

2006

Institute for Chemical Research Kyoto University

京都大学化学研究所

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





2006

Institute for Chemical Research Kyoto University

京都大学化学研究所

Challenge and Innovation

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Director
ESAKI, Nobuyoshi

The Special Institute of Chemical Research was founded at the Kyoto Imperial University, College of Science to study and produce salvarsan in 1915. The Institute for Chemical Research, which was established through the expansion of this facility as a "comprehensive research institute for chemistry" in 1926, will celebrate its 80th anniversary in 2006.

During the Taisho period, to improve the scientific research at the imperial universities, which at the time were focused on education rather than research activities, many other institutes were established in addition to the Institute for Chemical Research, including the Institute of Infectious Diseases, the Astronomical Observatory, the Aeronautical Research Institute, the Earthquake Research Institute at the Tokyo Imperial University, and the Institute for Materials Research at the Tohoku Imperial University.

The background for the establishment of each facility differs from institution to institution. The Special Institute of Chemical Research paid the research expenses using the income from the sales of salvarsan. With these profits, the institute managed to expand the scope of its research in a manner that was similar to what we now call a venture company. The faculty members involved in the research had backgrounds in chemistry and worked for undergraduate schools of science, engineering, medical science, and agriculture. As a result of extensive negotiations with the Ministry of Education and through the joint efforts of these faculty members, the Institute for Chemical Research was officially approved as an institute attached to the university. From the outset, the Institute for Chemical Research was a comprehensive research organization that involved all the departments related to natural sciences from Kyoto University. This feature distinguishes the Institute for Chemical Research among the many institutes attached to other universities.

The basic policy of the Institute for Chemical Research is "freedom of research", which is not restricted to only chemistry; the scope of our research expands into physics, biology, and informatics, in which we have achieved a number of milestones. As a result, this institute has developed into a large-scale research organization with 104 faculty members and 240 graduate students engaged in research activities in 31 laboratories supervised by full-time professors and five laboratories supervised by visiting professors, which are divided into three centers and five research divisions. Currently, each division (i.e., laboratory) of the Institute for Chemical Research acts as a cooperative chair for 11 majors in one of seven graduate schools: science, engineering, pharmaceutical science, agriculture, medical science, informatics, and human and environmental sciences. The ideas that underlie this unique "multidisciplinary community" were introduced at the time the institute was established some 80 years ago.

One can think of the Institute for Chemical Research as a kind of department store or a something-for-everyone type of institute. Each part of the institute, however, cooperates flexibly, and is committed to

the creation of pioneering new fields. Typical examples are the laboratories related to bioinformatics, which were established and developed in this way. These laboratories now serve as the Center of Excellence that lead the world in the field of bioinformatics. We can say with confidence that a cooperative framework, which offers positions or maintenance and repair expenses when required, has firmly taken root at the Institute for Chemical Research. This genuine cooperative framework operates not with a top-down approach but from the bottom up. It serves as one of the essential intangible assets for energetic research and education activities at a corporate university.

Several years ago, we discussed the vision which the Institute for Chemical Research should rely upon. We realized that the idea that led to the establishment of the Institute 80 years ago, which was stated to excel in the investigation of basic principles of chemistry and chemical application, clearly and aptly summarizes what the institute is trying to accomplish. Therefore, we decided to carry on this vision and now we are eager to move forward at the Institute for the Chemical Research. We have interpreted "special matters" to mean pioneering, state-of-the-art, interdisciplinary, and integrated research programs. We can perform our duties as an essential partner for the graduate schools by aggressively promoting research and education that are not addressed well at other undergraduate and graduate schools. The vision governing the Institute for Chemical Research was that the institute should perform excellent, freethinking research regardless of whether it is basic or applied; this is an excellent insight into what represents the true nature of research.

Based on an intrinsic approach from the bottom up that fosters original research, we plan to strengthen our continued support for integrated research. The Institute is currently performing research activities either as the head or as a core member of the 21st Century Center of Excellence (COE) projects in the fields of chemistry, physics, and in the interdisciplinary areas of bioinformatics and pharmaceutical sciences. Among these areas, the chemistry project will soon be completed.

Through various activities including the exchange of postgraduate students with overseas institutes, the number of postgraduate students has grown significantly. We are confident that many of these students will become leading researchers in the future. The more we promote interdisciplinary collaboration, the more we can convey the characteristics of the Institute for Chemical Research to other institutions abroad. We are committed to promote our research in collaboration with outstanding researchers inside the Institute within the university, across Japan, and throughout the world.

Finally, we appreciate your continued support and encouragement.

A handwritten signature in black ink, appearing to read "Nobuyoshi Esaki". The signature is fluid and cursive, written on a white background.

History



The First Building of ICR was constructed in Takatsuki, Osaka in 1929.



An exhibit showing the research activities at ICR submitted to the 4th Invention Fair at Tokyo in 1932. Here one can see the "latest" research in "activated carbon" or "soybeans oil separation". ICR has always been answering the commercial or social demands.



In 1955, the Cyclotron facility was established in the Old Keage Water Power Plant.



Lecture given by Professor Toshio Watanabe, a faculty member of ICR (1925-1935).

The Scientist's Heritage ICR, Kyoto University Professor Ichiro Sakurada

In this booklet, the industrialize plan of the very first chemical fiber invented in Japan is described.

