

ICR

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

2013
Institute for Chemical Research,
Kyoto University

Our Goal Is to Create Novel Fields of Research by Integrating the Wisdom in Our Various Research Fields.

ICR at Kyoto University Continues Its Challenge to Reveal Novel Findings for the Human Society.

Director
SATO, Naoki



The Institute for Chemical Research (ICR), launched in 1926 as the first research institute at Kyoto University, will celebrate its 87th anniversary in 2013, but its true roots date back to 1915 (Specialized Center for Chemical Research founded at Kyoto Imperial University, College of Science for the study of special medicinal substance, "Salvarsans," that is, arsphenamine). Our founding vision at the time of foundation above is to "Excel in the Investigation of Basic Principles of Chemistry and Their Applications." Since then, the ICR has continuously produced outstanding research achievements. Now, we have reached the current large-scale organization of five research divisions: Synthetic Chemistry, Materials Chemistry, Biochemistry, Environmental Chemistry, and Multidisciplinary Chemistry and three research centers: Advanced Research Center for Beam Science, International Research Center for Elements Science (IRCELS), and Bioinformatics Center. Currently, about 120 faculty members, 200 graduate students and 60 researchers are engaged in research activities in 32 laboratories in total supervised by full-time professors. Furthermore, we also have 5 laboratories supervised by visiting professors and an endowed laboratory.

The research within the ICR encompasses the fields of chemistry, physics, biology, and informatics. The chemical studies core covers fields including physical chemistry, inorganic chemistry, organic chemistry, materials chemistry, and biochemistry. The graduate schools to which our laboratories belong as cooperative ones accepting graduate students cover diverse fields of science, engineering, agriculture, pharmaceutical sciences, medicine, informatics, and human/environmental studies. These laboratories are spearheading leading-edge research, and yielding outstanding results in their own and/or correlated research areas. The legacy of our founding philosophy above continues to the present day and describes the essence of our research activities. With this vision in

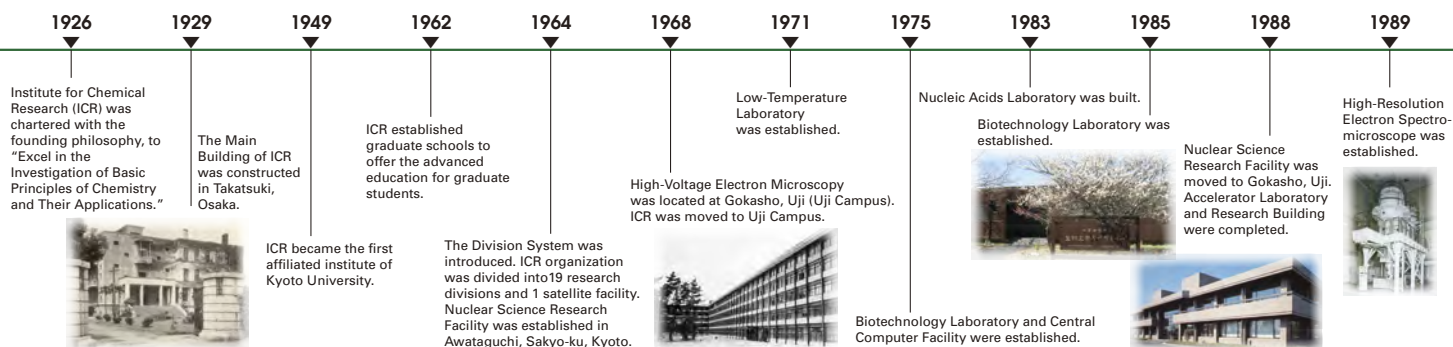
mind, we have entrusted our scientists to choose and pursue research topics at the forefront of advanced chemistry with bottom-up paradigms. Whether or not the human race maintains sustained growth is a key issue of this century. Moreover, we must recover from the Great East Japan Earthquake year before last and reform our country from various perspectives in Japan. Hence, the ICR encourages its members to be actively involved in research projects with a bottom-up approach in mind, and to value the development of unique interdisciplinary research projects, in order to create new knowledge as well as to contribute to the future of our society in materials-related fields.

Besides, the ICR is currently collaborating with domestic/oversea universities and research organizations (with about 58 official international collaboration agreements) and is functioning as a Joint Usage/Research Center proclaiming the Frontier/Interdisciplinary Research Core for Deepening Investigation and Promoting Cooperation in Chemistry-Oriented Fields supported by MEXT (2010-2016). In addition, the ICR, IRCELS in particular, is making a significant contribution to the MEXT Project of Integrated Research on Chemical Synthesis (2010-2016) as one of the key members of core research institutions from four Japanese national universities. Further, we also fully strive to foster and secure of young researchers through these activities as well as the graduate education mentioned above. For instance, last year we restarted an in-house annual grant system named "ICR Grant for Encouraging Promoting Integrated Research." The strong collaboration basis so far constructed in-house and also with of ensures the ICR serves as the core of global research propellers in chemistry-oriented fields.

