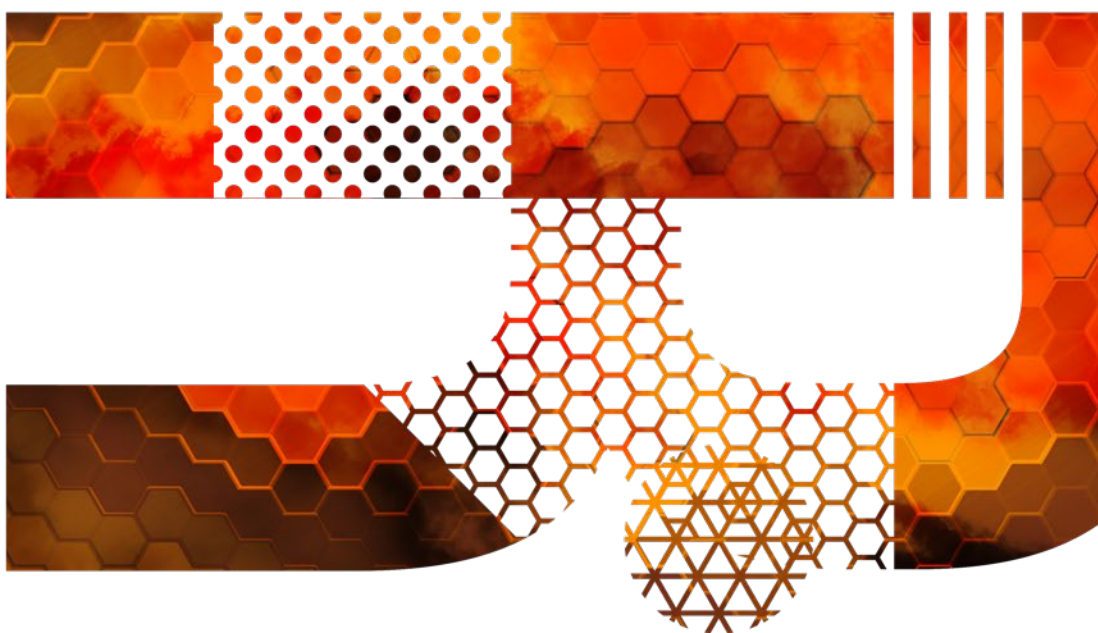




ICR2019



INSTITUTE FOR CHEMICAL RESEARCH KYOTO UNIVERSITY

2019

DIVISION OF SYNTHETIC CHEMISTRY

DIVISION OF MATERIALS CHEMISTRY

DIVISION OF BIOCHEMISTRY

DIVISION OF ENVIRONMENTAL CHEMISTRY

DIVISION OF MULTIDISCIPLINARY CHEMISTRY

ADVANCED RESEARCH CENTER FOR BEAM SCIENCE

INTERNATIONAL RESEARCH CENTER FOR ELEMENTS SCIENCE

BIOINFORMATICS CENTER

Preface



Director
TSUJII, Yoshinobu

Institute for Chemical Research (ICR) was founded in 1926 as the first research institute of Kyoto University with the founding vision to “Excel in the Investigation of Basic Principles of Chemistry and Their Applications.” ICR is a successor to the Specialized Center for Chemical Research established at the College of Science of Kyoto Imperial University in 1915 for the study of a special medicinal substance called “Salvarsan,” also known as arsphenamine. Ever since, ICR has continuously carried out outstanding research and flourished as a large-scale organization with five research divisions and three research centers: Division of Synthetic Chemistry, Division of Materials Chemistry, Division of Biochemistry, Division of Environmental Chemistry, Division of Multidisciplinary Chemistry, Advanced Research Center for Beam Science, International Research Center for Elements Science, and Bioinformatics Center. Currently, almost 120 faculty members, 210 graduate students, and 60 researchers are engaged in research activities in 30 laboratories directed by fulltime professors and 5 laboratories supervised by visiting professors.

