2018

Institute for Chemical Research
Kyoto University

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." It 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 special medicinal substances called "Salvarsan," that is arsphenamine. Ever since its establishment in 1926, ICR has continuously produced outstanding research achievements and flourished into 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 (IRCELS), and Bioinformatics Center. Currently, approximately 120 faculty members, 210 graduate students, and 60 researchers are engaged in research activities in 30 different laboratories directed by full-time professors. Besides the 30 laboratories, we have another 5 laboratories supervised by visiting professors.

Research fields 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 research fields: science, engineering, agriculture, pharmaceutical sciences, medicine, and informatics. Our laboratories have been spearheading cutting edge research and yielding startling results for 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 choice of research topics within advanced chemistry-related fields. Whether or not the human race maintains sustainable growth is a key issue of this century.

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. In fact, one of our major goals is to create and develop bio-inspired smart materials from the viewpoint of not only academic interests but also a policy, aiming to achieve green innovation and fabricate a sustainable society through "zero loss" or effective reduction of the loads on the environment at the production/usage of materials/energy. To achieve this goal, we have been collaborating with the Research Institute for Sustainable Humanosphere and the Institute of Advanced Energy since 2015 in the MEXT-supported joint research program. We have been also collaborating with both domestic and overseas universities and research institutions (with 70 official international collaboration agreements) and functioning as a Joint Usage/Research Center proclaiming the Frontier and Interdisciplinary Research Core for Deepening Investigation and Promoting Collaboration in Chemistry-oriented Fields supported by MEXT (2nd stage since 2016). In addition, IRCELS at ICR is making a significant contribution to the MEXT project of Integrated Research Consortium on Chemical Sciences (IRCCS; 2016-2021) as one of the four core research institutions from Japanese national universities. We also strive to foster and secure young researchers through our unparalleled research programs and graduate education; for instance, in 2012, we restarted 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 the 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.

1926 ICR founded with the founding philosophy to "Excel in the Investigation of Basic Principles of Chemistry and Their Applications."

1929 Main Building of ICR completed in Takatsuki, Osaka.

1949 ICR affiliated to Kyoto University.

1962 Started to accept graduate school students.

1964 ICR divided into 19 research divisions.
Nuclear Science Research Facility founded in Awataguchi, Sakyo-ku, Kyoto.

1968 High-Voltage Electron Microscopy Building completed in Gokasho.
ICR relocated to Gokasho, the present location of the institute.

1971 Low-Temperature Laboratory completed.

1975 Biotechnology Laboratory and Central Computer Facility completed.

1981 Research Facility of Nucleic Acids completed.

1983 Nucleic Acid Research Building completed.

1985 Biotechnology Laboratory completed.

1988 Nuclear Science Research Facility relocated to Gokasho.
Accelerator Laboratory and Research Building completed.

1989 High-Voltage High-resolution Electron Spectromicroscope completed.

1992 ICR reorganized into 9 research divisions and 2 satellite facilities.
Supercomputer Laboratory was completed.

1999 Joint Research Laboratory Building completed.

Our Mission

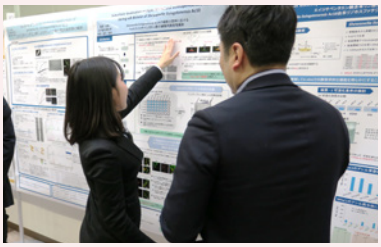
The founding philosophy of the Institute for Chemical Research is to “Excel in the Investigation of Basic Principles of Chemistry and Their Applications.” Research is grounded on the core values of freedom, independence, and harmony. As a key part of Kyoto University, the institute is committed to contributing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

