
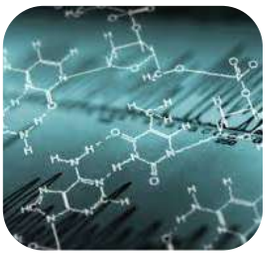


Berita IKM - Chemistry in Malaysia

September 2023

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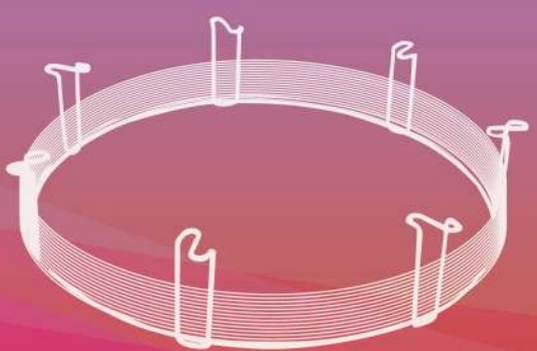

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CONTENTS

MESSAGE FROM THE PRESIDENT

IKM in full throttle in second half of 2023

The period from July to September, we are ready in full throttle with a number of national, regional and international meetings & events happening.

First, we had the **9th Network of Inter-Asian Chemistry Educators** (**9NICE**) Conference from 28 - 30th July 2023 in Kuching, Sarawak, Malaysia. The conference was attended by 100 participants from 7 countries that included teachers, university lecturers, retired educators, and high school students. Another 70 teachers & students participated in the IUPAC Young Ambassadors for Chemistry (YAC) programme held as part of the Conference. A report on 9NICE Conference appeared in this issue of Berita IKM.

Four IKM senior officials, namely Datuk ChM Dr Soon Ting Kueh, Datin ChM Dr Zuriati Zakaria, ChM Dr Malarvili Ramalingam and Prof ChM Dr Edward Juan Joon Ching attended the 21st General Assembly of the Federation of Asian Chemical Societies (FACS) held on 8th July 2023 at the Istanbul Technical University, Turkiye. The meeting was attended by 17 member countries and was chaired by Prof Dr Reuben Jih-Ru Hwu, President of FACS. The highlights were the signing of the MOU between the American Chemical Society (ACS) and FACS, the handover of the Chairmanship to Dr. Mustafa Culha from the Turkish Chemical Society and IKM won the bid to hold the 21st Asian Chemical Congress (21ACC) in Malaysia in 2027. This is of special significance to us as IKM will be celebrating our 60th Anniversary in 2027. The 19th Asian Chemical Congress (19ACC) was held on 9 – 14th July 2023 at the Suleyman Demirel Kultur Merkezi, Istanbul Technical University, Istanbul, Turkiye. About 450 participants attended the 19ACC. A report on the 19GA & 21ACC also appears in this issue of Berita IKM.

A delegation of 12 members led by IKM President, Datuk ChM Dr Soon Ting Kueh, participated in the IUPAC 52nd General Assembly (52GA) & 49th World Chemistry Congress (49WCC) (collectively known as IUPAC 2023) which was held from 18 – 25th August 2023 at The Hague, The Netherlands. The main purposes of the delegation are i) to promote and market IUPAC 2025 which will be held in Kuala Lumpur, Malaysia from 11 – 15th July 2025 and ii) to learn and share experiences with our Dutch counterparts in organizing IUPAC 2023. Datuk ChM Soon made a presentation on IUPAC 2025 at the Closing Ceremony and received warm applauses from the audiences. Close to 1,800 participants took part in IUPAC 2023. A report on IUPAC 2023 is also published in this issue of Berita IKM.

After this, we have the **International Congress on Pure & Applied Chemistry (ICPAC) Bali 2023** held from 12 – 17th September 2023 at the Patra Bali Resort & Villas, Bali, Indonesia. This is a hybrid meeting with 210 participants from 9 countries taking part. The participants were also treated with sumptuous foods and visited various scenic spots in the beautiful island of Bali.

The next major meeting will be the **16th Asian Conference on Analytical Sciences** (**ASIANALYSIS XVI**) will be held from 9 – 12th October 2023, together with **LabAsia 2023** in Kuala Lumpur Convention Centre (KLCC). This year's **ASIANALYSIS XVI** will also include the 19th Asia-Pacific International Symposium on Microscale Separations and Analysis 2023 (APCE 2023), Symposium on Forensic Science & Symposium on Halal Testing & Authenticity.

The final major event will be **Malam Kimia 2023** on 1st December 2023 at the One World Hotel, Petaling Jaya. Malam Kimia is our grand social event where we presented various IKM awards to our members, students, and also organizations.

Looks like we really in full swing in the second half of 2023. We are very happy that we are able to manage all these events successfully.

Datuk ChM Dr Soon Ting Kueh
President, Institut Kimia Malaysia
Date: 30th September 2023

56th IKM AGM Forum "Look Ahead & Moving Forward"

Prof ChM Dr Phang Sook Wai (TARUMT), ChM Dr Fatimah Salim (UiTM), Asst Prof ChM Dr Yvonne Choo Shuen Lann (XMU)

Institut Kimia Malaysia (IKM) has successfully organized a forum on "Look Ahead & Moving Forward" on 18th March 2023, from 9am to 12pm at One World Hotel, Petaling Jaya, Selangor. The forum aimed to discuss, debate and chart the future directions of IKM; to look into the future and prepare IKM to be "future-ready" and to explore new ways of conducting business to ensure the longevity and success of IKM for the next 50 years and beyond, by getting inputs from young chemists. As such, Malaysian Young Chemists Network (MYCN) members, Prof ChM. Dr Phang Sook Wai (University Tunku Abdul Rahman University of Management and Technology, TAR UMT), ChM Dr Fatimah Salim (Universiti Teknologi MARA) and Asst Prof ChM Dr Yvonne Choo Shuen Lann (Xiamen University Malaysia) coordinated and moderated the forum.

The forum has attracted around 61 participants from various backgrounds with the majority being young chemists who are academics and research officers from various R&D institutes, industries, and universities in Malaysia. The event was also attended by IKM Council members. The event commenced with a welcome address from Assoc Prof ChM Dr Juan Joon Ching, Chairman of Malaysian Young Chemists Network (MYCN) which was later followed by an overview of IKM - Looking Ahead and Moving Forward by Datuk ChM Dr Soon Ting Kueh, President of IKM. In his overview, he showcased IKM's progression and achievements thus far and posed thought-provoking questions such as "How can we work / collaborate with industrial organizations to further strengthen the development of chemistry in Malaysia?", "How we can collaborate with local universities to strengthen research in chemical sciences for the advancement of chemistry in Malaysia?", etc. With the kick start, the participants were then segregated into different tables for more topic-focused discussions that revolved around: (1) Membership Development, (2) Continuous Professional Development (CPD), (3) Advancing Chemical Sciences in Malaysia, (4) Promoting Chemistry Education in Malaysia, (5) Young Chemists: Opportunities, Career & Technopreneurship Development and (6) Chemistry in Policy Making.

The discussions were compiled on Padlet, allowing real-time compilation of ideas and cross-table interactions/ discussions on the subject matter. Representatives from each of the groups were given time at the podium to present their ideas and open-ended questions based on what they have discussed in the past hour. Many interesting ideas were shared and potential areas to be looked into. All the compiled inputs will be further discussed at a later date, adaptable recommendations will be identified, and appropriate implementations will be made where deemed necessary.

There was a closing remark at the end of the forum by Datin ChM Dr Zuriati Zakaria (IKM Vice President). In the additional remarks by Datuk ChM Dr Soon, he assured that all the key points highlighted in this forum will be further discussed by the Council and put into practice to further develop IKM and advancing chemistry in Malaysia. The forum ended by moderators thanking all the participants of the forum for making it successful and welcomed them to the 56th Annual General Meeting (56AGM) which was held at the same venue at 2.00 pm.