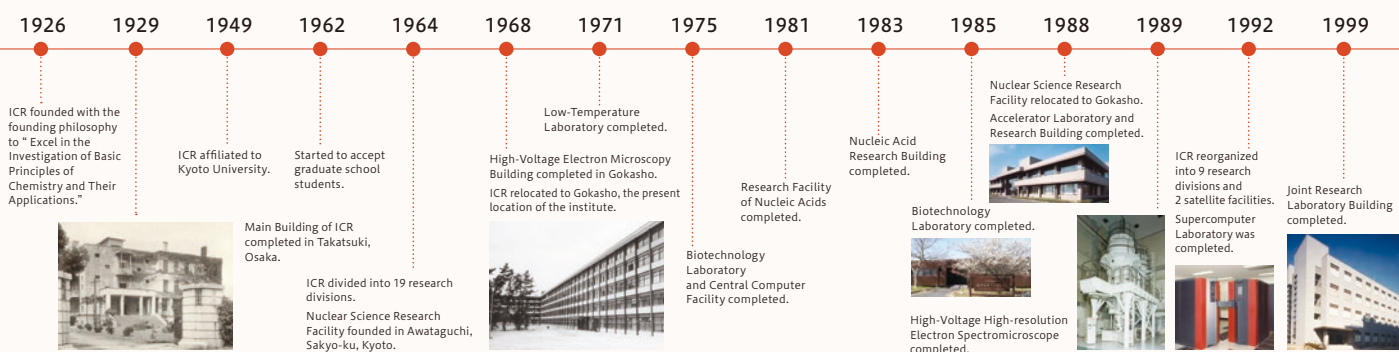
Research at ICR encompasses a wide range of scientific disciplines, including physics, biology, and informatics besides chemistry. Graduate schools to which our laboratories are affiliated as a “cooperative lab” cover a broad range of fields such as science, engineering, agriculture, pharmaceutical sciences, medicine, and informatics. These laboratories are spearheading cutting-edge research and yielding groundbreaking results in their special fields. The legacy of our founding philosophy continues today and describes the essence of our research activities. With the founding vision in mind, we have entrusted our scientists with the responsibility of choosing research topics within advanced chemistry-related fields. Thus, ICR members are actively involved in interdisciplinary research

projects with bottom-up paradigms in order to create new knowledge and contribute to the future of materials-related fields. One of our major challenges is to design and create smart materials from the viewpoint of not only academic interest but also green innovation and establishment of a sustainable society through “zero loss” in the production/transportation/usage of materials/energy. Toward the future, we have been collaborating with the Research Institute for Sustainable Humanosphere and the Institute of Advanced Energy since 2015 as part of the MEXT-supported joint research program. For the MEXT project of Integrated Research Consortium on Chemical Sciences (2016–2021), ICR (most importantly, International Research Center for Elements Science) has been making a significant contribution as one of the four core research institutions from Japanese national universities. ICR has also been collaborating with both domestic and overseas universities and research institutions (with 68 official international collaboration agreements) and functioning as a Joint Usage / Research Center supported by MEXT since 2010. On the basis of highly evaluated global activity in chemistry-oriented fields as well as interdisciplinary fields, ICR was newly certified as an International Joint Usage / Research Center by MEXT in 2018. In order to foster and secure young researchers through these activities, we also have original programs of unparalleled research and graduate education, including an in-house annual grant system named “ICR Grant for Promoting Integrated Research.” These collaborative achievements ensure that ICR serves as a global research core in chemistry-oriented fields.

Finally, we appreciate your continued encouragement and support.

History

For over 90 years, ICR has been striving to uncover the truth of chemistry and answer frontier quests.



Our Mission

The founding philosophy of the Institute for Chemical Research is to “Excel in the Investigation of Basic Principles of Chemistry and Their Applications.” Research is grounded on the core values of freedom, independence, and harmony. As a key part of Kyoto University, the institute is committed to contributing to the harmonious development of the global community by solving fundamental chemical issues.

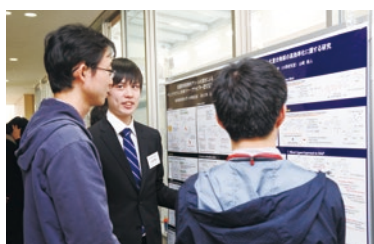
Research

We regard chemistry as a broad area of the natural sciences, and strive for balanced development: the platform of basic research into the true nature of matter serves as a foothold for more applied studies that strive to be flexible and responsive to the challenges of our global society.