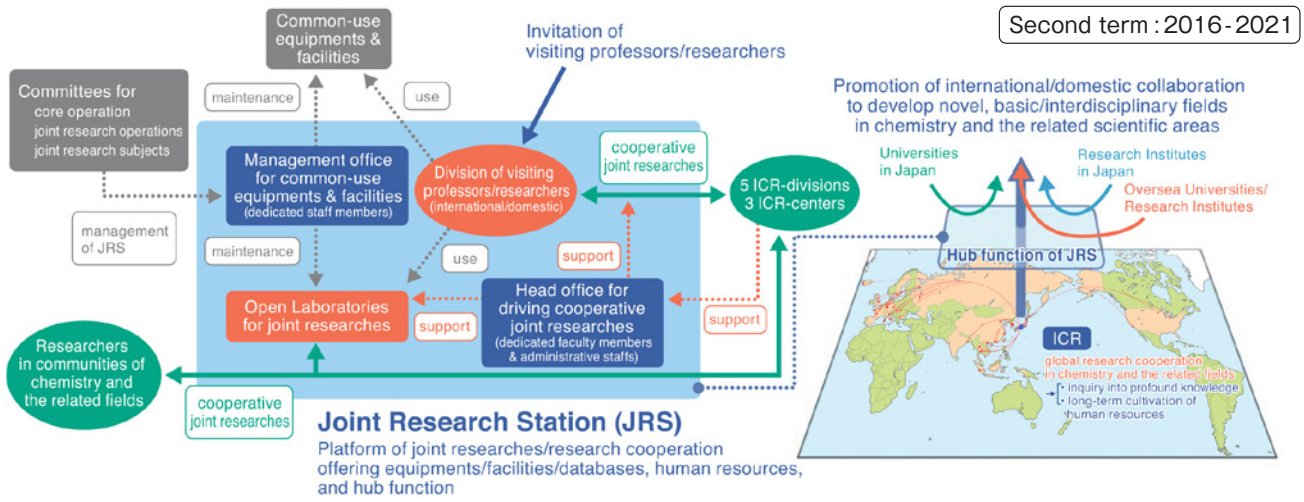
Through research in an integrated environment of world-class laboratories, we aim to train and develop talented people with broad experience and a high level of problem solving skills, capable of providing leadership towards the harmonious development of the global community.



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.

Frontier and Interdisciplinary Research Core for Deepening Investigation and Promoting Collaboration in Chemistry-oriented Fields



2000
ICR Administration Department merged with Uji Administration Office.

2001
Bioinformatics Center founded.

2002
Endowed Research Section of Proteome Informatics (SGI Japan) established. (Closed in March, 2005.)

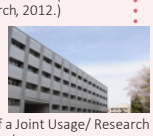
2003
ICR reorganized into 9 research divisions and 3 satellite facilities.
International Research Center for Elements Science founded.

2004
ICR reorganized into 5 research divisions and 3 centers.
Advanced Research Center for Beam Science established.
Uji Research Building completed.

2005
Laser Science Laboratory completed.

2007
Established ICR alumni association named “Hekisuikai.”

2009
Endowed Research Section of Water Chemistry Energy (AGC) established.(Closed in March, 2012.)



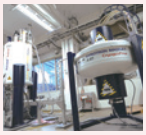
2010
First term of a Joint Usage/ Research Center started.
Seismic retrofit of the main building completed.

2011
Endowed Research Section of Nano-Interface Photonics (SEI group CSR Foundation) established.(closed in March, 2015.)
Bioinformatics Center reorganized.