If you have missed out on the forum that day and would like to join more IKM events in the near future, **Do Follow IKM and MYCN on social media to be informed of our latest events/updates :)**
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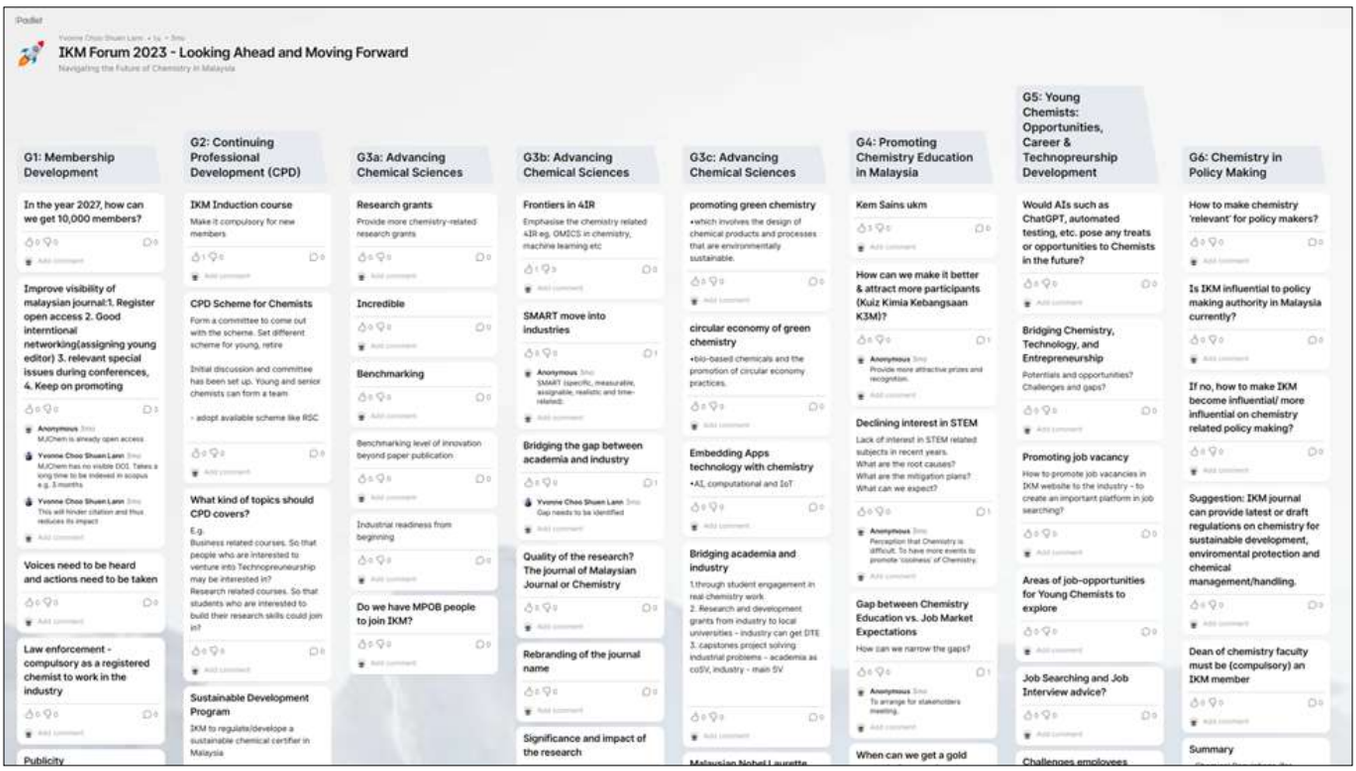


Screenshot of the Padlet Platform on the Day of The Forum

9th NETWORK OF INTER-ASIAN CHEMISTRY EDUCATORS (9NICE) CONFERENCE 2023

The 9th Network of Inter-Asian Chemistry Educators (9NICE) Conference 2023 was held in the city of Kuching, Sarawak, Malaysia from 28 - 30 July 2023. With the theme of "Chemistry for Sustainable Development & Environmental Protection", the 9NICE Conference 2023 comprised the following:

- Lectures: Keynotes, oral & poster presentations
- Cultural & Nature Tours
- Exhibition
- IUPAC Young Ambassadors for Chemistry (YAC) programme

9NICE 2023 was organized by Institut Kimia Malaysia (IKM) in collaboration with IKM Sarawak Branch Committee, Institute of Teacher Education (Batu Lintang Sarawak), Education Department of Sarawak, Universiti Malaysia Sarawak (UNIMAS) and Department of Chemistry, Sarawak. The conference is supported by IUPAC, IKM Law Hieng Ding Foundation and Business Events Sarawak.

NICE is a network of chemistry educators from four Asian countries/regions, namely Japan, Korea, Malaysia & Taiwan. The main objective of NICE is to promote chemistry education among the younger generation. It also aims to create a network of chemistry educators to share experience & expertise in the teaching & learning of chemistry. NICE organizes a biennial conference and in 2023, the 9NICE Conference was held from 28 – 30th July 2023 in the nostalgic city of Kuching in Sarawak, Malaysia. The participants of NICE conferences are mainly chemistry educators, teachers and students. This year's 9NICE Conference attracted 197 participants from 6 countries. For the programme of 9NICE Conference 2023, we have a total of 57 presentations including 4 keynote lectures, 27 oral and 26 poster presentations from 6 countries. The presentations cover many areas in chemistry education, environment & sustainability and also other key areas of chemistry.

Keynote papers presented during the 9NICE conference were as follows: -

- Keynote Lecture 1 - Exploring the future of Chemistry Education Centers in Korea by Prof Jongseok Park Kyungpook National University, South Korea.
- Keynote Lecture 2 - Raising Awareness: Multiple Uses of Chemicals and Chemical Weapons Convention by Prof Dato Dr Jamil Maah, Universiti Malaya, Malaysia
- Keynote Lecture 3 - Analogies in Chemistry Teaching and Learning by Prof Shingo Uchinukura, Kagoshima University, Japan
- Keynote Lecture 4 - Equation- free Quantum Chemistry and Molecular Orbital Theory Prof Yuan -Chung Cheng, National Taiwan University, Taiwan.

In addition, 9NICE Conference 2023 also included a Young Ambassadors for Chemistry (YAC) 2023 programme especially for students and teachers. This year's YAC 2023 comprised interactive experiments, demonstrations and workshops held at the Institute of Teacher Education (Batu Lintang Sarawak). The teachers & students enjoyed the interactive experiments and demonstration that aimed to associate chemistry with the UN Sustainable Development Goals (SDG) 2030. About 40 secondary students aged 16-17 with 10 teachers attended the YAC2023 programme. Another 18 students from Taiwan, Japan & Korea and staff from the Institute of Teacher Education also attended as observers. The participants were divided into 10 groups. Each group consists of 4 local students, 1 accompanying teacher and 1 or more international participants. They were given time to explore the experiments showcased in each of the laboratories before being brought to the next laboratory on a rotational basis.

Details of each laboratory were as follows:
Laboratory 1 – Booth 1 (SDG 6)
Table 1: Learning how to use a dropper
Table 2: Turbidity Test
Table 3: pH Test
Table 4: Identification of Dissolved Ions

Water Analysis Experiment by the Department of Chemistry Sarawak

- Tested water quality (pH, turbidity, dissolved ions, etc.) from local sources
- Showcased the importance of Chemistry in maintaining good water quality via
- analysis and water purification for better wellbeing.

Laboratory 2 – Booth 2 (SDG 7) and 3 (SDG 9)
Table 1: Veg-based Dye-Sensitized Solar Cells (DSSC)
Table 2: Water Electrolysis
Table 3: Tensile Stress of Common Household Materials
Table 4: Corrosion Protection

The Making of Solar Cell / Water Electrolysis Experiment

- Created simple solar cell (from colored vegetables and artificial dyes)
- Created simple water electrolysis set-up using battery, thumb pins, salt water/bicarbonate soda and transparent cups
- Showcased how the concept works and relate them to existing research on renewable energy (e.g. solar cells, fuel cell/water splitting, etc.)

Experiment Testing Strength of Materials and Corrosion Protection

- Tested the strength of common materials such as cardboard, rubber glove, plastic bag, etc. using simple set-up (cut materials into strips and exert pulling force using a spring scale between two fixtures resembling tensile test of materials)
- Tested out methods of preventing corrosion of nails (secondary school experiment)
- Showcased the need for chemist in the making, testing and protection of existing materials used in industry, innovation and infrastructure

Laboratory 3 – Booth 4 (SDG 12) and 5 (SDG 13)
Table 1-2: The Making of Bioplastic
Table 3-4: Biodiesel Synthesis

The Making of Bioplastic Experiment

- Made simple bio-plastic with starch (corn starch), vinegar, water and heat source
- Allowed students to bring home the bio-plastic they made to observe the biodegradation part
- Showcased the effort chemists are making in materials development (e.g. biodegradability, toxicity, etc.) and their application in other sectors (e.g. biomedicine, food packaging, etc.)

Waste to Wealth (Biodiesel Synthesis) Experiment

- Conducted waste to wealth experiment: synthesizing biodiesel from used cooking oil
- Showcase the importance of chemistry in climate action initiatives

A welcome reception was held at Roxy Hotel Kuching on the night before the conference started. Participants enjoy a leisure evening to gather, mingle and get to know each other as well as socializing and networking.

The second day of the conference was about relaxing. The participants enjoyed a trip to the Semenggoh Wildlife Centre to encounter one of Borneo's endangered species - Orangutans. Participants got to observe the forest reserve's caretakers during their feeding time.

