY ON NANOSTRUCTURED METAL OXIDE SURFACE FOR MOLECULAR SENSING APPLICATION
15:00-15:30	A_INV004	Jakrapong Kaewkhao	GLASS: FROM BASIC TO ADVANCED MATERIALS FOR INNOVATIVE LIFE
15:30-16:00	A_INV005	Supakij Suttiruengwong	INNOVATOR'S TOOLKIT
16:00-16:15	A_001	Ngamnete Phongpratheapchai	DETECTION OF CHIKUNGUNYA VIRUS USING REVERSE TRANSCRIPTION-PCR ASSAY COMBINED WITH LATERAL FLOW DIPSTICK
16:15-16:30	A_002	Nutthanun Moolsradoo	CORROSION RESISTANCE AND TRIBOLOGICAL STUDIES OF FLUORINATED-DLC FILM DEPOSITED BY PBII TECHNIQUE
16:30-16:45	A_003	Narakhan Khunsrimek	EFFECTS OF METEOROLOGICAL DATA SET SELECTION ON SIMULATION RESULTS OF ATMOSPHERIC DISPERSION CODE (NACAC)
16:45-17:00	A_004	Cheryanus Butkumchote	CONVERSION OF CASSAVA STARCH FACTORY SOLID WASTE TO COMPOST PRODUCTION BY BACTERIAL CONSORTIUM
17:00-17:15	A_005	Rajin Kakkoth Puthukkudi	IDENTIFYING FACTORS AFFECTING ELECTRICITY CONSUMPTION OF BANGKOK METROPOLITAN AREA IN THAILAND DURING COVID-19 SITUATION

Session:	SESSION C - PHYSICS FOR LIFE IN SPACE		
Link ZOOM:	https://zoom.us/j/97900743807		
Chair person:	Dr. Suparek Aukkaravittayapun		
Time	ID	Speaker	Title
13:30-14:00	C_INV001	David Ruffolo	COSMIC RAYS: A RANDOM WALK THROUGH THE SOLAR WIND
14:00-14:30	C_INV002	Kitiyanee Asanok	RADIO ASTRONOMY FOR SUSTAINABLE DEVELOPMENT IN THAILAND AND FUTURE PROSPECTIVE
14:30-15:00	C_INV003	Phongsatorn Saisutjarit	SMALL SATELLITES – SPACE TECHNOLOGIES FOR LIFE
Break			
15:10-15:25	C_001	Chanin Maetmueang	DAM LEAKAGE DETECTION USING ELECTRICAL RESISTIVITY TOMOGRAPHY, GROUND-PENETRATING RADAR AND MULTICHANNEL ANALYSIS OF SURFACE WAVE: A CASE STUDY OF NONG PLA SAWAI RESERVOIR, LAMPHUN PROVINCE, NORTHERN THAILAND
15:25-15:40	C_002	Sorawat Siangpipop	SURFACE WAVE GROUP VELOCITY TOMOGRAPHY FROM AMBIENT SEISMIC NOISE CROSS-CORRELATION IN NORTHERN THAILAND
15:40-15:55	C_003	Paagjira Gajaseni	MONTE CARLO SIMULATION OF X-RAY GENERATION IN PLASMA FOCUS MACHINE
15:55-16:10	C_004	Karnjana Oncheurn	A STUDY OF ALIGNED ELECTROSPUN NANOFIBER USING MODIFIED RING-PARALELS COLLECTOR METHOD
16:10-16:25	C_005	Tanachporn Lukprang	GREEN SYNTHESIS AND CHARACTERIZATION OF CARBON DOTS FROM MANGOSTEEN

Session:	SESSION D - SDG CHALLENGES: CHEMICAL SOLUTIONS FOR SUSTAINABLE SOCIETY		
Link ZOOM:	https://zoom.us/j/99499675848		
Chair person:	Prof. Dr. Vudhichai Parasuk		
Time	ID	Speaker	Title
13:30-13:55	D_INV001	Rojana Pornprasertsuk	Zn AND Mn RECYCLING PROCESS FROM SPENT ALKALINE AND Zn-C BATTERIES TO BE RE-UTILIZED IN RECHARGEABLE Zn-ION BATTERY APPLICATION
14:00-14:25	D_INV002	Khamphee Phomphrai	HIGHLY ACTIVE METAL COMPLEXES SUPPORTED BY CONSTRAINED SCHIFF-BASE LIGANDS FOR CYCLOADDITION OF CO ₂ TO EPOXIDES
14:30-14:42	D_001	Phatpasin Sumprasit	IMPACT OF ELECTROLYTE ADDITIVE ON IONIC SOLVATION AND TRANSPORT PROPERTIES FOR AQUEOUS ZINC-ION BATTERIES
14:45-14:57	D_002	Chaithawat Waikhani	EFFECT OF TEMPERATURE AND REDUCING AGENT CONCENTRATION ON THE Mn RECOVERY FROM SPENT ALKALINE AND Zn-C BATTERIES

Session:	SESSION E2 - IMPACT OF BIOLOGICAL SCIENCE TOWARDS SDGS: BIOLOGICAL SCIENCES TOWARDS SDGS		
Link ZOOM:	https://us02web.zoom.us/j/86926839567		
Chair person:	Prof. Dr. Chanpen Chanchao		
Time	ID	Speaker	Title
13:30-14:00	E2_INV001	Atsuo Kimura	NOVEL SINGLE- AND DOUBLE-ANCHOR-TYPE ISOMALTO-MEGALOSACCHARIDES: PRODUCTION, FUNCTION, APPLICATION, AND CONTRIBUTION TO SDGS
14:00-14:15	E2_001	Prachakchit Chumkiew	DRAFT GENOME ANALYSIS OF A BEE SYMBIONT-DERIVED ANTIMICROBIAL PRODUCER <i>Streptomyces</i> I-EHB-18
14:15-14:30	E2_002	Naeem Madsari	INNATE IMMUNITY ACTIVATION OF <i>Litopenaeus vannamei</i> BY Serine Protease AND HEAT-KILLED <i>Vibrio parahaemolyticus</i>
14:30-14:45	E2_003	Patcharee Phetthongyok	MICROBIAL DIVERSITY AND FUNCTION-BASED SCREENING FOR β -GALACTOSIDASES FROM WANG-PRA CAVE METAGENOME
14:45-15:00	E2_004	Pavinee Prapassornwattana	THE BINDING STUDY OF VIRAL CAPSID PROTEINS OF COXSACKIEVIRUS B3 WITH A BENZENE SULFONAMIDE DERIVATIVE AND RUPINTRIVIR BY USING COMPUTATIONAL METHODS
15:00-15:15	E2_005	Krittana Trisakulwattana	TRANSCRIPTOME ANALYSIS OF DENGUE VIRUS INFECTION IN HUMAN HEPATOCYTE
15:15-15:30	E2_006	Ngoentra Samnaknit	β -GLUCOSIDASE ACTIVITY AND IN-SILICO STRUCTURAL ANALYSIS FROM THREE STRAINS OF <i>ASPERGILLUS ACULEATUS</i>
15:30-15:45	E2_007	Sirawit Jirawannaporn	DETECTION OF LEPTOSPIRES BY RPA-CRISPR-Cas12a TARGETING <i>SecY</i> GENE
15:45-16:00	E2_008	Thunyarat Surasiang	EFFECTS OF A6E MUTATION ON PROTEIN EXPRESSION AND STRUCTURE FORMATION OF Asn1p-GFP IN <i>Saccharomyces cerevisiae</i>



Symposium:	SYMPOSIUM B: CHALLENGES OF QUANTUM SCIENCE AND TECHNOLOGY TOWARDS SUSTAINABLE DEVELOPMENTS		
Link ZOOM:	https://zoom.us/j/97485819800		
Chair person:	Assoc. Prof. Dr. Anucha Watcharapasorn		
Co-chair:	Dr. Pimonpan Sompert		
Time	ID	Speaker	Title
13:00-13:30	SYMP_B_INV001	Rodney Van Meter	SDGS AND THE QUANTUM INTERNET
13:30-14:00	SYMP_B_INV002	Thiparat Chotibut	QUANTUM TECHNIQUES FOR EXPLAINABLE NATURAL LANGUAGE PROCESSING
14:00-14:30	SYMP_B_INV003	Ivan Rungger	QUANTUM COMPUTERS FOR MATERIALS SIMULATIONS USING EMBEDDING METHODS
14:30-14:50	SYMP_B_001	Naphan Benchasattabuse	DISTRIBUTING MULTIPARTITE ENTANGLED STATE OVER QUANTUM INTERNET
14:50-15:10	SYMP_B_002	Poramet Pathumsoot	OPTIMIZATION OF EXPECTED WAITING TIME IN NETWORK OF QUANTUM REPEATERS
Break			
Chair person:	Asst. Prof. Dr. Narupon Chattrapiban		
Co-chair:	Dr. Nuttachai Jutong		
Time	ID	Speaker	Title
15:20-15:50	SYMP_B_INV004	Tanapoom Poomaradee	TOWARD ULTRACOLD CAESIUM ISOMERS
15:50-16:20	SYMP_B_INV005	Pimonpan Sompert	EXPLORING FERMI-HUBBARD SYSTEM VIA QUANTUM GAS MICROSCOPE
16:20-16:50	SYMP_B_INV006	Nirpendra Singh	COMPUTATIONAL DESIGN FOR TWO-DIMENSIONAL MATERIALS FOR THERMOELECTRIC TRANSPORT
16:50-17:10	SYMP_B_003	Kritsana Saego	OPTICAL QUANTUM ERASER

Symposium:	SYMPOSIUM D: CRYSTALLOGRAPHY		
Link ZOOM:	https://zoom.us/j/94796182096		
Chair person:	Prof. Dr. Nongnuj Muangsin		
Time	ID	Speaker	Title
13:30-14:00	SYMP_D_INV001	Min Fey Chek	CRYSTAL STRUCTURE OF BIOPLASTIC-SYNTHESIZING PHA SYNTHASE (PhaC) REVEALING AN UNEXPECTED OPEN-CLOSED HETERODIMER
14:00-14:15	SYMP_D_001	Waralee Srinarawat	CRYSTALLIZATION AND CHARACTERIZATION OF MONOSODIUM URATE AND CALCIUM PYROPHOSPHATE CRYSTALS AS CAUSE OF Gouty Arthritis
14:15-14:30	SYMP_D_002	Pasunee Laohawutthichai	CRYSTALLIZATION OF THE RECOMBINANT VIRAL RESPONSIVE PROTEIN 15 (PmVRP15) FROM THE BLACK TIGER SHRIMP <i>Penaeus monodon</i>
14:30-15:00	SYMP_D_INV002	Kanokwan Kongpatpanich	FUNCTIONALIZATION OF METAL-ORGANIC FRAMEWORKS FOR BIOMASS CONVERSION TO VALUE-ADDED CHEMICALS
15:00-15:15	SYMP_D_003	Chana Panyanon	STRUCTURES, PHOTOLUMINESCENCE AND CO ₂ ADSORPTION PROPERTIES OF NOVEL POLYOXOMETALATES DERIVED FROM RICE HUSK BIOMASS
15:15-15:30	SYMP_D_004	Patcharin Jundee	PETROGRAPHY AND GEOCHEMISTRY OF MAFIC DIKES IN THAN SALAI ABANDONED QUARRY, THONG SAEN KHAN DISTRICT, UTTARADIT PROVINCE
15:30-15:45	SYMP_D_005	Kenika Khotchasanthong	FOUR NOVEL ZINC(II) COORDINATION POLYMERS BASED ON TRITOPIC AND HETEROCYCLIC N-DONOR MIXED LIGANDS

Symposium:	SYMPOSIUM N: SOLUTIONS FOR TOMORROW: DOW SUSTAINABILITY TO TACKLE WORLD CHANGE		
Link ZOOM:	https://zoom.us/j/92682911642		
Chair person:	Ms. Kanchana Un-Arom		
Time	ID	Speaker	Title
13:30-14:30	SYMP_N_INV001	Chompoonuch Junbua, Rangsun Chaosuwanakij, Thawatchai Tungkavet, Anurak Rassamee Amornwiwat	SUSTAINABLE INNOVATIONS FOR FUTURE PACKAGING BY DOW PACK GURU
Break			
14:45-15:30	SYMP_N_INV002	Loganathan Ravisanker	ADVANCING SAFETY AND CIRCULARITY OF RUBBERIZED SPORTS SURFACES THROUGH INNOVATION AND VALUE CHAIN PARTNERSHIPS
15:30-16:15	SYMP_N_INV003	Jens Schmidt	SUSTAINABLE CHEMICAL PRODUCTION – TECHNOLOGY & PATHWAYS TOWARDS A GREEN FUTURE FOR DOW
16:15-16:30	SYMP_N_001	Nattakarn Kruatong	USE OF BIOCHAR IMPREGNATED WITH IRON AND CHITOSAN FOR HEAVY METAL REMOVAL: SORPTION PERFORMANCES

Symposium:	SYMPOSIUM O: SYMPOSIUM ON SCIENCE EDUCATION FOR SUSTAINABILITY – LITERACY FOR ALL		
Link ZOOM:	https://zoom.us/j/91474796565		
Chair person:	Dr. Ganigar Chen		
Time	ID	Speaker	Title
13:30-14:00	SYMP_O_INV001	Yoshito Andou	FABRICATION OF BIODEGRADABLE CELLULOSE COMPOSITE THROUGH GREENER REACTION PROCESS
14:00-14:30	SYMP_O_INV002	Ruetai Chongsrid	INSPIRATION, MOTIVATION, AND CREATIVITY; HOW TO DESIGN STEM ACTIVITIES FOR SUSTAINABLE DEVELOPMENT
14:30-14:45	SYMP_O_001	Alvin Lim Teik Zheng	N-DOPED REDUCED GRAPHENE OXIDE/GRAPHENE NANOPATELET (rGO/GNP) AEROGEL: PREPARATION AND CHARACTERIZATION
14:45-15:00	SYMP_O_002	Waraporn Rattanongphisat	EXPERIMENTAL INVESTIGATION ON SOLAR CHIMNEY STACK FOR NATURAL VENTILATION
15:00-15:15	SYMP_O_003	Mathivathani Kandiah	SILVER NANOPARTICLES: A SOLUTION FOR DEGRADING AZO DYES
15:15-15:30	SYMP_O_004	Abinaya Sathiskumar	BIOGENIC SYNTHESIS OF SILVER NANOPARTICLES USING THE EXTRACT OF ENVIRONMENTALLY BENIGN PLANT MATERIAL, BASIL (OCIMUM BASILICUM) AND DETERMINATION OF THEIR ANTIOXIDANT, ANTIBACTERIAL AND PHOTOCATALYTIC ACTIVITIES
15:30-15:45	SYMP_O_005	Ramlah Kamal	CONTRIBUTIONS OF A WEED: MICROWAVE ASSISTED GREEN SYNTHESIS OF SILVER NANOPARTICLES USING MORNING GLORY (Ipomoea spp.) FOR THE ASSESSMENT OF ITS ANTIOXIDANT, ANTIBACTERIAL AND PHOTOCATALYTIC ACTIVITY
15:45-16:00	SYMP_O_006	Napat Malathum	A REVIEW OF EDUCATIONAL PROGRAMMES AT THE RAMA 9 MUSEUM ASSOCIATED WITH THE UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOALS

Symposium:	SYMPOSIUM P: SUSTAINABLE FOOD SYSTEMS FOR GOOD HEALTH AND WELL-BEING		
Link ZOOM:	https://zoom.us/j/95623018275		
Chair person:	Assoc. Prof. Dr. Chaleeda Borompichaichartkul		
Time	ID	Speaker	Title
13:30-14:00	-	Chair of the Symposium	SYMPOSIUM OPENING AND REGISTRATION
14:00-15:00	SYMP_P_INV001	Akkharawit Kanjana-opas	SUSTAINABLE FOOD SYSTEM FOR LOCAL INGREDIENTS, TREND AND SUPPORTING POLICY
15:00-15:30	-	Chair of the Symposium	Q&A

Session:	Council of Science Deans of Thailand's Meeting		
Link ZOOM:	https://us02web.zoom.us/j/86493611605		
Time	ID	Speaker	Title
13:30-16:00	-	-	Meeting

Session:	CEPMART Meeting		
Link ZOOM:	https://zoom.us/j/97036988638		
Time	ID	Speaker	Title
13:30-16:00	-	-	Meeting

Session:	The 36th Chemistry Department Heads of Thailand Meeting		
Link ZOOM:	https://us02web.zoom.us/j/81962233745		
Time	ID	Speaker	Title
13:30-16:00	-	-	Meeting

Session:	The 4th Physics Department Heads of Thailand Meeting		
Link ZOOM:	https://us02web.zoom.us/j/82758209021		
Time	ID	Speaker	Title
13:30-16:00	-	-	Meeting

Session:	The 3rd Biology Department Heads of Thailand Meeting		
Link ZOOM:	https://us02web.zoom.us/j/84038882921		
Time	ID	Speaker	Title
13:30-16:00	-	-	Meeting

OCTOBER 6th, 2021

Session:	SESSION B - MATH STAT COMP FOR SDGS: SUSTAINABLE SOLUTIONS		
Link ZOOM:	https://zoom.us/j/99929413009		
Chair person:	Assoc. Prof. Dr. Chartchai Leenawong		
Time	ID	Speaker	Title
8:30-9:00	B_INV001	Kannapha Amaruchkul	MULTI-OBJECTIVE LAND-WATER ALLOCATION MODEL FOR SUSTAINABLE AGRICULTURE WITH PREDICTIVE STOCHASTIC YIELD RESPONSE
9:00-9:30	B_INV002	Teerapong Suksumran	THE GEOMETRY OF N-DIMENSIONAL EINSTEIN GYROGROUP VIA KLEIN'S APPROACH
9:30-10:00	B_INV003	Thittaporn Ganokratanaa	UNSUPERVISED ANOMALY DETECTION FOR SURVEILLANCE VIDEOS
Break			
10:10-10:25	B_001	Thanomsak Laokul	ENDPOINT THEOREMS OF MULTI-VALUED MAPPING SATISFYING CONDITION (D) IN UNIFORMLY CONVEX HYPERBOLIC SPACES
10:25-10:40	B_002	Chadaporn Keatmanee	GUIDELINES of THAILAND PERSONAL DATA PRIVACY COMPLIANCE in UML: CASE of A PATIENT ASSISTANCE PROGRAM
10:40-10:55	B_003	Chanon Tantiwattanapaibul	THE PERTURBED RISK MODEL WITH INVESTMENT AND SURRENDER BASED ON POISSON NEGATIVE BINOMIAL COUNTING PROCESS
10:55-11:10	B_004	Sathit Prasomphan	TRACKING AND TAKE CARE AMNESIA PATIENT APPLICATION BY USING iBEACON

Session:	SESSION E1 - IMPACT OF BIOLOGICAL SCIENCE TOWARDS SDGS: ACTIVE LEARNING FOR BIOLOGICAL SCIENCE CLASSES		
Link ZOOM:	https://zoom.us/j/98949274106		
Chair person:	Asst. Prof. Dr. Noppadon Kitana		
Time	ID	Speaker	Title
9:00-9:30	E1_INV001	Nantana Gajaseni	NEW NORMAL, NEW MINDSET AND NEW SKILLSET: WHY AND HOW?
9:30-10:00	E1_INV002	Teck Keong Seow	CONVERSION OF A LARGE NON-MAJORS BIOLOGY COURSE TO ONLINE TEACHING – INSTRUCTIONAL RE-DESIGN AND ITS IMPACT ON STUDENT LEARNING
10:00-10:30	E1_INV003	Pongchai Dumrongrojwatthana	ACTIVE LEARNING VIA GAMING AND SIMULATIONS IN BIOLOGY AND SUSTAINABLE DEVELOPMENT COURSES
10:30-10:50	E1_001	Peeradon Sarnkaew	COMPUTER GAME OF CELL STRUCTURE AND FUNCTION IN BIOLOGY
10:50-11:10	E1_002	Alba Abad	CONNECTING THE CLIMATE CHALLENGE
11:10-11:30	E1_003	Sarnchai Viriyachat	PRACTICAL LEARNING WITH THE SIMULATED HUMAN DIGESTION - IN VITRO DIGESTION ANALYSIS ON GLUCOSE AVAILABILITY IN COMMON SOURCES OF CARBOHYDRATE CONSUMED IN THAILAND
11:30-11:50	E1_004	Raekkhwan Polthanya	THE USE OF MICROSCOPE LENS FOR SMARTPHONE AS AN ALTERNATIVE ACTIVE LEARNING TOOL FOR HIGH SCHOOL BIOLOGY CLASS

Session:	SESSION E2 - IMPACT OF BIOLOGICAL SCIENCE TOWARDS SDGS: BIOLOGICAL SCIENCES TOWARDS SDGS		
Link ZOOM:	https://us02web.zoom.us/j/86926839567		
Chair person:	Prof. Dr. Chanpen Chanchao		
Time	ID	Speaker	Title
9:00-9:30	E2_INV002	Preecha Phuwapraisirisan	SESAMOLIN: A VERSATILE PRECURSOR FROM SESAME SEED FOR DERIVATIZING BIOACTIVE LIGNANS
9:30-9:45	E2_009	Siriprapha Sudthonglang	ANTI-INFLAMMATORY ACTIVITY OF THE ETHANOLIC EXTRACT OF THE POWDER FORMULA OF A FUNGUS <i>Cordyceps sinensis</i> AND THREE HERBS (<i>Panax ginseng</i> , <i>Kaempferia parviflora</i> AND <i>Houttuynia cordata</i>) IN RAW264.7 CELLS
9:45-10:00	E2_010	Tattiya Kantasa	BIOLOGICAL ACTIVITY OF PROTEIN HYDROLYSATE FROM <i>Lentinus squarrosulus</i> Mont
10:00-10:15	E2_011	Khoa Anh Nguyen	FIRST IDENTIFICATION OF α -GLUCOSIDASE INHIBITORS FROM THE STEM OF <i>Thunbergia laurifolia</i>
10:15-10:30	E2_012	Thanakamol Khongsonthi	PREDICTION OF ANTI P. ACNES PEPTIDES FROM VARIOUS PROTEASES HYDROLYZED RICEBERRY RICE BRAN
10:30-10:45	E2_013	Thipwan Jiemanukunkij	DETERMINATION OF ORGANIC AND INORGANIC ELEMENTS IN THE BIOGAS DIGESTATE LIQUID
10:45-11:00	E2_014	Watcharapong Wimonchaijit	PROPICONAZOLE INHIBITS ROOT ELONGATION AND LATERAL ROOT DEVELOPMENT IN RICE SEEDLINGS BY INTERFERING WITH AUXIN
11:00-11:15	E2_015	Luhur Septiadi	HEALTH STATUS OF THE RICE FROG <i>Fejervarya limnocharis</i> IN NAN PROVINCE, THAILAND, DURING PEAK HERBICIDE UTILIZATION PERIOD
11:15-11:30	E2_016	Sudarat Fueangmeekun	SUCCESSION OF CARRION INSECTS ON PIG CARCASSES RELOCATED FROM INDOOR TO OUTDOOR CONDITIONS

Symposium:	SYMPOSIUM A: ACCELERATION OF SUSTAINABILITY TOWARDS BIOBASED TECHNOLOGICAL PLATFORM DEVELOPMENT		
Link ZOOM:	https://zoom.us/j/99423993837		
Chair person:	Prof. Dr. Nuttha Thongchul		
Time	ID	Speaker	Title
9:00-9:30	SYMP_A_INV001	Hesham A. El Enshasy	MORPHOLOGY IN SUBMERGED CULTURE: THE MAIN CHALLENGE IN INDUSTRIAL BIOACTIVE COMPOUND PRODUCTION IN FUNGAL BIOFACTORIES
9:30-10:00	SYMP_A_INV002	Thana Sornchamni	THE POTENTIAL OF GREEN HYDROGEN
10:00-10:30	SYMP_A_INV003	Lalintip Hocharoen	BIOPROCESS DEVELOPMENT ON ANIMAL VACCINE PRODUCTION FOR A SUSTAINED TECHNOLOGY ENHANCEMENT
Break			
10:40-10:55	SYMP_A_001	Sitanan Thitprasert	SUGAR TOLERANCE IN D-LACTIC ACID FERMENTATION BY <i>Sporolactobacillus terrae</i> SBT-1
10:55-11:10	SYMP_A_002	Panaya Kotchaplai	SCREENING AND ISOLATION OF LIGNIN-DEPOLYMERIZING BACTERIA FOR AN AROMATIC FEEDSTOCK PRODUCTION
11:10-11:25	SYMP_A_003	Suwattana Pruksasri	PREPARATION OF BIOACTIVE PECTIN FILMS FROM POMELO PEELS

Symposium:	SYMPOSIUM C: CONSERVATION AND RESTORATION IN A CHANGING WORLD		
Link ZOOM:	https://zoom.us/j/96712657482		
Chair person:	Prof. Dr. Suchana Chavanich		
Time	ID	Speaker	Title
8:30-9:00	SYMP_C_INV001	Kentaro Ando	RESEARCH OF IOC/WESTPAC
9:00-9:30	SYMP_C_INV002	Dominic Thomson	NET FREE SEAS - EXPLORING COMMUNITY-BASED SOLUTIONS TO MARINE POLLUTION
9:30-10:00	SYMP_C_INV003	Siriporn Sriaram	LESSONS LEARNED AND WAY FORWARD FOR MANGROVE RESTORATION IN THAILAND
10:00-10:15	SYMP_C_001	Sirikorn Pongtornkulpanich	AGE ESTIMATION OF MARINE FOSSILS FROM PHETCHABUN PROVINCE USING X-RAY ANALYSIS

Symposium:	SYMPOSIUM L: THE SUSTAINABLE TOURISM REVIEW IN A POST-PANDEMIC 2022: REBUILDING TOURISM TO SUSTAINABILITY		
Link ZOOM:	https://zoom.us/j/95250053060		
Chair person:	Dr. Chainarong Srirak		
Time	ID	Speaker	Title
8:30-9:00	-	-	REGISTRATION
9:00-9:30	-	Patthaphon Sukjai & Anamai Damnet	INTRODUCTION & WELCOME AND OPENING REMARKS
9:30-10:00	SYMP_L_INV001	Noel Scott	SUSTAINABLE TOURISM AS A STRATEGY FOR ADVENTURE TOURISM DEVELOPMENT
10:00-10:30	SYMP_L_INV002	Ann Suwaree Ashton	STRENGTHENING TOURISM SUSTAINABILITY WELLNESS TOURISM; THROUGH SOUTHEAST ASIA
10:30-11:00	SYMP_L_INV003	Robert C. Sinclair	COVID-19, SUSTAINABLE TOURISM, AND THE CHALLENGES FOR THE FUTURE
11:00-11:30	SYMP_L_INV004	Gina B. Alcoriza	THE SUSTAINABLE TOURISM REVIEW IN A POST-PANDEMIC 2022: REBUILDING TOURISM TO SUSTAINABILITY
11:30-12:00	-	-	ROUND TABLE DISCUSSION

Symposium:	SYMPOSIUM P: SUSTAINABLE FOOD SYSTEMS FOR GOOD HEALTH AND WELL-BEING		
Link ZOOM:	https://zoom.us/j/95623018275		
Chair person:	Assoc. Prof. Dr. Chaleeda Borompichaichartkul		
Time	ID	Speaker	Title
9:30-10:10	-	-	REGISTRATION
10:10-11:05	SYMP_P_INV002	Richard Archer	STATE-of-the-ART FOOD TECHNOLOGY FOR SUSTAINABLE FOOD SYSTEMS
11:05-12:00	SYMP_P_INV003	Lalana Thiranusornkij	LOCAL INGREDIENTS AND SUSTAINABILITY FOOD SYSTEM R&D FROM DEMAND SIDE

Symposium:	SYMPOSIUM S: RECENT ADVANCES IN SYNTHETIC BIOLOGY AND GENOME EDITING		
Link ZOOM:	https://zoom.us/j/92606820017 (WEBINAR)		
Chair person:	Dr. Verawat Champreeda		
Time	ID	Speaker	Title
10:30-11:00	SYMP_S_INV001	Chayasith Uttamapinant	GENETIC CODE REPROGRAMMING WITH ENGINEERED TRANSLATION MACHINERIES
11:00-11:30	SYMP_S_INV002	Wanatchaporn Arunmanee	BIOENGINEERING OF <i>Escherichia coli</i> OUTER MEMBRANE VESICLES AS DRUG AND VACCINE DELIVERY SYSTEM
11:30-12:00	SYMP_S_INV003	Weerawat Runguphan	ENGINEERING YEAST TO PRODUCE ADVANCED BIOFUELS AND HIGH-VALUE BIOCHEMICALS

Session:	YRSS & JYRSS SESSIONS		
Link ZOOM 1:	YRSS (Bio & Chem) > https://us02web.zoom.us/j/89550706931		
Link ZOOM 2:	YRSS (Others) > https://us02web.zoom.us/j/87973842561		
Link ZOOM 3:	JYRSS > https://us02web.zoom.us/j/82857200853		
Time	ID	Speaker	Title
11:00-13:30	-	-	Poster Presentation (YRSS & JYRSS)

Session:	Annual Meeting of the Science Society of Thailand Under the Patronage of His Majesty the King		
Link ZOOM:	https://zoom.us/j/98330395165		
Time	ID	Speaker	Title
14:00-16:00	-	-	Meeting

Session:	Meeting of the STT48 Committee		
Link ZOOM:	https://us02web.zoom.us/j/81811050099		
Time	ID	Speaker	Title
16:00-18:00	-	-	Meeting

Session:	SESSION D - SDG CHALLENGES: CHEMICAL SOLUTIONS FOR SUSTAINABLE SOCIETY		
Link ZOOM:	https://zoom.us/j/99499675848		
Chair person:	Prof. Dr. Vudhichai Parasuk		
Time	ID	Speaker	Title
13:30-13:55	D_INV003	Suwat Nanan	SUSTAINABLE DEGRADATION OF ORGANIC POLLUTANTS IN WASTEWATER BY PHOTOCATALYTIC PROCESS
14:00-14:25	D_INV004	Xuechuan Hong	SMALL-MOLECULE FLUOROPHORES FOR NIR-II BIOMEDICAL FLUORESCENCE IMAGING AND AND IMAGE-GUIDED THERAPY
14:30-14:42	D_003	Chaiwat Rujirasereesakul	SUBSTITUENT EFFECT ON THE KINETIC BEHAVIOR OF PHOSPHINE-CATALYZED CONJUGATE ADDITION REACTION OF ALLENIC ESTERS: A POTENTIAL SOLUTION FOR DEVELOPMENT OF A KINETICALLY FASTER CATALYTIC CONJUGATE ADDITION
14:45-14:57	D_004	Wannisa Vichit	THERMAL STABILITY OF ENCAPSULATED RED HOMMALI RICE EXTRACT WITH BETA-CYCLODEXTRINS
15:00-15:12	D_005	Boonyaras Sookkheo	OIL ADSORPTION IN WASTEWATER USING CHITIN EXTRACTED FROM CUTTLEFISH BONE
15:15-15:27	D_006	Jariya Jitdee	SYNTHESIS AND GENETIC CODE EXPANSION OF PLASTIC-DEGRADING ENZYMES FOR DETECTION OF MICROPLASTICS

Symposium:	SYMPOSIUM F: FOREST BIODIVERSITY, CLIMATE CHANGE, AND SUSTAINABLE USE FOR SAVING LIFE ON EARTH		
Link ZOOM:	https://zoom.us/j/99369031822		
Chair person:	Asst. Prof. Dr. Oraphan Sungkajanttranon		
Time	ID	Speaker	Title
13:00-13:20	SYMP_F_INV001	Alistair Monument	CONSERVE THE WORLD'S MOST IMPORTANT FORESTS TO SUSTAIN NATURE'S DIVERSITY, BENEFIT OUR CLIMATE, AND SUPPORT HUMAN WELL-BEING
13:20-13:40	SYMP_F_INV002	Jantrararuk Tovarane	IMPACT OF CLIMATE CHANGE ON BIODIVERSITY FOR SUSTAINABLE USE
13:40-14:00	SYMP_F_INV003	Oh Cheow Sheng	SINGAPORE, BECOMING A CITY IN NATURE
14:00-14:20	SYMP_F_001	Ploypassorn Thirajitto	THE COMPARATIVE LEAF ANATOMY OF <i>Erycibe</i> ROXB. IN THAILAND

Symposium:	SYMPOSIUM H: METAL-ORGANIC COMPOSITES IN MATERIAL SCIENCE		
Link ZOOM:	https://zoom.us/j/98016113963		
Chair person:	Prof. Dr. Takumi Konno		
Time	ID	Speaker	Title
13:30-14:00	SYMP_H_INV001	Yi-Chou Tsai	THE CAPRICIOUS Mo-Mo QUINTUPLE BOND
14:00-14:30	SYMP_H_INV002	Phimphaka Harding	STRATEGIES TOWARDS LIGHT-ACTIVATION IN IRON(III) SPIN CROSSOVER MATERIALS
14:30-15:00	SYMP_H_INV003	Yun Zong	METAL-ORGANIC FRAMEWORKS (MOFS) IN ENERGY STORAGE RESEARCH
15:00-15:15	SYMP_H_001	Saran Sukchit	SYNTHESIS AND CHARACTERIZATION OF HETEROBIMETALLIC COMPLEXES SUPPORTED BY POLYETHYLENE GLYCOL CHAINS-APPENDED 2,6-PYRIDINEDIMETHANAMINE

Symposium:	SYMPOSIUM K: SUSTAINABLE USE OF MARINE BIODIVERSITY		
Link ZOOM:	https://us02web.zoom.us/j/88114006148		
Chair person:	Assoc. Prof. Dr. Thamasak Yeemin		
Time	ID	Speaker	Title
13:00-13:30	SYMP_K_INV001	Janny D. Kusen	REPRODUCTION OF SOME CORAL REEF FISHES IN MANADO BAY AND BUNAKEN NATIONAL PARK INDONESIA TO SUPPORT THE SUSTAINABILITY RESOURCES
13:30-14:00	SYMP_K_INV002	Baria-Rodriguez MVB	THE FIRST SUCCESSFUL PRODUCTION OF AN F2 GENERATION FROM 12-YEAR-OLD SEXUALLY PROPAGATED MASSIVE CORAL COLONIES
14:00-14:30	SYMP_K_INV003	Sau Pinn Woo	BLUE ECONOMY: DRIVING GROWTH THROUGH SUSTAINABLE USE OF MARINE BIODIVERSITY
14:30-14:45	SYMP_K_001	Makamas Sutthacheep	COMMUNITY STRUCTURE OF CORALS ON A NEW DIVE SITE, PRATHONG UNDERWATER PINNACLE IN THE ANDAMAN SEA
14:45-15:00	SYMP_K_002	Charernmee Chamchoy	THE COLONY SIZE STRUCTURE OF CORAL POPULATIONS ON SHALLOW REEF FLAT AT KO RANG KACHIU, MU KO CHUMPHON NATIONAL PARK
15:00-15:15	SYMP_K_003	Nachaphon Sangmanee	THE RELATIONSHIP OF MEIOFAUNAL COMMUNITIES AND CORAL COVER AT MU KO SURIN NATIONAL PARK, THE ANDAMAN SEA
15:15-15:30	SYMP_K_004	Wichin Suebpala	DIVERSITY OF SMALL-SCALE FISHING GEARS IN RANONG, PHANG NGA AND PHUKET, THE NORTH ANDAMAN SEA