The fiber was originally named "Gousei 1-go," which literally meant "The first chemical fiber." This fiber was later known by the popular name of "Vinyon." This booklet was donated to us from Professor Ichiro Sakurada who enthusiastically led this artificial fiber research project at Institute for Chemical Research, Kyoto University. The excellent members in this project included, Dr. Benki Ri a Korean scientist, Dr. Tsukumo Tomonari a member of Kurashiki Kenshoku Co. (present Kuraray Co., Ltd.), and so on. They reported the first synthetic fiber out of polyvinyl alcohol in 1939. The Vinyon was industrialized in 1950's. This booklet was dated 30 September 1942, in which we can find effort to make synthetic fiber commercialized.



YEAR

HISTORICAL EVENTS

SUCCESSIVE DIRECTORS

1915

Specialized Center for Chemical Research, a predecessor of Institute of the Chemical Research was founded.

1926

Institute for Chemical Research (ICR) was chartered with the founding philosophy, to "Excel in the investigation of basic principles of chemistry and chemical applications."

CHIKASHIGE, Masumi
1927~1930(1)

1929

The Main Building of ICR was constructed in Takatsuki, Osaka.

KITA, Gen-itsu
1930~1942(2)

1931

Research Factory Building was constructed.

1933

Workshop, Research Factory for Colloidal Drugs and Research Factory for Chemistry of Nutrition were established.

1935

Special Glass Laboratory and Research Factory for Fiber were established.

1936

Laboratory of Electric Chemistry and Transformer Station were established.
Research Factory for the Tundra Area was constructed in Saghalien.

1937

Test Factory for Synthetic Oil was established.

1939

Laboratory of Saviol Production was established, due to lack of imported medical Saviol during the World War II.

1940

Research Factory for Ceramics Chemistry and Research Factory for Synthetic Rubber were established.

HORIBA, Shinkichi
1942~1945(3)

1941

Research Factory for Colloidal Chemistry was established.

KONDO, Kinsuke
1945~1946(4)

1942

Booklet of the plan to industrialize "Gousei 1-go (Vinyon)," the first invented chemical fiber in Japan, was written by Ichiro Sakurada.

NOZU, Ryuzaburo
1946~1948(5)

1949

ICR became the first affiliated institute of Kyoto University. Hideki Yukawa was awarded the Nobel Prize in Physics for his prediction of the existence of mesons on the basis of theoretical work on nuclear forces.

UCHINO, Senji
1948~1953(6)

HORIO, Masao
1953~1956(7)

1955

Reconstruction of the Cyclotron was completed (in the Kyoto City Old Keage Water Power Plant).

TAKEI, Sankichi
1956~1959(8)

NAKAI, Risaburo
1959~1961(9)

1962

ICR established graduate schools to offer the advanced education for graduate students.

GOTO, Renpei
1961~1964(10)

1964

The Division System was introduced. ICR organization was divided into 19 research divisions and 1 satellite facility. Nuclear Science Research Facility was established in Awataguchi, Sakyo-ku, Kyoto.

KUNICHIKA, Sango
1964~1967(11)

TSUJI, Waichiro
1967~1970(12)

In the 80 years of its history, ICR has continued the challenge to uncover the basis of chemistry and answer the frontier quests. The liberal atmosphere of ICR supports the BIG battles to conquer the TINY world of molecules.

※Photograph is the monument of ICR in Takatsuki.

The Scientist's Heritage
ICR, Kyoto University

Professor Hideki Yukawa

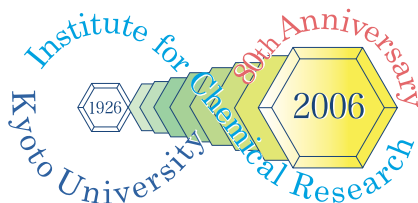
In 1949, Professor Hideki Yukawa was awarded the Nobel Prize in Physics in recognition of his research on elementary particle. This is a poster of the "Special Public Lecture" held at ICR in 1953, where Professor Yukawa delivered his famous research theory on "What is an elementary particle?" He graduated Kyoto Imperial University (KIU) at the age of 22, and promoted to a lecturer at KIU at the age of 25. He then took professorship at an University in Osaka for a time. In 1939 he returned to KIU and became a Professor at the Faculty of Science at the age of 32. He had been a faculty at ICR since 1943, the same year he was awarded the honorable "Order of Culture" at the most youngest in Japanese history. He was very active and enthusiastically affiliated to Universities and Institute throughout the world. His devotion and great contribution to ICR goes beyond his last days in 1968.



The High-voltage Electron Microscopy was the first equipment placed at Gokasho, Uji, the present location of ICR. This led the way for following labs to move to Uji Campus.



Building to hold large seminars and research presentations. In 1999, ICR built the Joint Research Laboratory.

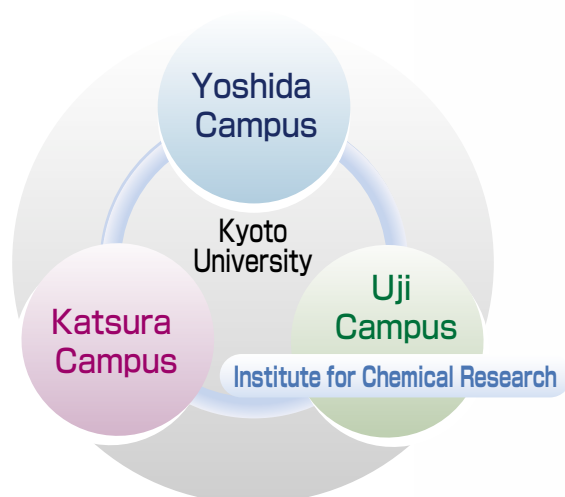


The logo for the 80th Anniversary of ICR. The stream of the letters represents the infinite possibility for ICR. The hexagons represent ICR's history and evolution for the last eight decades. ICR white colored birth is followed by a series of green colored youth, then leading to the yellow colored present. One can see the bright 80th year shining into the colorful future to come.