Finally, we would appreciate your continued encouragement and support.

History

Over the 85 years of its history, ICR has continued the challenge to uncover the basis of chemistry and answer the 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.

1. 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.



2. 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.



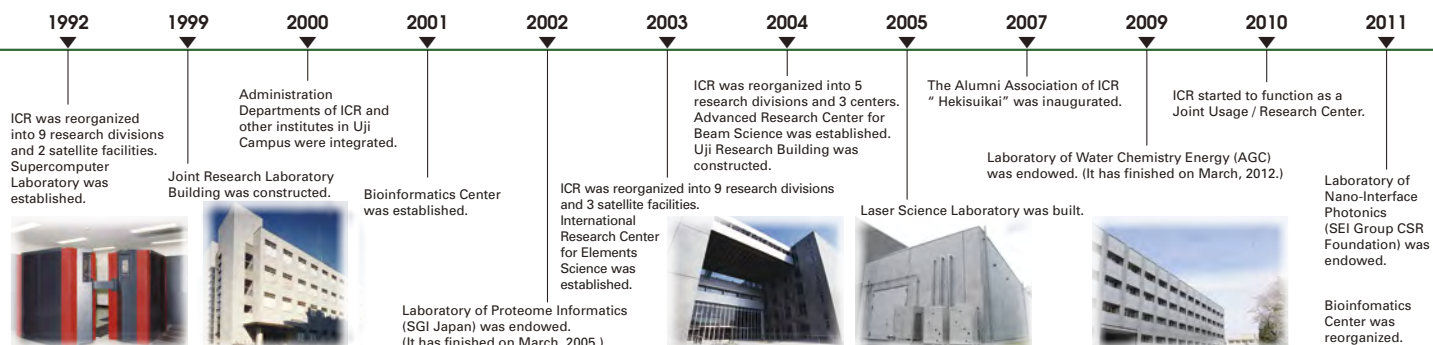
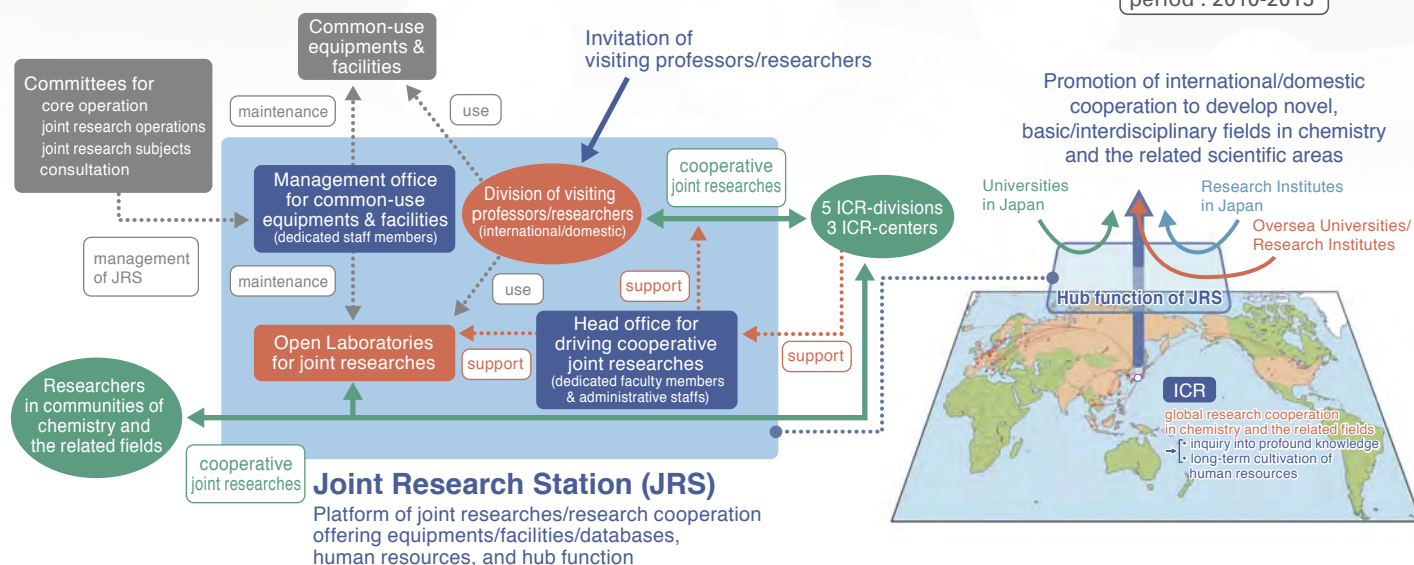
3. Relationship with Society

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/Interdisciplinary Research Core in ICR for Deepening Investigation and Promoting Cooperation in Chemistry-Oriented Fields

period : 2010-2015



Division of Synthetic Chemistry

Research is conducted for the creation of "Novel Materials" for clarification of their structures, functions, and properties irrespective of disciplines of organic and inorganic chemistry.