2013
Monochromated Atomic Resolution Analytical Electron Microscope introduced.

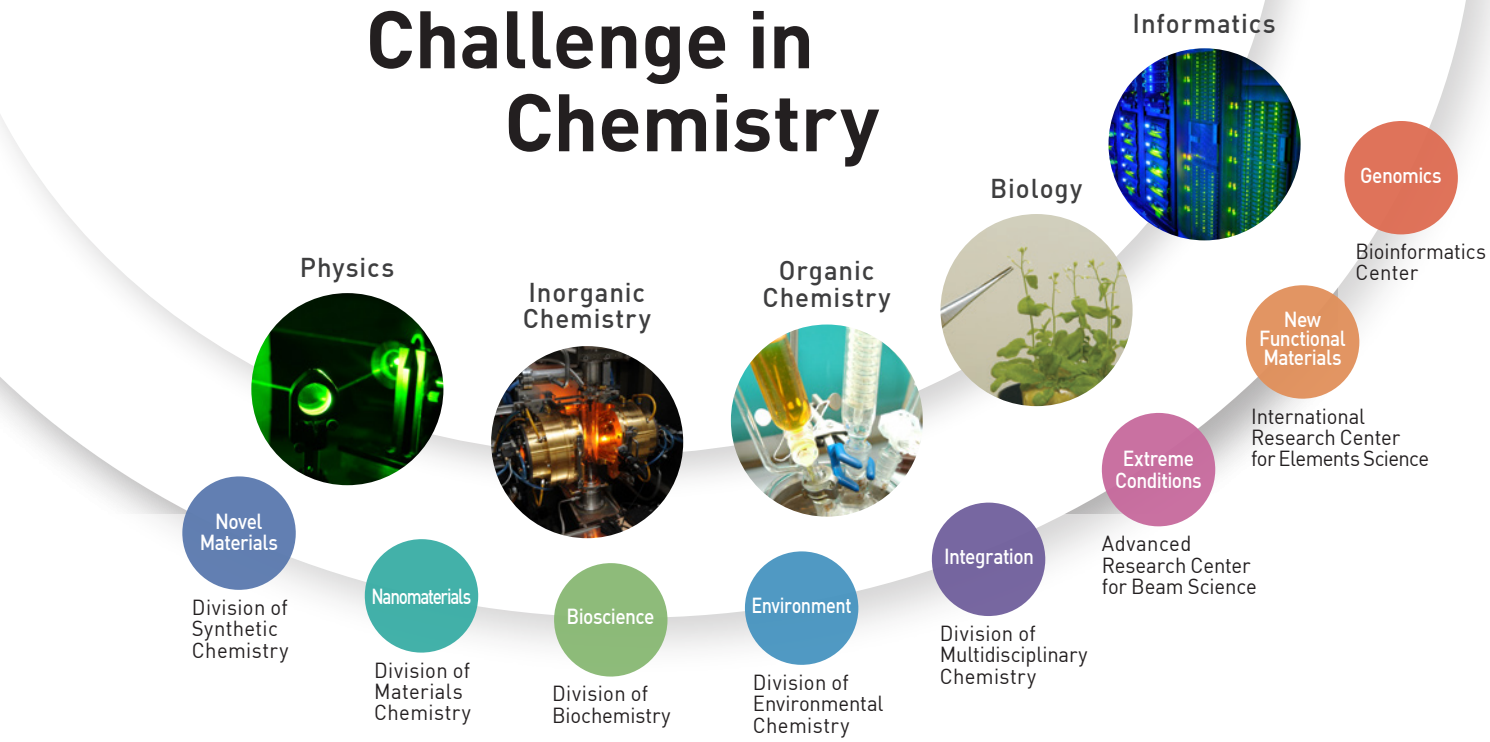
2016
Second term of a Joint Usage/ Research Center started.
International Research Center for Elements Science reorganized.

2017
Dynamic Nuclear Polarization-enhanced NMR (DNP-NMR) systems introduced.



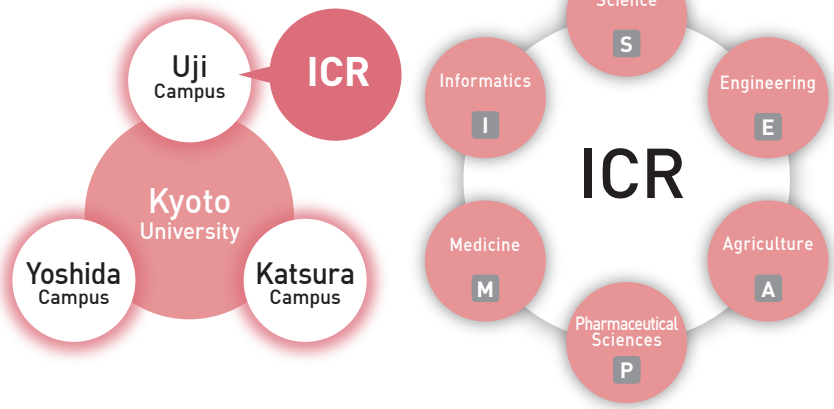
Research

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.