Participants also visited the Borneo Cultures Museum, which is the second largest museum in Southeast Asia. The state-of-the-art complex is home to over 1,000 artefacts that boast the rich culture and heritage of the indigenous peoples of Borneo and Sarawak.

On the last day, Prof Uday Maitra from India started the 'Chemistry is Fun" session with a series of lectures and demonstrations. He presented interesting lectures on historical chemistry and chemistry in space. The second demonstration was from a school teacher, Mr Liao Hsu-Mao from Taiwan. He discussed the Design and Application of the Mini Stirrer Modules. The demonstrations were catered for teachers so that they could each bring home a unit to be distributed and demonstrate to their students in their respective institutions. Mr Liao explained the steps involved to assemble each mini stirrer units and showcased the use of such units in teaching.

During the conference dinner, all the participants from each country showcased their singing talents on stage making the dinner full of entertainment and fun.

During the closing ceremony, Datuk ChM Dr Soon Ting Kueh passed the baton to the next NICE conference organizing Chairman, Prof. Dr Kuriyama from Yamagata University, Japan. The next NICE conference will be held in Japan in the year 2025.

Report by:
Datuk ChM Dr Soon Ting Kueh, Datin ChM Dr Zuriati Zakaria & Asst Prof ChM Dr Yvonne Choo Shuen Lann

Exploring the Sustainability of Malaysian Fragrance Brand: Industrial Visit to SugarBomb Worldwide Sdn Bhd

Prof ChM Dr Phang Sook Wai (TAR UMT), Assoc Prof ChM Dr Nurul Izzaty Hassan (UKM), ChM Dr Muntaz Abu Bakar (UKM), Assoc Prof ChM Dr Zainiharyati Mohd Zain (UiTM)

An inspiring and eye-opening industrial visit to SugarBomb Worldwide Sdn Bhd at Taman Industri Meru, Klang, led by the chairperson (AP ChM Dr Juan Joon Ching) and joined by seven committees from the Division of Green & Sustainable Chemistry (DGSC) under Institut Kimia Malaysia (IKM), was held on 9th May 2023 (Tuesday). This event was organized by Associate Professor ChM Dr. Nurul Izzaty Binti Hassan from UKM. The purpose of this industrial visit is to expose the committees to the production line processes of the perfume industry as well as to seek for the potential collaboration between IKM and SugarBomb Worldwide Sdn Bhd.

The committees arrived at the destination at 10am and the event was commenced by a welcome address from the Vice President of SugarBomb Worldwide Sdn Bhd - Dr Muhammad Zamir Othman. In the brief overview that was presented, he had showcased the history and introduction of SugarBomb Worldwide Sdn Bhd, and how the company was conceptualized in 2015 in the United Kingdom when the founders met, where idea and direction of the company was discussed. From there, what started off as a perfume brand has expanded into a wide range of other products such as air fresheners, hand sanitizers, and various other merchandises. So, what does SugarBomb symbolizes? 'Sugar' and 'Bomb' represent the best in the perfumery and when put together, it aims to produce sweet fragrance that will blast the perfume industry.

From a humble home workshop to a 3-acre-large factory, SugarBomb Worldwide Sdn Bhd has grown to having over 200 talents employed at their Headquarters in Klang and their factory in Meru, Klang. Besides being a perfume company, SugarBomb Worldwide Sdn Bhd also supports the MAHA 2022 that focuses on food security. In SugarBomb Worldwide Sdn Bhd, alcohol sustainability is worked on by recycling the alcohol waste from their industry through usage of a simple distillation setup. The recycled alcohol is then reused for the machine and apparatus cleaning purposes.

After the introductory talk, Dr Muhammad Zamir Othman led the committees to visit the warehouse, starting from quality control check on the raw chemicals used as well as the mixing process of different types of chemicals to produce perfume, detergents, and other toiletries products. After the mixing process, the mixtures were subjected to an ageing period to ensure the stability of the products. Prior to the completion of ageing process, pH analysis, colour analysis as well profiling analysis of the related products were carried out to ensure the quality of the product before proceeding to the packaging department.

DGSC team felt enlightened by the eye-opening knowledge that was learned about the perfume making processes and was also motivated by the dedicated spirit of SugarBomb Worldwide Sdn Bhd on the return focusing of food security through the recycle of alcohol wastes. Last but not least, Dr Muhammad Zamir Othman presented each of the DGSC team with a discovery set of perfume as souvenir and potential perfume making workshop or future collaboration activities were discussed.

BERITA IKM September 2023 Issue No. 152

Chemistry *in* Malaysia

IUPAC 52nd General Assembly (52GA) & 49th World Chemistry Congress (49WCC)

A delegation led by IKM President, Datuk ChM Dr Soon Ting Kueh, participated in the **IUPAC 52nd General Assembly (52GA) & 49th World Chemistry Congress (49WCC)** (collectively known as **IUPAC 2023**) which was held from 18 – 25th August 2023 at The Hague, The Netherlands.

Members of the delegation are as follows:

- Datuk ChM Dr Soon Ting Kueh
- Datin ChM Dr Zuriati Zakaria
- ChM Halimah Abdul Rahim
- ChM Dr Malarvili Ramalingam
- Prof ChM Dr Edward Juan Joon Ching
- Academician ChM Dr Ho Chee Cheong
- ChM Dr Yang Farina Abdul Aziz
- ChM Dr Jenny Lee Nyun Len
- ChM Dr Yvonne Choo Shuen Lann
- Prof ChM Dr Rusli Daik
- ChM Dr Lee Siang Yin
- ChM Dr Aqeel Saravanan

The delegation left KLIA in the early morning of 18th August to Amsterdam via Dubai by Emirates Airlines. At the Schiphol Airport in Amsterdam, the delegation took the train to Den Haag Central and then by taxi to Mercure Hotel where they stayed for the next eight days.

IUPAC 2023 took place at the World Forum in Den Haag, A group photo of the delegation was taken at the World Forum on 19th August 2023.

1. 52nd IUPAC General Assembly (52GA)

The 52GA began with Divisions & Committees meetings on 19th & 20th August. As a Titular member, I attended the Committee on Chemistry Education (CCE) meeting. My main role in CCE is the Conference Coordinator. The 27th International Conference on Chemistry Education (27ICCE) will be held in Pattaya, Thailand from 15 – 17th July 2024.

At the CCE meeting, the Turkish Chemical Society and Ataturk University presented a joint bid to organize 28ICCE in Erzurum, Türkiye in 2026. This bid was accepted by the Committee.

In the afternoon of 19th August, I attended the Division IV Polymer meeting where Prof Rusli made a presentation on our preparedness for the 51st IUPAC World Polymer Congress, or MACRO 2026.

The Divisions & Committees usually have their dinners after the Meetings.

2. 49th World Chemistry Congress (49WCC) – Welcome & Opening Session

The 49WCC began with a Plenary & Opening Session on Sunday, 20 August, at 4.00 pm in the King Witten Alexander Hall. The plenary speaker was Motty Stevens. This was followed by the Welcome Reception at 6.00 pm.

The Malaysian delegation went for a dinner at the Fatt Kee Restaurant near Mercure Hotel.

2.1 Exhibition

An Exhibition was also held in conjunction with IUPAC 2023. IKM took up one booth to promote and market IUPAC 2025 & MACRO 2026. We were assisted by Donny Tan of Business Event Sarawak and Geonice Chong of Informa Markets.

3. Visit to Malaysian Embassy in The Hague

On Monday, 21st August, the delegation visited the Malaysian Embassy in The Hague where we met up with Her Excellency, Dato' Nadzirah Osman, the Malaysian Ambassador to The Netherlands. Several issues were discussed including the role of the Embassy in promoting IUPAC 2025 in Kuala Lumpur & collaboration with Organization for the Prohibition of Chemical Weapons (OPCW).

4. Presidents' Forum

On Tuesday, 22nd August, there was a Presidents' Forum. IUPAC invited presidents of chemical societies from 107 countries and 27 came for this Meeting. The following two important matters were discussed:

1. The development and implementation of the FAIR data in chemistry; &
2. UN Intergovernmental Panel on Chemicals, Waste, and Pollution Prevention.

IUPAC President also highlighted the following developments by IUPAC:

- A UN declaration on the International Decade on Science for Sustainable Development is expected soon. IUPAC has been one of the big drivers as a key player to help achieve the SGDs.
- The Global Women's Breakfast has been one of the flagship activities and would like to see the GWB as one of the flagship activities for the International Decade.
- Top 10 Emerging Technologies in Chemistry: invite all members to send in proposal. The aim is to engage the public and the chemical industry.

- The Periodic Table Challenge: has been a great success, translated in 7 languages; all members are invited to publicise this and encourage participation.

