

# ICPAC MONGOLIA

<https://icpacmongolia2024.org/>



28 Aug – 1 Sept 2024

## International Congress on Pure & Applied Chemistry Ulaanbaatar, Mongolia



### SOUVENIR PROGRAMME

**"Promoting Excellence in Chemical Research and Innovation"**



Organized by:



Institut Kimia Malaysia

In Collaboration with:



Mongolian Chemical Society

ACC

Asia Chem Corporation, Japan

## ICPAC MONGOLIA 2024 ORGANIZING COMMITTEE

Datuk ChM Dr. Soon Ting Kueh (Chairman)	<i>President, Institut Kimia Malaysia</i>
Prof Dr Avid Budeebazar (Co-Chair)	<i>President, Mongolian Chemical Society</i>
ChM Dr. Yang Farina Abdul Aziz	<i>Institut Kimia Malaysia</i>
ChM Chang Hon Fong	<i>Institut Kimia Malaysia</i>
ChM Dr. Malarvili Ramalingam	<i>Institut Kimia Malaysia</i>
Prof. ChM Dr. Juan Joon Ching	<i>Institut Kimia Malaysia</i>
DCP(R) Dato' ChM Dr. Yew Chong Hooi	<i>Institut Kimia Malaysia</i>

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## INSTITUT KIMIA MALAYSIA

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## ICPAC MONGOLIA 2024

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### MESSAGE FROM PRESIDENTS OF INSTITUT KIMIA MALAYSIA (IKM) AND MONGOLIAN CHEMICAL SOCIETY (MCS)



On behalf of Institut Kimia Malaysia (IKM) and the Mongolian Chemical Society (MCS), we would like to welcome all of you to the International Congress on Pure & Applied Chemistry Mongolia (ICPAC Mongolia) 2024 which will be held from 28th August – 1st September 2024 at the Holiday Inn Ulaanbaatar, Mongolia.

ICPAC Mongolia 2024 is a major international scientific meeting covering all major areas of pure and applied chemistry. ICPAC was first held in 2016 in Kuching, Sarawak, Malaysia and ever since, it is being held annually in countries like Vietnam, Cambodia, Myanmar, Indonesia & Malaysia except for the years 2020 & 2021 due to the COVID 19 pandemic.

The participants of ICPAC Mongolia 2024 come from all over the world, but majority are from Japan and the rest of Asia. For ICPAC Mongolia 2024, we have a total of 187 delegates coming from 10 countries, namely Malaysia, Japan, Mongolia, China, Croatia, France, Germany, Lithuania, Poland and South Korea. The Scientific programmes included 3 Plenary Lectures, 6 Keynotes, 150 Invited/Oral Lectures and 4 poster presentations, making a total of 163 presentations.

On behalf IKM & MCS, we would like to record our sincere appreciation to our Joint Organizer, namely the Asia Chem Corporation (ACC), Japan, for collaborating with us in jointly organizing ICPAC Mongolia 2024. It is through our joint effort that we are able to make ICPAC Mongolia 2024 a reality. As Chairpersons of ICPAC Mongolia 2024, we would like to record our sincere gratitude to all plenary and keynote speakers, all oral lecturers and posters presenters of ICPAC Mongolia 2024. Their presentations have definitely contributed to the success of ICPAC Mongolia 2024. We would also like to thank all members of ICPAC Mongolia 2024 Organizing Committee and IKM Secretariat staff for working very hard to put ICPAC Mongolia 2024 together and making it a success.

For the delegates of ICPAC Mongolia 2024, we hope that you benefited from the deliberations and proceedings of the scientific programmes, and enjoyed the Congress Banquet and the special tour to Chingisiin Khuree that we have arranged for you. We also urge you to take extra time off to enjoy the beautiful scenery and local cultures of Mongolia.

We look forward to seeing you again in Kuala Lumpur in 2025 for IUPAC 2025.

With best regards.

**Datuk ChM Dr Soon Ting Kueh**  
President, Institut Kimia Malaysia (IKM)  
Date: 12th August 2024

**Professor Dr Avid Budeebazar**  
President, Mongolian Chemical Society (MCS)

## ICPAC MONGOLIA 2024 – PROGRAMME AT A GLANCE

### WEDNESDAY, 28 AUGUST 2024

0800 – 1600	Registration				<i>Ballroom, Level 2</i>	
0900 – 1030	Plenary Lecture 1 & 2				<i>Ballroom, Level 2</i>	
1030 – 1100	Coffee Break & Posters Viewing				<i>Ballroom, Level 2</i>	
<b>Venue</b>	<b>Ballroom, Level 2</b>	<b>Meeting Room 4, Level 19</b>	<b>Meeting Room 5, Level 19</b>			
1100 – 1240	OBC	PMC	PCC			
1240 – 1400	Lunch <i>Venue: Innjoy Restaurant, Level 2</i>					
1400 - 1620	OBC	PMC	IGS	AEC	ICC	
End of Sessions						
<b>OPENING CEREMONY &amp; WELCOME RECEPTION</b> <i>Ballroom, Level 2</i>						
1700	<b>Welcome Address by Professor Dr Avid Budeebazar</b> <i>President, Mongolian Chemical Society &amp; Co-Chairman, ICPAC Mongolia 2024</i>					
1705	<b>Address by Dr Battogtokh Dorjgotov</b> <i>Department of Science Policy, Ministry of Economy and Development of Mongolia</i>					
1710	<b>Address by Professor Emeritus Dr Tamotsu Takahashi</b> <i>Director, Asia Chem Corporation (Japan)</i>					
1715	<b>Officiating Address by Datuk ChM Dr Soon Ting Kueh</b> <i>President, Institut Kimia Malaysia &amp; Chairman, ICPAC Mongolia 2024</i>					
1725	Welcome Reception					

### THURSDAY, 29 AUGUST 2024

0800 – 1600	Registration				<i>Ballroom, Level 2</i>	
<b>Venue</b>	<b>Ballroom, Level 2</b>	<b>Meeting Room 4, Level 19</b>	<b>Meeting Room 5, Level 19</b>	<b>Meeting Room 3, Level 19</b>		
0900 – 1030	OBC	PMC	PCC		ICC	
1030 – 1100	Coffee Break & Posters Viewing				<i>Ballroom, Level 2</i>	
	Coffee Break				<i>Foyer Level 19</i>	
1100 – 1240	OBC	PMC	PCC		ICC	
1240 – 1400	Lunch <i>Venue: Innjoy Restaurant, Level 2</i>					
1400 - 1600	OBC	ANC	PCC		IGS	
1600 - 1630	Coffee Break & Posters Viewing				<i>Ballroom, Level 2</i>	
	Coffee Break				<i>Foyer Level 19</i>	
1630 - 1750	OBC	PMC	PCC		IGS	
End of Sessions						

### FRIDAY, 30 AUGUST 2024

0830 - 1400	<b>ICPAC MONGOLIA TOUR</b> <b>(Assemble at Holiday Inn Lobby by 0830)</b>
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## ICPAC MONGOLIA 2024 – PROGRAMME AT A GLANCE

### SATURDAY, 31 AUGUST 2024




0800 – 1400	Registration			<i>Ballroom, Level 2</i>
<b>Venue</b>	<b>Ballroom, Level 2</b>	<b>Meeting Room 4, Level 19</b>	<b>Meeting Room 5, Level 19</b>	
0845 - 0945	OBC	PMC	AEC	
0945 – 1030	Plenary Lecture 3			<i>Ballroom, Level 2</i>
1030 – 1100	Coffee Break			<i>Ballroom, Level 2</i>
1100 – 1240	OBC	ICC	PCC	
1240 – 1400	Lunch			<i>Venue: Innjoy Restaurant, Level 2</i>
1400 - 1620	OBC	IGS	PMC	PCC
1600 - 1630	End of Sessions & Coffee Break			<i>Ballroom, Level 2</i>
	End of Sessions & Coffee Break			<i>Foyer Level 19</i>
1900 - 2130	<b>CONGRESS BANQUET AT CHINGGIS KHAN HOTEL (Assemble at Hotel Lobby, Holiday Inn by 1800)</b>			

### SUNDAY, 1 SEPTEMBER 2024




0830 – 1000	Registration			<i>Ballroom, Level 2</i>
<b>Venue</b>	<b>Ballroom, Level 2</b>			
0900 – 1030	OBC			
1030 – 1100	Coffee Break			<i>Ballroom, Level 2</i>
1100 – 1220	PCC			
1220 – 1400	<b>CLOSING CEREMONY &amp; LUNCH</b>			

GENERAL SESSION AND SYMPOSIA	ABBREVIATION
ICPAC Mongolia 2024 General Session	IGS
Symposium on Organic and Biomolecular Chemistry	OBC
Symposium on Inorganic and Coordination Chemistry	ICC
Symposium on Physical Chemistry and Catalysis	PCC
Symposium on Analytical and Environmental Chemistry & Engineering	AEC
Symposium on Polymer and Materials Chemistry	PMC
Symposium on Analytical Chemistry	ANC

## ICPAC MONGOLIA 2024 – BALLROOM, LEVEL 2

WEDNESDAY, 28 AUGUST 2024	
VENUE: BALLROOM, LEVEL 2	
0800 – 1500	Registration
<b>PLENARY SESSION</b>	
	VENUE: BALLROOM, LEVEL 2
0900 – 0945 PL 1	<p><b>PLENARY SESSION</b></p> <p>Chairperson: ChM Dr Yang Farina Abdul Aziz <i>Institut Kimia Malaysia, Malaysia</i></p> <p><b>PLENARY LECTURE 1</b> How to Experimentally Obtain Microscopic Information on Electrochemical Interfaces? Yasuyuki Yokota <i>Institute of Physical and Chemical Research, Japan</i></p> <div style="text-align: right;"></div>
0945 – 1030 PL2	<p><b>PLENARY LECTURE 2</b> Sustainable Oxovanadium(V)-Catalyzed Synthesis of Ureas Using Carbon Dioxide under Atmospheric Pressure Toshiyuki Moriuchi <i>Osaka Metropolitan University, Japan</i></p>
1030 – 1100	Coffee Break
<b>Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)</b>	
<b>Chairperson: Assoc Prof ChM Dr Fatimah Salim, <i>Universiti Teknologi MARA, Malaysia</i></b>	
1100 – 1120 OBC 01	<p>Invited Lecture <b>Spirobipyridine Ligands for Efficient and Selective Synthesis through Noncovalent Interactions</b> Sobi Asako <i>Riken, Japan</i></p>
1120 – 1140 OBC 02	<p>Invited Lecture <b>Physicochemical Properties and Application of Phosphine Boranes in Structural Development of Biologically Active Compounds</b> Shinya Fujii <i>Tokyo Medical and Dental University, Japan</i></p>
1140 – 1200 OBC 03	<p>Invited Lecture <b>Development of Target Directing Water-Soluble Cyclooctadiynes and Their Application to Bio-Molecules</b> Masayuki Tera <i>Tokyo University of Agriculture and Technology, Japan</i></p>
1200 – 1220 OBC 04	<p>Invited Lecture <b>Chemo-enzymatic Transformation of Carbohydrates and Related Substances</b> Takeshi Sugai <i>Keio University, Japan</i></p> <div style="text-align: right;"></div>
1220 – 1240 OBC 06	<p>Invited Lecture <b>Halogen bonds found in estrogen-related receptor</b> Ayami Matsushima <i>Kyushu University, Japan</i></p> <div style="text-align: right;"></div>
1240 – 1400	Lunch

