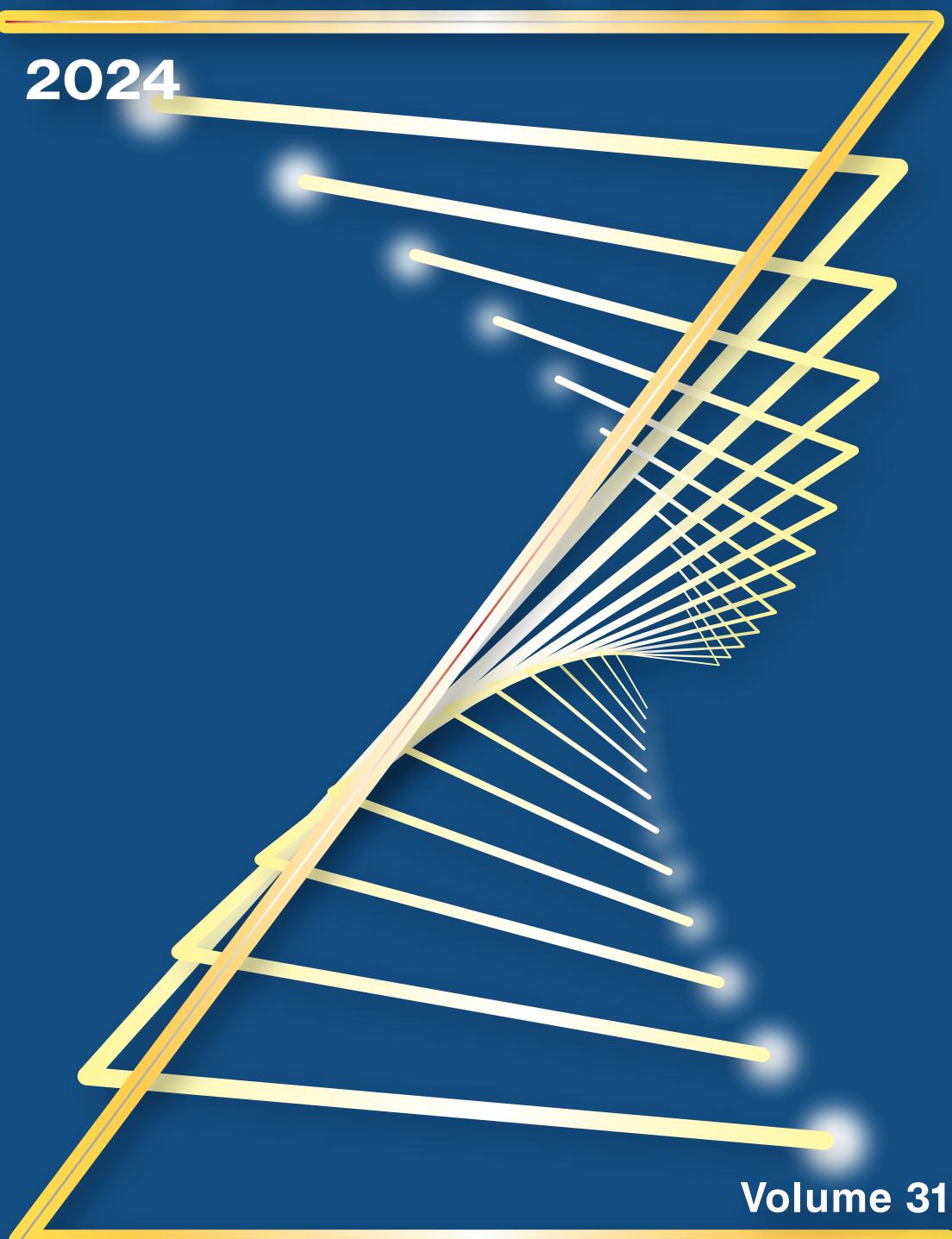


ICR ANNUAL REPORT

2024



Volume 31

Institute for Chemical Research
Kyoto University



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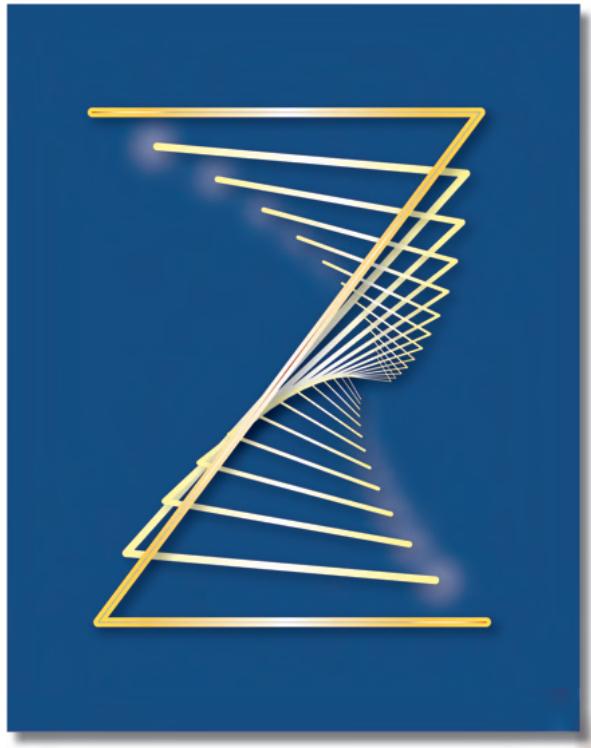
Request for Cooperation to the ICR's 100th Anniversary Fund

ICR has established a fund called "The ICR's 100th Anniversary Fund," which is a part of the Kyoto University Fund. Its aims are to hold the 100th anniversary event in 2026, to enhance the educational and research environments at ICR, and to promote social contribution activities. We ask for your kind understanding and cooperation.

■ <https://www.kikin.kyoto-u.ac.jp/contribution/chemical/>



ICR **ANNUAL** **REPORT** **2024**



**Institute for Chemical Research
Kyoto University**
Volume 31

Preface



Founded in 1926 as the first research institute of Kyoto University, the Institute for Chemical Research (ICR) will celebrate its 100th anniversary in 2026, two years from now. As the 36th Director of the Institute with such a long history, I have taken on the responsibility to carry on the traditions and achievements of the Institute and to develop the Institute into the future.

Our Institute has the founding vision of “excelling in the investigation of the basic principles of chemistry and their applications”. With this philosophy in mind, the Institute has consistently embarked on diverse and innovative pioneering research by flexibly and actively adapting to the changing times. In the course of an era that is about to enter its 100th year, significant advances in science and technology have drastically changed people’s living environment, and the chemistry we aim at and the chemistry society demands have also changed significantly. In line with these changes, our institute has developed cutting-edge research by broadening perspectives and strengthening collaborations based on our own curiosity and drive for improvement. Today, we can design and synthesize novel chemical compounds at atomic and molecular levels, and analyze the structures and properties using state-of-the-art quantum beams and informatics. In this way, our Institute contributes to the development of society through a wide range of sciences, including chemistry, physics, biology, and information technology. In order to carry out such broad fields of science, ICR currently organizes 5 research divisions -Synthetic Chemistry, Materials Chemistry, Biochemistry, Environmental Chemistry, and Multidisciplinary Chemistry- and 3 research centers -Advanced Research Center for Beam Science, International Research Center for Elements Science, and Bioinformatics Center. In total, about 450 members, including 25 professors, 28 associate professors, and 49 assistant professors, 53 research associates, 70 staff members, and 231 graduate students, are currently working and studying at the ICR.

The research results in 2024 were wonderful. Some of

the outstanding results are as follows. (1) Intrinsic visible plasmonic properties of colloidal PtIn₂ intermetallic nanoparticles were found. (2) Small multimodal thermometry with detonation-created multi-color centers was achieved in detonation nanodiamond. (3) Novel N₂-type superatomic molecules were synthesized. (4) Ferroelectric free-standing hafnia membranes with metastable rhombohedral structure were successfully obtained. (5) Tetrapodal hole-collecting monolayer materials based on saddle-like cyclooctatetraene core for inverted perovskite solar cells were synthesized.

ICR collaborates with other research institutions through MEXT projects including the Inter-University Collaborative Projects “Integrated Consortium on Chemical Synthesis”, Large-scale Scientific Research Project “Spintronics Research Network of Japan”, and “Quantum Leap Flagship Program (Q-LEAP)”. ICR is a member of the Kyoto University Research Coordination Alliance and is organizing a research unit for the realization of sustainable society. We are also conducting an international Joint Usage/Research Center (iJURC) “Global Frontier and Interdisciplinary Research Core for Deepening Investigations and Promoting Collaboration in Chemistry-oriented Fields”. ICR continues to make efforts to promote both domestic and international collaborative research and the training of young researchers.

Looking at the rapid changes in the world situation, we can see that we have entered a new era. The research activities of our Institute are also entering a new era after a period of turmoil. We believe that strengthening the presence of our Institute at the international level and training the next generation of young people who will play an active role in the world are essential tasks on which we should focus. We hope that this Annual Report will serve to update you on the progress of our research activities and globalization. We are committed to the further development of both our research and the Institute. We sincerely appreciate your continued encouragement and support.

January 2025

A handwritten signature in black ink that reads "Y. Shimakawa".

SHIMAKAWA Yuichi
Director

ICR News 2024

20th Anniversary Symposium of the International Research Center for Elements Science and Commemorative Lecture by Professor Emeritus Kohei Tamao, on the Occasion of his Receiving the Order of Culture

International Research Center for Elements Science in the Institute for Chemical Research has celebrated its 20th anniversary and organized the 20th Anniversary Symposium. Before the symposium, a memorial luncheon was held at Hekisuisha for Kohei Tamao, Professor Emeritus and the first Director of the Center, who received the Order of Culture in 2023. A display was set up at Hekisuisha to commemorate Professor Emeritus Kohei Tamao's receipt of the Order of Culture, and replicas of the Order of Culture was on public display. In the Symposium, after the opening address by Center Director Yuichi Shimakawa, an introductory lecture entitled "The 20-year history of the International Research Center for Elements Science and perspective for the future" was given. Then, Professor Emeritus Kohei Tamao gave a commemorative lecture on receiving the Order of Culture, entitled "Looking back on 80 years of a life full of good encounters: The birth of 'Element Science' at the Institute for Chemical Research, Kyoto University". More than 150 attendants, including current and past associates of the Center, enjoyed the event.

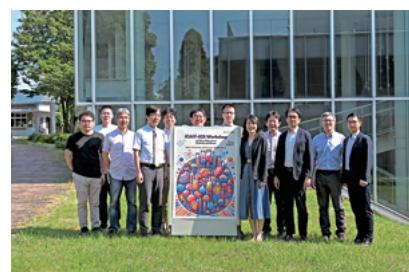


Five New Memorandum of Understandings to Deepen Collaborations

ICR currently holds a total of 71 Memorandum of Understandings (MOUs) with a wide range of institutions around the world. In 2023–2024, ICR signed MOUs with five new institutions; Tara OceanS, the Department of Chemical Sciences (University of Naples Federico II), the i-Center for Advanced Science and Technology (National Chung Hsing University), the Department of Chemistry and Industrial Chemistry (University of Pisa) and the Education & Research Center for Advanced Materials toward Carbon Neutrality (Hanyang University).

Based on these MOUs, it is expected that ICR, which promotes international, interdisciplinary and cutting-edge research, and the international organizations recognized for their unique research and high world standards, will facilitate student, faculty, and researcher exchange and promote interdisciplinary joint research. Furthermore, these partnerships aim to create synergistic benefits of international research advancement by fostering young researchers capable of excelling on the global stage and by facilitating the exchange of diverse materials and information.

Memorandum of Understanding for Collaboration
(1984–2024)



The “ICR Weeks” (ICR International Conference Weeks) were Held Successfully

■ Prof. KURIHARA, Tatsuo

The ICR Weeks were held from Thursday, November 7 to Friday, November 29, 2024, as part of our efforts to strengthen the global research network of ICR, in line with the departmental action plans and annual plans for the 4th phase of the Medium-Term Goals and Plans of Kyoto University. The event was organized in collaboration with the ICR International Joint Usage/Research Center. Over the course of three weeks, seven events were held, including international symposiums and public lectures. More than 500 participants, including attendees from Asia and Western countries, took part in the events. Numerous achievements, ranging from fundamental research to applied research in various chemistry-related fields such as organic chemistry, inorganic chemistry, and biochemistry, were presented, with lively discussions taking place. This event provided a valuable opportunity to build collaborative networks between ICR and domestic and international research institutions and to significantly contribute to the development of talented young researchers who will shape the global future.

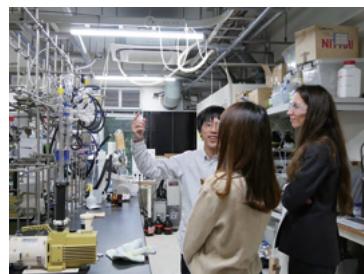
[More detail](#)



14th International Conference of Electroluminescence and Optoelectronic Devices



Japan-Taiwan Initiatives for Quantum Matters and Carbon Neutral



ICR, Kyoto University Young Researchers Seminar

ICR Held “Kyoto University Chemistry Talent-Spot Jakarta 2024”

ICR held “Kyoto University Chemistry Talent-Spot Jakarta 2024” on January 21st, 2024. This was the 9th event (including online), which ICR has been hosting around Asia since 2017. The Embassy of Japan in Indonesia and the Kyoto University alumni association in Jakarta cooperated to promote the event, and a total of 39 applications were received. From among these, 14 shortlisted students from top Indonesian universities, including University of Indonesia, Bandung Institute of Technology and IPB University, were invited to attend one-on-one interviews with seven professors. One of the top-performing students, Fadhila Redhafli, has joined a laboratory as a MEXT scholar and pursue a Master’s degree from Kyoto University.



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Abbreviations used in the columns

Prof. Em.	Professor Emeritus	Support Staff	Support Staff
Prof.	Professor	Assist. Res. Staff	Assistant Research Staff
Vis. Prof.	Visiting Professor	Assist. Techn. Staff	Assistant Technical Staff
Assoc. Prof.	Associate Professor	Assist. Admin. Staff	Assistant Administrative Staff
Vis. Assoc. Prof.	Visiting Associate Professor	Guest Scholar	Guest Scholar
Senior Lect.	Senior Lecturer	Guest Res. Assoc.	Guest Research Associate
Assist. Prof.	Assistant Professor	Distinguished Visiting Prof.	Distinguished Visiting Professor
Specially Appointed Prof.	Specially Appointed Professor	P. D.	Post-Doctoral Research Fellow
Specially Appointed Assoc. Prof.	Specially Appointed Associate Professor	Res.(pt.)	Researcher (part-time)
Specially Appointed Assist. Prof.	Specially Appointed Assistant Professor	Res. Support Staff	Research Support Staff
Program-Specific Assoc. Prof.	Program-Specific Associate Professor	R. F.	Research Fellow
Program-Specific Assist. Prof.	Program-Specific Assistant Professor	D1~3	Doctoral Course (Program) 1~3
Techn. Staff	Technical Staff	M1~2	Master's Course (Program) 1~2
Program-Specific Res.	Program-Specific Researcher	R. S.	Research Student
Proj. Res.	Project Researcher	U. G.	Undergraduate Student
Lect.(pt.)	Lecturer (part-time)	D. Sc.	Doctor of Science
Specially Contracted Staff	Specially Contracted Staff Member	D. Eng.	Doctor of Engineering
		D. Agr.	Doctor of Agricultural Science
		D. Pharm. Sc.	Doctor of Pharmaceutical Science
		D. Med. Sc.	Doctor of Medical Science
		D. Inf.	Doctor of Informatics
		D. Bioscience	Doctor of Bioscience
		Ph. D.	Doctor of Philosophy
		(pt)	part-time



ORGANIZATION

Institute for Chemical Research

5 Divisions and 3 Centers

Laboratories

Research Divisions

Division of Synthetic Chemistry

- Organoelement Chemistry
- Structural Organic Chemistry
- Synthetic Organic Chemistry
- Advanced Inorganic Synthesis

Division of Materials Chemistry

- Chemistry of Polymer Materials
- Polymer Controlled Synthesis
- Inorganic Photonics Materials
- Nanospintronics

Division of Biochemistry

- Biofunctional Design-Chemistry
- Chemistry of Molecular Biocatalysts
- Molecular Biology
- Chemical Biology

Division of Environmental Chemistry

- Molecular Materials Chemistry
- Hydrospheric Environment Analytical Chemistry
- Chemistry for Functionalized Surfaces
- Molecular Microbial Science

Division of Multidisciplinary Chemistry

- Polymer Materials Science
- Molecular Rheology
- Molecular Aggregates

Research Centers

Advanced Research Center for Beam Science

- Particle Beam Science
- Laser Matter Interaction Science
- Electron Microscopy and Crystal Chemistry
- Atomic and Molecular Structures

International Research Center for Elements Science

- Synthetic Organotransformation
- Advanced Solid State Chemistry
- Organometallic Chemistry
- Nanophotonics
- Structural Organic Chemistry
- Biofunctional Design-Chemistry

Bioinformatics Center

- Chemical Life Science
- Mathematical Bioinformatics
- Bio-knowledge Engineering
- GenomeNet Project Management Office

Visiting Divisions

- International Joint Usage/Research Center
- Supercomputer System
- Low Temperature Laboratory



**INTRODUCTORY
COLUMNS OF
LABORATORIES**

Division of Synthetic Chemistry

– Organoelement Chemistry –



<https://www.scl.kyoto-u.ac.jp/~oec/en/index.html>



Prof.
YAMADA, Hiroko
(D. Sc.)



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MIZUHATA, Yoshiyuki
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Assist. Prof. *¹
MATSUO, Kyohei
(D. Sc.)



Assist. Prof.
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P. D.
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INUTSUKA, Mayumi

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*² Re-employed Staff

*³ National Institute for Materials Science

Assist. Admin. Staff

TOTANI, Fuyuko

Lecturer (pt.)

HAYASHI, Hironobu*³ (D. Eng.)

Students

YANG, Yi (D3)	UENO, So (D2)	REN, Zhe (D1)	WANG, Yutang (M2)
KASAHARA, Shoma (D2)	MIYAZAKI, Kazuya (D1)	SUZUKI, Shinjiro (M2)	NISHIKAWA, Takeru (M1)
UCHIDA, Daichi (D2)	MURAKAMI, Hideyuki (D1)	TERANISHI, Kento (M2)	TAKAHASHI, Keita (M1)

Guest Res. Assoc.

SIMÓN MARQUÉS, Pablo Center for Materials Elaboration and Structural Studies, France, 9 October 2024–5 November 2024

Scope of Research

π -Extended aromatic compounds such as higher acenes and porphyrins are attractive as organic functional materials. In particular, we focus on the control of thin-film structure by self-assembly of the materials to investigate the correlation between packing structure and charge carrier mobility. We are also interested in the compounds including heavy main group elements to elucidate the similarities and differences in structures and reactivities between organic compounds and the corresponding heavier congeners.



KEYWORDS

Organic Semiconductor Aromatic Compound Self-Assembly Main Group Element Reactive Intermediate

Recent Selected Publications

- Tsuji, S.; Tokitoh, N.; Yamada, H.; Mizuhata, Y., Potassium 2-Germanaphthalenide: An Isolable Polycyclic System of Germanium-Incorporated Anionic Benzenoid, *Inorg. Chem. Front.*, **11**, 400-408 (2024).
- Tsuji, S.; Tokitoh, N.; Yamada, H.; Mizuhata, Y., The Reduction of Metallabenzenes: Different Scenarios Highly Dependent on the Central Group 14 Elements, Si vs. Ge, *Chem. Asian J.*, **19**, e202300945 (2024).
- Okba, A.; Simón-Marqués, P.; Matsuo, K.; Aratani, N.; Yamada, H.; Rapenne, G.; Kammerer, C., Synthesis of π -Conjugated Polycyclic Compounds by Late-Stage Extrusion of Chalcogen Fragments, *Beilstein J. Org. Chem.*, **20**, 287-305 (2024).
- Yamauchi, M.; Nakatsukasa, K.; Kubo, N.; Yamada, H.; Masuo S., One-Dimensionally Arranged Quantum-Dot Superstructures Guided by a Supramolecular Polymer Template, *Angew. Chem. Int. Ed.*, **63**, e202314329 (2024).
- Miyazaki, K.; Matsuo, K.; Hayashi, H.; Yamauchi, M.; Aratani, N.; Yamada H., An Unsymmetrical 5,15-Disubstituted Tetrabenzoporphyrin: Effect of Molecular Symmetry on the Packing Structure and Charge Transporting Property, *Org. Lett.*, **25**, 7354-7358 (2023).

Division of Synthetic Chemistry

– Structural Organic Chemistry –



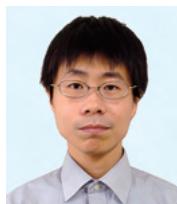
<https://www.scl.kyoto-u.ac.jp/~kouzou/en/index.html>



Prof.
MURATA, Yasujiro
(D. Eng.)



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Students

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Guest Res. Assoc.

ZHANG, Sheng (Ph. D.) Henan University, China, P. R., 1 August 2024–7 August 2024
MARGETIC, Davor (Ph. D.) The Rudjer Boskovic Institute, Croatia, 8 October 2024

Scope of Research

Fundamental studies are being conducted for the creation of new functional π -systems with novel structures and properties, and for evaluation of their application as organic semiconducting materials for photovoltaic and electroluminescent devices. The major subjects are: 1) organochemical transformation of fullerenes C₆₀ and C₇₀, specifically organic synthesis of endohedral fullerenes by the technique of molecular surgery; 2) generation of ionic fullerene species and their application for the synthesis of functional material; 3) synthesis of new carbon-rich materials by the use of transition metal complex; and 4) creation of new functional π -materials with unique photoelectric properties.