5. IUPAC 2025 & MACRO 2026 Appreciation Dinner

On the evening of Tuesday, 22nd August 2023, we hosted an IUPAC 2025 & MACRO 2026 Appreciation Dinner for key members of IUPAC Divisions & Committees officials together with members of our delegation at the Seafood Bar 19 restaurant. After a sumptuous dinner and drinks, there were a lot of exchange of ideas and social interactions.

6. IUPAC Council Meetings

IUPAC Council Meetings were held on 23rd & 24th August 2023. Among the major highlights and decisions were the followings:

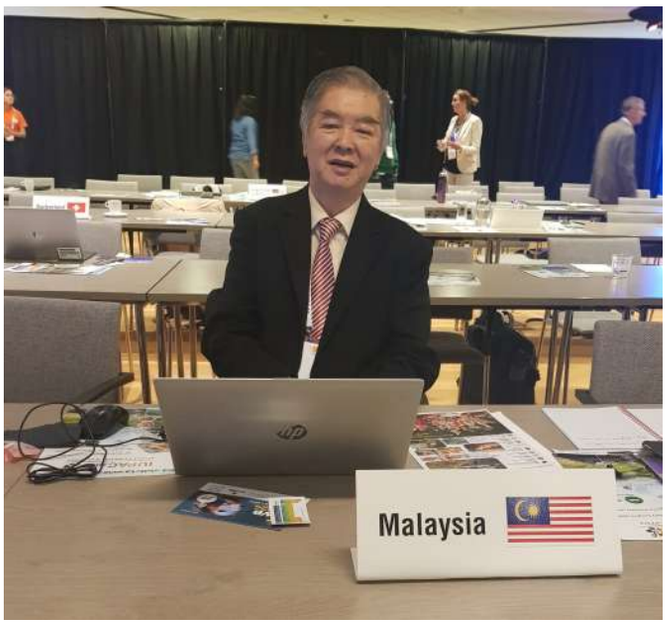
6.1 Elections of new Executive Officers for 2024 – 2025

- Mary Garson (Australia) was elected as Vice President for 2024 – 2025.
- Zoltan Mester (Canada) was elected as Secretary General for 2024 – 2025.

6.2 Elections of new Members of Executive Board (6) for 2024 – 2025

The following six persons were elected as Members of the Executive Board for 2024 - 2025:

Hemda Garelick (UK)
Richard Hartshorn (New Zealand)
Bonnie Lawlor (USA)
Bipul Saha (India)
Zhigang Shuai (China/Beijing)
Pietro Tundo (Italy)



6.3 New National Adhering Organizations (NAO)

The following two new NAOs were admitted to IUPAC starting from 2024:

- National Autonomous University of Honduras (UNAH)
- Jordanian Chemical Society (JCS)

6.4 Bidding for 55th IUPAC General Assembly (55GA) & 52nd World Chemistry Congress (52WCC) 2029

The Czech Republic/Slovakia won the bid to host the 55th IUPAC General Assembly (55GA) & 52nd World Chemistry Congress (52WCC) in Prague in 2029

6.5 Report on preparedness on 53rd IUPAC General Assembly (53GA) & 50th World Chemistry Congress (50WCC) 2025 in Kuala Lumpur, Malaysia

Datuk ChM Dr Soon Ting Kueh made a presentation on the preparedness on 53GA & 50WCC in Kuala Lumpur, Malaysia in 2025. The Report was well received and people were generally keen to come to Malaysia in 2025.

6.6 Election of Divisions & Committees Members

IKM members elected to the various IUPAC Divisions & Committees are shown in the table below.

6.7 Photo Sessions

A photo session of the IUPAC Divisions % Committees was organized. A Group photo of the Council was also taken.

7. Gala Dinner

The Gala Dinner was held in the 150 years old Grote Kerk Church on Thursday, 24 August 2023. About 1,200 guests attend the Gala Dinner.

8. Plenary Session & Closing Ceremony

The final Plenary Session was held in the King Wittem Alexander Hall at 10.50 am on Friday, 25th August. The Plenary Lecture was given by Chad Mirkin.

IKM Representatives	*Committee/Division*	*Grade*
Datuk ChM Dr Soon Ting Kueh	Committee on Chemistry Education (CCE)	Titular Member (TM)
Asst Prof ChM Dr Yvonne Choo Shuen Lann	Committee on Chemical Research Applied to World Needs (ChemRAWN)	Associate Member (AM)
Prof ChM Dr Chong Kwok Feng	Division I Physical & Biophysical Chemistry	Associate Member (AM)
ChM Dr Yang Farina Abdul Aziz	Division II Inorganic Chemistry	Associate Member (AM)
Datin ChM Dr Zuriati Zakaria	Division III Organic & Biomolecular Chemistry	Titular Member (TM)
Prof ChM Dr Rusli Daik	Division IV Polymer	National Representative (NR)
ChM Dr Malarvili Ramalingam	Division V Analytical Chemistry	Associate Member (AM)
Prof ChM Dr Edward Juan Joon Ching	Division VI Chemistry & The Environment	Associate Member (AM)

The Closing Ceremony was held in the same venue. Floris Rutjes, the Conference Chair, thank all participants, speakers, sponsors and members of the Organizing Committee for a successful IUPAC 2023.

8.1 Welcome to Malaysia 2025

Finally, IKM President, Datuk ChM Dr Soon Ting Kueh, made a presentation on IUPAC 2025 to be held in Malaysia in 2025. A video was also shown. It was well received by the audience.

9. Farewell to The Netherlands

On Saturday, 26th August 2023, the delegation took 2 cabs from Mercure Hotel to Amsterdam Schiphol Airport on the way back to Kuala Lumpur via Dubai. We have fond memories of the trip to The Hague and bid farewell to The Netherlands.

Report by
Datuk ChM Dr Soon Ting Kueh

INSTITUT KIMIA MALAYSIA

MALAYSIAN INSTITUTE OF CHEMISTRY
(Inaugurated on 8 April 1967, incorporated under Chemists Act 1975 on 1 November 1977)

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MALAM KIMIA 2023
Friday, 1 December 2023

Malam Kimia 2023 will be held on **Friday, 1 December 2023** at the **Citrine & Ruby Ballroom (Level G), One World Hotel, Bandar Utama, 47800 Petaling Jaya, Selangor.** Presentation of the IKM Annual Chemistry Awards such as the IKM Gold Medal, Graduate Chemistry Medals, Merit Awards and Laboratory Excellence Awards will be made during the function. The charges for dinner are **RM250.00** per person for IKM members and their spouses only and **RM300.00** per person for non-members. Companies are welcomed to book a table for **RM3000.00**.

The closing date for purchase of dinner tickets is **10 November 2023**.

REPLY SLIP

Executive Director
Institut Kimia Malaysia
127B, Jalan Aminuddin Baki
Taman Tun Dr. Ismail
60000 Kuala Lumpur

Date……

MALAM KIMIA 2023

1. I wish to purchase the following dinner tickets (Fill in the number of tickets in box):

   Member / spouse ☐ at RM250.00 each

   Guests (non-members) / Organization ☐ at RM3000.00 for 10 pax

   Guest (non-member) ☐ at RM300.00 each

2. I attach payment proof of RM …….. for the dinner ticket(s).

Signature: ……..

Name: ……..... IKM Membership Number:……

Address: ……..…….....

.....

Mobile Phone Number: …… Email: ……..……..

Mode of Payment (direct online transfer / walk-in / cheque / ATM transfer)	
Name of Account: INSTITUT KIMIA MALAYSIA	Name of Bank: PUBLIC BANK BERHAD
Account Number: 3127 731017	Cheque should be made payable to "INSTITUT KIMIA MALAYSIA"

R.S.V.P. by fax or email before 10 November 2023 **Fax: 03-77289909 or Email: siti@ikm.org.my or azizi @ikm.org.my**

INSTITUT KIMIA MALAYSIA

MALAYSIAN INSTITUTE OF CHEMISTRY
(Inaugurated on 8 April 1967, incorporated under Chemists Act 1975 on 1 November 1977)

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EMAIL: ikmhq@ikm.org.my **WEBSITE**: http://www.ikm.org.my **FACEBOOK**: Institut Kimia Malaysia

President: Datuk ChM Dr. Soon Ting Kueh

To: **All Senior IKM Members,**

Dear Senior IKM Members,

Senior IKM Members Get-together & Malam Kimia 2023 on Friday, 1 December 2023, Citrine & Ruby Ballroom (Level G), One World Hotel, Bandar Utama, 47800 Petaling Jaya, Selangor

IKM Council has decided to invite all **Senior IKM Members (age 60 years and above with at least 10 years of membership)** to attend the Malam Kimia 2023 to be held on **Friday, 1 December 2023** at the **Citrine & Ruby Ballroom (Level G), One World Hotel, Bandar Utama, 47800 Petaling Jaya, Selangor**. We are very pleased to extend a complimentary invitation personally to you and hope that you will be able to attend. If you would like to bring your spouse or family members, additional dinner tickets can be purchased from IKM Secretariat. We look forward to your attendance at this function.