## ICPAC MONGOLIA 2024 – BALLROOM, LEVEL 2




Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)	
Chairperson: Assoc Prof ChM Dr Fatimah Salim, <i>Universiti Teknologi MARA, Malaysia</i>	
1400 – 1420  OBC 05	Invited Lecture <b>Visible-Light-Driven Photocatalytic Ammonia Production Using Molybdenum Complexes</b> Yasuomi Yamazaki <i>The University of Tokyo, Japan</i> 
1420 – 1440	EMPTY SLOT
1440 – 1500  OBC 07	Invited Lecture <b>Photoreaction of N-(9H-calbazole-1-ylmethylidene)anilines and N-(9H-calbazole-3-ylmethylidene)anilines</b> Masatsugu Taneda <i>Osaka Kyoiku University, Japan</i> 
1500 – 1520  OBC 08	Invited Lecture <b>Chirality Transfer Reaction of Organophosphorus Compounds with a Binaphthyl Group and Their Use</b> Toshiaki Murai <i>Gifu University, Japan</i>
1520 – 1540  OBC 09	Invited Lecture <b>Simple Amino Alcohol Organocatalysts for Asymmetric Reactions</b> Hiroto Nakano <i>Muroran Institute of Technology, Japan</i>
1540 – 1600  OBC 10	Invited Lecture <b>Isolation and Structure Determination of the Colored Products from Cannabinoids and the Fast Blue RR</b> Kayo Nakamura <i>Tokyo University of Science, Japan</i> 
1600 – 1620  OBC 11	Oral Presentation <b>Modelling of Schiff Base Vanillin Derivatives Targeting Streptococcus Pneumoniae Bacterial Neuraminidase</b> Law Woon Yi <i>University of Malaysia Sarawak, Malaysia</i>
1700 - 1930	<b>Opening Ceremony &amp; Welcome Reception</b>

**THURSDAY, 29 AUGUST 2024**

**VENUE: BALLROOM, LEVEL 2**




0800 – 1600	Registration
Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)	
Chairperson: ChM Dr Malarvili Ramalingam, <i>Jabatan Kimia Malaysia, Malaysia</i>	
0900 – 0930  OBC 12	Keynote Lecture <b>A Full Structure–Activity Relationship Study of an Anti-<i>Helicobacter pylori</i> Natural Product, Intervonin</b> Takumi Watanabe <i>Institute of Microbial Chemistry, Japan</i>
0930 – 0950  OBC 13	Invited Lecture <b>Synthesis of meso-1,4-dialdehyde and its Application to Asymmetric Tishchenko Reaction</b> Takeyuki Suzuki <i>Osaka University, Japan</i>

## ICPAC MONGOLIA 2024 – BALLROOM, LEVEL 2



0950 – 1010  OBC 14	Invited Lecture <b>Evaluation of the Correlation Between Porphyrin Accumulation in Cancer Cells and Functional Positions for Application as A Drug Carrier</b> Toshifumi Tojo <i>Tokyo University of Science, Japan</i>	
1010 – 1030  OBC 15	Invited Lecture <b>Use of Intermolecular FRET for Evaluations of Lectin—Carbohydrate Interactions</b> Koji Matsuoka <i>Saitama University, Japan</i>	
1030 - 1100	Coffee Break	
<b>Chairperson: ChM Dr Malarvili Ramalingam, <i>Jabatan Kimia Malaysia, Malaysia</i></b>		
1100 – 1120  OBC 16	Invited Lecture <b>Synthesis of Fluoroalkylated Oxazoles Using Carboxylic Acid Anhydrides as the Fluoroalkyl Sources</b> Tsuyuka Sugiishi <i>Gunma University, Japan</i>	
1120 – 1140  OBC 17	Invited Lecture <b>Liquid-Liquid Phase Separation of Nucleic Acids</b> Daisuke Miyoshi <i>Konan University, Japan</i>	
1140 – 1200  OBC 18	Invited Lecture <b>Iridium-Catalyzed <i>ortho</i>-C–H Silylation of 2-Arylpyridine Derivatives by Using Phosphine–Borane Ligand</b> Gen Onodera <i>Nagasaki University, Japan</i>	
1200 – 1220  OBC 19	Invited Lecture <b>Computer Simulations for Atomic-Scale to Cellular-Scale Phenomena</b> Takefumi Yamashita <i>The University of Tokyo, Japan</i>	
1220 – 1240  OBC 20	Oral Presentation <b>Diversity-oriented Synthesis of Hydrophobic Building Blocks of Biofunctional Molecules Using Hydroboration of Vinylsilanes</b> Nao Namba <i>Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University, Japan</i>	
1240 – 1400	Lunch	
<b>Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)</b>		
<b>Chairperson: Prof ChM Dr Phang Sook Wai Tunku Abdul Rahman, <i>University of Management and Technology, Malaysia</i></b>		
1400 – 1420  OBC 21	Invited Lecture <b>Synthesis of Phosphine Chalcogenides using Chalcogenocyanate Ions</b> Shunsuke Sueki <i>Musashino University, Japan</i>	
1420 – 1440  OBC 22	Invited Lecture <b>Synthesis and Functions of Bacterial Lipid A for Safe Vaccine Adjuvant Development</b> Atsushi Shimoyama <i>Osaka University, Japan</i>	
1440 – 1500  OBC 23	Invited Lecture <b>Efficient Synthetic Approach Based on Cu-Catalyzed Coupling Reaction of Alkynylborate with Aldehyde</b> Masanari Kimura <i>Nagasaki University, Japan</i>	



## ICPAC MONGOLIA 2024 – BALLROOM, LEVEL 2

1500 – 1520  OBC 24	Invited Lecture <b>Switching of Circularly Polarized Luminescence via Dynamic Axial Chirality Control of Chiral Boron Difluoride Complexes</b> Masahiro Ikeshita <i>Nihon University, Japan</i>	
1520 – 1540  OBC 25	Oral Presentation <b>Obtaining of Chemicals and Pitch Products by Solvolysis of Russian and Mongolian Coals Using Coal- and Petroleum-Derived Heavy Residues as Solvents</b> Navchtsetseg Nergui <i>Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</i>	
1540 – 1600  OBC 26	Invited Lecture <b>TBA</b> Ryo Sekiya <i>Hiroshima University, Japan</i>	
1600 - 1630	Coffee Break	
<b>Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)</b>		
<b>Chairperson: Prof Dr Sarangerel Davaasambuu, National University of Mongolia, Mongolia</b>		
1630 - 1700  OBC 27	Keynote Lecture <b>Cyanobacterial Ampholyte Hydrogels Developed by Cationization of Sulfated Polysaccharide and their Cell-compatibility</b> Maiko Okajima <i>Jiangnan University, China</i>	
1700 – 1720  OBC 28	Invited Lecture <b>Au-Catalyzed Diverse Regiospecific <math>\alpha</math>-Methylene C–H functionalization of Tertiary Amines via Concerted Electron Transfer to O<sub>2</sub></b> Takafumi Yatabe <i>The University of Tokyo, Japan</i>	
1720 -1740  OBC 29	Invited Lecture <b>Hierarchically Self-Assembled Liquid Crystal Built from Short DNA</b> Makiko Tanaka <i>The University of Electro-Communications, Japan</i>	
<b>End of Sessions</b>		

**ICPAC MONGOLIA 2024 – BALLROOM, LEVEL 2**

<b>SATURDAY, 31 AUGUST 2024</b>	
<b>VENUE: BALLROOM, LEVEL 2</b>	
0800 – 1400	<b>Registration</b>
<b>Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)</b>	
<b>Chairperson: Academician ChM Dr Ho Chee Cheong, <i>Institut Kimia Malaysia, Malaysia</i></b>	
0845 – 0905  OBC 30	Invited Lecture <b>Development of Recoverable and Reusable Reagents for Aromatic Trifluoromethylation</b> Hideki Amii <i>Gunma University, Japan</i>
0905 – 0925  OBC 31	Oral Presentation <b>Investigating the Solid-State [2+2] Photodimerization of Trifluoromethyl Substituted <i>trans</i>-Cinnamic Acid Derivatives within KBr Pellet</b> Bayasgalan Ulambayar <i>Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</i>
0925 – 0945  OBC 32	Oral Presentation <b>Controlling The Substitution Pattern in Multifunctionalized Cyclopentadienes</b> Nikola Topolovcan <i>Ruder Boskovic Institute, Croatia</i>
<b>PLENARY SESSION</b>	
0945 – 1030 PL 3	<b>PLENARY SESSION</b> <span style="float: right;"><b>VENUE: BALLROOM, LEVEL 2</b></span>  Chairperson: Academician ChM Dr Ho Chee Cheong <i>Institut Kimia Malaysia, Malaysia</i>  <b>PLENARY LECTURES 3</b> <b>Material Reservoir AI Computing Device Made of Nanomaterials</b> Hirofumi Tanaka <i>Kyushu Institute of Technology, Japan</i>
1030 – 1100	Coffee Break
<b>Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)</b>	
<b>Chairperson: Academician ChM Dr Ho Chee Cheong, <i>Institut Kimia Malaysia, Malaysia</i></b>	
1100 – 1130  OBC 33	Keynote Lecture <b>Advancing Glioblastoma Therapy: Utilizing the Novel Boron Agent PBC-IP in Neutron Capture Therapy for Enhanced Efficacy</b> Hiroyuki Nakamura <i>Tokyo Institute of Technology, Japan</i>
1130 – 1150  OBC 34	Invited Lecture <b>Flexible Implementation of Web Applications for the Statistical Analysis of the Structure-Function Relationship among Metalloproteins.</b> Yusuke Kanematsu <i>Hiroshima University, Japan</i> 
1150 – 1210  OBC 35	Invited Lecture <b>Functionalization of Single Walled Carbon Nanotubes for Controlling Their Near Infrared Photoluminescent Properties</b> Yutaka Maeda <i>Tokyo Gakugei University, Japan</i> 




## ICPAC MONGOLIA 2024 – BALLROOM, LEVEL 2

1210 – 1230  OBC 36	Invited Lecture <b>Catalytic Enantioselective Nitrene Cycloadditions Enabling Collective Syntheses of Indole Alkaloids</b> Yang Wang <i>Ocean University of China, China</i>
1240 – 1400	Lunch
<b>Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)</b>	
<b>Chairperson: Dr Odonchimeg Munkhjargal, <i>Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</i></b>	
1400 – 1420  OBC 37	Invited Lecture <b>Synthesis of Multisubstituted Fluoroalkenes Using Halothane as a Fluorine-Containing Building Block</b> Yukiko Karuo <i>Setsuman University, Japan</i>
1420 – 1440  OBC 38	Invited Lecture <b>Development of Anti Amoeba Active Fumagillin Derivatives Based on the Incorporation of Fluorine Atom Strategy</b> Yuji Sumii <i>Nagoya Institute of Technology, Japan</i>
<b>Thematic Session: ICPAC Mongolia 2024 General Session (IGS)</b>	
1440 – 1500  IGS 14	Invited Lecture <b>Metal-Free Dibenzoxazepinone Synthesis by Hypervalent Iodine-Mediated Iterative Coupling Reactions</b> Toshifumi Dohi <i>Ritsumeikan University, Japan</i>
1500 – 1520  IGS 15	Invited Lecture <b>Subcellular Niche Segregation of Co-Obligate Symbionts in Whiteflies</b> Akiko Fujiwara <i>Gunma University, Japan</i>
1520 – 1540  IGS 16	Invited Lecture <b>Toxicity Predictor: A Tool to Predict Biochemical Pathways Related to Toxicities from Chemical Structures</b> Yoshihiro Uesawa <i>Meiji Pharmaceutical University, Japan</i>
<b>Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)</b>	
1540 – 1600  OBC 39	Invited Lecture <b>Highly Efficient Selective Monohydrolysis of Symmetric Diesters</b> Satomi Niwayama <i>Muroran Institute of Technology, Japan</i>
1600 - 1630	Coffee Break
1900 - 2130	<b>Congress Banquet at Chinggis Khan Hotel (Assemble at Hotel Inn Lobby by 1800)</b>