KEYWORDS

π -Conjugated Systems Endohedral Fullerenes
Functional Materials Helical Structures
Radical Species

Recent Selected Publications

- Zhang, Z.; Zhu, H.; Gu, J.; Shi, H.; Hirose, T.; Jiang, L.; Zhu, Y.; Zhong, D.; Wang, J., Nonplanar Nanographene with a Large Conjugated π -Surface, *J. Am. Chem. Soc.*, **146**, 24681–24688 (2024).
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- Hashikawa, Y.; Okamoto, S.; Murata, Y., Synthesis of Inter-[60]Fullerene Conjugates with Inherent Chirality, *Nat. Commun.*, **15**, 514 (2024).
- Liu, W.; Huang, G.; Chen, C.-Y.; Tan, T.; Fuyuki, H.; Hu, S.; Nakamura, T.; Truong, M. A.; Murdey, R.; Hashikawa, Y.; Murata, Y.; Wakamiya, A., An Open-Cage Bis[60]fulleroid as Electron Transport Material for Tin Halide Perovskite Solar Cells, *Chem. Commun.*, **60**, 2172–2175 (2024).
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Division of Synthetic Chemistry

– Synthetic Organic Chemistry –



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YANAGIDA, Ryo (M1)
OJI, Shoichiro (UG)
MURAOKA, Kanji (UG)
NIIKAWA, Tsukasa (UG)

Scope of Research

Our group has been carrying out innovative research on the radical-based organic synthesis by designing catalysts and chemical reactions as well as molecules. Our current research projects include (1) radical-mediated organocatalysis such as N-heterocyclic carbene catalysis or organophotoredox catalysis; (2) radical modification of nucleic acids; and (3) molecular imaging based on boron chemistry.

KEYWORDS

Synthetic Reactions
Photoredox Catalysis
Organocatalysis
Radical Reaction
Boron Molecule

Recent Selected Publications

- Watanabe, K.; Nagao, K.; Ohmiya, H., Deoxygenative Geminal Silylboration of Amides Using Silylboronates: Synthesis and Use of α -Boryl- α -Silylalkylamines, *Angew. Chem. Int. Ed.*, **63**, e202411990 (2024).
- Shibutani, S.; Nagao, K.; Ohmiya, H., A Dual Cobalt and Photoredox Catalysis for Hydrohalogenation of Alkenes, *J. Am. Chem. Soc.*, **146**, 4375-4379 (2024).
- Ota, K.; Nagao, K.; Hata, D.; Sugiyama, H.; Segawa, Y.; Tokunoh, R.; Seki, T.; Miyamoto, N.; Sasaki, Y.; Ohmiya, H., Synthesis of Tertiary Alkylphosphonate Oligonucleotides through Light-Driven Radical-Polar Crossover Reactions, *Nat. Commun.*, **14**, 6856 (2023).
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Division of Synthetic Chemistry

– Advanced Inorganic Synthesis –



https://www.scl.kyoto-u.ac.jp/~teranisi/index_E.html



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Program-Specific Assist. Prof.
SATO, Ryota
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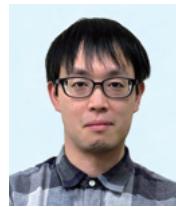
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P. D.
WEN, Dingchen
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P. D.
CHIGA, Yuki
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P. D.
CHEN, Yuexing
(Ph. D.)

*New Research Field Development Project

Students

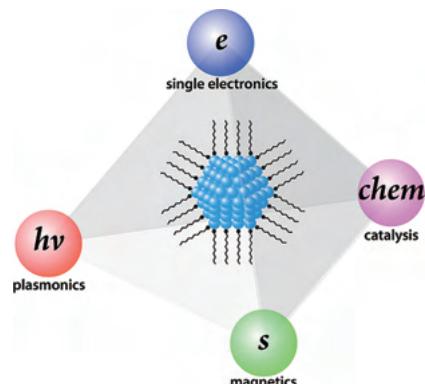
TIAN, Wu (D3) ZHU, Lingkai (D2) NAGAI, Nao (D1) PENG, Xiaoxiao (D1) FUKUYAMA, Mitsuki (M1)
XIA, Yan (D3) JIN, Yirou (D2) LEE, Hyunji (D1) MUTO, Mitsuki (M2)

Guest Res. Assoc.

WANG, Chien-Yi (Bachelor) National Yang Ming Chiao Tung University, Taiwan, 15 April 2024–28 February 2025

Scope of Research

We are focusing on the precise synthesis of inorganic nanoparticles by controlling the primary (size, shape, composition, etc.) and secondary (spatial arrangement) structures to tune properties such as electron confinement, carrier oscillation, spin, and catalysis. These high-quality inorganic nanoparticles are applied to both high-performance nanodevices (e.g., single electron transistor, plasmon waveguide, and nanocomposite magnet) and photo-energy conversion materials (e.g., overall water splitting and solar cell).



KEYWORDS

Inorganic Nanomaterials Quantum Dots Plasmonics
Oxidation Reduction Reactions Photocatalysts

Recent Selected Publications

- Takekuma, H.; Sato, R.; Iida, K.; Kawasaki, T.; Haruta, M.; Kurata, H.; Nobusada, K.; Teranishi, T., Intrinsic Visible Plasmonic Properties of Colloidal PtIn₂ Intermetallic Nanoparticles, *Adv. Sci.*, **11**, 2307055 (2024).
- Saruyama, M.; Takahata, R.; Sato, R.; Matsumoto, K.; Zhu, L.; Nakanishi, Y.; Shibata, M.; Nakatani, T.; Fujinami, S.; Miyazaki, T.; Takenaka, M.; Teranishi, T., Pseudomorphic Amorphization of Three-Dimensional Nanocrystal Superlattices through Morphological Transformation of Nanocrystal Building Blocks, *Chem. Sci.*, **15**, 2425-2432 (2024).
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- Suzuki, W.; Takahata, R.; Mizuhata, Y.; Tokitoh, N.; Xue, S.; Teranishi, T., Quantitative Analysis of Air-Oxidation Reactions of Thiolate-Protected Gold Nanoclusters, *Chem. Sci.*, **15**, 18896-18902 (2024).

Division of Materials Chemistry

– Chemistry of Polymer Materials –



http://www.cpm.kuicr.kyoto-u.ac.jp/index_en.html



Prof.
TSUJII, Yoshinobu
(D. Eng.)



Assist. Prof.
KINOSE, Yuji
(D. Eng.)



Assist. Prof.
ISHIDA, Koichiro
(D. Agr.)

Researchers (pt.)

MATSUKAWA, Kimihiro (D. Eng.)*
IKENAGA, Keiko
MORIKI, Yoshihito

*Res of Kyoto Inst Technol

Students

TAMAMOTO, Ken (D3) KISHIDA, Takaki (M1) SAIDA, Junnosuke (U. G.)
AKAGI, Shikoh (M2) YOSHIGAI, Toshiya (M1) MATSUMOTO, Yuji (U. G.)
SEIKE, Yuki (M2) GOTO, Haruki (M1) YAMAMOTO, Nozomu (U. G.)

Scope of Research

We perform kinetic and mechanistic analyses toward understanding chemical and physicochemical reactions occurring in polymerization systems and better routes for synthesis of well-defined polymers. In particular, new well-defined polymers or polymer assemblies are prepared by living polymerization techniques, and their structure-properties relationships are precisely analyzed. Projects in progress include: 1) kinetics and mechanisms of living radical polymerization (LRP); 2) synthesis of new polymeric materials by living polymerizations and their structure/properties studies; and 3) synthesis, properties, and applications of concentrated polymer brushes (CPB).



KEYWORDS

Precision Polymerization Living Radical Polymerization
Polymer Brush Tribology
Hybrid Materials

Recent Selected Publications

- Okubo, H.; Hase, K.; Tamamoto, K.; Tsujii, Y.; Nakano, K., In-Situ Observation of Ice-Adhesion Interface Under Tangential Loading: Anti-Icing Mechanism of Hydrophilic PPEGMA Polymer Brush, *Tribol. Lett.*, **72**, 96 (2024).
- Takahashi, Y.; Mizukami, M.; Tsujii, Y.; Kurihara, K., Surface Forces Characterization of Concentrated PMMA Brush Layers under Applied Load and Shear, *Langmuir*, **40**, 325-334 (2023).
- Okubo, H.; Kagiwata, D.; Nakano, K.; Tsujii, Y., Layered Structure and Wear Mechanism of Concentrated Polymer Brushes, *Langmuir*, **39**, 18458-18465 (2023).
- Ishida, K.; Kondo, T., Evaluation of Surface Free Energy Inducing Interfacial Adhesion of Amphiphilic Cellulose Nanofibrils, *Biomacromolecules*, **24**, 3786-3793 (2023).
- Ishida, K.; Kondo, T., Anisotropic Frictional Properties Induced by Cellulose Nanofibril Assembly, *Biomacromolecules*, **24**, 3009-3015 (2023).

Division of Materials Chemistry

– Polymer Controlled Synthesis –



<http://os.kuicr.kyoto-u.ac.jp/index.html>



Prof.
YAMAGO, Shigeru
(D. Sc.)



Assoc. Prof.
TOSAKA, Masatoshi
(D. Eng.)



Assist. Prof.
KAYAHARA, Eiichi
(D. Eng.)



Techn. Staff
FUJIHASHI, Akiko



P. D.
TOUSSAINT, François
(Ph. D.)

Students

WU, Jia-De (D3)
YAMIN, Naila (D3)
TONG, Tianxiang (D1)
WANG, Donghao (D1)
MIYOSHI, Nanami (M2)

XIE, Xuanhao (M2)
SHINODA, Yukine (M1)
NIU, Zijing (R. S.)
ZHANG, Jingyi (R. S.)

SUZUKI, Jin (U. G.)
TAKIKAWA, Hiroki (U. G.)
NINOMIYA, Teruhiro (U. G.)
MORISHITA, Yuki (U. G.)

Guest Scholars

SEIBERT, Jasmin Tanja (Ph. D.) Karlsruhe Institute of Technology (KIT), Germany, 5 November 2024–11 December 2024
CHANG, I-Hsiang (D4) National Tsing Hua University, Taiwan, 18 November 2024–17 January 2025

Scope of Research

Our research focuses on creation of new organic molecules with potential as key reagents and materials for future science and technologies. Furthermore, we have been developing new organic and polymeric materials based on our tailor-made molecules. For example, we are developing a new living radical polymerization method using heavier heteroatom compounds as controlling agents. Another topic is the synthesis of cycloparaphenylenes, hoop-shaped π -conjugated molecules, based on new synthetic strategies. We also study various condensed states of polymers by both static and dynamic methods to understand the relationship between structure and physical properties.



KEYWORDS

Organic Synthesis Polymer Synthesis Living Radical Polymerization Polymer Properties Curved π -Conjugated Molecules

Recent Selected Publications

- Sun, L.; Kayahara, E.; Nishinaga, T.; Ball, M.; Paley, D.; Nukolls, C.; Yamago, S., Synthesis and Physical Properties of Doubly-Annulated [10] Cycloparaphenylenes, *Bull. Chem. Soc. Jpn.*, **97**, uoad011 (2024).
- Kayahara, E.; Mizuhata, Y.; Yamago, S., Enhanced Host-Guest Interaction between [10]Cycloparaphenylenes ([10]CPP) and [5]CPP by Cationic Charges, *Beilstein J. Org. Chem.*, **20**, 436-444 (2024).
- Takahashi, K.; Mamitsuka, H.; Tosaka, M.; Zhu, N.; Yamago, S., CoPolDB: A Copolymerization Database for Radical Polymerization, *Polym. Chem.*, **15**, 965-971 (2024).
- Jiang, Y.; Kibune, M.; Tosaka, M.; Yamago, S., Practical Synthesis of Dendritic Hyperbranched Polyacrylates and Their Topological Block Polymers by Organotellurium-Mediated Emulsion Polymerization in Water, *Angew. Chem. Int. Ed.*, **62**, e202306916 (2023).
- Tosaka, M.; Takeuchi, H.; Kibune, M.; Tong, T.; Zhu, N.; Yamago, S., Stochastic Simulation of Controlled Radical Polymerization of Dendritic Hyperbranched Polymers, *Angew. Chem. Int. Ed.*, **62**, e202305127 (2023).

Division of Materials Chemistry

– Inorganic Photonics Materials –



<http://mizuochilab.kuicr.kyoto-u.ac.jp/indexE.html>



Prof.
MIZUOCHI, Norikazu
(D. Sc.)



Assoc. Prof.
MORIOKA, Naoya
(D. Eng.)



Program-Specific Assoc. Prof.
SHIGEMATSU, Ei
(D. Eng.)



Program-Specific Assoc. Prof.
OHKI, Izuru
(D. Bioscience)



Assist. Prof.
NISHIKAWA, Tetsuri
(D. Eng.)



Program-Specific Assist. Prof.
HERBSCHLEB, Ernst David
(Ph. D.)



Program-Specific Res.
FUJIWARA, Masanori
(D. Sc.)

Students

KAWASE, Riku (D2)
NAKAMURA, Masaya (D1)
DEGUCHI, Hiroshige (D1)
OKAJIMA, Kazuki (M2)
KAMIYAMA, Naoya (M2)

OHORI, Masanao (M1)
KONDO, Kazuki (M1)
NAKAGAWA, Hiromu (M1)
KITAYAMA, Motoki (U. G.)
SHIOTAHI, Ryo (U. G.)

Researchers (pt.)

KAWASHIMA, Hiroyuki (Ph. D.)
SO, Frederick Tze Kkit (D. Eng.)
MORITA, Kohki

Scope of Research

NV centers in diamond have been extensively interested because a single spin of the NV center can be manipulated and detected at room temperature. Furthermore, a spin-coherence time of the NV center is very long. The spin-coherence time is the time to retain coherence (superposition state) and directly relates to the sensitivity of sensors of magnetic field, electric field and temperature. Therefore, the unique and excellent properties of the NV center are expected to be applied for quantum computing, quantum communication, bio-imaging, and high-sensitive sensor with nano-scale resolution.



KEYWORDS

Diamond Quantum Materials NV Center
Quantum Sensing Quantum Information Science

Recent Selected Publications

- Herbschleb, E. D.; Chigusa, S.; Kawase, R.; Kawashima, H.; Hazumi, M.; Nakayama, K.; Mizuuchi, N., Robust Sensing via the Standard Deviation with a Quantum Sensor, *APL Quantum.*, **1**, 046106 (2024).
- So, F. T.-K.; Hariki, N.; Nemoto, M.; Shames, A. I.; Liu, M.; Tsurui, A.; Yoshikawa, T.; Makino, Y.; Ohori, M.; Fujiwara, M.; Herbschleb, E. D.; Morioka, N.; Ohki, I.; Shirakawa, M.; Igarashi, R.; Nishikawa, M.; Mizuuchi, N., Small Multimodal Thermometry with Detonation-Created Multi-Color Centers in Detonation Nanodiamond, *APL Materials*, **12**, 051102 (2024).
- Fujiwara, M.; Fu, H.; Hariki, N.; Ohki, I.; Makino, Y.; Liu, M.; Tsurui, A.; Yoshikawa, T.; Nishikawa, M.; Mizuuchi, N., Germanium-Vacancy Centers in Detonation Nanodiamond for All-Optical Nanoscale Thermometry, *Appl. Phys. Lett.*, **123**, 181903 (2023).

Division of Materials Chemistry

– Nanospintronics –



<https://www.scl.kyoto-u.ac.jp/~onoweb/>



Prof.
ONO, Teruo
(D. Sc.)



Assoc. Prof.
SHIOTA, Yoichi
(D. Eng.)



Assist. Prof.
HISATOMI, Ryusuke
(D. Eng.)



Program-Specific Assoc. Prof.
KARUBE, Shutaro
(D. Sc.)



Program-Specific Assist. Prof.
NARITA, Hideki
(Ph. D.)

Program-Specific Res.

MATSUMOTO, Hiroki (D. Sc.) TANAKA, Yuko

Support Staff

Students

JANG, Heechan (D3)

YE, Feifan (D3)

TOKORO, Fugo (M2)

KAWARAZAKI, Ryo (D3)

SUGIURA, Itaru (D2)

MANDOKORO, Tetsuma (M2)

KOMIYAMA, Haruka (D3)

TSENG, Chih-Hsiang (D2)

INAOKA, Yuma (M1)

TAGA, Kotaro (D3)

IIJIMA, Ryo (D1)

TAKAHASHI, Takuya (M1)

HAYASHI, Daiju (D3)

TAKAHASHI, Hiroyuki (M2)

YOSHIDA, Shoko (M1)

Guest Res. Assoc.

PARK, Jungmin (Ph. D.) KAIST, Korea, R., 1 March 2024–31 March 2025

Scope of Research

Conventional electronics uses only the charge of electrons, while traditional magnetic devices use only the spin degree of freedom of electrons. Aiming at complete control of both charge and spin in single solid-state devices, an emerging field called spintronics is rapidly developing and having an impact on information technologies. By combining the atomic-layer deposition with nanofabrication, we focus on the development of spin properties of various materials and the control of quantum effects in mesoscopic systems for novel spintronics devices.



KEYWORDS

Spintronics
Magnetism
Magnetic Materials

Recent Selected Publications

- Shiota, Y.; Taniguchi, T.; Hayashi, D.; Narita, H.; Karube, S.; Hisatomi, R.; Moriyama, T.; Ono, T., Handedness Manipulation of Propagating Antiferromagnetic Magnons, *Nat. Commun.*, **15**, 9750 (2024).
- Kobayashi, Y.; Itoh, T.; Hisatomi, R.; Moriyama, T.; Shiota, Y.; Fan, X.; Ono, T., Spin-Torque Ferromagnetic Resonance Based on Current-Induced Impedance, *Appl. Phys. Lett.*, **125**, 022405 (2024).
- Narita, H.; Ishizuka, J.; Kan, D.; Shimakawa, Y.; Yanase, Y.; Ono, T., Magnetization Control of Zero-Field Intrinsic Superconducting Diode Effect, *Adv. Mater.*, **35**, 2304083 (2023).
- Moriyama, T.; Sánchez-Tejerina, L.; Oda, K.; Ohkochi, T.; Kimata, M.; Shiota, Y.; Nojiri, H.; Finocchio, G.; Ono, T., Micromagnetic Understanding of Evolutions of Antiferromagnetic Domains in NiO, *Phys. Rev. Mater.*, **7**, 054401 (2023).
- Hayashi, D.; Shiota, Y.; Ishibashi, M.; Hisatomi, R.; Moriyama, T.; Ono, T., Observation of Mode Splitting by Magnon-Magnon Coupling in Synthetic Antiferromagnets, *Appl. Phys. Express*, **16**, 053004 (2023).

Division of Biochemistry

– Biofunctional Design-Chemistry –



<https://www.scl.kyoto-u.ac.jp/~bfdc/index.html>



Prof.
FUTAKI, Shiroh
(D. Pharm. Sc.)



Assoc. Prof.
IMANISHI, Miki
(D. Pharm. Sc.)



Assist. Prof.
KAWAGUCHI, Yoshimasa
(D. Pharm. Sc.)



Program-Specific Assist. Prof.
KIMURA, Seigo
(D. Pharm. Sc.)

Students

IWATA, Takahiro (D3)
KURIYAMA, Masashi (D3)
MICHIBATA, Junya (D3)
OTONARI, Kenko (D3)
IDA, Naka (D2)

NAKAGAWA, Yuna (D2)
TANAKA, Kamui (D2)
KASAHARA, Chisato (M2)
UEHATA, Yusuke (M2)
YAMASAKI, Daisuke (M2)

BABA, Nozomi (M1)
TAKEUCHI, Kosuke (M1)
KIKKAWA, Ayumi (M1)
KIYOKAWA, Megumi (M1)
NISHIJIMA, Hiroto (M1)

OBATA, Keito (M1)
SASAKI, Yuri (M1)
FURUYAMA, Yusei (U. G.)
SEKIGUCHI, Kaname (U. G.)
UCHIDA, Azumi (U. G.)

Scope of Research

The ultimate goal of our research is the regulation of cellular functions by designed peptides and proteins. Current research subjects include (1) development of novel intracellular delivery systems aiming at elucidation and control of cellular functions using designed membrane permeable peptide vectors, (2) elucidation of the DNA or RNA binding modes of nucleic acid binding proteins, and design of artificial regulators of gene expression, (3) elucidation and control of membrane curvature, and (4) design of stimulation-responsive artificial peptides and proteins.



KEYWORDS

Membrane-Permeable Peptides
Intracellular Delivery
Peptide Design
DNA/RNA Binding Protein
Membrane Curvature

Recent Selected Publications

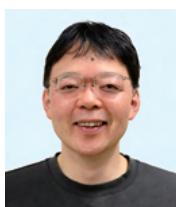
- Michibata, J.; Kawaguchi, Y.; Hirose, H.; Eguchi, A.; Deguchi, S.; Takayama, K.; Xu, W.; Niidome, T.; Sasaki, Y.; Akiyoshi, K.; Futaki, S., Polysaccharide-Based Coacervate Microgel Bearing Cationic Peptides That Achieve Dynamic Cell-Membrane Structure Alteration and Facile Cytosolic Infusion of IgGs, *Bioconjug. Chem.*, **35**, 1888-1899 (2024).
- Otonari, K.; Asami, Y.; Ogata, K.; Ishihama, Y.; Futaki, S.; Imanishi, M., Highly Sequence-Specific, Timing-Controllable m⁶A Demethylation by Modulating RNA-Binding Affinity of m⁶A Erasers, *Chem. Commun.*, **61**, 69-72 (2025).
- Kawaguchi, Y.; Kawamura, Y.; Hirose, H.; Kiyokawa, M.; Hirate, M.; Hirata, T.; Higuchi, Y.; Futaki, S., E3MPH16: An Efficient Endosomolytic Peptide for Intracellular Protein Delivery, *J. Controlled Release*, **367**, 877-891 (2024).
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- Tanaka K.; Suda A.; Uesugi M.; Futaki S.; Imanishi M., Xanthine Derivatives Inhibit FTO in an L-ascorbic Acid-Dependent Manner, *Chem. Commun.*, **59**, 10809-10812 (2023).