ChM Dr Aqeel Saravanan
Executive Director

REPLY SLIP

Executive Director
Institut Kimia Malaysia
127B Jalan Aminuddin Baki
Taman Tun Dr Ismail, 60000 Kuala Lumpur

Date: .....

MALAM KIMIA 2023

1. I will attend Malam Kimia 2023. ☐

2. I wish to purchase additional dinner tickets as follows: (Fill in the number of tickets in box):
   - Member / spouse ☐ at RM250.00 each
   - Guest (non-member) ☐ at RM300.00 each
   - Guests (non-members) / Organization ☐ at RM3000.00 for 10 pax

3. I attach payment proof of RM ..... for the dinner ticket(s).

Signature: .....

Name: ..... IKM Membership Number:.....

Address:.....

.....

Mobile Phone Number: ..... Email: .....

Mode of Payment (direct online transfer / walk-in / cheque / ATM transfer)
Name of Account: INSTITUT KIMIA MALAYSIA Name of Bank: PUBLIC BANK BERHAD
Account Number: 3127 731017 Cheque should be made payable to "INSTITUT KIMIA MALAYSIA"

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Industrial Visit by the Division of Food Science & Nutrition

Institut Kimia Malaysia (IKM) and the International Medical University (IMU) recently paid a visit to The Origin Foods Sdn Bhd (TOF) on 4th July 2023 at 2:30 PM. Led by Datin ChM Maimonah Sulaiman and ChM Li Hui Ling, along with nine Division members, Dr. Chong Pei Nee & Dr. Megan Chong from IMU and accompanied by seven IMU Nutrition programme students, the delegation visited TOF's premises situated at Lot 1, Jalan Industri PBP 11, Taman Perindustrian Pusat Bandar Puchong, 47100 Puchong, Selangor.

TOF is recognized as a leading contract manufacturer of nutraceutical products, specializing in health food, traditional medicine, and health supplements. The company prides itself on adhering to a set of stringent standards known as the "4G" manufacturer practices, which encompass Good Manufacturing Practice, Good Agriculture Practice, Good Laboratory Practice, and Good Safety Practice.

During the visit, Ms. Tee Chiou Huoy, Senior R&D Manager, and Ms. Tan Wai Yee, R&D Senior Executive, provided the delegation with introduction to TOF and a comprehensive tour of the factory. The tour included a glimpse into the production site, indoor organic wheatgrass aeroponic plantation, and ISO/IEC 17025 certified testing and analysis lab. Following the tour, a round table discussion took place with TOF's Managing Director, Datuk Wong Seng Tong. The meeting covered a range of significant topics, with particular focus on three key issues. Firstly, the delegation discussed product testing and certification, recognizing its crucial role in ensuring the safety and efficacy of nutraceutical products. The importance of maintaining high standards and compliance with regulatory requirements was emphasized.

Furthermore, the discussion delved into innovative health food development, with an emphasis on exploring new avenues for product development and formulation. The delegation had the opportunity to engage in food tasting, specifically sampling TOF's nutria-bar, which showcased the company's commitment to creating nutritious and appealing health food options.

Lastly, the meeting served as a platform to discuss future collaboration opportunities between IKM, IMU, and TOF. Recognizing the strengths and expertise of each organization, the participants explored potential avenues for joint initiatives and partnerships to further enhance research, development, and the promotion of nutraceutical products.

The fruitful meeting concluded at 4:30 PM, with the delegation expressing their gratitude to TOF for facilitating the visit and providing valuable insights into the nutraceutical industry. This collaborative effort between industry and academia holds promising prospects for advancing research and development in the field of nutraceuticals, ultimately benefiting consumers with safer and more effective health products.

Report prepared by,
Dr Chong Pei Nee, *International Medical University*

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The Importance of Efficient Occupational Safety and Health Management

Assoc. Prof. Ts. ChM Dr. Darfizzi Derawi
Deputy Chairman, Department of Chemical Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia
OSH Practioner / Trainer, Email: darfizzi@ukm.edu.my

The employment sector is often exposed to hazards and the risk of occupational accidents. Based on statistics released in 2021 by the Department of Statistics Malaysia, as many as 2 cases of fatal accidents occur for every 100,000 workers with an average of 1 case per day. Meanwhile, accidental injuries at work recorded an average of 59 cases per day.

Occupational Safety and Health (OSH) management is of paramount importance in any workplace, regardless of the industry or size of the organization. The primary focus of OSH management is to protect the health and safety of employees. By implementing effective safety measures, organizations can prevent workplace accidents, injuries, and illnesses, creating a safe and healthy work environment for their staff. Workplace accidents and illnesses can result in significant financial costs for businesses, including medical expenses, workers' compensation claims, and potential legal liabilities. OSH management helps mitigate these costs by preventing incidents before they occur. A safe and healthy work environment fosters higher employee morale and satisfaction. When employees feel safe, they are more likely to be motivated, engaged, and productive, leading to improved overall organizational performance. Organizations that prioritize employee safety and health build a positive reputation both within the workforce and among customers, partners, and the general public. A strong safety record can be a competitive advantage in attracting and retaining talent and winning contracts.

In Malaysia, employer and employee compliance with the Occupational Safety and Health Act is subject to the Occupational Safety and Health Act 1994 (Act 514). The main purpose of applying Act 514 is to ensure the safety, health and welfare of workers who are at risk while carrying out work activities and to protect individuals who are on the premises of the workplace involved. In addition, Act 514 is intended to promote a work environment that suits the physiological and psychological needs of employees. The existence of a special act related to PPE like this is due to the reality of the industrial employment sector which is often exposed to safety risks and dangers. The most important aspect that needs to be emphasized in good work practices is to ensure that workers are provided with the training, safety equipment, and other support resources necessary to be able to work safely. Failure to implement a safe work system in the workplace can lead to any incident or injury. Every incident or accident that occurs in the workplace will have a negative impact due to decreased productivity due to the absence or loss of skilled labor, health care and rehabilitation costs, effects on the emotional and well-being of employees, workers' compensation claims, and the possibility of legal action as provided existing deed. The actual cost of loss when an occupational accident occurs can be described with the Iceberg Theory (Figure 1). This theory explains that the costs that can be seen directly are only a small part compared to the costs that cannot be directly seen as a result of an occupational accident. These invisible costs are the main contributors to the actual costs that the employer has to bear in the event of an accident at work. Therefore, it is very important that company management and employers prioritize safety in the workplace. Hazard is a condition or situation that has the potential to cause harm to humans either injury or disease, destruction of property, destruction to the environment or a combination of all of them. Next, danger is the relative exposure to existing hazards. Meanwhile, risk involves the combination of the possibility of dangerous events with a certain period of time or conditions and the severity of the impact on injury or health to people, property, the environment or a combination of all of them. There are several types of hazards related to the workplace, namely physical, biological, chemical, ergonomic, and psychological hazards.

- Physical hazards consist of mechanical and electrical. Hazards in this category involve environmental factors that can cause injury. This includes noise levels, exposed electrical wiring, falling objects, wet floors, and other

conditions that could cause slips, falls, cuts, or other injuries.

- Biological hazards can cause diseases, infections, and serious health conditions. This hazard involves exposure to airborne and blood-borne agents such as viruses, bacteria, and fungi. This hazard also contributes significantly to sick building syndrome.
- Chemical hazards involve some chemicals that are carcinogenic and corrosive. These chemicals can be inhaled as gases or vapors, or come into contact with the skin as liquids or solids. Exposure to chemical hazards can cause skin irritation, respiratory problems, blindness, or serious health complications.
- Ergonomic hazards put pressure on muscles, tendons, and other connective tissues of the body. This condition occurs as a result of repeated exposure to abnormal postures and abnormal movements, improper design of workplaces, equipment and tasks.
- Psychological hazards involve stress, fatigue, bullying, sexual harassment, and violence at work. This condition can cause depression, reduced concentration, lack of attention, or negligence at work. This in turn results in morale problems, decreased productivity and quality of work, as well as increased risk of injury.

The management needs to identify the hazard in the workplace involved. They must take the necessary actions to control the risk closely related to the hazard. Risk control is the process of identifying practical measures to eliminate or reduce the possibility of injury or illness in the workplace. Generally, risk control measures involve combination methods of elimination, substitution, isolation, engineering controls, administrative controls, and personal protective equipment (PPE). OSH management is an ongoing process that encourages continuous improvement. Regular assessments, reviews, and updates to safety procedures enable organizations to adapt to changing circumstances and stay ahead of emerging risks. Employers have a legal and moral responsibility to provide a safe working environment for their employees. Prioritizing OSH management is a demonstration of a company's commitment to fulfilling this responsibility. Workplace accidents can disrupt operations and lead to downtime. Effective OSH management helps ensure business continuity by minimizing the likelihood of incidents that could halt or hinder daily operations. In conclusion, OSH management is essential for protecting employees, reducing costs, improving productivity, ensuring legal compliance, and maintaining a positive reputation. By investing in the safety and well-being of their workforce, organizations can create a more resilient and successful business environment.