## ICPAC MONGOLIA 2024 – BALLROOM, LEVEL 2

SUNDAY, 1 SEPTEMBER 2024	
VENUE: BALLROOM, LEVEL 2	
0830 – 1000	Registration
<b>Thematic Session: Symposium on Organic and Biomolecular Chemistry (OBC)</b>	
<b>Chairperson: ChM Chang Hon Fong, Institut Kimia Malaysia, Malaysia</b>	
0900 – 0930  OBC 40	Keynote Lecture <b>Flash Synthetic Chemistry Guided by Flow Microreactor Research</b> Aiichiro Nagaki <i>Hokkaido University, Japan</i> 
0930 – 0950  OBC 41	Invited Lecture <b>The Photochemistry of Xanthophyll Carotenoid-binding Rhodopsins</b> Keiichi Inoue <i>The University of Tokyo, Japan</i> 
0950 – 1010  OBC 42	Oral Presentation <b>Preparation and Characterization of Chitosan Cross-Linking With Glutaraldehyde</b> Odonchimeg Munkhjargal <i>Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</i>
1010 – 1030  OBC 43	Oral Presentation <b>Analysis of Physicochemical Properties of Mongolian Lignite</b> Navchtsetseg Nergui <i>Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</i>
1030 - 1100	Coffee Break
<b>Thematic Session: Symposium on Physical Chemistry and Catalysis (PCC)</b>	
<b>Chairperson: ChM Chang Hon Fong, Institut Kimia Malaysia, Malaysia</b>	
1100 – 1120  PCC 35	Invited Lecture <b>The Z-scheme Type Photocatalyst Based On Interlayer Expanded MoS<sub>2</sub> Coupled with Bi<sub>2</sub>O<sub>2</sub>CO<sub>3</sub> under 1 W LED Light</b> Joon Ching Juan <i>Universiti Malaya, Malaysia</i>
1120 – 1140  PCC 36	Oral Presentation <b>Bioleaching of Rare Earth Elements From Alkaline Rock-Carbonatite Related Deposit In Mongolia</b> Bayarbayasgalan Bayarsaikhan <i>National University of Mongolia, Mongolia</i>
1140 – 1200  PCC 37	Invited Lecture <b>Atomic/molecular-scale Structural Analysis on Ionic-Liquid Electrolyte/Electrode Interfaces by Atomic Force Microscopy</b> Takashi Ichii <i>Kyoto University, Japan</i> 
1200 – 1220  PCC 38	Oral Presentation <b>The Role of Carbon Black in the Galvanic Leaching of Chalcopyrite in the Presence of Manganese Dioxide</b> Altangerel Amarsanaa <i>National University of Mongolia, Mongolia</i>
1220 – 1400	Closing Ceremony & Lunch

**ICPAC MONGOLIA 2024 – MEETING ROOM 3, LEVEL 19**

<b>THURSDAY, 29 AUGUST 2024</b>	
<b>VENUE: MEETING ROOM 3, LEVEL 19</b>	
<b>Thematic Session: Symposium on Inorganic and Coordination Chemistry (ICC)</b>	
<b>Chairperson: ChM Dr Yang Farina Abdul Aziz, Institut Kimia Malaysia, Malaysia</b>	
0900 – 0920  ICC 04	Symposium Award Lecture <b>Structure of P<sub>2</sub>O<sub>5</sub> Glass</b> Shinji Kohara <i>National Institute for Materials Science, Japan</i>
0920 – 0940  ICC 05	Symposium Award Lecture <b>Anion Receptor Property of Vanadium-Oxygen Cluster Anion</b> Yuji Kikukawa <i>Kanazawa University, Japan</i> 
0940 – 1000  ICC 06	Invited Lecture <b>Trinuclear Co(III)-Co(II)-Co(III) Complexes Having the Doubly Alkoxido-Bridged Core Bridged by Acetato Ligand</b> Tomoyo Misawa-Suzuki <i>Sophia University, Japan</i> 
1000 – 1020  ICC 07	Invited Lecture <b>Double Asymmetric Hydrogenation in Total Synthesis of Lycoperdic Acid and Stereoisomers</b> Masato Oikawa <i>Yokohama City University, Japan</i>
1020 – 1040  ICC 08	Invited Lecture <b>Structural Characteristics Driving High Dielectric Permittivity of Bismuth Silicate Glass</b> Jens Rüdiger Stellhorn <i>Shimane University, Japan</i> 
1040 - 1100	Coffee Break
<b>Chairperson: ChM Dr Yang Farina Abdul Aziz, Institut Kimia Malaysia, Malaysia</b>	
1100 – 1120  ICC 09	Oral Presentation <b>Formation Process of Halogen-Rich Argyrodite</b> Hiroshi Yamaguchi <i>Shimane University, Japan</i>
1120 – 1140  ICC 10	Invited Lecture <b>Formation and Evolution of Asteroid Ryugu Based on Analysis of Spacecraft Return Samples</b> Tomoki Nakamura <i>Tohoku University, Japan</i>
1140 – 1200  ICC 11	Invited Lecture <b>Structure-Property Relationships in Novel Perovskite-Type Iron Oxides Synthesized Using Strong Oxidation Conditions</b> Masato Goto <i>Kyoto University, Japan</i>
1200 – 1220  ICC 12	Invited Lecture <b>Cation Dimerization in Ilmenite-Type Vanadium Oxides</b> Hajime Yamamoto <i>Tohoku University, Japan</i>
1220 – 1240  ICC 13	Oral Presentation <b>Synthesis and Characterization of Silver Nanoclusters with Different Central Anions</b> Aoi Akiyama <i>Tokyo University of Science, Japan</i>



## ICPAC MONGOLIA 2024 – MEETING ROOM 3, LEVEL 19



1240 – 1300  ICC 19	Invited Lecture <b>Synthesis and Characterization of Ca<sub>2</sub>(Mn,Ti)O<sub>4</sub> Colored Films</b> Ryohei Oka Nagoya Institute of Technology, Japan	
1300 – 1400	Lunch	
<b>Thematic Session: ICPAC Mongolia 2024 General Session (IGS)</b>		
<b>Chairperson: ChM Dr Ngai Koh Sing, Universiti Malaya, Malaysia</b>		
1400 – 1420  IGS 05	Invited Lecture <b>Unique Thermoelectric Power Generating Device without Need for Heat Sources Utilizing Thermoelectric Power Generating Ability, Capillary Action, and Vaporization Heat of Carbon-Nanotube Composite Papers</b> Takahide Oya Yokohama National University, Japan	
1420 – 1440  IGS 06	Invited Lecture <b>Wearable Biosensor for Non-Invasive Monitoring of Biological Information in Human Oral Cavity</b> Takahiro Arakawa Tokyo University of Technology, Japan	
1440 – 1500  IGS 07	Invited Lecture <b>Synthesis and Properties of Stacked Boron Single-Layer Materials</b> Tetsuya Kambe Osaka University, Japan	
1500 – 1520  IGS 08	Oral Presentation <b>Chloride Speciation in Crude Oil &amp; Liquid Hydrocarbon Chain</b> Norzaimi Bin Azam PETRONAS, Malaysia	
1520 – 1540  IGS 09	Oral Presentation <b>Development of Selective PR Antagonists Using Ferrocene as A Three-Dimensional Building Platform</b> Kotaro Ochiai Tokyo Medical and Dental University, Japan	
1540 – 1600  IGS 10	Oral Presentation <b>Investigation On Characterization of Tevshiin Govi Coal and Its Liquid Products Obtained By Pyrolysis and Hydrogenation</b> Purevsuren Barnasan Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia	
1600 - 1630	Coffee Break	
<b>Thematic Session: ICPAC Mongolia 2024 General Session (IGS)</b>		
<b>Chairperson: ChM Dr Ngai Koh Sing, Universiti Malaya, Malaysia</b>		
1630 – 1650  IGS 11	Invited Lecture <b>Chemical Synthesis of Fe-based Novel Magnets by Topotactic Reaction</b> Masaki Mizuguchi Nagoya University, Japan	
1650 – 1710  IGS 12	Invited Lecture <b>X-ray Absorption Spectroscopic Analysis by Ligand Field Theory in Co Ferrites: Understanding of Conductivity and Magnetic Anisotropy</b> Jun Okabayashi The University of Tokyo, Japan	
<b>End of Sessions</b>		

**ICPAC MONGOLIA 2024 – MEETING ROOM 4, LEVEL 19**

<b>WEDNESDAY, 28 AUGUST 2024</b>	
<b>VENUE: MEETING ROOM 4, LEVEL 19</b>	
<b>Thematic Session: Symposium on Polymer and Materials Chemistry (PMC)</b>	
<b>Chairperson: Dato' ChM Dr Mas Rosemal Hakim Mas Haris, <i>Institut Kimia Malaysia, Malaysia</i></b>	
1100 – 1120  PMC 01	Invited Lecture <b>Pt<sub>17</sub> Nanocluster Electrocatalysts: Preparation and Origin of High Oxygen Reduction Reaction Activity</b> Yuichi Negishi <i>Tokyo University of Science, Japan</i>
1120 – 1140  PMC 02	Oral Presentation <b>The Effects of Melanin on Properties Yak Hair</b> Batchimeg Ganbaatar <i>Mongolian University of Science and Technology, Mongolia</i>
1140 – 1200  PMC 03	Invited Lecture <b>Electron Spin Resonance Spectroscopy for Clear Observation of Reactions during Radical Polymerizations</b> Atsushi Kajiwara <i>Nara University of Education, Japan</i>
1200 – 1220  PMC 04	Oral Presentation <b>Synthesis and Characterisation of Carrageenan/Polyaniline Film and its Antibacterial Properties</b> Sook-Wai Phang <i>Tunku Abdul Rahman University of Management and Technology, Malaysia</i>
1220 – 1240  PMC 05	Oral Presentation <b>Evaluation of Bio-based Pickering Emulsifier's Microstructure and Rheological Characteristics Derived from Modified Spherical Cellulose Nanocrystals</b> Lee Hwei Voon <i>Universiti Malaya, Malaysia</i>
1240 – 1400	Lunch
<b>Thematic Session: Symposium on Polymer and Materials Chemistry (PMC)</b>	
<b>Chairperson: Dato' ChM Dr Mas Rosemal Hakim Mas Haris, <i>Institut Kimia Malaysia, Malaysia</i></b>	
1400 – 1420  PMC 06	Invited Lecture <b>Supramolecular Approach to Multiferroics</b> Takayoshi Nakamura <i>Hokkaido University, Japan</i>
1420 – 1440  PMC 07	Invited Lecture <b>Thin Film Synthesis of Cu-based Metal–Organic Frameworks by Physical Vapor Deposition and Solvent Vapor Annealing</b> Ryo Nakayama <i>Tokyo University, Japan</i>
1440 – 1500  PMC 08	Oral Presentation <b>Application of Lithium Perchlorate Based Polymer Electrolyte In Meeting Requirements Of Electric Double Layer Capacitor</b> Ngai Koh Sing <i>Universiti Malaya, Malaysia</i>



## ICPAC MONGOLIA 2024 – MEETING ROOM 4, LEVEL 19

Thematic Session: ICPAC Mongolia 2024 General Session (IGS)	
1500 – 1520  IGS 01	Invited Lecture <b>Isolation of Novel High Growth Euglena Strain from Malaysia</b> Koji Iwamoto <i>University of Technology Malaysia, Malaysia</i>
1520 – 1540  IGS 02	Invited Lecture <b>Towards Ultra-Sensitive Molecular Spectroscopy: A Temporal-Mode Selective Parametric Frequency Conversion Approach</b> Tokuei Sako <i>Nihon University, Japan</i>
1540 – 1600  IGS 03	Invited Lecture <b>High-Sensitivity Hydrogen Sensor and Biosensor Based on Silicon Microring Resonators</b> Taro Arakawa <i>Yokohama National University, Japan</i> 
1600 – 1620  IGS 04	Invited Lecture <b>Design of Multiblock Copolymers by Chain Shuttling Copolymerization</b> Philippe Zinck <i>UCCS, France</i> 
1700 - 1930	<b>Opening Ceremony &amp; Welcome Reception</b>