Original research is conducted in individual laboratories across scientific disciplines toward the creation of novel materials beyond common concepts. Clarification of the structure and intrinsic properties of novel materials have impact in many scientific fields including material science, synthetic organic and inorganic chemistry.

Organoelement Chemistry

S Prof. TOKITOH, Norihiro (D.Sc.)
 Assoc. Prof. SASAMORI, Takahiro (D.Sc.)
 Asst. Prof. MIZUHATA, Yoshiyuki (D.Sc.)
 Asst. Prof. AGOU, Tomohiro (D.Sc.)
 Techn. Staff. HIRANO, Toshiko



Structural Organic Chemistry

E Prof. MURATA, Yasujiro (D.Eng.)
 Assoc. Prof. WAKAMIYA, Atsushi (D.Eng.)
 Asst. Prof. MURATA, Michihisa (D.Eng.)



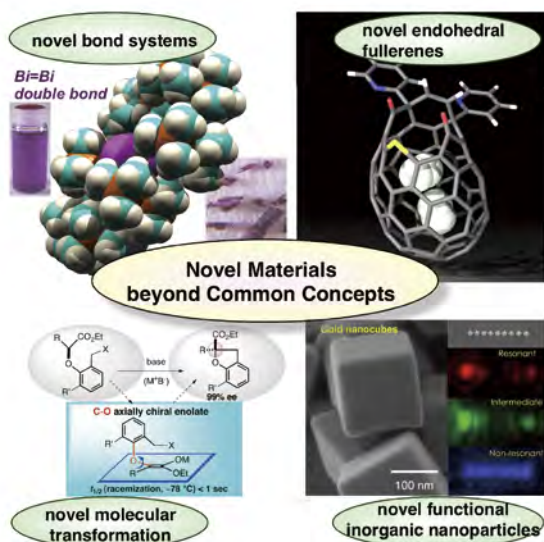
Synthetic Organic Chemistry

P Prof. KAWABATA, Takeo (D.Pharm.Sci.)
 Assoc. Prof. FURUTA, Takumi (D.Pharm.Sci.)
 Asst. Prof. YOSHIMURA, Tomoyuki (D.Pharm.Sci.)
 Techn. Staff. FUJIIHASHI, Akiko



Advanced Inorganic Synthesis

S Prof. TERANISHI, Toshiharu (D.Eng.)
 Asst. Prof. SAKAMOTO, Masanori (D.Eng.)
 Asst. Prof. SATO, Ryota (D.Sc.)



Division of Materials Chemistry

Creation of new functional materials for next generation by hybridization, conjugation, and integration of different materials and by nanomaterialization.

The aim of this research area is to develop a controlled synthetic method for nano-sized macromolecules. Novel precision fabrication of polymeric materials are also investigated. This area also emphasizes the creation and development of new functional materials by controlling electronic, photonic, and spin states through hybridization of organic-inorganic materials, creation of novel surfaces with high-density polymer brushes, development of nano-fabrication of artificial multi-layers, and the utilization of size- and quantum effects.

Chemistry of Polymer Materials

E Prof. TSUJII, Yoshinobu (D.Eng.)
 Assoc. Prof. OHNO, Kohji (D.Eng.)
 Asst. Prof. SAKAKIBARA, Keita (D.Agr.)



Polymer Controlled Synthesis

E Prof. YAMAGO, Shigeru (D.Sc.)
 Assoc. Prof. TOSAKA, Masatoshi (D.Eng.)
 Asst. Prof. NAKAMURA, Yasuyuki (D.Sc.)
 PS
 Asst. Prof. KAYAHARA, Eiichi (D.Eng.)
 PS: Program Specific



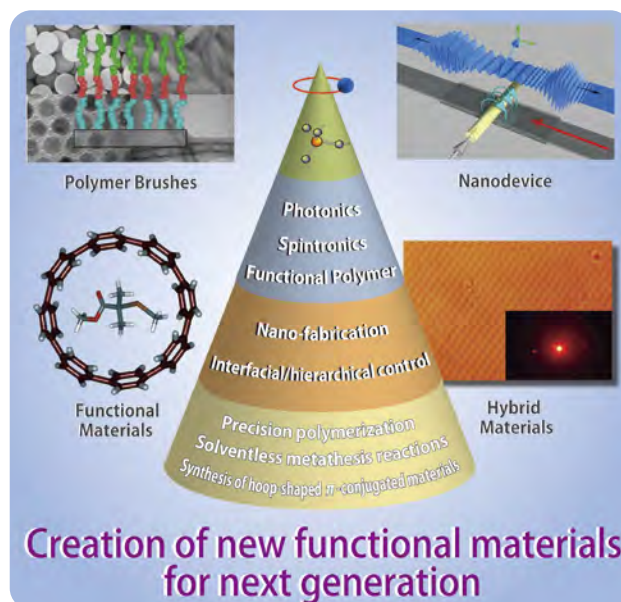
Inorganic Photonics Materials

E Prof. YOKO, Toshinobu (D.Eng.)
 Assoc. Prof. TOKUDA, Yomei (D.Eng.)
 Asst. Prof. MASAI, Hirokazu (D.Eng.)