Figure 1

19th ASIAN CHEMICAL CONGRESS 2023 AND THE 21ST GENERAL ASSEMBLY OF THE FEDERATION OF ASIAN CHEMICAL SOCIETIES

The 21st General Assembly of the Federation of Asian Chemical Societies (FACS) was held on 8 July at the Istanbul Technical University, Turkiye. The meeting was attended by 17 member countries and was chaired by Prof Dr Reuben Jih-Ru Hwu, President of FACS. The highlights of the meeting were the signing of the MOU between the American Chemical Society and FACS, the handover of the Chairmanship to Dr. Mustafa Culha from the Turkish Chemical Society and the announcement of the 20th Asian Chemical Congress to be held in Thailand in 2025. IKM won the bid to hold the 21st Asian Chemical Congress in Malaysia in 2027. During the bidding session, Datuk ChM Dr Soon Ting Kueh represented IKM managed to secure the bidding. The 21st Asian Chemical Congress in Malaysia mark an important year for IKM because it is also the 60th anniversary of IKM. We are expecting to gather about 1,000-1,500 participants from all around the world, especially from Asia, to attend this conference. After winning the bidding, we also hosted a celebration dinner with all the committee members.

The 19th Asian Chemical Congress was held on 9-14 July 2023 at the Suleyman Demirel Kultur Merkezi, Istanbul Technical University, Istanbul, Turkiye. The Congress was hosted by the Turkish Chemical Society with Prof. Dr. Mustafa Culha as the Chair of the organizing Committee and Associate Prof. Onder Metin as the Secretary-General.

During the opening ceremony, the Rector Prof. Dr. İsmail Koyuncu, Prof. Dr. Mustafa Çulha, President of the Federation of Asian Chemical Societies (FACS) and Congress Chair, and Prof. Dr Reuben Jih-Ru Hwu, former President of the Federation of Asian Chemical Societies (FACS), gave speeches.

Dr. Chi-Huey Wong was awarded the Israel Chemical Society International Barry Cohen Award and the Federation of Asian Chemical Societies (FACS) Foundation Lectureship Award.

Datin Dr Zuriati Zakaria, Vice President of IKM, Dr Miranda Wu, Past President of American Chemical Society and Dr David Winkler, Past President of Royal Australian Chemical Institute were awarded Fellows of FACS.

At the ceremony, Prof. Dr. Supawan Tantayanon was

presented the Citation Award, Prof. Dr Chi-Huey Wong was presented the Foundation Lectureship Award, Prof. Dr Richard Hartshorn was presented the Distinguished Contribution in Chemical Education Award, Prof. Dr. Chang Yun Son was presented the Distinguished Young Chemist Award and Prof. Dr. Ehud Keinan was presented the Citation Award.

During the Chemical Congress, nine plenary lectures were presented. The 2016 Nobel Laureate, Jean-Pierre Sauvage gave a talk on From Chemical Topology to Molecular Machines: A Historical Perspective and the President of IUPAC Javier García-Martínez gave a talk on Catalyzing a Sustainable Future through Chemistry.

Other plenary speakers were-
Steven P. Armes, *University of Sheffield, United Kingdom.* Talk Title: **Polymerisation-Induced Self-Assembly (PISA): A Platform Technology for Bespoke Polymer Particles**

Kazunari Domen, *The University of Tokyo, Japan,* Talk Title**:** Photocatalytic Water Splitting for Solar Hydrogen Production

Makoto Fujita, *The University of Tokyo, Japan, Talk Title:* **Coordination Self-Assembly: from Origins to the Latest Advances**

Metin Sitti, *Max Planck Institute for Intelligent Systems, Germany,* Talk Title: Light-, magnetically- and acoustically-driven active microparticles for targeted on-demand drug delivery

Michael Graetzel, *EPFL (Swiss Federal Institute of Technology Lausanne), Switzerland,*
Talk Title: **The Emergence of Perovskite Solar Cells for the Production of Electricity and Chemical Fuels from Sunlight**

Bin Liu, *National University of Singapore (NUS), Singapore,* Talk Title: **Accelerating Biomedical Research through AIEgen Innovation**

Shouheng Sun, *Brown University, USA,* Talk Title: **Nanoparticle Catalysis: Synthetic Tuning for Efficient Chemical Reactions**

Itamar Willner, *The Hebrew University of Jerusalem, Israel,* Talk Title: **DNA Nanotechnology: From Programmed Catalysis to Nanomedicine and Materials Science Applications**

During the 6 days Congress, there were 39 Keynote speakers, 44 invited speakers and 174 oral presentations. Around 303 posters, mostly by earlier career chemists and postgraduates were presented and winners of the posters were announced during the closing ceremony. The closing ceremony was held on 14th July at 12.00 pm during which

there were presentations of Young Rising Star Awards, Poster Awards followed by a FACS Flag Transfer ceremony to the Thai Chemical Society, the next host of Asian Chemical Congress.

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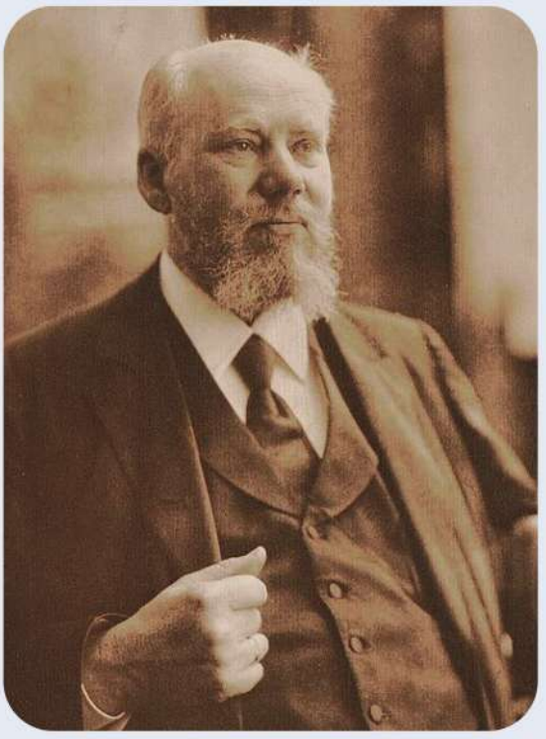

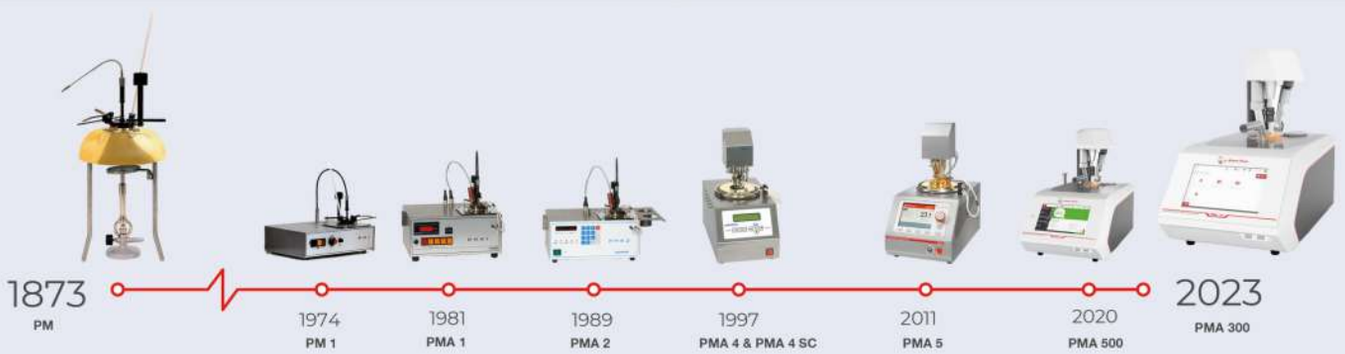

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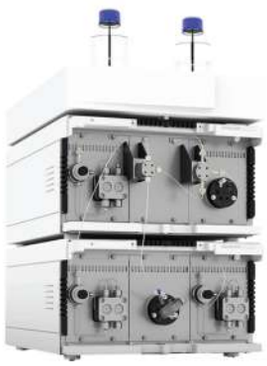