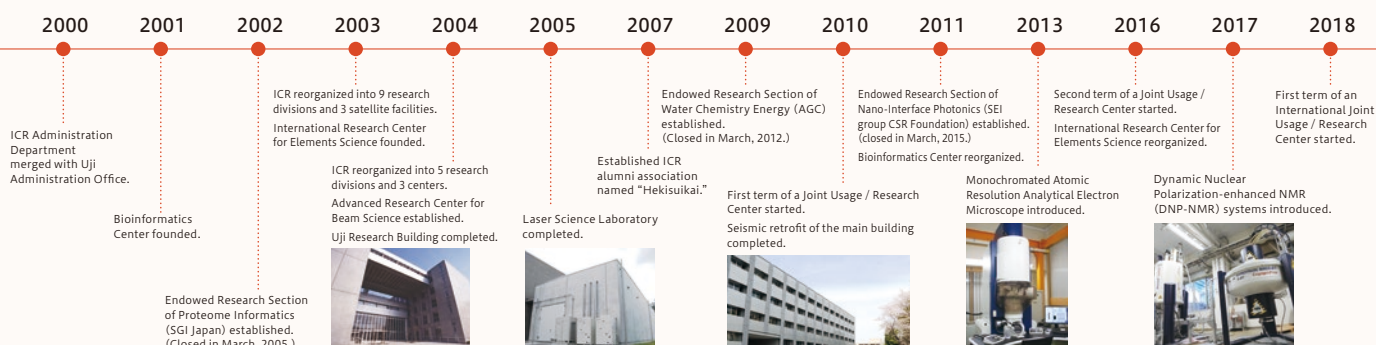
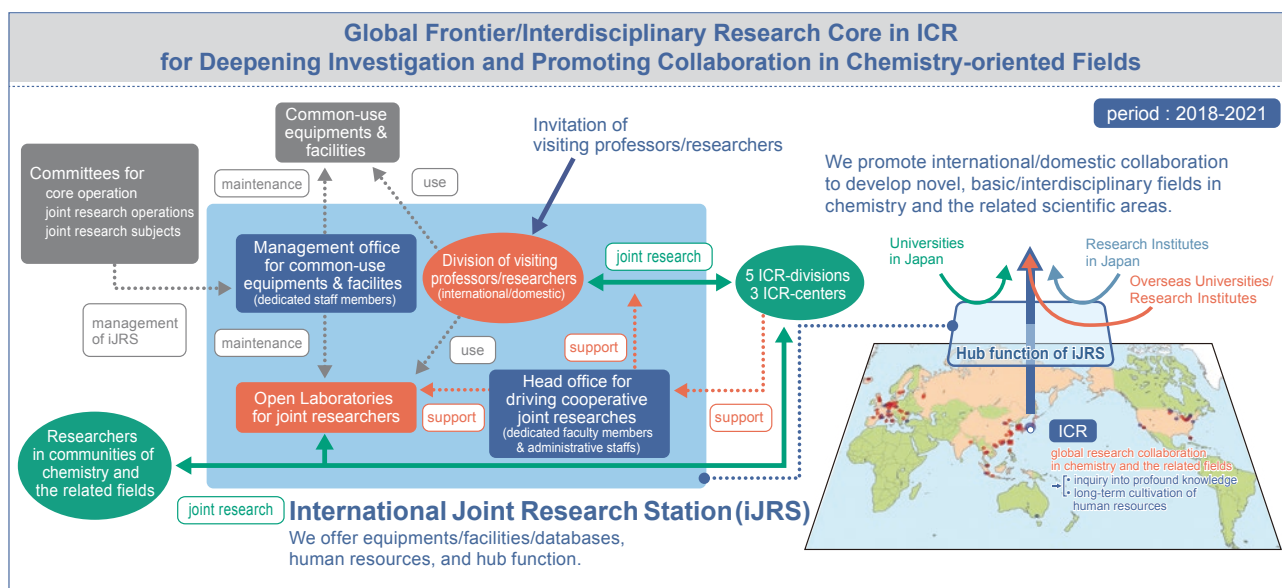
Education

Through research in an integrated environment of world-class laboratories, we aim to train and develop talented people with broad experience and a high level of problem solving skills, capable of providing leadership towards the harmonious development of the global community.



Outreach

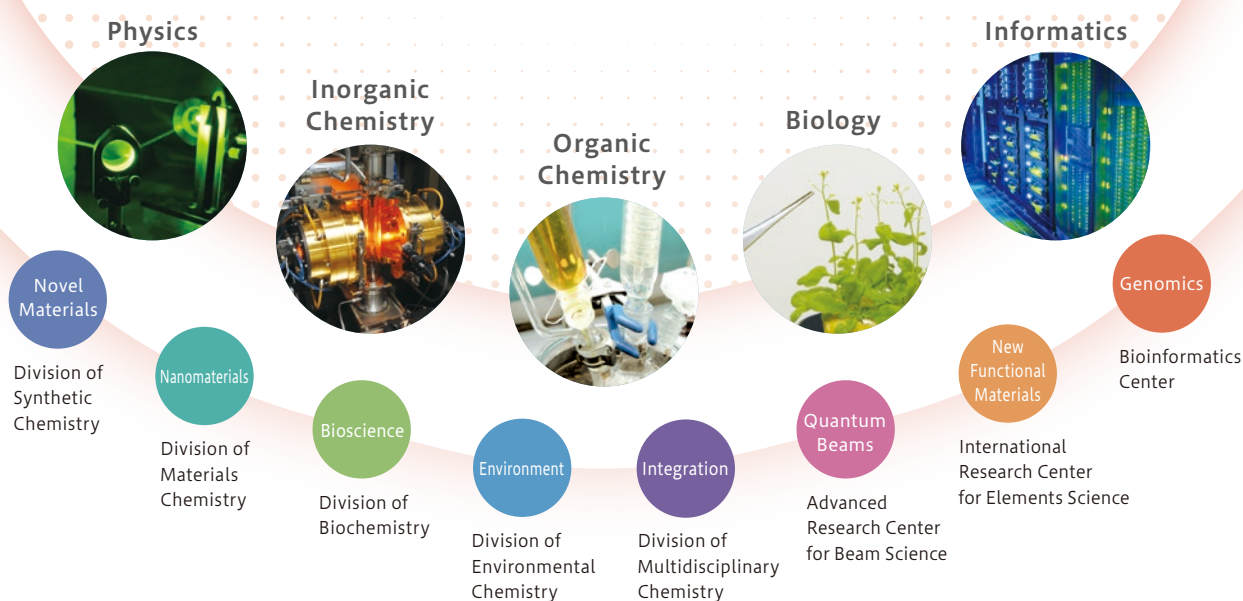
As researchers and educators of chemistry, we endeavor to deepen our exchanges with local communities and the Japanese society. We envision contributing to solving global problems through active scientific exchange with international researchers and institutions. Lastly, we commit to our accountability to society through internal review and information disclosure.