Symposium:	SYMPOSIUM L: THE SUSTAINABLE TOURISM REVIEW IN A POST-PANDEMIC 2022: REBUILDING TOURISM TO SUSTAINABILITY		
Link ZOOM:	https://zoom.us/j/95250053060		
Chair person:	Dr. Gina B. Alcoriza		
Time	ID	Speaker	Title
12:30-12:50	SYMP_L_001	Chainarong Srirak	A REVIEW OF NEW TOURISM IN THE POST-COVID ERA: OPPORTUNITIES AND CHALLENGES FOR SUSTAINABLE TOURISM DEVELOPMENT
12:50-13:10	SYMP_L_002	Piyapong Ketpiyarat	DEVELOPING AGRO-TOURISM STANDARDS TO SUPPORT NEW NORMAL TOURIST GROUPS: OPPORTUNITIES AND CHALLENGES FOR SUSTAINABLE TOURISM DEVELOPMENT IN THAILAND
13:10-13:30	SYMP_L_003	Patthaphon Sukjai	SOCIOLOGY OF TOURISM IN THE DIMENSION OF TRAVEL EXPERIENCE DESIGN WITH DEMOCRATIC CONCEPT
13:30-13:50	SYMP_L_004	Jong Saesong	GUIDELINES ON SELF-ADJUSTMENT OF TOURISM ENTREPRENEURS CAUSED BY EFFECTS OF COVID-19 IN PHRA NAKHON SI AYUTTHAYA
13:50-14:10	SYMP_L_005	Thanakorn Thangruang	POST NEW NORMAL TOURISM
Break			
14:20-14:40	SYMP_L_006	Suppawan Vongsrangsap	THE DEVELOPMENT OF A STAND UP PADDLE BOAT (SUP) ACTIVITY MODEL TO PROMOTE SUSTAINABLE SPORTS TOURISM
14:40-15:00	SYMP_L_007	Niramol Khwakhong	THE IMPORTANCE OF SERVICE QUALITY OF 5 STAR HOTELS IN RATCHAPRASONG AREA TO TRANSITION UNDERCORONAVIRUS-19 2019 SITUATION
15:00-15:20	SYMP_L_008	Apidet Changchai	THE PROCESS OF COORDINATING FORCES TO SHAKE SOCIETY THROUGH THE COVID-19 CRISIS: TOUR LEADER'S YOUTH CAPACITY DEVELOPMENT FOR SUSTAINABLE TOURISM DEVELOPMENT
15:20-15:40	SYMP_L_009	Apidet Changchai	THE WAY OF SURVIVAL OF THE THA - CHIN RIVERSIDE MARKET COMMUNITIES: APPROACH OF STEPPING THROUGH THE COVID - 19 CRISIS OF TOURISM COMMUNITY
15:40-16:00	SYMP_L_010	Varachoti Vitthalertphol	THE COMMUNICATION ACROSS CULTURE TO TOURISM IN THE NEW NORMAL WAY AFTER COVID-19
16:00-16:30	-	Gina B. Alcoriza	CLOSING REMARKS



Symposium:	SYMPOSIUM P: SUSTAINABLE FOOD SYSTEMS FOR GOOD HEALTH AND WELL-BEING		
Link ZOOM:	https://zoom.us/j/95623018275		
Chair person:	Assoc. Prof. Dr. Chaleeda Borompichaichartkul		
Time	ID	Speaker	Title
13:00-13:30	-	-	REGISTRATION
13:30-14:30	SYMP_P_INV004	Paola Pittia	FOOD INNOVATION FOR FOOD SYSTEM SUSTAINABILITY, GOOD HEALTH, AND WELL-BEING
14:30-15:00	SYMP_P_001	Naraporn Phomkaivon	PRE-GELATINIZED COLORED SWEET POTATOES: AN APPROACH FOR ENHANCING EXTRACTABLE POLYPHENOLS AND ANTIOXIDANT POTENTIAL
15:00-15:30	SYMP_P_002	Lalita Lakkham	REPLACEMENT OF PHILANGKASA EXTRACTS TO NITRITE IN FERMENTED MEAT PRODUCT
15:30-16:00	-	Chair of the Symposium	SYMPOSIUM SUMMARY AND CLOSE

Symposium:	SYMPOSIUM Q: ADVANCE IN SCIENCE AND TECHNOLOGY TO ACCELERATE DECARBONIZATION FOR INDUSTRIES		
Link ZOOM:	https://zoom.us/j/99809595789		
Chair person:	Dr. Sumate Chareonchaidet		
Time	ID	Speaker	Title
14:00-14:30	SYMP_Q_INV001	Nannan Sun	-TBA-
14:30-15:00	SYMP_Q_INV002	Edman Tsang	-TBA-
15:00-16:00	SYMP_Q_INV003	Representative from CAS ICCB	-TBA-

Symposium:	SYMPOSIUM R: GREEN AND SUSTAINABLE CHEMISTRY: OPPORTUNITIES FOR ACADEMIA AND INDUSTRY		
Link ZOOM:	https://us02web.zoom.us/j/82159107076		
Chair person:	Prof. Joseph S.M. Samec		
Time	ID	Speaker	Title
14:00-14:30	SYMP_R_INV001	Adam Slabon	FROM INVENTION TO INNOVATION: CHEMICAL TECHNOLOGIES FOR ENVIRONMENTAL APPLICATIONS
14:30-14:45	SYMP_R_001	Chalinee Janta	MICROWAVE-ASSISTED EXTRACTION FROM FRUITS OF <i>Lycium ruthenicum</i>
14:45-15:00	SYMP_R_002	Patchayanan Suksamran	ANALYSIS OF CHEMICAL COMPONENTS IN DIFFERENT TEA TAXA FROM CHIANG RAI USING UHPLC-MS/MS COMBINED WITH CHEMOMETRICS
15:00-15:15	SYMP_R_003	Achanai Buasri	RIVER SNAIL SHELL AS HIGHLY EFFECTIVE RENEWABLE HETEROGENEOUS BASE CATALYST FOR BIODIESEL PRODUCTION

Session:	POSTER PRESENTATION		
Link ZOOM:	https://zoom.us/j/92401135175		
Time	ID	Speaker	Title
16:00-17.30	-	-	Poster Presentation

OCTOBER 7th, 2021

Symposium:	SYMPOSIUM E: ENVIRONMENTAL (ECOLOGICAL) IMPACT OF MICROPLASTICS AND TECHNOLOGICAL POTENTIAL FOR MICROPLASTIC WASTE		
Link ZOOM:	https://us02web.zoom.us/j/84149957727		
Chair person:	Assoc. Prof. Dr. Taeng On Prommi		
Time	ID	Speaker	Title
8:30-8:45	SYMP_E_001	Suchanya Wongrod	ADSORPTION OF CADMIUM FROM AQUEOUS SOLUTIONS BY POLYETHYLENE MICROPLASTICS AND BAMBOO BIOCHAR
8:45-9:00	SYMP_E_002	Thanya Reunura	DETECTION OF MICROPLASTICS IN <i>Litopenaeus vannamei</i> (Penaeidae) AND <i>Macrobrachium rosenbergii</i> (Palaemonidae) IN CULTURED POND
9:00-9:15	SYMP_E_003	Witwisitpong Maneechan	OCCURRENCE OF MICROPLASTICS IN THE GASTROINTESTINAL TRACT OF <i>Anax</i> sp. (Odonata: Aeshnidae) FROM THE RICE FIELD
9:15-9:30	SYMP_E_004	Penkhae Thamsenanupap	ACCUMULATION OF MICROPLASTICS IN MACROINVERTEBRATES INHABITING IN HUAI KHAKHANG STREAM, MAHA SARAKHAM PROVINCE
9:30-9:45	SYMP_E_005	Pimchanok Patho	VARIATION OF THE PHYTOTOXICITY OF CRUMB RUBBERS WASTE ON WHEAT (<i>Triticum aestivum</i> L.) SEED GERMINATION WITH LEACHING CONDITIONS

Symposium:	SYMPOSIUM G: HOW CHEMISTRY CAN RESOLVE FOR COVID-19 PANDEMIC		
Link ZOOM:	https://zoom.us/j/98010238500		
Chair person:	Prof. Dr. Orawon Chailapakul		
Time	ID	Speaker	Title
8:30-9:00	SYMP_G_INV001	Charles S. Henry	LOW-COST MICROFLUIDIC SENSORS FOR BACTERIA AND VIRUS DETECTION
9:00-9:30	SYMP_G_INV002	Tanapat Palaga	HOW CHEMISTRY AIDS IN THE COVID-19 VACCINE DEVELOPMENT?
9:30-10:00	SYMP_G_INV003	Kittikhun Wangkanont	FLUORESCENT PROBE-BASED ASSAY FOR IDENTIFICATION OF SARS-COV-2 MAIN PROTEASE INHIBITORS
Break			
10:10-10:40	SYMP_G_INV004	Sudkate Chaiyo	RECENT DEVELOPMENT OF COLORIMETRIC AND ELECTROCHEMICAL BIOSENSORS FOR COVID-19 DIAGNOSIS
10:40-10:55	SYMP_G_001	Chirapha Prakobdi	COLORIMETRIC METHOD BASED ON THE SCHIFF'S TEST FOR DETECTION OF METHANOL ADULTERATION IN HAND SANITIZER
10:55-11:10	SYMP_G_002	Watcharapong Timklaypachara	PROGRAM FOR COMPARING HIGH PERFORMANCE CHEMICAL FINGERPRINTING OF SAMPLES WITH COMPREHENSIVE TWO-DIMENSIONAL GAS CHROMATOGRAPHY TO EVALUATE PERCENTAGE OF SIMILARITY OF COMPONENTS BETWEEN 2 SUBSTANCES
11:10-11:25	SYMP_G_003	Pakakan Ngernpradab	PDMS AS A MATERIAL FOR DIGITAL MAGNETOFLUIDICS FOR APPLICATIONS IN BIOMEDICAL ANALYSIS



Symposium:	SYMPOSIUM I: PREMIUM AGRICULTURE: A PATHWAY TOWARD SUSTAINABLE AND INCLUSIVE BCG ECONOMY MODEL		
Link ZOOM:	https://zoom.us/j/96019253904		
Chair person:	Dr. Worajit Setthapun		
Time	ID	Speaker	Title
8:30-9:00	SYMP_I_INV001	Chai Lay Ching	HEADING TOWARDS THE NEW ERA OF SMARTER FOOD SAFETY FOR A SUSTAINABLE FOOD SYSTEM
9:00-9:30	SYMP_I_INV002	Suvaluk Asavasanti	CIRCULAR FOOD PRODUCTION: VALORIZATION OF FOOD MANUFACTURING BY-PRODUCTS
9:30-10:00	SYMP_I_INV003	Alan Dronkers	HEMP AS A SUSTAINABLE CROP AND A RENEWABLE RESOURCE
10:00-10:30	SYMP_I_INV004	Korsak Towantakavanit	SYNBIO CONSORTIUM IS DRIVING THAILAND BCG ECONOMY TO THE NEW FRONTIER

Symposium:	SYMPOSIUM J: SUSTAINABLE HYDROGEN PRODUCTION FOR GREENER ENVIRONMENT AND CHEMICAL PRODUCTS		
Link ZOOM:	https://zoom.us/j/92367461035		
Chair person:	Prof. Dr. Suttichai Assabumrungrat		
Time	ID	Speaker	Title
8:30-9:00	SYMP_J_KEY001	Sibudjing Kawi	SUSTAINABLE BIOMASS TAR REFORMING FOR SYNGAS / HYDROGEN PRODUCTION VIA THERMAL & PLASMA CATALYSIS
9:00-9:30	SYMP_J_KEY002	Joongmyeon Bae	PORTABLE HYDROGEN ENERGY SYSTEM WITH AN ELECTROLYZER, METAL HYDRIDE, AND PEMFC FUEL CELL
9:30-10:00	SYMP_J_KEY003	Piyabut Charuphen	HANDLING GREEN HYDROGEN IN THE FORM OF AMMONIA FOR COMMERCIAL USE AIMING TO NET ZERO EMISSION AND SUSTAINABILITY
10:00-10:20	SYMP_J_INV001	Sakhon Ratchahat	HYDROGEN PRODUCTION FROM CATALYTIC METHANE DECOMPOSITION
Break			
10:30-10:50	SYMP_J_INV002	Jon Powell	MULTIFUNCTIONAL CATALYST PELLETS FOR HYDROGEN PRODUCTION
10:50-11:05	SYMP_J_001	Nopphon Weeranoppanant	MAKE IT FLOW: ITS APPLICATION IN PHOTOCATALYTIC WATER SPLITTING FOR HYDROGEN PRODUCTION
11:05-11:20	SYMP_J_002	Peat Khemnarong	HYDROGEN-RICH GAS PRODUCTION FROM STEAM REFORMING OF ETHANOL OVER Re-Ni/Al ₂ O ₃ CATALYSTS
11:20-11:35	SYMP_J_003	Pasin Pong-Art	EFFECTS OF SUPPORT AND STEAM ADDITION ON CALCIUM CARBONATE REGENERATION IN THE COMBINED SORPTION-ENHANCED STEAM METHANE REFORMING WITH BI-REFORMING PROCESS
11:35-11:50	SYMP_J_004_P	Patid Poolthongkam	PRELIMINARY STUDY THE PALLADIUM CLUSTERS FOR HYDROGEN PRODUCTION FROM FORMALDEHYDE USING DFT CALCULATION

Symposium:	SYMPOSIUM M: TUBERCULOSIS: OLD DISEASE, NEW APPROACHES		
Link ZOOM:	https://zoom.us/j/98381009359		
Chair person:	Assoc. Prof. Dr. Roderick Bates		
Time	ID	Speaker	Title
8:30-9:00	SYMP_M_INV001	Gerhard Grüber	FROM MECHANISTIC- AND STRUCTURAL UNDERSTANDING OF Mycobacterium tuberculosis METABOLIC ENZYMES TO ANTI-TB COMPOUND DISCOVERY
9:00-9:15	SYMP_M_001	Pharit Kamsri	IDENTIFICATION OF NOVEL SERINE/THREONINE PROTEIN KINASES B INHIBITORS AS ANTI-TUBERCULOSIS AGENTS FROM KINASE LIBRARY: MULTISTAGE VIRTUAL SCREENINGS AND PHAMACOKINETIC PREDICTIONS
9:15-9:30	SYMP_M_002	Bandit Khamsri	INSIGHT INTO THE BINDING MODE AND BINDING INTERACTIONS OF BENZO[d]ISOTHIAZOLE DERIVATIVES AS POTENTIAL MTB DNA gyrase INHIBITORS USING MOLECULAR DYNAMICS SIMULATIONS
9:30-10:00	SYMP_M_INV002	Aasheesh Srivastava	HOT PURSUIT OF MYCOBACTERIA BY POLYASPARTAMIDE POLYELECTROLYTES
Break			
10:10-10:25	SYMP_M_003	Naruedon Phusi	PROPOSING NOVEL M. tuberculosis InhA INHIBITORS USING STRUCTURE-BASED DRUG DESIGN APPROACHES: MD SIMULATIONS AND FMO CALCULATIONS
10:25-10:40	SYMP_M_005	Pattarakiat Seankongsuk	SYNTHESIS OF Mycobacterium tuberculosis ATP SYNTHASE INHIBITORS
10:40-11:10	SYMP_M_INV003	Pornpan Pungpo	-TBA-
11:10-11:25	SYMP_M_004	Prabhu Yavvari	SELECTIVE TARGETING OF MYCOBACTERIAL BIOFILMS AND INTRACELLULAR MYCOBACTERIA BY SYNTHETIC ANTIMICROBIAL POLYAMIDES

Session:	YRSS		
Link ZOOM 1:	Bio > https://zoom.us/j/95834561717		
Link ZOOM 2:	Chem > https://zoom.us/j/94192185568		
Link ZOOM 3:	Com > https://zoom.us/j/98708723715		
Link ZOOM 4:	Env > https://zoom.us/j/98755366844		
Link ZOOM 5:	Food > https://zoom.us/j/96269948597		
Link ZOOM 6:	Mat > https://us02web.zoom.us/j/83119174158		
Link ZOOM 7:	Math > https://us02web.zoom.us/j/81278076901		
Link ZOOM 8:	Phy > https://us02web.zoom.us/j/89956723455		
Time	ID	Speaker	Title
8:30-12:00	-	-	Oral Presentation (YRSS)
Break			
Link ZOOM:	https://us02web.zoom.us/j/82966993052		
15:30-16:30		-	YRSS Awarding Session

Session:	TYSA		
Link ZOOM:	https://us02web.zoom.us/j/82702769403		
Time	ID	Speaker	Title
13:00-15:00	-	-	TYSA Workshop

SESSION A - INNOVATION IMPACTS DRIVEN SDGS



INNOVATION IMPACTS DRIVEN SDGS

Chair: Dr. Mati Horprathum
Co-Chair: Asst. Prof. Dr. Narit Triamnak
Co-Chair: Asst. Prof. Dr. Kheamrutai Thamaphat

According to the COVID-19 pandemic presents, global disruption has been being violently accelerated widespread. Meanwhile, technological innovations have been being highlighted as the potential solutions for distressed circumstances in such disruption era which can enable daily life activities such as works, businesses, industrials or educations to continue throughout the pandemic. The technological innovations can also significantly contribute to sustainable development and generate additional opportunities of the Sustainable Development Goals (SDGs) success. Hence, the technological innovations are crucial and need to be accelerated and scaled to strengthen the economic and social impact developments, especially, the SDGs. This session is to share new ideas, opportunities and the technological innovations among students, scientists, researchers, professionals, and innovators with an integrated approach including science, technology, and innovation (STI) that can aid to the achievement of SDGs. The presentation and discussion are comprehensive on the state-of-the-art expertise, emerging issues, crucial knowledge, and product development processes of innovations as well as the “innovation ecosystem” which will facilitate the STI knowledge based for healthcare, agriculture, environment, education, media and furthermore.

Invited Speakers



Assoc. Prof. Dr. Jakrapong Kaewkhao



Assoc. Prof. Dr. Kazuki Nagashima



Assoc. Prof. Dr. Takao Yasui



Asst. Prof. Dr. Supakij Suttiruengwong



Asst. Prof. Dr. Teerakiat Kerdcharoen

SESSION B – MATH STAT COMP FOR SDGS: SUSTAINABLE SOLUTIONS



MATH STAT COMP FOR SDGS: SUSTAINABLE SOLUTIONS

Chair: Assoc. Prof. Dr. Chartchai Leenawong

Co-Chair: Dr. Witchaya Rattanametawee

Co-Chair: Dr. Punnarai Siricharoen

This session welcomes all researchers in Mathematics, Statistics, Computer Science, and related fields to present and exchange their academic views on the latest and novel research findings. The session's theme is, but not limited to, using the aforementioned fields to serve as sustainable solutions for achieving the 17 Sustainable Development Goals set by the United Nations.

Invited Speakers



Assoc. Prof. Dr. Kannapha Amaruchkul



Assoc. Prof. Dr. Teerapong Suksumran



Dr. Thittaporn Ganokratanaa

SESSION C - PHYSICS FOR LIFE IN SPACE



PHYSICS FOR LIFE IN SPACE
Chair: Dr. Suparek Aukkaravittayapun

Nowadays, human life obviously depends much on technologies and innovations, life on earth has been forced to adapt new changes in order to catch up and utilize the new technologies and innovations. Ideas of life in space colonies has also become more and more realistic with even more advanced developing technologies and innovations. Human life, in this case, not only depends on but hangs by technologies and innovations in all aspects, such as food, air, energy, medicine, safety, transportation, communication, etc. To realize such ambitious space exploration, Physics plays as an essential role of new technologies and innovations to support life in space. However, there are still many crucial unsolved problems involved Physics inevitably which needs to be overcome to realize and make life in extreme conditions possible and comfortable. This session welcomes presentations from a wide spectrum of Physics to address (but not limit to) the possible solutions to current & future problems or to understand the unknown for better human life on earth and in space.

Invited Speakers



Prof. Dr. David Ruffolo



Dr. Kitiyanee Asanok



Dr. Phongsatorn Saisutjarit

SESSION D - SDG CHALLENGES: CHEMICAL SOLUTIONS FOR SUSTAINABLE SOCIETY



**SDG CHALLENGES:
CHEMICAL SOLUTIONS FOR SUSTAINABLE SOCIETY**
Chair: Prof. Dr. Vudhichai Parasuk
Co-Chair: Prof. Dr. Sumrit Wacharasindhu
Co-Chair: Prof. Dr. Patchanita Thamyongkit
Co-Chair: Assoc. Prof. Dr. Siwaporn Meejoo Smith
Co-Chair: Assoc. Prof. Dr. Pattaraporn Kim

Global warming and climate change are the grand challenges of the century. Although chemicals and chemical products make a better living for humankind, it is undeniable that production processes and themselves cause harm to our environments and health, besides the global warming. To cope with these stagnant problems, the United Nations has launched “the 17 Sustainable Development Goals (SDGs)” campaign and persuade nations to join this program. In response to the program, Thai government has devised the BCG model (B=Bioeconomy, C=Circular Economy, G=Green Economy) to plan the nation economy development. Chemists have put considerable efforts towards this direction and established a new direction called “Green Chemistry”. Today, there are numerous publications in the area of Green and Sustainable Chemistry and the number is expanding. This implies the increasing importance of this field in chemistry. In the 47th International Congress on Science, Technology and Technology-based Innovation, presentations and discussions in the session “SDG Challenges: Chemical Solutions for Sustainable Society” will be focused in four following areas:

- Green Materials for Environmental Protection and Remediation
- Green Materials for Clean Energy
- Green Materials for CO₂ Utilization
- Green Chemical Processes

Invited Speakers



Prof. Dr. Xuechuan Hong



Assoc. Prof. Dr. Khamphree Phomphrai



Assoc. Prof. Dr. Rojana Pornprasertsuk



Assoc. Prof. Dr. Suwat Nanan

SESSION E1 - IMPACT OF BIOLOGICAL SCIENCE TOWARDS SDGs: ACTIVE LEARNING FOR BIOLOGICAL SCIENCE CLASSES



IMPACT OF BIOLOGICAL SCIENCE TOWARDS SDGs: ACTIVE LEARNING FOR BIOLOGICAL SCIENCE CLASSES

Chair: Asst. Prof. Dr. Noppadon Kitana

Co-Chair: Asst. Prof. Dr. Ekaphan Kraichak

With this era of learning, 21st century skills are important for this generation. Biological sciences is one of the basic disciplines for SDGs. Previously, biological science classes were full of contents and memorization. Do we still need contents in classes? How can we develop 21st century skills in our students? We would like to invite all instructors to share your experiences in active learning or other learning methodology that can develop the required skills and knowledge in biological sciences in all areas, from molecular biology through ecology.

Invited Speakers



Assoc. Prof. Dr. Nantana Gajaseni



Assoc. Prof. Dr. Teck Keong Seow



Asst. Prof. Dr. Pongchai Dumrongrojwattana

SESSION E2 - IMPACT OF BIOLOGICAL SCIENCE TOWARDS SDGS: BIOLOGICAL SCIENCES TOWARDS SDGS



IMPACT OF BIOLOGICAL SCIENCE TOWARDS SDGS: BIOLOGICAL SCIENCES TOWARDS SDGS

Chair: Prof. Dr. Chanpen Chanchao

Co-Chair: Prof. Dr. Supachitra Chadchawan

In order to reach SDGs, biological sciences research is one of the important pieces. The studies of life sciences in all disciplines and taxa are welcome to share your recent discovery in this conference. These include the researches in microbes, protozoans, plants, animals and human from molecular, cell, whole organism, and population through ecological system levels.

Invited Speakers



Prof. Dr. Atsuo Kimura



Prof. Dr. Preecha Phuwapraisirisan

SYMPOSIUM A



ACCELERATION OF SUSTAINABILITY TOWARDS BIOBASED TECHNOLOGICAL PLATFORM DEVELOPMENT

Chair: Prof. Dr. Nuttha Thongchul

Co-Chair: Assoc. Prof. Dr. Suwattana Pruksasri

Co-Chair: Dr. Siwaruk Siwamogsatham

As worldwide goals, the Sustainable Development Goals (SDGs) deliver a powerful determination for improving our planet. Fulfilling the SDG targets will take an unprecedented effort by all sectors in society. Recently, exploring the pathways to producing fuels and platform chemicals from sustainable feedstocks has attracted increased interest from researchers to entrepreneurs. With SDGs tools, future fuels and chemicals will be most likely produced from sustainable feedstocks. Renewable biomass including agricultural residues, municipal wastes, and industrial wastes is considered to be the sustainable resource with the potential to deliver renewable fuels and bio-based chemicals. In the past decade, research has been focusing on development of technologies to produce drop-in fuels/chemicals which could be used “as is” to substitute for conventional petroleum-derived fuels/chemicals. Bio-based functional replacement chemicals and novel products are promising new area of interest to academia and industry. This symposium aims to feature the current advancements in sustainable fuels/chemicals and identify the challenges in developing the novel conversion technologies via biological and/or chemical related pathways. All papers from both academia and industry relevant to novel sustainable product development and conversion technologies are invited. The topics include but are not limited to:

1. Biological or chemical production of drop-in bio-based fuels/chemicals from biomass;
2. Biological or chemical production of bio-based chemicals with functional replacement of the petroleum-derived products;
3. Biological or chemical production of novel products;
4. Drop-in or novel chemicals produced from other carbon feedstocks including municipal wastes, food wastes, waste fats/oils and other non-food/feed and renewable feedstocks

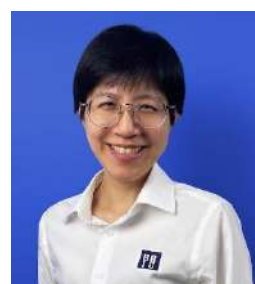
Invited Speakers



Prof. Dr. rer. Nat. Hesham A. El Enshasy



Dr. Thana Sornchamni



Dr. Lalintip Hocharoen

SYMPOSIUM B



**CHALLENGES OF QUANTUM SCIENCE AND TECHNOLOGY
TOWARDS SUSTAINABLE DEVELOPMENTS**
Chair: Assoc. Prof. Dr. Anucha Watcharapasorn
Co-Chair: Asst. Prof. Dr. Narupon Chattrapiban
Co-Chair: Asst. Prof. Dr. Sujin Suwanna
Co-Chair: Dr. Pimonpan Sompert
Co-Chair: Dr. Nithiwadee Thaicharoen
Co-Chair: Dr. Nuttachai Jutong

As the world moves forward to achieve sustainable developments, how Quantum Science and Technology can help pave the way to attain these goals is certainly a great challenge. It has recently become apparent that with worldwide academic and research collaboration, the transition from basic quantum research to commercial applications will create the next generation of disruptive technologies that will impact local and global societies in various aspects. This symposium aims to introduce advances in quantum science and technologies that provide better solutions to grand challenges in such fields as energy, health, security and environment. Based on “superposition”, a property from which objects can be in different states at the same time, and “entanglement”, where they can be inherently correlated without any direct physical interaction, Quantum Mechanics can be implemented in a wide range of applications. For example, quantum computation can provide a breakthrough in the design of new chemical processes, new materials and medical drugs, new paradigms in machine learning and artificial intelligence. With the effects of quantum entanglement, data can be completely and securely protected within the network and in long-range communication. Quantum technologies will also give rise to clocks and sensors with unmatched sensitivity and accuracy, with potential impact in navigation, synchronization of future smart networks and medical diagnostics.

Potential Topics > All contributed presentations and papers from academia, research institutes, private sectors and industries are welcome. The symposium aims to cover the following (but not limited to) topics in theory, simulation and experiment: Quantum computation, including quantum simulation, quantum computing software and algorithms, quantum control, quantum machine learning, Quantum materials science, including quantum engineering, Quantum metrology, sensing and imaging, Quantum communication, including quantum network, cryptography, quantum key distribution, quantum internet, Quantum information, Foundation of quantum theory, including measurement theory, quantum trajectories, quantum stochastic process, Applications of quantum in fields such as economics, finance, and other sciences

Invited Speakers



Prof. Dr. Rodney Van Meter



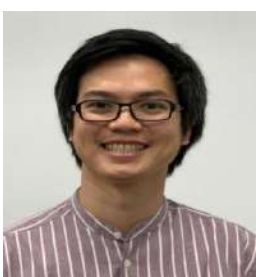
Asst. Prof. Dr. Nirpendra Singh



Dr. Ivan Rungger



Dr. Pimonpan Sompert



Dr. Tanapoom Poomaradee



Dr. Thiparat Chotibut

SYMPOSIUM C



CONSERVATION AND RESTORATION IN A CHANGING WORLD

Chair: Prof. Dr. Suchana Chavanich

Co-Chair: Dr. Nontivich Tandavanitj

Our environment has been threatened and impacted globally by anthropogenic activities, and the impacts are predicted to worsen in the next decade. How can we reimagine conservation in our rapidly changing world? What are the key knowledge gaps that must be urgently addressed for a better conservation? What are the challenges for conservation and restoration of the ecosystems? This session welcomes presentations on both basic and advanced research topics related to conservation and restoration of the ecosystems including but not limited to novel tools and technological innovations, successful approaches and insightful lessons, engagement and participation of communities, and transdisciplinary collaborations.

Invited Speakers



Dr. Dominic Thomson



Dr. Kentaro Ando



Dr. Siriporn Sriaram

SYMPOSIUM D



CRYSTALLOGRAPHY

Chair: Prof. Dr. Nongnuj Muangsin

Co-Chair: Assoc. Prof. Dr. Kuakarun Krusong

Co-Chair: Asst. Prof. Dr. Kittipong Chainok

X-ray crystallography is the experimental science and is by far the most powerful method to determine the arrangement of atoms of a crystalline solid in three-dimensional space. This method has been used in structural chemistry and biological macromolecules for over a century. In the biological crystallography, three-dimensional structures of molecules such as proteins and nucleic acids are determined at atomic level. This helps us to understand the basic mechanisms of biomolecules, as well as aid in novel drug discovery. In chemical crystallography, the determination of crystal structures of organic, organometallic and coordination compounds (i.e. coordination polymers and metal-organic frameworks) is of great importance and highly valuable for understanding the structure-property relationship as well as supramolecular interactions (such as hydrogen bonds, halogen bonds, and π - π stacking) of the crystalline solids. Moreover, it also brings about crystal engineering for better structural design and achievement of desired functionalities.

Invited Speakers



Dr. Kanokwan Kongpatpanich



Dr. Min Fey Chek

SYMPOSIUM E



ENVIRONMENTAL (ECOLOGICAL) IMPACT OF MICROPLASTICS AND TECHNOLOGICAL POTENTIAL FOR MICROPLASTIC WASTE

Chair: Assoc. Prof. Dr. Taeng On Prommi

Co-Chair: Asst. Prof. Dr. Akekawat Viteepradit

Co-Chair: Asst. Prof. Dr. Orawan Chunhachart

Co-Chair: Asst. Prof. Dr. Kamontip Kuttiyawong

An increasingly serious and widespread problem of microplastics in ecosystem and impacts on food chains, the particular challenge and perspective of the smart technology can play a vital role in microplastic pollution crisis. The symposium aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences and research results on all aspects of microplastic and its impacts and potential technology to eliminate microplastic waste and reduce microplastic pollution. The symposium focused on four themes:

- Monitoring and detection of microplastics in the environment
- Impacts of microplastic pollution on animal and human health
- Plastic waste management, recovery and conversion
- Smart technology for microplastic waste management
- Biotechnological approach for biodegradable of plastic

SYMPOSIUM F



FOREST BIODIVERSITY, CLIMATE CHANGE, AND SUSTAINABLE USE FOR SAVING LIFE ON EARTH

Chair: Asst. Prof. Dr. Oraphan Sungkajanttranon
Co-Chair: Asst. Prof. Dr. Sravut Klorvuttimontara
Co-Chair: Dr. Patchanee Vichitbandha

Human needs everything for living in daily life from nature. Biodiversity and ecosystem service are important and must be used carefully for sustaining life on earth. Human activities and climate change are the major causes effected to living things and livelihoods of people. These also play an important role in transmissible diseases between animals and humans. Forest Ecology and biodiversity are important and play a major role in the fight against climate change. People need forest products and services, but the forests should not be deforested or changing by desertification. We should talk together about vegetation, wildlife, insect, fungi, microorganisms, software and predict models, medicines, and products from the forest research. Let’s lighten and forced the ideas for helping and saving life on earth together and to the next generation.

Invited Speakers



Dr. Jantrararuk Tovanone



Mr. Alistair Monument



Mr. Oh Cheow Sheng

SYMPOSIUM G



HOW CHEMISTRY CAN RESOLVE FOR COVID-19 PANDEMIC

Chair: Prof. Dr. Orawon Chailapakul

Co-Chair: Dr. Sudkate Chaiyo

Recently, Coronavirus disease (COVID-19) is emerging as a global pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Globally, as of now, there have been about a billion confirmed cases, including 2 million deaths, reported to WHO. Due to the pandemic's current situation, knowledge and infection prevention have been continuously observed and developed. Chemistry also provides their essential contribution to the global fight against this outbreak. An understanding of viral structure to the isolation of vaccines as well as the development of materials and methods for diagnostic is played as a crucial role for chemistry area to tackle the covid-19 situation. This session aims to highlight cutting-edge chemical science research, including characterizing virus structure and mechanism of infection, novel compounds and their mechanism to inhibit virus structure for the treatment of COVID-19, advanced biosensing technologies for the rapid diagnosis of COVID-19, and other related. This will be achieved by taking the exploitation of a multidisciplinary approach. We hope this session will provide an opportunity for bringing together the chemists to help tackle the pandemic outbreak so as to open up new possibilities with practical use.

Invited Speakers



Prof. Dr. Charles S. Henry



Prof. Dr. Tanapat Palaga



Dr. Kittikhun Wangkanont



Dr. Sudkate Chaiyo

SYMPOSIUM H



METAL-ORGANIC COMPOSITES IN MATERIAL SCIENCE

Chair: Prof. Dr. Takumi Konno

Co-Chair: Assoc. Prof. Dr. Preeyanuch Sangtrirutnugul

Co-Chair: Dr. Thanthapatra Bunchuay

The design and creation of metal-organic composite materials have been an important research subject in material science due to the synergistic functionalities arising from organic and inorganic components. Most of this class of materials involve the direct contacts between metallic elements and organic parts in a microscopic level, which are well described as coordination bonds. Therefore, the profound understanding of the structures and functionalities of metal-organic composite materials based mainly on coordination chemistry is necessary for future development of material science. This session will focus on the design, structures, and functionalities of metal-organic composite materials that involve coordination compounds. We welcome papers discussing the molecular and solid structures containing metal centers, which lead to attractive solid-state functionalities, such as adsorption of molecules, dielectric properties, conducting and transporting phenomenon, catalytic activities, and photophysical properties.

Invited Speakers



Prof. Dr. Yi-Chou Tsai



Assoc. Prof. Dr. Phimphaka Harding



Dr. Yun Zong

SYMPOSIUM I



PREMIUM AGRICULTURE: A PATHWAY TOWARD SUSTAINABLE AND INCLUSIVE BCG ECONOMY MODEL

Chair: Dr. Worajit Setthapun

Co-Chair: Assoc. Prof. Dr. Poonpat Poonnoy

Co-Chair: Dr. Soracha Dechaumphai

Co-Chair: Asst. Prof. Dr. Pongsathorn Dechatiwongse

Bio-Circular-Green (BCG) Economy Model was conceptualized and promoted by the Thai government as a strategy to drive economic and social development. The model not only capitalizes strengths in robust agricultural activities in Thailand, but it also embraces different social and economic contexts in other countries that also aspire for an inclusive and sustainable growth. Bioeconomy, or bio-based economy, refers to the use and production of renewable biological resources especially in food, medical, and bioenergy sectors. Circular economy is based on the principles of reusing and recycling resources, extending product lifespan, and relocating waste efficiently. Green economy aims at an ultimate goal of sustainable development in a low carbon, resource efficient, and environmental-friendly society. Practically, the model conforms with the UN Sustainable Development Goals (SDGs) with an alignment in at least four goals: Goal 7 clean and affordable energy, Goal 11 sustainable cities and communities, Goal 12 responsible consumption and production, and Goal 13 climate action. Sustainability and inclusivity are essential factors of the BCG Economy Model to engage key stakeholders which will eventually create growth of local and global business opportunities, rate of employment, and countries' GDP. In particular, this session focuses on the way to develop the premium agriculture scheme as a part of the BCG Economy Model to upgrade the practices and product quality in the agricultural sector. Agricultural sector has been a basis for the economic and social development in Thailand so far, and it can serve as a good starting point of the discussion which can be further extended to other areas within BCG Economy, including food; medical and wellness; bioenergy, biomaterial and biochemical; and tourism and creative economy. Findings based on scientific research and technological development presented in this session will encourage an international collective effort of promoting the sustainable and inclusive growth through the concrete idea of the BCG Economy Model.