THURSDAY, 29 AUGUST 2024	
VENUE: MEETING ROOM 4, LEVEL 19	
Thematic Session: Symposium on Polymer and Materials Chemistry (PMC)	
Chairperson: Assoc Prof ChM Dr Fatimah Salim, <i>Universiti Teknologi MARA, Malaysia</i>	
0900 – 0930  PMC 09	Keynote Lecture <b>Magneto-Responsive Properties of Soft Materials Compositing with Magnetic Particles</b> Tetsu Mitsumata <i>Niigata University, Japan</i>
0930 – 0950  PMC 10	Invited Lecture <b>Evaluation of an Electrochromic Device Consisting of a Molten Viologen Polymer and Ferrocene Ionic Liquid</b> Hiroto Murakami <i>Nagasaki University, Japan</i>
0950 – 1010  PMC 11	Invited Lecture <b>Preparation of Polysilsesquioxane-based CO<sub>2</sub> Separation Membranes with Thermally Degradable Units</b> Joji Ohshita <i>Hiroshima University, Japan</i> 
1010 – 1030  PMC 12	Invited Lecture <b>Control of Marine Biodegradation of poly(ethylene succinate) Using Endospores</b> Miwa Suzuki <i>Gunma University, Japan</i> 
1030 - 1100	Coffee Break
Chairperson: Academician ChM Dr Ho Chee Cheong, <i>Institut Kimia Malaysia, Malaysia</i>	
1100 – 1120  PMC 13	Invited Lecture <b>Ferroelectric Semiconductor: Alkylamide-substituted BTBT</b> Tomoyuki Akutagawa <i>Tohoku University, Japan</i>



## ICPAC MONGOLIA 2024 – MEETING ROOM 4, LEVEL 19

1120 – 1140 <b>PMC 14</b>	Invited Lecture <b>Anhydrous Proton Conduction in Crystalline Molecular Assemblies Based on Molecular Internal Degrees of Freedom</b> Shun Dekura <i>Tohoku University, Japan</i>
1140 – 1200 <b>PMC 15</b>	Invited Lecture <b>Development of Metal-Like Lustrous Films Using Oligo(3-alkoxyselenophene)</b> Satoru Tsukada <i>Chiba University, Japan</i>
1200 – 1220 <b>PMC 16</b>	Oral Presentation <b>Investigation of Flotation Behaviour of Lepidolite Using A Novel Mixed Collector in Terms of Adsorption Mechanism</b> Khandjamts Batjargal <i>Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</i>
1240 – 1400	Lunch
<b>Thematic Session: Symposium on Analytical Chemistry (ANC)</b>	
<b>Chairperson: Dato' ChM Dr Yew Chong Hooi, Institut Kimia Malaysia, Malaysia</b>	
1400 – 1420 <b>ANC 01</b>	Invited Lecture <b>Effects of Cellular Exposure to Atmospheric Dust on the Suppression of Exosome Secretion</b> Daisuke Onoshima <i>Nagoya University, Japan</i>
1420 – 1440 <b>ANC 02</b>	Invited Lecture <b>Highly Selective Single Cell Introduction System into ICP-AES/MS Using Cell Sorter</b> Akane Yaida <i>Tokyo Institute of Technology, Japan</i> 
1440 – 1500 <b>ANC 03</b>	Invited Lecture <b>Spectrophotometry of Nanoparticles by Using Polarized Lights</b> Hitoshi Watarai <i>R3 Institute for Newly-Emerging Science Design, Osaka University, Japan</i>
1500 – 1520 <b>ANC 04</b>	Invited Lecture <b>Phytochemicals Identification from Rice-Infused <i>Eleusine Indica</i> and Their Anti-Inflammatory Effect in RAW 264.7 Cell Through Tandem LCMS Molecular Networking Technique</b> Fatimah Salim <i>Universiti Teknologi MARA, Malaysia</i>
1520 – 1540 <b>ANC 05</b>	Invited Lecture <b>Polarized High-Energy-Resolution Fluorescence Detected-X-ray Absorption Near-Edge Structure of the LSAT Single Crystal</b> Hiroyuki Asakura <i>Kindai University, Japan</i> 
1600 - 1630	Coffee Break
<b>Thematic Session: Symposium on Polymer and Materials Chemistry (PMC)</b>	
<b>Chairperson: Dr Navchtsetseg Nergui, Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</b>	
1630 – 1650 <b>PMC 17</b>	Invited Lecture <b>Photo-solubilization of Tunable Terpolyamides from Renewable Itaconic Acids</b> Mohammad Asif Ali <i>Jiangnan University, China</i>

## ICPAC MONGOLIA 2024 – MEETING ROOM 4, LEVEL 19

1650 – 1710  PMC 18	Invited Lecture <b>Photosynthesis-Inspired Fiber-Optic Monitoring Network for Sustainable Civil Design</b> Rei Furukawa <i>The University of Electro-Communications, Japan</i>
1710 – 1730  PMC 19	Oral Presentation <b>Dielectric Behavior of Plastic Crystal Based on Rod-shape Sulfonamide Derivatives</b> Chisato Sato <i>Tohoku University, Japan</i>
1730 – 1750  PMC 20	Oral Presentation <b>Synthesis and Response Surface Method Based Optimization of Double-Network Hydrogel-Biochar Composites for Enhanced Water Absorption</b> Cindy Tan Soo Yun <i>Universiti Teknologi MARA, Malaysia</i>
<b>End of Sessions</b>	

<b>SATURDAY, 31 AUGUST 2024</b>	
<b>VENUE: MEETING ROOM 4, LEVEL 19</b>	
<b>Thematic Session: Symposium on Polymer and Materials Chemistry (PMC)</b>	
<b>Chairperson: Prof ChM Dr Phang Sook Wai</b> <i>Tunku Abdul Rahman University of Management and Technology, Malaysia</i>	
0845 – 0905  PMC 21	Invited Lecture <b>Cofacial Porphyrin Dimers Generated by Cooperative Ion Binding</b> Joe Otsuki <i>Nihon University, Japan</i>
0905 – 0925  PMC 22	Invited Lecture <b>Amino Acid-Functionalized Polyacrylamides: Evaluation of Protein Cleavage Activity</b> Takahiko Matsushita <i>Saitama University, Japan</i>
0945 – 1030	<b>PLENARY LECTURES 3</b> <i>Venue: Ballroom Level 2</i>
1030 – 1100	Coffee Break
<b>Thematic Session: Symposium on Inorganic and Coordination Chemistry (ICC)</b>	
<b>Chairperson: Prof ChM Dr Phang Sook Wai,</b> <i>Tunku Abdul Rahman University of Management and Technology, Malaysia</i>	
1100 – 1120  ICC 14	Invited Lecture <b>Luminescence of N<sup>A</sup>C<sup>N</sup>-Coordinated Platinum(II) Complexes in Human Cell</b> Shingo Hattori <i>Yokohama City University, Japan</i>
1120 – 1140  ICC 15	Invited Lecture <b>Local Structure Analysis of Negative-Electrode Oxides for Large Lithium-Ion Batteries Using Quantum Beams</b> Naoto Kitamura <i>Tokyo University of Science, Japan</i>
1140 – 1200  ICC 16	Invited Lecture <b>Optical Properties for Red and Infrared Emitting Scintillators Containing a Novel Emission Center III</b> Shunsuke Kurosawa <i>Tohoku University, Japan</i>

## ICPAC MONGOLIA 2024 – MEETING ROOM 4, LEVEL 19

1200 – 1220 ICC 17	<p>Oral Presentation  <b>Efficient Copper Extraction from Asgat Polymetallic Ore</b>                      Nyamdelger Shirchinnamjil  <i>Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</i></p>
1220 – 1240 ICC 18	<p>Oral Presentation  <b>Synthesis of Mesoporous Silicates</b>                      Ulziidelger Byambasuren  <i>Mongolian University of Science and Technology, Mongolia</i></p>
1240 – 1400	Lunch
<b>Thematic Session: Symposium on Polymer and Materials Chemistry (PMC)</b>	
<b>Chairperson: Dr Nyamdelger Shirchinnamjil, Institute of Chemistry and Chemical Technology, Mongolian Academy of Sciences, Mongolia</b>	
1400 – 1420 PMC 23	<p>Invited Lecture  <b>Battery Performances of Organic Materials with One-dimensional Columnar Structures as Cathodes</b>                      Hirofumi Yoshikawa  <i>Kwansei Gakuin University, Japan</i></p>
1420 – 1440 PMC 24	<p>Invited Lecture  <b>Organic Semiconductors for Optoelectronic Devices and Optical Sensors</b>                      Juozas Vidas Grazulevicius  <i>Kaunas University of Technology, Lithuania</i></p>
1440 – 1500 PMC 25	<p>Invited Lecture  <b>Anti-resonance Stabilization for Aromatic Polybenzimidazoles Superstable Under Extreme Environments</b>                      Tatsuo Kaneko  <i>Jiangnan University, China</i></p>
1500 – 1520 PMC 26	<p>Invited Lecture  <b>Crystal Structure and Property of Metal Endohedral [C60] Fullerene</b>                      Eunsang Kwon  <i>Tohoku University, Japan</i></p>
1520 – 1540 PMC 27	<p>Oral Presentation  <b>Solvent Dependence of Molecular Assembly Structures of Hexadehydrotribenzo[12]annulene Derivatives with Alkylamide groups</b>                      Yotaro Kasahara  <i>Tohoku University, Japan</i></p>
1540 – 1600 PMC 28	<p>Oral Presentation  <b>Photo-induced Water-Dissolution of Poly(ethylene terephthalate)s Modified With Pyrrolidone Derivatives</b>                      Jixin Zheng  <i>Jiangnan University, China</i></p>
1600 – 1620 PMC 29	<p>Oral Presentation  <b>High Performance Nylon Gels with Pyrrolidone Ring</b>                      Jie Liu  <i>Jiangnan University, China</i></p>
1620 - 1630	Coffee Break
1900 - 2130	<b>Congress Banquet at Chinggis Khan Hotel (Assemble at Hotel Inn Lobby by 1800)</b>

## ICPAC MONGOLIA 2024 – MEETING ROOM 5, LEVEL 19

<b>WEDNESDAY, 28 AUGUST 2024</b>	
<b>VENUE: MEETING ROOM 5, LEVEL 19</b>	
<b>Thematic Session: Symposium on Physical Chemistry and Catalysis (PCC)</b>	
<b>Chairperson: Dato' ChM Dr Yew Chong Hooi, Institut Kimia Malaysia, Malaysia</b>	
1100 – 1120  PCC 01	Invited Lecture <b>Mineral-Cluster Chemistry in Space: Planetary Formation Regions and Planetary Atmospheres</b> Masashi Arakawa <i>Kyushu University, Japan</i>
1120 – 1140  PCC 02	Invited Lecture <b>Crystal Structure and Physical Properties of Basket-Shaped Polyoxometalates</b> Masaru Fujibayashi <i>National Institute of Technology, Ube College, Japan</i>
1140 – 1200  PCC 03	Invited Lecture <b>Evaluation of Intramolecular Interactions with Negative Fragmentation Approach including Basis-Set Superposition Error Correction</b> Yu Takano <i>Hiroshima City University, Japan</i>
1200 – 1220  PCC 04	Invited Lecture <b>Electric Field Assisted Low-Temperature CO<sub>2</sub> Reduction Over Supported Metal Catalysts</b> Shuhei Ogo <i>Kochi University, Japan</i> 
1220 – 1240  PCC 05	Invited Lecture <b>Precise Synthesis of Ligand-Protected Metal Nanoparticles and Nanoclusters for Photoelectrochemical Applications</b> Tokuhisa Kawawaki <i>Tokyo University of Science, Japan</i> 
1240 – 1400	Lunch
<b>Thematic Session: Symposium on Analytical and Environmental Chemistry &amp; Engineering (AEC)</b>	
<b>Chairperson: Dato' ChM Dr Yew Chong Hooi, Institut Kimia Malaysia, Malaysia</b>	
1400 – 1420  AEC 01	Invited Lecture <b>Solvation Environment of Solute Molecules Dissolved in a Single Levitated Microdroplet Revealed by Fluorescence Microscopy</b> Kenji Sakota <i>Osaka Metropolitan University, Japan</i>
1420 – 1440  AEC 02	Oral Presentation <b>Urea Removal from Aqueous Solution by Adsorption on Alkaline Sludge from Solar Photovoltaic Industry</b> Azizul Hakim Lahuri <i>Universiti Putra Malaysia, Malaysia</i>
1440 – 1500  AEC 03	Oral Presentation <b>Development of Photocatalysts for Environmental Water Purification by High-Throughput Experimentation</b> Kyo Yanagiyama <i>Japan Institute of Science and Technology, Japan</i>