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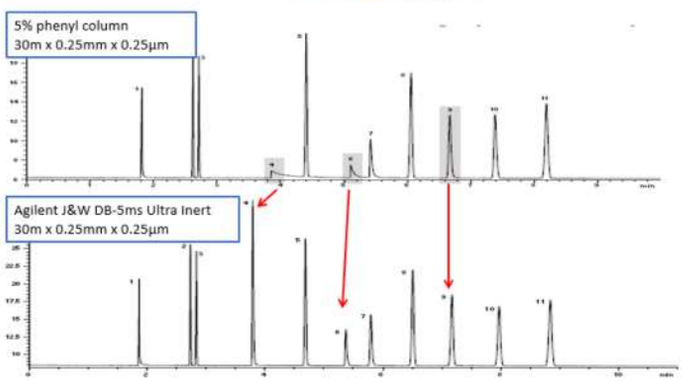
DB-624MS UI	Medium polarity	Analysis of solvents and volatiles	yes
DB-UI 8270D	Application specifique, apolar	Environmental analysis (semi-volatiles)	yes



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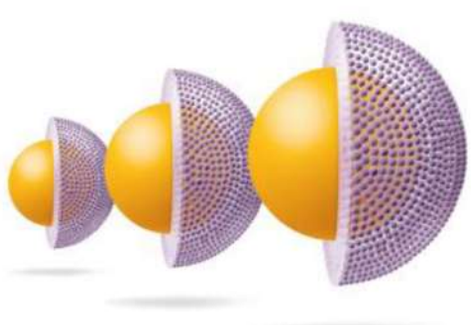

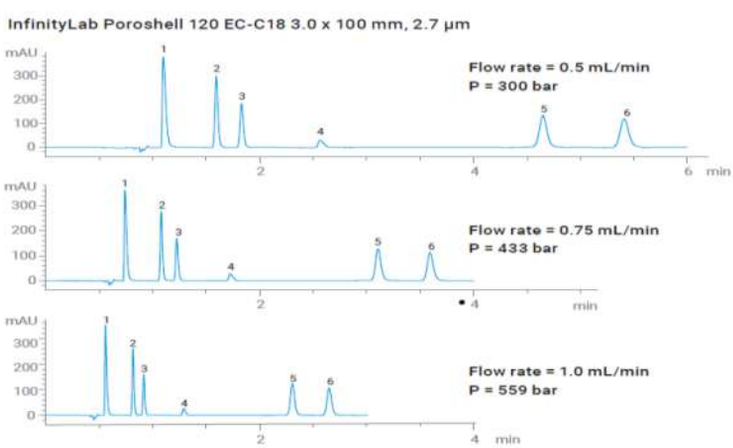

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Release of Advanced Liquid Processing System-treated Contaminated Wastewater from the Fukushima Daiichi Nuclear Power Plant

Prof. Dr Fani Sakellariadou

Dr Fani Sakellariadou is Professor in Geochemical Oceanography, Dept. of Maritime Studies and appointed as Director of the Oceanography and Marine Geochemistry Laboratory, Dept. of Maritime Studies University of Piraeus, Greece. She also the secretary and project coordinator at Division VI (Chemistry and the Environment) of the International Union of Pure and Applied Chemistry, a member of the International Council of Scientific Unions. Elected Vice President for the biennium 2024-2025 and President for 2026-2027. Her main research interests are chemical studies in marine sediments and more specifically about heavy metals, dissolved organic carbon and humic material, marine placer deposits, sea-bed mining, pollutant studies in harbor sediments, micro-plastics in the marine environment and many more. She has published more than 150 peer-reviewed publications.

Comment

On 11th March 2011, a magnitude-9 earthquake occurred in the Pacific Ocean about 80 miles east of the Japanese city of Sendai. It triggered a towering tsunami that reached the coastline and seriously damaged the Fukushima Daiichi Nuclear Power Plant (FDNPP).

Cooling water injected with molten damaged cores after the accident, as well as groundwater and rainwater seeping into the reactor consist contaminated wastewater (IAEA, 2015). Contaminated wastewater from FDNPP has undergone a decontamination process, treated by multi-nuclide removal equipment (Advanced Liquid Processing System, ALPS) to reduce 62 types of nuclides from the contaminated water to less than or equal to the regulatory concentrations and then stored in tanks at the site.

In 2013, the Japanese government proposed several solutions for the contaminated wastewater fate, including geosphere injection, vapor release, and directly releasing Fukushima's water into the Pacific Ocean. At present, the Fukushima Daiichi site is crowded with more than 1,000 towering storage tanks. On 13th of April 2021, the Japanese government officially approved Fukushima Daiichi's proposal to release 1.3 million tons of the nuclear-contaminated water into the sea over course of 30 years (Xidi Chen and Qi Xu, 2022; Lu et al, 2021).Even though nuclear power plants routinely discharge wastewater into the ocean in accordance with specific regulatory authorizations based on safety and environmental impact assessments, the Fukushima Nuclear Accident's discharge of such a significant volume stands out from the way that general nuclear power plants typically operate.

Great opposition and concerns have been raised internationally because of the ecotoxicological features of radioactive materials and their harmful and long-term impacts on the environment. The decontamination process is not perfect. The Tokyo Electric Power Company Holdings, Incorporated (TEPCO) insisted for years that there was only tritium left in the tanks. In October 2018, TEPCO admitted that the nuclear wastewater contained other radioactive materials apart from tritium, such as ^{106}Ru, ^{60}Co and ^{90}Sr. Although the concentration of these isotopes is lower than that of tritium, they are more likely to remain on the seafloor and more easily accumulated in marine life (Buesseler, 2020; Oceanus).

Tritium, 3H, is a radioisotope of hydrogen with a 12.3-year half-life. It is the greatest concern in Japan's nuclear wastewater discharge. Tritium replaces hydrogen atoms in water molecules and therefore it is very difficult to remove it even though the ALPS process (Shozugawa et al., 2020). Once in the environment, tritium reacts with oxygen and is quickly integrated into numerous cycles of the biosphere as tritiated water (HTO). It is extremely mobile in the environment and in all biological systems, (Ferreira et al., 2023). Tritium present in seawater, can become incorporated in organic compounds. Organic bound tritium is formed in aquatic plants through photosynthesis, then appears in fish and shellfish through ingestion (Yankovich et al., 2011). Consequently, tritium may accumulate in the food web (de With et al., 2021). The effects of tritiated water and organically bound tritium on humans have not yet been thoroughly studied. Some evidence suggests that exposure to elevated levels of tritium can pose a risk of cancer or genetic defects (Fairlie et al., 2014).

Radioisotopes with longer half-life, like ^{14}C, ^{106}Ru, ^{60}Co, and ^{90}Sr, often escape from the ALPS treatment and still exist in the treated wastewater, which can more easily enter marine sediments and be absorbed by marine organisms. These radioisotopes impose a potential threat to the marine environment and public health (Buesseler, 2020; Shozugawa et al., 2020; Normile, 2021; Zhao et al., 2021). The concentration of ^{14}C is also high in the treated wastewater (The Korea Times, 2021). Since it has a 5730-year half-life, it is also of concern as it may enter the biosphere and accumulate in marine ecosystems (Williams et al., 2010). ^{14}C is integrated in cellular components (proteins, nucleic acids), particularly cellular DNA. ^{106}Ru poses a long-term radiation risk to the environment and it is more easily incorporated into marine biota or sediments at high concentration factors (Buesseler, 2020). ^{60}Co is another kind or radioisotope that emits gamma rays which can penetrate the human body and damage the cells (Khajeh et al., 2017). ^{90}Sr has a chemical behavior like that of calcium and it can accumulate in organisms, particularly

in bones, increasing the osteosarcoma and leukemia risk (Khani et al., 2012).

Despite the large volume of the ocean and its complex current system leading to a significant dilution and dispersion of radioactive materials, it is well recognized that radionuclides with long half-life will still exist in the marine environment for a long time (Men et al., 2017), causing major consequences to the natural environment, the marine life, and the human health (Liu et al., 2021).The behavior of radioactive materials in the ocean depends on their chemical properties. Soluble radionuclides are dispersed. Radionuclides may react with molecules or bound to particulates. They can be suspended in the sea water and if larger and heavier they may sink on the seafloor. A major concern about the deliberate release of radioactive materials into the sea is the lack of information and knowledge. It is necessary to thoroughly evaluate and monitor any potential effects of the proposed discharge of Fukushima nuclear wastewater in the Pacific Ocean. Moreover, it is necessary to elaborate studies on the potential discharge alternatives including a comparison of their radiological impacts.