Invited Speakers



Asst. Prof. Dr. Suvaluk Asavasanti



Dr. Chai Lay Ching



Dr. Korsak Towantakavanit



Mr. Alan Dronkers

SYMPOSIUM J



SUSTAINABLE HYDROGEN PRODUCTION FOR GREENER ENVIRONMENT AND CHEMICAL PRODUCTS

Chair: Prof. Dr. Suttichai Assabumrungrat

Co-Chair: Assoc. Prof. Dr. Pattaraporn Kim- Lohsoontorn

Co-Chair: Assoc. Prof. Dr. Suwimol Wongsakulphasatch

The global hydrogen demand is found to continuously increase each year with the market value at hundreds of billions of dollars per year. Hydrogen can be used safely for a wide range of applications, i.e., in food, metal, glass and chemical industries. In addition, according to energy crisis and environmental concern, hydrogen is considered as a straightforward solution to issues related pollution and global warming. Hydrogen has been driven to become one of alternative energy carriers as well as used in carbon dioxide conversion to higher-valued products. To meet the requirement of global demand, technologies to produce hydrogen are therefore essential and is considered as significance. This conference session on “Sustainable Hydrogen Production for Greener Environment and Chemical Products” aims to gather outstanding researches and the comprehensive coverage of all aspects related to the hydrogen production technology for greener environment and chemical products. This session will bring together high-quality research on the different aspects of hydrogen production technology including current status and remaining challenges. Topics include, but not are limited to:

- Hydrogen production technologies, including chemical, electrochemical and biological processes
- Theoretical and experimental investigation for hydrogen production process design
- Integrated process development relating to the production of hydrogen and its utilization
- Hydrogen in CO₂ conversion to higher-valued products

Keynote and Invited Speakers



Prof. Dr. Joongmyeon Bae



Prof. Dr. Sibudjing Kawi



Mr. Piyabut Charuphen



Dr. Sakhon Ratchahad



Dr. Jon Powell

SYMPOSIUM K



SUSTAINABLE USE OF MARINE BIODIVERSITY

Chair: Assoc. Prof. Dr. Thamasak Yeemin

Co-Chair: Asst. Prof. Dr. Suchai Worachananant

Co-Chair: Asst. Prof. Dr. Makamas Sutthacheep

Marine biodiversity is comprised of several levels of organizations, from the genetic variability, to the species, populations, communities, and ecosystems. Over three billion people around the world depend on marine biodiversity for food and income, particularly fishing, mariculture and tourism. However, coastal and marine ecosystems have been greatly disturbed by over-exploitation of natural resources, habitat loss, pollution and climate change. In order to restore and conserve marine ecosystems, the sustainable use of marine biodiversity, from the shore to the deep sea, including coastal and offshore environments, is one of the key solutions for sustainable development. In this symposium, scientists and managers working in Thailand and other countries are invited to exchange their experiences in research, management, monitor and conservation aspects, focusing on sustainable use of marine resources. Some case studies from ecosystem services of sandy beach, mangrove, seagrass bed and coral reef ecosystems will be highlighted. The symposium will also cover the topics in ecotourism, capacity enhancement for monitoring and research, community-based management and marine protected areas.

Invited Speakers



Prof. Dr. Janny Dirk Kusen



Dr. Maria Vanessa Baria-Rodriguez



Dr. Abe Woo Sau Pinn

SYMPOSIUM L



**THE SUSTAINABLE TOURISM REVIEW IN A POST-PANDEMIC 2022:
REBUILDING TOURISM TO SUSTAINABILITY**

Chair: Dr. Chainarong Srirak
Co-Chair: Dr. Gina B. Alcoriza
Co-Chair: Dr. Piyapong Ketpiyarat
Co-Chair: Ms. Patthaphon Sukjai

Covid-19 has disrupted tourism, hospitality, and leisure worldwide. It has also provided some space for academics, industry, and policy makers to think again about what tourism, hospitality and leisure are for, who they are for, and how they might be reconsidered as we transition into a post-pandemic future. The purpose of this symposium series is therefore to ask some big questions about what tourism, hospitality and leisure stand for in the post-pandemic world. Their purpose has long been understood as going far beyond simply offering satisfying experiences for their customers to generate incomes for the organizations involved. The sectors are widely understood to be integrally involved in contributing to sustainable development in the long term but what is their role in securing reliance in the short-term? How might all three sectors be involved in attempting to enrich communities and achieve local economic development? What is their role in providing health and wellbeing benefits, and how can this role be better harnessed? How are three sectors to work more closely together in a post-pandemic world? These and other major questions for the tourism, hospitality and leisure sectors in the post-pandemic age will be considered. Furthermore, the discussion panel also highlights the role of local communities and its leadership role for enhancement of sustainable tourism, thus how sustainable tourism could affect on wellbeing of local community under the shadow of SDG 1, 3 and 4. Similarly, the panel also discusses the role of sustainable logistics in tourism sector, which is beneficial for environmental sustainability.

Invited Speakers



Prof. Dr. Noel Scott



Assoc. Prof. Dr. Ann Suwaree Ashton



Dr. Robert C. Sinclair



Dr. Gina B. Alcoriza

SYMPOSIUM M



TUBERCULOSIS: OLD DISEASE, NEW APPROACHES

Chair: Assoc. Prof. Dr. Roderick Bates

Co-Chair: Assoc. Prof. Dr. Pornpan Pungpo

Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, is a serious disease that claims more than one million lives each year. In addition, one third of the world's population is likely to be infected with the latent form of TB. The continuing challenge of TB is made greater for two reasons. The first is the appearance of drug-resistant strains. The second is that TB is likely to increase susceptibility to covid-19, and possibly vice-versa. Despite the seriousness of TB, most of the drugs currently used were developed decades ago and typically suffer from the disadvantage of requiring a very long treatment time to truly eliminate the bacterium. This symposium on "Tuberculosis: old disease, new approaches" will bring together three researchers who are using cutting edge tools such as structural biology and computational design to create new drugs that will be effective against this remarkably challenging bacterium. The session will also include presentations by students working on diverse projects in this critical area.

Invited Speakers



Prof. Dr. Aasheesh Srivastava



Prof. Dr. Gerhard Grüber



Assoc. Prof. Dr. Pornpan Pungpo

SYMPOSIUM N



SOLUTIONS FOR TOMORROW: DOW SUSTAINABILITY TO TACKLE WORLD CHANGE

Chair: Ms. Kanchana Un-Arom (Site Analytical & Quality Leader)

Co-Chair: Mr. Nattapong Jirawattanaworakul (Site Public Affairs Leader)

Co-Chair: Dr. Soparat Yudthavorasit (Senior Analytical Specialist)

Sponsored by 

Dow is the world’s leading materials science company with an ambition to become the most innovative, customer centric, inclusive and sustainable. Dow’s portfolio of plastics, industrial intermediates, coatings and silicones businesses delivers a broad range of differentiated science-based products and solutions for its customers in high-growth market segments, such as packaging, infrastructure, mobility and consumer care. Dow was founded in 1897 by Herbert Henry Dow and has started its business in Thailand since 1970, then expanded through a joint venture with SCG in 1987. Dow has started its sustainability journey in 1995 and growing our commitment overtime. Currently, Dow is embarking on the third stage of sustainability journey by rethinking business model and collaborating to grow impact. Dow sustainability targets in this stage are to ‘Protect the climate, Stop the waste and Close the loop’ focusing on carbon neutrality, circular economy/recycling, climate protection and safer material use. People and new science-and technology-based solutions become a key factor to tackle the sustainability challenges. In Thailand, Dow has various initiatives to tackle world challenges for sustainability, such as Public-Private Partnership for Plastics and Waste Management (PPP Plastics), Recycled Plastic Road, Dow for Sustainable Industry, International Coastal Clean-up and Dow Chemistry Classroom, ect. In this session, Dow aims to share and demonstrate actions to solve the sustainability world challenges. Innovation or research on topics related to Dow’s focuses from academic and industrial sector are very welcome.

Invited Speakers



Dr. Jens Schmidt



Mr. Loganathan Ravisanker



Ms. Chompoonuch Junbua



Mr. Rangsun Chaosuwannakij



Dr. Thawatchai Tungket



Mr. Anurak Rassameeamornwiwat

SYMPOSIUM O



SYMPOSIUM ON SCIENCE EDUCATION FOR SUSTAINABILITY - LITERACY FOR ALL

Chair: Dr. Ganigar Chen

Co-Chair: Asst. Prof. Dr. Supakorn Boonyuen

Co-Chair: Asst. Prof. Dr. Watcharee Ketpichainarong

Co-Chair: Asst. Prof. Dr. Chanyah Dahsah

Education is a crucial element for preparing citizen to approach toward the Sustainable Development Goals. Particularly, scientific literacy is the cornerstone of SDG awareness and action. This symposium aims to be an effective platform for research communication among educators and researchers whose working on the interaction between science education and sustainable development by sharing best practice and carrying dialogue. The special attention will be paid to SDG3: Good Health and well-being, SDG6: Clean Water and Sanitation, SDG10 Sustainable cities and community, SDG12: Responsible Consumption and Production and SDG13: Climate Action but other topics linked science education to other SDGs also welcomed. The symposium is open for all levels (from kinder garden to vocational) and any styles (whether formal or informal or anything in between) of education.

Invited Speakers



Prof. Dr. Yoshito Ando



Ms. Ruetai Chongsrid

SYMPOSIUM P



SUSTAINABLE FOOD SYSTEMS FOR GOOD HEALTH AND WELL-BEING
Chair: Assoc. Prof. Dr. Chaleeda Borompichaichartkul
Co-Chair: Assoc. Prof. Dr. Cheunjit Prakitchaiwattana
Co-Chair: Assoc. Prof. Dr. Kitipong Assatarakul

The occurrence of coronavirus disease (COVID-19) pandemic leads to changes of lifestyle and working system, moreover it causes a high impact on a falling of world economy. Health and well-being problems are increased in attention markedly due to impact of COVID-19. Along with the occurrence of pandemic, according to WHO, about 690 million people were undernourished at the end of 2019 and absent rapid interventions, the COVID-19 pandemic could force an additional 130 million people into chronic hunger. Poor nutrition causes 45 per cent of deaths in children under five – 3.1 million children each year. Limitation of transportation during pandemic leads to food losses. Each year, an estimated one third of all food produced ends up rotting in the bins of consumers and retailers, or spoiling due to poor transportation and harvesting practices. Sustainable food systems support adequate nutrition, which helps people of all ages to achieve good health. Rebuilding our food systems to make them more sustainable, productive and resilient is essential--for solving long-term hunger challenges and managing acute shocks, like disease outbreaks and climate extremes. Sustainable food systems reduce waste and spoilage, and empower consumers to make smart choices in their food shopping and other innovations, sustainable food systems can deliver widespread benefits to people and plane. This session of “Sustainable Food Systems for Good Health and Well-being” opens for these following areas: Food cultivation and postharvest, Food processing and engineering, Food packaging and quality control, Product development of healthy and functional foods and ingredients, Zero waste in food systems and Food Logistic and supply chain.

Invited Speakers



Prof. Dr. Paola Pittia



Prof. Dr. Richard Archer



Asst. Prof. Dr. Akkharawit Kanchana-opas



Dr. Lalana Thiranusornkit

SYMPOSIUM Q



**ADVANCE IN SCIENCE AND TECHNOLOGY TO ACCELERATE
DECARBONIZATION FOR INDUSTRIES**

Chair: Dr. Sumate Chareonchaidet

Co-Chair: Dr. Jirut Wattoom

Sponsored by  SCG

New high records of temperature have been reported in news around the world recently. It is the real and direct impact of the global warming issue. World leaders have agreed to limit global warming to 2°C above pre-industrial temperature – the goal of the Paris Climate Agreement. Carbon emission is one of the key contributions to this problem and there are many actions that need to do in order to reach the goal. Adopting new technologies is also an option to accelerate the decarbonization pathway. SCG has already committed to becoming a net-zero carbon company by 2050. We are not only focused on implement available technologies but put tremendous effort into the science community to develop a more effective decarbonization innovation. We aim to foster the cooperation between academics and industries to develop new technology to bring Thailand to be net-zero carbon country in the near future. This symposium on “Advance in Science and Technology to Accelerate Decarbonization for Industries” aims to gather outstanding researches and implementation in the industries coverage of all aspects related to renewable energy, energy storage, carbon capture, storage, and utilization. This symposium will bring together high-quality research on the different aspects of decarbonization technology including current status and remaining challenges. Topics include, but not are limited to: Renewable energy, energy transition, energy storage and electrification, Carbon capture and utilization to new materials and chemicals and Integrated process development relating to the reducing carbon emission in heavy industries.

Invited Speakers



Prof. Dr. Nannan Sun



Prof. Dr. Edman Tsang



Representative from CAS ICCB

SYMPOSIUM R



GREEN AND SUSTAINABLE CHEMISTRY: OPPORTUNITIES FOR ACADEMIA AND INDUSTRY

Chair: Prof. Dr. Joseph S.M. Samec

Co-Chair: Asst. Prof. Dr. Duangamol Tungasmita

Even if climate change may not stop us from using fossil fuels, the supply will within 50 years according to BP's latest report (<https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2019-full-report.pdf>). Thus, we will need to find a new feedstock for our needs for producing chemicals for: food-, material-, transportation-, pharmaceutical production. The non-eatable part of biomass, lignocellulose is such a source that grows widely in both agriculture (stems, husks, etc) and in forestry. In addition to this, chemists will need to build up fundamental understanding and develop new methodologies and processes. This symposium will discuss how academia and industry can collaborate to smoothen this transition and welcomes papers regarding topics on Green and Sustainable Chemistry: -from fundamental studies to industrial implementations.

Invited Speakers



Prof. Dr. Adam Slabon

SYMPOSIUM S



RECENT ADVANCES IN SYNTHETIC BIOLOGY AND GENOME EDITING (WEBINAR)

Chair: Dr. Verawat Champreeda

Synthetic biology plays a crucial role in bio-industry where cell factories convert a range of raw materials to a variety of products, including biofuels, biochemicals, biopolymers, and specialty functional compounds. Capability of living organisms on biotechnological application can be enhanced by using synthetic biology to improve their ability to use a wider range of substrates from 1st Gen (sugar & starch), 2nd Gen (cellulosics) and CO₂, to synthesize new products, or make it tolerate stressed operational conditions as well as to create new non-natural functionality. Genetic modification has been facilitated by the discovery of the CRISPR/Cas system, which leads to establishment of an efficient molecular tool for editing genomes of living organisms for desirable traits of interests. With the rapid development in omics technology and computational data analysis, synthetic biology is moving at a higher speed towards the design of cell factories with higher performances for target applications. These integrations of frontier technologies and knowledge advancement in recent years provide a platform for accelerating the scientist's capability on creating new organisms with desirable properties for the new era of biotechnology. In this session, the seminar will cover frontier researches in the field of synthetic biology in various model organisms by leading scientists. The topics cover the study on genetic code expansion for reprogramming translational machineries in mammalian cells, design and engineering of yeast cell factories for production of bio-based chemicals, and bioengineering of the bacterial membrane vesicles for biomedical applications. The webinar will give examples of inspired researches in synthetic biology for researchers working in this field.

Invited Speakers



Dr. Chayasith Uttamapinant



Dr. Wanatchaporn Arunmanee



Dr. Weerawat Runguphan



ABSTRACTS FOR INVITED SPEAKERS



INVITED SPEAKER: A_INV001

INTERNET OF THINGS FROM FARM TO FORK

Teerakiat Kerdcharoen*

Department of Physics, Faculty of Science, Mahidol University

*e-mail: teerakiat.ker@mahidol.ac.th

Abstract:

TBA



INVITED SPEAKER: A_INV002

NANOWIRE MICROFLUIDICS FOR EARLY DISEASE DIAGNOSIS

Takao Yasui^{1-3,*}

¹Department of Biomolecular Engineering, Graduate School of Engineering, Nagoya University

²Institute of Nano-Life-Systems, Institutes of Innovation for Future Society, Nagoya University

³Japan Science and Technology Agency (JST), PRESTO

*e-mail: yasui@chembio.nagoya-u.ac.jp

Abstract:

Analyzing microRNAs (miRNAs) within urine extracellular vesicles is important for realizing miRNA-based, simple and non-invasive early disease diagnoses and timely medical checkups. The urinary miRNA species differ in healthy and cancer groups of people, and they represent a warning sign for various cancer scenarios. However, the inherent difficulty in collecting dilute EVs from urine has hindered the development of such diagnoses and medical checkups. We propose a device composed of nanowire-integrated microfluidic device, which enables highly efficient EV collections and *in-situ* extraction of huge numbers of miRNAs to exceed the extraction numbers of the conventional ultracentrifugation method¹⁻³. The mechanical stability of nanowires anchored into substrates during buffer flow and the electrostatic collection of EVs onto the nanowires are the two key mechanisms ensuring the success of the present device. We utilize our method to discover the numbers of potentially cancer-related miRNAs in urine. These urinary miRNAs would also act as miRNA groups for classifying cancer-related regulations. We also successfully identify miRNA groups in urine through a combination of nanowire-based miRNA extraction and machine learning-based analysis; the groups allow detection and localization of cancer. The machine learning-based analysis identified miRNA groups from almost all human miRNAs. The groups consisting of ~50 miRNA species could classify cancer and non-cancer subjects with high accuracy, sensitivity, and specificity. We expect these miRNA groups in urine will open a new era for work towards urine-based liquid biopsy. And the present device concept will be a foundation for work towards the long-term goal of urine-based early diagnoses and medical checkups of diseases.

1. T. Yasui, T. Yanagida, S. Ito, Y. Konakade, D. Takeshita, T. Naganawa, K. Nagashima, T. Shimada, N. Kaji, Y. Nakamura, I. A. Thiodorus, Y. He, S. Rahong, M. Kanai, H. Yukawa, T. Ochiya, T. Kawai and Y. Baba, *Sci. Adv.*, 2017, **3**, e1701133.
2. T. Suwatthanarak, I. A. Thiodorus, M. Tanaka, T. Shimada, D. Takeshita, T. Yasui, Y. Baba and M. Okochi, *Lab Chip*, 2021, **21**, 597-607.
3. T. Yasui, P. Paisrisarn, T. Yanagida, Y. Konakade, Y. Nakamura, K. Nagashima, M. Musa, I. A. Thiodorus, H. Takahashi, T. Naganawa, T. Shimada, N. Kaji, T. Ochiya, T. Kawai and Y. Baba, *Biosens. Bioelectron.*, 2021, in press.

INVITED SPEAKER: A_INV003

DIRECTING CHEMICAL REACTION PATHWAY ON NANOSTRUCTURED METAL OXIDE SURFACE FOR MOLECULAR SENSING APPLICATION

Kazuki Nagashima,^{1,2*} Takuro Hosomi,^{1,2} Jiangyang Liu,¹ Guozhu Zhang,¹ Masaki Kanai,³ Tsunaki Takahashi,^{1,2} Takeshi Yanagida^{1,3}

¹ Department of Applied Chemistry, Graduate School of Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-8656, Japan

² Japan Science and Technology Agency (JST), PRESTO, 4-1-8 Honcho, Kawaguchi, Saitama, 332-0012, Japan

³ Institute for Materials Chemistry and Engineering, Kyushu University, 6-1 Kasuga-Koen, Kasuga, Fukuoka, 816-8580, Japan

*e-mail: kazu-n@g.ecc.u-tokyo.ac.jp

Abstract:

Nanostructured metal oxides are prevailed materials for catalysts and molecular sensors due to their thermal/chemical robustness, which allow us to apply them for long-term used applications. An important challenge in these research fields is to direct the surface chemical reaction for realizing the desired chemical processes, however it has been restricted due to difficulty to understand the complex nature of metal oxide nanostructured surface. To overcome such limitation, we developed a platform based on metal oxide nanowire array for investigating the surface molecular behaviors on metal oxide. We fabricated the metal oxide nanowires with well-defined crystal facets and large surface area by designing their self-assembling process and used them to amplify the signals in spectrometric and spectroscopic analyses by concentrating the surface-adsorbed molecules. Such nanowire based analytical platform successfully demonstrated the impact of cation state on surface molecular behaviors and offered a rational strategy to direct the surface chemical reaction pathway. By employing organic and inorganic surface modifications, we successfully designed the surface cation state of metal oxide nanowires and suppressed the detrimental dimerization reaction of volatile carbonyl compounds. The directed chemical reaction pathway led to the fast recovery and the low temperature operation in molecular sensing device even without assistance of noble metal catalyst.

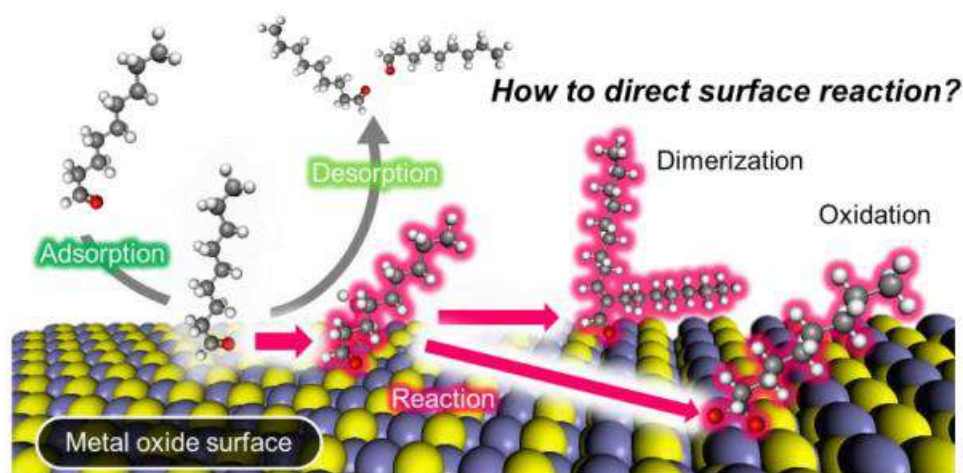


Figure.



INVITED SPEAKER: A_INV004

GLASS: FROM BASIC TO ADVANCED MATERIALS FOR INNOVATIVE LIFE

Jakrapong Kaewkhao^{1,*}

¹Center of Excellence in Glass Technology and Materials Science, Nakhon Pathom Rajabhat University, Nakhon Pathom, Thailand, 73000

*e-mail: jakrapong@webmail.npru.ac.th

Abstract:

Glass is an innovative material that has several of applications. Glass is an important component of many products in everyday life. Conventional and Innovative life is always be with glass material. In this talk, basic and advanced materials of glass will be explained. Several application for innovative life and impacted of human behavior be addressed. Moreover, advanced glass researches from Glass-Lab in Nakhon Pathom Rajabhat University are also demonstrated.



INVITED SPEAKER: A_INV005

INNOVATOR'S TOOLKIT

Supakij Suttiruengwong*

Department of Materials Science and Engineering, Faculty of Engineering and Industrial Technology,
Silpakorn University

*e-mail: Suttiruengwong_S@su.ac.th

Abstract:

TBA



INVITED SPEAKER: B_INV001

Multi-Objective Land-Water Allocation Model for Sustainable Agriculture with Predictive Stochastic Yield Response

Kannapha Amaruchkul*

Graduate School of Applied Statistics, National Institute of Development Administration (NIDA),
118 Serithai Rd., Bangkokpi, Bangkok 10240, Thailand
*e-mail: kamaruchkul@gmail.com

Abstract:

Consider an agricultural land-water resource allocation problem, in which yields are spatial dependent and stochastically correlated. To achieve sustainability, we formulate a multi-objective optimization problem, in which the decision maker determines the cultivation areas and the supplemental irrigation water levels at different locations, with social, economic and environmental goals in mind. For the social goal, we minimize the root mean squared difference of incomes among locations. For the economic goal, we minimize the production risk. We show that minimizing production risk is equivalent to maximizing the service level, when demand is normally distributed. For the environmental goal, we minimize the resource utilization. Assume that the yield vector at different locations follows a multivariate normal distribution. We formulate the multi-objective optimization problem using a weight global criterion method, and we provide a sufficient condition for convex quadratic programming. We demonstrate the applicability of our proposed framework in the case study of sugarcane production in Thailand. To capture yield response to water, we propose several models including linear and nonlinear regressions, and we obtain the closed-form expression for the linear and probit yield response models. The numerical experiment reveals that our solution significantly improves the social and economic goals, compared to the current policy. Finally, we illustrate how to apply our model to quantify the monetary value from reducing yield variability, which could be resulted from smart irrigation or precision agriculture.



INVITED SPEAKER: B_INV002

THE GEOMETRY OF N-DIMENSIONAL EINSTEIN GYROGROUP VIA KLEIN'S APPROACH

Teerapong Suksumran*

Department of Mathematics, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand

*e-mail: teerapong.suksumran@cmu.ac.th

Abstract:

Einstein addition of relativistically admissible velocities in special relativity leads to the notion of a gyrogroup in mathematics. Roughly speaking, “gyrogroup” is a name for a peculiar mathematical structure consisting of one non-empty set and one non-associative binary operation. For example, the n -dimensional Einstein gyrogroup consists of the open unit ball $B = \{\mathbf{v} \in \Upsilon^n : \|\mathbf{v}\| < 1\}$, together with Einstein addition \oplus_E given by

$$\mathbf{u} \oplus_E \mathbf{v} = 1/(1 + \langle \mathbf{u}, \mathbf{v} \rangle)(\mathbf{u} + 1/\gamma_{\mathbf{u}}\mathbf{v} + (\gamma_{\mathbf{u}}/1 + \gamma_{\mathbf{u}})\langle \mathbf{u}, \mathbf{v} \rangle \mathbf{u}),$$

where Υ^n is the space of n -tuples with real components, $\langle \mathbf{u}, \mathbf{v} \rangle$ is the usual Euclidean inner product, and $\gamma_{\mathbf{u}} = 1/(1 - \|\mathbf{u}\|^2)^{1/2}$. This gyrogroup arises as a model for studying hyperbolic geometry, which is non-Euclidean geometry, as shown in the work of Abraham A. Ungar. In this work, we study the geometry of n -dimensional Einstein gyrogroup, using Klein's approach. This approach indicates a strong connection between geometry and algebra. We then determine the isometry group of the n -dimensional Einstein gyrogroup in an explicit form.



INVITED SPEAKER: B_INV003

UNSUPERVISED ANOMALY DETECTION FOR SURVEILLANCE VIDEOS

Thittaporn Ganokratanaa*

King Mongkut's University of Technology Thonburi

*e-mail: thittaporn.gan@kmutt.ac.th

Abstract:

Anomaly detection is of great significance for intelligent surveillance videos. Current works typically struggle with object detection and localization problems due to crowded and complex scenes. Hence, we propose a Deep Spatiotemporal Translation Network (DSTN), novel unsupervised anomaly detection and localization method based on Generative Adversarial Network (GAN) and Edge Wrapping (EW). In training, we use only the frames of normal events in order to generate their corresponding dense optical flow as temporal features. During testing, since all the video sequences are input into the system, unknown events are considered as anomalous events due to the fact that the model knows only the normal patterns. To benefit from the information provided by both appearance and motion features, we introduce (i) a novel fusion of background removal and real optical flow frames with (ii) a concatenation of the original and background removal frames. We improve the performance of anomaly localization in the pixellevel evaluation by proposing (iii) the Edge Wrapping to reduce the noise and suppress non-related edges of abnormal objects. Our DSTN has been tested on publicly available anomaly datasets, including UCSD pedestrian, UMN, and CUHK Avenue. The results show that it outperforms other state-of-the-art algorithms with respect to the frame-level evaluation, the pixel-level evaluation, and the time complexity for abnormal object detection and localization tasks.

INVITED SPEAKER: C_INV001

COSMIC RAYS: A RANDOM WALK THROUGH THE SOLAR WIND

David Ruffolo^{1,*}

¹Department of Physics, Faculty of Science, Mahidol University
*e-mail: david.ruf@mahidol.ac.th

Abstract:

Cosmic rays are energetic particles or gamma rays from space, representing Earth’s radiation environment, including sporadic bursts of solar energetic particles from solar storms that relate to “space weather” hazards for human activity and instruments in space, air passengers, and power outages at Earth. Space is filled with a tenuous, magnetized plasma (ionized gas) and the motion of charged cosmic rays in space is a random walk as the particles scatter from magnetic irregularities in the plasma. Thus time variations in the cosmic ray flux and directional distribution provide interesting information about plasma processes of the Sun and solar wind. We summarize recent research in Thailand regarding 1) the nature of magnetic fluctuations in the solar wind, using data from the Parker Solar Probe (PSP), mankind’s first spacecraft to approach close to the Sun, 2) magnetic connectivity in space, also probed using PSP data, 3) particle acceleration by solar storms, as studied using ground-based neutron monitors (NMs) and soon to be studied using the Thai research satellite TSC-1, 4) particle drifts, as revealed by NM measurements of cosmic ray anisotropy, 5) particle diffusion, as revealed by NM measurements of cosmic ray anisotropy and flux variation with solar cycles, and 6) participation in the LHAASO collaboration to measure the highest-energy gamma rays and reveal “PeVatrons” that accelerate cosmic rays to PeV (10^{15} eV) energies in our Galaxy. Partially supported by the Program Management Unit for Human Resources & Institutional Development, Research and Innovation, NXPO [grant number B05F630115] and grant RTA6280002 from Thailand Science Research and Innovation.

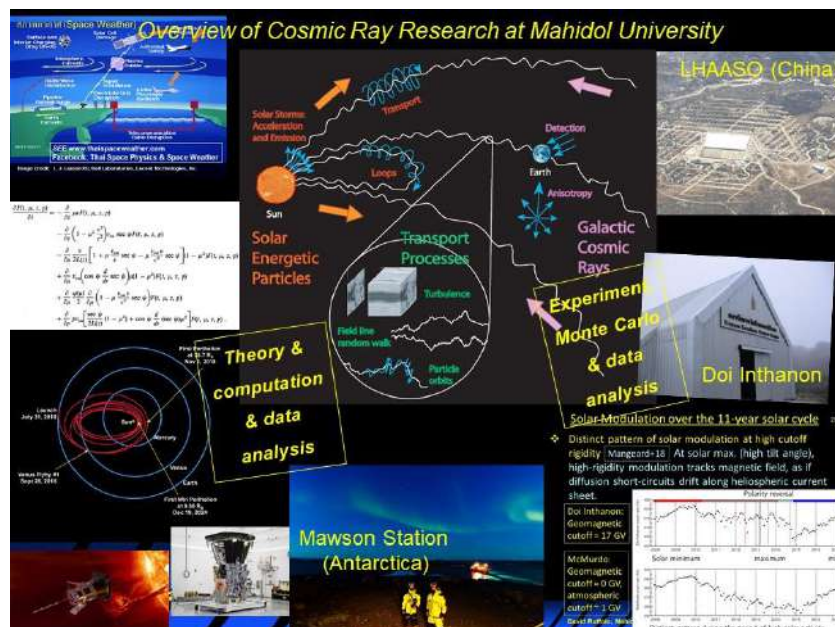


Figure 1. Overview of cosmic ray research at Mahidol University.



INVITED SPEAKER: C_INV002

RADIO ASTRONOMY FOR SUSTAINABLE DEVELOPMENT IN THAILAND AND FUTURE PROSPECTIVE

Kitiyanee Asanok*

(on behalf of RANGD project, NARIT, Thailand)

*e-mail: kitiyanee@narit.or.th

Abstract:

Radio astronomy (in 0.3 mm up to 30 m or 10 MHz up to 1 THz) is one of the essential study fields to understand the universe in the era of multi-wavelength and multi-messenger observations and to accelerate the understanding together with theoretical calculations. This astronomical study field with radio telescopes (i.e., generally parabolic structures) enables us to unveil a variety of the universe such as early, hot or cool, strange objects; because of its uniqueness and advantages: longer wavelengths than general astronomy at optical wavelengths and characterized emission. These emissions come from various types of objects in the universe, e.g., interstellar medium, cosmic microwave background, a region where new stars are born, pulsars, galaxies, active galactic nuclei (AGN), etc.

In spite of the importance of this radio astronomy, for a decade in Thailand elective courses have been given to undergrad and postgrad students just in a few universities. There are some researchers and students who are interested in this field but not as much flavor as other fields. To achieve sustainable development in Thailand, the National Astronomical Research Institute of Thailand (NARIT) (Public Organization) has initiated the project entitled Radio Astronomy Network and Geodesy for Development (RANGD) under the approval of the Ministry of Higher Education, Science, Research and Innovation (MHESI) since the year 2016. The main objectives of this project are to disseminate knowledge in radio astronomy and geodesy scientific research, development of microwave / digital technology, and human resources in many career paths, e.g., the researchers, scientists, engineers, lecturers, students, and other people who are interested in this field by learning integration with our Thai National Radio Telescope (TNRT). This telescope has a 40-m diameter size, which is the largest in South-East Asia, and is ongoing built at Huai Hong Khrai Royal Development Study Center, Doi Saket Chiang Mai, and will be completed within the year 2022. In this talk, therefore, I will introduce the importance of this project, why we need to do radio astronomy research in Thailand, which plans could achieve the development sustainability of Thailand? and research collaboration with other essential projects such as Thai Space Consortium (TSC) and other fields of astronomy.



INVITED SPEAKER: C_INV003

SMALL SATELLITES – SPACE TECHNOLOGIES FOR LIFE

Phongsatorn Saisutjarit*

International Institute of Space Technology for Economic Development (InSTED)

King Mongkut's University of Technology North Bangkok

1518 Pracharat 1 Rd. Wongsawang Bangsue Bangkok 10800 Thailand

*e-mail: phongsatorn.s@eng.kmutnb.ac.th

Abstract:

Space has been used as a tool for humankind for over 50 years. Many space technologies have an important contribution to the United Nations' Sustainable Development Goals (SDGs), such as utilizing of global navigation satellite system (GNSS), earth observation satellite (EOS), satellite communication, human space flight and microgravity research, space technology transfer, and inspiration via research/education. These space technologies can help countries pursue the SDGs such as access to clean water, food security, poverty alleviation, health care, environmental sustainability, and urban development. Small satellite missions can play a role as a part of a national strategies to respond to these needs in each area. The number of small satellite constellation missions is growing rapidly every year to provide more accurate observation data in near-real time or global communication and positioning. Besides, the potential societal benefits that space technologies would bring, exploring the new way to apply small satellites for optimizing and improving how we use resources, and capacity building through developing small satellite projects of the research group at Thai Space Consortium would be also introduced in this session.



INVITED SPEAKER: D_INV001

Zn AND Mn RECYCLING PROCESS FROM SPENT ALKALINE AND Zn-C BATTERIES TO BE RE-UTILIZED IN RECHARGEABLE Zn-ION BATTERY APPLICATION

Rojana Pornprasertsuk^{1,2,3,4*}, Theeranon Tankam^{1,2}, Jiaqian Qin^{3,5}, Nisit Tantavitchet^{2,3,6}, Jitti Kasemchainan^{2,3,6}, Prasit Pattananuwat^{1,2,3}, Soorathep Kheawhom^{3,7}, Patchanita Thamyongkit⁸, Rongrong Cheacharoen⁵, Anongnat Somwangthanaroj⁷, Nattaporn Tonanon⁷, Suthep Jongwannasiri⁹, Kamonpan Manowilaikun^{1,2}, Kunchaya Thungsuai¹, Natnicha Kiatsiriwatthana⁸, Kittima Lolupiman^{5,7}

¹ Department of Materials Science, Faculty of Science, Chulalongkorn University, Thailand

² Center of Excellence in Petrochemical and Materials Technology, Chulalongkorn University, Thailand

³ Research Unit of Advanced Materials for Energy Storage, Chulalongkorn University, Thailand

⁴ Department of Materials Science and Technology, Nagaoka University of Technology, Japan

⁵ Metallurgy and Materials Science Research Institute, Chulalongkorn University, Thailand

⁶ Department of Chemical Technology, Faculty of Science, Chulalongkorn University, Thailand

⁷ Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University, Thailand

⁸ Department of Chemistry, Faculty of Science, Chulalongkorn University, Thailand

⁹ Siamfrit Co., Ltd., Thailand

*e-mail: rojana.p@chula.ac.th

Abstract:

The Zn and Mn extraction processes from spent alkaline and Zn-C batteries by hydrometallurgical route and the synthesis of recycled Zn film and MnO₂ for Zn-ion battery application were developed in the project. The Zn and Mn extraction process involved the acid leaching of Zn and Mn ions from the spent alkaline and Zn-C battery electrodes in the lab-scale were initially investigated using various leaching conditions. The acid leaching using 0.5-2 M HCl and H₂SO₄ at ambient temperature providing Zn extraction efficiencies in a range of 72.3-95.3%. By introducing an inexpensive reducing agent namely sodium sulfide (Na₂S), sodium metabisulfite (Na₂S₂O₅) or hydrogen peroxide (H₂O₂) in 2M H₂SO₄, the Mn extraction efficiency for Mn was increased from 21.9% (no reducing agent) up to 48.4%, 82.8% and 98.9%, respectively. The upscale leaching study was subsequently performed in a 100-L pilot scale reactor demonstrated the Zn and Mn extraction efficiencies of 71% and 65%, respectively. Using the leaching/washing solutions from the upscale hydrometallurgical route, Zn-film deposition on the stainless steel/Cu substrates and the MnO₂ synthesis via hydrothermal, reflux and electrodeposition techniques were performed. Both recycled Zn and MnO₂ were subsequently used as the anode and cathode main components in the CR2032 rechargeable Zn-ion battery, which in turn providing specific capacity more than 150 mAh/g and working performance more than 1,000 cycles.