## ICPAC MONGOLIA 2024 – MEETING ROOM 5, LEVEL 19



1500 – 1520  AEC 04	Oral Presentation <b>Evaluation of Soil Quality in the Industrial Area and Reduce of Copper Polluted Soil by Electro Kinetic Remediation</b> Oyuntsetseg Bolormaa <i>National University of Mongolia, Mongolia</i>
<b>Thematic Session: Symposium on Inorganic and Coordination Chemistry (ICC)</b>	
1520 – 1540  ICC 01	Invited Lecture <b>Control of Dimensionality and Electron Transfers Based on Cyanide-bridged Metal Complex</b> Yoshihiro Sekine <i>Kumamoto University, Japan</i>
1540 – 1600  ICC 02	Invited Lecture <b>Graphene Oxide as a Super Material</b> Shinya Hayami <i>Kumamoto University, Japan</i>
1600 – 1620  ICC 03	Invited Lecture <b>Synthesis and Characterization of Pd(II) Complex with bis(1-(2-pyridyl)imidazole-2-thione) ligand Bridged by Diether</b> Kenji Matsumoto <i>Kochi University, Japan</i>
1700 - 1930	<b>Opening Ceremony &amp; Welcome Reception</b>

### THURSDAY, 29 AUGUST 2024

#### VENUE: MEETING ROOM 5, LEVEL 19

#### Thematic Session: Symposium on Physical Chemistry and Catalysis (PCC)



**Chairperson: Prof ChM Dr Juan Joon Ching, *Universiti Malaya, Malaysia***


0900 – 0930  PCC 06	Keynote Lecture <b>Design of Multimetallic Alloys Highly Efficient for CO<sub>2</sub> Utilization and Light Olefin Production</b> Shinya Furukawa <i>Osaka University, Japan</i>	
0930 – 0950  PCC 07	Invited Lecture <b>Photoredox Catalysis of Vitamin B12 Derivative for Green Molecular Transformation</b> Hisashi Shimakoshi <i>Kyushu University, Japan</i>	
0950 – 1010  PCC 08	Invited Lecture <b>Computational Chemistry for Data-driven Material Development and Its Application to Multi-element Materials</b> Michihisa Koyama <i>Shinshu University, Japan</i>	
1010 – 1030  PCC 09	Invited Lecture <b>In situ Formation of Isolated Metal Species in Zeolites from Bulk Metals/Metal Oxides and Their Unique Catalytic and Adsorption Property</b> Zen Maeno <i>Kogakuin University, Japan</i>	
1030 - 1100	Coffee Break	

## ICPAC MONGOLIA 2024 – MEETING ROOM 5, LEVEL 19



Chairperson: Prof ChM Dr Juan Joon Ching, <i>Universiti Malaya, Malaysia</i>	
1100 – 1120  PCC 10	Invited Lecture <b>Bis-carbene Ruthenium Olefin Metathesis Catalysts</b> Bartosz Trzaskowski <i>University of Warsaw, Poland</i>
1120 – 1140  PCC 11	Invited Lecture <b>Minimizing Voltage Loss of Organic Photovoltaics by Local Dipole Moment Change of Non-Fullerene Acceptors</b> Akira Yamakata <i>Okayama University, Japan</i>
1140 – 1200  PCC 12	Invited Lecture <b>Data-driven Approach To Materials Exploration</b> Kenta Hongo <i>Japan Advanced Institute of Science and Technology, Japan</i>
1200 – 1220  PCC 13	Oral Presentation <b>Dielectric Properties of Wheel-Shaped Polyoxometalate Depending on Inner Cations</b> Yuma Takemoto <i>Hiroshima university, Japan</i>
1220 – 1240  PCC 14	Oral Presentation <b>Gold Nanocluster Connections by Pyridine Complexes</b> Taiga Kosaka <i>Tokyo University of Science, Japan</i>
1240 – 1400	Lunch
Chairperson: Assoc Prof ChM Dr Lee Hwei Voon, <i>Universiti Malaya, Malaysia</i>	
1400 – 1420  PCC 15	Invited Lecture <b>Development of In-Silico Material Design Tool Based on the Molecular Theory of Solvation</b> Norio Yoshida <i>Nagoya University, Japan</i>
1420 – 1440  PCC 16	Invited Lecture <b>Unlocking the Secrets of CO Interaction and Activation on Inhomogeneous Ru Nanoparticles Using the Electronic Structure Decomposition Approach</b> Rivera David <i>Hiroshima University, Japan</i>
1440 – 1500  PCC 17	Invited Lecture <b>Structure Tuning of Low-dimensional Titania Nanotubes and their Physicochemical and Photochemical Functions</b> Tohru Sekino <i>Osaka University, Japan</i>
1500 – 1520  PCC 18	Invited Lecture <b>Metallic Molecular Conductors Based on Hyperconjugated Electrons</b> Toshio Naito <i>Ehime University, Japan</i>
1520 – 1540  PCC 19	Invited Lecture <b>Crystalline Logic Gate Through Ion and Molecule Exchange in an Aqueous Solution</b> Jun Manabe <i>Hiroshima University, Japan</i>
1540 – 1600  PCC 20	Invited Lecture <b>In Silico Composition Optimization of Ammonia Absorption Materials</b> Manabu Sugimoto <i>Kumamoto University, Japan</i>
1600 - 1630	Coffee Break

## ICPAC MONGOLIA 2024 – MEETING ROOM 5, LEVEL 19

Thematic Session: Symposium on Physical Chemistry and Catalysis (PCC)	
Chairperson: Assoc Prof ChM Dr Lee Hwei Voon, <i>Universiti Malaya, Malaysia</i>	
1630 – 1650  PCC 21	Invited Lecture <b>Li ion Transport Environment in Ion-Conducting Sulfide Glasses</b> Koji Ohara <i>Shimane University, Japan</i>
1650 – 1710  PCC 22	Invited Lecture <b>Theoretical Approach to Coordination Polymer Photocatalysis</b> Yuta Tsuji <i>Kyushu University, Japan</i> 
1710 – 1730  PCC 23	Invited Lecture <b>Infrared Induced Changes in the Microscopic Hydrogen Bond Structures of Hydrated Phenol Cations</b> Haruki Ishikawa <i>Kitasato University, Japan</i> 
1730 – 1750  PCC 24	Invited Lecture <b>Machine-Learning-Assisted Discovery of Molecules with High Charge Mobility in Amorphous Phase</b> Toshio Asada <i>Osaka Metropolitan University, Japan</i>
End of Sessions	

SATURDAY, 31 AUGUST 2024	
VENUE: MEETING ROOM 5, LEVEL 19	
Thematic Session: Symposium on Analytical and Environmental Chemistry & Engineering (AEC)	
Chairperson: ChM Dr Jenny Lee Nyuk Len, <i>Institut Kimia Malaysia, Malaysia</i>	
0845 – 0905  AEC 05	Oral Presentation <b>Decontamination - Standardize Procedure and Environmental Protection</b> Mohd Hisham Ibrahim <i>Petroliam Nasional Berhad, Malaysia</i> 
0905 – 0925  AEC 06	Oral Presentation <b>Size Effect of Pt Cocatalysts on Carbon Nitride for Photocatalytic Hydrogen Evolution</b> Yuki Yamazaki <i>Tokyo University of Science, Japan</i>
0945 – 1030	<b>PLENARY LECTURES 3</b> <i>Venue: Ballroom, Level 2</i>
1030 – 1100	Coffee Break
Thematic Session: Symposium on Physical Chemistry and Catalysis (PCC)	
Chairperson: ChM Dr Jenny Lee Nyuk Len, <i>Institut Kimia Malaysia, Malaysia</i>	
1100 – 1120  PCC 25	Invited Lecture <b>Chirality Recognition of Propylene Oxide Dimer Induced by Hydrogen Bond with Achiral Pyrrole</b> Yoshiteru Matsumoto <i>Shizuoka University, Japan</i>

## ICPAC MONGOLIA 2024 – MEETING ROOM 5, LEVEL 19

1120 – 1140 PCC 26	Oral Presentation <b>Internal Energy Dependence of the Pyrrole Dimer Cation Structures Formed In A Supersonic Plasma Expansion</b> Dashjargal Arildii <i>Technische Universität Berlin, Germany</i>	
1140 – 1200 PCC 27	Invited Lecture <b>Catalyst Discoveries from Scratch</b> Toshiaki Taniike <i>Japan Advanced Institute of Science and Technology, Japan</i>	
1200 – 1220 PCC 28	Invited Lecture <b>Surface &amp; Interface Sciences in Energy Conversion Materials</b> Taketoshi Minato <i>Institute for Molecular Science, Japan</i>	
1220 – 1240 PCC 29	Invited Lecture <b>High-Entropy Intermetallics: Serving Isolated Pt Sites for Ultrastable Propane Dehydrogenation Catalysis</b> Yuki Nakaya <i>Osaka University, Japan</i>	
1240 – 1400	Lunch	
<b>Chairperson: ChM Dr Azizul Hakim Lahuri, Universiti Putra Malaysia, Malaysia</b>		
1400 – 1420 PCC 30	Invited Lecture <b>Low-temperature Catalytic Methane Combustion using Ozone</b> Shunsaku Yasumura <i>The University of Tokyo, Japan</i>	
1420 – 1440 PCC 31	Invited Lecture <b>Catalysis of Intermetallic Compounds for Propyne Hydrogenation</b> Takayuki Kojima <i>Shinshu University, Japan</i>	
1440 – 1500 PCC 32	Invited Lecture <b>Impact of Acid-Base Amounts for Proton Conductivity and Molecular Dynamics of Phosphonic Acid-Modified Mesoporous Silica/Imidazole Composite</b> Yasuhiro Shigeta <i>Kanazawa University, Japan</i>	
1500 – 1520 PCC 33	Invited Lecture <b>Development of Photocatalytic or Photoelectrochemical System for CO<sub>2</sub> Reduction Using Water as Electron Donor</b> Tomoaki Takayama <i>Nara Institute of Science and Technology, Japan</i>	
1520 – 1540 PCC 34	Oral Presentation <b>Oxidation Stability of MXene (Ti<sub>3</sub>C<sub>2</sub>T<sub>x</sub>) Nanosheets</b> Sarangerel Davaasambuu <i>National University of Mongolia, Mongolia</i>	
1540 – 1600 PCC 40	Invited Lecture <b>Identification of a Single Molecule in Nanoelectrodes using Surface-Enhanced Raman Scattering and Electric Current</b> Satoshi Kaneko <i>Tokyo Institute of Technology, Japan</i>	
1600 - 1630	Coffee Break	
1900 - 2130	<b>Congress Banquet at Chinggis Khan Hotel (Assemble at Hotel Inn Lobby by 1800)</b>	



## ICPAC MONGOLIA 2024 – LIST OF POSTERS

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Thematic Session: Symposium on Physical Chemistry and Catalysis (PCC)	
<b>PCC 39P</b>	Poster Presentation <b>Acquisition of Catalyst Design Rules Through Feature Engineering</b> Aya Fujiwara <i>Japan Advanced Institute of Science and Technology, Japan</i>
Thematic Session: Symposium on Polymer and Materials Chemistry (PMC)	
<b>PMC 30P</b>	Poster Presentation <b>Phase Structure Analysis of Multiphase Polymer Blends Using Multimodal Characteristics Mapping</b> Taiko Oshida <i>Japan advanced institute science and technology, Japan</i>
<b>PMC 31P</b>	Poster Presentation <b>High-performance, Water-Soluble Biopolyimides from Aminocinnamoyl Photodimers</b> Zhou Boxin <i>Jiangnan University, China</i>

## Plenary Lecture 1

**Yasuyuki Yokota**  
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Research, Japan



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Dr. Yasuyuki Yokota is a Senior Research Scientist of Surface and Interface Science Laboratory at RIKEN. Prior to taking his current posts, he was the Assistant Professor of Department of Materials Engineering Science at Osaka University. He obtained B.S. (2002), M.S. (2004), and Ph.D. (2007) from Tokyo Institute of Technology, Japan. Awards and honours include The Prize of Nano Probe Technology from JSPS Nanoprobe Technology 167 (2015). His personal research is focused on the structural and electronic properties of electrochemical interfaces.