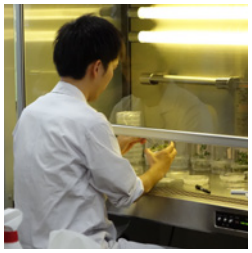
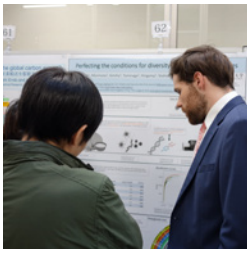


Education

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.

Organoelement Chemistry S

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

Structural Organic Chemistry E

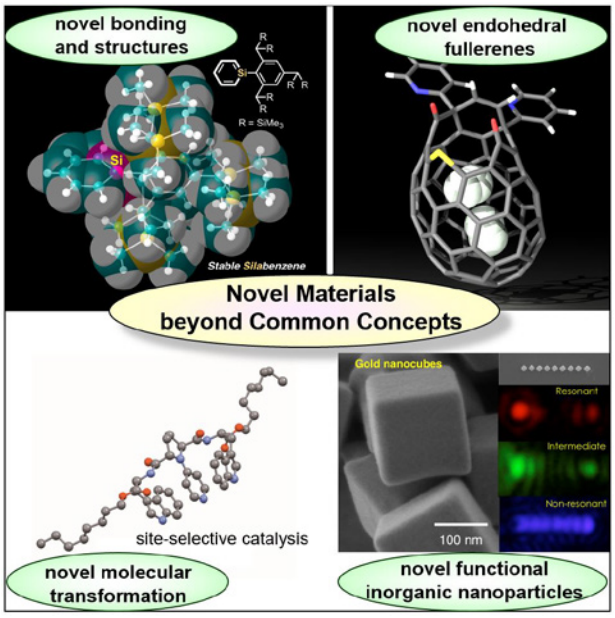
Prof
MURATA, Yasujiro (D Eng)
Assist Prof
HASHIKAWA, Yoshifumi

Synthetic Organic Chemistry P

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

Advanced Inorganic Synthesis S

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)



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.

Chemistry of Polymer Materials E

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

Polymer Controlled Synthesis E

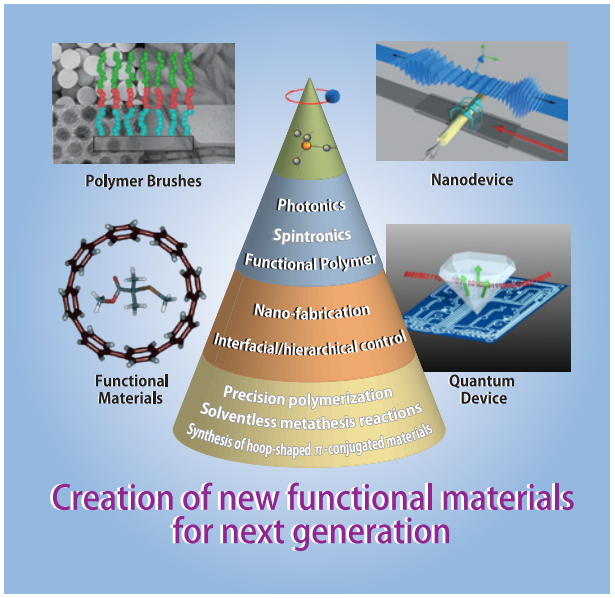
Prof
YAMAGO, Shigeru (D Sc)
Assoc Prof
TOSAKA, Masatoshi (D Eng)
Assist Prof
KAYAHARA, Eiichi (D Eng)
Assist Prof
HASHIMOTO, Sigma (D Eng)

Inorganic Photonics Materials E

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

Nanospintronics S

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



Bioscience

Division of Biochemistry

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

Biofunctional Design-Chemistry P

Prof
FUTAKI, Shiroh (D Pharm Sc)
Senior Lect
IMANISHI, Miki (D Pharm Sc)
Assist Prof
KAWANO, Kenichi (D Pharm Sc)