INVITED SPEAKER: D_INV002

HIGHLY ACTIVE METAL COMPLEXES SUPPORTED BY CONSTRAINED SCHIFF-BASE LIGANDS FOR CYCLOADDITION OF CO₂ TO EPOXIDES

Jiraya Kiriratnikom, Nattiya Laiwattanapaisarn, Khamphee Phomphrai*

Department of Materials Science and Engineering, School of Molecular Science and Engineering, Vidyasirimedhi Institute of Science and Technology (VISTEC), Wang Chan, Rayong 21210, Thailand

*e-mail: khamphee.p@vistec.ac.th

Abstract:

Carbon dioxide (CO₂) is an attractive C1 feedstock for the chemical synthesis because of its availability, abundance, inexpensive, nontoxicity, and renewability. Nowadays, CO₂ has been converted to various valuable chemicals including methanol, urea, salicylic acids, and organic carbonates. Among these industrially important compounds, the cycloaddition reactions of CO₂ to epoxides affording cyclic carbonates are a commercially important reaction already exploited as polar aprotic solvents for catalytic reactions, electrolytes for lithium-ion batteries used in electric vehicles and mobile devices, and precursors for valuable polymers and chemicals. Motivated by these applications, we have set out to design a new highly active catalyst based on the famous bis(salicylidene)ethylenediamine (salen ligand) for the production of cyclic carbonates from CO₂ and epoxides. Although the development of salen ligands may seem matured, we found that the ligand can actually be further developed to add more constraint around the aromatic backbone giving a new constrained Schiff-base ligand (inden). In this work, the inden Cr and Al complexes were developed and found to be highly active for the CO₂/epoxide cycloaddition reaction giving 100% cyclic carbonates with very high turn-over frequency (TOF > 10,000 h⁻¹). Catalyst development and cycloaddition reactions will be discussed.

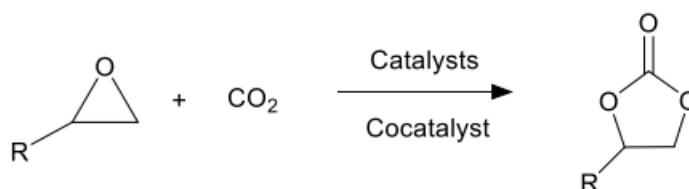


Figure. Cycloaddition of CO₂ to epoxides.



INVITED SPEAKER: D_INV003

SUSTAINABLE DEGRADATION OF ORGANIC POLLUTANTS IN WASTEWATER BY PHOTOCATALYTIC PROCESS

Teeradech senasu, Tammanoon chankhanittha, Suwat Nanan*

Materials Chemistry Research center, Department of chemistry, Faculty of Science, Khon Kaen University,
Khon Kaen 40002 Thailand

*e-mail: suwatna@kku.ac.th

Abstract:

The incomplete degradation of the organic pollutants by various conventional treatments has been elucidated. In some cases, formation of the secondary pollutants was also found. Alternatively, photocatalytic treatment has been used as a clean and effective route for removal of the organic pollutants in wastewater. It is well accepted that one of the most important challenging topics in environmental protection is to develop novel photocatalysts with high sunlight harvesting capacity and high charge separation efficiency. In this talk, the heterojunctions based on two photocatalysts will be discussed. Interestingly, in the case of CdS/BiOBr, the decoration of the hexagonal CdS on the surface of the tetragonal BiOBr for creation of the sunlight responsive photocatalyst will be demonstrated. The CdS/BiOBr-1:3 exhibited 100% removal of norfloxacin and ciprofloxacin antibiotics under visible light. In addition, complete degradation of the pollutants under natural solar light was also achieved. Construction of the heterojunction is a key strategy for improvement of the photocatalytic performance due to a decrease of the charge carrier recombination rate, an increase in visible light absorption range, and an enhancement of the surface area of the photocatalyst. The removal of the pollutants correlated well with the first-order reaction. Photogenerated hole played a crucial role in removal of the antibiotics. Confirmation of the stability of the prepared was also elucidated. The photoactivity of the photocatalyst remained the same after five times of use implying the excellent reusability. The present work demonstrates the promising potential of the heterojunction photocatalyst for detoxification of dyes and antibiotics in wastewater.



INVITED SPEAKER: D_INV004

SMALL-MOLECULE FLUOROPHORES FOR NIR-II BIOMEDICAL FLUORESCENCE IMAGING AND AND IMAGE-GUIDED THERAPY

Hui Zhou^{1,2}, Qianqian Li¹, Yishen Liu^{1,2}, Tian Tian², Xuechuan Hong^{*,1,2}, Yuling Xiao^{*,1}

¹ State Key Laboratory of Virology, Hubei Province Engineering and Technology Research Center for Fluorinated Pharmaceuticals, Wuhan University School of Pharmaceutical Sciences, Wuhan 430071, China

² College of Science, Research Center for Ecology, Laboratory of Extreme Environmental Biological Resources and Adaptive Evolution, Tibet University, Lhasa, 850000, China

*e-mail: xiaoyl@whu.edu.cn, xhy78@whu.edu.cn

Abstract:

NIR-II fluorophores have shown great promise for biomedical applications with superior in vivo optical properties. Very recently, there has been an upsurge of interdisciplinary study focusing on developing versatile types of inorganic/organic fluorophores that can be used for non-invasive NIR-II imaging with low tissue autofluorescence and deeper tissue penetration. In this paper, we will provide an overview of the reports published to date on the design, properties, and molecular imaging of organic NIR-II fluorophores. Then, we will present the novel imaging modalities and versatile biomedical applicants brought by these superior fluorescent properties. Finally, we will report development of D-A type thiopyrylium-based NIR-II fluorophores with frequency upconversion luminescence (FUCL). H4-PEG-PT or H4-PEG-Glu can not only quickly and effectively image mitochondria in live or fixed osteosarcoma cells with subcellular resolution, but also efficiently achieving mitochondria-targeted cancer therapy.

Keywords:

Image-guided therapy, NIR-II imaging, small-molecule fluorophores, mitochondria-targeted

Reference

1. A. L. Antaris, H. Chen, K. Cheng, Y. Sun, G. Hong, C. Qu, S. Diao, Z. Deng, X. Hu, B. Zhang, X. Zhang, O. K. Yaghi, Z. R. Alamparambil, X. Hong, Z. Cheng, H. Dai. *Nat. Mater.* **2016**, *15*, 235–242.
2. H. Zhou, X. Zeng, A. Li, W. Zhou, L. Tang, W. Hu, Q. Fan, X. Meng, H. Deng, L. Duan, Y. Li, Z. Deng, X. Hong, Y. Xiao. *Nat. Commun.* **2020**, *11*, 6183.
3. Y. Li, Y. Liu, Q. Li, X. Zeng, T. Tian, W. Zhou, Y. Cui, X. Wang, X. Cheng, Q. Ding, X. Wang, J. Wu, H. Deng, Y. Li, X. Meng, Z. Deng, X. Hong, Y. Xiao. *Chem. Sci.* **2020**, *11*, 2621–2626.
4. J. Lin, X. Zeng, Y. Xiao, L. Tang, J. Nong, Y. Liu, H. Zhou, B. Ding, F. Xu, H. Tong, Z. Deng, X. Hong. *Chem. Sci.* **2019**, *10*, 1219–1126.
5. B. Ding, Y. Xiao, H. Zhou, X. Zhang, C. Qu, F. Xu, Z. Deng, Z. Cheng, X. Hong. *J. Med. Chem.* **2019**, *62*, 2049–2059.
6. Y. Sun, X. Zeng, Y. Xiao, C. Liu, H. Zhu, H. Zhou, Z. Chen, F. Xu, J. Wang, M. Zhu, J. Wu, Z. Deng, Z. Cheng, X. Hong. *Chem. Sci.* **2018**, *9*, 2092–2097.



INVITED SPEAKER: E1_INV001

NEW NORMAL, NEW MINDSET AND NEW SKILLSET: WHY AND HOW?

Nantana Gajaseni*

Vice President, Mae Fah Luang University
Chiangrai 57100, Thailand
*e-mail: nantana.gaj@mfu.ac.th

Abstract:

Since COVID-19 pandemic the universities all around the world have been immediately switched the traditional teaching and learning (T&L) as face-to-face approach to online/distance learning instead. All stakeholders are struggle in coping fast enough in this disruption in particular on which T&L strategies would be applied and how we could teach our students to ensure and meet the same learning outcomes as before. Undeniably, this disruption enforced everyone to adopt “Digital Technology” that is seemingly a good choice to substitute face-to-face T&L approach. It is also acceptable that this quick digital transformation will enhance learning experiences with digital literacy development. However, it eventually brings up many questions on quality of T&L in terms of digital-ready skills, inequality of access, adaptability in online T&L; students’ knowledge acquisition; practical skills in professional requirement; development of soft-skills, social-skills, and future-ready skills; etc. Therefore, it is essential for the university to consider a transformation in both appropriate facilities’ support and rule & regulation of study programme to be more flexible and more partnership involvement to be ready to this higher education disruption. Even in a post-COVID-19 landscape we still live in the current COVID-19 preventive measures with social distancing, lower density classrooms and new learning environment and style, but the societal expectation on quality of graduate is still the same. By well preparing ourselves, we really need to rethink, redesign, reposition our mindset, our T&L strategies and our role as educators in science. There is no way of return to traditional T&L but the “Blended Learning (Face-to-Face and Online)” will be encouraging active learning as the trend of higher education in a new normal.

INVITED SPEAKER: E1_INV002

CONVERSION OF A LARGE NON-MAJORS BIOLOGY COURSE TO ONLINE TEACHING – INSTRUCTIONAL RE-DESIGN AND ITS IMPACT ON STUDENT LEARNING

Sylvia Sze Joo Law,¹ Teck Keong Seow^{2*}

¹Department of Biological Sciences, National University of Singapore, Singapore

²College of Alice & Peter Tan, Centre for Development of Teaching & Learning, and Department of Biological Sciences, National University of Singapore, Singapore

*e-mail: teckseow@nus.edu.sg

Abstract:

The sudden changes to human life that were brought about by the COVID-19 pandemic had also affected the global educational landscape. Just like many higher education institutions around the world, the universities in Singapore were not spared by the drastic changes either. While many had to switch to online teaching within a very short time, the General Biology course had the benefit of 2 to 3 months of vacation to re-design the instructional approach for the shift to online teaching. The instructional re-design was based on the Community of Inquiry framework, in which the three key elements of social, cognitive, and teaching presence converge to realise a collaborative constructivist educational experience (Figure 1).

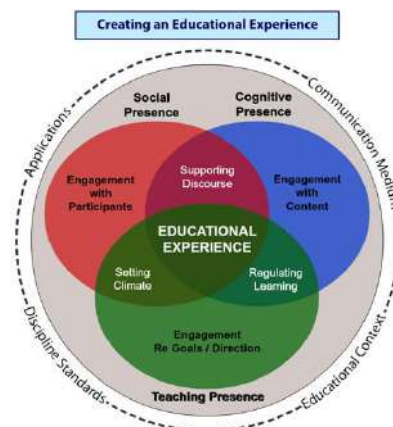


Figure 1. Community of Inquiry framework

The class of about 220 students was divided into 8 sections of not more than 30 students per section, with each section being assisted by two or three teaching assistants. Every e-class was conducted using the flipped classroom approach, with the students watching the instructional videos prior to the e-class and attempting formative diagnostic quizzes during the e-class. Each e-class of about 30 students was further subdivided into 10 separate breakout rooms of not more than 3 students per room to discuss the quiz questions. The teaching assistants would move from one breakout room to another to guide the peer discussions with appropriate prompt questions. Preliminary analysis of the end-of-semester summative assessment data demonstrated that despite the conversion to online teaching, performance of the class was comparable to the performance of previous cohorts when the classes were conducted face-to-face. This finding showed that the use of the Community of Inquiry framework for the instructional re-designing towards online teaching of the large non-majors General Biology course had no unfavourable impact on student learning.



INVITED SPEAKER: E1_INV003

ACTIVE LEARNING VIA GAMING AND SIMULATIONS IN BIOLOGY AND SUSTAINABLE DEVELOPMENT COURSES

Pongchai Dumrongrojwatthana^{1,*} Rattanapan Poomirat²

¹Department of Biology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand

²Former PhD student in Biological Science Program, Faculty of Science, Chulalongkorn University, Bangkok, Thailand

*e-mail: pongchai.d@chula.ac.th

Abstract:

Academic scholars, who are involved in primary, secondary, and higher educations, are responsible for advocating the concept of sustainable development, which integrates environmental, social, and economic aspects. Among various obligations, one of the most important is to teach, or coach, students on how to obtain the 21st century skills to meet job requirements, as well as serving as good citizens under recent 'volatile-uncertain-complex-ambiguous (VUCA)' world. These mandates can be accomplished via diverse activities, including teaching, research, student supports, and academic services. It is necessary to balance all activities while maintaining teaching standards and quality. Among several teaching techniques, gaming and simulation (G&S) has been proven as an effective tool to develop student's competency by applying their knowledge into action and practical learning. In this study, the applications of two G&S, namely 'ReHab' and 'Green Roof', serve as active learning tools in biology, sustainable development, and natural resource management courses. The ReHab game simulates a forest management situation. It can be applied in biology, ecology, and sustainable development courses, such as Principle of Natural Resource Management. The game involved of two groups of players with different goals of natural resource utilization, harvesters who generate incomes from plant biomass, and park rangers who protect the forest for rare migratory bird species. Two scenarios, 'no communication among players' and 'negotiation among players is allowed', are designed as game rules. Players have to apply their biological knowledge to sustain the system, which includes maintaining a steady source of income, conserve bird population, and reduce economic gap among players. The Green Roof game simulates an urban green space design. It is especially designed for shared learning regarding green roof ecosystem services in Ecology course. Two scenarios, 'construct green roof based on students' perception' and 'increase ecosystem services of the roof', are assigned for players. At the end of the game, a debriefing session is required to summarize the lessons learned. Implementing these two games in classes revealed that G&S can promote the concept of sustainable development goals and can assist students in obtaining diverse learning outcomes.



INVITED SPEAKER: E2_INV001

NOVEL SINGLE- AND DOUBLE-ANCHOR-TYPE ISOMALTOMEGALOSACCHARIDES: PRODUCTION, FUNCTION, APPLICATION, AND CONTRIBUTION TO SDGS

Weeranuch Lang, Takayoshi Tagami, Masayuki Okuyama, Atsuo Kimura*

Research Faculty of Agriculture, Hokkaido University, Sapporo 060-8589, Japan

*e-mail: kimura@abs.agr.hokudai.ac.jp

Abstract:

A scientific term of "megalosaccharide (MS)", proposed in 1959 by Thoma et al., was defined by sugar-size, of which the degree of polymerization (DP) ranged between oligosaccharide (DP = 2 to 9) and polysaccharide (DP > 100 or 200). However, this term became obsolete, since no efficient production method was available, while its valuable function was expected. We found that a mutant of dextran dextrinase (DDase) produced the α -1,6-glucosyl linked linear MS (isomaltomegalosaccharide; IMS), enabling us to analyze the function of MS for the first time. IMS exhibited the remarkable action to solubilize the compounds belonging to BCS-II (Biopharmaceutics Classification System Class II) like flavonoid, which will be mentioned in the last part of abstract.

DDase catalyzes a successive α -1,6-glucosyl transfer reaction to form dextran using maltooligosaccharide (MOS) as a substrate. Our initial research showed that wild-type DDase (or native DDase) synthesized less or no IMS from MOS, and only produced isomaltooligosaccharides and dextran. However, C-terminal deletion-mutant of DDase produced a large amount of IMS, indicating that structural element related to IMS-formation was present in C-terminal region. Our further study demonstrated that native DDase generated IMS under quite high substrate concentration, probably due to availability of enough MOS of acceptor substrate.

Considering the transfer reaction of DDase, the reducing terminal of IMS is composed of MOS moiety, the portion of which is called as "anchor" (formed by rigid α -1,4-glucosyl chain). This IMS has only one anchor, since DDase originally produces the single-anchor-type IMS (Sa-IMS). We subjected Sa-IMS to the reaction of CGTase (cyclodextrin glucosyl transferase) with cyclodextrin, and succeeded in synthesis of double-anchor-type IMS (Da-IMS). Therefore, Da-IMS has two anchors of MOS moieties existing at its non-reducing and reducing ends.

Sa-IMS enhanced the rat intestinal uptake of quercetin-3-O- β -glucoside (Q3G; a flavonoid showing favorable physiological actions, e.g. anti-diabetic effect) by increasing solubility of Q3G. Sa-IMS also solubilized the water-insoluble ethyl red (azo-benzene dye, an environmental pollutant with less degradation in nature), and assisted azoreductase to degrade ethyl red, indicating potential ability to overcome pollution. Furthermore, the ibuprofen (IBP; anti-inflammatory medical agent) was also solubilized by Sa-IMS. It was found that Da-IMS had much stronger ability to solubilize Q3G and IBP than Sa-IMS did, due to double-anchor effect. Interestingly, those three compounds are members of BCS-II, which display the low water-solubility and high membrane-permeability. Since most of medicinal drugs and many functional food materials as well as azo-dyes belong to BCS-II, both of Sa-IMS and Da-IMS have the valuable function to solubilize the BCS-II compounds, contributing to dose-reduction of important BCS-II materials and thereby cutting down their production energy. Further contribution to SDGs is the enzymic degradation of pollutant (azo-dyes), providing clean environment.

INVITED SPEAKER: E2_INV002

SESAMOLIN: A VERSATILE PRECURSOR FROM SESAME SEED FOR DERIVATIZING BIOACTIVE LIGNANS

Wisuttaya Worawalai, Titiruetai Doungwichitkul, Warin Rangubpit, Panyakorn Taweecat, Pornthep Sompornpisut, Preecha Phuwapraisirisan*

Department of Chemistry, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand

*e-mail: preecha.p@chula.ac.th

Abstract:

Sesamol is a major lignan found in sesame (*Sesamum indicum*) seeds. Unlike sesamin, one additional oxygen atom in sesamol structure makes it more reactive as the presence of acetal. However, the controversial results between *in vitro* and *in vivo* bioactivities have raised the question of true bioactive metabolites possibly released after two major lignans are digested by animal models. We have prepared over 50 lignans using sesamol as the starting material. Sesamol was first converted to the more reactive hemiacetal derivative named samin, which was further derivatized into a wide variety of lignans by nucleophilic substitution. Upon bioactivity evaluation e.g. glucosidase inhibition of the synthesized lignans, the products containing more phenolic hydroxy showed more potent bioactivity. The synthesis of sesamol derivatives and mechanism of inhibition investigated by kinetic study and molecular simulation will be presented.





INVITED SPEAKER: SYMP_A_INV001

MORPHOLOGY IN SUBMERGED CULTURE: THE MAIN CHALLENGE IN INDUSTRIAL BIOACTIVE COMPOUND PRODUCTION IN FUNGAL BIOFACTORIES

Hesham Ali El Enshasy^{1,2,*}

¹ Institute of Bioproduct Development (IBD), Universiti Teknologi Malaysia (UTM), Skudai, Johor Bahru, Malaysia

² City of Scientific Research and Technology Applications, New Burg Al Arab, Alexandria, Egypt.

*e-mail: henshasy@ibd.utm.my

Abstract:

Since centuries, fungal cells have been widely used for the production of many key bioactive molecules in chemical, food, feed, and pharmaceutical industries. This based on their high growth rate, the ability to utilize wide range of complex and economic substrates, and the capacity to produce metabolites in high concentration as extracellular product. In addition, they have been considered as one of the preferred biofactories for the production of different types of recombinant proteins based on their high excretion capacity which reduce the cost of downstream process. However, growth morphology of fungal cells in submerged culture is considered is one the main challenges for the cultivation of fungi in large scale. The same strain can show completely different morphological features (ranged from dispersed mycelium to complex pellet structure) with any minor change in cultivation conditions, cultivation conditions, or strain genetic manipulation. Therefore, for each cultivation process, a desired morphology needs to be controlled to produce the targeted product in high concentration. This presentation, will provide updated information about the recent development on factors affecting fungal morphology in submerged cultivation system using full scale approach from spore induction to large scale cultivation. Production of glucose oxidase and gluconic acid using a recombinant strain of *Aspergillus niger* (carrying multiple copy of *Gox* gene under regulation of *gpdA* promotor, with alpha amylase signal sequence) will be given as example to describe in details how growth morphology control and biopellet engineering design approaches can be used as tool in bioprocess development of bioproduct formation in industrial scale.



INVITED SPEAKER: SYMP_A_INV002

THE POTENTIAL OF GREEN HYDROGEN

Thana Sornchamni*

Innovation Institute, PTT Public Company Limited

*e-mail: thana.s@pttplc.com

Abstract:

Hydrogen is considered as one of the means to abate the climate change and most of countries, who aim to achieve net-zero carbon target, usually have hydrogen energy in their national energy agenda. The potential uses of hydrogen are growing in several applications, eg. mobility, heat and power, and chemicals. Currently, most of hydrogen is still produced either from coal or from natural gas and the production of this hydrogen still releases carbon dioxide to our atmosphere. Therefore, there is an effort to move to green hydroge, which is much more environment friendly.

Green hydrogen is defined as hydrogen produced from renewable energy, such as solar energy and wind energy, through the electrolysis technology. Green hydrogen has gained lots of attention due to two main factors. The first one is from the fact that the cost of renewable energy declined significantly during the last decade and the trend is still continue in the future. The second is that the cost of electrolysis technology is also declined within the last five year (2014-2019). In the presentation, comparison of different water electrolysis technologies, Alkaline Electrolysis (AEL), Proton Exchange Membrane (AEM) and Solid Oxide Electrolyzer (SOE) and the costs of producing green hydrogen from renewable energy will be discussed.



INVITED SPEAKER: SYMP_A_INV003

BIOPROCESS DEVELOPMENT ON ANIMAL VACCINE PRODUCTION FOR A SUSTAINED TECHNOLOGY ENHANCEMENT

Lalintip Hocharoen*

Bioprocess Research and Innovation Centre (BRIC), National Biopharmaceutical Facility (NBF), King Mongkut's University of Technology Thonburi (KMUTT)

*e-mail: lalintip.hoc@kmutt.ac.th

Abstract:

Thailand is confronting a number of challenges, such as inequality, an imbalanced economy, poverty in the country's regions, as well as a growing aging population. Overcoming these challenges aligns well with the UN Sustainable Development Goals (SDGs) and this work carried out by the South East Asia Research Collaboration (SEARC) team as a part of the Global Challenge Research Fund (GCRF) consortium contributes significantly towards achieving several SDGs, notably; SDG1: No poverty, SDG2: Zero hunger, SDG3: Global health and wellbeing, SDG9: Industry, innovation and infrastructure, and SDG17: Partnerships for the goals. This work has focused on the establishment of biopharmaceuticals and animal vaccine production capacity to reduce costs, increase accessibility, transform healthcare provision in Thailand and provide a sustained increase in the availability of high-tech drugs. Herein, we presented one of our collaborative technological platform developments for animal vaccines, particularly for swine vaccines, as Thailand's pig industry is relatively large while the pig vaccines are all imported, making the cost high and the farmer inaccessible. Porcine Circovirus type 2d (PCV2d) has become the predominant PCV genotype and considerably affected the swine industry, yet there is no commercially available PCV2d vaccine available. Currently, prevention is accomplished through the use of other genotype vaccines, which are relatively costly for veterinary applications. The novel PCV2d vaccine based on a subunit protein platform using *E. coli*, which is more reasonable, fast and provides a higher level of protein expression, was then designed. The production process was successfully scaled up from bench to large-scale (30L) production. This production platform technology has a high potential for successful industrial production on a local and global scale, enabling Thailand to become self-sufficient in terms of technology enhance.



INVITED SPEAKER: SYMP_B_INV001

SDGS AND THE QUANTUM INTERNET

Rodney Van Meter*

Keio University Shonan Fujisawa Campus, 5322 Endo, Fujisawa, Kanagawa 252-0882, Japan
*e-mail: rdv@sfc.keio.ac.jp

Abstract:

How will quantum computing help sustainable development goals? Quantum computers hold tremendous promise for revolutionizing computation. In this talk, I will present the seven key ideas for understanding quantum computing, focusing especially on how waves come together to solve interesting problems. In the latter part of the talk, I will present some of the problems that quantum computers are expected to help solve that will positively impact society's push to achieve the UN Sustainable Development Goals.



INVITED SPEAKER: SYMP_B_INV002

Quantum Techniques for Explainable Natural Language Processing

Chanatip Mangkang,¹Jirawat Tangpanitanon,^{2,3}Pradeep Bhadola,⁴Yuichiro Minato,⁵ Dimitris Angelakis,⁶
Thiparat Chotibut,^{1,*}

¹Chula Intelligent and Complex Systems, Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok, Thailand

²Quantum Technology Foundation (Thailand)

³Thailand Center of Excellence in Physics, Chiang Mai, Thailand

⁴The Institute for Fundamental Study, Naresuan University, Thailand

⁵Blueqat Inc., Japan

⁶Centre for Quantum Technologies, National University of Singapore, Singapore

*e-mail: thiparatc@gmail.com, thiparat.c@chula.ac.th

Abstract:

Deep Learning (DL) has empowered computers with superior performance in modern Natural Language Processing (NLP) tasks, such as sentiment analysis and machine translation. Even for texts with long-range correlations such as sequences of characters in Wikipedia, DL can effectively express the power-law decay in the mutual information between two distant characters [H. W. Lin, M. Tegmark, *Entropy*, 19, 299 (2017)]. Despite empirical successes, its intrinsic non-linearity complicates the analysis of algorithmic behaviours. Which network architectures and how many parameters are essential to reproduce long-range correlations are important yet theoretically challenging questions to tackle. Here, we attempt to provide systematic answers through the mapping between DL and its matrix product state (MPS) counterpart [Y. Levine et al. *Phys. Rev. Lett.*, 122, 065301 (2019)]. By recasting DL as MPS, we show that the number of parameters required to achieve high performance in sentiment analysis, and to reproduce power-law decay in the mutual information in Wikipedia texts, can be efficiently extracted from the entanglement entropy in the dual MPS. Our work utilises tools in many-body quantum physics to resolve explainability issues of NLP, and more generally of sequence modelling.



INVITED SPEAKER: SYMP_B_INV003

QUANTUM COMPUTERS FOR MATERIALS SIMULATIONS USING EMBEDDING METHODS

Ivan Rungger^{1,*}

¹National Physical Laboratory, TW11 0LW Teddington, United Kingdom

*e-mail: ivan.rungger@npl.co.uk

Abstract:

We present quantum algorithms to perform calculations for condensed matter systems on currently available quantum computers. We use the dynamical mean field theory (DMFT) embedding method, which is required to properly describe the large class of materials with strongly correlated electrons. We first apply a method based on the variational quantum eigensolver (VQE) to a 2-site system. This method made it possible to run DMFT calculations on quantum computing hardware for the first time (arXiv:1910.04735). We then present a recent method based on the maximally localised dynamical embedding (MLDE), which has the advantage that the number of qubits required for DMFT simulations is significantly reduced (Nature Computational Science 1, 410 (2021)). We conclude by presenting our newly developed Krylov variational quantum algorithm with improved scaling properties, which allowed us to perform simulations for real material systems on quantum computing emulators (arXiv:2105.13298).



INVITED SPEAKER: SYMP_B_INV004

TOWARD ULTRACOLD CAESIUM ISOMERS

Tanapoom Poomaradee^{1*}, Alexandros Giatzoglou¹, Ilkka Pohjalainen², Sami Rinta-Antila², Iain. D. Moore², Philip M. Walker³, Luca Marmugi¹, and Ferruccio Renzoni¹

¹Department of Physics and Astronomy, University College London, Gower Street, London WC1E 6BT, United Kingdom

²Department of Physics, University of Jyväskylä, Surfontie 9, 40014 Jyväskylä, Finland

³Department of Physics, University of Surrey, Guilford GU2 7XH, United Kingdom

*e-mail: ucaptpo@ucl.ac.uk

Abstract:

The text should be fully justified. Magneto Optical Trap (MOT) of ^{133}Cs atoms was performed. The atomic source was provided by an ion beam generated from a surface ionisation source. The focused ion beam enters the cold atom setup through the small hole of vacuum impedance and is implanted and neutralised in a 25 mm thick foil. The foil is chosen to be yttrium due to a favourable imbalance between ionisation energy and work function. Then, neutralised atoms were extracted by resistive heating. After that, MOT loading from the neutraliser was performed. The implantation profile was numerically simulated, and a phenomenological model for the neutraliser was also developed. A model of 1D diffusion was used to extract the neutraliser activation energy.

In addition, preliminary implantation tests were also performed with radioactive beams, in this case to produce ^{135}mCs . The ^{135}mCs ion was generated by means of proton induced fission in a Uranium target. The ions were extracted and accelerated through a mass separator which directed the ^{135}mCs ion beam to be implanted in a neutraliser. After implantation, gamma emission from the neutraliser was detected by a gamma detector. Then, by using the gamma spectrum, half-life of ^{135}mCs was measured in order to verify implantation of the species. Moreover, preliminary tests for trapping of ^{135}Cs were also conducted.



INVITED SPEAKER: SYMP_B_INV005

EXPLORING FERMİ-HUBBARD SYSTEM VIA QUANTUM GAS MICROSCOPE

Pimonpan Sompert^{1,2*}

¹Max-Planck-Institut für Quantenoptik, Garching, Germany

²Research Center for Quantum Technology, Faculty of Science, Chiang Mai University, 239 Huay Kaew Road, Muang, Chiang Mai, 50200, Thailand

*e-mail: pimonpan.sompert@mpq.mpg.de

Abstract:

Many exotic phenomena in Fermi-Hubbard model are created by the interplay between charge and spin in the doped systems. Here, we study the influence of the charge motion in one- and two- dimensional antiferromagnet at the microscopic level by use a powerful quantum gas microscope of ultracold fermions (⁶Li). In this system, the tunneling energy, the on-site interaction and chemical potential can be precisely controlled. With our high-resolution imaging, we can resolve both spin and charge density of individual lattice-site. This enables the measurements of spin-spin, density-density and spin-density correlations in the systems. In the talk, I will present our results on the time-resolved deconfinement between spin and charge in 1D system and the imaging of magnetic polarons in 2D system.



INVITED SPEAKER: SYMP_B_INV006

COMPUTATIONAL DESIGN FOR TWO-DIMENSIONAL MATERIALS FOR THERMOELECTRIC TRANSPORT

Nirpendra Singh*

Department of Physics and Center for Catalysis and Separation (CeCaS),
Khalifa University of Science and Technology, Abu Dhabi, United Arab Emirates

*e-mail: nirpendra.singh@ku.ac.ae

Abstract:

The discovery of graphene, a one-atom-thick layer of carbon atoms, has opened up a window to the two-dimensional (2D) world of materials and triggered a surge of research activities on various 2D layered materials, including single layers of hexagonal-boron nitride (h-BN) and transition metal dichalcogenides (such as MoS₂ and WSe₂). Thermoelectric materials can convert heat into electricity directly and therefore have applications in waste heat recovery. Manipulating the carrier concentration and band structures of materials have effectively optimized the electrical transport properties, whereas nanostructure engineering and defect engineering can significantly reduce thermal conductivity. In the talk, I will discuss the thermoelectric properties of two-dimensional materials in the bulk and monolayer phase. I will also demonstrate various strategies to reduce the thermal conductivity and improve the Seebeck coefficient and discuss the design principles of two-dimensional materials for their applications in thermoelectric transport.

INVITED SPEAKER: SYMP_C_INV001

RESEARCH OF IOC/WESTPAC

Kentaro Ando^{1,2,*}, Fangli Qiao^{1,3}, Aileen Tan^{1,4}, Wenxi Zhu¹

¹ IOC/WESTPAC, UNESCO

² Japan Agency for Marine-Earth Science and Technology, Japan

³ First Institute of Oceanography, Ministry of Natural Resources, China

⁴ Centre For Marine & Coastal Studies, Universiti Sains Malaysia, Malaysia

*e-mail: andouk@jamstec.go.jp

Abstract:

Since the establishment as regional sub-commission of IOC in 1989, WESTPAC has been developed through the collaboration and contributions by 22 member states. In line with the Vision and High-Level Objectives (HLOs) of IOC, as well as the challenges faced by this particular region, WESTPAC has become recognized as a catalyst, advocate, coordinator and facilitator in promoting ocean knowledge, sustained observations and services for the improvement of governance towards a healthy ocean and coasts for shared prosperity in the last ten years. WESTPAC is committed to developing, coordinating and implementing marine scientific research, observations and services on four themes: Understanding Ocean Processes and Climate in the Indo-Pacific; Ensuring Marine Biodiversity and Seafood Safety; Safeguarding the Health of Ocean Ecosystems; and Enhancing knowledge of emerging ocean science issues. WESTPAC has formed 16 projects and working groups, implementing activities through them as shown in Figure 1. We will introduce some research projects, which may be related to the theme of the symposium. The first author will also introduce the research activities by JAMSTEC.

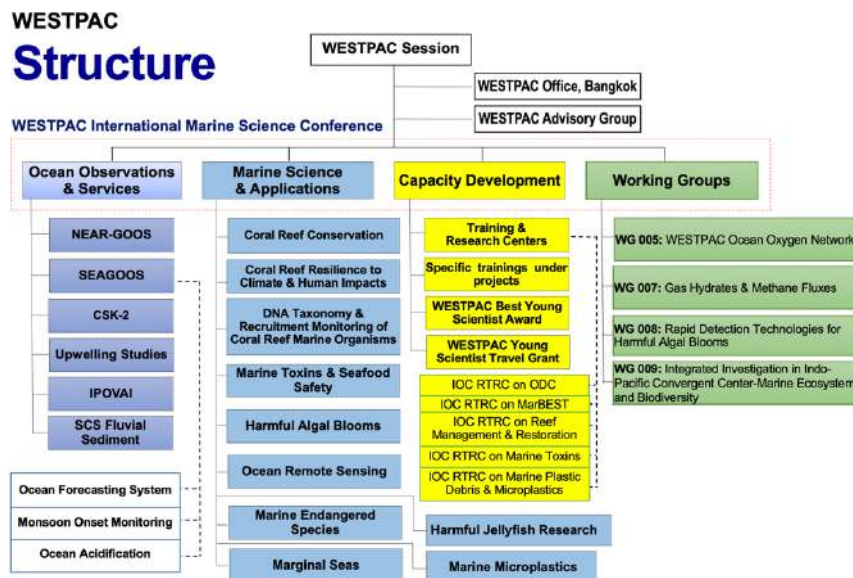


Figure 1. Structure of IOC/WESTPAC



INVITED SPEAKER: SYMP_C_INV002

NET FREE SEAS - EXPLORING COMMUNITY-BASED SOLUTIONS TO MARINE POLLUTION

Dominic Thomson^{1,*}

¹ Environmental Justice Foundation (EJF), Global HQ: Unit 417, Exmouth House,
3/11 Pine Street, Farringdon, London, EC1R 0JH, UK

*e-mail: dominic.thomson@ejfoundation.org

Abstract:

Dominic Thomson is the Deputy Director and Project Manager for EJF based in Bangkok. In this presentation he will explore how communities can and should be at the core of any project designed to address environmental crises such as marine pollution. One of these projects is the Net Free Seas which collects discarded fishing nets to be recycled into new exciting products. It works with small-scale fishing communities across Thailand to collect and clean these nets ready to be taken to recycling factories.

These communities are often located in far-flung districts, far away from municipal waste management systems. Before Net Free Seas many communities relied on burning nets or sending them to landfill to dispose of them. This project aims to give them an alternative livelihood where they can actually get money for these old nets. Through engaging directly with communities such projects can maximise the environmental goals as well as the economic and societal gains from tackling marine pollution.



INVITED SPEAKER: SYMP_C_INV003

LESSONS LEARNED AND WAY FORWARD FOR MANGROVE RESTORATION IN THAILAND

Siriporn Sriaram*

International Union for Conservation of Nature (IUCN), Thailand Programme

*e-mail: Siriporn.Sriaram@iucn.org

Abstract:

Half of the world's mangroves or around 32 million hectares have been destroyed in the past decades. From 1990 – 2020, 10 million hectares of mangrove forests were lost (FAO, 2020). As a vital ecosystem which nourish juvenile fisheries and marine species as nursing grounds. Healthy mangrove ecosystem helps protect coastlines from extreme weather events and stabilise shorelines from erosion. Thailand has a total mangrove coverage of 277,923 hectares in 24 coastal provinces. From 1961 – 1995, due to charcoal concession, shrimp farming/aquaculture, mining and resettlement (Aksornkoae 2004; MFF 2011a), 55% of mangrove areas were lost.

In 2002, the Department of Marine and Coastal Resources (DMCR) was established and responsible for the mangroves monitoring and law enforcement, mangrove conservation and planting outside national parks and naval areas. On June 2021, the United Nations launched the UN Decade for Ecosystem Restoration (2021 – 2030) and encouraging global-wide afford on mangrove restoration as nature-based solution to tackle climate change issues. A large number of donors, NGOs and private companies have supported mangrove restoration in Thailand.