Research

Research at ICR spans the breadth of chemistry, including organic chemistry, inorganic chemistry, biological chemistry, physical chemistry, polymer chemistry, analytical chemistry, and computational chemistry. Over 100 faculty members direct research programs at ICR. The staff are organized into five research divisions and three research centers, comprising 30 individual laboratories.

CHALLENGE in CHEMISTRY



Education

Kyoto University comprises of three campuses, Yoshida, Uji, and Katsura. ICR is located at Uji Campus. Each of the 30 laboratories is affiliated with one of the following six graduate schools: science, engineering, agriculture, pharmaceutical sciences, medicine, and informatics. Together with the graduate schools, ICR is committed to offering exceptional teaching and research programs across a wide range of disciplines.

Novel Materials

Division of Synthetic Chemistry

Exploring beyond traditional concepts, we use inorganic and organic chemistry to synthesize new functional molecules and materials, and investigate their structures, properties, and applications.

Graduate School of Science Organoelement Chemistry

Prof. **TOKITOH, Norihiro** (D. Sc.)
Assoc. Prof. **MIZUHATA, Yoshiyuki** (D. Sc.)
Assist. Prof. **YUKIMOTO, Mariko** (D. Sc.)
Techn. Staff **HIRANO, Toshiko**



Graduate School of Engineering Structural Organic Chemistry

Prof. **MURATA, Yasujiro** (D. Eng.)
Assoc. Prof. **HIROSE, Takashi** (D. Eng.)
Assist. Prof. **HASHIKAWA, Yoshifumi**



Graduate School of Pharmaceutical Science Synthetic Organic Chemistry

Prof. **KAWABATA, Takeo** (D. Pharm. Sc.)
Assist. Prof. **UEDA, Yoshihiro** (D. Pharm. Sc.)
Assist. Prof. **MORISAKI, Kazuhiro** (D. Pharm. Sc.)
Techn. Staff **FUJHASHI, Akiko**



Graduate School of Science Advanced Inorganic Synthesis

Prof. **TERANISHI, Toshiharu** (D. Eng.)
Assoc. Prof. **SAKAMOTO, Masanori** (D. Eng.)
Assist. Prof. **SATO, Ryota** (D. Sc.)
Program-Specific Assist. Prof. **SARUYAMA, Masaki** (D. Sc.)
Program-Specific Assist. Prof. **TRINH, Thang Thuy** (D. Materials Science)



novel bonding and structures

novel endohedral fullerenes

Stable Silabenzene

Novel Materials beyond Common Concepts

site-selective catalysis

Gold nanocubes

novel molecular transformation

novel functional inorganic nanoparticles

Nanomaterials

Division of Materials Chemistry

We focus on the creation and development of next-generation nano-sized functional materials by controlling electronic, photonic, and spin states as well as fabrication methods.

Graduate School of Engineering Chemistry of Polymer Materials

Prof. **TSUJII, Yoshinobu** (D. Eng.)
Assoc. Prof. **OHNO, Kohji** (D. Eng.)
Assist. Prof. **SAKAKIBARA, Keita** (D. Agr.)



Graduate School of Engineering Polymer Controlled Synthesis

Prof. **YAMAGO, Shigeru** (D. Sc.)
Assoc. Prof. **TOSAKA, Masatoshi** (D. Eng.)
Assist. Prof. **KAYAHARA, Eiichi** (D. Eng.)



Graduate School of Engineering Inorganic Photonics Materials

Prof. **MIZUOCHI, Norikazu** (D. Sc.)
Assist. Prof. **MORISHITA, Hiroki** (D. Eng.)
Assist. Prof. **FUJIWARA, Masanori** (D. Sc.)