Division of Biochemistry

– Chemistry of Molecular Biocatalysts –



<https://www.scl.kyoto-u.ac.jp/~plant/index.html>



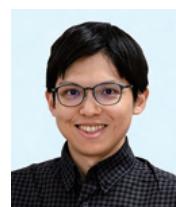
Prof.
YAMAGUCHI, Shinjiro
(D. Agr.)



Assist. Prof.
MASHIGUCHI, Kiyoshi
(D. Agr.)



Assist. Prof.
HAYASHI, Kengo
(D. Sc.)



Program-Specific Assist. Prof.
OGAWA, Satoshi
(D. Agr.)



Program-Specific Res.
SUN, Rui
(D. Life Sc.)

Students

ZHAO, Shuo (D1)	XU, Qianfan (M1)
HUANG, Yihao (D1)	WANG, Zizheng (R. S.)
ZHANG, Wenqiang (D1)	KANG, Yuan (R. S.)
JIANG, Yue (M2)	

Scope of Research

Plant hormones are a group of small molecules that are synthesized by plants and control their growth, development and environmental responses. This laboratory aims at elucidating how plant hormones are made and act in plants. Towards this goal, we combine chemical (organic chemistry, biochemistry, and analytical chemistry) and biological (molecular genetics, physiology, molecular biology, genomics) approaches. We are also looking for new hormone-like compounds by using mutant plants that show morphological phenotypes.

KEYWORDS

Plant Hormone
Strigolactone
Biosynthesis
Cytochrome P450
Receptor



Recent Selected Publications

- Mashiguchi, K.; Morita, R.; Tanaka, K.; Kodama, K.; Kameoka, H.; Kyozuka, J.; Seto, Y.; Yamaguchi, S., Activation of Strigolactone Biosynthesis by the DWARF14-LIKE/KARRIKIN-INSENSITIVE2 Pathway in Mycorrhizal Angiosperms, but Not in Arabidopsis, a Non-Mycorrhizal Plant, *Plant Cell Physiol.*, **64**, 1066-1078 (2023).
- Cui, J.; Nishide, N.; Mashiguchi, K.; Kuroha, K.; Miya, M.; Sugimoto, K.; Itoh, J.-I.; Yamaguchi, S.; Izawa, T., Fertilization Controls Tiller Numbers via Transcriptional Regulation of a MAX1-like Gene in Rice Cultivation, *Nat. Commun.*, **14**, 3191 (2023).
- Mashiguchi, K.; Seto, Y.; Onozuka, Y.; Suzuki, S.; Takemoto, K.; Wang, Y.; Dong, L.; Asami, K.; Noda, R.; Kisugi, T.; Kitaoka, N.; Akiyama, K.; Bouwmeester, H.; Yamaguchi, S., A Carlactonic Acid Methyltransferase That Contributes to the Inhibition of Shoot Branching in Arabidopsis, *Proc. Natl. Acad. Sci. U.S.A.*, **119**(14), e2111565119 (2022).
- Ishida, T.; Watanabe, B.; Mashiguchi, K.; Yamaguchi, S., Synthesis and Structure-Activity Relationship of 16,17-Modified Gibberellin Derivatives, *Phytochem Lett.*, **49**, 162-166 (2022).
- Mashiguchi, K.; Seto, Y.; Yamaguchi, S., Strigolactone Biosynthesis, Transport and Perception, *Plant J.*, **105**, 335-350 (2021).

Division of Biochemistry – Molecular Biology –



<https://www.scl.kyoto-u.ac.jp/~molbio/index.html>



Assoc. Prof.
TSUGE, Tomohiko
(D. Sc.)



Assist. Prof.
KATO, Mariko
(D. Agr.)

Students

HAGHIR, Shahrzad (D3)
ODOI, Miku (D2)
SILVOSA MILLADO, Cyrose Suzie (D1)

Guest Scholar

KAWACHI-REUSCHER, Miki (D. Agr.) Georg-August-Universität Göttingen, Germany, 7 October 2024–15 October 2024

Scope of Research

This laboratory aims to clarify the molecular bases of regulatory mechanisms involved in plant development, especially morphogenesis and environment adaptation, using techniques of forward and reverse genetics, molecular biology, and biochemistry. Current major subjects are: 1) COP9 signalosome modulating signal transduction in the nuclei, 2) RNA processing mediated gene expression regulation, 3) phospholipid signaling in cell morphogenesis, and 4) transcriptional network for cell morphogenesis.

KEYWORDS

Morphogenesis
mRNA Processing
Phospholipid Signaling

Signal Transduction
COP9 Signalosome



Recent Selected Publications

- Kato, M.; Watari, M.; Tsuge, T.; Zhong, S.; Gu, H.; Qu, L.-J.; Fujiwara, T.; Aoyama, T., Redundant Function of the *Arabidopsis* Phosphatidylinositol 4-Phosphate 5-Kinase Genes *PIP5K4-6* is Essential for Pollen Germination, *Plant J.*, **117**, 212-215 (2024).
- Akagi, C.; Kurihara, Y.; Makita, Y.; Kawaguchi, M.; Tsuge, T.; Aoyama, T.; Matsui, M., Transcriptional Activation of Ribosome-Related Genes at Initial Photoreception is Dependent on Signals Derived from Both the Nucleus and the Chloroplasts in *Arabidopsis thaliana*, *J. Plant Res.*, **136**, 227-238 (2023).
- Watari, M.; Kato, M.; Blanc-Mathieu, R.; Tsuge, T.; Ogata, H.; Aoyama, T., Functional Differentiation among the *Arabidopsis* Phosphatidylinositol 4-Phosphate 5-Kinase Genes *PIP5K1*, *PIP5K2* and *PIP5K3*, *Plant Cell Physiol.*, **63**, 635-648 (2022).
- Zhang, X.; Nomoto, M.; Garcia-León, M.; Takahashi, N.; Kato, M.; Yura, K.; Umeda, M.; Rubio, V.; Tada, Y.; Furumoto, T.; Aoyama, T.; Tsuge, T., CFI 25 Subunit of Cleavage Factor I is Important for Maintaining the Diversity of 3' UTR Lengths in *Arabidopsis thaliana* (L.) Heynh, *Plant Cell Physiol.*, **63**, 369-383 (2022).

Division of Biochemistry

– Chemical Biology –



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UESUGI, Motonari
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ABO, Masahiro
(D. Pharm. Sc.)



Assist. Prof.
NISHIO, Kosuke
(D. Med. Sc.)



Assist. Prof.
SINGH, Vaibhav Pal
(D. Med. Sc.)

Students

FARRAG, Asmaa Mostafa
Abdelbari Soliman (D3)

TSERENDAGVA, Manchir (D2)

LATOS, Krystian (D1)
HELMS, Melanie (M2)
HERRERA, Matthew Dewell (R. S.)

AYATOLLAHI, Parisa Sadat (R. S.)
OBEID Omar (R. S.)

Guest Res. Assoc.

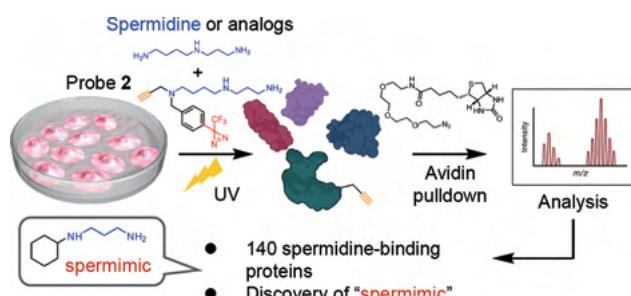
KIM, Hyosuk (Ph. D.) Yonsei University, Korea, R., 1 April 2023–31 March 2026

Scope of Research

Chemical biology is an interdisciplinary field of study that is often defined as “chemistry-initiated biology.” As biological processes all stem from chemical events, it should be possible to understand or manipulate biological events using chemistry. Our laboratory has been discovering or designing unique organic molecules that modulate fundamental processes in human cells. Such synthetic organic molecules often serve as tools for basic cell biology. Discovery or design of small molecules with unique biological activities permits small-molecule-initiated exploration of complex cellular events. Our mission is to create a new world of bioactive synthetic molecules: new modes of activity, new shapes, and new sizes. We hope that these basic studies open new avenues for small-molecule applications in a range of fields.

KEYWORDS

Chemical Biology Self-Assembly Chemical Library
Chemical Genetics Immunology



Recent Selected Publications

- Singh, V. P.; Hirose, S.; Takemoto, M.; Farrag, A. M. A. S.; Sato, S.; Honjo, T.; Chamoto, K.; Uesugi, M., Chemoproteomic Identification of Spermidine-Binding Proteins and Antitumor-Immunity Activators, *J. Am. Chem. Soc.*, **146(24)**, 16412-16418 (2024).
- Toh, K.; Nishio, K.; Nakagawa, R.; Egoshi, S.; Abo, M.; Perron, A.; Sato, S.; Okumura, N.; Koizumi, N.; Dodo, K.; Sodeoka, M.; Uesugi, M., Chemoproteomic Identification of Blue-Light-Damaged Proteins, *J. Am. Chem. Soc.*, **144(44)**, 20171-20176 (2022).
- Nishio, K.; Toh, K.; Perron, A.; Goto, M.; Abo, M.; Shimakawa, Y.; Uesugi, M., Magnetic Control of Cells by Chemical Fabrication of Melanin, *J. Am. Chem. Soc.*, **144(37)**, 16720-16725 (2022).
- Ado, G.; Noda, N.; Vu, H. T.; Perron, A.; Mahapatra, A. D.; Arista, K. P.; Yoshimura, H.; Packwood, D. M.; Ishidate, F.; Sato, S.; Ozawa, T.; Uesugi, M., Discovery of a Phase-Separating Small Molecule That Selectively Sequesters Tubulin in Cells, *Chemical Science*, **13**, 5760-5766 (2022).
- Jin, S.; Vu, H. T.; Hioki, K.; Noda, N.; Yoshida, H.; Shimane, T.; Ishizuka, S.; Takashima, I.; Mizuhata, Y.; Beverly Pe, K.; Ogawa, T.; Nishimura, N.; Packwood, D.; Tokito, N.; Kurata, H.; Yamasaki, S.; Ishii, K. J.; Uesugi, M., Discovery of Self-Assembling Small Molecules as Vaccine Adjuvants, *Angew. Chem. Int. Ed.*, **60(2)**, 961-969 (2021).

Division of Environmental Chemistry

– Molecular Materials Chemistry –



<https://www.scl.kyoto-u.ac.jp/~moma/index-e.html>



Prof.
KAJI, Hironori
(D. Eng.)



Assist. Prof.
SHIZU, Katsuyuki
(D. Eng.)



Assist. Prof.
SUZUKI, Katsuaki
(D. Human & Envirnmtl. Studies)



Assist. Prof.
CHOI, Heekyoung *
(D. Sc.)



Program-Specific Assoc. Prof.
TANAKA, Hiroyuki
(D. Sc.)

*New Research Field Development Project



Techn. Staff
MAENO, Ayaka



Techn. Staff
NAKAJIMA, Yuuki

Students

MURAKAMI, Kimiya (D3)
FUJINAKA, Masatoshi (D3)
SATO, Hiroki (D2)
ISHIHARA, Kuraudo (D1)
ONOE, Renon (M2)
YASUDA, Yuka (M2)
FUKUSHIMA, Shohei (M2)

KAWABATA, Kazuhiro (M1)
KOZAKA, Shunsuke (M1)
TAKARAKO, Masataka (M1)
UCHIKAWA, Ryosuke (U. G.)
KONDO, Ryo (U. G.)
TAKAHASHI, Kento (U. G.)

Guest Scholar

HUDSON, Zachary (D. Chem.) The University of British Columbia, Canada, 20 February 2024–31 March 2024

Guest Res. Assoc.

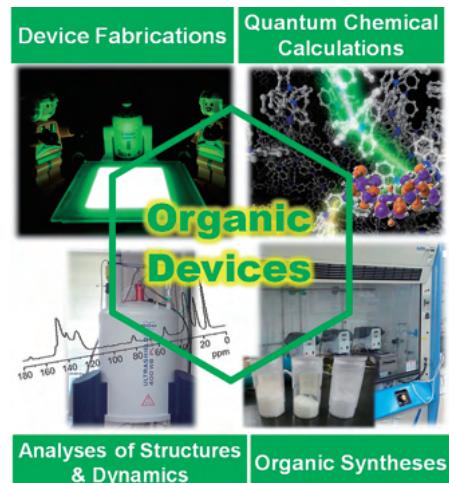
JUNG, Andre Philipp Karlsruhe Institute of Technology, Germany, 2 September 2024–17 September 2024
BERGMANN, Katrina University of British Columbia, Canada, 30 September 2024–20 December 2024

Scope of Research

Our research goal is to develop high-performance organic electroluminescence devices, organic solar cells, and polymer materials. Toward this, we carry out syntheses, device fabrications, precise structure characterizations, and quantum chemical calculations for high functional organic materials. Along with exploring novel synthetic routes and novel devices, we perform detailed analyses of structures and dynamics, mainly by sophisticated solid-state NMR spectroscopy, in order to obtain structure–dynamics–property relationships.

KEYWORDS

Organic Light-Emitting Diodes Solid-State NMR
Quantum Chemical Calculation Amorphous Materials
Dynamic Nuclear Polarization Enhanced NMR



Recent Selected Publications

- Okumura, R.; Tanaka, H.; Shizu, K.; Fukushima, S.; Yasuda, Y.; Kaji, H., Development of an Organic Emitter Exhibiting Reverse Intersystem Crossing Faster than Intersystem Crossing, *Angew. Chem. Int. Ed.*, **63**, e202409670 (2024).
- Shizu, K.; Kaji, H., Quantitative Prediction of Rate Constants and Its Application to Organic Emitters, *Nat. Commun.*, **15**, 4723 (2024).
- Shizu, K.; Ren, Y.; Kaji, H., Promoting Reverse Intersystem Crossing in Thermally Activated Delayed Fluorescence via the Heavy-Atom Effect, *J. Phys. Chem. A*, **127**, 439–449 (2023).
- Tanaka, H.; Mizuhata, Y.; Tokitoh, N.; Miyamoto, R.; Kanamori, K.; Kaji, H., Multiple Stimuli-Responsive Supramolecular Organic Framework under Concomitant Emission Color Changes, *J. Phys. Chem. C*, **127**, 20459–20465 (2023).
- Suzuki, K.; Kaji, H., Torsion Angle Analysis of a Thermally Activated Delayed Fluorescence Emitter in an Amorphous State Using Dynamic Nuclear Polarization Enhanced Solid-State NMR, *J. Am. Chem. Soc.*, **145**, 16324–16329 (2023).

Division of Environmental Chemistry

– Hydrospheric Environment Analytical Chemistry –



https://inter3.kuicr.kyoto-u.ac.jp/scope_E.html



Prof.
SOHRIN, Yoshiki
(D. Sc.)



Assoc. Prof.
TAKANO, Shotaro
(D. Sc.)



Assist. Prof.
ZHENG, Linjie
(D. Sc.)



Assist. Prof. *
ALAM, Mahboob
(Ph. D.)



Techn. Staff
NAKAHARA, Fumiko

*New Research Field
Development Project

Students

CHAN, Cheuk-Yin (D3)

MATSUOKA, Kohei (D2)

KAKIMOTO, Ryochi (M2)

YUNOKI, Keisuke (M2)

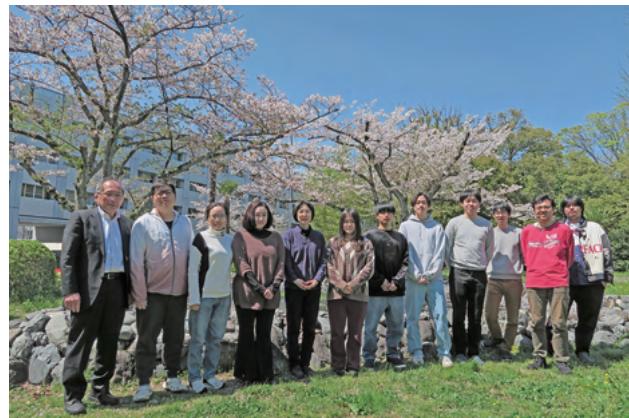
GODA, Aoi (M1)

GOSHONA, Shinya (M1)

MIZUTANI, Atsuki (M1)

Scope of Research

(i) Biogeochemistry of trace elements in the hydrosphere: Novel analytical methods are developed for trace metals and their isotopes. Distribution of trace elements in the hydrosphere and their effects on the ecosystem are investigated. The study also covers hydrothermal activity, deep biosphere, and paleocean. (ii) Ion recognition: Novel ligands and ion recognition system are designed, synthesized, and characterized.



KEYWORDS

Marine Chemistry Analytical Chemistry
Trace Elements Stable Isotopes
Metal Ion Recognition

Recent Selected Publications

- Ueki, R.; Zheng, L.; Takano, S.; Sohrin, Y., Distributions of Zirconium, Hafnium, and Niobium in the Indian Ocean: Influence of Lithogenic Sources on Incompatible Elements, *Mar. Chem.*, **260**, 104365 (2024).
- Takano, S.; Kanamura, H.; Sohrin, Y., Multielemental Isotopic Analysis for Trace Metals in Geochemical Samples, Part 2: Nickel, Copper, Zinc, Cadmium, and Lead in Sediments, Atmospheric Particles, and Plankton, *ACS Earth Space Chem.*, **8**, 547-553 (2024).
- Zheng, L.; Minami, T.; Takano, S.; Sohrin, Y., Distributions of Cadmium, Nickel, Zinc, Copper, and Iron in the Western South Pacific Ocean: Local Sources of the Nutrient-Type Trace Metals, *Mar. Chem.*, **263-264**, 104411 (2024).
- Takano, S.; Kanamura, H.; Sohrin, Y., Multielemental Isotopic Analysis for Trace Metals in Geochemical Samples, Part 1: Dissolved Iron, Nickel, Copper, Zinc, Cadmium, and Lead in Seawater, *ACS Earth Space Chem.*, **8**, 702-711 (2024).
- Chan, C.-Y.; Zheng, L.; Sohrin, Y., The Behaviour of Aluminium, Manganese, Iron, Cobalt, and Lead in the Subarctic Pacific Ocean: Boundary Scavenging and Temporal Changes, *J. Oceanogr.*, **80**, 99-115 (2024).
- Cheng, Y.; Cai, P.; Chen, H.; Yuan, L.; Jiang, X.; Zhang, S.; Chen, Y.; Luo, Y.; Sohrin, Y., Nitrate and Silicate Fluxes at the Sediment-Water Interface of the Deep North Pacific Ocean Illuminated by $^{226}\text{Ra}/^{230}\text{Th}$ Disequilibria, *Geochim. Cosmochim. Acta*, **383**, 81-91 (2024).

Division of Environmental Chemistry

– Chemistry for Functionalized Surfaces –



<https://www.scl.kyoto-u.ac.jp/~yoeki/>



Prof.
HASEGAWA, Takeshi
(D. Sc.)



Assoc. Prof.
MORI, Taizo
(D. Eng.)



Assist. Prof.
SHIOYA, Nobutaka
(D. Sc.)



Res. (pt.)
MATSUDA, Hiroshi
(D. Eng.)

Students

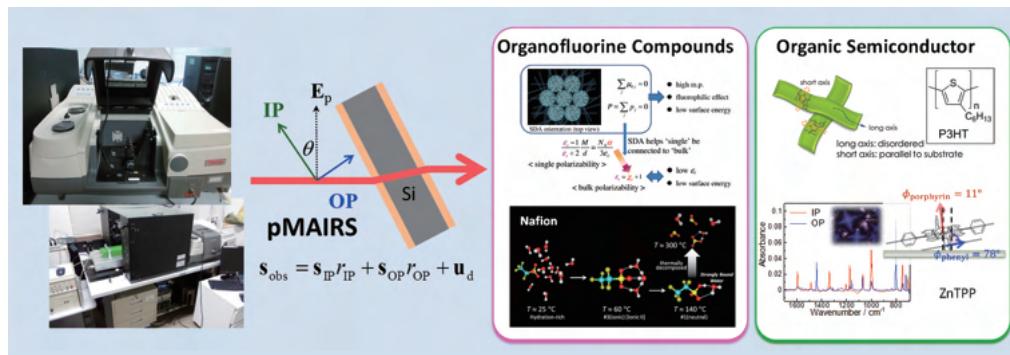
OKA, Takayuki (D1)
ARAKI, Taisuke (M2)
SUGIMOTO, Emi (M2)
OONUKI, Tomoya (M1)

Scope of Research

To understand the chemical structure and properties of a molecular aggregated system, the keywords of molecular interactions and orientation are focused on, and the molecular aggregates are investigated by using originally developed spectroscopic techniques. The current major topics are: (1) perfluoroalkyl-specific properties in a condensed system; (2) controlling factors of molecular packing and orientation in a thin film of an organic semiconductor compound; (3) development of new molecular orientation analytical technique “MAIRS2.”