The presentation provides a summary of lessons learned from mangrove restoration projects in Thailand and identify opportunities for setting up the Public-Private-Partnership Mangrove restoration project that apply Forest Landscape Restoration (FLR) technique.

Keywords:

mangrove restoration, Forest Landscape Restoration, Nature-based solution, climate change

INVITED SPEAKER: SYMP_D_INV001

Crystal structure of bioplastic-synthesizing PHA synthase (PhaC) revealing an unexpected open-closed heterodimer

Min Fey Chek*, Sun-Yong Kim, Tomoyuki Mori, Toshio Hakoshima

Laboratory of Structural Biology and Protein Engineering,
Nara Institute of Science and Technology, Nara, Japan

*e-mail: chek.min_fey.ce9@bs.naist.jp

Abstract:

PHA synthase (PhaC) is the key enzyme in the biosynthesis of polyhydroxyalkanoate (PHA). PhaC forms an active dimer to polymerize acyl-moieties from the substrate acyl-coenzyme A (acyl-CoA) into PHA polymers. PHA is a type of biodegradable polyester produced by a wide-range of bacteria and archaea when there are plenty of carbon and limiting amount of other nutrients in surrounding environment. Additionally, the microbes also possess PHA depolymerase (PhaZ), which will biodegrade PHA in natural environments includes soil and ocean. These advantageous characteristics making PHA a promising alternative to the commodity petroleum-based plastics. Here, we report the crystal structure of the catalytic domain of PhaC from *Chromobacterium* sp. USM2, bound to CoA (PhaC_{C5}-CAT). PhaC_{C5}-CAT displayed an α/β hydrolase core subdomain, comprised of a catalytic triad (Cys291, Asp447, His477) and a CAP subdomain, which adopts a dynamic structure. In the open form, CAP subdomain restructured and retracted to allow substrate entry into the active site. In the current structure, PhaC_{C5}-CAT form a dimer, where one protomer adopts an open conformation bound to a CoA, while the other protomer adopts a closed conformation in a CoA-free form. This open-closed heterodimer indicates the open conformation is stabilized by the asymmetric dimerization, enabling PhaC to accommodate CoA. The β -mercaptoethylamine moiety of the CoA is extended into the active site (Cys291) of PhaC, which is connected to a possible acyl-moiety binding cavity (Site A). The structure reveals the importance of dimerization in PhaC activity and the possible acyl-moiety binding site.

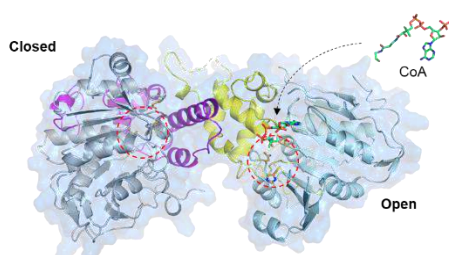


Figure. The open-closed heterodimer of PhaC_{C5}-CAT. Catalytic triad (red circle) was covered by CAP subdomain in the closed form (Magenta). In the open form, the CAP subdomain (yellow) was restructure to allow substrate (e.g. acyl-CoA) enter into active site (red circle). The closed form CAP subdomain stabilized open form CAP subdomain in the heterodimer.

INVITED SPEAKER: SYMP_D_INV002

FUNCTIONALIZATION OF METAL-ORGANIC FRAMEWORKS FOR BIOMASS CONVERSION TO VALUE-ADDED CHEMICALS

Vitsarut Tangsermvit,¹ Taweesak Pila,¹ Vetiga Somjit,¹ Satoshi Horike,¹ Kanokwan Kongpatpanich,^{1,*}

¹Department of Materials Science and Engineering, School of Molecular Science and Engineering, Vidyasirimedhi Institute of Science and Technology, Rayong, 21210, Thailand

*e-mail: kanokwan.k@vistec.ac.th

Abstract:

5-Hydroxymethylfurfural (HMF) is one of the key intermediate for the synthesis of several bio-based chemicals, polymers, and fuels. HMF is practically synthesized from fructose, while the one-pot synthesis of HMF from glucose is largely unexplored due to the necessary to have high density of both Lewis and Brønsted acid sites in the catalyst. In this work, the Lewis acid sites have been incorporated to the organic linker of the Brønsted MOF to achieve the efficient catalyst for glucose-to-HMF transformation. The local structure and acid density of the catalytic sites have been investigated to provide the understanding on the high catalytic performance of the presented acid-functionalized MOF. Moreover, the incorporation of the redox-active sites to MOF structure is also studied to demonstrate the use of MOF materials for the production 1,4-furandicarboxylic acid (FDCA), which is potentially used as monomer for bioplastic, from HMF at room temperature.

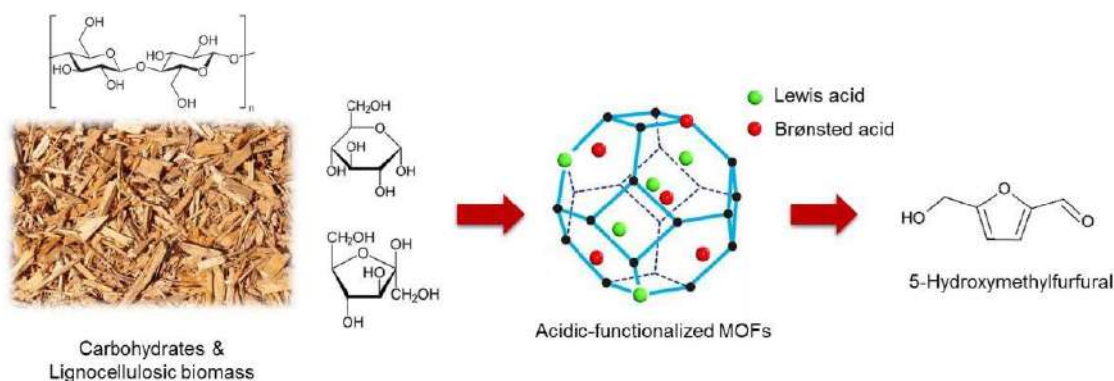


Figure. Functionalization of MOF materials for catalytic sugar conversion.

INVITED SPEAKER: SYMP_F_INV001

CONSERVE THE WORLD'S MOST IMPORTANT FORESTS TO SUSTAIN NATURE'S DIVERSITY, BENEFIT OUR CLIMATE, AND SUPPORT HUMAN WELL-BEING

Alistair Monument*

WWF International

*e-mail: amonument@wwfint.org

Abstract:

Forests are essential to our life on Earth, providing vital ecosystem services like clean air, water, food, timber, medicine and much, much more. After oceans, forests are the world's largest storehouses of carbon. Forests are home to more than three-quarters of the world's life on land. Approximately 750 million people, including 60 million Indigenous people, live in forests. Threats to the world's forests are growing. Expanding agriculture, due to an increased population and shifts in diet, is responsible for most of the world's deforestation. Illegal and unsustainable logging, usually resulting from the demand for cheap wood and paper, is responsible for most of the degradation of the world's forests—the largest threat to the world's forests. In degraded forests, small trees, bushes and plants often are severely damaged or dead; rivers are polluted; slopes are eroded; and more. Forests impact every part of our lives. The threats are so severe that we are losing huge swathes of forests at an alarming rate. The Amazon, the planet's largest rain forest, lost at least 17% of its forest cover in the last half century due to human activity—mainly clearing trees to create new or larger farms and ranches. The last 50 years our world has been transformed by an explosion in global trade, consumption and human population growth, as well as an enormous move towards urbanization. Until 1970, humanity's Ecological Footprint was smaller than the Earth's rate of regeneration. To feed and fuel our 21st century lifestyles, we are overusing the Earth's biocapacity by at least 56%. These underlying trends are driving the unrelenting destruction of nature, with only a handful of countries retaining most of the last remaining wilderness areas. Our natural world is transforming more rapidly than ever before, and climate change is further accelerating the change.

Finally, everyone has an important part to play in conserving forests for the future. Together, we can build a future that benefit both biodiversity and human well-being.



Figure.

INVITED SPEAKER: SYMP_F_INV002

IMPACT OF CLIMATE CHANGE ON BIODIVERSITY FOR SUSTAINABLE USE

Jantrararuk Tovanonte^{1,2*}

¹ School of Science, Mae Fah Luang University, Chiang Rai, Thailand

² Mae Fah Luang University Botanical Garden, Chiang Rai, Thailand

*e-mail: jantrararuk@mfu.ac.th

Abstract:

Climate change is one of the greatest challenges which its impact has adapted either through shifting habitat, losing species richness, changing life cycles, or the development of new physical traits biodiversity. The rate and magnitude of global climate change might be induced by the human activities to increased greenhouse gases emissions. As known, Human activities such as the production of goods and services for human well-being have resulted in the loss of biodiversity. Protecting the biodiversity is able to support the efforts to reduce the negative effects of climate change because it can help the storing carbon. Here, we try to use the meteorological approach of climate change model to predict the biological responses the climate change to augment the ability to mitigate future changes to global biodiversity and the services it provides to humans for their sustainable uses.



Figure.



INVITED SPEAKER: SYMP_F_INV003

SINGAPORE, BECOMING A CITY IN NATURE

Oh Cheow Sheng *

¹ Group Director (Streetscape), National Parks Board, Singapore

*e-mail: Oh_Cheow_Sheng@NParks.gov.sg

Abstract:

Singapore – A City in a Garden

At the start of Singapore's greening journey, the aim was to green up the island as quickly as possible to provide shade and access to green spaces for all. The greening strategy then evolved to provide colour through the planting of flowering trees and shrubs. Parks were linked up by the Park Connector Network and developments were encouraged to incorporate skyrise greenery to help improve the living environment. In the more recent years, the National Parks Board (NParks) has adopted biophilic design in restoring habitats and has been engaging the community in our efforts to sustain our greening efforts.

NParks has safeguarded more than 7,800 hectares of green spaces – nature reserves, gardens, and parks, linked by some 340km of park connectors as well as roadside greenery along streetscape – across Singapore, and has integrated greenery throughout the city. This is where we are today – a City in a Garden where greenery pervades our urban landscape.

Key Challenges

As Singapore continues to urbanise, the growing infrastructure will put increasing pressure on the established green cover. This, coupled with climate change and more extreme weather conditions, will result in higher urban temperatures and increased risks of localised flooding events. Therefore, the city needs to be developed in a way that continues to provide a high-quality living environment for Singaporeans, while ensuring that Singapore remains a distinctive global city that instils pride in our people, continue to be competitive, attract talent, investment and visitors.

Becoming a City in Nature

Singapore will be transformed into a City in Nature by the following strategies:

1. Extending Singapore's nature park network
2. Intensifying nature in parks and gardens
3. Restoring nature into the urban landscape
4. Strengthening connectivity between Singapore's green spaces

Enhancing stewardship of greenery and biodiversity

A City in Nature will enable the community to forge closer bonds through active stewardship of the environment. NParks will be expanding its outreach programmes to reach out to communities, schools, and individuals to encourage them to become stewards of greenery and biodiversity.

Under the enhanced stewardship programme, NParks has launched a new movement in Apr 2020 to plant a million trees across Singapore over the next 10 years.



INVITED SPEAKER: SYMP_G_INV001

LOW-COST MICROFLUIDIC SENSORS FOR BACTERIA AND VIRUS DETECTION

Charles S. Henry,^{1,2,*} Jeremy Link,¹ Elijah Barstis,¹ Ilhoon Jang,¹ David Dandy,² Brian Geiss³

¹ Department of Chemistry, Colorado State University, Fort Collins, CO USA

² Department of Chemical & Biological Engineering, Colorado State University, Fort Collins, CO, USA

³ Department of Microbiology, Immunology, and Pathology, Colorado State University, Fort Collins, CO, USA

*e-mail: chuck.henry@colostate.edu

Abstract:

Prior to the COVID-19 pandemic, infectious diseases accounted for millions of deaths worldwide. These bacterial and viral infections came from a wide range of sources including contaminated food, water, and contact with infected individuals. While these cases have been a significant burden, the world has feared the rise of a new pandemic like the Spanish Flu of 1918. We have now realized these fears with the rapid spread of SARS-CoV-2 infections around the globe. At present, more than 200M cases have been reported with more than 4M known fatalities worldwide. The economic and social losses have also been devastating. Diagnostics play a critical role in the fight against COVID-19 with their ability to identify infected individuals. The most common diagnostic assays are sensitive and specific but require expensive laboratories and highly trained individuals for operation increasing the time to get results and overall cost. Rapid diagnostic tests are an alternative that can be done outside of traditional laboratories but to date have largely under performed due to their limited complexity. Over the last decade, the Henry lab has been working to develop low-cost microfluidic devices for analysis of pathogenic bacteria and viruses. This talk will cover our recent research in this area leading to demonstration of how we are applying what we've learned to develop new systems to aid in the fight against the pandemic.



INVITED SPEAKER: SYMP_G_INV002

HOW CHEMISTRY AIDS IN THE COVID-19 VACCINE DEVELOPMENT?

Tanapat Palaga^{1, 2*}

¹Department of Microbiology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand

²Chulalongkorn Vaccine Research Center, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand

*e-mail: Tanapat.p@chula.ac.th

Abstract:

Corona virus SARS-CoV2 is the cause of pandemic COVID-19. Effective and timely vaccine development and administration is the key for controlling the global impact of the diseases. Vaccine development relies on multidisciplinary effort mainly from immunologists, virologists and chemists. Various platforms of COVID-19 vaccines are available with speedy translating from lab bench to human arms. Adjuvants are one of the key components of successful vaccines. Adjuvants are not only used for delivery of vaccine or prolong vaccine half-life *in vivo*, but also plays a key role in determining immune response outcome. Different vaccine types require different adjuvants. Widely used mRNA vaccines are proved to be effective for preventing infections and/or disease severity of COVID-19. mRNA vaccines use antigen encoded genes in the form of mRNA with lipid nanoparticle for delivery. This presentation will review the different types of adjuvants currently in use with the focus on mRNA vaccine. Using *in vivo* imaging, the kinetics and biodistribution of mRNA delivered by lipid nanoparticles will be discussed with the implication in future use of mRNA vaccine for infectious diseases and cancer immunotherapy.



INVITED SPEAKER: SYMP_G_INV003

FLUORESCENT PROBE-BASED ASSAY FOR IDENTIFICATION OF SARS-COV-2 MAIN PROTEASE INHIBITORS

Peerapon Deetanya^{1,2}, Kowit Hengphasatporn³, Patcharin Wilasluck^{1,2}, Yasuteru Shigeta³, Thanyada Rungrotmongkol^{4,5}, Kittikhun Wangkanont^{1,2,*}

¹ Center of Excellence for Molecular Biology and Genomics of Shrimp, Department of Biochemistry, Faculty of Science, Chulalongkorn University, Bangkok 10330 Thailand

² Molecular Crop Research Unit, Department of Biochemistry, Faculty of Science, Chulalongkorn University, Bangkok 10330 Thailand

³ Center for Computational Sciences, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki 305-8577, Japan

⁴ Program in Bioinformatics and Computational Biology, Faculty of Science, Chulalongkorn University, Bangkok, 10330, Thailand

⁵ Structural and Computational Biology Research Unit, Department of Biochemistry, Faculty of Science, Chulalongkorn University, Bangkok 10330 Thailand

*e-mail: kittikhun.w@chula.ac.th

Abstract:

The main protease of SARS-CoV-2 is responsible for viral polyprotein cleavage. This process is crucial for viral multiplication. Thus, the main protease is a promising target for antiviral drug development. Traditional enzyme activity assays for inhibitor identification rely on peptide-based substrates. However, the COVID-19 pandemic has limited or delayed access to peptide synthesis services, especially for researchers in developing countries. We explored the application of 8-anilino-1-naphthalene-sulfonate (ANS) as a fluorescent probe for inhibitor identification. Fluorescence enhancement upon binding of ANS to the main protease was observed. This interaction was competitive with a peptide substrate, indicating that ANS bound within the active site. The utility of ANS-based competitive binding assay to identify main protease inhibitors was demonstrated with the flavonoid natural products baicalein and rutin. The molecular details of ANS and rutin interaction with the main protease were investigated with molecular modeling. Our results suggested that ANS could be utilized in a competitive binding assay to facilitate the identification of novel SARS-CoV-2 antiviral agents.



INVITED SPEAKER: SYMP_G_INV004

RECENT DEVELOPMENT OF COLORIMETRIC AND ELECTROCHEMICAL BIOSENSORS FOR COVID-19 DIAGNOSIS

Sudkate Chaiyo^{*},¹ Abdulhadee Yakoh,¹ Wanwisa Deenin,^{1,2} Pawanrat Srithong,³ Orawon Chailapakul³

¹Institute of Biotechnology and Genetic Engineering, Chulalongkorn University, Bangkok, 10330, Thailand

²Program in Biotechnology, Faculty of Science, Chulalongkorn University, Bangkok, 10330, Thailand

³Electrochemistry and Optical Spectroscopy Center of Excellence (EOSCE), Department of Chemistry, Faculty of Science, Chulalongkorn University, Bangkok, 10330, Thailand

*e-mail: sudkate.c@chula.ac.th

Abstract:

Nowadays, the world has been facing the pandemic of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. As human-to-human transmission rapidly increased, this coronavirus disease 2019 (COVID-19) has spread globally and poses a threat to public health. Early and accurate diagnostics is undoubtedly needed for the containment of COVID-19 as it can facilitate the control of infection sources, thus limiting the spread of this viral contagious. Conventionally, the RT-PCR-based test for viral RNA detection is considered the gold-standard method for diagnosing COVID-19. However, the RT-PCR method might not be promptly available or affordable in many countries, as it is generally tested in a centralized laboratory/hospital by skilled personnel. To complement the detection of viral RNA, various immunosensing platforms have been developed for both antibody and antigen of SARS-CoV-2 detection. Two different techniques, colorimetric and electrochemical detection, were implemented with the sensing platforms and utilized for different sensing purposes. Both detectors can be simply miniaturized with the proposed sensors and enabled for on-field testing. In addition, the effectiveness of each sensor was demonstrated with the real-world samples (human sera for antibody testing and swab samples for antigen testing), in which the results were in good accordance with the traditional methods. These platforms can open the way to conceptually new biosensors for immunosensing applications, which are amenable to point-of-care applications and sensitive diagnostics.

INVITED SPEAKER: SYMP_H_INV001

THE CAPRICIOUS Mo–Mo QUINTUPLE BOND

Li-Teng Sun, Meng-Wei Lee, Yi-Chou Tsai*

Department of Chemistry and Frontier Research Center on Fundamental and Applied Sciences and Matters, National Tsing Hua University, Hsinchu 30013, Taiwan

*e-mail: yictsai@mx.nthu.edu.tw

Abstract:

Alkynes have two sets of mutually orthogonal π bonds, so alkynes can act as either a 2- or 4-electron donor ligand. We recently reported the metal-metal δ bonds and carbon-carbon π bond are in close resemblance in several ways. For instance, they are both two-center two-electron bonds formed by the highest occupied molecular orbital, and these two bonds are symmetry-adaptable for π interaction with the bonded atoms. As such, the quintuply bonded dimolybdenum amidinate contains two δ bonding pairs and are employed as a 2- and 4-electron donor to stabilize low-valent metal complexes. For example, the Mo-Mo quintuply bonded bis(amidinate) $\text{Mo}_2[\mu-\kappa^2\text{-HC}(\text{N}-2,6\text{-}i\text{Pr}_2\text{C}_6\text{H}_3)_2]_2$ readily displaced two CO ligands upon reacting with $\text{W}(\text{CO})_6$ to give the 18-electron species $(\text{OC})_4\text{W}\{\eta^2\text{-Mo}_2[\mu-\kappa^2\text{-HC}(\text{N}-2,6\text{-}i\text{Pr}_2\text{C}_6\text{H}_3)_2]_2\}$, where $\text{Mo}_2[\mu-\kappa^2\text{-HC}(\text{N}-2,6\text{-}i\text{Pr}_2\text{C}_6\text{H}_3)_2]_2$ is a four-electron donor ligand. More interestingly, two δ bonds in the Mo-Mo quintuple bond undergo double heterolysis upon reacting with $\text{Fe}(\text{CO})_5$ and $\text{CpCo}(\text{CO})_2$. In these two isolated products, one Mo atom is invariably ligated by a CO group, and the other Mo atom is bound to the 16-electron fragment “ $(\text{OC})_4\text{Fe}$ ” and “ $\text{Cp}(\text{CO})\text{Co}$.” These two complexes are the transition metal analog of Fischer carbenes supported by experiments and theoretical investigations.

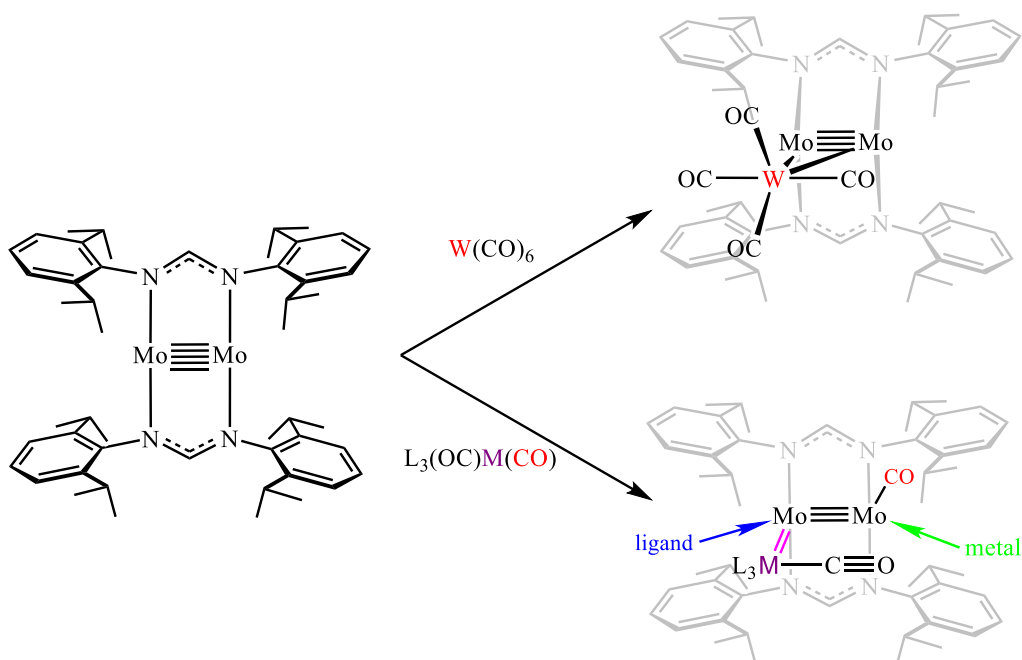


Figure.

INVITED SPEAKER: SYMP_H_INV002

STRATEGIES TOWARDS LIGHT-ACTIVATION IN IRON(III) SPIN CROSSOVER MATERIALS

Phimphaka Harding,^{1*} David J. Harding,¹Theerapoom Boonprab,¹ Warisa Thammasangwan,¹ Raul Diaz-Torres,¹ Shane G. Telfer,² Keith S. Murray,³ Eric Collet,⁴ Guillaume Chastanet,⁵ Rodolphe Clérac⁶

¹ Functional Materials and Nanotechnology Center of Excellence, Walailak University, Thasala, Nakhon Si Thammarat, 80160, Thailand

² MacDiarmid Institute for Advanced Materials and Nanotechnology, Institute of Fundamental Sciences, Massey University, Wellington 6140, New Zealand

³ School of Chemistry, Monash University, Clayton, Melbourne, Victoria, 3800, Australia

⁴ Univ Rennes, CNRS, Institut de Physique de Rennes-UMR 6251, 35000 Rennes, France

⁵ CNRS, Université de Bordeaux, ICMCB, 87 avenue du Dr A. Schweitzer, Pessac, F-33608, France

⁶ Univ. Bordeaux, CNRS, Centre de Recherche Paul Pascal, UMR 5031, 33600 Pessac, France

*e-mail: kphimpha@mail.wu.ac.th

Abstract:

Spin crossover (SCO) is the reversible switching between two possible spin states, high spin and low spin.¹ The two spin states may be switched by a range of external stimuli including heat, light and pressure enabling their use in a rich array of applications. Octahedral iron(II) complexes form the bulk of SCO research but more recently work has been extended to iron(III) systems.² These complexes have the advantage of being air-stable, and allow a more diverse ligand set to enable SCO. Nevertheless, a weakness for iron(III) SCO systems is that they rarely undergo light activated SCO. In this talk, through a range of different examples, strategies towards enabling light activation in iron(III) SCO systems is discussed.

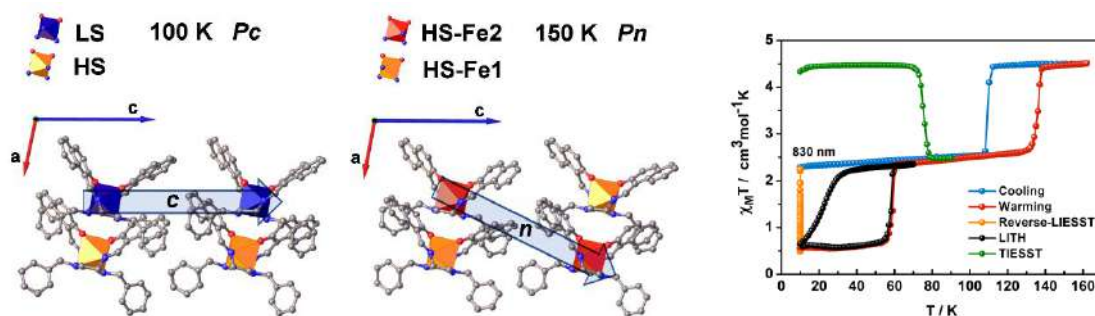


Figure. Structure of $[\text{Fe}(\text{naphBzen})_2]\text{I}$ showing the reconstructive phase transition and the magnetic profile under thermal and light activation.

INVITED SPEAKER: SYMP_H_INV003

METAL-ORGANIC FRAMEWORKS (MOFs) IN ENERGY STORAGE RESEARCH

Yun Zong*

Agency for Science, Technology and Research (A*STAR), Singapore

*e-mail: zong_yun@hq.a-star.edu.sg

Abstract:

Metal-organic frameworks (MOFs) are ideal precursors to produce ultrahigh surface area heteroatoms-doped porous carbons which find excellent applications in energy storage as a whole. For zinc-air batteries reaping on high surface areas and critical transitional elements for high activity electrocatalysis, MOFs, particularly Co-based ones (e.g. ZIF-67) are good choices. To construct air-electrode of zinc-air batteries, binders are often needed which not only compromises electrochemically active surface area, but also the electrode conductivity. Moreover, due to the evolution of oxygen the catalyst particles may be flushed off, leading to degradation of electrocatalytic activities. Herein, MOFs in energy storage research, MOFs for zinc-air batteries, as well as immobilization of MOFs for performance enhancement of zinc-air batteries will be discussed. As example, we introduce in-situ selectively grown ZIF-67 onto electrospun polyacrylonitrile (PAN) fibers, forming PAN@ZIF-67 hybrid in “gems-on-string” structure. Thermal pyrolysis did not disturb the hierarchical structure, but furnish high ORR activity with excellent durability in alkaline electrolyte. In zinc-air battery (ZnAB) it delivers a stable discharge voltage of 1.24 V at a high current density of 20 mA cm⁻². A continuous operation over 38 days is demonstrated with the discharge voltage above 1.0 V at a current density of 10 mA cm⁻². A freestanding C-PAN@ZIF-67 mat as flexible cathode of thin and bendable ZnABs enables high discharge voltages in both flat and bent states, giving great promise to future flexible electronics.

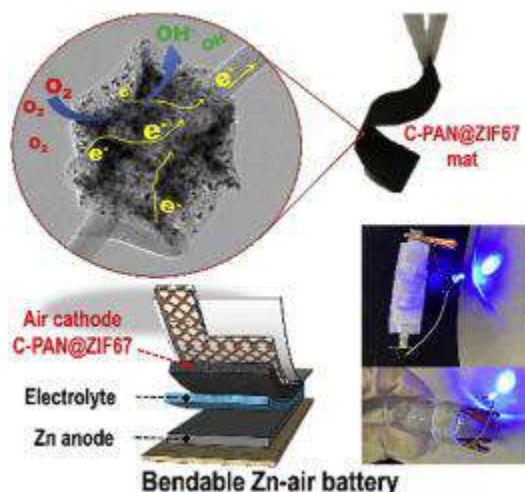


Figure. ZIF-67-derived Co and N co-doped particles strung on carbon fibers to form “gems-on-string” structure, represents a class of promising oxygen reduction reaction (ORR) catalyst with enhanced catalytic activity and stability for high-performance zinc-air batteries.



INVITED SPEAKER: SYMP_I_INV001

HEADING TOWARDS THE NEW ERA OF SMARTER FOOD SAFETY FOR A SUSTAINABLE FOOD SYSTEM

Filipe Magnum Silva Dos Santos¹, Alka¹, Low Kah Hin², Chai Lay Ching^{1,*}

¹ Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.

² Department of Chemistry, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.

*e-mail: lcchai@um.edu.my

Abstract:

As we are moving into the fourth wave of industrial revolution (4IR), we are about to experience a digital transformation of all industries, that includes agriculture, manufacturing, retail, banking and services, as well as the entire industrial value chain. 4IR is all about integrating information and communication technology such as the Internet of Things (IoT) with machines and processes for industry to form a smart and intelligent network of machines. It includes the emerging technologies of artificial intelligence (AI), cognitive computing, autonomous robots and more. These emerging smart technologies will drive a drastic industry transformation. The food industry network is complex as the food supply chain extend from farm (agriculture), food processing and manufacturing, packaging, logistics and transportation, retails, food service industry, last-mile delivery, and food waste management. Therefore, it is always challenging to manage and maintain the quality and safety of foods along these complex and dynamic food supply chain. In this presentation, various new smart technologies that enables better food traceability, foodborne disease management, food safety testing, and food packaging will be discussed.



INVITED SPEAKER: SYMP_I_INV002

CIRCULAR FOOD PRODUCTION: VALORIZATION OF FOOD MANUFACTURING BY-PRODUCTS

Suvaluk Asavasanti*

*e-mail: suvaluk.asa@kmutt.ac.th

Abstract:

TBA



INVITED SPEAKER: SYMP_I_INV003

HEMP AS A SUSTAINABLE CROP AND A RENEWABLE RESOURCE

Alan Dronkers^{1*}

¹ Hemp Flax Group B.V.

*e-mail: panta67@hotmail.com

Abstract:

Sustainable agriculture is not only related to the non-use of herbicides and pesticides but is also related to improving and maintaining a healthy living top soil that has a good structure and is full of organic dust for a high absorption capacity. One of the main problems in agriculture around the world today is top soil erosion which reduces the capacity to hold water and fertilizer. The cultivation of hemp has a good effect on the soil structure because of its great and deep penetrating root system. At the same time at harvest the stalks are cut to a minimum of 15 centimeters above ground which leaves the soil protected for wind erosion and adds hemp fiber to the soil. Our company Hempflax grows its crops not with organic farmers but with normal farmers that normally have less attention for their top soil. So, most soils are heavily eroded when we start to grow our hemp. Both the crop itself and the application of organic fertilizers (mainly pig and cow manure) improve the top soil very much at just one cultivation cycle. The next following crop in the Netherlands is most time potatoes, the most lucrative crop for the farmers there. The hemp cultivation is not making a lot of money for the farmers but because of the better soil their potato crop after hemp can yield up to 10% more and because hemp reduced weeds (they can not compete with the fast growing hemp plants), less herbicide is needed in their following potato crop because the land after hemp was clean already. A true sustainable agriculture maintains a healthy and living top soil and has no further negative effects for the environment.

Many products we have in our society are produced and made from non renewable resources. So, if we use packaging materials made from plastics made from oil then we make those materials from a finite resource that one day will not be available anymore. But if we make packaging materials from bamboo then we make them from an endless renewable resource that can also be produced sustainably (organic with no negative effects for the soil or nature). Like bamboo, hemp can be cultivated sustainably and has even more uses for mankind.

We can also build a house with hemp when we build the walls from 'hempcrete'. Hempcrete is made from the wood core of the stalk (this has an open fiber). The wood is processed with hydraulic lime and because of that is instantly petrified (it becomes stone) and is not only very well insulating but also fire resistant. Where concrete can not 'breathe' especially humidity, hempcrete is a breathing wall product that regulates the humidity (no dangerous fungus in the house like with concrete). During this breathing process it also binds CO₂ and has self repairing properties when cracks might occur.

So, I can wake up in my hemp house, in my hemp bed (hemp MDF) with my hemp mattress (hemp fiber felt) and hemp pillows and hemp blankets (hemp textile). I stretch myself in my hemp underwear and put on my hemp slippers and open the hemp curtains. I go and take a shower with my hemp soap (made with seed oil) and hemp shampoo, brushing my teeth with CBD toothpaste (CBD is an anti inflammatory agent coming from the hemp flower). Then I put on my hemp shirt and hemp jeans and go to the kitchen to eat some hemp bread (made with the dehulled seeds) with hemp peanut butter and hemp cheese (made with hemp milk, made of the seed). I eat this while having some hemp tea and checking the 'hemp news'. Then I put on my hemp shoes and my hemp coat and go to my hemp electric car (with interior and exterior hemp fiber enforced plastics and other fiber interior components) with a hemp battery (hemp carbon/graphene) and drive to the hemp factory for another day at work. Life should be good in a world economy based on renewable resources and in balance with a healthy nature and environment for us to live.



INVITED SPEAKER: SYMP_I_INV004

SYNBIO CONSORTIUM IS DRIVING THAILAND BCG ECONOMY TO THE NEW FRONTIER

Korsak Towantakavanit*

Manager of Ecosystem and Incubation, Bangchak Initiative and Innovation Center
(BiiC) Bangchak Corporation PLC.

Secretary of Food-Bio Industry Working Group under Innovation Institute for
Industry (III), Federation of Thailand Industries

*e-mail: korsak@bangchak.co.th

Abstract:

Thailand Synthetic Biotechnology Consortium “SynBio Consortium” is about to be officially launched at the end of 2021 in order to gather key stakeholders to drive BCG economy. SynBio is a critical key success factor for the nation to shift into new paradigm of more sustainable economic and social development. The main driver of this mission is the agricultural sector. Let’s imagine either we can produce milk without a cow or produce meat without animals but they are made of microbes. From the recently study funded by National Higher Education Science Research and Innovation Policy Council reported that SynBio combines various disciplines in genetics, molecular biology, systems biology, microbiology, biochemistry, and analytical chemistry. These skills need to be applied using quantitative engineering techniques of mathematics, computing, bioinformatics, biostatistics, and advanced computational modeling and simulation. Furthermore, additional skills are required in engineering, robotics, software engineering, artificial intelligence, and machine learning to support high throughput synthetic organism construction and testing. The preferred solution for integrating and developing these cross disciplinary skills is to fund focused flagship programs where scientists, engineers, and business skills can overlap and synergize.

Therefore, SynBio is determined as a secret source to tackle global challenges such as climate change, energy consumption, environmental protection, and health care. It could usher in a new normal of human being, after COVID-19 emerged, where agricultural biomass becomes the primary source of feedstocks for “Cell Factory” processing that currently manufactured from actual animals or plants. Already, SynBio is making its first steps as an enabling technology to produce various kinds of sustainable premium applications such as agriculture, renewable energy, food, supplement, ingredients, herbs, medical etc.



INVITED SPEAKER: SYMP_J_KEY001

SUSTAINABLE BIOMASS TAR REFORMING FOR SYNGAS / HYDROGEN PRODUCTION VIA THERMAL & PLASMA CATALYSIS

S. Kawi^{1,*}

¹Department of Chemical & Biomolecular Engineering, National University of Singapore, Singapore

*e-mail: chekawis@nus.edu.sg

Abstract:

Biomass has potential to provide about 25% of global total energy demand. The utilization of biomass by gasification is one of the promising routes for the production of not only hydrogen but also syngas, which is a prerequisite to produce higher valuable chemicals (methanol and ammonia) via the Fischer Tropsch process. Although biomass conversion is a promising route yet this process faces removal tar, mixture of heavy condensable hydrocarbons (1-5 ring aromatic compounds). The use of catalyst for tar cracking provides a promising way to make the process more economical and efficient as a catalyst can reduce the reaction temperature and increase the product yield. Plasma conversion process is also an emerging method to convert the reactant at lower (<300 °C) temperature [1-5].