Graduate School of Science Nanospintronics

Prof. **ONO, Teruo** (D. Sc.)
Assoc. Prof. **MORIYAMA, Takahiro** (Ph. D.)
Assist. Prof. **SHIOTA, Yoichi** (D. Eng.)



Polymer Brushes

Nanodevice

Photonics

Spintronics

Functional Polymer

Nano-fabrication

Interfacial/hierarchical control

Functional Materials

Quantum Device

Precision polymerization

Solventless metathesis reactions

Synthesis of hoop shaped π -conjugated materials

Creation of new functional materials for the next generation

Bioscience

Division of Biochemistry

We develop new applied biomaterials by investigating biological processes such as recognition and sensing from a chemical perspective.

Graduate School of Pharmaceutical Science Biofunctional Design-Chemistry

Prof. **FUTAKI, Shiroh** (D. Pharm. Sc.)
Senior Lect. **IMANISHI, Miki** (D. Pharm. Sc.)
Assist. Prof. **KAWANO, Kenichi** (D. Pharm. Sc.)
Program-Specific Assoc. Prof. **HIROSE, Hisaaki** (D. Pharm. Sc.)



Graduate School of Agriculture Chemistry of Molecular Biocatalysts

Prof. **YAMAGUCHI, Shinjiro** (D. Agr.)
Assist. Prof. **WATANABE, Bunta** (D. Agr.)
Assist. Prof. **MASHIGUCHI, Kiyoshi** (D. Agr.)



Graduate School of Science Molecular Biology

Prof. **AOYAMA, Takashi** (D. Sc.)
Assoc. Prof. **TSUGE, Tomohiko** (D. Sc.)
Assist. Prof. **KATO, Mariko** (D. Agr.)
Techn. Staff **YASUDA, Keiko**



Graduate School of Medicine Chemical Biology

Prof. **UESUGI, Motonari** (D. Pharm. Sc.)
Assoc. Prof. **SATO, Shinichi** (D. Eng.)
Senior Lect. **PERRON, Amelie** (Ph. D.)
Assist. Prof. **TAKEMOTO, Yasushi** (D. Eng.)
Program-Specific Assist. Prof. **ABO, Masahiro** (D. Pharm. Sc.)
Program-Specific Assist. Prof. **MAO, Di** (D. Med. Sc.)



Cell

Cargo

Membrane-permeable peptide

Wild type

Mutant defective in branch-inhibiting hormone

PIPK1, PI(4,5)P₂, Effector, Cell Polarity

Morphogenesis of Plants and Cells

RSL2, LRL1, LRL2, RHDS, RSL1, GL2, TGT1, GL3, EGL3, WER, MYB93

Chemical Library of 70,000 Molecules



Division of Environmental Chemistry

We contribute to solving environmental problems through research on environment-friendly organic device design, enzyme/microorganism-based biotechnology, and hydrospheric biogeochemistry.

Graduate School of Engineering Molecular Materials Chemistry

Prof. **KAJI, Hironori** (D. Eng.)
Assist. Prof. **SHIZU, Katsuyuki** (D. Eng.)
Assist. Prof. **SUZUKI, Katsuaki** (D. Human & Environmtl. Studies)
Techn. Staff **OHMINE, Kyoko**
Techn. Staff **MAENO, Ayaka**



Graduate School of Science Hydrospheric Environment Analytical Chemistry

Prof. **SOHRIN, Yoshiki** (D. Sc.)
Assist. Prof. **TAKANO, Shotaro** (D.Sc.)
Assist. Prof. **ZHENG, Linjie** (D.Sc.)
Techn. Staff **IWASE, Misato**



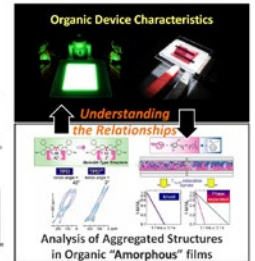
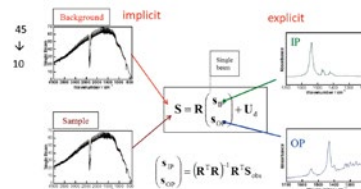
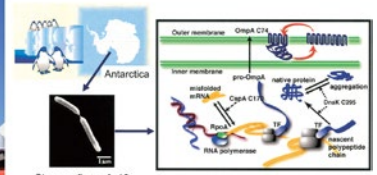
Graduate School of Science Chemistry for Functionalized Surfaces

Prof. **HASEGAWA, Takeshi** (D.Sc.)
Assist. Prof. **SHIMOAKA, Takafumi** (D.Sc.)
Assist. Prof. **SHIOYA, Nobutaka** (D.Sc.)



Graduate School of Agriculture Molecular Microbial Science

Prof. **KURIHARA, Tatsuo** (D. Eng.)
Assoc. Prof. **KAWAMOTO, Jun** (D. Agr.)
Assist. Prof. **OGAWA, Takuya** (D. Agr.)