KEYWORDS

Infrared and Raman Spectroscopy
Surface and Interface Chemistry
Perfluoroalkyl Compounds
Organic Semiconductors
pMAIRS and MAIRS2



Recent Selected Publications

- Shioya, N.; Yoshida, M.; Fujii, M.; Eda, K.; Hasegawa, T., Disappearance of Odd-Even Effects at the Substrate Interface of *n*-Alkanes, *J. Am. Chem. Soc.*, **146(46)**, 32032-32039 (2024).
- Araki, T.; Oka, T.; Shioya, N.; Hasegawa, T., Molecular Symmetry Change of Perfluoro-*n*-Alkanes in ‘Phase I’ Monitored by Infrared Spectroscopy, *Anal. Sci.*, **40(9)**, 1723-1731 (2024).
- Shioya, N.; Mori, T.; Ariga, K.; Hasegawa, T., Multiple-Angle Incidence Resolution Spectrometry: Applications in Nanoarchitectonics and Applied Physics, *Jpn. J. Appl. Phys.*, **63(6)**, 060102 (2024).
- Hasegawa, T.; Nakagawara, A.; Takagi, T.; Shimoaka, T.; Shioya, N.; Sonoyama, M., Phonon Modes Controlled by Primary Chemical Structure of Partially Fluorinated Dimyristoylphosphatidylcholine (DMPC) Revealed by Multiple-Angle Incidence Resolution Spectrometry (MAIRS), *J. Chem. Phys.*, **160(6)**, 064704 (2024).
- Shioya, N.; Fang, T.; Fujii, M.; Fujiwara, R.; Hayashi, H.; Yamada, H.; Hasegawa, T., Quantitative Analysis of Photochemical Reactions in Pentacene Precursor Films, *Langmuir*, **40(1)**, 1137-1142 (2024).

Division of Environmental Chemistry

– Molecular Microbial Science –



<https://molmicro.kuicr.kyoto-u.ac.jp/en/>



Prof.
KURIHARA, Tatsuo
(D. Eng.)



Assoc. Prof.
KAWAMOTO, Jun
(D. Agr.)



Assist. Prof.
OGAWA, Takuya
(D. Agr.)

Specially Contracted Staff

KITAYAMA, Kaori

Researcher (pt.)

SUWANAWAT, Nittikarn

Students

ZHU, Mengshan (D3)
TSUDZUKI, Taiku (D3)
INOUE, Hiromu (D2)

YOUN, Jae Hyung (D1)
YANG, Yuanzheng (D1)
SAKAMOTO, Daiki (M2)

SHIODA, Yudai (M2)
YOSHIDA, Riki (M2)
SHIMODA, Kaichi (M1)

TAKANO, Haruka (M1)
YAMASHITA, Atsuki (M1)
SANKARALINGAM,
Nivitha Vani (M1)

Scope of Research

Microorganisms are found almost everywhere on Earth. They have a great diversity of capacities to adapt to various environments, including chemically and physically unusual environments. Our main subject is to clarify the molecular basis of environmental adaptations of microorganisms and their application. Specific functions of proteins and lipids with essential roles in environmental adaptation of extremophilic microorganisms are of our particular interest. We also undertake mechanistic analysis of microbial enzymes, in particular, those involved in unique metabolic pathways, and their application.



KEYWORDS

Extremophiles
Phospholipid Acyltransferase

Bacterial Cold-Adaptation Mechanism
Extracellular Membrane Vesicle

Polyunsaturated Fatty Acid

Recent Selected Publications

- Zhu, M.; Kawamoto, K.; Imai, T.; Ogawa, T.; Kurihara, T., Enhancing Extracellular Membrane Vesicle Productivity of *Shewanella vesiculosa* HM13, a Prospective Host for Vesiculation-Mediated Protein Secretion, by Weakening Outer Membrane-Peptidoglycan Linkage, *J. Biosci. Bioeng.*, **138**, 137-143 (2024).
- Inoue, H.; Kawano, K.; Kawamoto, J.; Ogawa, T.; Kurihara, T., Rapid Screening and Identification of Genes Involved in Bacterial Extracellular Membrane Vesicle Production Using a Curvature-Sensing Peptide, *bioRxiv*, 05.20.594893 (2024).
- Casillo, A.; Fanina, S.; Kamasaka, K.; Kawamoto, J.; Kurihara, T.; Lanzetta, R.; Corsaro, M. M., Structural Study of a Polysaccharide Component of *nfnB* Mutant of *Shewanella vesiculosa* HM13, *Carbohydr. Res.*, **541**, 109148 (2024).
- Kamasaka, K.; Kawamoto, J.; Tsudzuki, T.; Liu, Y.; Imai, T.; Ogawa, T.; Kurihara, T., Capsular Polysaccharide-Mediated Protein Loading onto Extracellular Membrane Vesicles of a Fish Intestinal Bacterium, *Shewanella vesiculosa* HM13, *bioRxiv*, 04.25.538355 (2023).
- Ogawa, T.; Kuboshima, M.; Suwanawat, N.; Kawamoto, J.; Kurihara, T., Division of the Role and Physiological Impact of Multiple Lysophosphatidic Acid Acyltransferase Paralogs, *BMC Microbiol.*, **22**, 241 (2022).

Division of Multidisciplinary Chemistry

– Polymer Materials Science –



<https://www.scl.kyoto-u.ac.jp/~polymat/e-index.html>



Prof.
TAKENAKA, Mikihito
(D. Eng.)



Assoc. Prof.
OGAWA, Hiroki
(D. Eng.)



Assist. Prof.
NAKANISHI, Yohei
(D. Eng.)



Assist. Prof.
SHIBASAKI, Kazuki *
(D. Eng.)

*New Research Field
Development Project

Techn. Staff

ISODA, Kumiko
TATEISHI, Nayuko

Students

SEKO, Tamio (D3)
HAMAMOTO, Hiroki (D3)
ARAWAKA, Masato (D2)
SAWADA, Satoshi (D1)

TAMURA, Yukiko (D1)
BANDO, Shusuke (D1)
SHIMABUKURO, Wataru (M2)
SHIRAISHI, Harunori (M2)

NOMURA, Yuki (M2)
HOSOMI, Yu (M2)
KUBO, Haruki (M1)
TOBITA, Naoto (M1)

YOSHINO, Syunki (M1)
SHIMOTSU, Yui (U. G.)
TAKAGI, Jumpei (U. G.)
MATSUMOTO, Ryohei (U. G.)

Scope of Research

The structure and molecular motion of polymer substances are studied, mainly using scattering methods such as X-ray, neutron, and light with intent to solve fundamentally important problems in polymer science. The main projects are studied on 1) the morphologies and the dynamics of self-assembling processes in block copolymers, 2) the hierarchical structures in crystalline polymer and rubber-filler systems, 3) the viscoelastic effects in glassy materials, 4) formation processes and ordering structures in polymer thin films.

KEYWORDS

Polymer Physics Polymer Properties
Self Assembly Softmatter
Hierarchical Structure



Recent Selected Publications

- Nakanishi, Y.; Ishige, R.; Ogawa, H.; Huang, Y.; Sakakibara, K.; Ohno, K.; Kanaya, T.; Takenaka, M.; Tsujii, Y., Unified Explanation for Self-Assembly of Polymer-Brush-Modified Nanoparticles in Ionic Liquids, *Polym. J.*, **55**, 1199-1209 (2023).
Shibata, M.; Nakanishi, Y.; Abe, J.; Arima-Osonoi, H.; Iwase, H.; Shibayama, M.; Motokawa, R.; Kumada, T.; Takata, S.; Yamamoto, K.; Takenaka, M.; Miyazaki, T., Structural Changes of Polystyrene Particles in Subcritical and Supercritical Water Revealed by *in situ* Small-Angle Neutron Scattering, *Polym. J.*, **55**, 1165-1170 (2023).
Watanabe, Y.; Ogawa, H.; Konishi, T.; Nishitsuji, S.; Ono, S.; Shimizu, N.; Takenaka, M., Distribution of Oriented Lamellar Structures in Injection-Molded High-Density Polyethylene Visualized via the Small Angle X-ray Scattering-Computed Tomography Method, *Macromolecules*, **56(15)**, 5964-5973 (2023).
Watanabe, Y.; Nishitsuji, S.; Takenaka, M., Anomalous Small-Angle X-ray Scattering Analyses on Hierarchical Structures of Rubber-Filler Systems, *J. Appl. Crystallogr.*, **56(2)**, 461-467 (2023).
Kishimoto, M.; Takenaka, M.; Iwabuki, H., Spatial Distribution of the Amorphous Region Constrained by Polymer Crystallites, *Macromolecules*, **56(1)**, 207-214 (2023).

Division of Multidisciplinary Chemistry

– Molecular Rheology –



<https://molrheo.kuicr.kyoto-u.ac.jp/en/>



Assoc. Prof.
MATSUMIYA, Yumi
(D. Eng.)

Students

TOSAKI, Tomohiro (M2)
YAMAMOTO, Ayumu (M2)

HAYASHI, Taichi (M1)
TOMIMURA, Yuya (M1)

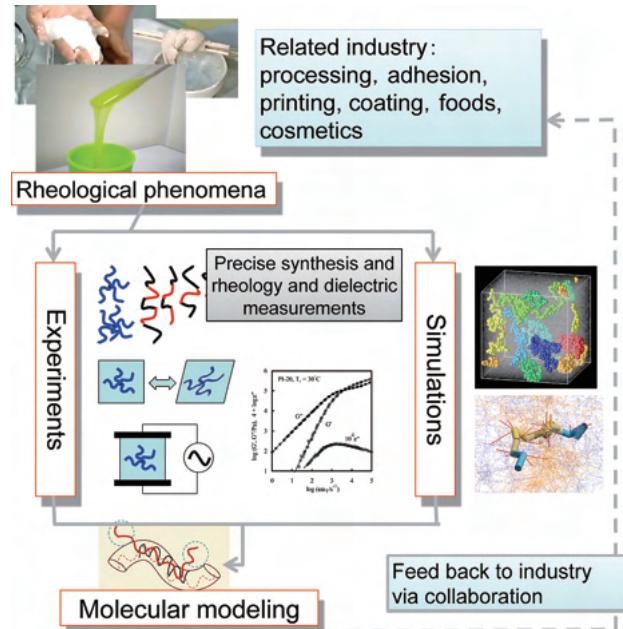
SAKAGUCHI, Keiki (U. G.)
TAKAOKI, Sayako (U. G.)

Scope of Research

Research focus is placed on the molecular origin of rheological properties of various materials. Depending on time and temperature, homogeneous polymeric materials exhibit typical features of glass, rubber, and viscous fluid while heterogeneous polymeric systems exhibit plasticity in addition to these features. For basic understanding of these features, the molecular motion and structures at various scales are studied for polymeric systems in deformed state. Rheological measurements are performed with various rheometers. Auto-correlation of the molecular orientation is also investigated with dynamic dielectric spectroscopy. Analysis of rheological and dielectric behavior elucidates a new aspect of softmatter physics.

KEYWORDS

Rheology Dielectric Spectroscopy
Soft Matter Mesoscopic Model



Recent Selected Publications

- Matsumiya, Y.; Watanabe, H., Non-university of Constraint Release Relaxation in Entangled Linear Polymers of Various Chemical Structures, *Rubber Chem. Tech.*, **97(4)**, 471-511 (2024).
- Zhang, Y.; Tang, J.; Chen, Q.; Kwon, Y.; Matsumiya, Y.; Watanabe, H., Nonlinear Stress Relaxation of End-Associative Star Chain. 2. Behavior Under Double-Step Strain, *J. Soc. Rheol. Jpn.*, **52(2)**, 143-160 (2024).
- Zhang, Y.; Tang, J.; Chen, Q.; Kwon, Y.; Matsumiya, Y.; Watanabe, H., Nonlinear Stress Relaxation of End-Associative Star Chain. 1. Behavior Under Single-Step Strain, *J. Soc. Rheol. Jpn.*, **52(2)**, 123-141 (2024).

Division of Multidisciplinary Chemistry

– Molecular Aggregates –



<https://www.scl.kyoto-u.ac.jp/~wakamiya/english/index.html>



Prof.
WAKAMIYA, Atsushi
(D. Eng.)



Senior Lect.
MURDEY, Richard
(Ph. D.)



Assist. Prof.
NAKAMURA, Tomoya
(D. Eng.)



Assist. Prof. *
TRUONG, Minh Anh
(D. Eng.)



Program-Specific Assist. Prof.
OHASHI, Noboru
(D. Eng.)



Specially Appointed Assist. Prof.
CHEN, Chien-Yu
(Ph. D.)

*New Research Field
Development Project

Students

TAN, Tiansheng (D3)	ALY, Aly (D1)	CHO, Woojin (M1)
HASEGAWA, Akio (D2)	ADACHI, Yuta (M2)	LING, Yükhe (M1)
MIYAKE, Yuki (D1)	SAKAMOTO,	YANASE, Ibuki (M1)
HARATA, Fuyuki (D1)	Chihiro (M2)	NORIEGA,
HIRA, Shota (D1)	WAN, Linbo (M2)	Javier Pablo (M1)

Program-Specific Researchers

IWASAKI, Yasuko MATSUSHIGE, Yuko

Researchers (pt.)

SHIMAZAKI, Ai

Assist. Techn. Staff

HARAMATSU, Megumi

Guest Scholar

YU, Ming-Hsuan (D3) National Taiwan University, Taiwan, 12 September 2024–3 December 2024

Scope of Research

We design and synthesize unique electronic materials with sophisticated device applications in mind. These materials have novel solid-state aggregation structures or well-defined interface orientation that promote efficient electrical current flow or enhance device lifetime. Electronic devices based on these new materials are then evaluated using advanced measurement techniques, and the results are used to inform the next direction of the materials chemistry. We call this synergistic approach for achieving our research goals “Needs Inspired Fundamental Science”.



KEYWORDS

Molecular Design and Synthesis Molecular Aggregation Functional Materials Semiconductors Perovskite Solar Cells

Recent Selected Publications

- Truong, M. A.; Ueberricke, L.; Funasaki, T.; Adachi, Y.; Hira, S.; Hu, S.; Yamada, T.; Sekiguchi, N.; Nakamura, T.; Murdey, R.; Iikubo, S.; Kanemitsu, Y.; Wakamiya, A., Tetrapodal Hole-Collecting Monolayer Materials Based on Saddle-Like Cyclooctatetraene Core for Inverted Perovskite Solar Cells, *Angew. Chem. Int. Ed.*, **63**, e202412939 (2024).
- Tan, T.; Murdey, R.; Sumitomo, S.; Nakamura, T.; Truong, M. A.; Wakamiya, A., Anhydrous *N,N*-Dimethyl-*N,N*-Dineopentylammonium Fluoride Electrolyte for Fluoride Ion Batteries, *Chem. Mater.*, **36**, 4533-4560 (2024).
- Hu, S.; Thiesbrummel, J.; Pascual, J.; Stolterfoht, M.; Wakamiya, A.; Snaith, H. J., Narrow Bandgap Metal Halide Perovskites for All-Perovskite Tandem Photovoltaics, *Chem. Rev.*, **124**, 4079-4123 (2024).
- Liu, W.; Huang, G.; Chen, C.-Y.; Tan, T.; Fuyuki, H.; Hu, S.; Nakamura, T.; Truong, M. A.; Murdey, R.; Hashikawa, Y.; Murata, Y.; Wakamiya, A., An Open-Cage Bis[60]Fulleroid as an Electron Transport Material for Tin Halide Perovskite Solar Cells, *Chem. Commun.*, **60**, 2172-2175 (2024).
- Nakamura, T.; Kondo, Y.; Ohashi, N.; Sakamoto, C.; Hasegawa, A.; Hu, S.; Truong, M. A.; Murdey, R.; Kanemitsu, Y.; Wakamiya, A., Materials Chemistry for Metal Halide Perovskite Photovoltaics, *Bull. Chem. Soc. Jpn.*, **97**, uoad025 (2024).

Advanced Research Center for Beam Science

– Particle Beam Science –



<https://pbs.kuier.kyoto-u.ac.jp/en/>



Prof.
WAKASUGI, Masanori
(D. Sc.)



Assoc. Prof.
TSUKADA, Kyo
(D. Sc.)



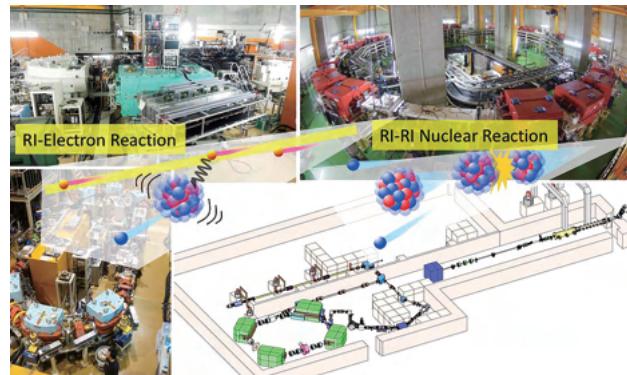
Techn. Staff
TONGU, Hiromu

Students

YOSHIDA, Satoru (M2) MAEDA, Yusei (M2) KOBAYASHI, Hiroki (M1)
TACHIBANA, Mariko (M2) KAGAMI, Rin (M1)

Scope of Research

One of our research is an experimental research for unstable nuclear structures by means of the electron and heavy-ion accelerators. We address the technical development in an RI beam production driven by a high-energy electron beam, an electron scattering from the RI's in combination with the RI target inserted in an electron storage ring, and the precision mass measurement for extremely short-lived and rare exotic nuclei using a heavy-ion storage ring. We will address some technical development aiming at a nuclear photo-absorption cross-section measurement and the beam recycling in a heavy-ion storage ring to study the nuclear reactions involving rare exotic nuclei.



KEYWORDS

Beam Physics Accelerator Physics
Unstable Nuclear Physics Storage Ring
Electron Linac

Recent Selected Publications

Tsukada, K.; Abe, Y.; Enokizono, A.; Goke, T.; Hara, M.; Honda, Y.; Hori, T.; Ichikawa, S.; Ito, Y.; Kurita, K.; Legris, C.; Maehara, Y.; Ohnishi, T.; Ogawara, R.; Suda, T.; Tamae, T.; Wakasugi, M.; Watanabe, M.; Wauke, H., First Observation of Electron Scattering from Online-Produced Radioactive Target, *Phys. Rev. Lett.*, **131**, 092502 (2023).

Ogawara, R.; Abe, Y.; Ohnishi, T.; Enokizono, A.; Hara, M.; Hori, T.; Ichikawa, S.; Kurita, K.; Maehara, Y.; Suda, T.; Tsukada, K.; Wakasugi, M.; Watanabe, M.; Wauke, H., Ion-Trapping Properties of SCRIT: Time Evolutions of ^{138}Ba Charge State Distributions, *Nucl. Instr. Met.*, **B541**, 90-92 (2023).

Miyata, K.; Ogawara, R.; Ishikawa, M., Improvement of Crystal Identification Accuracy for Depth-of-Interaction Detector System with Peak-to-Charge Discrimination Method, *Sensors*, **23**, 4584 (2023).

Li, H. F.; Naimi, S.; Sprouse, T. M.; Mumpower, M. R.; Abe, Y.; Yamaguchi, Y.; Nagae, D.; Suzaki, F.; Wakasugi, M.; Arakawa, H.; Dou, W. B.; Hamakawa, D.; Hosoi, S.; Inada, Y.; Kajiki, D.; Kobayashi, T.; Sakaue, M.; Yokoda, Y.; Yamaguchi, T.; Kagesawa, R.; Kamioka, D.; Moriguchi, T.; Mukai, M.; Ozawa, A.; Ota, S.; Kitamura, N.; Masuoka, S.; Michimasa, S.; Baba, H.; Fukuda, N.; Shimizu, Y.; Suzuki, H.; Takeda, H.; Ahn, D. S.; Wang, M.; Fu, C. Y.; Wang, Q.; Suzuki, S.; Ge, Z.; Litvinov, Yu. A.; Lorusso, G.; Walker, P. M.; Podolyak, Zs.; Uesaka, T., First Application of Mass Measurements with the Rare-RI Ring Reveals the Solar r-Process Abundance Trend at $A = 122$ and $A = 123$, *Phys. Rev. Lett.*, **128**, 152701 (2022).

Kusumoto, T.; Inoue, S.; Ogawara, R.; Kodaira, S., Measurement of the Energy Spectrum of Laser-Accelerated Protons Using FNTD: Development of an Easy and Quick Method for Energy Spectrometry, *Radiat. Meas.*, **151**, 106715 (2022).

Advanced Research Center for Beam Science – Laser Matter Interaction Science –



<https://en.laser.kuicr.kyoto-u.ac.jp/>



Prof.
TOKITA, Shigeki
(D. Eng.)



Assist. Prof.
OKAZAKI, Daiki
(D. Eng.)



Assist. Prof.
KIRITA, Yuri
(D. Sc.)



Res (pt.)
HASHIDA, Masaki
(D. Eng.)

Researcher (pt.)

MASUNO, Shin-ichiro

Assist. Techn. Staff

MATSUMOTO, Keiko

Students

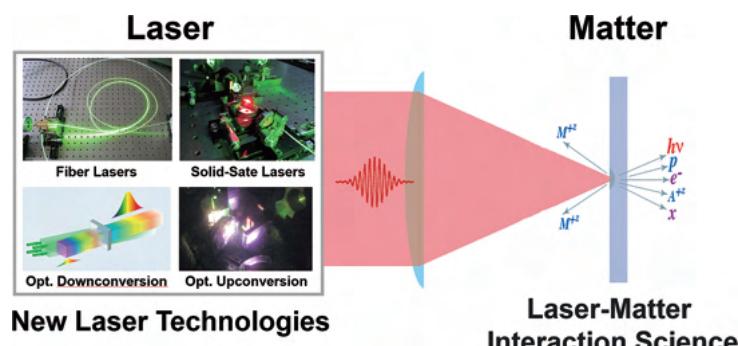
UETA, Isshin (M1) LEE, Sungho (M1)
HIYANE, Soshi (M1) WU, Xinlei (R. S.)