In recent years, our research group has developed several strategies to solve this tar problem by designing and preparing stable catalysts for tar reforming by both thermal and plasma catalytic processes, using: Specific structure derived catalysts [6-13]; Addition of promoters [6,9]; Formation of bimetallic sites [6,14]; Bimetallic catalysts [6,10,11]; Organic-assistant catalyst synthesis [6,15]; Catalytic-plasma reaction [1-5]; Using waste derived materials as catalysts/support [6,16].

It is believed that effective conversion of tar produced during biomass gasification will continue to be a concern, and developing an excellent catalyst to convert tar is the crucial key to further improve the gasification technology to make it successful industrially.

References:

- [1] J. Ashok, S. Kawi, *Energy Conv. & Manage.* (2021) in press.
- [2] L.N. Liu, Z.K. Zhang, S. Das, S. Kawi, *Appl. Catal. B-Env.* 250 (2019) 250-272.
- [3] L. Liu, S. Das, T. Chen, A. Borgna, S. Kawi, *Appl. Catal. B: Env.* 265 (2020) 118573.
- [4] L. Liu, S. Das, S. Xi, S. Kawi, *Energy Conver. & Manage.* 206 (2020) 112475.
- [5] S. Kawi, J. Ashok, N. Dewangan, S. Pati, *Waste & Biomass Valor.* 11 (2021) 1-30.
- [6] J. Ashok, S. Das, K. Tomishige, S. Kawi, *Fuel Proc. Tech.* 199 (2020) 106252.
- [7] S. Jayaprakash, A. Jangam, S. Kawi, *Fuel Proc. Tech.* 219 (2021) 106871.
- [8] X. Gao, Z. Wang, J. Ashok, S. Kawi, *Chem. Eng. Sci.* X 7 (2020) 100065.
- [9] J. Ashok, Y. Kathiraser, S. Kawi, *Appl. Catal. B-Env.* 172 (2015) 116-128.
- [10] J. Ashok, S. Kawi, *Appl. Catal. A: Gen.* 613 (2021) 118013.
- [12] Z.W. Li, Z.G. Wang, S. Kawi, *ChemCatChem* 11 (2019) 202-224.
- [13] J. Ashok, S. Das, S. Kawi, *Energy Conv. & Manage.* X 1 (2019) 100003.
- [14] U. Oemar, K. Hidajat, S. Kawi, *Appl. Catal. B-Env.* 148 (2014) 231-242.
- [15] U. Oemar, K. Hidajat, S. Kawi, *ChemCatChem* 7 (2015) 3376-3385.
- [16] J. Ashok, S. Das, S. Kawi, *Waste Manage.* 82 (2018) 249-257.



INVITED SPEAKER: SYMP_J_KEY002

PORTABLE HYDROGEN ENERGY SYSTEM WITH AN ELECTROLYZER, METAL HYDRIDE, AND PEMFC FUEL CELL

Joongmyeon Bae^{1,*}

¹Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology,
Republic of Korea

*e-mail: jmbae@kaist.ac.kr, +82-10-8772-1045

Abstract:

Production of green hydrogen to make sustainable environment attracts strong attentions nowadays. Likewise, hydrogen storage is also an important topic and there are various methods. Among those methods, metal hydride is studied to be applied to underwater equipment due to the high volumetric energy density.

Metal hydride has technical issues that it takes a long time to charge hydrogen and that thermal management is required.

In this study, a new system is suggested to overcome those problems. The system consists of a “charging unit” that stores hydrogen into metal hydride produced through water electrolysis and a “discharging unit” that utilizes the stored hydrogen in connection with the fuel cell.

In order to apply it to the target applications, AB2 type metal hydride is selected for the energy storage medium. However, the heat transfer coefficient of metal hydride is much lowered than usual metal powders. Consequently, the time it takes relatively long time for charging, which is an exothermic reaction. For discharging, which is an endothermic, the temperature of the hydrogen storage unit falls below zero. For internal thermal management, to solve this matter, design of heat transfer was eloquently built and the effective design was mechanically installed at the hydrogen storage system.

As a result, the time required for hydrogen charging was reduced to 1/4 compared to the system without thermal management and the temperature of the hydrogen storage unit could be maintained over zero during hydrogen discharge.



INVITED SPEAKER: SYMP_J_KEY003

HANDLING GREEN HYDROGEN IN THE FORM OF AMMONIA FOR COMMERCIAL USE AIMING TO NET ZERO EMISSION AND SUSTAINABILITY

Piyabut Charuphen^{1,*}

¹ Bangkok Industrial Gas Co., Ltd., Bangkok, Thailand

*e-mail: CHARUPP@airproducts.com

Abstract:

As the world is pursuing the net zero emissions target driven by the climate change concerns, hydrogen produced from renewable sources, so-called green hydrogen, is ultimately an effective solution for bringing us there. Hydrogen is the most abundant substance on earth and can be found almost in every organic compound surrounding us, yet its light weight makes it challenging for getting stored and transported economically. Producing green hydrogen competitively is one thing while storing and transporting it to serve demands afar is another thing, putting hydrogen economy viability in question.

Air Products and Chemicals Inc. (AP), a global leading industrial gas company with the global largest hydrogen market, has leveraged its expertise in industrial gas technology to produce green ammonia by using green hydrogen as feedstock. Green ammonia is easier for being stored and transported, compared to hydrogen due to its property. Ammonia can then be dissociated to hydrogen at the point of hydrogen demand. The commercial-scale green ammonia production from green hydrogen has been recently invested by AP in Saudi Arabia, equivalent to total green hydrogen production of 650 ton per day. The green ammonia is aimed to serve green hydrogen demand in Europe and Japan for the mobility sector.

Hydrogen for mobility is driven by fuel cell electric vehicle (FCEV) using hydrogen as fuel presenting another alternative to battery electric vehicle (BEV) by resolving users' pain points from BEV's time-consuming battery charging. AP develops hydrogen refueling technology for FCEVs which provides not only safety, but also the same user experience as in refueling conventional gasoline for internal-combustion engine vehicles.



INVITED SPEAKER: SYMP_J_INV001

HYDROGEN PRODUCTION FROM CATALYTIC METHANE DECOMPOSITION

Sakhon Ratchahat^{1,*}, Suttichai Assabumrungrat², Ryo Watanabe³, and Choji Fukuhara³

¹ Department of Chemical Engineering, Faculty of Engineering, Mahidol University, Nakhon Pathom, 73170, Thailand

² Center of Excellence in Catalysis and Catalytic Reaction Engineering, Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University, Bangkok 10330, Thailand

³ Department of Applied Chemistry and Biochemical Engineering, Graduate School of Engineering, Shizuoka University, Shizuoka 432-8561, Japan

*e-mail: sakhon.rat@mahidol.edu

Abstract:

Hydrogen production from methane has been widely used and applied at commercial scale. Several process such as steam reforming, dry reforming, partial oxidation, and catalytic decomposition can convert methane into hydrogen. Recently the catalytic decomposition of methane (CDM) is great of interest due to its various advantages. Methane can be directly decomposed into pure hydrogen and remained deposit carbon on catalysts. By this way, hydrogen purity could be easily adjusted by controlling the process parameters. Meanwhile the formation of deposit carbon could be controlled to produce high value-added products such as carbon nanomaterials. Thus, catalysts play an important role in producing high-purity hydrogen and determining the property and quality of carbon nanomaterials. We have introduced CoMo/MgO catalyst for CDM process. As a results, it was found that the high-purity hydrogen of > 90% was obtained. In addition, the carbon nanomaterials were characterized to have crystalline structure higher than the commercial benchmark. However, the stability of catalyst is suggested to be further studied. In this research work, CDM process demonstrates a potential for production of high-purity hydrogen and carbon nanomaterials.

INVITED SPEAKER: SYMP_J_INV002

MULTIFUNCTIONAL CATALYST PELLETS FOR HYDROGEN PRODUCTION

Suwimol Wongsakulphasatch,¹ Suttichai Assabumrungrat,² Pasin Pong-Art,¹ Jon Powell^{3,*}

¹Department of Chemical Engineering, Faculty of Engineering,
King Mongkut's University of Technology North Bangkok, Bangkok, Thailand 10800

²Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University,
Bangkok, Thailand 10330

³International School of Engineering, Faculty of Engineering, Chulalongkorn University,
Bangkok, Thailand 10330

*e-mail: jdapowell@gmail.com:

Abstract:

Hydrogen has a wide range and increasing number of applications, including hydrogenation of organic compounds or fuel in transportation. Steam reformation of fossil fuels is the primary means of producing hydrogen, a by-product of which is CO₂. Current and recent work carried out by the authors involves the up-scaling of a process referred to as sorption enhanced steam reformation, with the development of catalyst pellets being an important part of that up-scaling process. Aims of this work include (i) the production of pellets that provide both catalysis of the steam reformation reaction and CO₂ sorption (ii) successful implementation of the pellets in a small pilot-scale plant. Results obtained using the NiO/CaO-Al₂O₃ multifunctional catalyst in both powder and pellet form show that hydrogen purities of 90 % and 85 % are achievable, respectively. The next phase of the research will involve the use of a small pilot-scale rig, and further development of the pellets. These developments will focus on addressing potential transport phenomena and mechanical strength issues caused by the up-scaling of the reactor and catalyst particle size. The authors discuss their approach in addressing these future challenges.

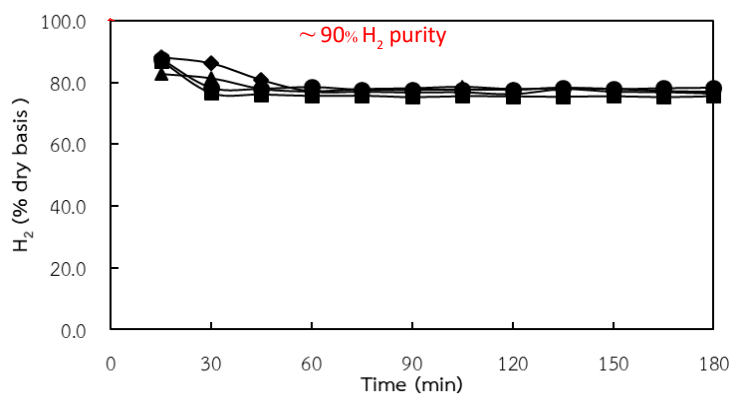


Figure.



INVITED SPEAKER: SYMP_K_INV001

REPRODUCTION OF SOME CORAL REEF FISHES IN MANADO BAY AND BUNAKEN NATIONAL PARK INDONESIA TO SUPPORT THE SUSTAINABILITY RESOURCES

Janny D. Kusen¹ Kakaskasen Andris Roeroe¹ Poppy Lintong^{2,*}

¹ Faculty of Fisheries and Marine Sciences, Sam Ratulangi University Manado Indonesia

² Faculty of Medicine, Sam Ratulangi University Manado Indonesia

*e-mail: jannydkusen@unsrat.ac.id

Abstract:

Issue sustainability since the 1930s, especially in the USA has become an important scientific reference in the exploitation of marine fish with the presence of MSY (Maximum Sustainability Yield) against the exploitation that scientifically tends to over exploitation. The bottom line of this effort is to limitation the exploitation up to *ca.* 80 % from totally fish stock in knowing area to give time for remain fish community to recruitment naturally. Marine fishes as resources (biotic resources) that should be sustained in any reason, because it also impacts economic resources locally and globally. This is one of the reasons for the research on reproduction of several types of economically valuable coral fish in Bunaken National Park, North Sulawesi Indonesia. The main purpose of study is to analyze when these species spawning through approach with GSI (Gonado Somatix Index) and verified with gonad development histologically. By known their indices, it will be known well when these fishes will spawning down, therefore the concept to local government through the policy of exploration for when not be to exploited of certain types of fish and when it allowable. The result of six month data was figured up at some local economically species particularly to one family that famous coral reef fishes of the area. Some parts of these gonadal development could recognize the spawning time. The present rundown progress is to prepare academic base policy to government. In Indonesia's national scale since year 2016 set fish stocks at 12.5 million tons/year, whereas this stock fish number theoretically uncertainty parameters therefore to be called as fish stock assessment. No one might be secured for effort of 85 % from the national fish stock assessment, especially the number off exploitation unit. At least we have base officially number to monitor in the next survey it will going rise or down. Up to the present condition almost not reported yet the fish productivity country have field policy to limitation which economical species allowable or prohibited to exploitation. These decisions based on intensively scientific research is very important to maintain global fish stock sustained, while in the fact that some counties in the world have yearly high demand of fish stock from outside the country. Therefor the fish stock sustainability to secure the domestic high demand became the big economically business from this important biotic resources as one of their economically resources that also to be sustained. On the other hand, as biotic resources marine fishes cannot be converted like abiotic resources one, while it is unavoidable as daily needs of mostly world population. Through this small scale research could be remain again to all country to think seriously this issues and its technology. This era we have to decide how we are going to the real steps that we have to implemented the bioresources sustainability that important ecologically and economically. Because the future we just had been borrowed from our grand-grand children.



INVITED SPEAKER: SYMP_K_INV002

THE FIRST SUCCESSFUL PRODUCTION OF AN F₂ GENERATION FROM 12-YEAR-OLD SEXUALLY PROPAGATED MASSIVE CORAL COLONIES

Baria-Rodriguez MVB^{1*}, dela Cruz DW², Bonilla KG¹, Ligson CA¹, Toh TC, Edwards AJ⁴,
Harrison P², Guest JR⁴

¹The Marine Science Institute, University of Philippines Diliman, 1101 Quezon City, Philippines

²Marine Ecology Research Centre, School of Environment, Science and Engineering, Southern Cross University, Lismore, New South Wales, Australia

³College of Alice and Peter Tan, National University of Singapore, 8 College Avenue East, Singapore, 138615

⁴School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne NE1 7RU, United Kingdom

* e-mail: vrodriguez@msi.upd.edu.ph

Abstract:

Coral sexual propagation for reef restoration offers several advantages compared to asexual propagation as it leads to high genetic diversity and provides access to millions of propagules. The majority of studies using the sexual mode of propagation focus on fast-growing *Acropora* species, which have been recently shown to successfully generate F₁ (first filial generation) in less than 4 years. However, there is still a lack of long-term studies on massive corals as material for reef restoration using the sexual mode of propagation, despite the fact that massive corals are generally more stress tolerant and slow to recruit naturally to degraded reefs. Here, we report on the survivorship, growth, and reproduction of two sexually propagated, massive coral species (*Favites abdita* and *F. colemani*), outplanted to the reef and monitored until 12 years post-fertilization (2009 - 2021). In 2009, gravid parent colonies were collected generating F₁ parents which were outplanted in 2011. After 6 years, almost 90% of outplanted colonies were sexually mature and after 12 years, colony diameter ranged between 3.0 - 31.6 cm and 3.5 - 21.0 cm for *F. abdita* and *F. colemani*, respectively. In 2021, gravid F₁ colonies were spawned generating F₂ gametes. F₂ generation larvae were successfully collected with 100% fertilization (for *F. abdita*) and successfully settled on artificial substrates for both species. By far, this is the first study to demonstrate long-term sexual propagation of massive corals. It is highly recommended to use multiple species, with various life history strategies, via sexual propagation to restore and sustain coral population in degraded reef areas.

Keywords:

Favites abdita, *Favites colemani*, F₁ generation, F₂ generation, Spawning



INVITED SPEAKER: SYMP_K_INV003

BLUE ECONOMY: DRIVING GROWTH THROUGH SUSTAINABLE USE OF MARINE BIODIVERSITY

Sau Pinn Woo,^{1,*} Annette Jaya-Ram,¹ Aileen Shau Hwai Tan^{1,2}

¹ Centre for Marine and Coastal Studies (CEMACS), Universiti Sains Malaysia, 11800 USM, Penang, Malaysia

² School of Biological Sciences, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia

*e-mail: abe_woo@hotmail.com

Abstract:

The Southeast Asia region is one of the fastest growing economy and population in the world. It sits at one of the world's marine mega biodiversity hotspot that accounts for about 76% species of corals and 37% of the fishes in the world. Rapid coastal development and rising populations have put tremendous pressure on the marine biodiversity resources especially on the demand of food. The enormous marine biodiversity resources in this region is thought to be under estimated and are under utilized that has the potential to leap the region's economic growth in the next decade. Blue food, marine pharmacognosy, and marine green tourism are some of the emerging industry in Blue Economy that are very much related to marine biodiversity that can be the game changer for Southeast Asia. A collaborative effort from academics, governments, as well as public and private sectors are essential in tapping the potentials of marine biodiversity resources and at the same time ensuring the conservation and sustainability of the marine environment and ecosystem in line with the visions of Sustainable Development Goals (SDG).



INVITED SPEAKER: SYMP_L_INV001

Sustainable Tourism as a Strategy for Adventure Tourism Development

Noel Scott*

Professor of Tourism Management, in the Sustainable
Research Centre, University of Sunshine Coast, Queensland, Australia.

*e-mail: nscott1@usc.edu.au

Abstract:

COVID 19 has put the international tourism market on hold and provided an opportunity for rethinking the experiences that adventure tour operators offer to their customers. This means innovation and new product development. This talk will discuss developing and involving sustainable tourism as a strategy for adventure tourism 'products'. Developing any new products requires a clear understanding of the target market. This presentation will discuss how to enhance tours by developing experiences meeting the needs of a particular segment.



INVITED SPEAKER: SYMP_L_INV002

STRENGTHENING TOURISM SUSTAINABILITY WELLNESS TOURISM; THROUGH SOUTHEAST ASIA

Ann Suwaree Ashton*

Graduate School of Tourism Management
National Institute of Development Administration, Thailand
*e-mail: suwaree.n@nida.ac.th, suwareeashton@hotmail.com

Abstract:

The main aim of this paper is to propose a strategy for developing wellness destinations in the next new normal tourism, especially in Southeast Asia case study: a theoretical and practical approach. In the past few years, even before the COVID-19 pandemic, the current phenomenon of a well-being lifestyle had already played an important role in peoples' everyday lives. Hence, due to a high demand in wellness activity and product, many events have occurred, for example: sports and leisure for health in different places around the world (e.g. Japan, Thailand, Indonesia, and Cambodia). The healthy food market, slow food tourism development, including organic food products have been launched with highly competitive prices from many famous brands. In addition, in relation to an academic perspective it is clearly identified that a holistic wellness strategy destination development within the Southeast Asia region is still lacking, hence this chapter will fulfil those gaps (Hermon & Hazler, 1999; Lee, Denizci Guillet, & Law, 2018).

The wellness development theory and case studies in this chapter is to provide an understanding of the important concept will be proposed to match with a wellness current trend circumstance. The different case studies will be discussed in related to wellness activity and attributes. Particularly, four important wellness activities: including: sport and leisure for health; spa/beauty; healthy food; and spiritual retreat concept (Bhumiwat & Ashton, 2020b). The significant insight of wellness attributes will be discussed, such as the well-being of: physical; mental; emotional; social and spiritual (Bhumiwat & Ashton, 2020a; Voigt, 2010; Voigt & Pforr, 2014).

Keywords:

Wellness strategy; Southeast Asia; Ageing healthy living; Wellness activity; Smart wellness destination.

References

- Bhumiwat, A., & Ashton, A., S., (2020a). Emotional Tourist Experience Model: Exploring the Health-wellbeing for the Active 50-plus Tourist *Journal of Tourism, Hospitality & Culinary Arts*, 12(3), 84-105.
- Bhumiwat, A., & Ashton, A., S., (2020b). Wellness Tourism Development: Spa for Health in the Hotel Industry and Tourist Perception *Journal of Tourism Quarterly* 2(3-4), 54-66.
- Hermon, D. A., & Hazler, R. J. (1999). Adherence to Wellness Model and Perceptions of Psychological Well-being. *Journal of Counseling & Development*, 77(3), 339-343.
- Lee, A. H., Denizci Guillet, B., & Law, R. (2018). Tourists' emotional wellness and hotel room colour. *Current Issues in Tourism*, 21(8), 856-862.
- Voigt, C. (2010). Understanding Wellness Tourism: An Analysis of Benefits Sought, Health-Promoting Behaviours and Positive Psychological Well-being. University of South Australia Adelaide.
- Voigt, C., & Pforr, C. (2014). *Wellness Tourism A Destination Perspective* NY, Milton Park: Routledge



INVITED SPEAKER: SYMP_L_INV003

COVID-19, SUSTAINABLE TOURISM, AND THE CHALLENGES FOR THE FUTURE

Robert C. Sinclair^{1,*}, R. Jeffrey Melton², Patthaphon Sukjai³, Artan, Zell⁴

¹ President & CEO, Sinclair & Associates Consulting Incorporated, Advisory Director, Global Mining Sustainability

² Senior Partner, Ocean Editors

³ Faculty of Liberal Arts and Science, Kasetsart University

⁴ Zeta Labs

*e-mail: bob.sinclair76@gmail.com

Abstract:

The COVID-19 pandemic has had massive effects on economies worldwide. One industry that was particularly hard-hit on a global level was tourism. In this presentation, we discuss the impact of the pandemic in terms of psychological/cultural variables (e.g., collectivism versus individualism), which are the reasons that the East dramatically outperformed the West in terms of infection and death per million rates, and the impact of reopening economies in successful and unsuccessful manners. Furthermore, we discuss injustices in the distribution of vaccines and implications for the tourism industry. We describe the conditions that must be met in order to successfully reopen the tourism economy without threatening citizens' health. Finally, we advocate for vaccine passports that are formatted identically worldwide in the same manner as passports for international travel, the potential for use of dynamic face and voice recognition, and explicate our rationale.

Reference:

Sinclair, R. C., Melton, R. J., Sukjai, P., & Artan, Z. (2021, October 6-7). COVID-19, sustainable tourism, and the challenges for the future. Keynote address presented at *the 47th International Congress on Science, Technology and Technology-based Innovation: Sciences for SDGs; Challenges and Solutions*. Faculty of Arts and Sciences, Kasetsart University, Nakhon Pathom, Thailand.



INVITED SPEAKER: SYMP_L_INV004

THE SUSTAINABLE TOURISM REVIEW IN A POST-PANDEMIC 2022: REBUILDING TOURISM TO SUSTAINABILITY

Gina B. Alcoriza*

Associate Professor, Program Chairperson, Tourism Management
University of Santo Tomas-Legazpi, Legazpi City, Philippines
*e-mail: gb_alcoriza@yahoo.com.ph

Abstract:

Sustainable tourism development is now a buzzword worldwide because of the growing urbanization, climate change and social transformation. Nonetheless, the effects of COVID19 Pandemic to tourism is quite a serious problem and now a great concern on the recovery of the industry. The world now needs balance for the next generation's benefits that focuses on active participation of local residents in facilitating tourism in the countryside. The concern of rebuilding tourism now is more on a sustainable approach with greater emphasis on environmental preservation, economic stabilization and social security. The presentation describes sustainable tourism in a post-pandemic 2022. This emphasizes the activities in our rural communities as significant resources in developing sustainable tourism, and its importance and benefits. Sustainable tourism development strategies are considered in this presentation giving balance on planet, people and prosperity.

INVITED SPEAKER: SYMP_M_INV001

FROM MECHANISTIC- AND STRUCTURAL UNDERSTANDING OF *Mycobacterium tuberculosis* METABOLIC ENZYMES TO ANTI-TB COMPOUND DISCOVERY

Wuan-Geok Saw,¹ Priya Ragnathan,¹ Shin Joon,¹ Chui Fann Wong,¹ Amaravadhi Harikishore,¹ Roderick Wayland Bates², Gerhard Grüber,^{1,*}

¹ School of Biological Science, Nanyang Technological University, Singapore

² Division of Chemistry and Biological Chemistry, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore 637371

² Experimental Drug Development Centre, The Agency for Science, Technology and Research, Singapore

³ School of Biological Science, Nanyang Technological University, Singapore

*e-mail: ggrueber@ntu.edu.sg

Abstract:

Mycobacterium tuberculosis (*Mtb*) is one of the most successful human pathogens. Tuberculosis (TB), the deadly disease caused by this bacterium, kills more people than any other bacterial infectious disease.¹ There has been a recent resurgence of TB drug discovery activities, resulting in the identification of a number of novel enzyme inhibitors. Many of which targets the electron transport chain complexes and the F-ATP synthase as new target spaces for drug discovery, since the generation of ATP is essential for the bacterial pathogen's physiology, persistence, and pathogenicity. The mycobacterial F₁F₀-ATP synthase (F-ATP synthase) consists of nine subunits with a stoichiometry of $\alpha_3:\beta_3:\gamma:\delta:\epsilon:a:b:b':c_9$. The F₁ domain contains subunits $\alpha_3:\beta_3:\gamma:\epsilon$, the proton-translocating F₀ domain subunits $a:c_9$, and subunits $b:b':\delta$ are holding both domains together. Rotation of $\gamma\epsilon$ connects proton-conduction and ATP-formation within the $\alpha_3:\beta_3$ hexamer. In the membrane-embedded F₀ domain, each of the nine *c* subunits forms a helix-loop-helix structure, where the loop docks to the bottom of the N-terminal domain of subunit ϵ and the globular domain of γ , which both rotate and enable the coupling to the F₁ portion to transfer torque, derived by H⁺-transport, to the catalytic $\alpha_3\beta_3$ -headpiece. The talk describes how structural- and mechanistic insights into the molecular engine, F-ATP synthase, provided the platform for novel anti-TB targets and -compounds.

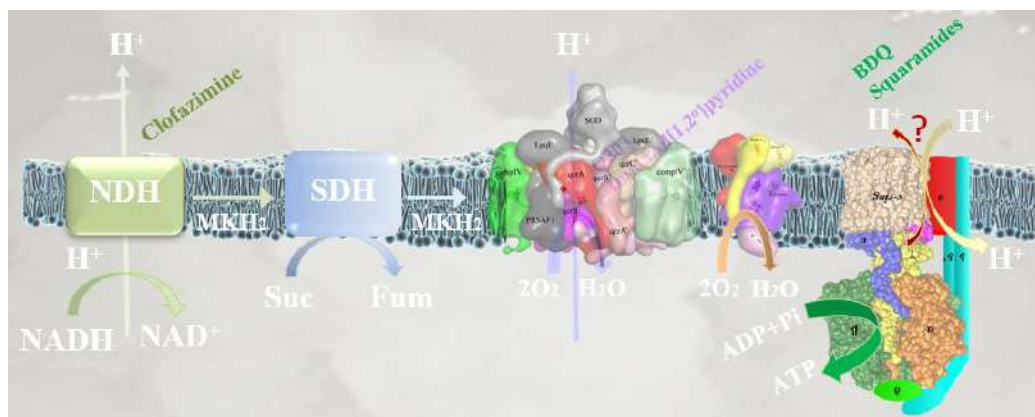


Figure. Respiratory chain of Mycobacteria

INVITED SPEAKER: SYMP_M_INV002

HOT PURSUIT OF MYCOBACTERIA BY POLYASPARTAMIDE POLYELECTROLYTES

Aasheesh Srivastava,^{*1} Prabhu Srinivas Yavvari,¹ Anand Kumar Awasthi,¹ Siddhi Gupta,² Avinash Bajaj²

¹Dept. of Chemistry, IISER Bhopal, Bhopal 462066 Madhya Pradesh India

²Regional Center for Biotechnology, NCR Biotech Cluster, Faridabad 122001 Haryana India

*e-mail: asrivastava@iiserb.ac.in

Abstract:

Infections caused by *Mycobacterium* are a cause of death and disfigurement for millions across the world. For example, tuberculosis (TB) accounts for approximately two million deaths every year, largely in the developing countries. The 'next generation' of this challenge is already staring at us in the form of Multi-drug resistant forms of TB (MDR-TB) and extensively drug-resistant TB (XDR-TB). In this talk, I will discuss about our efforts in designing and developing polyaspartamide polyelectrolytes as novel antimicrobial polymers that can selectively kill *Mycobacterium* with high potency. These biodegradable and biocompatible polymers are easy to prepare and modify chemically. They achieve the killing of *Mycobacterium* through a non-membrane lytic process, which is somewhat uncommon in antimicrobial polymers.

Mycobacteria also uses our own macrophage cells as a safe hideout to escape the common antimycobacterial drugs. These macrophage-residing *Mycobacteria* are therefore especially challenging to target by current drugs and become a source for recurrent infections. In the later part of my talk, I will present how we further improved our polyamide polyelectrolytes to achieve the killing of *Mycobacteria* that reside within macrophages. Not only this, but our polymers could also degrade the biofilms formed by *Mycobacteria*, further confirming their potent antimycobacterial potential. The talk will cover such polymer-based approaches that we are taking to create antimicrobial and antifouling surfaces.

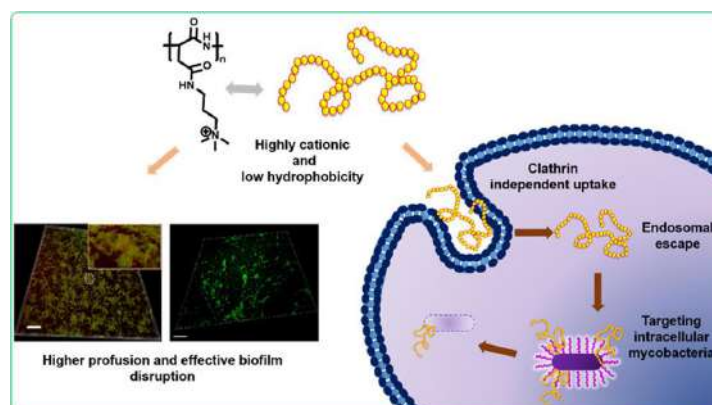


Figure. Schematic of cationic polyelectrolytes targeting *Mycobacterium* residing within macrophages.



INVITED SPEAKER: SYMP_M_INV003

-TBA-

Pornpan Pungpo*

*e-mail: pornpan.p@ubu.ac.th

Abstract:

TBA



INVITED SPEAKER: SYMP_N_INV001

SUSTAINABLE INNOVATIONS FOR FUTURE PACKAGING BY DOW PACK GURU

Chompoonuch Junbua*, Rangsun Chaosuwannakij, Thawatchai Tungkavet, Anurak Rassamee Amornwiwat

Dow Thailand Group, Thailand
*e-mail: JChompoonuch@dow.com

Abstract:

Nowadays, sustainability plays a major key for global innovation development, especially for future packaging trends. Material development in packaging industry is by far having a huge growth in terms of application from the broad and increase demand of people to fulfil the daily well-being. Dow Thailand Group, the leading materials science company with packaging experts “Dow Pack Guru team” succeed on the introduction of innovative science and technology to turn idea for solutions to become an action in real life. In this panel discussion, the fundamentals of polyethylene, the applications of using innovative material, mega-market trends in packaging industry, how plastic packaging can reduce Green House Gas emissions, the research and development in terms of science aiming to close the loop for a circular economy are presented. Zero-waste for long-term sustainability starting from product designing, production usage and disposal of waste as a value feedstock for other industry are also included with the real-world case sharing on sustainable packaging innovations in Thailand and the Asia Pacific.

INVITED SPEAKER: SYMP_N_INV002

ADVANCING SAFETY AND CIRCULARITY OF RUBBERIZED SPORTS SURFACES THROUGH INNOVATION AND VALUE CHAIN PARTNERSHIPS

Loganathan Ravisanker^{1*}, Paul Fong¹, Dr. Zhang Liang², Wei Li²

¹ Dow Inc., Singapore

² Dow Inc., Shanghai, P.R. China

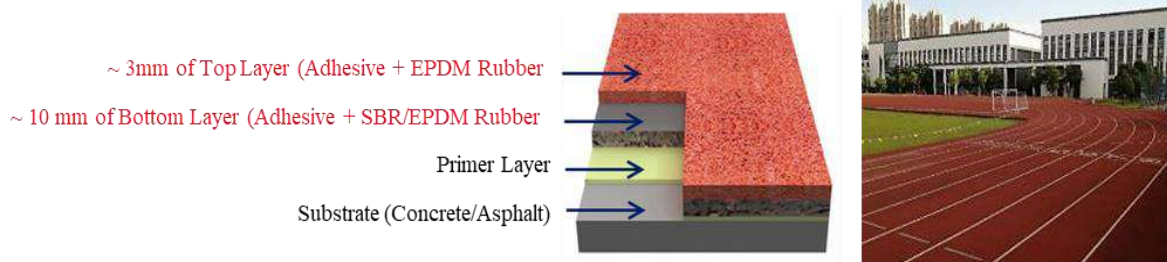
*e-mail: Lravisanker@dow.com

Abstract:

Field applied rubberized sports surfaces such as running tracks and playgrounds consist of an adhesive system that binds the elastic components such as EPDM and SBR rubber granules. Once cured, the surface provides desired strength and cushioning properties to reduce fall-related injuries for the users. However, the presence of harmful substances such as aromatic solvents, heavy metals, TDI, MOCA in the rubberized surfaces has been a cause of concern for the users' health and safety. In 2015, news of a 'poisonous running track' in China further highlighted the concerns and the need for sustainable and safe alternative materials.

ECOGROUND™ binder technology from Dow is a safe alternative for installing rubberized surfaces. Based on water-based acrylic copolymers, this novel binder technology has very low VOC, low odor, and is free of hazardous substances. In addition, a unique accelerator system in this binder technology enables better chemical bonding and mechanical interlocking with the granules and provides desired mechanical and cushioning properties.

As a water-based system, ECOGROUND™ is easy and safe to store and handle on sites and provides superior UV resistance, and thus helps retain aesthetics for a longer time. This innovative binder won the 2017 R&D 100 awards for Green Technology and has enabled safe and sustainable sports surfaces in many schools and universities in the region.



Recycled SBR granules from tires are widely used at the bottom layer of the rubberized play surfaces, while EPDM granules are used in the top layer for better aesthetics. However, SBR granules raise safety concerns with the presence of hazardous substances. As a result, the trend in some regions is to use all EPDM granules that only further increases the carbon footprint of such rubberized systems.

In Singapore, in partnership with various industry stakeholders, including educational institutions, Dow has successfully demonstrated the use of granules from used sports and school shoes as a potential replacement for the SBR granules.

The used shoes usually are thrown away into waste bins and eventually end up in incinerators and landfills. Thus, recycling used shoes into sports surfaces reduces carbon footprint and potentially improves the safety profile of the rubberized play surfaces.

INVITED SPEAKER: SYMP_N_INV003

SUSTAINABLE CHEMICAL PRODUCTION – TECHNOLOGY & PATHWAYS TOWARDS A GREEN FUTURE FOR DOW

Jens Schmidt^{1*}

¹ DOW Inc. Germany

*e-mail: JSSchmidt3@dow.com

Abstract:

Society and regulatory bodies are getting more and more concerned about climate change and drive required changes in our society to keep global warming below a critical level. With industrial emissions from required energy and direct process emissions accounting for ~30% of the total global greenhouse gas emissions (source: Climate Watch / World Resources Institute) there is a clear need for industry players to define and implement transitions to a more sustainable production.

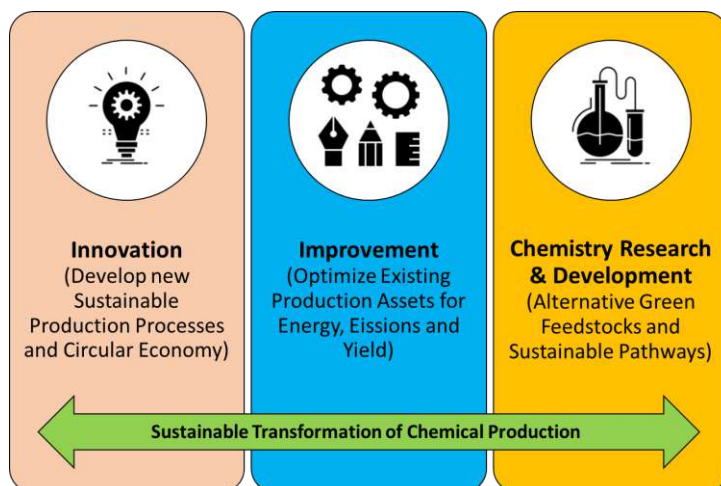


Fig.1: Key elements of a sustainable transformation of chemical production

DOW Inc as a major chemical producer has also defined Sustainability goals, such as a GHG reduction target to support society in this transformation, not only through the benefit its products bring in the value chains via energy savings downstream but also directly in Dow' s production processes around the world.

A successful transition will have to tackle all 3 scopes (1, 2, 3) of GHG emissions by developing innovative new processes which require less energy and don' t depend on fossil sources, allow for circular economies via recycling as well as optimizing existing assets regarding their energy footprint and emissions profile. In addition, a company needs to look beyond

their own emissions and understand the footprint of key raw materials as these can drive over 50% of the final products carbon footprint. Here, besides improved production processes, research and development activities are needed to identify alternative green raw materials and different chemical production routes which allow for sustainable value chains.