Division of Multidisciplinary Chemistry

We flourish in the intersection of chemistry and physics, carrying out fundamental research in cooperation with the other divisions to enhance the scientific value of materials development.

Graduate School of Engineering Polymer Materials Science

Prof. **TAKENAKA, Mikihito** (D. Eng.)
Assoc. Prof. **OGAWA, Hiroki** (D. Eng.)



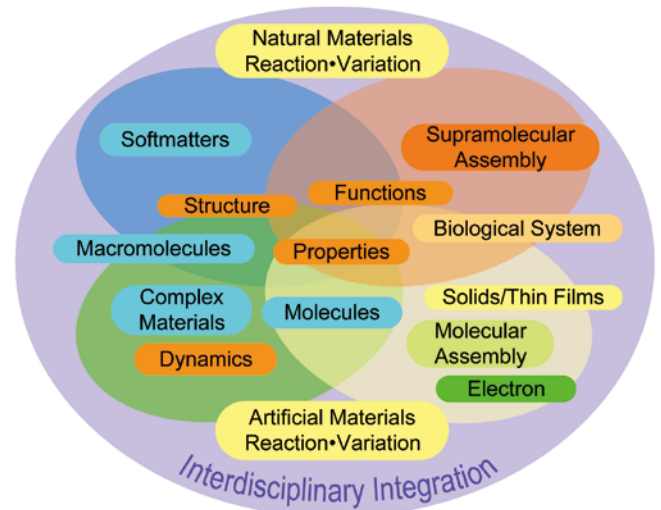
Graduate School of Engineering Molecular Rheology

Prof. **WATANABE, Hiroshi** (D.Sc.)
Assoc. Prof. **MATSUMIYA, Yumi** (D. Eng.)



Graduate School of Science Molecular Aggregation Analysis

Prof. **WAKAMIYA, Atsushi** (D. Eng.)
Assist. Prof. **MURDEY, Richard** (Ph.D.)
Assist. Prof. **NAKAMURA, Tomoya** (D. Eng.)



Advanced Research Center for Beam Science

We promote the development of quantum beams and ultimate space-time analysis and their applications to physics of nuclei, materials and plasmas.

Graduate School of Science Particle Beam Science

Prof. **WAKASUGI, Masanori** (D.Sc.)
Assoc. Prof. **IWASHITA, Yoshihisa** (D.Sc.)
Techn. Staff **TONGU, Hiromu**



Graduate School of Science Laser Matter Interaction Science

Prof. **SAKABE, Shuji** (D. Eng.)
Assoc. Prof. **HASHIDA, Masaki** (D. Eng.)
Assist. Prof. **INOUE, Shunsuke** (D.Sc.)



Graduate School of Science Electron Microscopy and Crystal Chemistry

Prof. **KURATA, Hiroki** (D.Sc.)
Assist. Prof. **NEMOTO, Takashi** (D.Sc.)
Assist. Prof. **HARUTA, Mitsutaka** (D.Sc.)



Graduate School of Science Atomic and Molecular Structures

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

Particle Beam

- Study of unstable nuclei using storage rings
- Electron scattering off unstable nuclei in an electron storage ring
- Nuclear reactions in a heavy-ion storage ring

Laser Beam

- Physics of intense laser-matter interaction and its applications
- Laser processing
- Generation of quantum beams
- Ultrafast diagnostics
- Laser self-organized application

Electron Beam

- Monochromated gun
- Aberration corrected lens
- Sub-Å electron probe
- Crystalline thin film
- Dark field image
- Bright field image
- Elemental mapping
- Sr, Ti, O

New Functional Materials

International Research Center for Elements Science

With the concept of “elemental science” as a base, we create ground-breaking functional materials with element-derived characteristic properties. This center has two joint laboratories in other divisions.

Graduate School of Engineering Synthetic Organotransformation

Prof. **NAKAMURA, Masaharu** (D.Sc.)
 Assoc. Prof. **TAKAYA, Hikaru** (D. Eng.)
 Assist. Prof. **ISOZAKI, Katsuhiro** (D. Eng.)
 Assist. Prof. **IWAMOTO, Takahiro** (D. Eng.)
 Program-Specific Senior Lect. **PINCELLA, Francesca** (Ph. D.)



Graduate School of Science Advanced Solid State Chemistry

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 Assist. Prof. **AMANO PATINO, Midori Estefani** (Ph. D.)



Graduate School of Engineering Organometallic Chemistry

Assist. Prof. **WAKIOKA, Masayuki** (D. Eng.)

Graduate School of Science Nanophotonics

Prof. **KANEMITSU, Yoshihiko** (D. Eng.)
 Assoc. Prof. **HIRORI, Hideki** (D.Sc.)
 Assist. Prof. **TAHARA, Hirokazu** (D.Sc.)