Chemistry of Molecular Biocatalysts A

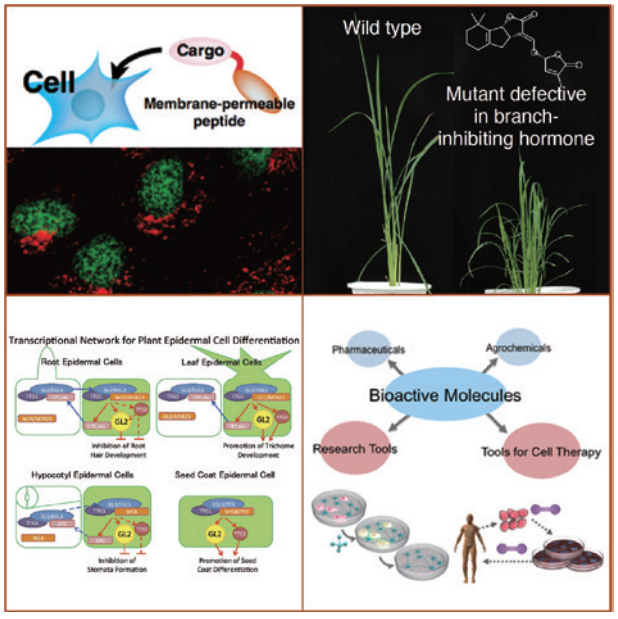
Prof
YAMAGUCHI, Shinjiro (D Agr)
Assist Prof
WATANABE, Bunta (D Agr)

Molecular Biology S

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

Chemical Biology M

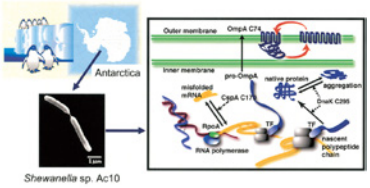
Prof
UESUGI, Motonari (D Pharm Sc)
Assoc Prof
SATO, Shinichi (D Eng)
Senior Lect
PERRON, Amelie (Ph D)
Assist Prof
TAKEMOTO, Yasushi (D Eng)

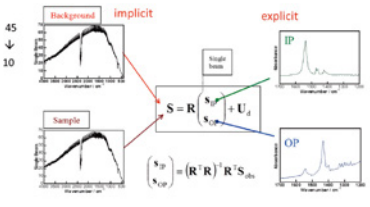


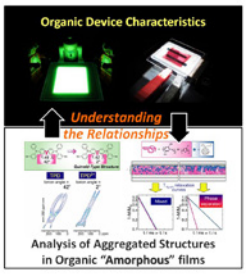
Environment

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.







Molecular Materials Chemistry E

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

Hydrospheric Environment Analytical Chemistry S

Prof
SOHRIN, Yoshiki (D Sc)
Assoc Prof
UMETANI, Shigeo (D Sc)
Assist Prof
TAKANO, Shotaro (D Sc)
Assist Prof
ZHENG, Linjie (D Sc)
Techn Staff
IWASE, Misato

Chemistry for Functionalized Surfaces S

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

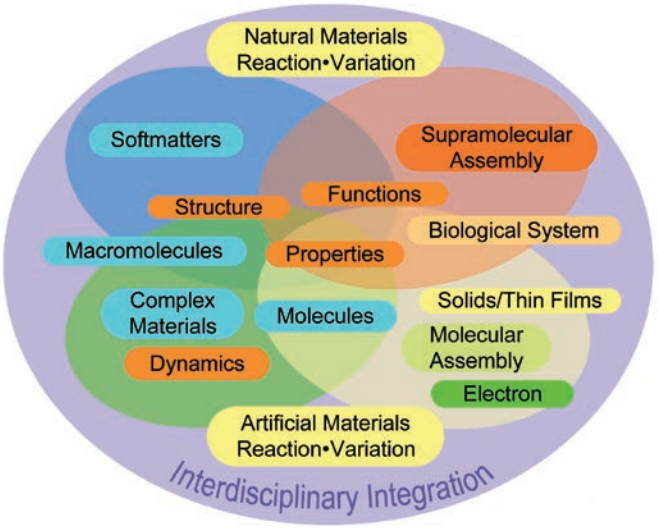
Molecular Microbial Science A

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

Integration

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.