Nanospintronics

S Prof. ONO, Teruo (D.Sc.)
 Asst. Prof. MORIYAMA, Takahiro (Ph.D.)
 Asst. Prof. KIM, Kab-Jin (Ph.D.)
 Techn. Staff. KUSUDA, Toshiyuki



ICR is located in the Uji Campus of Kyoto University. 32 Laboratories constitute the system of "5 Research Divisions and 3 Research Centers" and more than 100 faculties and many researchers are engaging various research of science.



Diverse Research Fields

ICR = Spring of Wisdom To Excel in the Investigation of Basic Principles of Chemistry and Their Applications (since 1926)

Bioscience

Division of Biochemistry

Biology meets chemistry; this division elucidates the mechanisms behind intra/inter-cellular recognition, stimuli response, and biomolecular synthesis in living organisms, leading to the development of pioneering novel materials.

The goals of this division are (i) Design and creation of bioactive peptides/proteins controlling cellular and gene functions, (ii) Chemical understanding of the reaction mechanisms and physiological significance of biocatalysts, (iii) Unveiling the framework of regulatory network between genetic programs and environmental stimulus responses in higher plants, and (iv) Discovery of new bioactive organic molecules and their new use.

Biofunctional Design-Chemistry

P Prof. FUTAKI, Shiroh (D Pharm Sci)
 Assist Prof. IMANISHI, Miki (D Pharm Sci)
 Assist Prof. TAKEUCHI, Toshihide (D Pharm Sci)



Chemistry of Molecular Biocatalysts

A Prof. HIRATAKE, Jun (D Agr)
 Assist Prof. WATANABE, Bunta (D Agr)
 Assist Prof. KOEDUKA, Takao (D Agr)



Molecular Biology

S Prof. AOYAMA, Takashi (D Sci)
 Assist Prof. TSUGE, Tomohiko (D Sci)
 Techn Staff YASUDA, Keiko



Chemical Biology

M Prof. UESUGI, Motonari (D Pharm Sci)
 Assoc Prof. OHKANDA, Junko (D Eng)
 Assist Prof. SHIMOGAWA, Hiroki (D Sci)



Environment

Division of Environmental Chemistry

This research group aims to contribute to the development of a sustainable society through fundamental studies such as structural characterization and dynamics of solutions and polymers, biogeochemistry in the hydrosphere, and biotechnology with useful enzymes and microorganisms.

The main research subjects are as follows: (1) Syntheses, structure, and functionality of well-organized organic EL devices, organic solar-cells, and polymer materials. (2) Biogeochemistry of trace elements in the hydrosphere, ion recognition. (3) Structural analysis of functionalized ultrathin films and molecules at an interface using vibrational spectroscopy coupled with multivariate analysis, and intermolecular interactions in solution with nanoscale inhomogeneity and/or tunable reactivity. (4) Physiology of extremophilic microorganisms and their applications to production of useful compounds and bioremediations. Biochemistry of trace elements.

Molecular Materials Chemistry

E Prof. KAJI, Hironori (D Eng)
 Assoc Prof. GOTO, Atsushi (D Eng)
 Assist Prof. FUKUSHIMA, Tatsuya (D Eng)
 Techn Staff OHMINE, Kyoko
 Techn Staff MAENO, Ayaka



Hydrospheric Environment Analytical Chemistry

S Prof. SOHRIN, Yoshiaki (D Sci)
 Assoc Prof. UMETANI, Shigeo (D Sci)
 Techn Staff MINAMI, Tomoharu (D Eng)