Scope of Research

We are developing cutting-edge high-intensity laser sources and studying experimental research on the laser interaction with matter by using the new laser sources. We are promoting cross-disciplinary research based on high-intensity laser technologies such as development of high-intensity mid-infrared solid-state lasers and fiber lasers, research on particle acceleration and wavelength conversion with plasmas produced by high-intensity ultrafast lasers, development of laser isotope separation method for neutrino research, and search for dark matter using high-intensity lasers.

KEYWORDS

High Power Laser Optics
Ultrafast Laser Physics
Laser-Plasma Interaction Physics
Laser Isotope Separation
Dark Matter



Recent Selected Publications

- Furuse, H.; Ueno D.; Omata K.; Imai M.; Tokita, S., Mid-Infrared Fine-Grained Er:Y₂O₃ Laser Ceramics Fabricated by Spark Plasma Sintering, *Ceram. Int.*, **50**, 46925-46931 (2024).
- Li, E.; Uehara, H.; Tokita S.; Zhao, M.; Yasuhara, R., High-Power, Single-Frequency Mid-Infrared Laser Based on a Hybrid Fe:ZnSe Amplifier, *Infrared Phys. Technol.*, **136**, 105071 (2024).
- Ogawa, I.; Hiraiwa, T.; Nakajima, J.; Yuhaku, R.; Tozawa, M.; Niki, H.; Tokita, S.; Miyanaga, N.; Uemukai, M.; Rittirong, A.; Umehara, S.; Matsuoka, K.; Yoshida, S., Laser Isotope Separation to Study for the Neutrino-Less Double Beta Decay of ⁴⁸Ca, *J. Phys. Conf. Ser.*, **2586**, 012136 (2023).
- Goya, K.; Sasanuma, H.; Ishida, G.; Uehara, H.; Tokita, S., Fusion Splicing of Plastic Optical Fibers Using a Mid-IR Fiber Laser, *Appl. Phys. Express*, **16**, 052006 (2023).
- Homma, K.; Tesileanu, O.; Nakamiya, Y.; Kirita, Y.; Chiochiu, C.; Cuciuc, M.; Giubega, G.; Hasada, T.; Hashida, M.; Ishibashi, F.; Kanai, T.; Kodama, A.; Masuno, S.; Miyamaru, T.; Neagu, L.; Rodrigues, V. R. M.; Rosu, M. M.; Sakabe, S.; Tamlyn, J.; Tazlauanu, S. V.; Tokita, S., Challenge of Search for Cosmological Dark Components with High-Intensity Lasers and beyond, *Eur. Phys. J. A.*, **59**, 109 (2023).

Advanced Research Center for Beam Science – Electron Microscopy and Crystal Chemistry –



<http://eels.kuicr.kyoto-u.ac.jp/EMCC/home-en.html>



Assoc. Prof.
HARUTA, Mitsutaka
(D. Sc.)



Assist. Prof.
NEMOTO, Takashi
(D. Sc.)



Program-Specific Res.
KIYOMURA, Tsutomu
(D. Sc.)



Program-Specific Res.
KADONO, Toshiharu
(D. Sc.)

Researcher (pt.)

OGAWA, Tetsuya (D. Sc.)

Students

LIN, I-Ching (D3)
YASUI, Kentaro (M2)

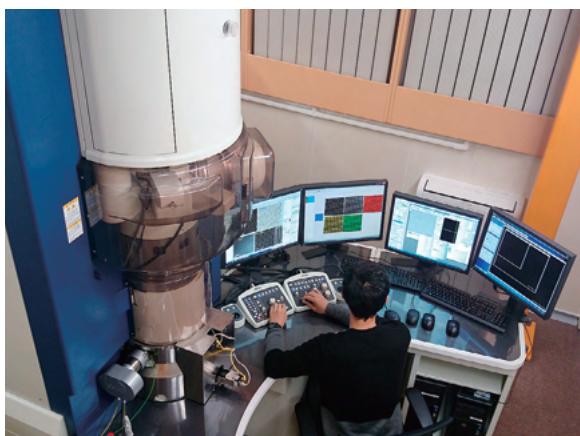
JO, Yoshiyuki (M2)
SEKOGUCHI, Maho (M1)

Scope of Research

In the field of nanotechnology, the importance of high spatial resolution analysis of materials further increases. We study the structure and the electronic state of materials at atomic scale through direct imaging of atoms or molecules by (scanning) transmission electron microscopy ((S)TEM) combined with energy dispersive X-ray spectroscopy (EDS) and electron energy-loss spectroscopy (EELS), which gives the information of elemental and electronic state. And we are studying with the aim of establishing new analytical methods using electron microscopes and evaluating materials using these methods.

KEYWORDS

STEM
EELS
EDS
Elemental Mapping
Electronic State



Recent Selected Publications

- Lin, I-C.; Haruta, M.; Nemoto, T.; Kurata, H., Isotropic Behavior of Oxygen Vibrations in PbTiO_3 Investigated by Ti $L_{2,3}$ -Edge Electron Energy-loss Spectroscopy, *Phys. Rev. B.*, **110**, [035109-1]-[035109-8] (2024).
- Lin, I-C.; Haruta, M.; Nemoto, T.; Goto, M.; Shimakawa, Y.; Kurata, H., Extraction of Anisotropic Thermal Vibration Factors for Oxygen from the Ti $L_{2,3}$ -Edge in SrTiO_3 , *J. Phys. Chem. C.*, **127(36)**, 17802-17808 (2023). Supplemental cover
- Iwashimizu, C.; Haruta, M.; Nemoto, T.; Kurata, H., Different Atomic Contrasts in HAADF Images and EELS Maps of Rutile TiO_2 , *Microscopy*, **72(4)**, 353-360 (2023). Editor's Choice
- Haruta, M.; Kikkawa, J.; Kimoto, K.; Kurata, H., Comparison of Detection Limits of Direct-Counting CMOS and CCD Cameras in EELS Experiments, *Ultramicroscopy*, **240**, [113577-1]-[113577-6] (2022).
- Haruta, M.; Nemoto, T.; Kurata, H., Sub-picometer Sensitivity and Effect of Anisotropic Atomic Vibrations on Ti $L_{2,3}$ -Edge Spectrum of SrTiO_3 , *Appl. Phys. Lett.*, **119**, [232901-1]-[232901-5] (2021). Featured Article

Advanced Research Center for Beam Science

– Atomic and Molecular Structures –



<https://www.scl.kyoto-u.ac.jp/~fujii/indexE.html>



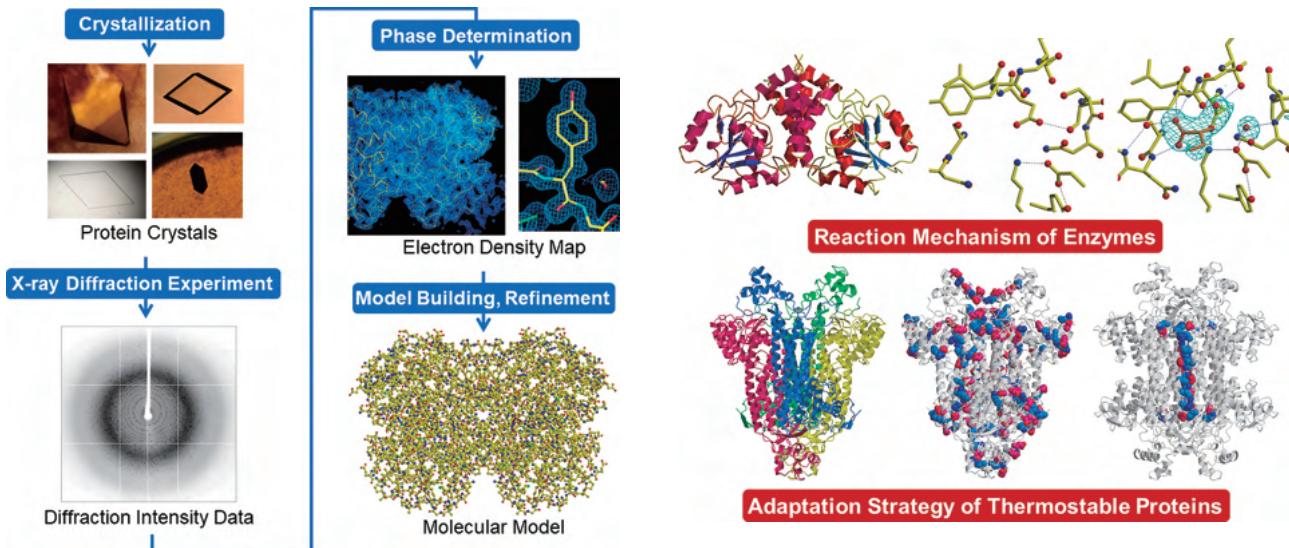
Assist. Prof.
FUJII, Tomomi
(D. Sc.)

Scope of Research

This laboratory analyzes X-ray crystallographic structures of biological macromolecules and studies the structural biology about the relationships between protein structures and their functions and properties based on the crystal structures. The main research themes are elucidation of the reaction mechanism of enzymes, the relationship between the multiform conformation and the functional variety of proteins, the structural basis for the domain-arrangements of multi-domain proteins or protein-protein interactions, structure determination for structure-based protein engineering and industrial application, and the adaptation strategy of proteins from thermophilic or cold-adapted bacteria.

KEYWORDS

Crystal
X-ray Crystallographic Analysis
Structural Biology
Protein Crystallography
Structure and Function



Recent Selected Publications

- Fujii, T.; Sato, A.; Okamoto, Y.; Yamauchi, T.; Kato, S.; Yoshida, M.; Oikawa, T.; Hata, Y., The Crystal Structure of Maleylacetate Reductase from *Rhizobium* sp. Strain MTP-10005 Provides Insights into the Reaction Mechanism of Enzymes in Its Original Family, *Proteins: Structure, Function, and Bioinformatics*, **84**, 1029-1042 (2016).
- Fujii, T.; Yamauchi, T.; Ishiyama, M.; Gogami, Y.; Oikawa, T.; Hata, Y., Crystallographic Studies of Aspartate Racemase from *Lactobacillus sakei* NBRC 15893, *Acta Crystallogr. Sect. F Struct. Biol. Cryst. Commun.*, **71**, 1012-1016 (2015).
- Fujii, T.; Goda, Y.; Yoshida, M.; Oikawa, T.; Hata, Y., Crystallization and preliminary X-ray Diffraction Studies of Maleylacetate Reductase from *Rhizobium* sp. Strain MTP-10005, *Acta Crystallogr. Sect. F Struct. Biol. Cryst. Commun.*, **64**, 737-739 (2008).
- Fujii, T.; Oikawa, T.; Muraoka, I.; Soda, K.; Hata, Y., Crystallization and Preliminary X-ray Diffraction Studies of Tetrameric Malate Dehydrogenase from the Novel Antarctic Psychrophile *Flavobacterium frigidimarlis* KUC-1, *Acta Crystallogr. Sect. F Struct. Biol. Cryst. Commun.*, **63**, 983-986 (2007).
- Fujii, T.; Sakai, H.; Kawata, Y.; Hata, Y., Crystal Structure of Thermostable Aspartase from *Bacillus* sp. YM55-1: Structure-based Exploration of Functional Sites in the Aspartase Family, *J. Mol. Biol.*, **328**, 635-654 (2003).

International Research Center for Elements Science – Synthetic Organotransformation –



<https://www.scl.kyoto-u.ac.jp/~elements/en/>



Prof.
NAKAMURA, Masaharu
(D. Sc.)



Assoc. Prof.
ISOZAKI, Katsuhiro
(D. Eng.)



Senior Lect.
PINCELLA, Francesca
(D. Eng.)



Assist. Prof.
DOBA, Takahiro
(D. Sc.)



Program-Specific Assist. Prof.
NAKAGAWA, Yuka
(D. Sc.)



Program-Specific Assist. Prof.
MINEO, Keito
(D. Agr.)

Students

ISERI, Kenta (D2)
YIN, Haozhi (D2)
WU, Beiling (D2)
GO, Touran (D2)
CHEN, Litian (D1)

ZHANG, Hao (D1)
UEDA, Kyosuke (M2)
SHIKAMI, Satoshi (M2)
TAKEUCHI, Soshi (M1)
WANG, Nan (M1)

JAYAWEERA KANKANAMGE,
Hema Malani (R. S.)
ANDO, Masaki (U. G.)
SEKIYA, Sota (U. G.)
SOGA, Teppei (U. G.)

Program-Specific Res.

IMAI, Makiko (D. Agr.)
KATHRIARACHCHIGE DON,
Suresh Kalum Kathriarachchi (D. Sc.)

Researchers (pt.)

MATSUMURA, Hiroyuki (D. Eng.)
AOKI, Satoshi (D. Sc.)

AVENA, Ramon Francisco Bernardino
NAKAMURA, Yuki

Scope of Research

Our research activity focuses on the development of new molecular transformations, which can contribute to better or ideal synthesis of functional molecules as well as to exploitation of new chemical (metal and carbon) resources. The present research subjects are (1) metal-catalyzed carbon–carbon and carbon–heteroatom bond forming reactions by using universal metals such as iron (2) development of small metallic nanocluster catalysts based on supramolecular approaches (3) utilization of woody biomass as the renewable carbon resources by mild catalytic transformations of wood molecules into useful compounds and materials.



KEYWORDS

Iron Catalysis Organotransformation Woody Molecular Transformation Supramolecular & Superatomic Catalysis

Recent Selected Publications

- Saito, R.; Isozaki, K.; Mizuhata, Y.; Nakamura, M., Synthesis of N₂-Type Superatomic Molecules, *J. Am. Chem. Soc.*, **146**, 20930-20936 (2024).
Lu, S.; Agata, R.; Nomura, S.; Matsuda, H.; Isozaki, K.; Nakamura, M., Regioselective Propargylic Suzuki-Miyaura Coupling by SchPROP-Iron Catalyst, *J. Org. Chem.*, **89**, 8385-8396 (2024).
Pincella, F.; Isozaki, K.; Sato, R.; Teranishi, T.; Takaya, H.; Nakamura, M., Reusable Magnetite Nanoparticle (Fe₃O₄ NP) Catalyst for Selective Oxidation of Alcohols under Microwave Irradiation, *ACS Omega*, **9**, 24477-24488 (2024).
Isozaki, K.; Matsuda, H.; Agata, R.; Jeon, J.; Wu, B.; Pincella, F.; Ikenaga, M.; Tachibana, Y.; Ohta, Y.; Nakamura, M., Synthetic Urushiols from Biorenewable Carbon Resources: Chemical Conversion of Enzymatic Degradation Products of Wood Lignin to an Ancient yet Future Coating Material, *RSC Sustain.*, **2**, 1358-1362 (2024).
Isozaki, K.; Iseri, K.; Saito, R.; Ueda, K.; Nakamura, M., Dual Catalysis of Gold Nanoclusters: Photocatalytic Cross-Dehydrogenative Coupling by Cooperation of Superatomic Core and Molecularly Modified Staples, *Angew. Chem. Int. Ed.*, **136**, e202312135 (2024).
Nakajima, S.; Hashimoto, T.; Lu, S.; Hashizume, D.; Matsuda, H.; Hatakeyama, T.; Isozaki, K.; Takaya, H.; Nakamura, M., SciPROP-R: An Effective Bisphosphine Ligand for the Chemo-Selective Iron-Catalyzed Suzuki-Miyaura Coupling of Alkyl Chlorides, *Bull. Chem. Soc. Jpn.*, **96**, 1298-1309 (2023).

International Research Center for Elements Science – Advanced Solid State Chemistry –



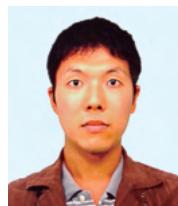
<https://www.scl.kyoto-u.ac.jp/~shimakgr/indexE.html>



Prof.
SHIMAKAWA, Yuichi
(D. Sc.)



Assoc. Prof.
KAN, Daisuke
(D. Sc.)



Assist. Prof.
GOTO, Masato
(D. Sc.)



Techn. Staff
ICHIKAWA, Noriya
(D. Eng.)

Program-Specific Res.

JI, Kunlang (Ph. D.)
LPUTERA, Kevin (Ph. D.)

Students

IIHOSHI, Makoto (D3)
ISODA, Yosuke (D3)
SHEN, Yufan (D3)
XIE, Ling-Ling (D3)

CHEN, Chen (D3)
WATANABE, Rei (D2)
ITO, Mayuri (M2)
FUJI, Souta (M2)

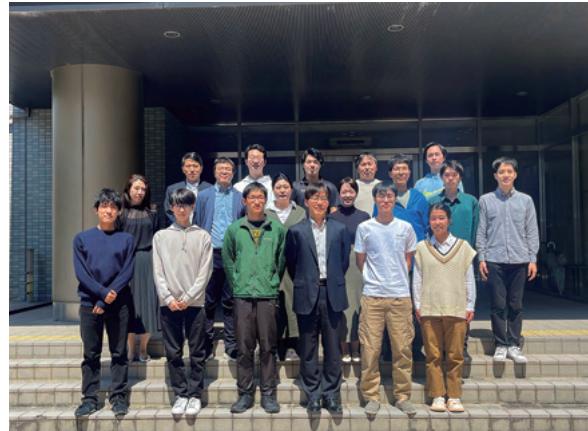
MAKI, Rintaro (M1)
TSURUNAGA, Daiki (M1)

Scope of Research

Transition metal oxides have a wide variety of interesting and useful functional properties, including electronic conduction, superconductivity, ferroelectricity, and ferromagnetism. In fact, some of these oxides are used in current electronic devices. Our research mainly focuses on perovskite-structured transition metal oxides with novel functional properties due to complex couplings between their lattices, charges and spins. We are currently exploring such functional oxides with advanced oxide-synthesis techniques such as high-pressure synthesis and epitaxial thin film growth.

KEYWORDS

Solid State Chemistry Functional Metal Oxides
High Pressure Synthesis Epitaxial Thin Film Growth
Heterointerface



Recent Selected Publications

- Shen, Y.; Ooe, K.; Yuan, X.; Yamada, T.; Kobayashi, S.; Haruta, M.; Kan, D.; Shimakawa, Y., Ferroelectric Freestanding Hafnia Membranes with Metastable Rhombohedral Structure down to 1-nm-thick, *Nat. Commun.*, **15**, 4789 (2024).
- Xie, L.; Isoda, Y.; Nakamizo, S.; Majima, T.; Hosokawa, S.; Nitta, K.; Shimakawa, Y.; Kan, D., Impact of Interfacial Proton Accumulation on Protonation in a Brownmillerite Oxide, *Adv. Funct. Mater.*, **34**, 2410084 (2024).
- Watanabe, R.; Goto, M.; Kosugi, Y.; Kan, D.; Shimakawa, Y., Oxygen Release and Incorporation Behaviors in BaFeO₃ Polymorphs with Unusually High-Valence Fe⁴⁺, *Chem. Mater.*, **36**, 2160-2112 (2024).
- Iihoshi, M.; Goto, M.; Shimakawa, Y., Stabilities of Charge Disproportionated States by Successive Charge Transitions of Mixed and Unusually High Valence Fe^{3.5+} in LnBaFe₂O₆ (Ln = Pr, Sm), *Chem. Mater.*, **36**, 6047-6052 (2024).
- Injac, S. D.; Mullens, B. G.; Denis Romero, F.; Avdeev, M.; Barnett, C.; Yuen, A. K. L.; Amano Patino, M.; Mukherjee, S.; Vaitheeswaran, G.; Singh, D. J.; Kennedy, B. J.; Shimakawa Y., Characterisation of Pb₂Rh₂O₇ and Y₂Rh₂O₇: an Unusual Case of Pyrochlore Stabilisation under High Pressure, High Temperature Synthesis Conditions, *J. Mater. Chem. C.*, **12**, 3077-3089 (2024).

International Research Center for Elements Science – Organometallic Chemistry –



<https://www.om.kuier.kyoto-u.ac.jp/>



Prof.
OHKI, Yasuhiro
(D. Eng.)



Assist. Prof.
TANIFUJI, Kazuki
(D. Sc.)



Assist. Prof. *
IZU, Hitoshi
(D. Sc.)

*New Research Field
Development Project

Res. (pt.)

FUJISAKI, Yoshie

Students

TANAKA, Kanata (D1)
MATSUOKA, Yuto (D1)
SHIMOYAMA, Sayaka (M2)
SUNAMI, Kohei (M2)

SAEED, Hassan (R. S.)
ADACHI, Taira (U. G.)
YAMAMOTO, Kodai (U. G.)

Guest Res. Assoc.

JAMIL, Mohamad Shazwan Shah (Ph.D.) Universiti Teknologi Malaysia, Malaysia, 16 July 2024–12 October 2024

Scope of Research

Developing efficient energy storage systems and innovative material production processes is a significant challenge for chemists in contributing to a sustainable society. We approach these problems using transition metal clusters, of which multiple metal atoms work together as catalysts and functional materials. Our laboratory focuses explicitly on creating a new method to synthesize the clusters with atomic precision and applying the obtained clusters to difficult chemical conversions, such as the reduction of CO₂ and N₂.