Polymer Materials Science E

Prof
TAKENAKA, Mikihito (D Eng)
Assist Prof
OGAWA, Hiroki (D Eng)

Molecular Rheology E

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

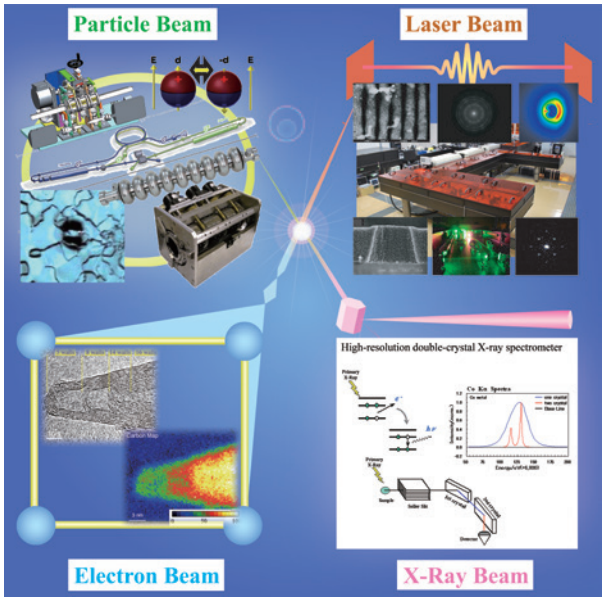
Molecular Aggregation Analysis S

Prof
WAKAMIYA, Atsushi (D Eng)
Assist Prof
MURDEY, Richard (Ph D)

Extreme Conditions

Advanced Research Center for Beam Science

Our research center focuses on physics of quantum beams and their interaction with matter for fundamental research and practical analysis. We have world-class expertise in neutron optics, particle beam accelerator, soft-X-ray diffraction, electron microscopies, and high power lasers.



Particle Beam Science S

Assoc Prof
IWASHITA, Yoshihisa (D Sc)
Techn Staff
TONGU, Hiromu

Laser Matter Interaction Science S

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

Electron Microscopy and Crystal Chemistry S

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

Atomic and Molecular Structures S

Assoc Prof
ITO, Yoshiaki (D Sc)
Assist Prof
FUJII, Tomomi (D Sc)

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.

Synthetic Organotransformation E

Prof NAKAMURA, Masaharu (DSc)
Assoc Prof TAKAYA, Hikaru (D Eng)
Assist Prof ISOZAKI, Katsuhiro (D Eng)
Assist Prof IWAMOTO, Takahiro (D Eng)

Advanced Solid State Chemistry S

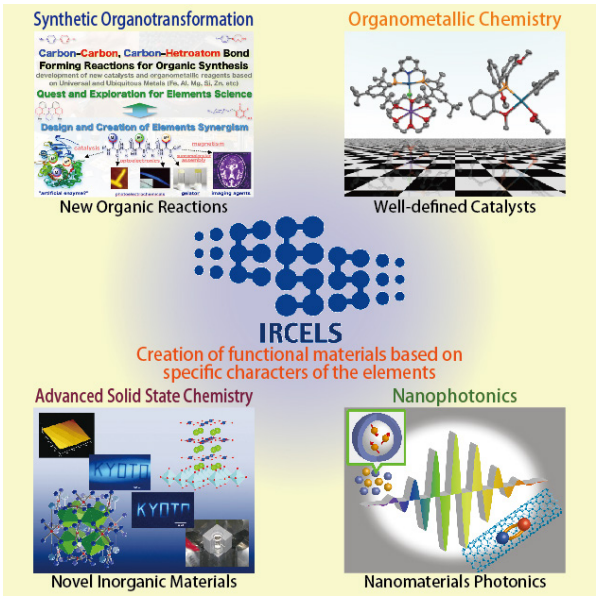
Prof SHIMAKAWA, Yuichi (D Sc)
Assoc Prof KAN, Daisuke (D Sc)
Program-Specific Assist Prof SAITO, Takashi (D Sc)
Techn Staff ICHIKAWA, Noriya (D Eng)

Organometallic Chemistry E

Prof OZAWA, Fumiyuki (D Eng)
Assist Prof WAKIOKA, Masayuki (D Eng)

Nanophotonics S

Prof KANEMITSU, Yoshihiko (DEng)
Assoc Prof HIRORI, Hideki (D Sc)
Assist Prof TAHARA, Hirokazu (D Sc)