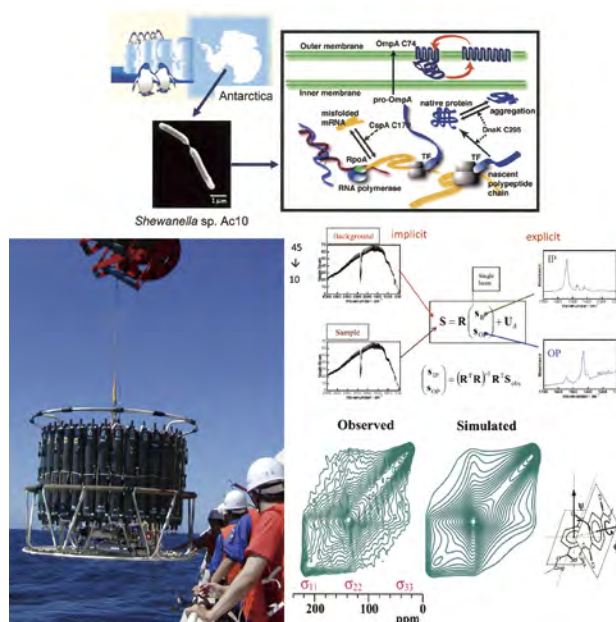
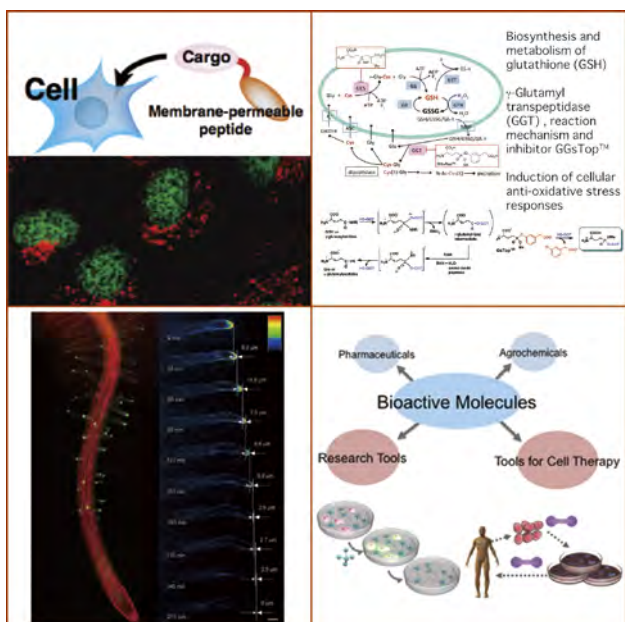
Solution and Interface Chemistry

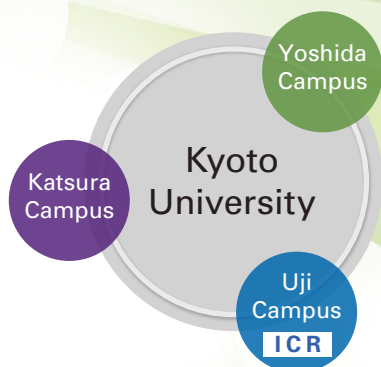
S Prof. HASEGAWA, Takeshi (D Sci)
 Assoc Prof. MATUBAYASI, Nobuyuki (PhD)
 Assist Prof. WAKAI, Chihiro (D Sci)
 Assist Prof. SHIMOAKA, Takafumi (D Sci)



Molecular Microbial Science

A Prof. KURIHARA, Tatsuo (D Eng)
 Assist Prof. KAWAMOTO, Jun (D Agr)





3 Campuses of Kyoto University



Education in the Graduate Schools

Integration

Division of Multidisciplinary Chemistry

Integrating viewpoints of science and engineering, we aim at developing basis in the interdisciplinary area among chemistry, physics, and biology. We carry out fundamental, exploratory research through cooperation with other divisions/centers in ICR to establish a novel aspect of the advanced materials science.

This division performs basic research that aims to achieve molecular understanding of various phenomena of natural/artificial materials, develop an interdisciplinary integration view of natural science based on chemistry, and establish a new aspect of material science. The research is being conducted with a multidisciplinary methodology through collaboration within this division as well as with the other divisions/centers in ICR.

Polymer Materials Science

E Prof. KANAYA, Toshiji (ID Eng)
 Assoc Prof. NISHIDA, Koji (ID Eng)
 Assist Prof. INOUE, Rintaro (ID Eng)



Molecular Rheology

E Prof. WATANABE, Hiroshi (ID Sci)
 Assoc Prof. MASUBUCHI, Yuichi (ID Eng)
 Assist Prof. MATSUMIYA, Yumi (ID Eng)
 Techn Staff OKADA, Shinichi



Molecular Aggregation Analysis

S Prof. SATO, Naoki (ID Sci)
 Assoc Prof. ASAMI, Koji (ID Sci)
 Assist Prof. YOSHIDA, Hiroyuki (ID Sci)
 Assist Prof. MURDEY, Richard (Ph D)

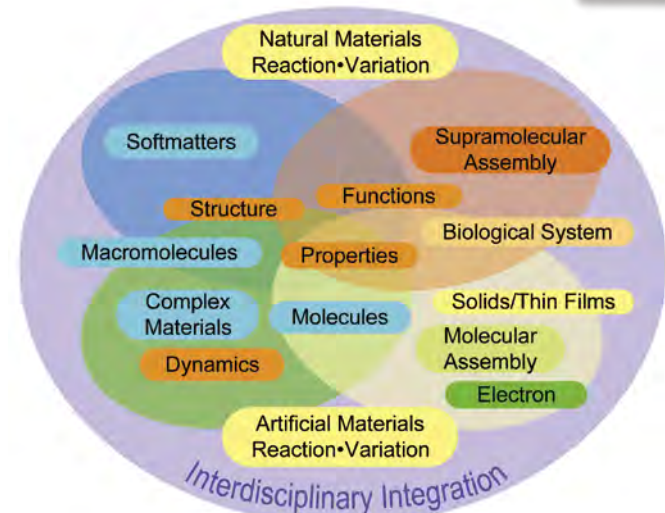


Supramolecular Biology

S Prof. TOSHIMITSU, AkiO (ID Eng)