YEAR	HISTORICAL EVENTS	SUCCESSIVE DIRECTORS
1968	High-Voltage Electron Microscopy was located at Gokasho, Uji (Uji Campus). ICR was moved to Uji Campus.	KUNICHIKA, Sango 1970~1972 (13)
1971	Low-Temperature Laboratory was established.	SUITO, Eiji 1972~1974 (14)
1975	Biotechnology Laboratory and Central Computer Facility were established.	TAKEZAKI, Yoshimasa 1974~1976 (15)
1980	DNA Laboratory was established.	SHIGEMATSU, Tsunenobu 1976~1978 (16)
1983	Nucleic Acids Laboratory was built.	TASHIRO, Megumi 1978~1980 (17)
1987	The Division System was revised. ICR organization became 19 research divisions and 2 satellite facilities.	TAKADA, Toshio 1980~1982 (18)
1988	Nuclear Science Research Facility was moved to Gokasho, Uji. Accelerator Laboratory and Research Building were completed.	FUJITA, Eiichi 1982~1984 (19)
1989	High-Resolution Electron Spectromicroscope was established.	INAGAKI, Hiroshi 1984~1986 (20)
1992	ICR was reorganized into 9 research divisions and 2 satellite facilities. Supercomputer Laboratory was established.	KURATA, Michio 1986~1988 (21)
1999	Joint Research Laboratory Building was constructed.	TAKANAMI, Mituru 1988~1990 (22)
2000	Administration Departments of ICR and other institutes in Uji Campus were integrated.	SAKKA, Sumio 1990~1992 (23)
2001	Bioinformatics Center was established.	ODA, Jun-ichi 1992~1994 (24)
2002	Proteome Informatics was established with donation from SGI Japan. (It has finished on March, 2005.) Bioinformatics Training Unit was offered as one of the programs in Bioinformatics Center.	MIYAMOTO, Takeaki 1994~1996 (25)
2003	ICR was reorganized into 9 research divisions and 3 satellite facilities. International Research Center for Elements Science was established.	SHINJO, Teruya 1996~1998 (26)
2004	ICR was reorganized into 5 research divisions and 3 centers. Advanced Research Center for Beam Science was established. Uji Research Building was constructed.	SUGIURA, Yukio 1998~2000 (27)
2005	Laser Science Laboratory was built.	TAMAOKO, Kohei 2000~2002 (28)
		TAKANO, Mikio 2002~2005 (29)
		ESAKI, Nobuyoshi 2005~ (30)

Research Activities

3 Campuses of Kyoto University



Faculties and Researchers

University Staffs

(As of June 1, 2006)

Professor	Associate Professor	Assistant Professor	Research Associate	Technician	Sub-total
30 (4)	24 (4)	40 [1]	4	8	106 [1] (8)
Researcher	Other Staff				Sub-total
33	61				94
Total					200 [1] (8)

The number in [] represents Fixed Term Program-specific Faculty.
The number in () represents Visiting Professors.

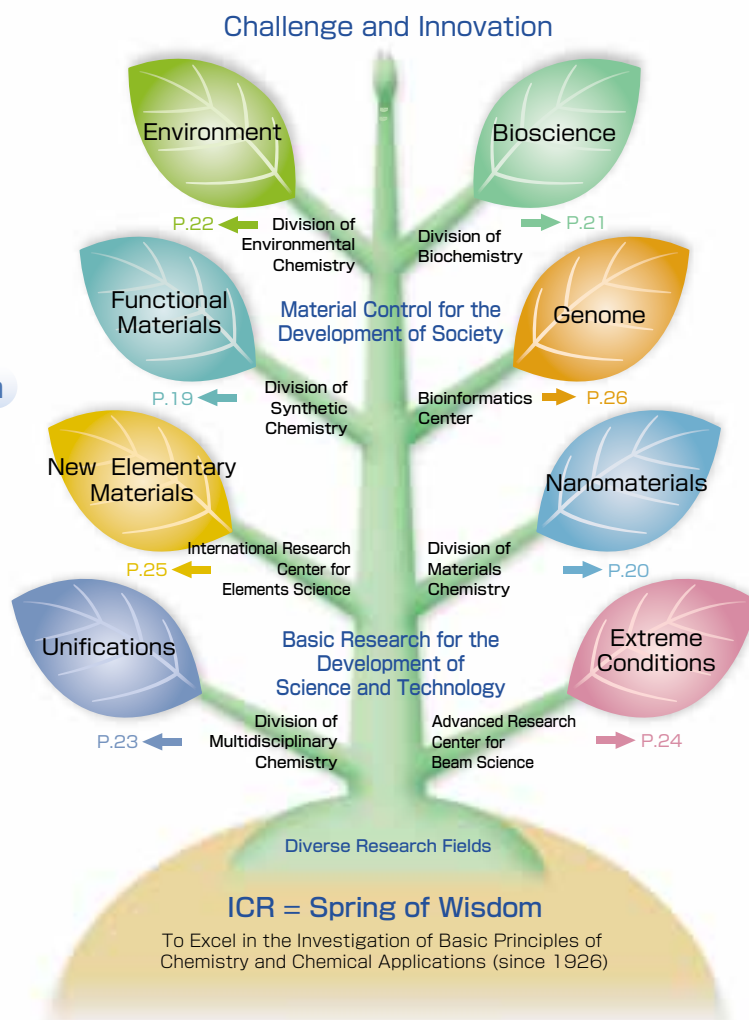
Research Students, Fellows and Associates