### Education

2002 B.S. Tokyo Institute of Technology  
2004 M.S. Tokyo Institute of Technology  
2007 Ph.D. Tokyo Institute of Technology

### Professional

2004-2007 Junior Research Associate, Frontier Research System, RIKEN  
2007-2009 Special Postdoctoral Researcher, Surface Chemistry Laboratory, RIKEN  
2009-2015 Assistant Professor, Graduate School of Engineering Science, Osaka University  
2012-2012 Visiting Researcher, University of California, Los Angeles, USA  
2015-2018 Researcher, Surface and Interface Science Laboratory, RIKEN  
2018-Present Senior Research Scientist, Surface and Interface Science Laboratory, RIKEN  
2019-2023 PRESTO Researcher, Japan Science and Technology Agency

## How to Experimentally Obtain Microscopic Information on Electrochemical Interfaces?

**Yasuyuki Yokota\***

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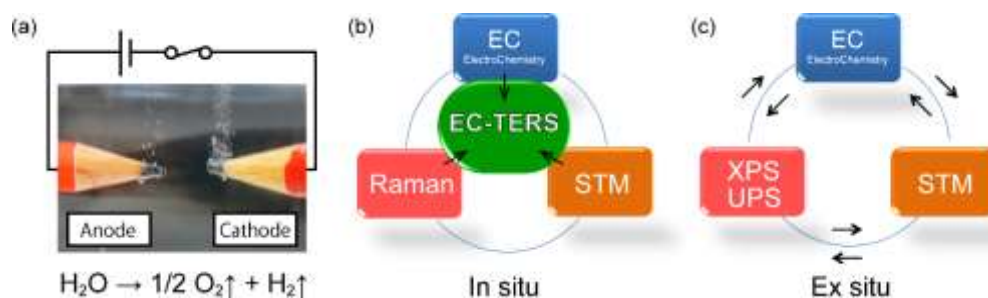
### Abstract:

Since the electrolysis of water was first reported more than 200 years ago, basic and applied researches have been conducted on electrochemical reactions occurring at the interface between solution and electrode (Fig. 1(a)). In particular, the development of electrochemical devices such as storage batteries has become an urgent issue in recent years, and it is desirable to develop a method that can evaluate the details of the electric double layer, which determines device performance, at the atomic and molecular scale. In the field of surface electrochemistry, electrochemical scanning tunneling microscopy (EC-STM) has been widely used since the late 1980s to analyze the structure of electrodes and adsorbed species, and is now considered the most powerful in situ measurement technique. However, it is difficult to identify reaction products and evaluate their electronic states at the interface in an electrochemical environment because the presence of an electrolyte solution imposes various limitations on measurements. Therefore, we are developing an in situ measurement system combining EC-STM and near-field spectroscopy (Fig. 1(b), electrochemical tip-enhanced Raman spectroscopy (EC-TERS)),<sup>[1-4]</sup> and an ex situ measurement system combining an electrochemical cell and ultra-high vacuum (UHV) equipment (Fig. 1(c), photoelectron spectroscopy and UHV-STM).<sup>[5-8]</sup>

In this presentation, we will discuss the significance of basic research in electrochemistry, followed by a discussion of the current status of each development and future prospects.

**Keywords:** Electrochemistry, STM, Tip-enhanced Raman spectroscopy, Photoelectron spectroscopy

### Graphical abstract:



**Fig. 1.** (a) Photograph of electrolysis of water. (b)(c) Schematics of (b) in situ and (c) ex situ techniques developed in this study. EC: electrochemistry, STM: scanning tunneling microscopy, TERS: tip-enhanced Raman spectroscopy, XPS (UPS): X-ray (UV) photoelectron spectroscopy.

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## Plenary Lecture 2

**Toshiyuki Moriuchi**  
Osaka Metropolitan University, Japan



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Graduate School of Science  
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### *Education*

1991 B.S.	Faculty of Engineering, Osaka University
1993 M.S.	Graduate School of Engineering, Osaka University
1995 Ph.D.	Graduate School of Engineering, Osaka University

### *Professional*

1994 – 1995	Research Fellow of the Japan Society for the Promotion Science
1995 – 1998	Assistant Professor, Faculty of Engineering, Osaka University
1998 – 2004	Assistant Professor, Graduate School of Engineering, Osaka University
2004 – 2008	Lecturer, Graduate School of Engineering, Osaka University
2008 – 2018	Associate Professor, Graduate School of Engineering, Osaka University
2018 – 2022	Professor, Graduate School of Science, Osaka City University
2022 – present	Professor, Graduate School of Science, Osaka Metropolitan University

### *Postdoctoral Work*

1996 – 1997	California Institute of Technology (Prof. Jacqueline K. Barton Group)
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### *Honors and Awards*

Inoue Research Award for Young Scientists (1997), AJINOMOTO Award in Synthetic Organic Chemistry, Japan (2004), HGCS Japan Award of Excellence 2011 (2012), The 15th Kansai Branch Award of the Society of Synthetic Organic Chemistry, Japan (2017), Nagase Foundation Award 2018 (2018).

### *International Advisory Board*

- 1) International Advisory Board (IAB) of the International Symposium on Bioorganometallic Chemistry (ISBOMC)
- 2) International Advisory Board (IAB) of the International Vanadium Symposium

### *Research Field*

Organometallic Chemistry, Synthetic Organic Chemistry, Supramolecular Chemistry, Bioorganometallic Chemistry, Bioinorganic Chemistry,

## Sustainable Oxovanadium(V)-Catalyzed Synthesis of Ureas Using Carbon Dioxide under Atmospheric Pressure

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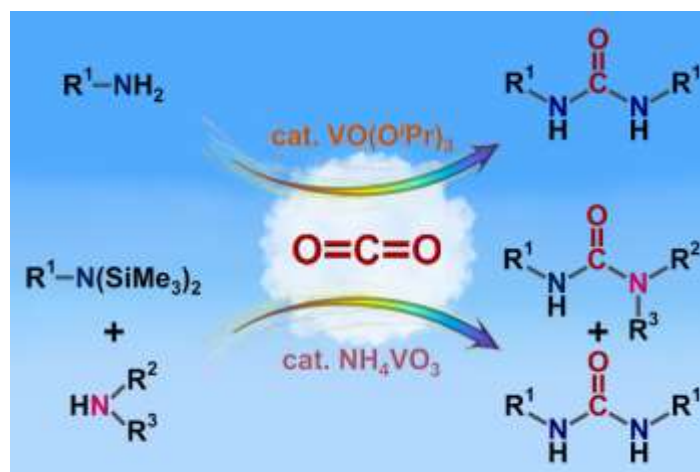
### Abstract

The catalytic transformation of carbon dioxide as a C1 building block into valuable compounds has attracted much attention for the future sustainable society. Ureas, which are among the most important carbonyl compounds, are widely used in pesticides, herbicides, and raw materials for resins. Generally, catalytic synthesis of ureas with carbon dioxide requires high carbon dioxide pressure and high temperatures. We have already performed one-step synthesis of imidovanadium(V) compounds from amines and oxovanadium(V) compounds.<sup>1</sup> Catalytic transformation of carbon dioxide by *in situ* generated imidometal compounds have not been achieved. From these points of view, we embarked upon the development of a practical catalytic system for the synthesis of ureas from amines and carbon dioxide under atmospheric pressure by using a commercially available oxovanadium(V) catalyst.<sup>2-4</sup>

A commercially available  $\text{VO}(\text{O}^i\text{Pr})_3$  was demonstrated to serve as an efficient catalyst for the catalytic synthesis of symmetrical ureas from amines and carbon dioxide under atmospheric pressure. Various primary amines were successfully converted to the corresponding symmetrical ureas by using this catalytic system. A sustainable approach for the catalytic synthesis of unsymmetrical ureas from disilylamines and carbon dioxide under atmospheric pressure was also performed by using a commercially available easy-to-handle  $\text{NH}_4\text{VO}_3$ .

**Keywords:** carbon dioxide, C1 building block, atmospheric pressure, oxovanadium(V) catalyst, urea

### Graphical abstract



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## Plenary Lecture 3

**Hirofumi Tanaka**  
Kyushu Institute of Technology, Japan

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Graduate School of Life Science and Systems Engineering,  
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**Plenary Talk Title:**

Material reservoir AI computing device made of nanomaterials

**Biodata:** Prof. Tanaka completed his doctorate in materials science by studying the structural and magnetic properties of ferromagnetic nanoalloys at Osaka University in 1999. Then, moved to a national laboratory, RIKEN, to study the conductivity of metallic nanowires with double-probe scanning tunneling microscopy as a special postdoctoral researcher. After that, he advanced the molecular-ruler method in which precise multilayers of self-assembled molecular monolayers are used as lithographic resists to yield nanostructures with precise nanometer-scale spacings as a postdoctoral researcher at the Pennsylvania State University under Prof. Paul Weiss (presently UCLA, former chief editor of ACS Nano). Prof. Tanaka then joined the Research Center for Molecular-Scale Nanoscience at the Institute for Molecular Science in 2003 as an assistant professor, where he directed research in molecular electronics using carbon nanotube electrodes. He found that gold nanoparticles can switch from metallic conduction of SWNTs to semiconducting simply by nanoparticle adsorption. He has also focused on the development of atomic switches, exploring the ultimate miniaturization of electrical switches, and controlled by photo irradiation 2004-2008 in a key technology project of the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) and receive an excellent journal award from Japan Society of Applied Physics in 2012. He moved to the Department of Human Intelligence Systems, Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology (Kyutech) as a full professor in 2014 and is focusing on bio-mimic and/or neuromorphic AI electric nanodevices such as material reservoir devices. He concurrently became a director of the Research Center for Neuromorphic AI Hardware, Kyutech, in 2020. He was awarded an honorary degree from Suranaree University of Technology, Thailand, in 2021 (see photo), and received the degree certificate from Thai HRH Princess Sirindhorn. He obtained a national project as a PI, ALCA-NEXT, during 2023-2026 supported by Japan Science and Technology Agency, focused on carbon neutral and green computing. His broad knowledge of materials, from metals and inorganic materials to organic materials, and techniques for measurement and fabrication helped lead efforts in molecular electronics and in combining nanocarbon and nanoparticles to realize a new world of materials intelligence in nanosystems.

## Material reservoir AI computing device made of nanomaterials

**Hirofumi Tanaka**<sup>a,b,\*</sup>

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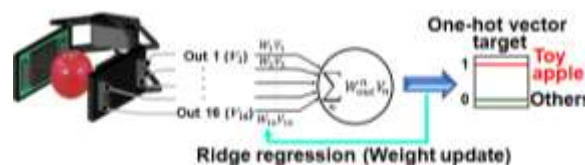
<sup>b</sup>Research Center for Neuromorphic AI Hardware, Kyushu Institute of Technology, Japan

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### Abstract

In recent years, superior computational power of deep learning based on software has been widely recognized, and the practical applications of artificial intelligence are rapidly expanding. On the other hand, the hardware for replacing to such artificial intelligence (AI) algorithms is facing the physical limits of scaling in silicon CMOS technology, and performance improvement is expected to hit the ceiling. For the reason, there is a growing interest in hardware technologies that physically implement artificial neural networks (ANNs), neuromorphic (mimicking human brain) information processing systems, and the applications (hereafter referred as AI systems in this paper), as well as new materials and devices. A critical difference between the presently required device functionality and that in conventional computational systems is the use of dynamics. By cleverly using nanomaterials' nonlinearity and network structure, devices that spontaneously generate pulses, noise, and other physical phenomena are expected to be realized to utilize for the AI hardware. These devices will enable drastically lower power consumption and higher integration of AI systems. One of the candidates of such a highly efficiency device is reservoir computing (RC) device. The RC is a framework for computation derived from recurrent neural network theory that maps input signals into higher dimensional computational spaces through the dynamics of a fixed, non-linear system called a reservoir. After the input signal is fed into the reservoir, which is treated as a "black box," a simple readout mechanism is trained to read the state of the reservoir and map it to the desired output. We are looking for the suitable materials and configurations for the reservoir device for higher functionality. In the presentation, I will introduce the key points of the devices' functionalization, application to robots, and other recent research results, especially haptic in-sensor computing devices.<sup>1</sup>