Interdisciplinary Chemistry for Innovation



Extreme Conditions

Advanced Research Center for Beam Science

Our research is performed to develop new capabilities with combination of various beams, to develop new methods for space-time analysis with extreme resolution, to multidimensional analyze of functional chemical materials oriented for application, and to establish for collaborative research system.

The Advanced Research Center aims to create advanced material science in nano space/time scale by combining various beams (particle, laser, electron and X-ray beams) to understand and control nanospace/time phenomena from physical, chemical and biological aspects. The current topics include dynamics and handling of particle beams and improvement of their characteristics, physics of intense short pulse laser-matter interactions and its applications, high-resolution dynamical structure visualization of nano-materials, analysis of chemical reaction pathways, and dynamical analysis of vital phenomena based on molecular structures.

Particle Beam Science

S Assoc Prof. IWASHITA, Yoshihisa (ID Sci)
 Techn Staff TONGU, Hiromu

Laser Matter Interaction Science

S Prof. SAKABE, Shuji (ID Eng)
 Assoc Prof. HASHIDA, Masaki (ID Eng)



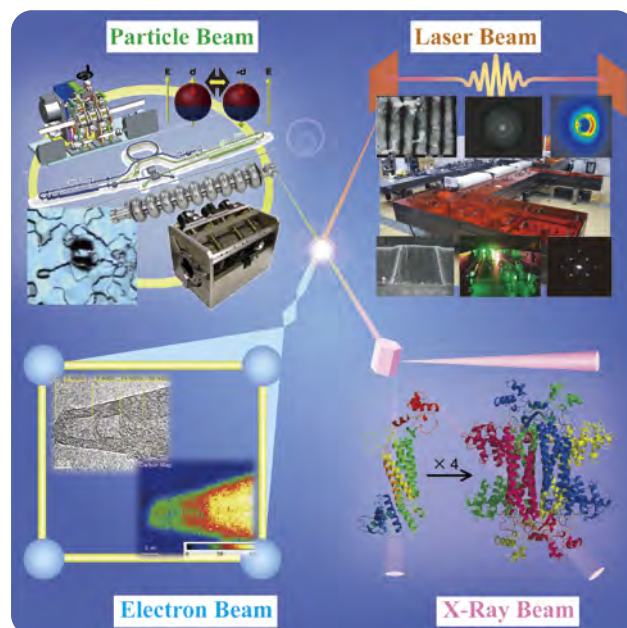
Electron Microscopy and Crystal Chemistry

S Prof. KURATA, Hiroki (ID Sci)
 Assist Prof. NEMOTO, Takashi (ID Sci)
 Assist Prof. HARUTA, Mitsutaka (ID Sci)



Structural Molecular Biology

H Prof. HATA, Yasuo (ID Sci)
 Assoc Prof. ITO, Yoshiaki (ID Sci)
 Assist Prof. FUJII, Tomomi (ID Sci)
 Assist Prof. YAMAUCHI, Takae (ID Agr)



International Research Center for Elements Science

Our aim is to develop a guideline for the creation of novel elementary materials through uncovering the role of key elements which determine the functions of materials.

Our research interests are centered on the development of Elements Science for creation of new functional materials and innovative chemical transformations. We are trying to design and synthesize new inorganic and organic compounds and to seek for their new functionalities from the viewpoints of fundamental science and industrial applications.

Organic Main Group Chemistry

Prof. NAKAMURA, Masaharu (D.Sc.)

Assoc. Prof. TAKAYA, Hikaru (D.Eng.)

Assist. Prof. ISOZAKI, Katsuhiko (D.Eng.)



Advanced Solid State Chemistry

Prof. SHIMAKAWA, Yuichi (D.Sc.)

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

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

Assist. Prof. ICHIKAWA, Noriya (D.Eng.)

PS: Program Specific



Organotransition Metal Chemistry

Prof. OZAWA, Fumiyuki (D.Eng.)

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

Assist. Prof. TAKEUCHI, Katsuhiko (D.Sc.)



Photonic Elements Science

Prof. KANEMITSU, Yoshihiko (D.Eng.)

Assoc. Prof. TAYAGAKI, Takeshi (D.Sc.)

Assist. Prof. IHARA, Toshiyuki (D.Sc.)