IRCELS
 Creation of functional materials based on specific characters of the elements

Synthetic Organotransformation
 Carbon-Carbon, Carbon-Metroatom Bond Forming Reactions for Organic Synthesis
 Development of New Catalytic and Organometallic Catalysts based on Unusual and Unconventional Metals (Fe, Al, Mn, Si, Zn, and Cu)
 Quest and Exploration for Elements Science
 Design and Creation of Elements Synergism
 New Organic Reactions

Organometallic Chemistry
 Well-defined Catalysts

Advanced Solid State Chemistry
 Novel Inorganic Materials

Nanophotonics
 Nanomaterials Photonics

Genomics

Bioinformatics Center

We develop bioinformatics tools and resources to assist understanding many aspects of life sciences, from molecules to ecosystems.

Graduate School of Science/Pharmaceutical Science Chemical Life Science

Prof. **OGATA, Hiroyuki** (D.Sc.)
 Assist. Prof. **BLANC-MATHIEU, Romain** (D.Sc.)
 Assist. Prof. **ENDO, Hisashi** (D. Environmental Science)



Graduate School of Informatics Mathematical Bioinformatics

Prof. **AKUTSU, Tatsuya** (D. Eng.)
 Assoc. Prof. **TAMURA, Takeyuki** (D. Inf.)
 Assist. Prof. **MORI, Tomoya** (D. Inf.)



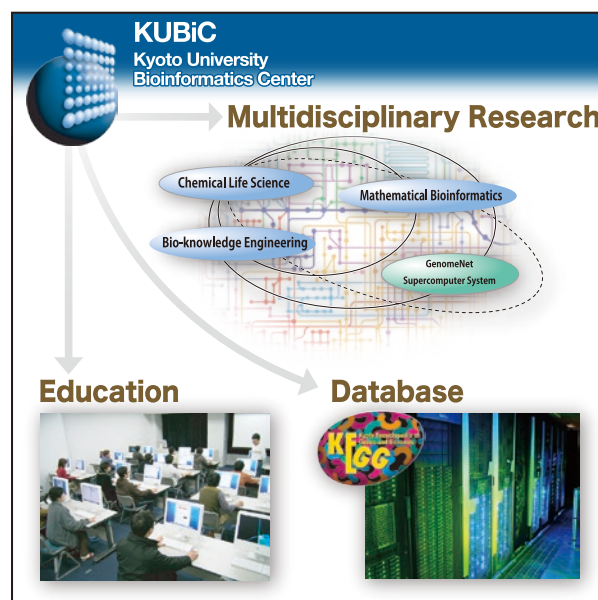
Graduate School of Pharmaceutical Science Bio-knowledge Engineering

Prof. **MAMITSUKA, Hiroshi** (D.Sc.)
 Assist. Prof. **NGUYEN, Hao Canh** (D. Knowledge Science)



GenomeNet Project Management Office

Prof. **MAMITSUKA, Hiroshi** (D.Sc.)



Visiting Professors

Division of Synthetic Chemistry

Prof. **TOMOOKA, Katsuhiko**
 Professor, Institute for Materials Chemistry and Engineering, Kyushu University

Division of Biochemistry

Prof. **KASAHARA, Hiroyuki**
 Professor, Institute of Global Innovation Research, Tokyo University of Agriculture and Technology

Division of Multidisciplinary Chemistry

Prof. **ISHIDA, Yasuhiro**
 Team Leader, Center for Emergent Matter Science, RIKEN

International Research Center for Elements Science

Prof. **OIWA, Akira**
 Professor, The Institute of Scientific and Industrial Research, Osaka University

Division of Materials Chemistry

Assoc. Prof. **TOKITA, Masatoshi**
 Associate Professor, School of Materials and Chemical Technology, Tokyo Institute of Technology

Division of Environmental Chemistry

Assoc. Prof. **KOSONO, Saori**
 Project Associate Professor, Biotechnology Research Center, The University of Tokyo

Advanced Research Center for Beam Science

Assoc. Prof. **SANO, Tomokazu**
 Associate Professor, Graduate School of Engineering, Osaka University

Bioinformatics Center

Assoc. Prof. **SAIGO, Hiroto**
 Associate Professor, Graduate School and Faculty of Information Science and Electrical Engineering, Kyushu University

International Visiting Professor

Bioinformatics Center

Prof. **CAI, Hongmin** Professor, South China University of Technology [July–October, 2019]

Hakubi Project to Foster and Support Young Researchers, Kyoto University

Synthesis and Exploration of Novel Charge Transition Oxide Materials for Future Multifunctional Devices

Program-Specific Assist. Prof. **DENIS ROMERO, Fabio**

Overseas Visitors in 2018



Overseas Visitors in 2018
20 countries, 117 people

Major Research Projects

As of May 2019

Research and Education Funding

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

Representative from ICR TSUJII, Yoshinobu / Term 2016–2021

MEXT Project of Integrated Research Consortium on Chemical Sciences Joint Project with ICAT (Hokkaido Univ.), RCMS (Nagoya Univ.), IMCE (Kyushu Univ.)