KEYWORDS

Transition Metal Clusters
Homogeneous Catalysis
Nitrogen Fixation
Bioinorganic Chemistry



Recent Selected Publications

- Izu, H.; Shimoyama, S.; Tanifugi, K.; Ohki, Y., Synthesis of Cubic [Mo₃S₄M] (M = Rh, Ir) Clusters for Borylation of C–H Bonds in Aromatic Compounds, *Organometallics*, **43**, 3251–3257 (2024).
- Matsuoka, Y.; Sakai, Y.; Izu, H.; Shimoyama, S.; Fujisawa, M.; Tada, M.; Lakshan, N. M.; Sameera, W. M. C.; Tanifugi, K.; Ohki, Y., Silylation of N₂ Catalyzed by Cubic [Mo₃S₄Ni] Clusters Bearing Mo-bound Cyclopentadienyl Ligands, *Coord. Chem. Res.*, **1**, 100001 (2024).
- Izu, H.; Bhave, D. G.; Matsuoka, Y.; Sameera, W. M. C.; Tanifugi, K.; Ohki, Y., Synthesis, Characterization, and Catalytic Activity of a Cubic [Mo₃S₄Pd] Cluster Bearing Bulky Cyclopentadienyl Ligands, *Eur. J. Inorg. Chem.*, **26**, e202300399 (2023).
- Ohki, Y.; Munakata, K.; Matsuoka, Y.; Hara, R.; Kachi, M.; Uchida, K.; Tada, M.; Cramer, R. E.; Sameera, W. M. C.; Takayama, T.; Sakai, Y.; Kuriyama, S.; Nishibayashi, Y.; Tanifugi, K., Nitrogen Reduction by the Fe Sites of Synthetic [Mo₃S₄Fe] Cubes, *Nature*, **607**, 86–90 (2022).
- Lee, C. C.; Kang, W.; Jasiewski, A. J.; Stiebrtz, M. T.; Tanifugi, K.; Ribbe, M. W.; Hu, Y., Evidence of Substrate Binding and Product Release via Belt-Sulfur Mobilization of the Nitrogenase Cofactor, *Nat. Catal.*, **5**, 443–454 (2022).

International Research Center for Elements Science – Nanophotonics –



<https://www.scl.kyoto-u.ac.jp/~opt-nano/en/index.html>



Assoc. Prof. P. D.
HIRORI, Hideki ZHANG, Zhenya
(D. Sc.) (D. Sc.)



Students

UMETANI, Hiroto (M1)
WATANABE, Yuichi (M1)

Scope of Research

Our research interest is to understand optical and quantum properties of nanometer-structured materials and to establish opto-nano science for creation of innovative functional materials. Space- and time-resolved laser spectroscopy is used to study optical properties of semiconductor quantum nano-structures and strongly correlated electron systems in low-dimensional materials. The main subjects are as follows: 1) investigation of optical properties of single nanostructures through the development of a high-resolution optical microscope, 2) ultrafast optical spectroscopy of excited states of semiconductor nanostructures, 3) photophysics of solar cell materials, and 4) engineering material properties with lights.



KEYWORDS

Femtosecond Laser Spectroscopy	Single Photon Spectroscopy
Quantum Dots	Perovskites
High Harmonic Generation	

Recent Selected Publications

- Zhang, Z.; Kanega, M.; Maruyama, K.; Kurihara, T.; Nakajima, M.; Tachizaki, T.; Sato, M.; Kanemitsu, Y.; Hirori, H., Spin Switching in $\text{Sm}_{0.7}\text{Er}_{0.3}\text{FeO}_3$ Triggered by Terahertz Magnetic-Field Pulses, *Nature Mater.*, doi: 10.1038/s41563-024-02034-4 (2024).

Nakagawa, K.; Mao, W.; Sato, S. A.; Ago, H.; Rubio, A.; Kanemitsu, Y.; Hirori, H., Hot Electron Effect in High-Order Harmonic Generation from Graphene Driven by Elliptically Polarized Light, *APL Photonics*, **9**, 076107 (2024).

Sekiguchi, F.; Narita, H.; Hirori, H.; Ono, T.; Kanemitsu, Y., Anomalous Behavior of Critical Current in a Superconducting Film Triggered by DC plus Terahertz Current, *Nature Commun.*, **15**, 4435 (2024).

Maruyama, K.; Zhang, Z.; Takumi, M.; Satoh, T.; Nakajima, M.; Kanemitsu, Y.; Hirori, H., Tesla-Class Single-Cycle Terahertz Magnetic Field Pulses Generated with a Spiral-Shaped Metal Microstructure., *Appl. Phys. Express*, **17**, 022004 (2024).

Hirori, H.; Sato, S. A.; Kanemitsu, Y., High-Order Harmonic Generation in Solids: The Role of Intraband Transitions in Extreme Nonlinear Optics, *J. Phys. Chem. Lett.*, **15**, 2184-2192 (2024).

Bioinformatics Center

– Chemical Life Science –



<https://cls.kuicr.kyoto-u.ac.jp/en/>



Prof.
OGATA, Hiroyuki
(D. Sc.)



Assoc. Prof.
ENDO, Hisashi
(D. Environmental Sc.)



Assist. Prof.
OKAZAKI, Yusuke
(D. Sc.)



Assist. Prof. *
HIKIDA, Hiroyuki
(D. Agr.)



Specially Appointed Assoc. Prof.
NECHES, Russell Young
(Ph. D.)



Specially Appointed Assist. Prof.
MENG, Lingjie
(D. Sc.)



Program-Specific Res.
SATO, Takuya
(D. Agr.)



Program-Specific Res.
JIANG, Siyu
(Ph. D.)



Program-Specific Res.
KIM, Suhyun
(Ph. D.)

Proj. Res.

OKUDA, Shihō
YAMAGISHI, Yuki

*New Research Field
Development Project

Students

YANG, Qingwei (D3)
ZHANG, Ruixuan (D3)
LIU, Wenwen (D2)
WU, Junyi (D2)
CHEN, Jingjie (D1)

ZHANG, Liwen (D1)
KIKUYA, Saki (M2)
NAGASAKA, Koumei (M2)
TANG, Wei (M2)
ZHAO, Hongda (M2)

SASAKI, Hiroto (M1)
YU, Zhaoxi (R. S.)
SHENBAGAN, Shaanaav Daniel (R. S.)
OUYANG, Chengzhou (R. S.)
NOZAWA, Tomohito (U. G.)

Guest Research Associate

DEMORY, David (Ph. D.) CNRS – BIOM Laboratory, France, 18 February 2024–6 March 2024

Scope of Research

We are interested in understanding the functioning and evolution of biological systems at varying scales from tiny microbes up to the Earth's environment, by leveraging rapidly accumulating big data in life science and bioinformatics approaches. We currently focus on 1) the evolution of viruses and their links to the origin of life, 2) microbial ecology in different ecosystems, and 3) the development of bioinformatics methods and biological knowledge resources for biomedical and industrial applications. To fuel these research activities, we take part in environmental sampling campaigns such as *Tara Oceans*. Our resources and developed tools are accessible through GenomeNet (www.genome.jp) to scientific communities and the public.



KEYWORDS

GenomeNet Bioinformatics Environmental Genomics Virology Molecular Evolution

Recent Selected Publications

- Zhang, L.; Meng, L.; Fang, Y.; Ogata, H.; Okazaki, Y., Spatiotemporal Dynamics of Giant Viruses within a Deep Freshwater Lake Reveal a Distinct Dark-Water Community, *ISME J.*, **18** (1), wrae182 (2024).
- Wu, J.; Meng, L.; Gaia, M.; Hikida, H.; Okazaki, Y.; Ogata, H., Gene Transfer Among Viruses Substantially Contributes to Gene Gain of Giant Viruses, *Mol. Biol. Evol.*, **41**, msae161 (2024).
- Kijima, S.; Hikida, H.; Delmont, T. O.; Gaia, M.; Ogata, H., Complex Genomes of Early Nucleocytopiruses Revealed by Ancient Origins of Viral Aminoacyl-tRNA Synthetases, *Mol. Biol. Evol.*, **41**, msae149 (2024).
- Zhao, H.; Meng, L.; Hikida, H.; Ogata, H., Eukaryotic Genomic Data Uncover an Extensive Host Range of Mirusviruses, *Curr. Biol.*, **34**, 2633-2643.e3 (2024).
- Ban, H.; Endo, H.; The EukBank Team; Kuwata, A.; Ogata, H., Global Distribution and Diversity of Marine Parmales, *Microbes Environ.*, **39**, ME23093 (2024).
- Nishimura, Y.; Yamada, K.; Okazaki, Y.; Ogata, H., DiGAlign: Versatile and Interactive Visualization of Sequence Alignment for Comparative Genomics. *Microbes Environ.*, **39**, ME23061 (2024).

Bioinformatics Center

– Mathematical Bioinformatics –



<https://www.bic.kyoto-u.ac.jp/takutsu/index.html>



Prof.
AKUTSU, Tatsuya
(D. Eng.)



Assoc. Prof.
TAMURA, Takeyuki
(D. Inf.)



Assist. Prof.
MATSUI, Motomu
(Ph. D.)



Guest Scholar
ZHANG, Han
(Ph. D.)



Guest Scholar
MELKMAN, Avraham
(Ph. D.)



Guest Res. Assoc.*
SUN, Liangjie
(Ph. D.)

Nankai University,
China, P. R., 15
July 2024–14
January 2025

Ben-Gurion University
of the Negev, Israel
11 November 2024–23
December 2024

*JSPS Postdoctoral Fellowships
for Research in Japan, China, P.
R., 1 November 2023–31
October 2025

Students

TAKAGI, Motoshige (D3)

OHTOMO, Masahiro (D3)

NAKASHIMA, Shogo (D3)

MU, Lixuan (D3)

SHIOTA, Koji (D3)

LIU, Chunting (D3)

MA, Yier (D3)

FUJITA, Satoki (D3)

GHAFOOR, Mamoon (D3)

YANG, Ziwei (D2)

WU, Chenyao (D2)

CUI, Yan (M2)

IWAKI, Takuma (M2)

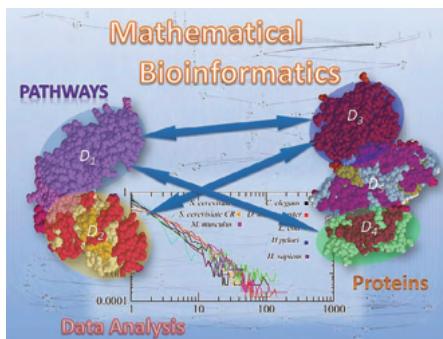
KUANG, Jinxiang (R. S.)

Scope of Research

Due to the rapid progress of genome sequencing technology, whole genome sequences of organisms ranging from bacteria to human have become available. In order to understand the meaning behind the genetic code, we have been developing algorithms and software tools for analyzing biological data based on advanced information technologies such as theory of algorithms, artificial intelligence, and machine learning. We are currently studying the following topics: systems biology, scale-free networks, metabolic networks, phylogenetic trees, neural networks, chemo-informatics, and discrete and stochastic methods for bioinformatics.

KEYWORDS

Complex Networks
Boolean Networks
Neural Networks
Metabolic Networks
Phylogenetic Trees



Recent Selected Publications

- Ghafoor, M.; Akutsu, T., On the Generative Power of ReLU Network for Generating Similar Strings, *IEEE Access*, **12**, 52603-52622 (2024).
- Pan, Q.; Zhong, J.; Akutsu, T.; Liu, Y.; Liu, R., Distributed Pinning Control: Stabilizing Large Boolean Networks Subjected to Perturbations, *IEEE Trans. Cybern.*, **54**, 7094-7102 (2024).
- Tokuhara, Y.; Akutsu, T.; Schwartz, J-M.; Nacher, J. C., A Practically Efficient Algorithm for Identifying Critical Control Proteins in Directed Probabilistic Biological Networks, *npj Syst. Biol. Appl.*, **10**, 87 (2024).
- Tamura, T., Trimming Gene Deletion Strategies for Growth-Coupled Production in Constraint-Based Metabolic Networks: TrimGdel, *IEEE ACM Trans. Comput. Biol. Bioinform.*, **20**, 1540-1549 (2023).
- Tamura, T., MetNetComp: Database for Minimal and Maximal Gene-Deletion Strategies for Growth-Coupled Production of Genome-Scale Metabolic Networks, *IEEE ACM Trans. Comput. Biol. Bioinform.*, **20**, 3748-3758 (2023).

Bioinformatics Center

– Bio-knowledge Engineering –



<https://www.bic.kyoto-u.ac.jp/pathway/index.html>



Prof.

MAMITSUKA, Hiroshi
(D. Sc.)



Senior Lect.

NGUYEN, Hao Canh
(D Knowledge Science)

Program-Specific Res.

LEE, John Christer Jun Rong (M. Mathematics)

Students

JIANG, Zhiqian (M1)
OKAMURA, Natsumi (U. G.)

Guest Res. Assoc.

GERLETTI, Pietro (M. Sc. Bioinformatics)
TÖRÖK, Dora (M. Sc.)

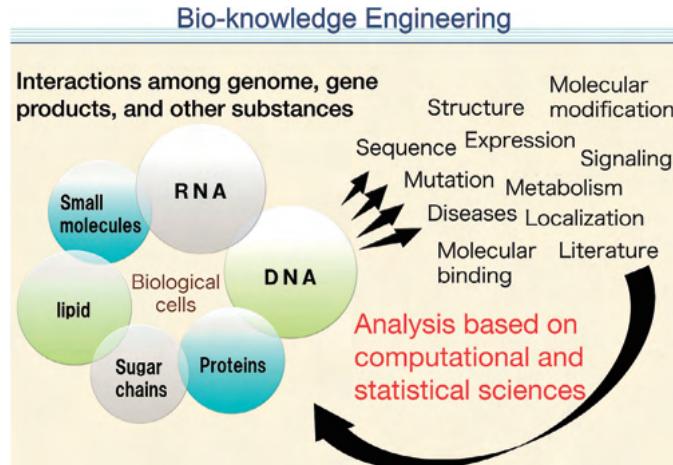
Robert Koch Institute, Germany, 4 September 2024–15 October 2024
Semmelweis University, Hungary, 13 September 2024–12 December 2024

Scope of Research

We are interested in graphs and networks in biology, chemistry, and medical sciences, including metabolic networks, protein-protein interactions and chemical compounds. We have developed original techniques in machine learning and data mining for analyzing these graphs and networks, occasionally combining with table-format datasets, such as gene expression and chemical properties. We have applied the techniques developed to real data to demonstrate the performance of the methods and find new scientific insights.

KEYWORDS

Bioinformatics Machine Learning
Data Mining Artificial Intelligence Systems Biology



Recent Selected Publications

- Cao, T.; Sun, L.; Nguyen, C. H.; Mamitsuka, H., Learning Low-Rank Tensor Cores with Probabilistic ℓ_0 -Regularized Rank Selection for Model Compression, *Proceedings of the 33rd International Joint Conference on Artificial Intelligence (IJCAI 2024)*, 3780-3788 (2024).
- Nguyen, D. A.; Nguyen, C. H.; Petschner, P.; Mamitsuka, H., SPARSE: A Sparse Hypergraph Neural Network for Learning Multiple Types of Latent Combinations to Accurately Predict Drug-drug Interactions, *Bioinformatics (Proceedings of the 30th International Conference on Intelligent Systems for Molecular Biology (ISMB 2022))*, **38(Supplement 1)**, i333-i341 (2022).
- You, R.; Qu, W.; Mamitsuka, H.; Zhu, S., DeepMHCII: A Novel Binding Core-Aware Deep Interaction Model for Accurate MHC II-peptide Binding Affinity Prediction, *Bioinformatics (Proceedings of the 30th International Conference on Intelligent Systems for Molecular Biology (ISMB 2022))*, **38(Supplement 1)**, i220-i228 (2022).
- Nguyen, C. H.; Mamitsuka, H., Learning on Hypergraphs with Sparsity, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **43(8)**, 2710-2722 (2021).
- Nguyen, D. H.; Nguyen, C. H.; Mamitsuka, H., ADAPTIVE: leArning DAta-dePendeNT, concise molecular VEctors for fast, Accurate Metabolite Identification from Tandem Mass Spectra, *Bioinformatics (Proceedings of the 27th International Conference on Intelligent Systems for Molecular Biology (ISMB/ECCB 2019))*, **35(14)**, i164-i172 (2019).



ACTIVITIES OF
INTERNATIONAL **J**OINT
USAGE/**R**ESEARCH
C

iJURC Cooperative Research Projects

(1 April 2024 ~ 31 March 2025)

FIELD-SPECIFIC RESEARCH

Field-specific research is jointly conducted with ICR researcher(s) in fields specified by ICR.

— EXPLORATORY —
Domestic 22, International 7

— ADVANCED —
Domestic 22, International 29

PROPOSAL-BASED RESEARCH

This category invites proposals from either chemists from multi-disciplinary research areas in the above field-specific research fields or other research fields.

— EXPLORATORY —
Domestic 10, International 5

— ADVANCED —
Domestic 9, International 21

PROMOTION OF COLLABORATIVE AND MULTIDISCIPLINARY RESEARCH

This category is primarily aimed at strengthening collaborations in chemistry and related fields between researchers in Japan and those around the world. This category accepts proposals in which the principle investigator will seek international research collaborations with foreign institutes that have signed a General Memorandum for Academic Cooperation and Exchange with the ICR.

Domestic 1, International 1

FACILITIES AND EQUIPMENT USE

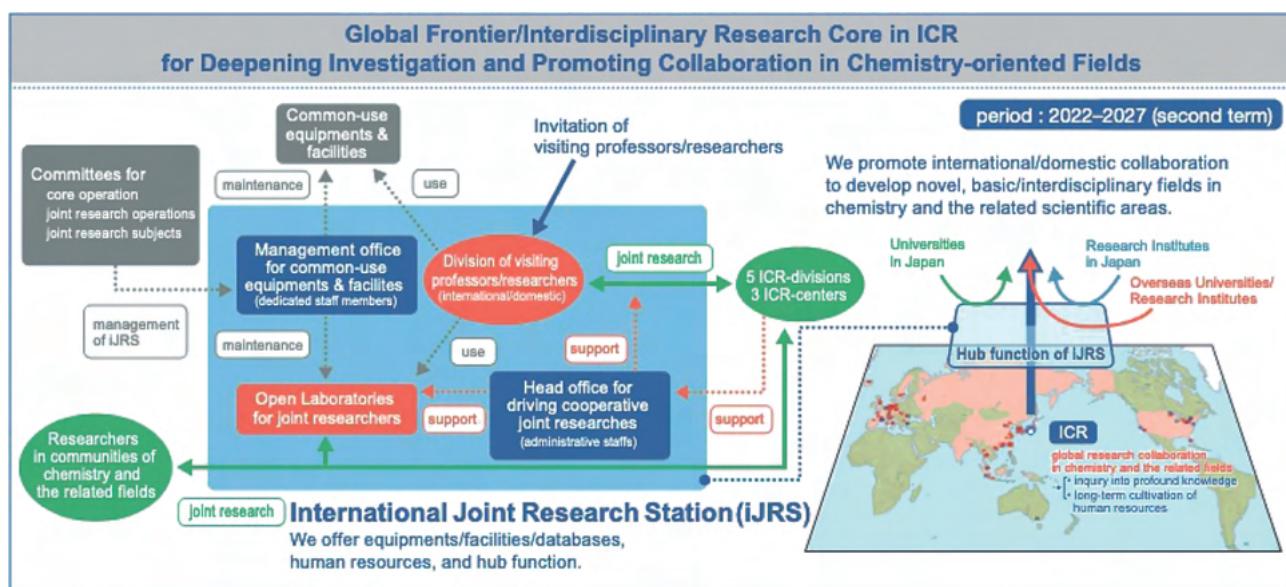
Facilities and equipment use projects are collaborative research that are mainly aimed at using ICR's shared facilities, equipment, and resources.

Domestic 6, International 4

Number of Applications 235

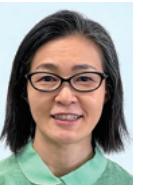
Adopted Research Projects 137 (Domestic 70, International 67)

For more details
<https://www.icr-ijurc.jp/en/>





VISITING PROFESSORS' ACTIVITIES IN ICR

	<p>Laboratory of Polymer Controlled Synthesis Professor, Department of Chemistry, School of Science & Graduate School of Advanced Science and Engineering, Hiroshima University</p> <p>Lecture at ICR Is Carbon-Carbon π Single Bond Possible?</p>		<p>Laboratory of Hydropheric Environment Analytical Chemistry Professor, Atmosphere and Ocean Research Institute, The University of Tokyo</p> <p>Lecture at ICR Urgent Marine Issues Understood Through Observation: From Climate Change to Plastic Pollution</p>
	<p>Electron Microscopy and Crystal Chemistry Team Leader, Center for Emergent Matter Science, RIKEN</p> <p>Lecture at ICR Real Space Observation of Nanometric Topological Objects and Their Dynamics</p>		<p>Laboratory of Chemical Life Science Professor, Faculty of Science and Engineering, Soka University</p> <p>Lecture at ICR Integrating Glycoscience Data to Characterize the Extended Central Dogma</p>
	<p>Laboratory of Structural Organic Chemistry Designated Associate Professor, Institute of Transformative bio-Molecules, Nagoya University</p> <p>Lecture at ICR Creation and Application of Functional Molecular Nanocarbons by Novel Modification Design</p>		<p>Laboratory of Chemistry of Molecular Biocatalysts Associate Professor, Center for Bioscience Research & Education, Utsunomiya University</p> <p>Lecture at ICR Evolutionary Origins of Steroid Hormones in Plants</p>
	<p>Laboratory of Molecular Aggregates Associate Professor, Department of Applied Chemistry, Graduate School of Engineering, Osaka Institute of Technology</p> <p>Lecture at ICR Organometallic Semiconductors for Thermoelectric Energy Harvesting</p>		<p>Laboratory of Nanophotonics Senior Researcher, Kansai Institute for Photon Science, National Institutes for Quantum Science and Technology</p> <p>Lecture at ICR Femtosecond and Attosecond Spectroscopy Based on Ultrafast Laser Sources</p>



Vis. Prof.
BODWELL, Graham James
(Ph. D.)

Laboratory of Polymer Controlled Synthesis
Professor, Department of Chemistry,
Memorial University of Newfoundland,
Canada

Lecture at ICR

Synthesis, Chemistry and Properties of
Cyclophanes with Bent Polycyclic Aromatic
Hydrocarbons



Vis. Assoc. Prof.
KHANG, Tsung Fei
(Ph. D.)