(As of May 1, 2006)

Research Student	Research Fellow	Sub-total
6	6	12
Postdoctoral Fellow of JSPS	Research Associate	Sub-total
11	10	21
Total		33

Institute for Chemical Research, Kyoto University

5 Research Divisions and 3 Research Centers



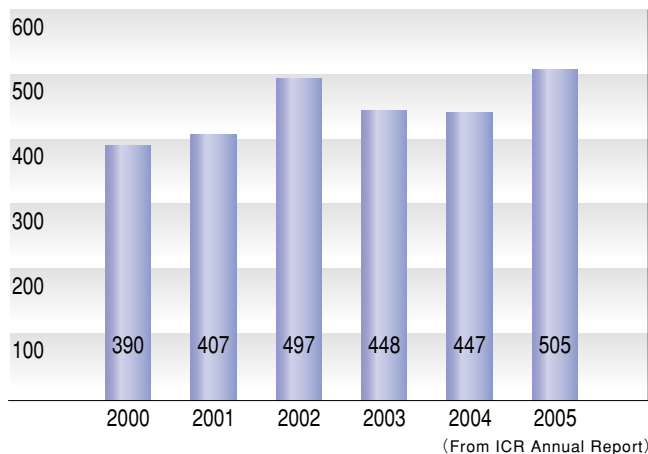
ICR is located in the Uji Campus of Kyoto University. 31 Laboratories constitute the system of "5 Research Divisions and 3 Research Centers" and more than 100 faculties and many researchers are engaging various research of science.

Diverse Research Fields

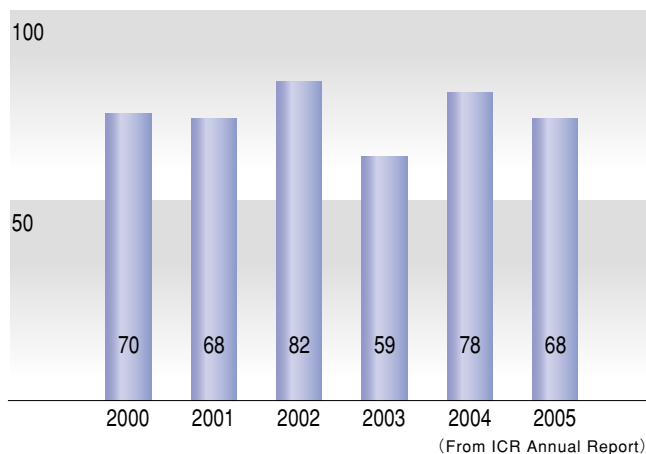


Chemistry, Physics, Biology, Informatics...
31 laboratories are covering a variety of scientific fields,
and developing novel technologies for the future.

Publications



Seminars



Major Research Projects

As of June, 2006

Ministry of Education, Culture, Sports, Science and Technology (MEXT), Center of Excellence 21st Century COE Programs

Center of Research and Knowledge Information Infrastructure for Genome Science

Joint Program with Graduate School of Pharmaceutical
Science, and Kyoto University Hospital

Project Leader : KANEHISA, Minoru Term : 2003-2007



Genome Science is a new area of life science in the 21st century, endeavoring to gain an overall picture of high-level life systems such as cells, whole organisms, and ecosystems. The core of this field is bioinformatics, and our group is particularly aimed towards medicinal and industrial applications, pioneering a new field of study fusing genomics and chemistry in bioinformatics.

Laboratories, participate from ICR

Bioinformatics Center, Chemical Biology, Supramolecular Biology

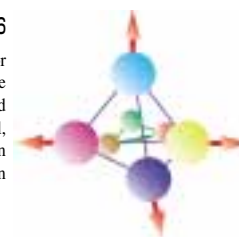
Kyoto University Alliance for Chemistry

- Chemistry for Materials Conversion -

Joint Program with Graduate School of Science and
School of Engineering

Representative from ICR : TOKITOH, Norihiro Term : 2002-2006

This project is pushing on with the construction of a new alliance for chemical research of the highest standard by promoting an active interchange among the two graduate schools and one institute related to chemistry in Kyoto University with paying respect for the original, unique research environment of individual institutions. In addition, an effective higher education on chemistry is provided by the execution of a new educational program, which extends all over the alliance.



Laboratories, participate from ICR

Organoelement Chemistry, Structural Organic Chemistry, Chemistry of Polymer Materials, Inorganic Photonics Materials, Biofunctional Design-Chemistry, Solution and Interface Chemistry, Molecular Microbial Science, Electron Microscopy and Crystal Chemistry, Organic Main Group Chemistry, Advanced Solid State Chemistry, Organotransition Metal Chemistry

Center for Diversity and Universality in Physics

- Unified Research and Education on Elementary Particles,
Macroscopic Systems and the Universe -

Joint Program with Graduate School of Science, YITP,
Kwasan and Hida Observatories, and KU-IIC

Representative from ICR : NODA, Akira Term : 2003-2007

Aims at deep understanding of various physical processes peculiar to each level in nature, creation of new research fields and clarification of universal principle common to all over the levels. Making emphasis on training and education of young scientists, young researchers with good international competition are to be brought up through international collaborations, organizing of international conferences and sending to the ones overseas.