**Keywords:** Haptic recognition, Neuromorphic (Brainmorphic), In-Material Reservoir Computing, Recurrent Neural Network, Randomness, in-sensor computing



**Fig.1.** Demonstration of an in-sensor computing reservoir device implemented in a robotic hand to classify grasped objects.<sup>1</sup>

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## A Full Structure–Activity Relationship Study of an Anti-*Helicobacter pylori* Natural Product, Intervenin

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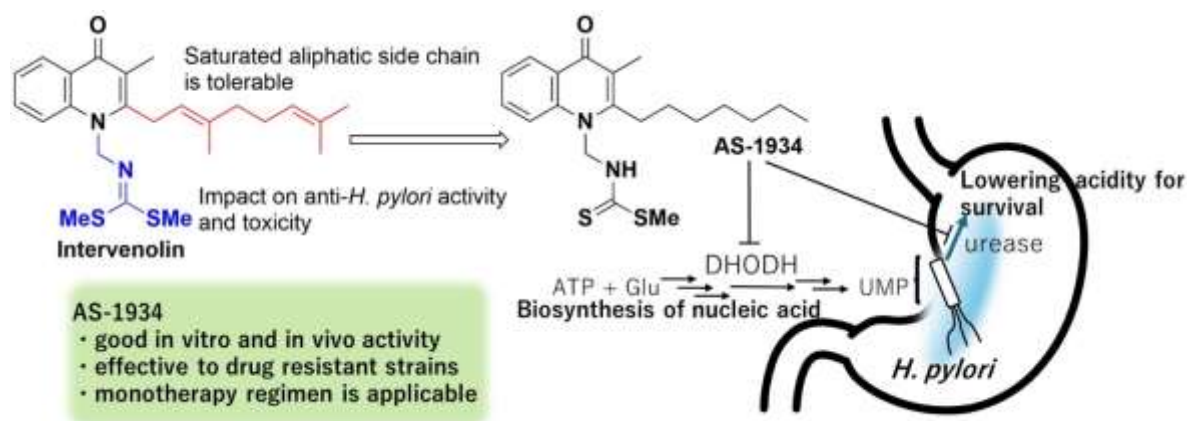


### Abstract

Innervenin is an anti-*Helicobacter pylori* natural product bearing quinolone scaffold with geranyl side chain at 2-position.<sup>1</sup> In this presentation, a full structure–activity relationship study of this compound to generate a promising medicinal lead will be disclosed.

This study revealed that 1) the geranyl side chain could be exchanged to saturated alkyl group without damaging anti-*H. pylori* activity, 2) substituent at 1-position showed impact on biological activity and toxicity. In particular, AS-1934 exhibited good efficacy in vivo, with which detailed mode of action was investigated. As the results, antibacterial activity of AS-1934 was found to be exerted by dual mode of action; inhibition of DHODH (dihydroorotate dehydrogenase), a crucial enzyme for biosynthesis of nucleic acid by bacteria, and urease which reduces acidity around *H. pylori* in stomach and is indispensable for its survival. It is also noteworthy that stability of AS-1934 under acidic conditions enabled monotherapy regimen in mice; current common clinical regimen using acid-labile antibacterial agents requires proton pump inhibitor or potassium-competitive acid blocker to decrease gastric acidity.

**Keywords:** natural product, structure-activity relationship, anti-*Helicobacter pylori*, DHODH inhibitor, urease inhibitor



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## Cyanobacterial Ampholyte Hydrogels Developed by Cationization of Sulfated Polysaccharide and their Cell-compatibility

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**Mohammad Asif Ali<sup>1,2</sup>**,  
**Kazuaki Matsumura<sup>2</sup>**, Tatsuo Kaneko<sup>1,2\*</sup>

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### Abstract

Sacran is a cyanobacterial supergiant polysaccharide with carboxylate and sulfate groups and shows anti-allergic and anti-inflammatory properties [1], while too high anionic functions restrict cell compatibility. Here quaternary ammonium groups were substituted to form sacran ampholytes and cell-compatibility of the cationized sacran hydrogels was evaluated. The cationized process involved using N-(3-chloro-2-hydroxypropyl) tri-methylammonium chloride reacting with the primary amine or hydroxyl group of sacran. The degree of cationization ranged from 32 % to 87 % for sugar residues. Hydrogels of sacran ampholyte were made by annealing their dried sheet by thermal cross-linking and exhibited anisotropic swelling properties. The water contact angle on the hydrogels decreased from 26.5° to 15.3° with an increase in cationization degree, enhancing the hydrophilicity. IC50 values of sacran ampholytes were reduced with an increased cationization degree to decrease cytotoxicity towards the L929 mouse fibroblast cell line, which is associated with an increased cell proliferation density after 3 days of incubation. SEM images show fibroblast intercellular connections. Thus, sacran ampholyte hydrogel showed increased hydrophilicity and cell compatibility, which can lead to various biomedical applications.

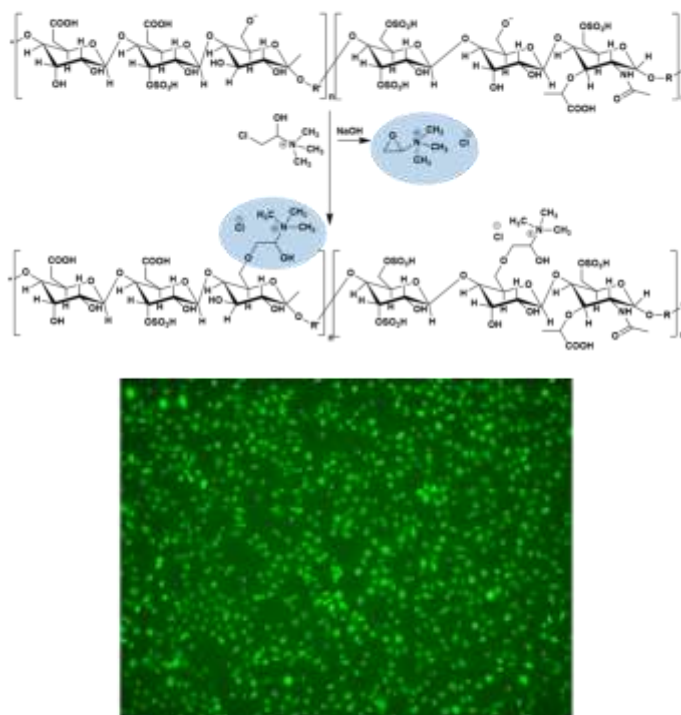


Figure 1. Modification of *Aphanothece sacrum* biomaterials, sacran, by N-(3-chloro-2-hydroxypropyl) tri-methylammonium chloride (left). L929 cells cultured on cationized sacran measured via CCK-8 assay.

[1] M. K. Okajima, et al., *Pure Appl. Chem.*, 79, 2039 (2007); N. R. Ngatu, et al., *Ann. Aller. Asthma. Immunol.* 108, 117 (2012).

## Advancing Glioblastoma Therapy: Utilizing the Novel Boron Agent PBC-IP in Neutron Capture Therapy for Enhanced Efficacy

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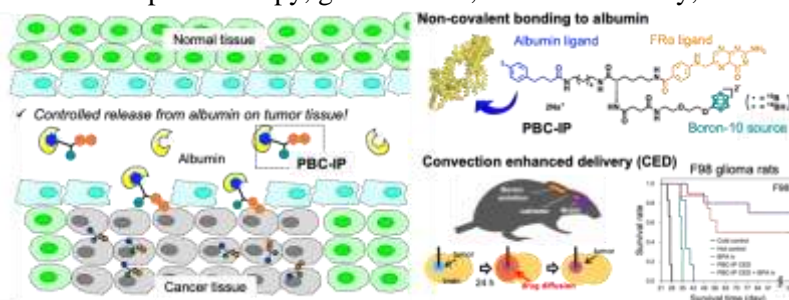


### Abstract

Boron neutron capture therapy (BNCT) is one of the emerging minimally invasive cancer therapies. BNCT utilizes the nuclear reaction between low-energy thermal neutron (0.025 eV) and boron-10 (<sup>10</sup>B), and the produced  $\alpha$ -particle and lithium nuclei are high linear energy transfer particles (2.4 MeV) with sufficient intensity to kill cells. Selective delivery of <sup>10</sup>B atoms to the tumor is essential for effective BNCT. L-*p*-boronophenylalanine (L-BPA) has been widely used in the treatment of brain tumor and head and neck cancer as well as melanoma. In 2020, accelerator-based BNCT using L-BPA was approved for unresectable, locally advanced, or locally recurrent head and neck cancers in Japan.<sup>1</sup> Although L-BPA is known to be selectively taken up by tumor cells via L-type amino acid transporter 1 (LAT-1), the development of new boron agents is coveted for patients with L-BPA-insusceptibility.

We developed a novel boron agent, PBC-IP, which consists of three functional groups: folate receptor (FR $\alpha$ )-targeting, <sup>10</sup>B resource (twelve <sup>10</sup>B atoms in the molecule), and albumin-binding moieties.<sup>2</sup> PBC-IP was selectively taken up by glioma cells C6, F98 (rat glioma) and U87MG (human glioblastoma) and accumulated 10- to 20-fold higher than L-BPA. PBC-IP administrated intravenously to U87MG xenograft model showed higher boron accumulation in tumors than BPA, effectively suppressing tumor growth after thermal neutron irradiation. PBC-IP administrated via convection-enhanced delivery to glioma orthotopic rat models showed 50% survival at 6 months after BNCT treatment, whereas no survival was observed in rats treated with L-BPA. Preclinical studies are ongoing in compliance with Good Laboratory Practice (GLP) regulations.

**Keywords:** boron neutron capture therapy, glioblastoma, selective delivery, folate receptor



### References

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## Flash Synthetic Chemistry Guided by Flow Microreactor Research

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### Abstract

Many successful applications reported in the literature speak well for the power of the flow-microreactor method in chemical synthesis. The reaction time in a flow microreactor is defined as the residence time between a reagent inlet and the quencher inlet, which can be controlled precisely and reduced to millisecond order by adjusting the length between these positions and the flow speed. Such a feature of flow microreactors enables the use of short-lived highly reactive intermediates for synthesis. Various chemical reactions using highly reactive short-lived organolithium species that are difficult or even impossible to perform in batch processes can be accomplished in flow microreactors using space integration of reactions. In this presentation, we show our recent results to flash synthetic chemistry guided by flow microreactor research.

**Keywords:** Microreactor, flow chemistry, flash chemistry

### References

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3. A Synthetic Approach to Dimetallated Arenes Using Flow Microreactors and the Switchable Application to Chemoselective Cross-Coupling Reactions. Ashikari, Y.; Kawaguchi, T.; Mandai, K.; Aizawa, Y.; Nagaki, A.\* *J. Am. Chem. Soc.* **2020**, 142, 17039-17047.
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5. A Novel Approach to Functionalization of Aryl Azides via Generation and Reactions of Organolithiums Bearing Masked Azides Using Flow Microreactors. Ichinari, D.; Ashikari, Y.; Mandai, K.; Aizawa, Y.; Yoshida, J.\*; Nagaki, A.\* *Angew. Chem., Int. Ed.* **2020**, 59, 1567-1571.