Laboratory of Bio-knowledge Engineering
Associate Professor (Statistics programme),
Institute of Mathematical Sciences, University
of Malaya, Malaysia

Lecture at ICR

Developing Statistical Machine Learning-
Based Bioinformatics Methods for Medical
Sciences



Vis. Prof.
LEI, Xiaoguang
(Ph. D.)

Laboratory of Chemical Biology

Professor, College of Chemistry and Molecular
Engineering, Peking University, China,
P.R.

Lecture at ICR

Opportunities for Merging Chemical and
Biological Synthesis



Vis. Prof.
AJAYAGHOSH, Ayyappanpillai
(Ph. D.)

Laboratory of Molecular Aggregates

Chair Professor, S.S.Bhatnagar, SRM Institute
of Science and Technology, India

Lecture at ICR

Supramolecular LCST Smart Windows



Prof. Em. /Specially Appointed Prof.
KANEMITSU, Yoshihiko (D. Eng.)



Prof. Em. /Specially Appointed Prof.
KANEHISA, Minoru (D. Sc.)



PERSONAL

Retirement

Professor FUTAKI, Shiroh
Division of Biochemistry
– Biofunctional Design-Chemistry –



On March 31, 2025, Dr. Shiroh Futaki retired from Kyoto University and was honored with the title of Professor Emeritus of Kyoto University.

Dr. Futaki graduated from the Faculty of Pharmaceutical Sciences, Kyoto University in 1983. He received his master's degree from the Graduate School of Pharmaceutical Sciences, Kyoto University in 1985 and his Ph.D. in Pharmaceutical Sciences from Kyoto University in 1989. He became a research associate and associate professor at the Faculty of Pharmaceutical Sciences, Tokushima University in 1987 and 1993, respectively. Meanwhile, he spent 16 months (1989–1991) in the United States as a Postdoctoral Associate in the Department of Biochemistry, Rockefeller University. In 1997, he became an associate professor at the Institute for Chemical Research, Kyoto University, and was promoted to full professor in 2005. In addition, from 2010 to 2015, he served as Vice Director of the Institute for Chemical Research, Kyoto University.

Dr. Futaki has made significant contributions to peptide science, particularly in the area of design and functional analysis of membrane-interacting peptides. These include: (1) discovery of cell membrane permeability of arginine-rich peptides and analysis of membrane interaction and permeation mechanism; (2) intracellular delivery using arginine-rich cell-penetrating peptides and membrane permeabilizing peptides; (3) creation of peptides that affect cell membrane curvature, lipid packing, and tension; and (4) potentials of macropinocytosis in intracellular delivery.

Dr. Futaki is best known for (1) and (2). The idea of cell-penetrating peptides has opened a new stream in chemistry-based cellular studies and drug development. He is one of the pioneers in this field of research. Initially, he was motivated to understand the mystery of membrane permeability of HIV Tat-derived cationic segment (TAT peptide). After studying the cell permeation behavior of a number of RNA-binding peptides, he realized that membrane permeability is ubiquitously shared among arginine-rich peptides. This also shed light on the fundamental role of arginines in the TAT peptide.

Dr. Futaki was also interested in analyzing the internalization mechanisms of arginine-rich cell-penetrating peptides. He reported that cellular uptake of arginine-rich peptides involves macropinocytosis, which is an actin-driven, clathrin-independent fluid-phase endocytosis. At that time, macropinocytosis was considered to be only a specific form of endocytosis associated with host infection by some viruses. However, subsequent studies by the research group

and others have revealed the importance of macropinocytosis in the cellular uptake of a wide variety of extracellular materials.

Regarding the transport of substances/materials across cell membranes, the membranes have mostly been considered as canonical lipid bilayers without lipid packing defects. However, Dr. Futaki proposes the conceptual importance of lipid packing defects for membrane translocation, which can be induced by peptide-membrane interaction. Through the development of curvature-inducing peptides, he realized that dynamic structural changes of cell membranes are accompanied by lipid packing defects. This eventually allowed membrane translocation of arginine-rich peptides. He also developed a peptide capable of delivering antibodies (IgG) into cells. The sequence was originally from a lytic peptide derived from a spider venom, but the lytic activity on the cell surface was ingeniously attenuated by the placement of negatively charged Glu residues in the potentially hydrophobic face of the peptide. However, later studies have shown that this also has activity to induce membrane ruffling, lipid packing defects and transient permeation of membranes.

As a result of the above work, he has published more than 290 original papers and 55 reviews. He has served as Principle Investigator of PRESTO, SORST and CREST programs of Japan Science and Technology Agency (JST). His honors also include Visiting Professor, Université Pierre et Marie Curie in Paris in 2010 and Honorary Member of the Hungarian Academy of Sciences since 2019. He was awarded by The Pharmaceutical Society of Japan (PSJ) Award in 2020, The Akabori Memorial Award, which is given to scientists who have made significant contributions to the advancement of research in peptide science in the world, in 2022, and The Naito Memorial Award for the advancement of science, in 2024. He served as co-chair of the 10th International Peptide Symposium/55th Japanese Peptide Symposium, which was held in Kyoto in 2018. He also held the positions of trustee of the Japanese Biochemical Society and head of the Kinki Branch, vice president and trustee of the Japanese Peptide Society, and trustee of the Pharmaceutical Society of Japan and head of the Kansai Branch.

His contribution to Kyoto University and the Institute for Chemical Research through his scientific, teaching, and administrative activities is greatly appreciated. His warm and sincere personality will remain in the hearts of his colleagues and students.



AWARDS

PUBLICATIONS

**INTERNATIONAL
RESEARCH
COLLABORATIONS**

GRANTS

THESES

AWARDS

FACULTY MEMBERS — AWARDS —

KANEHISA, Minoru
The 5th Kobayashi Award
Kobayashi Foundation
29 February 2024

KANEHISA, Minoru
Highly Cited Researcher 2024
Clarivate Analytics
19 November 2024

KANEMITSU, Yoshihiko
Outstanding Achievement Award, M&BE
The Japan Society of Applied Physics
19 September 2024

HIRANO, Toshiko
Special Distinguished Service Award on 70th Anniversary of the Association of Organic Micro-Analysts
The Association of Organic-Micro Analysts, The Japan Society for Analytical Chemistry
11 July 2024

HASHIKAWA, Yoshifumi
The 13th JACI Prize for Encouraging Young Researcher
Japan Association for Chemical Innovation, Japan
25 June 2024

HASHIKAWA, Yoshifumi
13th SPRUC Young Scientist Award
SPring-8 Users Community, Japan
6 September 2024

HASHIKAWA, Yoshifumi
The 21st Osawa Award
The Fullerenes, Nanotubes, Graphene Research Society, Japan
24 September 2024

OHMIYA, Hirohisa
JSPS Prize
Japan Society for the Promotion of Science
7 March 2024

OHMIYA, Hirohisa
Japan Academy Medal
The Japan Academy
7 March 2024

NAGAO, Kazunori
The Chemical Society of Japan Award for Young Chemists
The Chemical Society of Japan
19 March 2024

TAKAHATA, Ryo
Oral Presentation Award for Young Scientist
The 75th Divisional Meeting of Division of Colloid and Surface Chemistry
2 October 2024

TAKEKUMA, Haruka
Young Scientist Presentation Award
The 85th JSAP Autumn Meeting 2024
13 November 2024

MATSUMOTO, Kenshi
Nanoscale Horizons Award
The Society of Nano Science and Technology, 22nd Annual Meeting
23 May 2024

KINOSE, Yuji
Promortive Award of the Society of Fiber Science and Technology, Japan, Kansai
The Society of Fiber Science and Technology, Japan, Kansai
29 January 2024

YAMAGO, Shigeru
Winners of the Chemical Society of Japan Award for 2023
The Chemical Society of Japan
19 March 2024

YAMAGO, Shigeru
Aggarwal Lecture Award 2024
Cornell University
7 October 2024

TOSAKA, Masatoshi
The Adhesion Society of Japan Award
The Adhesion Society of Japan
27 June 2024

HISATOMI, Ryusuke
Funai Information Technology Award for Young Researchers
The Funai Foundation for Information Technology
18 May 2024

NARITA, Hideki
NF Foundation R&D Encouragement Award
NF Foundation
15 October 2024

KAWAGUCHI, Yoshimasa
Oral Presentation Awards
The 18th Symposium on Biorelevant Chemistry
13 September 2024

YAMAGUCHI, Shinjiro
Highly Cited Researcher 2024
Clarivate Analytics
19 November 2024

UESUGI, Motonari
Ohdang Award
The Pharmaceutical Society of Korea
22 October 2024

ZHENG, Linjie
The Okada Prize
The Oceanographic Society of Japan
1 April 2024

**WAKAMIYA, Atsushi
HAMAKAWA Award**

The 35th International Photovoltaic Science and Engineering Conference (PVSEC-35)
11 November 2024

NAKAMURA, Tomoya

The 21st Next Generation Photovoltaic Power Generation System Symposium, Innovative PV Encouragement Award
The Japan Photovoltaic Society (JSES)
28 August 2024

**WAKASUGI, Masanori and TSUKADA, Kyo
RIKEN EIHO Award**

RIKEN
12 March 2024

GOTO, Masato and SHIMAKAWA, Yuichi

48th JSPM Award for Innovative Research
Japan Society of Powder and Powder Metallurgy
21 May 2024

TANIFUJI, Kazuki

The Young Scholar Lectures of the Chemical Society of Japan
The Chemical Society of Japan
20 March 2024

TANIFUJI, Kazuki

The Young Scientists' Award, the Commendation for Science and Technology
The Minister of Education, Culture, Sports, Science and Technology
17 April 2024

— POSTER AWARDS —

NAKAMURA, Tomoya

Best Poster Presentation Award

The 21st International Symposium on the Physics of Semiconductors and Applications (ISPSA 2024)
6 June 2024

CHEN, Chien-Yu

Poster Award

The 35th International Photovoltaic Science and Engineering Conference (PVSEC-35)
15 November 2024

STUDENTS

— AWARDS —

UCHIDA, Daichi

Organic & Biomolecular Chemistry Award

The 34th Symposium on Physical Organic Chemistry
13 September 2024

TIAN, Wu

CSJ Student Presentation Award 2024

The 104th CSJ Annual Meeting (2024)
16 April 2024

TAGA, Kotaro

R5 Ginpu Award

Graduate School of Science, Kyoto University
28 February 2024

OTONARI, Kenko

Travel Fellowship

The RNA Society of Japan
2 March 2024

KURIYAMA, Masashi

37th EPS/14th IPS Travel Awards

The Japanese Peptide Society
16 April 2024

TANAKA, Kamui

Oral Presentation Awards

The 144th Annual Meeting of the Pharmaceutical Society of Japan
23 April 2024

NAKAGAWA, Yuna

Oral Presentation Awards

The 144th Annual Meeting of the Pharmaceutical Society of Japan
23 April 2024

YAMASAKI, Daisuke

Oral Presentation Awards

The 74th Kansai Regional Meeting of the Pharmaceutical Society of Japan
18 October 2024

MICHIBATA, Junya

Oral Presentation Awards

The 61st Japanese Peptide Symposium
31 October 2024

ARAKI, Taisuke

Analytical Sciences Hot Article Award

The Japan Society for Analytical Chemistry
15 September 2024

OKA, Takayuki

Best Presentation Award

JSAP Molecular Electronics and Bioelectronics
26 September 2024

HARATA, Fuyuki

Innovative PV Encouragement Award

The 21st Next Generation Photovoltaic Power Generation System Symposium
28 August 2024

IIHOSHI, Makoto

CSJ Student Presentation Award 2024

The 104th CSJ Annual Meeting
16 April 2024

SHEN, Yufan

Young Scientist Presentation Award

The 56th JASP Spring Meeting
17 September 2024

SHIOTA, Koji

ICR Oral Award

ICR Graduate Student Presentations AY2023
22 February 2024

— PAPER AWARD —

UEKI, Ryuta

GJ The Best Student Paper Award of 2024

The 71st Annual Meeting of the Geochemical Society of Japan
19 September 2024

— POSTER AWARDS —

WATANABE, Koh

Chemistry Letters Young Researcher Award

The 58th Yuuki Hannou Wakate no Kai

20 June 2024

OTA, Kenji

Chemistry Letters Young Researcher Award

8th UK-Japan Catalysis Meeting

26 September 2024

LEE, Hyunji

Young Best Presentation Award

The Society of Nano Science and Technology, 22nd Annual Meeting

24 May 2024

OKAHARA, Ryouta

ICR Poster Award

ICR Graduate Student Presentations AY2023

22 February 2024

OKAJIMA, Kazuki

Poster Presentation Awards for Young Researchers

Quantum Innovation 2024

8 November 2024

YOSHIE, Syunsuke

ICR Poster Award

ICR Graduate Student Presentations AY2023

22 February 2024

IDA, Naka

Poster Presentation Awards

The 144th Annual Meeting of the Pharmaceutical Society of Japan

23 April 2024

KIYOKAWA, Megumi

Poster Presentation Awards

The 61st Japanese Peptide Symposium

31 October 2024

KIYOKAWA, Megumi

Poster Presentation Awards

The Gene-Delivery Kumamoto Conference 2024

15 November 2024

KIKKAWA, Ayumi

Poster Presentation Awards

The Gene-Delivery Kumamoto Conference 2024

15 November 2024

SATO, Hiroki

ICEL2024 Poster Award

14th International Conference on Electroluminescence and Opto-electronic Devices

15 November 2024

YASUDA, Yuka

ICEL2024 Poster Award

14th International Conference on Electroluminescence and Opto-electronic Devices, Royal Society of Chemistry

15 November 2024

YASUDA, Yuka

A-COE 2024 Best Poster Presentation Award

The 16th Asian Conference on Organic Electronics

22 November 2024

OKA, Takayuki
Outstanding Poster Award

The Japan Society for Analytical Chemistry, Kinki Branch

6 August 2024

OONUKI, Tomoya
Special Poster Award

The Japan Society for Analytical Chemistry, Kinki Branch

6 August 2024

MIYAKE, Yuki
ICR Poster Award

ICR Graduate Student Presentations AY2023

22 February 2024

ADACHI, Yuta
Award for Excellence
98th Materials_Tailoring_Committee

3 August 2024

HARATA, Fuyuki
Poster Award

The 35th International Photovoltaic Science and Engineering Conference (PVSEC-35)

15 November 2024

SEKOGUCHI, Maho
Excellent Poster Award

The Japanese Society of Microscopy 2024 Young Scientist Symposium

17 October 2024

SAITO, Ryohei
ICR Poster Award

ICR Graduate Student Presentations AY2023

22 February 2024

WU, Beiling
Poster Prize

The 1st Resource Circulation Co-Creation Conference 2024

17 June 2024

ISERI, Kenta
Poster Prize

The 44th Young Researchers' Seminar on Organic Synthesis

1 August 2024

ISERI, Kenta
Poster Prize

The 74th Conference of Japan Society of Coordination Chemistry

19 September 2024

WATANABE, Rei
Ceramic Society of Japan Distinguished Poster Award

The Ceramic Society of Japan Annual Meeting 2024

16 May 2024

XIE, Lingling
Poster Prize of iWOE-30 2024

30th International Workshop on Oxide Electronics

30 September 2024

FUJI, Sota
Best Poster Prize

25th Quantum Science and Engineering Center (QSEC) Public Symposium

18 October 2025

TANAKA, Kanata
ICR Poster Award
ICR Graduate Student Presentations AY2023
22 February 2024

TANAKA, Kanata
Dalton Transactions Award
The 74th Conference of Japan Society of Coordination Chemistry
19 September 2024

DAIKOKU, Yusuke
ICR Poster Award
ICR Graduate Student Presentations AY2023
22 February 2024

ZHANG, Ruixuan
Best Archaeal and Eukaryotic Viruses Poster Presentation
Viruses of Microbes 2024
19 July 2024

PUBLICATIONS

DIVISION OF SYNTHETIC CHEMISTRY

— Organoelement Chemistry —

Kubo, N.; Yamauchi, M.; Yamada, H.; Masuo, S., Self-Assembly Behavior of Perylene Bisimide Derivatives on a Perovskite Nanocrystal Surface, *J. Phys. Chem. C*, **128**(11), 4648-4654 (2024).

Yanagisawa, T.; Mizuhata, Y.; Tokitoh, N., Small Molecule Activation Based on Novel Heavier Group 13/15 Interelement Compounds, λ^3,λ^3 -Phosphanylalumanes, *Bull. Chem. Soc. Jpn.*, **97**(1), bcsj.20230186 (2024).

Tsuji, S.; Tokitoh, N.; Yamada, H.; Mizuhata, Y., The Reduction of Metallabenzenes: Different Scenarios Highly Dependent on the Central Group 14 Elements, Si vs. Ge, *Chem. Asian J.*, **19**(2), e202300945 (2024).

Yamauchi, M.; Nakatsukasa, K.; Kubo, N.; Yamada, H.; Masuo, S., One-Dimensionally Arranged Quantum-Dot Superstructures Guided by a Supramolecular Polymer Template, *Angew. Chem. Int. Ed.*, **63**(1), e202314329 (2024).

Tsuji, S.; Tokitoh, N.; Yamada, H.; Mizuhata, Y., Potassium 2-Germanaphthalenide: An Isolable Polycyclic System of Germanium-Incorporated Anionic Benzenoid, *Inorg. Chem. Front.*, **11**(2), 400-408 (2024).

Yukimoto, M.; Kanda, K.; Aoki, T.; Mizuhata, Y.; Tokitoh, N., Synthesis of 1-Adamantylaminogermylene and Its Chalcogenation Reactions, *Eur. J. Inorg. Chem.*, **27**(7), e202300663 (2024).

Shioya, N.; Fang, T.; Fujii, M.; Fujiwara, R.; Hayashi, H.; Yamada, H.; Hasegawa, T., Quantitative Analysis of Photochemical Reactions in Pentacene Precursor Films, *Langmuir*, **40**(1), 1137-1142 (2024).

Chen, M.; Duan, Y.; Liu, X.; Zhan, Q.; Hayashi, H.; Matsuo, K.; Yamada, H.; Gao, G.; Zheng, Y.; Zhang, L., Excellent π -Bowl Semiconductors Based on C_{70} Subunit, *CCS Chem.*, **6**(2), 353-364 (2024).

Kayahara, E.; Mizuhata, Y.; Yamago, S., Enhanced Host–Guest Interaction between [10]Cycloparaphenylenes ([10]CPP) and [5]CPP by Cationic Charges, *Beilstein J. Org. Chem.*, **20**, 436-444 (2024).

Okba, A.; Simón Marqués, P.; Matsuo, K.; Aratani, N.; Yamada, H.; Rapenne, G.; Kammerer, C., Synthesis of π -Conjugated Polycyclic Compounds by Late-Stage Extrusion of Chalcogen Fragments, *Beilstein J. Org. Chem.*, **20**, 287-305 (2024).

Kasahara, S.; Ohtomo, M.; Hayashi, R.; Fushimi, N.; Yamaguchi, J.; Matsuo, K.; Aratani, N.; Sato, S.; Hayashi, H.; Yamada, H., On-Surface Smooth Polymerization of 5,11-Bianthryl-Anthradithiophene, *Chem. Lett.*, **53**(3), upae036 (2024).

Kubo, N.; Yamauchi, M.; Yamada, H.; Masuo, S., Self-Assembly Behavior of Perylene Bisimide Derivatives on a Perovskite Nanocrystal Surface, *J. Phys. Chem. C*, **128**(11), 4648-4654 (2024).

Murakami, H.; Iwabuchi, H.; Asari, M.; Yamada, H.; Kuzuhara, D., Bowl-Shaped Kekulene Analogues: Cycloarenes with two Five-Membered Rings, *Chem. Eur. J.*, **30**(45), e202401828 (2024).

Suzuki, W.; Mizuhata, Y.; Tokitoh, N.; Teranishi, T., Dioxygen Activation by Gold(I)-Distorted Porphyrin Dinuclear Complexes, *Chem. Eur. J.*, **30**(48), e202401242 (2024).

Saito, R.; Isozaki, K.; Mizuhata, Y.; Nakamura, M., Synthesis of N_2 -Type Superatomic Molecules, *J. Am. Chem. Soc.*, **146**(30), 20930-20936 (2024).

Yu, M.; Wan, Z.-C.; Song, S.-W.; Yang, Z.-Y.; Suzuki, M.; Yamada, H., Dual-Benefit Strategy for Developing an Efficient Photodetector with Prompt Response to UV-near IR Radiations: *In Situ* Synthesis and Crystallization through a Simple One-Step Annealing, *J. Mater. Chem. A*, **12**(30), 19288-19297 (2024).

Tsuji, S.; Nishino, R.; Tokitoh, N.; Yamada, H.; Mizuhata, Y., Reaction of Potassium Germabenzenide with Benzil: Unusual Ring Opening to Form a Unique Polycyclic Penta-Coordinated Germanate, *Main Gr. Met. Chem.*, **47**(1), 20230031 (2024).

Dong, Y.; Wu, F.; Zhang, T.; Qiu, F.; Pan, J.; Mizuhata, Y.; Yamada, H.; Teranishi, T.; Xue, S., Synthesis of π -Ring-Fused Porphyrin(2.1.1.1)s and Their Rh(I) Complexes, *Inorg. Chem.*, **63**(33), 15510-15515 (2024).

Suzuki, W.; Takahata, R.; Mizuhata, Y.; Tokitoh, N.; Xue, S.; Teranishi, T., Quantitative Analysis of Air-Oxidation Reactions of Thiolate-Protected Gold Nanoclusters, *Chem. Sci.*, **15**(45), 18896-18902 (2024).