Bioinformatics Center

Our laboratories promote research in bioinformatics and the development of the foundation for an integrated and extensive resource for the bioscience.

In order to understand and utilize the information encoded in the genome, a blueprint of life, it is necessary to develop both state-of-the-art informatics technologies and excellent human resources. The Bioinformatics Center is involved in basic research on the analysis of genomic and molecular information towards understanding design principles of the biological systems, applications of bioinformatics methods to pharmaceutical and medical sciences, development of databases for deciphering the genome, and bioinformatics education and training of young scientists.

Chemical Life Science

SP

Assoc. Prof. GOTO, Susumu (D.Eng.)

PS Assist. Prof. TOKIMATSU, Toshiaki (D.Agr.)

PS Assist. Prof. KOTERA, Masaaki (D.Sc.)

PS: Program Specific

Mathematical Bioinformatics

Prof. AKUTSU, Tatsuya (D.Eng.)

Assist. Prof. HAYASHIDA, Morihiro (D.Inf.)

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



Bio-knowledge Engineering

Prof. MAMITSUKA, Hiroshi (D.Sc.)

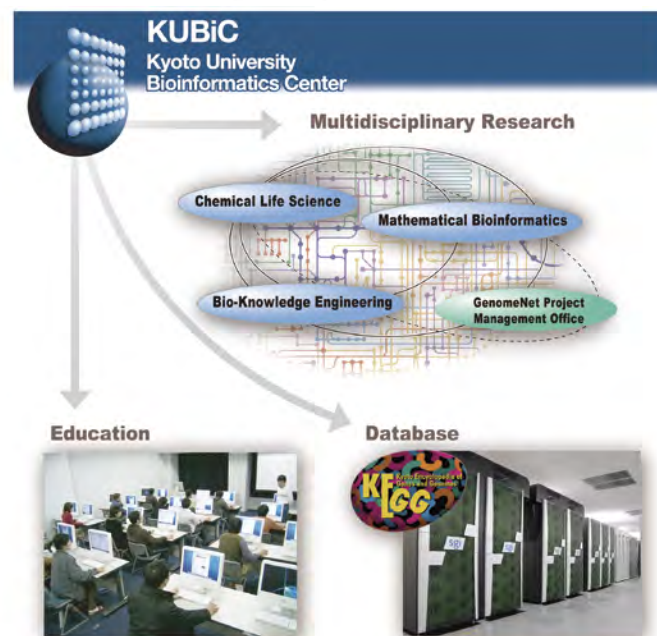
Assist. Prof. KARASUYAMA, Masayuki (D.Eng.)

Assist. Prof. NGUYEN, Hao Canh (D.Eng.)



GenomeNet Project Management Office

Prof. AKUTSU, Tatsuya (D.Eng.)



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

Organic Main Group Chemistry

Carbon-Carbon, Carbon-Heteroatom Bond
Forming Reactions for Organic Synthesis
Development of new catalysts and innovative chemical transformations
Quest and Exploration for Elements Science

Design and Creation of Elements Synergism

New Organic Reactions

Organotransition Metal Chemistry

Well-defined Catalysts

Advanced Solid State Chemistry

Novel Inorganic Materials

Photonic Elements Science

Nanomaterials Photonics

Endowed Research Section

Division of Nano-Interface Photonics (SEI Group CSR Foundation) has been opened in April 2011, donated by Sumitomo Electric Industries Group CSR Foundation.

Our research aim is to open up new research field of nanomaterials science, by focusing on nano-interface as a platform to develop novel optical functionalities. We study optical properties of semiconductor nanomaterials, leading to new solar energy conversion technologies.

Program Specific
Assoc. Prof. YAMADA, Yasuhiro

Program Specific
Assist. Prof. OKANO, Makoto

Prof.
(Supporting Faculty Member) KANEMITSU Yoshihiko

Hakubi Project to Foster and Support Young Researchers, Kyoto University

Algorithmic Graph Theory with Applications to Bioinformatics

Program Specific
Assoc. Prof. JANSSON, Jesper

Visiting Professors from International Country

International Research Center for Elements Science,
Organotransition Metal Chemistry

Prof. CHEN, Jwu-Ting Professor, National Taiwan University, Taiwan
March-May, 2013

Visiting Professors

Division of Synthetic Chemistry, Structural Organic Chemistry

Prof. FUKUZUMI, Shunichi Professor, Graduate School of Engineering, Osaka University

Division of Biochemistry, Chemical Biology

Prof. HASHIMOTO, Shunichi Professor, Faculty of Pharmaceutical Sciences, Hokkaido University

Division of Multidisciplinary Chemistry, Interdisciplinary Chemistry for Innovation

Prof. NAGASHIMA, Hideo Professor, Institute for Materials Chemistry and Engineering, Kyushu University

International Research Center for Elements Science, Advanced Solid State Chemistry