Laboratory, participate from ICR

Particle Beam Science

Research Activities

Major Research Projects

As of June, 2006

MEXT, Research and Education Funding for Inter-University Research Project

Joint Project of Chemical Synthesis Core Research Institutions

Joint Project with RCMS (Nagoya Univ.), and IMCE (Kyushu Univ.)

Representative from ICR : OZAWA, Fumiuyuki Term : 2005-2009

The purpose of this joint research program is to develop novel synthetic chemistry for production of new materials through the intimate cooperation of three highly recognized research groups. The education and training of young scientists would also benefit from a research environment that exposes them to different branches of materials chemistry.



Laboratories, participate from ICR International Research Center for Elements Science, etc.

MEXT, Nanotechnology Support Project Nanotechnology Support Project in Kyoto University

Precise Analysis Support of Nanoscale Materials

Cooperative Project with KU-VBL, Advanced Research Institute of Nanoscale Science and Engineering

Representative from ICR : ISODA, Seiji Term : 2002-2006

As part of the nanotechnology support project promoted by the MEXT, the precise analysis support of nanoscale materials is offered under cooperation of three departments in Kyoto University. Many equipment are opened for nanotechnology users with support of university researchers having deep knowledge and plentiful experience.

MEXT, Leading Project Research and Development Project for Economic Activation

Practical Development of Nanoscale Electronic State Analysis

Cooperative Project with IMRAM (Tohoku Univ.), JAERI, and JEOL

Representative from ICR : KURATA, Hiroki Term : 2004-2006

It aims to develop a general-purpose analytical electron microscope for practical use in nanoscale electronic state analysis. To achieve high-resolution in electron energy loss spectroscopy and X-ray emission analysis, the microscope equips a highly-stabilized high-brightness nano-tip electron gun. These technical elements are newly developed as the core of future microscopes.

Special Coordination Fund of the MEXT, Bioinformatics Training Unit

Education and Research Organization for Genome Information Science

Cooperative Program with HGC (Univ. of Tokyo)

Representative : KANEHISA, Minoru Term : 2002-2006

We are training talented youth to be internationally active in bioinformatics, with a distance learning system for up to three-way simultaneous real-time broadcast, an e-learning system using WebCT and a video lecture library, and international workshops with universities in the US and Germany.

Laboratories, participate from ICR Bioinformatics Center

MEXT, Next-Generation Supercomputing Nanoscience Project

Next-Generation Nano-biomaterial and Environment

Cooperative Project with IMS, RIKEN, ISSP (Univ. of Tokyo), KEK, AIST

Representative from ICR : NAKAHARA, Masaru Term : 2003-2007

A national project for the theoretical prediction and design of nano-scale materials. By introducing the grid technology into the physical and chemical researches, a new theory is developed and a huge-scale computation is performed by outstanding scientists in the field of theoretical-computational chemical sciences.

6

Grants-in-Aid for Specially Promoted Research

Science and Technology of Concentrated Polymer Brushes

Research Leader : FUKUDA, Takeshi Term : 2005-2008

This project aims at pioneering new fields of science and technology based on concentrated polymer brushes, which are turning out to be highly rigid and strong, extremely smooth, and effectively size-excluding surfaces comprising of highly extended flexible polymers.

Grants-in-Aid for Creative Scientific Research

The Chemistry of Unsaturated Compounds of Heavier Main Group Elements: Pursuit of Novel Properties and Functions

Research Leader : TOKITOH, Norihiro Term : 2005-2009

By taking advantage of the method for kinetic stabilization, the synthesis and isolation of a variety of unsaturated compounds containing heavier main group element(s) will be examined in the hope of developing novel functional materials with making use of the characteristics of each element. As a result, new research fields will be established for the chemistry in pursuit of novel physical properties and functions.

Projects at Institute of Sustainability Science

Institute of Sustainability Science (ISS) was established in April 2006 as a joint research unit consisting of Institute for Chemical Research (ICR), Institute of Advanced Energy (IAE), Research Institute for Sustainable Humanosphere (RISH), Disaster Prevention Research Institute (DPRI), and the Center of Southeast Asian Studies (CSEAS). The objective of this joint organization is to incubate the seeds of the "Science for society," contribute to human sustainability, and the seeds of "Frontier science" that will nurture young researchers. From ICR, dozens researchers participate in ISS related projects, and the following 4 projects have started 2006 with ICR researchers as its Project Leader.