Uchida, D.; Yukimoto, M.; Tokitoh, N.; Yamada, H.; Mizuhata, Y., A Unique Synthetic Route toward a 1,2-Dihydrodigermene via Formal α -Elimination of Bromo and Silyl Groups from a Bromo(Phenylsilyl)Germane, *Z. Anorg. Allg. Chem.*, e202400131 (2024).

Hayashi, H.; Zhu, J.; Minamino, N.; Murakami, Y.; Kasahara, S.; Matsuo, K.; Aratani, N.; Yamada, H., Ethynylene-Bridged Pentacene Trimer and Tetramer Prepared Through Unexpected Oligomerization and Their Subsequent Thermal Conversions, *Eur. J. Org. Chem.*, e202400770 (2024).

Xue, S.; Lv, X.; Dong, Y.; Zhang, T.; Qiu, F.; Pan, J.; Kuzuhara, D.; Yamada, H.; Aratani, N., Synthesis of Hetero-Trimetal Porphyrin Nanobelts, *Chem. Eur. J.*, e202402680 (2024).

Kayahara, E.; Hirata, S.; Mizuhata, Y.; Yasuda, Y.; Kusakabe, Y.; Kaji, H.; Yamago, S., Synthesis of π -Extended [1.1]Paracyclophanes, [1.1][n]PCP ($n = 2, 3$, and 4), and Their Through-Space Conjugation, *Chem. Eur. J.*, e202402225 (2024).

— Structural Organic Chemistry —

Hashikawa, Y.; Murata, Y., Direct Through-Space Substituent- π Interactions in Noncovalent Arene–Fullerene Assemblies, *Chem. Asian J.*, **19**(8), e202400075 (2024).

- Hashikawa, Y.; Sadai, S.; Murata, Y., Molecular CO₂ Storage: State of a Single-Molecule Gas, *ACS Phys. Chem. Au*, **4**(2), 143-147 (2024).
- Hashikawa, Y.; Okamoto, S.; Murata, Y., Synthesis of Inter-[60]Fullerene Conjugates with Inherent Chirality, *Nat. Commun.*, **15**(1), 514 (2024).
- Hashikawa, Y.; Murata, Y., Cobalt-Functionalized Open-[60]Fullerenes, *Organometallics*, **43**(3), 227-232 (2024).
- Okamoto, S.; Hashikawa, Y.; Murata, Y., Solution Dynamics of Covalent Open-[60]Fullerene Dimers, *ChemPlusChem*, **89**(9), e202400260 (2024).
- Huang, G.; Sadai, S.; Hashikawa, Y.; Murata, Y., Reactions of Diaminonaphthalenes with a Cage-Opened C₆₀ Derivative, *Asian J. Org. Chem.*, **13**(5), e202300634 (2024).
- Hashikawa, Y.; Sadai, S.; Ikemoto, Y.; Murata, Y., Water Adsorption on π -Surfaces of Open-Fullerenes, *J. Phys. Chem. A*, **128**(14), 2782-2788 (2024).
- Hashikawa, Y.; Sadai, S.; Ikemoto, Y.; Murata, Y., Open-[60]Fullerenols with Water Adsorbed Both Inside and Outside, *Chem. Commun.*, **60**(10), 1261-1264 (2024).
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- Okamoto, S.; Hashikawa, Y.; Murata, Y., Phosphine-Mediated Dimerization of Open-[60]Fullerenes, *Chem. Asian J.*, **19**(11), e202400142 (2024).
- Zhang, Z.; Zhu, H.; Gu, J.; Shi, H.; Hirose, T.; Jiang, L.; Zhu, Y.; Zhong, D.; Wang, J., Nonplanar Nanographene with a Large Conjugated π -Surface, *J. Am. Chem. Soc.*, **146**(35), 24681-24688 (2024).
- Nakazono, R.; Hu, W.; Hirose, T.; Amaya, T., Synthesis and Characterization of a Cyclic Trimer of a Chiral Spirosilabifluorene, *Chem. Eur. J.*, **30**(45), e202401343 (2024).
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INTERNATIONAL RESEARCH COLLABORATIONS

[Australia]

Monash University, Monash Biomedicine Discovery Institute

RMIT University, School of Engineering

[China, P. R.]

Chinese Academy of Medical Sciences and Peking Union Medical College, Institute of Medicinal Plant Development

Chinese Academy of Science (CAS), Changchun Institute of Applied Chemistry

Chinese Academy of Sciences (CAS), Shanghai Institute of Optics and Fine Mechanics (SIOM)

Fudan University, Institute of Science and Technology for Brain-Inspired Intelligence and MOE Frontiers Center for Brain Science

Fudan University, School of Pharmacy

Jiangsu University, School of Chemistry and Chemical Engineering

Peking University, College of Life Sciences

Qingdao Agricultural University, College of Agronomy

Sun Yat-Sen University, School of Chemistry

Sun Yat-Sen University, School of Marine Sciences

South China University of Technology, School of Computer Science and Engineering

Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai)

ShanghaiTech University, School of Information Science and Technology

Tsinghua University, Department of Chemistry

Xiamen University, College of Ocean and Earth Sciences

[Czech Republic]

The Czech Academy of Sciences, Institute of Hydrobiology

[France]

Centre National de la Recherche Scientifique

French Alternative Energies and Atomic Energy Commission (CEA), Laboratoire de Physiologie Cellulaire & Végétale

Université de Strasbourg, Institut de Physique et Chimie des Matériaux (IPCMS)

Université de Toulouse, CEMES

[Germany]

European Molecular Biology Laboratory

Julius-Maximilians-Universität Würzburg, Institut für Anorganische Chemie and Institute for Sustainable Chemistry & Catalysis with Boron

Max Planck Institute, Max Planck Institute for the Structure and Dynamics of Matter

University of Potsdam, Institute for Physics and Astronomy

Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg (ZSW)

[India]

CSIR-Central Leather Research Institute

Indian Institute of Science, Materials Research Centre

[Italy]

University of Naples Federico II, Department of Chemical Sciences

[Korea, R.]

Pohang University of Science and Technology, Department of Chemistry

Sungkyunkwan University, Department of Energy Science

Ulsan National Institute of Science and Technology, UNIST, Department of Chemistry

[Lithuania]

Kaunas University of Technology, Department of Organic Chemistry

Vilnius University, Institute of Chemical Physics

[Norway]

University of Bergen, Department of Biology

[Pakistan]

Quaid-i-Azam University, Department of Mathematics

[Singapore]

Nanyang Technological University, School of Chemistry, Chemical Engineering and Biotechnology

[Spain]

Universidad de Valencia, Instituto de Ciencia de los Materiales (ICMUV)

University Jaume I, Institute of Advanced Materials (INAM)

University of the Basque Country, Polymat

[Sri Lanka]

University of Colombo, Department of Chemistry

[Switzerland]

University of Zurich, Department of Plant and Microbial Biology

[Taiwan]

National Taiwan University, Center for Condensed Matter Sciences

National Yang Ming Chiao Tung University, Department of Materials Science and Engineering

[Thailand]

Chiang Mai University, Department of Chemistry, Faculty of Science

[the U.K.]

University of Oxford, Department of Physics

[the U.S.]

Columbia University, Department of Chemistry

Lawrence Berkeley National Laboratory, Molecular Biophysics and Integrated Bioimaging

University of California, Department of Botany and Plant Sciences

University of Denver, Department of Physics and Astronomy

[Vietnam]

AMROMICS JSC

Hanoi University of Civil Engineering, Faculty of Information Technology

Le Quy Don Technical University, Center for Applied Mathematics and Informatics

VNU University of Engineering and Technology, Faculty of Information Technology

*The list shows the institutions with which papers are co-authored.

GRANTS

(1 April 2023 ~ 31 March 2024)

RESEARCH AND EDUCATION FUNDING

/total 3 projects

International Joint Usage / Research Center : Global Frontier and Interdisciplinary Research Core for Deepening Investigation and Promoting Collaboration in Chemistry-oriented Fields

Integrated Research Consortium on Chemical Science

Center for Spintronics Research Network

COMMISSIONED RESEARCH

/total 59 projects

— MEXT —

Quantum Leap Flagship Program (MEXT Q-LEAP)
(3 projects)

Advanced Research Infrastructure for Materials and Nanotechnology in Japan

Initiative to Establish Next-generation Novel Integrated Circuits Centers (X-NICS)

Project for Promoting Public Utilization of Advanced Research Infrastructure

— METI —

Go-Tech Project, The Small and Medium Enterprise Agency

— JSPS —

Core-to-Core Program (2 projects)

— JST —

A-STEP (Adaptable and Seamless Technology Transfer Program through Targetdriven R&D) (2 projects)

Strategic Basic Research Programs, CREST (Core Research for Evolutional Science and Technology) (8 projects)

Strategic Basic Research Programs, PRESTO (Preliminary Research for Embryonic Science and Technology) (9 projects)

Strategic Basic Research Programs, ACT-X (2 projects)

JST-Mirai Program (2 projects)

FOREST (Fusion Oriented Research for Disruptive Science and Technology) (5 projects)

Database Integration Coordination Program

SICORP (Strategic International Collaborative Research Program)

Sakura Science Exchange Program

ASPIRE (Adopting Sustainable Partnerships for Innovative Research Ecosystem) (2 projects)

— AMED —

P-PROMOTE (Project for Promotion of Cancer Research and Therapeutic Evolution)

Research on Development of New Drugs

Project Promoting Support for Drug Discovery

Program on R&D of New Generation Vaccine Including New Modality Application

— NEDO —

Development of Technologies to Promote Photovoltaic Power Generation as a Primary Power Source

Collaborative Industry-Academia-Government research and Development Project for Solving Common Challenges Toward Dramatically Expanded Use of Fuel Cells and Related Equipment

NEDO Feasibility Study Program (3 projects)

Intensive Support Program for Young Promising Researchers

Green Innovation Fund Projects

— ERCA —

ERTDF (Environment Research and Technology Development Fund)

SIP (Cross-ministerial Strategic Innovation Promotion Program)

— OTHERS —

4 projects

GRANTS-IN-AID FOR SCIENTIFIC RESEARCH

/total 138 projects

Grant-in-Aid for Specially Promoted Research

Grant-in-Aid for Scientific Research on Innovative Areas
(Research in a Proposed Research Area)

Grant-in-Aid for Transformative Research Areas (A)
(6 projects)

Grant-in-Aid for Transformative Research Areas (B)

Grant-in-Aid for Scientific Research (S)
(6 projects)

Grant-in-Aid for Scientific Research (A)
(9 projects)

Grant-in-Aid for Scientific Research (B)
(25 projects)

Grant-in-Aid for Scientific Research (C)
(14 projects)

Grant-in-Aid for Challenging Research (Pioneering)
(5 projects)

Grant-in-Aid for Challenging Research (Exploratory)
(9 projects)

Grant-in-Aid for Early-Career Scientists
(26 projects)

Grant-in-Aid for Research Activity Start-up
(4 projects)

Grant-in-Aid for Encouragement of Scientists

Grant-in-Aid for Publication of Scientific Research Results
(Databases)

Grant-in-Aid for JSPS Fellows
(28 projects)

Fund for the Promotion of Joint International Research
(International Collaborative Research)

COLLABORATIVE RESEARCH

/total 47 projects

DONATIONS

/total 55

Abbreviations and Acronyms

AMED: Advanced Research and Development Programs for Medical Innovation
ERCA: Environmental Restoration and Conservation Agency
JSPS: Japan Society for the Promotion of Science
JST: Japan Science and Technology Agency
METI: Ministry of Economy, Trade and Industry
MEXT: Ministry of Education, Culture, Sports, Science and Technology
NEDO: New Energy Development Organization

THESES

TSUJI, Shingo D. Sc., Kyoto University “Synthetic Studies on Aryl Anions Containing a Heavier Group 14 Element as a Skeletal Atom” Supervisor: Assoc. Prof. MIZUHATA, Yoshiyuki 25 March 2024	KUSAKABE, Yu D. Eng., Kyoto University “Management of Excited States for Efficient Exciton-Photon Conversion in Purely Organic Systems” Supervisor: Prof. KAJI, Hironori 25 March 2024
HUANG, Guanglin D. Eng., Kyoto University “Synthesis and Properties of Open-Cage C ₆₀ Derivatives Encapsulating Polar Molecules” Supervisor: Prof. MURATA, Yasujiro 25 March 2024	UEKI, Ryuta D. Sc., Kyoto University “Marine Geochemistry of Zirconium, Niobium, Hafnium, and Tantalum in the Subarctic North Pacific and Indian Oceans” Supervisor: Prof. SOHRIN, Yoshiki 25 March 2024
SATO, Yukiya D. Pharm. Sc., Kyoto University Supervisor: Prof. OHMIYA, Hirohisa 25 March 2024	ZHU, Mengshan D. Agr., Kyoto University “Identification and Characterization of Proteins Involved in Extracellular Membrane Vesicle Production of <i>Shewanella vesiculosa</i> HM13” Supervisor: Prof. KURIHARA, Tatsuo 24 September 2024
SHIBUTANI, Shotaro D. Pharm. Sc., Kyoto University Supervisor: Prof. OHMIYA, Hirohisa 25 March 2024	LU, Siming D. Eng., Kyoto University “Iron-Catalyzed Suzuki-Miyaura Cross-Coupling Reactions Toward Selective Synthesis of Alkynes and Allenes via Propargylic/Allenyl Radical Species” Supervisor: Prof. NAKAMURA, Masaharu 25 November 2024
CHIGA, Yuki D. Sc., Kyoto University “Structural and Photofunctional Control of Gold Clusters Using Organic Ligands” Supervisor: Prof. TERANISHI, Toshiharu 23 January 2024	CHO, Kenichi D. Sc., Kyoto University “Luminescence Fine Structure and Exciton-Phonon Interactions in Single Halide Perovskite Nanocrystals” Supervisor: Prof. KANEMITSU, Yoshihiko 25 March 2024
SO, Frederick Tze Kit D. Eng., Kyoto University “Development of Ultrasmall Diamond Sensors with Detonation Nanodiamonds” Supervisor: Prof. MIZUOCHI, Norikazu 25 March 2024	NAKAGAWA, Kotaro D. Sc., Kyoto University “Impact of Intraband Transitions in High Order Harmonic Generation from Solids” Supervisor: Prof. KANEMITSU, Yoshihiko 25 March 2024
KOBAYASHI, Yuta D. Sc., Kyoto University “Study on Magnetotransport Properties of Chiral Antiferromagnets” Supervisor: Prof. ONO, Teruo 25 March 2024	ZHANG, Zhenya D. Sc., Kyoto University “Nonlinear Coherent Spin Dynamics in Antiferromagnets Initiated by Tesla-Class Terahertz Magnetic Fields” Supervisor: Assoc. Prof. HIRORI, Hideki 24 September 2024
SINGH, Vaishav Pal D. Med. Sc., Kyoto University “Chemoproteomic Identification of Spermidine-Binding Proteins and Antitumor-Immunity Activators” Supervisor: Prof. UESUGI, Motonari 24 September 2024	MENG, Lingjie D. Sc., Kyoto University “Unveiling the Global Diversity and Evolution of Giant Viruses Through Ocean Metagenomics” Supervisor: Prof. OGATA, Hiroyuki 25 March 2024
TOH, Kohei D. Med. Sc., Kyoto University “Chemoproteomic Identification of Blue-Light-Damaged Proteins” Supervisor: Prof. UESUGI, Motonari 25 March 2024	

KANEKO, Hiroto
D. Sc., Kyoto University
“Application of Statistical Learning to Global-Scale Marine
Microbial Ecology”
Supervisor: Prof. OGATA, Hiroyuki
25 March 2024

BAN, Hiroki
D. Sc., Kyoto University
“Unveiling the Evolution and Ecology of Parmales Through Omics
Data”
Supervisor: Prof. OGATA, Hiroyuki
24 May 2024

SHIOTA, Koji
D. Inf., Kyoto University
“Machine Learning-Based Methods for Predicting the Most
Stable Conformation and Binding Affinity of Protein-Drug
Complexes”
Supervisor: Prof. AKUTSU, Tatsuya
24 September 2024



**THE 124TH
ICR ANNUAL
SYMPOSIUM**

**SEMINARS /
MEETINGS AND
SYMPOSIA**

THE 124TH ICR ANNUAL SYMPOSIUM

— ICR Award for Young Scientist —

SINGH, Vaibhav Pal (Chemical Biology)

“Chemoproteomic Identification of Spermidine-Binding Proteins and Antitumor-Immunity Activators”

— ICR Award for Graduate Students —

SHEN, Yufan (Advanced Solid State Chemistry)

“Ferroelectric Freestanding Hafnia Membranes with Metastable Rhombohedral Structure down to 1-nm-thick”

ZHAO, Hongda (Chemical Life Science)

“Eukaryotic Genomic Data Uncover an Extensive Host Range of Mirusviruses”

ISERI, Kenta (Synthetic Organotransformation)

“Dual Catalysis of Gold Nanoclusters: Photocatalytic Cross-Dehydrogenative Coupling by Cooperation of Superatomic Core and Molecularly Modified Staples”

— ICR Grants for Promoting Integrated Research —

YAMAUCHI, Mitsuaki (Organoelement Chemistry)

“Correlation between Molecular Orientation and Device Performance in Benzoporphyrin Supramolecular Thin Films”

HIGAKI, Tatsuya (Organometallic Chemistry); TAKAHATA, Ryo (Advanced Inorganic Synthesis)

“Atomically Precise Structure Determination of Iron-Group Metal Nanoclusters Using Synchrotron X-ray Radiation”

NAKAGAWA, Yuka (Synthetic Organotransformation)

“Development of Direct and Precision Conversion Reactions for Lignocellulosic Biomass via Organic Photocatalysis”

MORIOKA, Naoya (Inorganic Photonics Materials)

“Developing Foundational Technology for SiC-Based Spin Quantum Devices with High Efficiency”

— Oral Presentation —

YAMADA, Takumi (Advanced Inorganic Synthesis)

“Photoluminescence Imaging Spectroscopy of Halide Perovskites”

SEMINARS / MEETINGS AND SYMPOSIA

SEMINARS

Number of Seminars 91
(Japanese speaker 33, Foreign speaker 58)

MEETINGS AND SYMPOSIA

Atomic Level Characterizations for New Materials and Devices in Winter 2024 (ALC-W 2024)
Organized by ONO, Teruo
17-20 January 2024 (Hokkaido, Japan)

The 3rd Kyoto-SKKU Perovskite International Research Collaboration Center (PIRCC) Workshop
Organized by WAKAMIYA, Atsushi
27 February 2024 (Kyoto, Japan)

The 2nd Mid-Infrared Laser Technology Committee Meeting
Organized by TOKITA, Shigeki
29 February 2024 (Nagoya, Japan)

ACBI Istanbul Meeting 2024
Organized by UESUGI, Motonari
3 March 2024 (Istanbul, Turkey)

Nanomaterials Chemistry Workshop 2024
Organized by TERANISHI, Toshiharu
4-5 April 2024 (Kyoto, Japan)

The 58th Yuuki Hannou Wakate no Kai
Organized by OHMIYA, Hirohisa
19-21 June 2024 (Shiga, Japan)

Workshop for Emerging Technologies and Perspectives in Lake Microbial Ecology
Organized by OKAZAKI, Yusuke
2 August 2024 (Kyoto, Japan)

Integrated Research Consortium on Chemical Sciences (IRCCS)-GTR-Interdisciplinary Workshop (Student Exchange)
Organized by WAKAMIYA, Atsushi
5-6 August 2024 (Kyoto, Japan)

The International Conference on New Frontiers in Advanced Magnetism (NFAM2024)
Organized by HIRORI, Hideki
5-9 August 2024 (Sapporo, Japan)

The 66th Symposium of the Chemistry on Natural Products
Organized by UESUGI, Motonari
4-6 September 2024 (Kyoto, Japan)

The 3rd Mid-Infrared Laser Technology Committee Meeting
Organized by TOKITA, Shigeki
13 September 2024 (Sapporo, Japan)

8th UK-Japan Catalysis Meeting
Organized by OHMIYA, Hirohisa
25-26 September 2024 (Kyoto, Japan)

The 19th JSAP Student Research Meeting on Organic Devices
Organized by OKA, Takayuki
1-3 October 2024 (Kyoto, Japan)

Japan-Bordeaux Joint Seminar on Oligoacene-Based Functional Materials
Organized by YAMADA, Hiroko
21 October 2024 (Kyoto, Japan)

The 11th Next-Generation Fiber Laser Technology Committee Meeting
Organized by TOKITA, Shigeki
25 October 2024 (Kyoto, Japan)

Low-Energy Electron Scattering for Nucleon and Exotic Nuclei (LEES2024)
Organized by TSUKADA, Kyo
28 October - 1 November 2024 (Sendai, Japan)

Wageningen University-Kyoto University Joint Meeing
Organized by KURIHARA, Tatsuo
29 October 2024 (Kyoto, Japan)

7th ICAPPS 2024
Organized by UESUGI, Motonari
31 October - 2 November 2024 (Yogyakarta, Indonesia)

The 3rd KU-UNIST Joint Symposium on Chemistry and Materials Science
Organized by OHKI, Yasuhiro
7-8 November 2024 (Kyoto, Japan)

14th International Conference on Electroluminescence and Optoelectronic Devices (ICEL 2024)
Organized by KAJI, Hironori and HIROSE, Takashi
12-15 November 2024 (Kyoto, Japan)

The 67th Symposium of the Young Coordination Chemists' Association of Japan in Kinki Branch
Organized by IZU, Hitoshi
16 November 2024 (Kyoto, Japan)

International Symposium on Natural Products Chemistry and Chemical Biology 2024
Organized by UESUGI, Motonari
22-25 November 2024 (Hangzhou, China)

The 8th International Conference on Computational Biology and Bioinformatics
Organized by AKUTSU, Tatsuya
28-30 November 2024 (Kyoto, Japan)

Institute for
Chemical
Research

Kyoto University