Genomics

Bioinformatics Center

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

Chemical Life Science S P

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

Mathematical Bioinformatics I

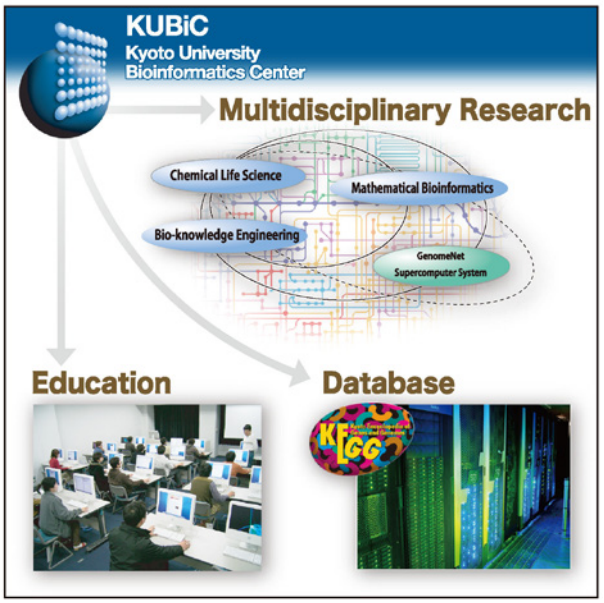
Prof AKUTSU, Tatsuya (D Eng)
Assoc Prof TAMURA, Takeyuki (D Inf)
Assist Prof MORI, Tomoya (D Inf)

Bio-knowledge Engineering P

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

GenomeNet Project Management Office

Prof AKUTSU, Tatsuya (D Eng)



Visiting Professors

Division of Materials Chemistry
Prof MOTOME, Yukitoshi — Professor, School of Engineering, The University of Tokyo

Division of Environmental Chemistry
Prof KOBAYASHI, Takeshi — Associate Scientist, Ames Laboratory, Iowa State University

Advanced Research Center for Beam Science
Prof SHIMIZU, Hirohiko — Professor, Graduate School of Science, Nagoya University

Bioinformatics Center
Prof GOTO, Susumu — Professor, Joint Support-Center for Data Science Research, Research Organization of Information and Systems

Division of Synthetic Chemistry
Assoc Prof ISHIDA, Shintaro — Associate Professor, Graduate School of Science, Tohoku University

Division of Biochemistry
Assoc Prof ZHOU, Lu — Associate Professor, School of Pharmacy, Fudan University

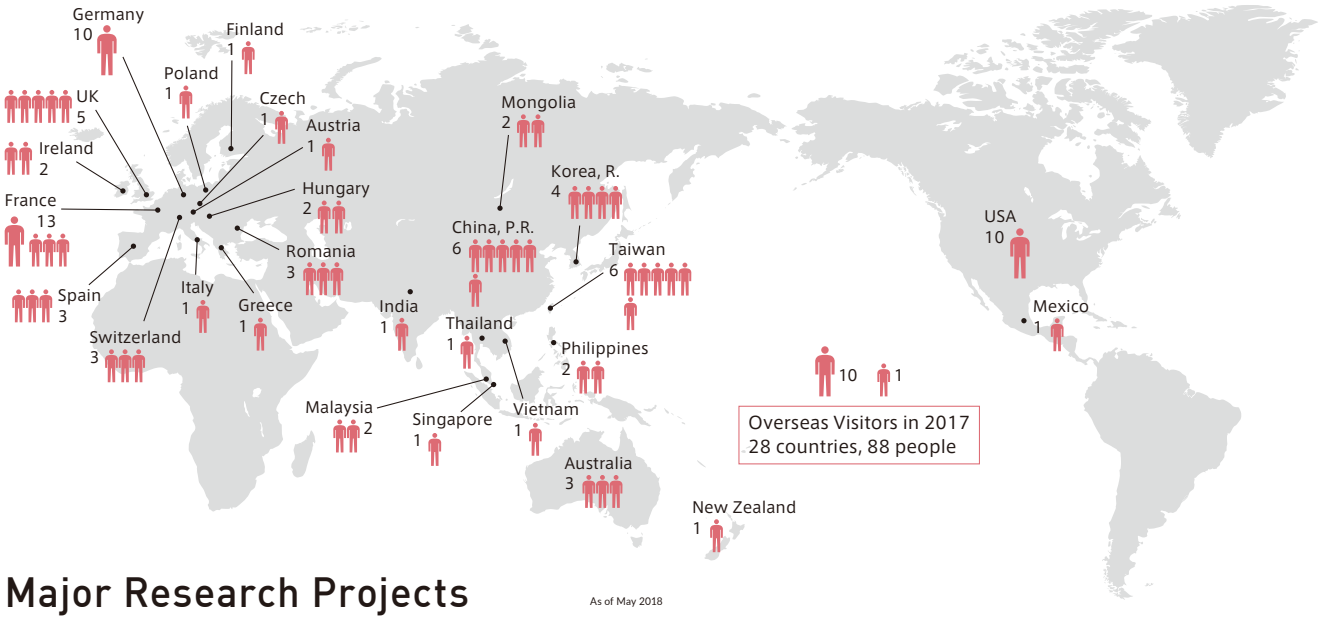
Division of Multidisciplinary Chemistry
Assoc Prof SAKAI, Takamasa — Associate Professor, School of Engineering, The University of Tokyo