Last not least the transformation to sustainable chemical production has to be accompanied by economic feasibility and business models which are highly dependent on incentives for green products in the market, government subsidies to overcome market barriers for entry and societal and investor preferences towards sustainable producers.

The presentation will outline the high level framework and illustrate the concept above with a few selected examples.

INVITED SPEAKER: SYMP_O_INV001

FABRICATION OF BIODEGRADABLE CELLULOSE COMPOSITE THROUGH GREENER REACTION PROCESS

Yoshito Andou^{1,2*}, Safarul Mustapha³, Tessei Kawano³

¹ Organization for Promotion of Research and Open Innovation, Kyushu Institute of Technology, Fukuoka 808-0196, Japan

² Collaborative Research Centre for Green Materials on Environmental Technology, Kyushu Institute of Technology

³ Department of Life Science and Systems Engineering, Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology

*e-mail: yando@life.kyutech.ac.jp

Abstract:

Reduction of carbon dioxide is a big concern for relaxation of global warming. The carbon dioxide increases due to the consuming of petroleum-derived products and human activities, which must reduce and replace resources based on petroleum to other. We also need to change our lifestyle. Since the use of non-biodegradable products is not sustainable, sustainable environmental science and green chemistry is certainly important nowadays.

Lignocellulose can be one candidate for low carbon resources to replace from petroleum. With increasing environmental concern our research has focused on green materials such as sustainable, renewable, and biodegradable. In this time, the author focused on celluloses as a bio-based filler and its modification as eco-friendly methods. Especially, the study of polymer composite with cellulose filler will introduce, which has been growing exponentially its study as a low-carbon material because of high strength, and stiffness, lighter in weight and biodegradability. In one of our studies, poly(lactic acid) [PLA] composite with nanocellulose was prepared through twin-screw extruder as a molding method (Figure 1). Although it is difficult to disperse cellulose in polymer matrix, this PLA composite showed high dispersibility of nanocellulose in the matrix resin.

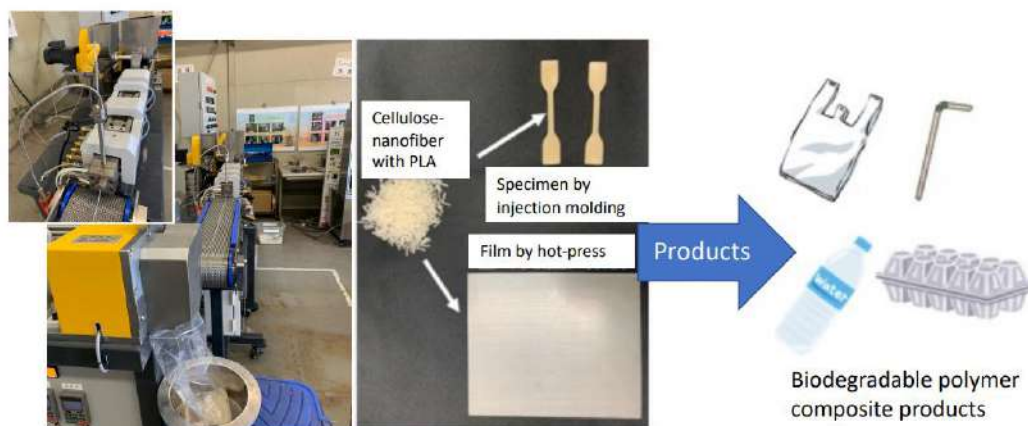


Figure 1. Preparation of PLA composites with cellulose nanofiber through twin-screw extruder and its molding products.



INVITED SPEAKER: SYMP_O_INV002

INSPIRATION, MOTIVATION, AND CREATIVITY: HOW TO DESIGN STEM ACTIVITIES FOR SUSTAINABLE DEVELOPMENT

Ruetai Chongsrid*

National Science and Technology Development Agency, Pathum Thani, 12120, Thailand

*e-mail: reutai@nstda.or.th

Abstract:

In Thailand, Sirindhorn Science Home is one of the national learning centres for STEM activities for teachers and children under the STEM academy program, National Science and Technology Development Agency (NSTDA), Ministry of Higher Education Science Research and Innovation.

STEM activities at the Sirindhorn Science Home academy program aims to equip children and youth young people with three major skills for a worthwhile future: inspiration, motivation, and creativity.

The key pillars of the work that Sirindhorn Science Home is doing are STEM teachers' training, a STEM camp for students, and the development of curricula and science educational content and material such as books and, multimedia. Building on this, the STEM program can encourage and help develop essential skills, such as critical thinking, communication, collaboration, and creativity which are essential. Above all, it is one of the main organizations that contribute to STEM education for sustainable development.

The STEM academy program offers develops activities for children which are related with the 17 goals of sustainable development. For example, Biomimicry program, Climate action program, STEM plus culture program, Energy and transportation program, Food and feed program, Agriculture program, Robotics and automation program, Smart material for sustainable city program, Good health program, and Biodiversity program.

The STEM program academy has incorporates 7 pedagogies: 1) Making it a meaningful learning experience 2) Cultivating creativity through powerful ideas 3) Allowing students them to construct their own understanding and knowledge of the world 4) Creating challenging activities in specific contexts 5) Nurturing curiosity continuously with the Learning Spiral model 6) Teaching children how to think rather than what to think. Thus, there is metacognition process in students through recording, reflection, and discussion and 7) Setting an inspiring learning environment and offering fun hands-on activities with related their daily life to motivate students to bring out their inspirations for their best learning efficiency.

Keywords:

inspiration, motivation, creativity, STEM Activity, Education for Sustainable Development, ESD



INVITED SPEAKER: SYMP_P_INV001

SUSTAINABLE FOOD SYSTEM FOR LOCAL INGREDIENTS, TREND AND SUPPORTING POLICY

Akkharawit Kanjana-opas*

Vice President of National Science and Technology Development Agency

*e-mail: akkharawit.kan@nstda.or.th

Abstract:

TBA



INVITED SPEAKER: SYMP_P_INV002

STATE-of-the-ART FOOD TECHNOLOGY FOR SUSTAINABLE FOOD SYSTEMS

Richard Archer^{1,*}

¹School of Food & Advanced Technology, Massey University, New Zealand

¹Riddet Institute, Palmerston North, New Zealand

*e-mail: r.h.archer@massey.ac.nz

Abstract:

For the last six years a major research programme called FIET (Food Industry Enabling Technologies) has been running across three New Zealand universities plus three research institutes. FIET covered “new” food process technologies targeted at making the New Zealand food system more sustainable. Some are new inventions, some new to New Zealand, and two are modern incarnations of ancient food preservation processes. The talk will cover ten of the more interesting projects and their technologies:

Ice Bank – the best-performed format now on offer for storing and retrieving “cold”

Rapid Liquid Freezer – robust, compact freezer for sheep or goat milk

Meat Tenderisation – new technologies for accelerating industrial scale sous vide

Precision Smoking – new device for generating culinary smoke without the undesirables

Creamed Pomace – new process to convert pomace to smooth, high fibre ingredient

Atmospheric Freeze Drying – drying from frozen more cheaply than vacuum freeze drying

Drying Sticky Products – dry juice or honey to a non-sticky powder with minimal agent

Pulsed Electric Field – reduced oil and energy use on potato chips

Microwave Sterilisation – fast thermal treatment of packaged RTE meals at retort pressures

UV of Rolling Berries – extended shelf life by even UV treatment on all sides of berries

These FIET-developed technologies are now ready for, or are undergoing, commercialisation.



INVITED SPEAKER: SYMP_P_INV003

LOCAL INGREDIENTS AND SUSTAINABILITY FOOD SYSTEM R&D FROM DEMAND SIDE

Lalana Teeranusornkit*

Senior Deputy Managing Director In terms of food innovation and new product development, CPF

*e-mail: lalana.thi@cpf.co.th

Abstract:

TBA



INVITED SPEAKER: SYMP_P_INV004

FOOD INNOVATION FOR FOOD SYSTEM SUSTAINABILITY, GOOD HEALTH, AND WELL-BEING

Paola Pittia*

Faculty of Bioscience and Technology for Food, Agriculture and Environment, University of Teramo

*e-mail: ppittia@unite.it

Abstract:

TBA



INVITED SPEAKER: SYMP_Q_INV001

-TBA-

Nannan Sun*

*e-mail: TBA

Abstract:

TBA



INVITED SPEAKER: SYMP_Q_INV002

-TBA-

Edman Tsang*

*e-mail: TBA

Abstract:

TBA



INVITED SPEAKER: SYMP_Q_INV003

-TBA-

Representative from CAS ICCB*

*e-mail: TBA

Abstract:

TBA

INVITED SPEAKER: SYMP_R_INV001

FROM INVENTION TO INNOVATION: CHEMICAL TECHNOLOGIES FOR ENVIRONMENTAL APPLICATIONS

Adam Slabon*

Department of Materials and Environmental Chemistry, Stockholm University Svante

Arrhenius väg 16c 10691 Stockholm, Sweden

*e-mail: adam.slabon@mmk.su.se

Abstract:

The success of Green Chemistry is reflected both in academic research and sustainable commercial applications. In this talk, I will discuss the challenges and opportunities of scientific research with respect to its path from successful validation in the laboratory toward potential implementation and commercialization. Two examples from our on-going work will be used to elucidate the critical aspects for the transition from invention to innovation:

- Efficient treatment of domestic and industrial wastewater is one of the major challenges of the 21st century. Among the inorganic pollutants, nitrogen species are significant contaminants, and the management of the nitrogen cycle is one of the most crucial parts of wastewater purification. The company AquaBioSolve Stockholm AB has patented a solution that substitutes the required chemicals for denitrification by using electricity.
- The growing demand for Li-ion batteries (LIBs) has made their postconsumer recycling an imperative need toward the recovery of valuable metals, such as cobalt and nickel. Nevertheless, their recovery and separation from active cathode materials in LIBs, via an efficient and environmentally friendly process, have remained a challenge. A bio-inspired metal-organic framework (MOF) achieves efficient cobalt separation at room temperature.

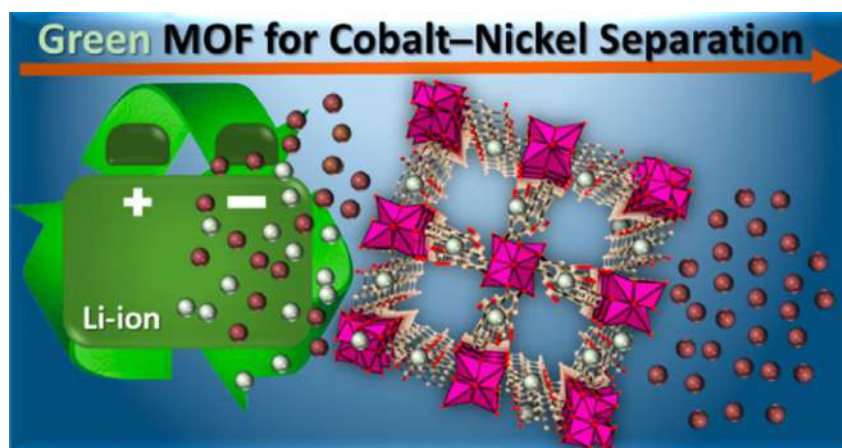


Figure. Toward sustainable recycling of Li-ion batteries *via* Green Chemistry.



INVITED SPEAKER: SYMP_S_INV001

GENETIC CODE REPROGRAMMING WITH ENGINEERED TRANSLATION MACHINERIES

Chayasith Uttamapinant^{1,*}

¹School of Biomolecular Science and Engineering, Vidyasirimedhi Institute of Science and Technology (VISTEC),
Rayong 21210, Thailand

*e-mail: chayasith.u@vistec.ac.th

Abstract:

I will outline research efforts in my laboratory in developing labeling strategies for proteinogenic species not amenable to commonly used labeling techniques such as GFP. These species include microproteins, proteins produced from alternative open reading frames, and proteolytically processed peptides. Central to our efforts is the genetic code expansion technology, in which several components of the cellular protein translation machineries are engineered to allow production of proteins bearing new building blocks with useful reporting properties. We developed variants of genetic code expansion-based labeling strategies, including a molecular beacon reporter for processed peptides and subcellular proteome tagging tools, and demonstrated their utilities in imaging microproteins and peptides, including *de novo* generated amyloid-beta peptides, and proteomes in living mammalian cells.



INVITED SPEAKER: SYMP_S_INV002

BIOENGINEERING OF *Escherichia coli* OUTER MEMBRANE VESICLES AS DRUG AND VACCINE DELIVERY SYSTEM

Sedthawut Laotee,¹ Thitirat Rattanawongwiboon,² Najet Mahmoudi,³
Wanatchaporn Arunmanee^{1,*}

¹ Department of Biochemistry and Microbiology, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, 10330, Thailand

² Thailand Institute of Nuclear Technology (Public Organization), Ongkharak, Nakorn Nayok, 26120, Thailand

³ STFC ISIS Facility, Rutherford Appleton Laboratory, Chilton, Didcot, OX11 0QX, United Kingdom

*e-mail: wanatchaporn.a@chula.ac.th

Abstract:

To tackle antimicrobial resistance, antibiotic use is currently being reduced in farming. However, food production yields can be reduced due to increased disease outbreaks. One solution is vaccination, which is very cost effective and does not promote antibiotic resistance. The most effective vaccines are live-attenuated vaccines that closely mimic the biology of the pathogen. However, despite showing the best efficacy, they can revert to a virulent form and increase the risk of disease transmission in both the agricultural environment and humans. Thus, new safer and effective vaccine platforms should be developed. Outer membrane vesicles (OMVs) are released by Gram-negative bacteria and contain lipopolysaccharide (LPS), outer membrane proteins (OMP), toxins, DNA, etc. Genetically engineered OMVs can be created to attach any antigens to OMVs. Benefits of using OMVs as vaccines: 1) easy and cheap production from genetically well-defined *E. coli* 2) LPS serves as an internal adjuvant even when modified to reduce toxicity 3) safe; OMV-based vaccines have been approved for humans.

OMV's are an increasingly mature technology but a remaining hurdle to their use, noted in recent reviews, is OMV heterogeneity which makes quality control difficult. Even though a meningitis serogroup B OMV vaccine, Bexsero, has been approved for human use by EMA in 2013, it is currently the only OMV-based vaccine on the market. The main challenges in OMV development are the high reactogenicity of LPS and unwanted OMV-associated immunogens, and batch to batch consistency of OMV production. We are interested in finding the minimal redesign to make reproducible and stable OMVs. In the *E. coli* outer membrane, OMPs vary in number, size, and characteristics and may hold the key to OMV consistency. Some OMPs consisted of specific LPS binding sites which create ordered regions within the outer membrane. Certain OMPs may thus help stabilise OMVs and control the amount of LPS present. Our project uses a new approach that combine genetic engineering with accurate physical analysis to understand the qualities of reproducible, simple and stable OMVs. Furthermore, OMVs were also modified to display antigens for further applications. Therefore, the OMVs with these qualities would be a promising platform to produce safe and effective vaccines for clinical use.

INVITED SPEAKER: SYMP_S_INV003

ENGINEERING YEAST TO PRODUCE ADVANCED BIOFUELS AND HIGH-VALUE BIOCHEMICALS

Weerawat Runguphan^{1,*}, Akaraphol Watcharawipas¹, Kittapong Sae-tang¹, Kitisak Sansatchanon¹, Wiparat Siripong¹, Philipp Wolf², Theodora Puspowangi Kusumoputri³, Clara Angela⁴, Joe James Downes⁴, Pipat Sudyang¹, Kriengsak Boonchoo¹, Kanokarn Kocharin¹, Sutipa Tanapongpipat¹

¹ National Center for Genetic Engineering and Biotechnology, Thailand

² Leipzig University, Germany

³ Atma Jaya University, Indonesia

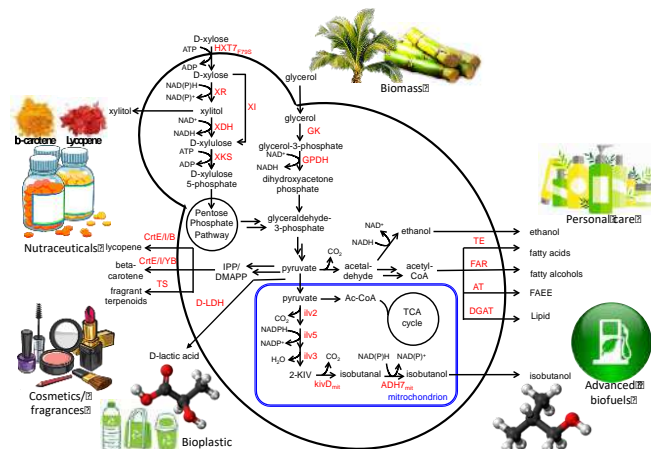
⁴ Indonesia International Institute for Life-Sciences

⁵ University of Kent, United Kingdom

*e-mail: weerawat.run@biotec.or.th

Abstract:

As the effects of climate change become increasingly severe, metabolic engineers and synthetic biologists are looking towards greener sources for transportation fuels, platform chemicals and high-value chemicals. The design and optimization of microorganisms to produce these compounds from renewable feedstocks can significantly reduce dependence on fossil fuels and thereby produce fewer emissions. In this presentation, we provide an overview of our recent work including: 1) Engineering the yeast *Pichia pastoris* and *Saccharomyces cerevisiae* to produce the advanced biofuels isobutanol, isoamyl alcohol and the fragrant compounds acetate esters and 2) Engineering the yeast *S. cerevisiae* to produce D-lactic acid. For the first work, our strategy exploited the yeast's amino acid biosynthetic pathway and diverted the amino acid intermediates to the 2-keto acid degradation pathway for higher alcohol production. Rewiring of the cells' primary metabolism using CRISPR/Cas9 further improved product yields. Efforts are underway to create a consolidated bioprocessing platform based on a single microorganism that directly converts sugarcane bagasse into advanced biofuels. For the second work, we identified highly efficient D-lactate dehydrogenase variants after screening 600 lactic acid bacteria isolates. Systematic deletions and down-regulation of genes in the ethanol and glycerol pathways resulted in a strain that can produce D-lactic acid at near theoretical yield. Altogether, our work represents progress towards efficient microbial production of fuels, platform chemicals and high-value chemicals.





ORAL PRESENTATION SESSIONS

INFORMATION FOR ORAL PRESENTATION

Oral presentations will include a pre-recorded video presentation and a live discussion with other speakers and attendees of the session.

Oral presentations need to be pre-recorded before the conference, and uploaded to the virtual conference platform as an mp4. **The deadline to upload oral presentations to the conference e-mail (stt47congress@gmail.com) is September 24, 2021. In addition, please use the STT47 virtual background during the recording if possible.**

Presentations should be a maximum of 12 to 15 minutes based on your time slot. Select invited speakers have been asked to provide 25 minute presentations. If your video presentation exceeds the maximum time restriction, we will contact you and ask you to re-record and upload the presentation.

Video presentations will be available to attendees on the assigned date-time of each session. Each session will also have a live, Q&A-style discussion. The time and date of the discussion for your session can be found in this program book.

These live discussions will bring together the speakers, depending on the number of speakers in the session. They will provide an opportunity to answer questions from attendees, discuss your work with like-minded peers, and build connections. Live discussions will occur over ZOOM platform. You will be able to access the live discussion session through the conference platform. Access to the Zoom Meeting room will be provided 15 minutes prior to the start of the discussion time. As a presenter you should rename yourself as "ID – NAME," during the live discussion. We highly encourage all presenters to be available to take part in their live discussion session.



POSTER PRESENTATION SESSIONS

INFORMATION FOR POSTER PRESENTATION

Poster presentations will include a high-quality PDF poster, an optional pre-recorder video flash talk (as an mp4 format), and a live discussion with conference attendees on assigned conference schedule.

Posters will be accessible to conference attendees in the main conference platform for the duration of the event. You have the option of pre-recording a three-minute flash talk to accompany your poster. The flash talk will also be available in the main conference platform throughout the event. The flash talks can include excerpts of your high-quality poster in the form of a PowerPoint presentation or a high-level walkthrough. If your optional flash talk exceeds the maximum time restriction, we will contact you and ask you to re-record and upload the new video.

The deadline to upload posters to the conference support e-mail (stt47congress@gmail.com) is September 24, 2021. In addition, please use the STT47 virtual background during the recording if possible.

Presenters will also take part in a 180-minute live poster session hosted through ZOOM platform on 5th and 6th October. During this time, speakers should be present in ZOOM platform to discuss their presentations with conference attendees. We highly encourage all presenters to be available to take part in their live discussion session. As a presenter you should rename yourself as "ID – NAME SURNAME," during the live discussion.

SESSION A - INNOVATION IMPACTS DRIVEN SDGS

ID	Presenter	Title
A_001_P	Penpark Sirimark	THE STUDY OF EFFICIENCY OF LPG HOT AIR DRYER COMPARED WITH ELECTRICAL HOT AIR DRYER; CASE STUDY OF DRIED SLICED PORK

SESSION D - SDG CHALLENGES: CHEMICAL SOLUTIONS FOR SUSTAINABLE SOCIETY

ID	Presenter	Title
D_001_P	Sokkeang Be	ENCHANING MANGROVE BIOCHAR RESIDUE FOR PHOSPHATE ADSORPTION BY MODIFIED WITH Fe ³⁺ , K ⁺ AND Na ⁺
D_002_P	Narumon phonrung	FABRICATION CHARACTERIZATION AND LEACHING PROPERTIES OF POLYACRYLONITRILE ELECTROSPUN NANOFIBROUS MEMBRANES CONTAINING BIOCHAR AND ZINC NANOPARTICLES
D_003_P	Sirintip Sangsawang	IDENTIFICATION OF NON-COVALENT INHIBITORS OF SARS-CoV-2 MAIN PROTEASE THOUGHT VIRTUAL SCREENING AND PHARMACOKINETIC PREDICTION
D_004_P	Kanlapangha Rattanaikaew	PREPARATION AND CHARACTERIZATION OF POLYMETHACRYLATE EUGENOL-BASED PARTICLES
D_005_P	Latdamanee Phuththatham	SYNTHESIS AND CHARACTERIZATION OF NEARLY UNIFORM BIOBASED POLYMER PARTICLES FOR USE AS ANTIMICROBIAL FILM

SESSION E2 - IMPACT OF BIOLOGICAL SCIENCE TOWARDS SDGS: BIOLOGICAL SCIENCES TOWARDS SDGS

ID	Presenter	Title
E2_001_P	Panus Yingjamsiri	REGULATION OF HUMAN ID1 GENE PROMOTER BY MICRORNA-221/222
E2_002_P	Orapan Sripichai	ANTIBACTERIAL ACTIVITY OF ETHANOLIC EXTRACTS FROM THAI MEDICINAL PLANTS AGAINST <i>Porphyromonas gingivalis</i>
E2_003_P	Orapan Sripichai	ANTIMICROBIAL SUSCEPTIBILITY PROFILE OF <i>Cutibacterium acnes</i> ISOLATES FROM ACNE PATIENTS IN THAILAND
E2_004_P	Kanokorn Wechakorn	ANTIOXIDANT AND ANTIDIABETIC INHIBITORY ACTIVITY OF CRUDE EXTRACTS FROM EDIBLE INSECTS
E2_005_P	Pimchanok Puthong	COMPARATIVE STUDY ON BIOACTIVE INGREDIENTS AND ANTIOXIDANT POTENTIAL OF SOME CABBAGES (<i>BRASSICA OLERACEA</i> VAR. <i>CAPITATA</i>)
E2_006_P	Passanan Bawornkrailerd	IDENTIFICATION OF TOXIC PLANTS FROM MORPHOLOGICALLY SIMILAR EDIBLE PLANTS IN THAILAND USING DNA BARCODE
E2_007_P	Ekachai Chukeatirote	ISOLATION AND CHARACTERIZATION OF BACTERIOPHAGE INFECTING <i>Bacillus cereus</i>
E2_008_P	Sompradtana Worabandit	MEDIA AFFECTING GERMINATION RATE OF ORCHID SEEDS IN <i>Seidenfadenia mitrata</i> (Rchb. f.) Garay
E2_009_P	Phanthipha Runsaeng	METHOD FOR PROTEIN EXTRACTION AND PAPER DEVICE FOR PROTEIN SEMI-QUANTITATIVE SCREENING IN NATURAL RUBBER LATEX
E2_010_P	Supawee Kinnonkok	PREVALENCE AND CHARACTERISATION OF ANTIMICROBIAL RESISTANCE GENOTYPES AND PHENOTYPES OF <i>CAMPYLOBACTER</i> ISOLATES FROM PATIENTS IN THAILAND
E2_011_P	Jenjira Chalerm	RAPID AND ACCURATE IDENTIFICATION OF HUMAN-ASSOCIATED STAPHYLOCOCCI BY USE OF MULTIPLEX REAL-TIME PCR
E2_012_P	Chanoknant Thongsuk	STUDY ON PHYTOCHEMICAL COMPOSITION AND BIOLOGICAL ACTIVITIES OF <i>Aspidistra sutepensis</i> K. Larsen
E2_013_P	Burassakorn Tongmee	CHARACTERIZATION OF CRUDE PROTEASE EXTRACTE FROM VISCERA OF SEA BASS (<i>Lates calcarifer</i>)

SYMPOSIUM A

ID	Presenter	Title
SYMP_A_001_P	Jirabhorn Piluk	EFFICACY OF UVC LIGHT IN DECONTAMINATION OF INDICATOR PATHOGENS AND ITS SURFACE CLEANING APPLICATION

SYMPOSIUM C

ID	Presenter	Title
SYMP_C_001_P	Damisa Kaminsin	GENETIC DIVERSITY OF PAINTED STORK <i>Mycteria leucocephala</i> IN DUSIT ZOO, THAILAND, BASED ON MITOCHONDRIAL CYTOCHROME B SEQUENCES

SYMPOSIUM D

ID	Presenter	Title
SYMP_D_001_P	Yupa Wattanakanjana	CRYSTAL STRUCTURE OF SILVER (I) BROMIDE COMPLEX CONTAINING 4-PHENYLTHIOSEMICARBAZIDE AND TRIPHENYLPHOSPHINE LIGANDS
SYMP_D_002_P	Nanthawat Wannarit	CRYSTAL STRUCTURES AND HIRSHFELD SURFACE ANALYSIS OF NEW MONO- AND DINUCLEAR COPPER(II) COMPLEXES CONTAINING MIXED DIIMINE AND HYDROXYBENZOATE DERIVATIVE LIGANDS
SYMP_D_003_P	Nareekarn Meebua	SYNTHESIS, CHARACTERIZATION, X-RAY STRUCTURES OF NEW COPPER(II) COORDINATION POLYMERS INCORPORATING IMIDAZOLE-BASE DERIVATIVES AND SULFATO ANIONIC BRIDGING LIGAND
SYMP_D_004_P	Vipada Petson	SYNTHESIS, CHARACTERIZATION AND CRYTAL STRUCTURE OF A NEW DINUCLEAR COPPER(II) COMPLEX CONTAINING 1,10-PHENANTHROLINE AND 3-NITROBENZOATE LIGANDS
SYMP_D_005_P	Chayanin Nisaimun	EFFECT OF GYPSUM WASTE ADDITIONS ON THE LOW-DENSITY CALCIUM SILICATE INSULATING BOARD USING RICE HUSK ASH AS SiO ₂ SOURCE
SYMP_D_006_P	Kulwadee Ponanunrirk	CRYSTAL STRUCTURE OF ONE-DIMENSIONAL LADDER CHAIN-LIKE STRUCTURE CADMIUM(II) COORDINATION POLYMER

SYMPOSIUM F

ID	Presenter	Title
SYMP_F_001_P	Kajonsak Vongshewarat	SPECIES DIVERSITY OF LICHEN AT THE UTHOKKAWIPATPRASIT WATER GATE IN PAKPHANANG DISTRICT, NAKHON SI THAMMARAT PROVINCE

SYMPOSIUM G

ID	Presenter	Title
SYMP_G_001_P	Thanathip Kosawatphat	STRAIGHTFORWARD SIGNAL AMPLIFICATION FOR A SENSITIVE DETECTION OF HORMONAL CORTISOL USING THE CONSTRICTED LATERAL FLOW TEST STRIP
SYMP_G_002_P	Umaporn Pimpitak	DEVELOPMENT OF LATERAL FLOW IMMUNOASSAY FOR RAPID AND SENSITIVE DETECTION OF anti-SARS-CoV-2 IgG

SYMPOSIUM H

ID	Presenter	Title
SYMP_H_001_P	Kann Jiwattayakul	RATIONALIZATION OF REACTIVITY OF NICKEL AND PALLADIUM Pincer COMPLEXES AS CATALYSTS FOR IODOBENZENE AND 1,2-DIMETHYLDISULFANE: THEORETICAL STUDY
SYMP_H_002_P	Napat Misrisuk	STRUCTURAL CHARACTERIZATION OF ONE POT SYNTHESIZED NANO-SIZED B-TRICALCIUM PHOSPHATE
SYMP_H_003_P	Kanyaporn Thubthong	A PERYLENE DIIMIDE/TITANIUM DIOXIDE HYBRID AS ELECTRON TRANSPORTING LAYER IN PEROVSKITE SOLAR CELLS
SYMP_H_004_P	Juntasak Wangrangsimakul	EFFECTS OF TYPES OF ARYLAMINES BASED BENZOXAZINE BINDERS IN BRAKE PADS ON THERMAL DEGRADATION KINETICS

SYMPOSIUM I

ID	Presenter	Title
SYMP_I_001_P	Rachata Lueachan	VALUE ADDED MANGO PEELS POWDER AS DIETARY FIBER IN CRISPY MIXED-VEGETABLE SHEET

SYMPOSIUM K

ID	Presenter	Title
SYMP_K_001_P	Arirush Wongnutpranont	MACROBENTHIC FAUNA AND TOURISM ACTIVITIES WITHIN UNDERWATER PINNACLE DIVE SITES IN THE NORTH ANDAMAN SEA, THAILAND
SYMP_K_002_P	Laongdow Jungrak	SPECIES DIVERSITY AND ABUNDANCE OF MACROBENTHIC INVERTEBRATES IN SEAGRASS AT KO PHRA THONG, PHANG NGA PROVINCE
SYMP_K_003_P	Ploypailin Rangseethampanya	THE INITIAL STUDY OF FISH ASSEMBLAGE IN THE CORAL NURSERIES OF HIGH STRESS-TOLERANT CORAL FRAGMENTS IN THE WESTERN GULF OF THAILAND

SYMPOSIUM N

ID	Presenter	Title
SYMP_N_001_P	Chayanit Sripradit	EFFECT OF PHOSPHATE COMPOUND AS LIQUID PHASE SINTERING ADDITIVE ON PROPERTIES OF ALUMINA CERAMICS
SYMP_N_002_P	Pimrampa Kititarakul	PREPARATION OF PERVIOUS PAVING BRICK FROM CERAMIC PITCHER USING CERAMIC GLAZE AS BONDING MATERIAL

SYMPOSIUM O

ID	Presenter	Title
SYMP_O_001_P	Supakorn Boonyuen	THE INTEGRATION OF GREEN CHEMISTRY AND SMALL SCALE FOR BASIC REDOX REACTIONS
SYMP_O_002_P	Rasitvich Panichvatana	PHYTOFABRICATION OF SILVER NANOPARTICLES (AgNPs) WITH PHARMACEUTICAL CAPABILITIES BY USING Oroxylum Indicum (L.) Kurz BARK EXTRACT
SYMP_O_003_P	Tanyalak Nuntakulkaisak	A SIMPLE PIEZOELECTRIC CALIBRATION METHOD OF THE LOW-COST OPTICAL INTERFEROMETRY KIT FOR UNDERGRADUATE TEACHING LABORATORY

SYMPOSIUM Q

ID	Presenter	Title
SYMP_Q_001_P	Soravich Mulinta	EFFECTS OF POTTERY STONE ON PHYSICAL – MECHANICAL PROPERTIES MICROSTRUCTURE AND PORCELAIN OF TABLEWARE FOR SINGLE-FAST FIRING

SYMPOSIUM R

ID	Presenter	Title
SYMP_R_001_P	Chidchanok Tabtimhin	ELEMENTAL CONTENT IN ARABICA GREEN COFFEE BEAN FROM NORTHERN THAILAND USING INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY COMBINED WITH CHEMOMETRICS
SYMP_R_002_P	Satipat Suttayasorranakhom	MOLECULAR DOCKING INVESTIGATION TOWARDS GELDANAMYCIN ANALOGUES FOR HSP90 TARGETED ANTI-CANCER DRUG THERAPY
SYMP_R_003_P	Pheeraphong Bunroek	DEVELOPMENT OF SEA BASS SCALES GELATIN/NANO-TiO ₂ BLENDED FILMS FOR INHIBITION OF Staphylococcus aureus BY THE PHOTOCATALYTIC
SYMP_R_004_P	Keeradara Hiruntrakool	DENSITY FUNCTIONAL THEORY STUDY OF THE GLYPHOSATE ADSORPTION ON LEWIS ACIDIC BEA ZEOLITES: EFFECT OF LEWIS ACID
SYMP_R_005_P	Ornanong Opasmongkolchai	DIRECT CARBOXYLATION OF METHANE WITH CARBON DIOXIDE OVER 3d-TRANSITION METALS SUPPORTED ON METAL-ORGANIC FRAMEWORK NU-1000: A DENSITY FUNCTIONAL THEORY STUDY
SYMP_R_006_P	Athittaya Rasrichai	EFFECTS OF THE ZEOLITE FRAMEWORK ON THE ADSORPTION OF GLYPHOSATE ON HAFNIUM-CONTAINING ZEOLITES: A DFT STUDY

Junior Young Rising Stars of Science Award 2021

ID	Presenter	Title
JYRSS-01	Prapawarin Wanabodeenimit Voratha Assavasirijinda Sasikanchana Khongraksa	ANTI-BACTERIAL AND BIODEGRADABLE FILM FOR FOOD PRESERVING PACKAGING
JYRSS-02	Romteera Boongor Palika Sangtongsittichok	THE IDENTIFICATION OF VIBRIO SPP. CONTAMINATION IN FRESH AND PRESERVED SEAFOOD USING NUCLEOTIDE SEQUENCE OF 16S rRNA GENE
JYRSS-03	Palin Chokjindachai	SYNTHESIS OF FUNCTIONALIZED IONIC LIQUIDS FOR EVALUATION OF ANTIBACTERIAL ACTIVITY
JYRSS-04	Phattharaset Anantaviriya Pirada Saelee Chanyapas Thongyam	ISOLATION AND SCREENING OF BACTERIA PRODUCING BACTERIOCIDIN TO INHIBIT THE GROWTH OF GASTROINTESTINAL TRACT PATHOGENIC BACTERIA
JYRSS-05	Aleeta Ardcharoen Jirath Kanaraksanti Pitchayut Sangchery	ENZYMATIC PRODUCTION OF XYLOOLIGOSACCHARIDES FROM BANANA PEELS
JYRSS-06	Paravee Santikulluk Chalisa Pornsukjantra Chirayu Intaratanoo	SMART FARMING: LEAF SPOT DETECTING APPLICATION FOR HYDROPONIC GREEN OAK
JYRSS-07	Chawin Butdisuwan Premisiri Nitkamhan	MICROSTRUCTURE, BIOACTIVE COMPOUNDS, AND PHYSICAL PROPERTIES OF GLUTEN-FREE MACARONI FROM RED RICE
JYRSS-08	Kanchaporn Srisamai Kanyanat Churaya	ALPHA-AMYLASE INHIBITORY ACTIVITY OF PROTEIN AND PROTEIN HYDROLYSATES FROM HANG JASMINE RICE 105
JYRSS-09	Khwanchira Wannahom Chidapha Suepsin Laksikarn Lakornthip	A STUDY OF FATIGUE ON GRADE 9 AND 11 STUDENTS OF THE MAHASARAKHAM UNIVERSITY DEMONSTRATION SCHOOL (SECONDARY), ACADEMIC YEAR 2020
JYRSS-10	Kan Senklang Penpitcha Phongtui Nutthakit Pichai	PACKAGING CONTAINS ACTIVATED CARBON FROM LONGAN SEEDS, EMITTING ESSENTIAL OIL AND INHIBITING RIPENING OF MANGO DURING THE TRANSPORTATION
JYRSS-11	Kamonchanok Sukpaona	INHIBITION OF DENTAL CARRIES BACTERIA USING ASSAM TEA EXTRACTS CULTIVATED ON THE NORTH OF THAILAND
JYRSS-12	Kritchanaat Rattanasaiyai Phonkrit Angsupokai Koon Senklang	INSTRUMENT DESIGN FOR MEASURING PM 2.5 FILTRATION EFFICIENCY OF SURGICAL MASK
JYRSS-13	Kongpob Pakaranodom Mawin Srichart	SENTIMENT ANALYSIS OF COMMENTS ABOUT SMARTWATCH ON SOCIAL MEDIA BY DATA ANALYTIC METHOD
JYRSS-14	Mawaddah Billateah Nada Surerat	WOOD PLASTIC COMPOSITE FROM PLASTIC AND PARA WOOD WASTE