Representative from ICR SHIMAKAWA, Yuichi / Term 2016–2021

MEXT Project of Creative Research on Highly Efficient Smart Materials for Green Innovation

Joint Project with Institute of Advanced Energy (Kyoto Univ.), Research Institute for Sustainable Humanosphere (Kyoto Univ.)



Representative from ICR TSUJII, Yoshinobu / Term 2015–2020

JST Strategic Basic Research Programs (ACCEL)

Reinforcement of Resiliency of Concentrated Polymer Brushes and Its Tribological Applications – Development of Novel “Soft and Resilient Tribology (SRT)” System

Research Leader TSUJII, Yoshinobu WATANABE, Hiroshi
Term 2015–2020

Data Mining-based Evaluation and Design of Materials for Concentrated Polymer Brushes (CPB)

Research Leader MAMITSUKA, Hiroshi / Term 2015–2020



Human Resource in ICR

Faculty

Numbers in () Represent Visiting Professors.

Professor	Associate Professor	Senior Lecturer	Assistant Professor	Technical Staff	PS* Associate Professor	PS* Assistant Professor	PS* Researcher	Sub-total	Researcher	Other Staff	Sub-total	Total
28	17	2	37	8	1	5	17	115	34	39	73	188
(4)	(4)							(8)				(8)

* PS : Program Specific ** Including Researchers from Abroad As of May 1, 2019

Researchers (PD) from Abroad

Country	Number	Country	Number	Country	Number	Country	Number	Total
Brunei	1	China, P.R.	7	India	3	Italy	1	17
Korea, R.	3	Taiwan	1	Vietnam	1			

As of May 1, 2019

Research Students, Fellows, and Associates

Research Student	Research Fellow	Postdoctoral Fellow of JSPS	Research Associate	Total
5	0	1	8	14

As of May 1, 2019

Graduate Students

Numbers in () Represent Students from Abroad.

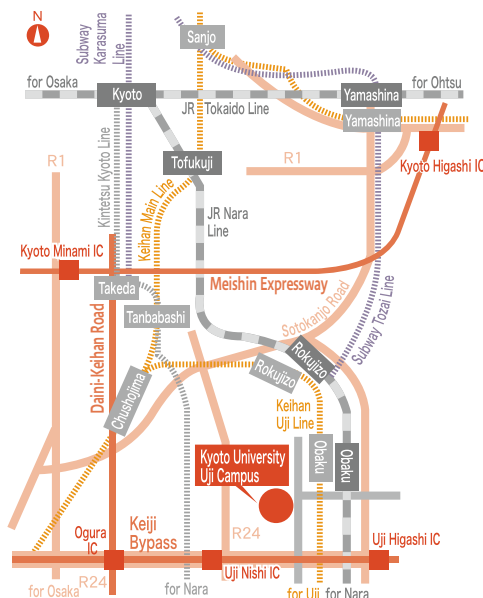
	Science	Engineering	Agriculture	Pharmaceutical Science	Medicine	Informatics	Total
Master's Course	50 (2)	40 (7)	12 (2)	18 (1)	3 (2)	2 (1)	125 (15)
Doctoral Course	40 (11)	7 (4)	5 (1)	17 (6)	6 (3)	7 (4)	82 (29)
Total	90 (13)	47 (11)	17 (3)	35 (7)	9 (5)	9 (5)	207 (44)

As of May 1, 2019

Graduate Students from Abroad

Country	Number	Country	Number	Country	Number	Country	Number	Total
Austria	1	China, P.R.	29	India	1	Indonesia	1	44
Korea, R.	2	Peru	1	Philippines	2	Taiwan	3	
Thailand	1	USA	1	Vietnam	2			

As of May 1, 2019



- Access
- From Obaku Station on the JR Nara Line: 7 min on foot (from Kyoto Station to Obaku Station: 20 min)
- From Obaku Station on the Keihan Uji Line: 10 min on foot (from Chushojima Station to Obaku Station: 10 min)
- From Kyoto-Minami IC: 20 min by car
- From Uji-Higashi IC: 10 min by car / From Uji-Nishi IC: 10 min by car



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Tel: +81-774-38-3344 Fax: +81-774-38-3014
E-mail: koho@scl.kyoto-u.ac.jp

The latest information of ICR is on the web
<https://www.kuicr.kyoto-u.ac.jp/sites/icr/>