Exploratory Research

Projects	Project Leader	Collaborating Institutes
Morphological and Functional Differentiation of Root Hairs for Absorbing Inorganic Nutrients	AOYAMA, Takashi	RISH
Exploratory Study on New Chemical Reactions Exploiting Biorenewable Carbon Resources	NAKAMURA, Masaharu	RISH
Germinal Research of Particle Movement and Material Circulation Dynamics in Brackish / Fresh Water Regions Targeting Interdisciplinary Fusion	WATANABE, Hiroshi	DPRI

Interdisciplinary Research

Projects	Project Leader	Collaborating Institutes
Development of Efficient Intracellular Delivery Systems as Sustainability Biotechnology	FUTAKI, Shiroh	IAE

Major Grants and Funds in 2006

As of May, 2006

(Over ten million yen)

Specially Promoted Research	Science and Technology of Concentrated Polymer Brushes	FUKUDA, Takeshi
Creative Scientific Research	The Chemistry of Unsaturated Compounds of Heavier Main Group Elements: Pursuit of Novel Properties and Functions	TOKITOH, Norihiro
Priority Areas Research	Mathematical Analysis of Structure and Dynamics of Biological Information Networks	AKUTSU, Tatsuya
	Biological Systems Database	KANEHISA, Minoru
Scientific Research (S)	Chemistry and Physics of 3d Transition Metal Oxides Equipped with Deep 3d Levels: Search for New Materials and New Functions	TAKANO, Mikio
Scientific Research (A)	Science and Functions of Organic Amorphous Materials - Approach from Precise Static and Dynamic Structural Analysis	KAJI, Hironori
	Fine Organic Synthesis by Nucleophilic Catalysis	KAWABATA, Takeo
MEXT, Research Revolution 2002	Nanotechnology Support Project; Precise Analysis Support of Nanoscale Materials	ISODA, Seiji
MEXT, Leading Project	Practical Development of Nanoscale Electronic State Analysis	KURATA, Hiroki
Contact Research	Probing the <i>Plasmodium falciparum</i> Genome (JST)	GOTO, Susumu
	Deciphering Systemic Biological Functions by Integration of Genomic and Environmental Information (JST)	KANEHISA, Minoru
Joint Research	Studies on Crystallization Process of PLA (TOYOTA Motor Corporation)	KANAYA, Toshiji
Inter-University Research Project	Joint Project of Chemical Synthesis Core Research Institutions	OZAWA, Fumiyuki*
21st Century COE Program	Center of Research and Knowledge Information Infrastructure for Genome Science	KANEHISA, Minoru*
	Kyoto University Alliance for Chemistry -Chemistry for Materials Conversion-	TOKITOH, Norihiro*
Special Coordination Fund of the MEXT	Bioinformatics Training Unit: Education and Research Organization for Genome Information Science	KANEHISA, Minoru
Industrial Technology Research Grant Program by NEDO	Cellular Imaging of Small Molecules	UESUGI, Motonari

* the Project Leader, or the Representative from ICR

Grants-in-Aid for Scientific Research

Partnership between Universities and Industry

Research and Education Funding

Other Funds

Major Grants and Funds in 2005

(Over ten million yen)

Specially Promoted Research	Science and Technology of Concentrated Polymer Brushes	FUKUDA, Takeshi
Creative Scientific Research	The Chemistry of Unsaturated Compounds of Heavier Main Group Elements: Pursuit of Novel Properties and Functions	TOKITOH, Norihiro
Priority Areas Research	Mathematical Analysis of Structure and Dynamics of Biological Information Networks	AKUTSU, Tatsuya
	Biological Systems Database	KANEHISA, Minoru
Scientific Research (S)	Chemistry and Physics of 3d Transition Metal Oxides Equipped with Deep 3d Levels: Search for New Materials and New Functions	TAKANO, Mikio
Scientific Research (A)	Control of Physical Properties by Utilizing Spin-polarized Current	ONO, Teruo
	Science and Functions of Organic Amorphous Materials - Approach from Precise Static and Dynamic Structural Analysis	KAJI, Hironori
	Creation of New Bio-interfaces Based on High-Density Polymer Brushes	TSUJII, Yoshinobu
Scientific Research (B)	Study of Relationship between Rheological Properties and Loop Fraction in Multi-block Copolymers	WATANABE, Hiroshi
	Development of Intracellular Targeting Peptide Vectors and the Real-time Observation of the Intracellular Delivery	FUTAKI, Shiroh
Young Scientists (A)	Science of (Semi-soft) Colloidal Crystals of High-Density Polymer Brush/Inorganic Fine Particle Hybrid Systems	OHNO, Kohji
MEXT, Research Revolution 2002	Nanotechnology Support Project; Precise Analysis Support of Nanoscale Materials	ISODA, Seiji
MEXT, Leading Project	Practical Development of Nanoscale Electronic State Analysis	KURATA, Hiroki
Contact Research	Probing the <i>Plasmodium falciparum</i> Genome (JST)	GOTO, Susumu
	Research and Development of Novel Polymer-Electrolyte Membrane with Ionic-Liquid Polymer by High-Density, Controlled Graft-Polymerization Technique (NEDO)	TSUJII, Yoshinobu
Inter-University Research Project	Joint Project of Chemical Synthesis Core Research Institutions	OZAWA, Fumiyuki*
21st Century COE Program	Center of Research and Knowledge Information Infrastructure for Genome Science	KANEHISA, Minoru*
	Kyoto University Alliance for Chemistry -Chemistry for Materials Conversion-	TOKITOH, Norihiro*
Special Coordination Fund of the MEXT	Bioinformatics Training Unit: Education and Research Organization for Genome Information Science	KANEHISA, Minoru

* the Project Leader, or the Representative from ICR

Grants-in-Aid for Scientific Research

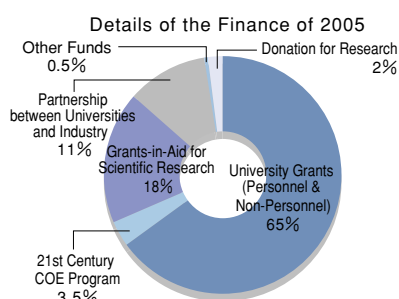
Partnership between Universities and Industry