ID	Presenter	Title
JYRSS-15	Mumin Waealee Sakirin Sakayae	OCCURRENCE AND DISTRIBUTION OF MICROPLASTICS IN PATTANI BAY WITH SPECIAL REFERENCE TO MANGROVE HABITATS
JYRSS-16	Basla Siripatana Kittipong Nopchanasuphap	INTELLIGENT TRAFFIC LIGHT SYSTEM
JYRSS-17	Pitchayapa Muangjaila Pannaporn Pleeroy	THE EFFECT OF ZINC OXIDE AND TITANIUM DIOXIDE ON GROWTH OF MELON AND THAI PEPPER
JYRSS-18	Napat Rattanaburee Ratima Sirikat	BACTERIAL CELLULOSE COATED BY VIRGIN COCONUT OIL FOR WOUND DRESSING APPLICATION
JYRSS-19	Kittipong Tapyou Pannawich Chaisil	SMART SCHOOL ATTENDANCE SYSTEM USING FACE RECOGNITION WITH NEAR OPTIMAL IMAGING
JYRSS-20	Sopida Rakprathum Tanadol Phoyoo Waranon Kaewket	DEVELOPMENT OF ALTERNATIVE METHOD FOR DETERMINATION OF POTASSIUM IN AGRICULTURAL SAMPLES
JYRSS-21	Thidarat Promjabok Kwanchanok Thitawannonate	DIVERSITY OF BACTERIA ISOLATED FROM KLONGTUP MANGROVE FOREST AT SATTAHIP DISTRICT, CHONBURI PROVINCE AND SURVEY OF PROTEASE PRODUCING BACTERIA
JYRSS-22	Chanyanut Promkhan Napat Chonkuljana Supawit Srinithiwat	A STUDY OF EMISSIVITY OF HUMAN SKIN USING THERMAL INFRARED SENSOR
JYRSS-23	Supat Saengmanee Natcha Suttirat	NANOFLUIDS SYNTHESIS FROM MANGOSTEEN PEEL EXTRACT
JYRSS-24	Natwadee Boonrit Pattarasuda Jeenjam	THERMAL PROPERTIES OF SOLID FUEL BRIQUETTES PRODUCED FROM RICE HUSK MIXED WITH PLASTICS BY EXTRUSION TECHNIQUE
JYRSS-25	Visaruta Butburee Sasitorn Rakthong	THE DEVELOPMENT OF CHILD SLEEPING PAD OF RUBBER FOAM WITH ADDITION SILVER NANOCOMPOSITE
JYRSS-26	Chayanit Panjak Mingkwan Anna Wasanruk	DEVELOPMENT OF TOOL FOR ESTIMATING ALZHEIMER'S DISEASE RISK BY USING MIRNA AS BIOMARKER
JYRSS-27	Nitikorn Poondechalarp Poopha Suwananek	DEVELOPMENT OF OIL-BASED FORMULATION OF TRICHODERMA SP. AS A BIOCONTROL AGENT AGAINST PHYTOPATHOGENIC MICROBES
JYRSS-28	Thanakorn Hengsoontorn Pimwalan Kesornbubpha	PROTEIN HYDROLYSATE FROM SOY-MILK RESIDUE AS AN ALTERNATIVE NITROGEN SOURCE FOR AURANTIOCHYTRIUM SP. CULTIVATION
JYRSS-29	Phiriyaporn Jen-aksorn Kongsiri Pongfai	UNDERSTANDING OF REGIOSELECTIVITY IN THE ALPHA-GALACTOSIDASE WITH QM/MM
JYRSS-30	Phawat Pien-ngam	THE STUDY ON CATALYTIC ACTIVITY OF PALLADIUM ON ALUMINA FOR SYNTHESIS OF 3,4- DIHYDROPYRIMIDIN-2(1H)-ONES AND ITS DERIVATIVES UNDER GREEN CHEMISTRY APPROACH



ID	Presenter	Title
JYRSS-31	Tanatcha Chaichana Chattarin Jomkham	ITERATIVE METHODS FOR SOLVING SPLIT FEASIBILITY PROBLEM AND APPLICATION
JYRSS-32	Kittapat Manasil Thaksaporn Nantapornsiripong	EXPRESSION OF MONOPOLAR SPINDLE 1 KINASE (MPS1/TTK) IN HEPATOCELLULAR CARCINOMA

Young Rising Stars of Science Award 2021

ID	Presenter	Title
Bio-01	Sirawit Ngammaungpak	BIOCHEMICAL EFFECTS FROM VARIOUS PARTS OF <i>Moriga oleifera</i> ON GROWTH INHIBITION OF <i>Mimosa pigra</i>
Bio-02	Nuchanart Suntornnont	EFFECTS OF COENZYME Q10 ON OXIDATIVE STRESS OF HUMAN KERATINOCYTES
Bio-04	Pichsinee Sapparojpatana	EVOLUTION OF ANDROGENESIS IN BASKET CLAM GENUS <i>Corbicula</i> IN THAILAND
Bio-05	Chamawee Lertwattanaporn	PRODUCTION OF BACTERIAL BIODEGRADABLE POLYHYDROXYALKANOATES (PHAS)
Bio-06	Matchapon Anchaleepornsarn	A STUDY OF THE MATING SYSTEM IN A RARE MORNING GLORY SPECIES IN THAILAND, <i>Blinkworthia lycioides</i> CHOISY (CONVOLVULACEAE)
Bio-07	Nalapat Leangnim	BIOCHEMICAL CHARACTERIZATION OF A CELL-ASSOCIATED TANNASE FROM TANNIN-TOLERANT YEAST, <i>Cyberlindnera rhodanensis</i> A22.3 FOR FEED ADDITIVE APPLICATION
Bio-08	Chanakan Thepyoo	IDENTIFICATION OF LIVESTOCK ANIMAL ACE2 NUCLEOTIDE SEQUENCE IN REGIONS ENCODED FOR AMINO ACIDS BINDING FOR SPIKE 1 PROTEIN OF THE SARs-COV-2
Bio-09	Nutcha Sa-ingthong Anukoon Ketnak	EVALUATING PHYSIOLOGICAL RESPONSES OF NEWLY IMPROVED RD6 (RD6 BC4F4) RICE TO SALT STRESS AT SEEDLING STAGE
Bio-11	Dhup Bhukdee	IMPROVED COLORECTAL CANCER SUBTYPING WITH MACHINE LEARNING AND BIOINFORMATICS ANALYSIS
Bio-12	Wathusiri Khongsiri	ISOLATION AND CHARACTERIZATION OF LYTIC BACTERIOPHAGES AGAINST <i>Aeromonas hydrophila</i>
Bio-13	Papitchaya Taluptong	DETECTION OF <i>Phytophthora palmivora</i> from durian BY LOOP-MEDIATED ISOTHERMAL AMPLIFICATION (LAMP) ASSAY
Bio-14	Krissana Komolwanich	A STUDY ON ANTIBACTERIAL ACTIVITIES OF FRUIT PEEL WASTES FROM RAMBUTAN, LONGAN AND BANANA
Bio-15	Paphanaphak Prakopphon	MICROPLASTIC POLLUTION IN COMMERCIALY DRIED ANCHOVY FISH IN CHUMPHON PROVINCE
Bio-16	Kanyanat Kaewutai	DISTRIBUTION OF WEDGE CLAMS <i>Donax</i> spp. ON SANDY BEACHES OF SOUTHERN THAILAND
Bio-18	Kanthida Pamornpol	THE EFFECT OF PROPOLIS EXTRACT FROM <i>Geniotrigona thoracica</i> TO INHIBIT <i>Propionibacterium acnes</i> AND <i>Staphylococcus aureus</i>
Bio-19	Intouch Khunanopparat	VARIATION IN SKULL MORPHOLOGY OF THE PANHA'S CROCODILE NEWT <i>Tylototriton panhai</i> IN LOEI-PHETCHABUN RANGES

ID	Presenter	Title
Bio-20	Jirakit Jaronrunghanan	LOW-COST PRODUCTION OF SUPER EFFECTIVE BIOBOOM IN FLUIDIZED-BED BIOREACTOR FOR CRUDE OIL REMOVAL
Bio-21	Sudarat Sukphanao	IDENTIFICATION OF <i>Streptomyces</i> sp. STRAIN SBTS01 AND W18L9 AS NOVEL SPECIES AND GENOME DATA MINING REVEALED THE BIOSYNTHESIS POTENTIAL AS PLANT GROWTH PROMOTER
Bio-22	Fah Lertkulvanich	MORPHOLOGY AND GENETIC DIVERSITY OF GOLDEN SILK ORB-WEAVER (<i>Nephila</i>) IN THAILAND
Bio-23	Anotai Suklom	THE TAXONOMIC STUDIES OF GENUS <i>Floresorchestia</i> IN KASETSART UNIVERSITY
Bio-24	Hathaichanok Vanviratikul	GENERATION OF <i>Chlamydomonas reinhardtii</i> 'S MUTANT LIBRARY
Bio-26	Kanyanee Srikaewfathong	SCREENING OF PROBIOTIC BACTERIA AND PREBIOTIC CONCENTRATION TO PROMOTE PROBIOTIC GROWTH FOR INCREASING EFFICIENCY AND INHIBITING POTENTIAL PATHOGENS IN CHICKEN
Chem-01	Aphiwan Saenonphut	PORTABLE NON-ENZYMATIC ELECTROCHEMICAL SENSORS FOR PROTEIN DETECTION IN RUBBER
Chem-02	Anawat Khanonkun Pittayaporn Ardnarong	FLOW IMPROVEMENT ON MICROFLUIDIC PAPER-BASED ANALYTICAL DEVICES
Chem-03	Atchareeya Boonthana-Arkrapat Penpicha Janprasert	GREEN PROCESS FOR <i>Camellia Oleifera</i> SEED OIL PRODUCTION
Chem-04	Kajjana Boonpalit	MECHANISMS OF HYDROGEN ACTIVATION AND STYRENE HYDROGENATION BY LEWIS ACID-TRANSITION METAL CATALYSTS
Chem-05	Phanawat Charoensuk	SYNTHESIS AND CHARACTERIZATION OF CARBOXYMETHYLCELLULOSE HYDROGELS FROM RICE STRAW FOR POTENTIAL USE IN AGRICULTURAL AND BIOMEDICAL APPLICATIONS
Chem-06	Kanokwan Sakunrungrit	RAPID AND SENSITIVE METHOD FOR DETERMINATION OF MERCURY IN PHARMACEUTICAL PRODUCTS BASED ON GREEN SYNTHESIS OF CARBON NANODOTS
Chem-07	Nureesa Jehmong Sitirokiyoh Chehheng	SYNTHESIS OF HYDROXYAPATITE FROM BUDU WASTE USING ORGANIC ACID EXTRACTION
Chem-08	Siripreeya Phankingthongkum	VIRTUAL ALTERNATIVES TO MOLECULAR MODEL SET FOR CHEMISTRY EDUCATION
Chem-09	Chanon Chanloi	Cu-CATALYZED HYDROFLUORINATION OF α,β -ACETYLENIC ESTERS WITH PhC(O)F AS A F-SOURCE : A DFT STUDY
Chem-10	Asmah Narongraksakhet	FORMULATION AND STABILITY TESTING OF PERFUME CONTAINING WAN SAO LONG (<i>Amomum bioforum</i> Jack) AS MAIN INGREDIENTS
Chem-13	Nutthawan Sangnawakit	STRUCTURE AND TRANSPORT PROPERTIES OF ELECTROLYTES IN AQUEOUS ZINC-LON BATTERIES

ID	Presenter	Title
	Siriporn Teeraburanapong	
Chem-14	Chaninat Sriaudcha Potjana Ponil Sayamon Sonbuddee	NOVEL STARCH-BASED SUPERABSORBENT POLYMERS: SYNTHESIS, CHARACTERIZATION AND SWELLING PERFORMANCE
Chem-15	Chantalaksana Chantarangkul	STRUCTURAL STUDIES AND DFT CALCULATIONS OF MANGANESE(III) SCHIFF BASE COMPLEXES
Chem-16	Sudarat Laihang	THE FABRICATION OF N AND P-DOPED VEGETABLE ROOT-DERIVED HIERARCHICAL POROUS CARBON FOR SUPERCAPACITORS WITH ULTRAHIGH CAPACITANCE
Chem-18	Kulpon Makjaroen Meta Wongs	DESIGNING A PROTEIN-BASED BIOSENSOR FOR METAL DETECTION USING PROTEIN ENGINEERING APPROACH
Com-01	Chanaporn Chaisumritchoke Tup Kongthaworn Borvorntat Nirandmongkol	A DEEP LEARNING-BASED MOSQUITO SPECIES AND GENDER CLASSIFICATION SYSTEM
Com-02	Kannika Wiratchawa	DEVELOPMENT OF A NATURAL LANGUAGE PROCESSING DATASET AND A MACHINE LEARNING MODEL FOR IDENTIFYING TYPE OF LAW OF POST IN LEGAL WEBBOARDS
Com-03	Luigi Alfonso Macaraig Jeerapan Sudsawad Eric Bergum	NLP EMOTION CLASSIFICATION
Com-05	Werayut Pornanek Yutthaphum Kaewkibil	MEDICAL PROFESSIONALS AND FUNDAMENTALS HELP CARE CHAT BOT
Com-06	Put Phapon	FREE-WEARABLE FALL DETECTION FOR ELDERLY WITH DEEP LEARNING
Com-07	Sirawit Phoyoo	FLOOD DISASTER FORECASTING SYSTEM WITH LOT TECHNOLOGY
Com-09	Damrong Tonghiri	AIR QUALITY FORECASTING MODEL USING TIME-SERIES DATA
Com-10	Korrakot Triwichian Malada Leewalan	SHARE TRAVEL EXPENSES MICRO-SERVICES PLATFORM
Com-12	Aung Khant Oo Siyu Han Prasong Chonsathian	NEARBY FESTIVAL
Env-01	Ratchanon Ampornpitak	A LANDSCAPE TREE (<i>Tabebuia argentea</i>) EXHIBITS HIGHER SENSITIVITY TO SOIL MOISTURE THAN A LANDSCAPE PALM (<i>Ptychosperma macarthurii</i>) GROWING IN THE SAME ROOF GARDEN: AN IMPLICATION FOR SUSTAINABLE URBAN WATER USE
Env-02	Nutchapon Chaiwanich	EFFECTS OF ARSENIC ON GROWTH AND BIOETHANOL PRODUCTION OF CASSAVA
Env-03	Arrat Chuaichat	EFFECTS OF SEDIMENT ON JUVENILE CORAL ABUNDANCE AT KO MAPHRAO, THE WESTERN GULF OF THAILAND

ID	Presenter	Title
Env-04	Prakaidao Nontasri Tanunnut Thammasorn	DESIGNING ENVIRONMENTALLY FRIENDLY BUILDINGS: A CASE STUDY OF THE BANG PU WETLANDS NATURE STUDY CENTER, SAMUT PRAKAN PROVINCE
Env-05	Kanapon Kiranon Pornnapa Watada Hataichanok Kaewkunjorn	MODELLING FINE ATMOSPHERIC PARTICULATE MATTER USING MACHINE LEARNING
Food-01	Isaya Kijpatanasilp	KINETIC MODELING OF MICROBIAL DEGRADATION AND QUALITY OF LONGAN JUICE BY UV RADIATION
Food-03	Sukal Wasutaputtipong Chinananth Limtanapunyaporn	WILD BITTER GOURD KIMCHI
Food-04	Kamonchanok Kumlao	DEVELOPMENT OF PLANT-BASED CHEDDAR CHEESE USING RESPONSE SURFACE METHODOLOGY (RSM)
Food-05	Kanchanaphon Chumthong Nattana Kongchoosi	PRODUCTION AND CHARACTERIZATION OF pH-SHIFT- PRODUCED PROTEIN ISOLATES FROM SAGO PALM WEEVIL (<i>Rhynchophorus ferrugineus</i>) LARVAE
Food-06	Kanyakorn Thauparong Phatcharida Buaklee	DEVELOPMENT OF ROASTED RICE TEA PRODUCT FROM <i>Cordyceps militaris</i>
Food-07	Sasitorn Khuntong	EVALUATION OF 5'-Ribonucleotides AS THE UMAMI FLAVOR IN FRESH TOMATO
Mat-01	Yolada Issaraseree Nattapan Phongpala	SUPERHYDROPHOBIC RUBBER-COATED FABRIC FOR OIL-WATER SEPARATION
Mat-02	Teepich Houtae	RECYCLING PEROVSKITE SOLAR CELLS BY NOVEL SPRAY PROCESSES
Mat-04	Chanatphapa Cunrawahthanarrong	EFFECT OF STACKING SEQUENCE ON THE STRENGTH OF CARBON FIBER SANDWICH PANEL FOR A COMPOSITE MONOCOQUE CHASSIS OF AN ELECTRIC FORMULA STUDENT RACING CAR
Mat-07	Patcharee Kulrit	BIOCOMPOSITE HYDROGEL LOADED WITH INDIGO EXTRACT FOR COSMETIC APPLICATIONS
Mat-09	Sarawut Changart	QUANTITY OF MICROPLASTIC FIBERS FROM WASHING SYNTHETIC FABRICS BY HAND WASHING
Mat-10	Supaporn Kamlue	DEVELOPMENT OF GAS SENSOR BASED ON 2D TITANIUM CARBIDE (Ti ₃ C ₂ T _x MXene)
Mat-11	Sasiprapa Loosungnoen Titinan Pintakorn Saranyu Khiaokhoen	A STUDY OF THE NANO STAMPING PROCESS TO FABRICATE A METALLIC NANOSTRUCTURE FOR LSPR PLASMONIC BIOSENSING APPLICATION
Math-01	Nichakan Loesatapornpipit	ASYMPTOTIC PROPERTIES OF DISCRETE MINIMAL S ₁ LOGT-ENERGY CONSTANTS AND CONFIGURARTION
Math-02	Sukrid Petpradittha	ENTIRE SOLUTIONS OF SOME FUNCTIONAL EQUATIONS
Math-03	Arlisa Janjing	SOME NUMBER-THEORETIC PRODUCTS
Math-04	Suphawich Sengpanich	GRAPHS ASSOCIATED WITH THE MAP $x \rightarrow x+x-1$ ON Zn

ID	Presenter	Title
Math-05	Krongkhwan Paksonisit Nadthapong Sritecha Suktorn Bundok	FORECASTING MODEL FOR THE CHANCE OF THUNDERSTORMS IN UPPER NORTHEASTERN, THAILAND
Math-06	Pornnapat Yamphram	OPTIONS PORTFOLIO SELECTION AND INDIFFERENCE PRICING UNDER MEAN-VARIANCE UTILITY WITH FINITE LIQUIDIFY
Phy-01	Noppachanin Kongsathitporn	EXOPLANET TRANSIT TIMING VARIATION AND TRANSIT DURATION VARIATION
Phy-02	Panupol Untarabut	MOLECULAR DYNAMICS SIMULATIONS OF LITHIATION AND DELITHIATION PROCESS IN POROUS SILICON ELECTRODE MATERIAL FOR HIGH-PERFORMANCE LI-LON BATTERIES
Phy-03	Rattachanok Chongprasit	SYNTHESIS OF VANADIUM DIOXIDE (VO ₂) NANOPARTICLES FOR THERMOCHROMIC APPLICATIONS
Phy-04	Siriporn Silapat Siriwan Laophilai	ANALYSIS OF SPATIAL TEMPORAL VARIATIONS OF CHLOROPHYLL-A USING DATA FROM AQUA MODIS SATELLITE
Phy-05	Suriya Nongkae Khacharin Tangphanit	DEVELOPMENT OF ELECTRODE MATERIALS FROM Ni(OH) ₂ FOR SUPERCAPACITOR APPLICATION
Phy-06	Grit Saowanit	TRACKING ORIGINS OF GAMMA RAYS IN THE MILKY WAY GALAXY BY FERMI-LAT ALL SKY MAPS
Phy-07	Worathat Paenthong	MULTI-CHANNEL RESONANCE SPECTROSCOPY FOR VOCS OPTICAL SENSOR ARRAY

INTERNATIONAL ADVISORY BOARD



Prof. Dr. Michael Kramer
Germany



Prof. Howard Alper
Canada



Prof. Javier García Martínez
Spain



Prof. Dr. Daniel Solow
USA



Dr. Peter Gölitz
Germany



Dr. Eva E. Wille
Germany

LOCAL ADVISORY BOARD



Prof. Dr. Supawan Tantayanon



Prof. Dr. Supa Hannongbua



Prof. Dr. Supachitra Chadchawan



Assoc. Prof. Dr. Utomporn Phalavonk



Assoc. Prof. Boonrucksar Soonthornthum



Asst. Prof. Dr. Anamai Damnet



Asst. Prof. Dr. Rajit Vadhanasindhu, Honorary Doctorate Degree

COMMITTEES

SCIENTIFIC COMMITTEE

1. Prof. Dr. Chanpen Chanchao (Thailand)
2. Prof. Dr. Gang Meng (China)
3. Prof. Dr. Nongnuj Muangsin (Thailand)
4. Prof. Dr. Orawon Chailapakul (Thailand)
5. Prof. Dr. Suchana Chavanich (Thailand)
6. Prof. Dr. Takeshi Yanagida (Japan)
7. Prof. Dr. Takumi Konno (Japan)
8. Prof. Dr. Suttichai Assabumrungrat (Thailand)
9. Prof. Dr. Vudhichai Parasuk (Thailand)
10. Prof. Joseph S.M. Samec (Sweden)
11. Prof. Patrick Cognet (France)
12. Prof. Zuriati Zakaria (Malaysia)
13. Assoc. Prof. Dr. Anucha Watcharapasorn (Thailand)
14. Assoc. Prof. Dr. Chaleeda Borompichaichartkul (Thailand)
15. Assoc. Prof. Dr. Chartchai Leenawong (Thailand)
16. Assoc. Prof. Dr. Kazuki Nagashima (Japan)
17. Assoc. Prof. Dr. Nuttha Thongchul (Thailand)
18. Assoc. Prof. Dr. Taeng On Prommi (Thailand)
19. Assoc. Prof. Dr. Thamasak Yeemin (Thailand)
20. Assoc. Prof. Roderick Bates (Singapore)
21. Asst. Prof. Dr. Noppadon Kitana (Thailand)
22. Asst. Prof. Dr. Oraphan Sungkajanttranon (Thailand)
23. Dr. Chainarong Srirak (Thailand)
24. Dr. Ganigar Chen (Thailand)
25. Dr. Mati Horprathum (Thailand)
26. Dr. Rakhi Majumda (India)
27. Dr. Sumate Chareonchaidet (Thailand)
28. Dr. Suparerk Aukkaravittayapun (Thailand)
29. Dr. Verawat Champreeda (Thailand)
30. Dr. Worajit Setthapun (Thailand)
31. Miss Kanchana Un-Arom (Thailand)

ORGANIZING COMMITTEE

The Science Society of Thailand Under the Patronage of His Majesty the King

1. Prof. Dr. Somkiat Ngamprasertsith (Chairman)
2. Assoc. Prof. Dr. Benjapon Chalermisinsuwan (Secretary)
3. Assoc. Prof. Dr. Boonchoat Paosawatyanong
4. Assoc. Prof. Dr. Onruthai Pinyakong
5. Assoc. Prof. Dr. Rajalida Lipikorn
6. Assoc. Prof. Dr. Saiwarun Chaiwanichsiri
7. Assoc. Prof. Dr. Tipaporn Limpaseni
8. Dr. Mati Horprathum
9. Dr. Ratchanon Piemjaiswang

Kasetsart University, Kamphaeng Saen Campus

9. Assoc. Prof. Dr. Saiwarun Chaiwanichsiri
10. Assoc. Prof. Dr. Taeng On Prommi
11. Assoc. Prof. Dr. Sakauwrat Jongpattanakorn
12. Assoc. Prof. Dr. Auttasit Tubtimtae
13. Assoc. Prof. Dr. Pongrawee Nimnoi
14. Asst. Prof. Dr. Weeranut Kaewwiset
15. Asst. Prof. Dr. Piyapong Laosrirattanachai
16. Asst. Prof. Dr. Potjaman Poolmee
17. Asst. Prof. Dr. Piched Anuragudom
18. Asst. Prof. Dr. Veeramol Vailikhit
19. Asst. Prof. Dr. Tissawas Thumrongsanta
20. Asst. Prof. Dr. Eakachai Suntonsinsoungvon
21. Asst. Prof. Dr. Pornpairin Rungcharoenthong
22. Asst. Prof. Dr. Sucheewan Krobthong
23. Asst. Prof. Dr. Jintanart Wongchawalit
24. Asst. Prof. Dr. Wisut Jarunthawatchai
25. Asst. Prof. Dr. Attapol Khamkhien
26. Asst. Prof. Dr. Suntree Sangjan
27. Asst. Prof. Dr. Aree Innun
28. Asst. Prof. Dr. Bundet Boekfa
29. Asst. Prof. Dr. Busara Pattanasiri
30. Asst. Prof. Dr. Siraprapha Premcharoen
31. Asst. Prof. Dr. Rudeerat Suntako
32. Asst. Prof. Dr. Pharima Phiriyangkul
33. Asst. Prof. Wuttipong sillapavisa
34. Asst. Prof. Patchara Jaturakomol
35. Dr. Danupon Sangnak
36. Dr. Aunchistha Poo-Udom
37. Dr. Arm Unartngam
38. Dr. Varangkana Jitchum
39. Dr. Tipawan Rungsawang
40. Dr. Thana Maihom
41. Dr. Adisorn Chaibang

- | | | |
|-----|------|--------------------------|
| 42. | Dr. | Pemikar Srifa |
| 43. | Dr. | Chananyoo Tintabura |
| 44. | Mr. | Krit Leangphan |
| 45. | Mr. | Sasin Tiendee |
| 46. | Mr. | Jakkapan Boonwong |
| 47. | Mr. | Chalermchai Aueviriyavit |
| 48. | Mr. | Khwanchai Suksomboon |
| 49. | Mr. | Ratchapad Chuangrangsee |
| 50. | Mr. | Teerapong tippanthong |
| 51. | Mr. | Prab Sathong-on |
| 52. | Mr. | Pongpisit Amonpongpaisan |
| 53. | Mr. | Suthawee Kryangan |
| 54. | Mr. | Suchart Pornnapalai |
| 55. | Mr. | Werapon Buntham |
| 56. | Mr. | Jeerasak Thongdonkuang |
| 57. | Mr. | Sataporn Chaisomparn |
| 58. | Mr. | Punyarit Yasri |
| 59. | Miss | Umaporn Boonphetkaew |
| 60. | Miss | Pimtham Uafua |
| 61. | Miss | Chudaporn Sonpakdee |
| 62. | Miss | Wilai Jangboon |
| 63. | Miss | Jongjit Nuchjareon |
| 64. | Miss | Pornpun Laosomboon |
| 65. | Miss | Kingdao Sudoke |
| 66. | Miss | Weerada Thanapongthram |
| 67. | Miss | Nattida Rungsri |
| 68. | Miss | Supawan Laohasukpaisan |
| 69. | Miss | Rungsiya Tongphud |
| 70. | Miss | Tapanat Tanthanakit |
| 71. | Miss | Siriwan Daothong |
| 72. | Miss | Thanita Chaisuwan |
| 73. | Miss | Kannika Pantean |
| 74. | Miss | Wilawan Pliankham |
| 75. | Miss | Sathita Chingthongkam |
| 76. | Miss | Ruttanavadee Sawsawun |
| 77. | Miss | Pojjane Thongkhonghan |
| 78. | Miss | Atikan Thirasinp |
| 79. | Miss | Wassana Sam-ai |
| 80. | Miss | Duangporn Chuwong |
| 81. | Miss | Wilaiwan Nuchtongmuang |
| 82. | Miss | Netnapa Pumhan |
| 83. | Miss | Somying Thongyod |
| 84. | Miss | Wipawan Rounsri |
| 85. | Miss | Siraporn Meejumrus |
| 86. | Miss | Nantawan Jaiyen |
| 87. | Miss | Atitaya Sripranthong |



- | | | |
|-----|------|-----------------------|
| 88. | Miss | Kunniga Sukeewong |
| 89. | Miss | Jitima Suangamiam |
| 90. | Miss | Arisara Khunphithuk |
| 91. | Miss | Wichuda Poonoi |
| 92. | Miss | Orasa Satongkeaw |
| 93. | Mrs | Wasana Hatthakij |
| 94. | Mrs | Chanaporn Singtothong |

REVIEWER COMMITTEE

1. Prof. Dr. Bunjerd Jongsomjit
2. Prof. Dr. David Ruffolo
3. Prof. Dr. Nongnuj Muangsin
4. Prof. Dr. Sirilux Poompradub
5. Prof. Dr. Sujitra Youngme
6. Prof. Dr. Supon Ananta
7. Assoc. Prof. Dr. Anchalee Samphao
8. Assoc. Prof. Dr. Aniruth Phon-On
9. Assoc. Prof. Dr. Anucha Watcharapasorn
10. Assoc. Prof. Dr. Apinpus Rujiwatra
11. Assoc. Prof. Dr. Arthit Intarasit
12. Assoc. Prof. Dr. Chartchai Leenawong
13. Assoc. Prof. Dr. Cheewarat Printrakoon
14. Assoc. Prof. Dr. Cheunjit Prakitchaiwattana
15. Assoc. Prof. Dr. Christopher Smith
16. Assoc. Prof. Dr. David J. Harding
17. Assoc. Prof. Dr. David James Harding
18. Assoc. Prof. Dr. Duangkamol Gleeson
19. Assoc. Prof. Dr. Gina B. Alcoriza
20. Assoc. Prof. Dr. Jonggol Tantirungrotechai
21. Assoc. Prof. Dr. Kuakarun Krusong
22. Assoc. Prof. Dr. Luckhana Lawtrakul
23. Assoc. Prof. Dr. Nooduan Muangsan
24. Assoc. Prof. Dr. Nuttha Thongchul
25. Assoc. Prof. Dr. Orawan Duangphakdee
26. Assoc. Prof. Dr. Pattaraporn Kim
27. Assoc. Prof. Dr. Pongtharin Lotrakul
28. Assoc. Prof. Dr. Poonpat Poonnoy
29. Assoc. Prof. Dr. Rojana Pornprasertsuk
30. Assoc. Prof. Dr. Sirichok Jungthawan
31. Assoc. Prof. Dr. Soorathep Kheawhom
32. Assoc. Prof. Dr. Supavadee Kiatisevi
33. Assoc. Prof. Dr. Suwattana Pruksasri
34. Assoc. Prof. Dr. Suwimol Wongsakulphasatch
35. Assoc. Prof. Dr. Taeng On Prommi
36. Assoc. Prof. Dr. Tawatchai Tanee
37. Assoc. Prof. Dr. Taweetham Limpanuparb
38. Assoc. Prof. Dr. Vudhichai Parasuk
39. Asst. Prof. Dr. Akekawat Vitheepradit
40. Asst. Prof. Dr. Amara Apilux
41. Asst. Prof. Dr. Amporn Wiwegweaw
42. Asst. Prof. Dr. Anukorn Boutson
43. Asst. Prof. Dr. Atipong Bootchanont

44. Asst. Prof. Dr. Atsalek Rattanawanee
45. Asst. Prof. Dr. Chan Inntam
46. Asst. Prof. Dr. Chitiphon Chuaicham
47. Asst. Prof. Dr. Chutima Jiarpinitnun
48. Asst. Prof. Dr. Dumrongkiet Arthan
49. Asst. Prof. Dr. Ekachai Chukeatirote
50. Asst. Prof. Dr. Inthawoot Suppavorasatit
51. Asst. Prof. Dr. Jarin Kanchanawarin
52. Asst. Prof. Dr. Jaursup Boonmak
53. Asst. Prof. Dr. Kamontip Kuttiyawong
54. Asst. Prof. Dr. Kanchana Uraisin
55. Asst. Prof. Dr. Kanogwan Seraypheap
56. Asst. Prof. Dr. Kheamrutai Thamaphat
57. Asst. Prof. Dr. Kittipong Chainok
58. Asst. Prof. Dr. Kom Campiranon
59. Asst. Prof. Dr. Muhammad Kashif
60. Asst. Prof. Dr. Nanthawat Wannarit
61. Asst. Prof. Dr. Narit Triamnak
62. Asst. Prof. Dr. Narupon Chattrapiban
63. Asst. Prof. Dr. Olarik Surinta
64. Asst. Prof. Dr. Orawan Chunchachart
65. Asst. Prof. Dr. Parsiri Khetpiyarat
66. Asst. Prof. Dr. Pawana Kangtia
67. Asst. Prof. Dr. Pongchai Dumrongrojwatthana
68. Asst. Prof. Dr. Pongsathorn Dechatiwongse Na Ayuthaya
69. Asst. Prof. Dr. Prasit Pattananuwat
70. Asst. Prof. Dr. Rakrudee Sarnthima
71. Asst. Prof. Dr. Sahanat Petchsri
72. Asst. Prof. Dr. Saisamorn Lumlong
73. Asst. Prof. Dr. Saowanit Saithong
74. Asst. Prof. Dr. Saranyu Khammuang
75. Asst. Prof. Dr. Sasipohn Prasertpalichat
76. Asst. Prof. Dr. Sirima Puangpraphant
77. Asst. Prof. Dr. Siriporn Sripinyowanich
78. Asst. Prof. Dr. Sittiporn Pattaradirokrat
79. Asst. Prof. Dr. Somjintana Taveepanich
80. Asst. Prof. Dr. Suchai Worachananant
81. Asst. Prof. Dr. Sujin Suwanna
82. Asst. Prof. Dr. Supakorn Boonyuen
83. Asst. Prof. Dr. Supareak Praserthdam
84. Asst. Prof. Dr. Supanee Phanthanawiboon
85. Asst. Prof. Dr. Suwicha Wannawichian
86. Asst. Prof. Dr. Thanachan Mahawanich
87. Asst. Prof. Dr. Theeranan Tanphanich
88. Asst. Prof. Dr. Tipwan Sappasat
89. Asst. Prof. Dr. Walailuck Chavanasporn

90.	Asst. Prof. Dr.	Warut Pannakkong
91.	Dr.	Abdulhadee yakoh
92.	Dr.	Adisorn Chaibang
93.	Dr.	Akawat Sirisuk
94.	Dr.	Anchalee Chankong
95.	Dr.	Assadawoot Srikhaow
96.	Dr.	Bongkot Witchachucherd
97.	Dr.	Ganigar Chen
98.	Dr.	Jurin Kanarat
99.	Dr.	Jutamas Kaewsuk
100.	Dr.	Khomson Suttisintong
101.	Dr.	Kitiyane Asanok
102.	Dr.	Krieng Kanchanawatee
103.	Dr.	Laddawan Sangsawang
104.	Dr.	Mati Horprathum
105.	Dr.	Nipapan Ruecha
106.	Dr.	Nithiwadee Thaicharoen
107.	Dr.	Nontivich Tandavanitj
108.	Dr.	Nopporn Thasana
109.	Dr.	Nut Songvoravit
110.	Dr.	Nuttachai Jutong
111.	Dr.	Nuttapong Sanglerdsinlapachai
112.	Dr.	Panupong Thammachoti
113.	Dr.	Pimonpan Sompert
114.	Dr.	Piyachat Lilasilpazard
115.	Dr.	Punnarai Siricharoen
116.	Dr.	Rongrong Cheacharoen
117.	Dr.	Rungroj jintamethasawat
118.	Dr.	Sanit Piyapattanakorn
119.	Dr.	Sarawut Siriwong
120.	Dr.	Siwaruk Siwamogsatham
121.	Dr.	Suchana Chavanich
122.	Dr.	Sudkate Chaiyo
123.	Dr.	Suebpong Sa-nguansil
124.	Dr.	Supawadee Wichitchan
125.	Dr.	Thanakorn Prinyasart
126.	Dr.	Threeraphat Chutimasakul
127.	Dr.	Tossaporn Lertvanithphol
128.	Dr.	Uraivan Waiwijit
129.	Dr.	Voranop Viyakarn
130.	Dr.	Watcharawuth Krittinatham
131.	Dr.	Witchaya Rattanametawee
132.	Dr.	Wittawin Susutti
133.	Mr.	Manasit Sarigaphuti

STT47 SPONSORS ACKNOWLEDGEMENT

PLATINUM



SILVER





สมาคมวิทยาศาสตร์แห่งประเทศไทยในพระบรมราชูปถัมภ์

<https://www.scisoc.or.th/>