As an alternative it was suggested (Buesseler, 2020) that additional tanks could be built in the adjacent area to allow some of the contaminants with shorter half-lives to decay. However, there are worries that another significant earthquake could fracture the tanks and result in uncontrolled leaks. The 2030 UN Agenda for Sustainable development promotes the creation of inclusive and equitable societies. The voice of local communities and indigenous peoples should be considered seriously. For them, fishing activities are vital. Local Japanese fishers and coastal communities are very anxious. Additionally, neighboring countries, like China, South Korea and Taiwan, as well as Pacific Island countries and the Pacific Islands Forum, the region's intergovernmental organization, are opposed.

In conclusion, nuclear waste discharge into the ocean has the potential to seriously affect the marine ecology, harm food safety, public health and other vital interests of the people in nearby countries. Pollutants will spread to neighboring countries where the marine ecosystem has already been contaminated by the release of numerous radioactive wastes. On the other hand, it is well recognized that, the Global Ocean (including the Pacific one) is a shared resource but a finite one. It needs careful management and stewardship to ensure it will continue to deliver wealth and benefits in the long term. By now, we know that only health ecosystems can provide ecosystem services to humans. We should agree that the era of deliberately dumping toxic waste in the Global Ocean is, or should be, over.

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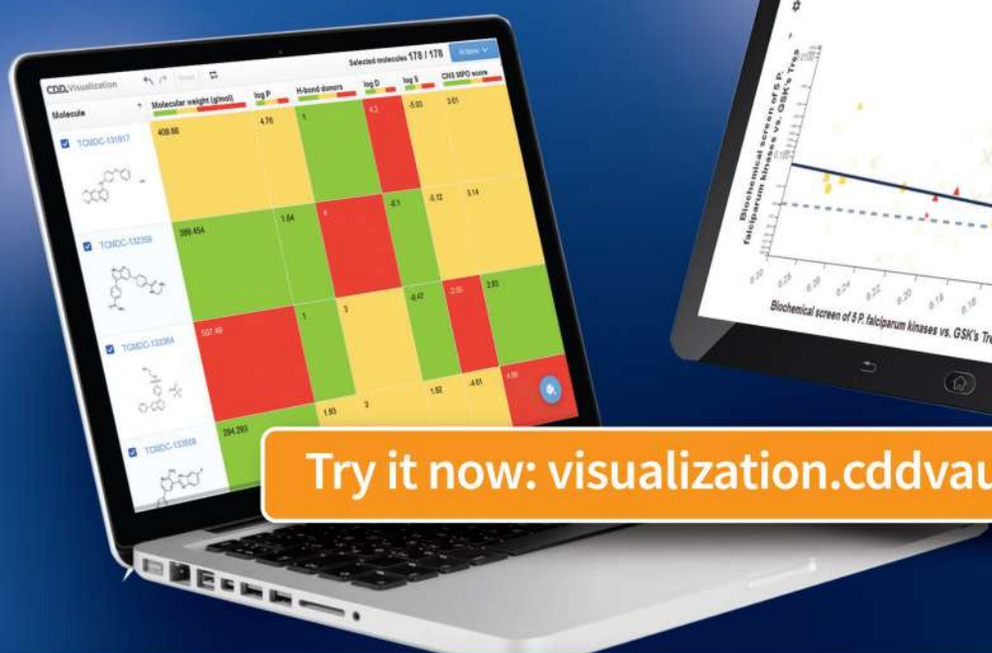

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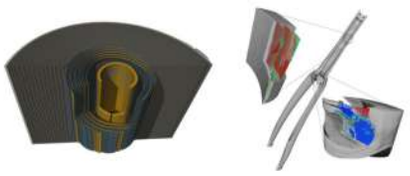

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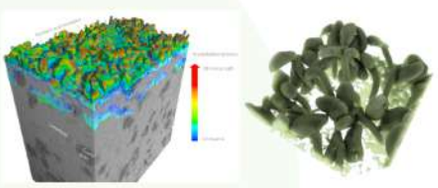

3D render of 138 scans of a crystallizing gypsum crust on a sandy limestone. Color corresponds to the time evolution of the gypsum formation and sub-surface microporous layers.

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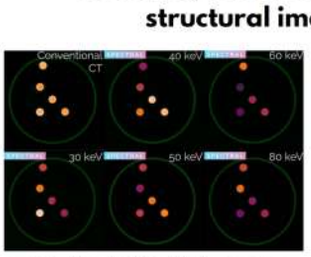

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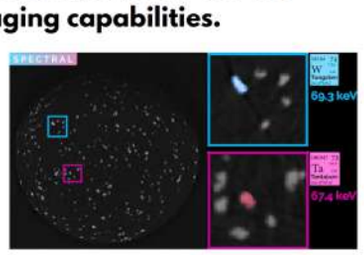

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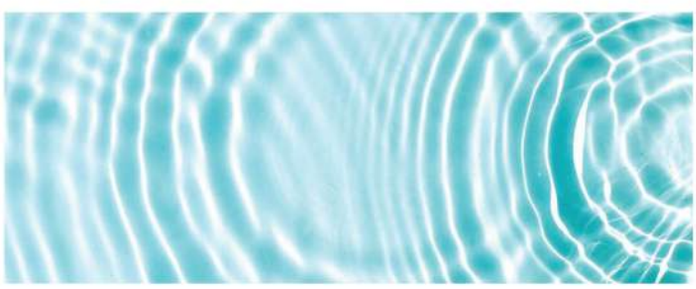

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L/3452/10312/23
Khairul Nazri Bin Baharuddin
L/3450/10309/23
Koh Joo Shi
L/3467/10344/23
Ku Mohamed Asyraf Bin Ku Ahmad
L/3458/10324/23
Law Pei Thien
L/3477/10363/23
Lee Jier
L/3453/10314/23
Magdeline Lai Tze Leng
L/3474/10357/23
Muhamad Nabil Najmuddin Bin Azman
L/3435/10260/23
Muhammad Amirul Afifi Bin Mat Yaki
L/3486/10384/23

Muhammad Faris Danial Bin Azhari
L/3439/10273/23
Muhammad Najmi Bin Risdan
L/3457/10322/23
Muhammad Syukor Bin Sulaiman
L/3429/10118/23
Muhammad Zhafran Bin Mohd Zulkarnain
L/3472/10355/23
Muzaffar Bin Mustafar
L/3448/10307/23
Najihah Binti Abd Latif
L/3466/10343/23
Ng Wei Keat, Dr.
L/3432/10250/23
Nor Adilla Binti Abdullah
L/3443/10293/23
Nor Akalili Binti Ahmad, Dr.
L/3459/10328/23
Nor Aneesa Binti Shahrul Hisham
L/3484/10381/23
Nor Diany Binti Zaidi
L/3441/10282/23
Nor Madiana Binti Ali
L/3440/10275/23
Nur Aini Fatihah Binti Azani
L/3444/10295/23
Nur Alya Asyura Binti Mazlan
L/3456/10321/23
Nur Bahirah Binti Abdul Rais
L/3488/10387/23
Nur Fatihah Binti Abdul Pata
L/3463/9972/23
Nur Fatma binti Ujang
L/3460/10331/23
Nur Mizan Izzati Binti Masran
L/3446/10301/23
Nur Qursya Binti Mohd Noor Salizan
L/3445/10296/23
Nurfarrah Atiqah Binti Roslan
L/3481/10375/23
Nurhazwane Binti Abdul Fadil
L/3451/10310/23
Nursyaliza Binti Elias
L/3476/10361/23
Nurul Ain Husna Binti Zulkiflee
L/3470/10353/23
Nurul Effie Alieyxa Binti Suhardi
L/3468/10349/23
Nurul Farhanah Binti Zakaria
L/3487/10386/23
Nurul Izzah Atirah binti Razali
L/3449/10308/23
Saranraj A/L Saravanan
L/3479/10372/23
Shalini A/P Palanisamy
L/3430/10236/23
Stefhanie Binti Sylvester
L/3469/10352/23
Syahrina Nur 'Afiqah Binti Abdul Halim
L/3447/10305/23
Tan Hooi Ping
L/3482/10378/23
Wan Nurdini Afiqah Binti Salpol Yusree
L/3483/10379/23
Wan Yusreena Ilya Binti Wan Azizee
L/3428/9938/23
Wong Soon Kit
L/3433/10251/23

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Affifandi bin Allias
M/6502/8935/21/23
Caroline Joan Anak Dan
M/6466/7882/17/23
Eva Tan Lee Yin
M/6468/6846/15/23
Jocephine anak Jonip
M/6464/8931/21/23
Mohammad Azri Bin Md Hanafiah
M/6467/9634/22/23
Nurul Akmaliah binti Hussin
M/6472/7467/16/23
Phneh Kok Wei
M/6469/6184/12/23
Siti Nurhairunissa binti Drahman
M/6465/7553/16/23
Sonja Sheena Jacob
M/6501/8988/21/23
Thamil Selvi A/P Nathan
M/6470/8725/20/23
Wan Mohd Hilmey Bin W. Mohd Arifin
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