Research and Education Funding

Other Funds

Finance

2001~2005



	Personnel	Non-Personnel	21st Century COE Program	Grants-in-Aid for Scientific Research	Partnership between Universities and Industry	Other Funds*	Donation for Research	Total
2001	1,397,585	1,725,272	—	814,418	356,231	98,673	106,478	4,498,657
2002	1,471,582	1,680,788	65,000	677,913	130,578	514,748	109,766	4,650,375
2003	1,246,811	1,590,885	163,815	651,521	188,351	442,525	110,422	4,394,330
2004	1,458,777	1,318,372	149,759	567,740	254,884	485,301	81,638	4,316,471
2005	1,392,000	1,313,534	150,074	754,366	439,384	17,620	69,529	4,136,507

* For 2001, including other competitive research funds of the Japanese Government (315,230)
 For 2002, including other competitive research funds of the Japanese Government (17,998)
 For 2003, including other competitive research funds of the Japanese Government (16,286)

Facilities



Nucleic Acids Laboratory 1,207m²



Biotechnology Laboratory 540m²



High-Resolution Electron Spectromicroscope Laboratory 913m²
Low-Temperature High-Resolution Electron Microscope Laboratory 586m²
 (Advanced Research Center for Beam Science)



Laser Science Laboratory 242m²
 (Advanced Research Center for Beam Science)

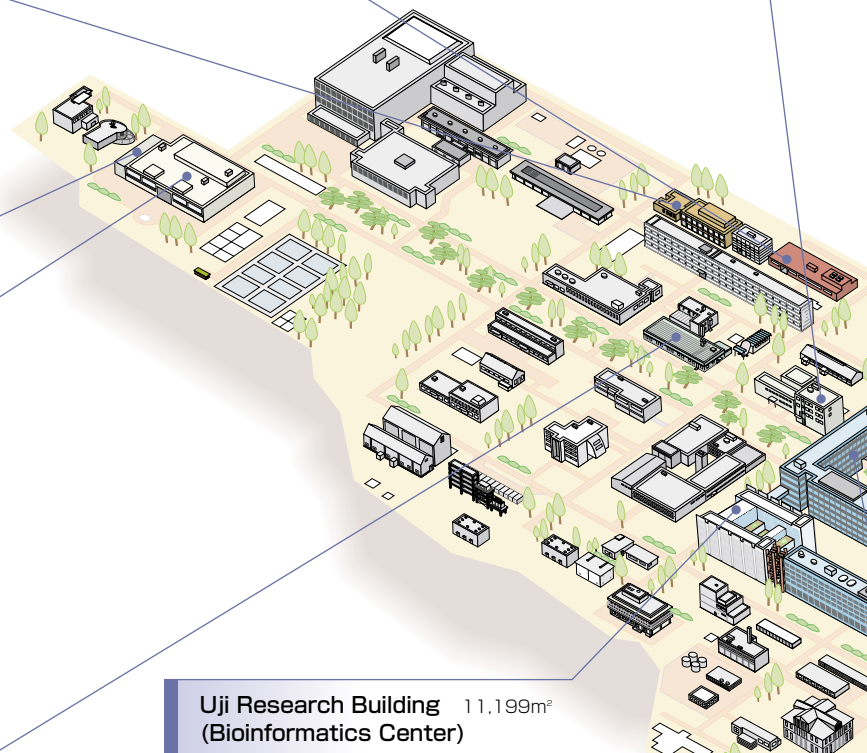
Accelerator Laboratory 2,910m²
 (Advanced Research Center for Beam Science)



Low-Temperature Laboratory 760m²



Uji Research Building 11,199m²
 (Bioinformatics Center)



for Mimurodo
 for Uji

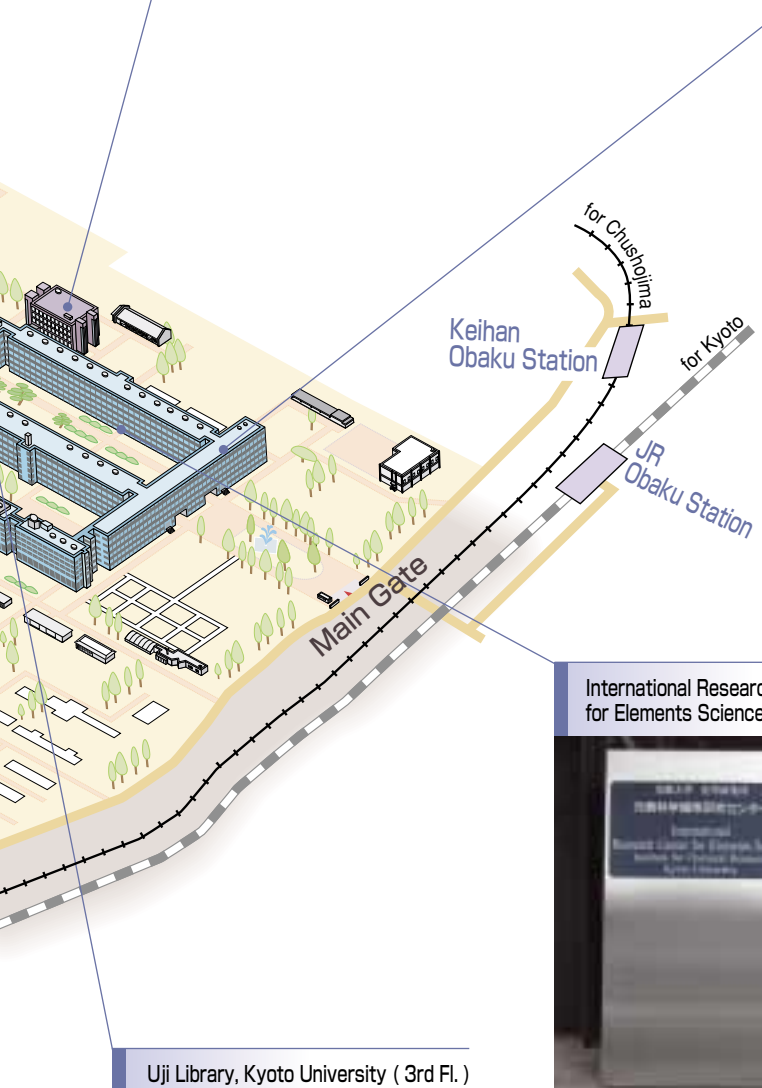
ICR is located on the Uji River side. It is one of the most important section of Kyoto University. There are 31 laboratories within about 10 buildings.