Prof. IMANISHI, Nobuyuki Professor, Graduate School of Engineering, Mie University

Division of Materials Chemistry, Polymer Controlled Synthesis

Assoc. Prof. YUSA, Shin-ichi Associate Professor, Graduate School of Engineering, University of Hyogo

Division of Environmental Chemistry, Hydrospheric Environment Analytical Chemistry

Assoc. Prof. NISHIOKA, Jun Associate Professor, Pan-Ohtsuk Research Center, Institute of Low Temperature Science, Hokkaido University

Advanced Research Center for Beam Science, Laser Matter Interaction Science

Assoc. Prof. YATSUI, Takashi Associate Professor, School of Engineering, The University of Tokyo

Bioinformatics Center Mathematical Bioinformatics

Assoc. Prof. SHIBUYA, Tetsuo Associate Professor, The Institute of Medical Science, Human Genome Center, The University of Tokyo

Visitors from Abroad in 2012



Major Research Projects

As of April 2013

Research and Education Funding

Joint Usage / Research Center: Frontier/Interdisciplinary Research Core in ICR for Deepening Investigation and Promoting Cooperation in Chemistry-Oriented Fields

■ Representative from ICR : SATO, Naoki / Term : 2010-2015

MEXT Project of Integrated Research on Chemical Synthesis

Joint Project with CRC (Hokkaido Univ), RCMS (Nagoya Univ), IMCE (Kyushu Univ)

■ Representative from ICR : OZAWA, Fumiyouki / Term : 2010-2015



Life Science Database Integration Projects

Key Technology Development for Data Integration and Application to Emerging Fields

■ Research Leader : GOTO, Susumu / Term : 2011-2013

Genome-based Integrated Resource for Diseases, Drugs, and Environmental Substances

■ Research Leader : KANEHISA, Minoru (Specially Appointed Professor) / Term : 2011-2013

JSPS International Training Program

International Research and Training Program on Bioinformatics and Systems Biology

■ Program Director : MAMITSUKA, Hiroshi / Term : 2009-2013

Human Resource in ICR

Faculty

Numbers in () Represent Visiting Professors.

Professor	Associate Professor	PS* Associate Professor	** Assistant Professor	PS* Assistant Professor	Technician	PS* Researcher	Sub-total	Researcher**	Other Staff	Sub-total	Total
29	19	1	38	5	9	11	112	34	31	65	177
(4)	(4)						(8)				(8)

* PS: Program Specific ** Including Researchers from Abroad As of July 1, 2013

Researchers(PD) from Abroad

Country	Number	Country	Number	Country	Number	Country	Number
Austria	1	Canada	1	China, P. R.	6	France	1
India	2	Korea, R.	1	Taiwan	2	UK	1
Vietnam	2					Total	17

As of May 1, 2013

Research Students, Fellows and Associates

Research Student	Research Fellow	Postdoctoral Fellow of JSPS	Research Associate	Total
3	0	8	11	22

As of May 1, 2013

Graduate Students

Numbers in () Represent Students from Abroad.

	Science	Engineering	Agriculture	Pharmaceutical Sc.	Medicine	Informatics	Human & Environmental Studies	Total
Master's Course	46 (1)	53 (3)	14 (2)	12 (2)		3 (3)		128 (11)
Doctoral Course	30 (3)	11 (2)	2	16 (4)	3 (2)	7 (3)	1	70 (14)
Total	76 (4)	64 (5)	16 (2)	28 (6)	3 (2)	10 (6)	1	198 (25)

As of May 1, 2013

Graduate Students from Abroad

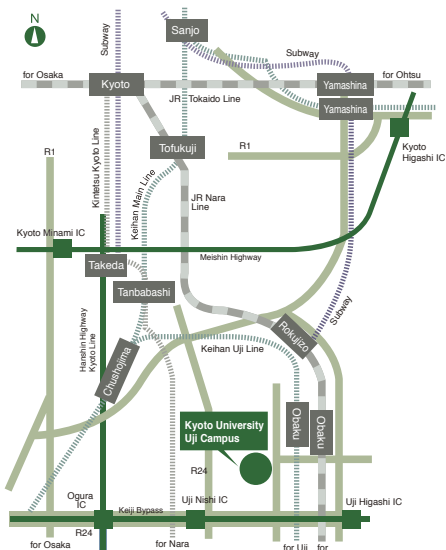
Country	Number	Country	Number	Country	Number	Country	Number
China, P. R.	17	Egypt	1	Korea, R.	2	Philippines	1
Taiwan	3	Thailand	1			Total	25

As of May 1, 2013



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Kyoto University**

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E-mail: koho@scl.kyoto-u.ac.jp



Access

From Obaku Station on the JR Nara Line: 7 min by walk

(from Kyoto Station to Obaku Station: 20 min)

From Obaku Station on the Keihan Uji Line: 10 min by walk

(from Sanjo Station to Obaku Station: 35 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