International Research Center for Elements Science
Assoc Prof OKAMOTO, Yoshihiko — Associate Professor, Graduate School of Engineering, Nagoya University

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 2017



Major Research Projects

As of May 2018

Research and Education Funding

Joint Usage / Research Center: 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 2015-2019

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

Research Leader MAMITSUKA, Hiroshi / Term 2015-2019

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
27	16	2	37	7	0	3	14	106	29	45	74	180
(4)	(4)							(8)				(8)

* PS : Program Specific ** Including Researchers from Abroad As of May 1, 2018

Researchers (PD) from Abroad

Australia	1	China, P.R.	7	Germany	1	India	2	Total	17
Italy	1	Korea, R.	3	Mexico	1	Vietnam	1		

As of May 1, 2018

Research Students, Fellows and Associates

Research Student	Research Fellow	Postdoctoral Fellow of JSPS	Research Associate	Total
6	0	2	18	26

As of May 1, 2018

Graduate Students

Numbers in ( ) Represent Students from Abroad.

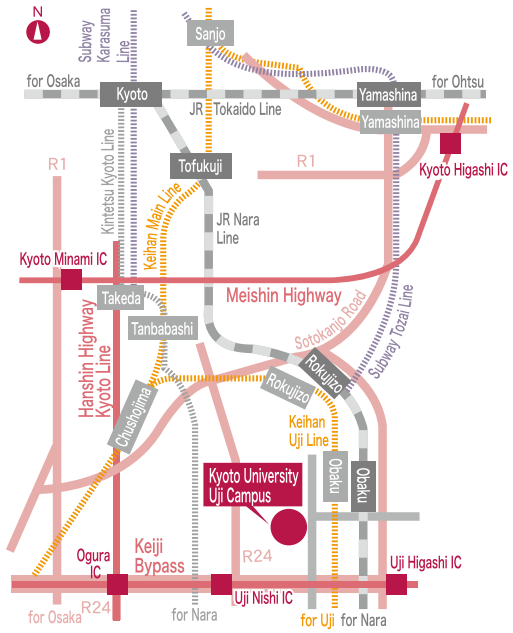
	Science	Engineering	Agriculture	Pharmaceutical Sc.	Medicine	Informatics	Total
Master's Course	50 (4)	44 (3)	8 (2)	25 (3)	1 (1)	4 (2)	132 (15)
Doctoral Course	36 (10)	14 (5)	6 (2)	13 (4)	6 (3)	7 (5)	82 (29)
Total	86 (14)	58 (8)	14 (4)	38 (7)	7 (4)	11 (7)	214 (44)

As of May 1, 2018

Graduate Students from Abroad

Austria	1	China, P.R.	27	Indonesia	1	Korea, R.	5	Total	44
Peru	1	Philippines	3	Taiwan	2	Thailand	2		
USA	1	Vietnam	1						

As of May 1, 2018



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

Institute for Chemical Research
Kyoto University

Gokasho, Uji, Kyoto, Japan 611-0011
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/