## Design of Multimetallic Alloys Highly Efficient for CO<sub>2</sub> Utilization and Light Olefin Production

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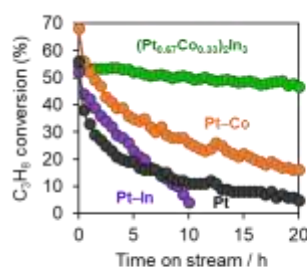
### Abstract

The oxidative dehydrogenation of propane using CO<sub>2</sub> (CO<sub>2</sub>-ODP) is a promising technique for high-yield propylene production and CO<sub>2</sub> utilization. The development of a highly efficient catalyst for CO<sub>2</sub>-ODP is of great interest and benefit to the chemical industry as well as net zero emissions. Here, we report unique catalyst materials and design concepts based on our pseudo-binary alloys<sup>1</sup> and high-entropy intermetallics<sup>2</sup> for this challenging chemistry. A pseudo-binary alloy is a ternary alloy in which a part of A(B) site in a binary intermetallic A<sub>m</sub>B<sub>n</sub> is substituted with a third element A'(B') to form (A<sub>1-x</sub>A'<sub>x</sub>)<sub>m</sub>B<sub>n</sub> (A<sub>m</sub>(B<sub>1-p</sub>B'<sub>p</sub>)<sub>n</sub>) (Fig: upper left).<sup>3</sup> Introducing an appropriate third element allows to flexibly tune and improve the catalytic performance, particularly for reactions involving more than one molecules that have quite different properties such as light alkane and CO<sub>2</sub>. Further multimetalization of the A and B sites forms a high-entropy intermetallic (A<sub>1-x-y</sub>A'<sub>x</sub>A''<sub>y</sub>)<sub>m</sub>(B<sub>1-p-q</sub>B'<sub>p</sub>B''<sub>q</sub>)<sub>n</sub>, which exhibits much greater thermal stability in the high-temperature reaction due to entropy effects (Fig: lower left).<sup>3</sup> In this study, we designed (Pt<sub>1-x</sub>Co<sub>x</sub>)<sub>2</sub>In<sub>3</sub>/CeO<sub>2</sub>, in which Pt, Co, In, and CeO<sub>2</sub> were chosen for facile C–H scission, CO<sub>2</sub> activation, inhibiting side reaction, and coke combustion. This catalyst showed high catalytic activity and stability in CO<sub>2</sub>-ODP at 550 °C compared with the corresponding monometallic Pt and Pt-based binary alloy catalysts (Fig: upper right).<sup>1</sup> The specific activity of (Pt<sub>0.67</sub>Co<sub>0.33</sub>)<sub>2</sub>In<sub>3</sub>/CeO<sub>2</sub> was five times higher than that of the best catalyst ever reported, even with a long catalyst life (Fig: lower right). The stability of this catalyst was further enhanced by using (PtCoNi)(SnInGa)/CeO<sub>2</sub> high-entropy intermetallic catalyst. This catalyst exhibited much longer catalyst life in CO<sub>2</sub>-ODP at 600 °C due to greater thermal stability (Fig: lower right).<sup>2</sup> In the presentation, we discuss about the structural analysis, reaction mechanism, and the roles of each metals in detail.

**Keywords:** CO<sub>2</sub> utilization; alloy; catalyst; propylene production; high-entropy



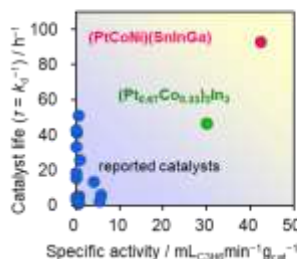
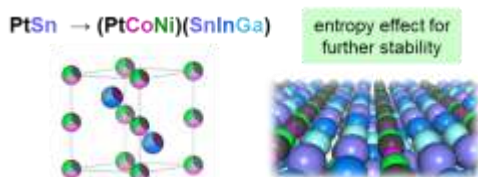
### 1<sup>st</sup> generation: pseudo-binary alloy



✓ CO<sub>2</sub> utilization & olefin production

✓ highly active, selective & stable

### 2<sup>nd</sup> generation: high-entropy intermetallics



✓ further enhancement by multi-metallization

✓ much greater than previous systems

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## Magneto-Responsive Properties of Soft Materials Composited with Magnetic Particles

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### Abstract

Magneto-responsive elastomer (magnetic elastomer) is a composite of soft polymer matrix and magnetic particles where the viscoelastic property alters in response to a magnetic field. This is called the magnetorheological effect that has been extensively studied since the past several decades. The magnetic field response is generally fast and the change in viscoelasticity exceeds several times of the original value at 1 s. A typical example is shown in Fig. 1; the storage modulus for a magnetic elastomer without magnetic field (=0 mT) is  $\sim 10^4$  Pa and it rapidly increases to  $\sim 3$  MPa at 500 mT<sup>1</sup>. It has been attracted great interest as industrial devices that can change their elastic moduli reversibly by an electrical signal.

We report here on several improvements in the magnetic field response of elastic modulus for magnetic field-responsive elastomers. One of them is a bimodal elastomer in which magnetic and nonmagnetic particles are composited. For example, the increment in storage modulus is enhanced by 2.5-4.3 folds by compositing with nonmagnetic particles of ZnO<sup>2</sup> or Al<sub>2</sub>O<sub>3</sub><sup>3</sup>. This originates from the occurrence of the stress transfer by the chains of magnetic and nonmagnetic particles. Another example is a magnetic elastomer fabricated to create a void inside the elastomer<sup>4</sup>. When voids are formed, the storage modulus at 500 mT is 20 folds with respect to the initial modulus. This strongly indicates that the creation of a space enables the movement of magnetic particles in the elastomer resulting in the formation of chain structure effectively. The mechanisms of these enhancement effects are discussed along with the formation of chain structure of magnetic particles under a magnetic field observed by synchrotron radiation X-ray CT<sup>5</sup>. Applications of magnetic elastomers we developed, e.g. multi-frequency vibration absorber<sup>6</sup> are also presented.

**Keywords:** stimuli-responsive gel, magnetic responsive elastomer, elasticity

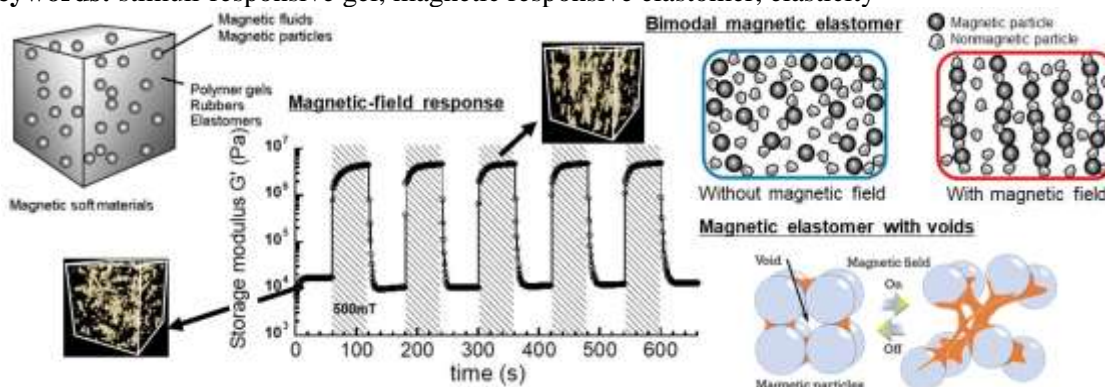


Fig1. Magnetic field response of storage modulus and the particle structure for a magnetic elastomer. Movement of magnetic particles in bimodal magnetic elastomers and magnetic elastomer with voids.

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## Structure of P<sub>2</sub>O<sub>5</sub> Glass

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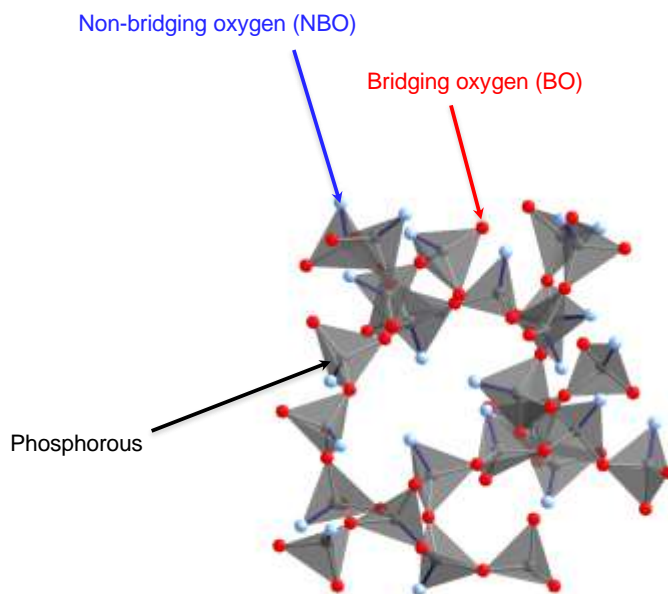
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### Abstract

P<sub>2</sub>O<sub>5</sub> is a typical network forming oxide with Q<sup>3</sup> tetrahedral motifs, in which three bridging oxygens (BOs) and one non-bridging oxygen (NBO) are bonded to a phosphorus atom. To understand the origin of diffraction peaks of P<sub>2</sub>O<sub>5</sub> glass, a three-dimensional structure model that is consistent with neutron and X-ray diffraction data is constructed by a combined reverse Monte Carlo (RMC) and classical molecular dynamics (MD) simulations. Partial structure factors obtained from the RMC–MD model indicate that a doublet first sharp diffraction peak (FSDP) of P<sub>2</sub>O<sub>5</sub> glass is originated from the Q<sup>3</sup> network, which is composed of two different length scales formed by P–O bonds, i.e., P–BO and P=NBO bonds. We discuss origins of the diffraction peaks deduced from the three-dimensional glass structure model via topological analyses.



**Keywords:** glass, structure, x-ray diffraction, neutron diffraction

## Anion Receptor Property of Vanadium-Oxygen Cluster Anion

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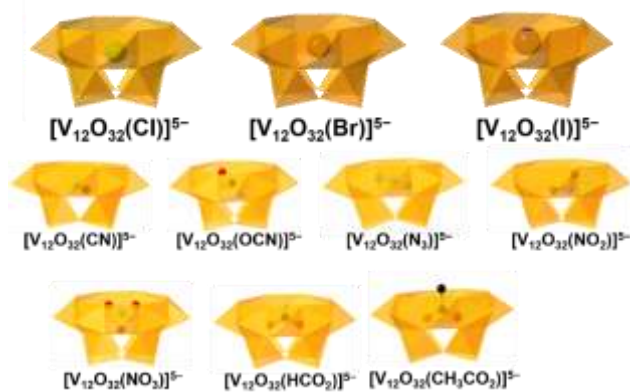


### Abstract

Dodecavanadate,  $[V_{12}O_{32}]^{4-}$  (V12), possess a bowl-shaped structure with a 4.4 Å cavity entrance. Compound V12 composed of twelve  $VO_5$  square pyramids, and the cavity shows unique electrophilicity. The interior of V12 is relatively cationic owing to high-valent and coordinatively unsaturated vanadium atoms to stabilize an electron-rich group. Compound V12 acts as a unique anion receptor. By the reaction of V12 and various anion species, such as  $Cl^-$ ,  $Br^-$ ,  $I^-$ ,  $NO_3^-$ ,  $NO_2^-$ ,  $OCN^-$ ,  $CN^-$ ,  $N_3^-$ , and  $CH_3COO^-$ , anion inserted V12 were obtained, and their crystal structures were determined by X-ray crystallographic analysis.<sup>1-4</sup> Interestingly, a deprotonated nitromethane anion is also stabilized in the concave of V12. Due to the high polarizability,  $Br_2$  was inserted into V12 to form  $[V_{12}O_{32}(Br_2)]^{4-}$  (V12(Br2)).<sup>5</sup> The inserted  $Br_2$  was polarized, as detected with a peak at  $185\text{ cm}^{-1}$  by IR spectroscopy. The elongation of Br–Br distance of 2.33 Å is estimated by the extended X-ray absorption fine structure spectroscopy. The reaction of V12(Br2) and toluene yielded bromination of toluene at the ring, showing the electrophilicity of the inserted  $Br_2$  molecule. Bromination of pentane with V12(Br2) showed high selectivity for 3-bromopentane (64%) among the monobromopentane products and preferred threo isomer among 2,3-dibromopentane. V12(Br2) was also reacted with butane and propane. The unique inorganic cavity traps  $Br_2$  leading the polarization of the diatomic molecule. Due to its new reaction field, the trapped  $Br_2$  shows selective functionalization of alkanes.

**Keywords:** Anion receptor, polyoxometalate, vanadium, polarization

### Graphical abstract













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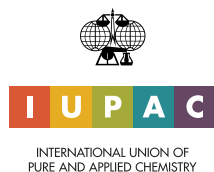
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