Joint Research Laboratory Building 3,777m²



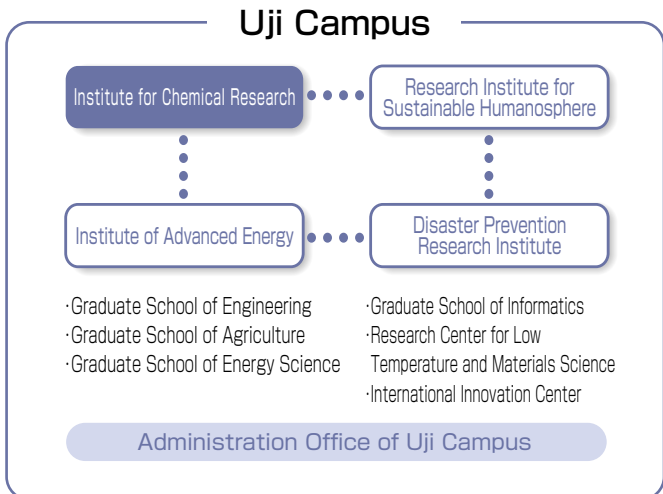
Main Building 11,714m²
Administration Office (3rd Fl.)



International Research Center for Elements Science



Uji Library, Kyoto University (3rd Fl.)



Uji is famous for its verdurous riverfront scenery. Here has been a strategic point between Kyoto and Nara, the old capitals of Japan. There are two World Heritages, Byodoin Temple and Uji-gami Shrine. We endeavor to enrich the buildings and facilities those are suitable to the center for the most advanced studies and harmonious with nature and the local community.

Research Instruments

Main Building



Mass Spectrometer

Triple stage quadruple MS/MS system: Finnigan mat TSQ7000. Mass range: m/z 1–100,000 (ESI), m/z 1–1,000 (APCI). Ion source: ESI, APCI (positive, negative)



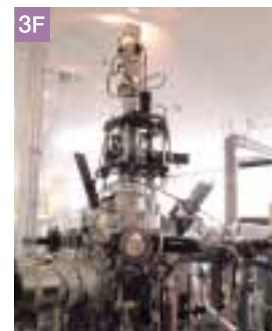
X-ray Data Collection System for Biological Macromolecular Crystals

An equipment which can digitalize diffraction images obtained on an IP detector by irradiating mirror-focused X-rays to biological macromolecular crystals. This enables cryo-crystallographic measurement.



Solution Nuclear Magnetic Resonance Apparatus

ECA600 supplied by Jeol Co. Ltd. can measure the ^1H to ^{14}N nuclei at world-record sensitivity and make possible in-situ observations for living cells and dynamic measurements for such nanoscale structures as membranes.



Pulsed-Laser Deposition System

Thin-film samples are grown by deposition of ablated target materials with KrF excimer laser ($\lambda:248\text{nm}$). Atomic layer-by-layer film-growth can be monitored through in-situ RHEED system.

10

High-Resolution Electron Spectromicroscope Laboratory



High Resolution Electron Spectromicroscope

Structures of materials can be analyzed at atomic resolution by using 1000 keV electron beam, and EELS can investigate electronic states and elemental distributions in nanoscale regions.

Accelerator Laboratory



Electron Storage Ring, KSR

Accumulates electrons up to 300 MeV and can be utilized as a synchrotron light source. It is also used as a pulse stretcher of the time structure of the output beam from 100 MeV electron Linac. It is further applied for investigation of electron-ion interaction by combination with an ion trap.

Biotechnology Laboratory



Multifunctional Automatic Fermentor

A large-scale fermentor with a 500-L chamber operated under accurate control of temperature, pH, and aeration rates, and useful for large-scale production of biomolecules.

Laser Science Laboratory

Intense Short-Pulse Laser System

T^6 -laser: the CPA-laser system consisting of a short-pulse mode locked oscillator and three amplifiers, emitting 200mJ in 100fs (2TW)(1J in 100fs, 10TW at maximum). In Laser Irradiation Room, adjoining to the T^6 -laser Room, laser-matter interaction experiments with the T^6 -laser can be performed.



ICR is engaged in wide range of research covering most fields of chemistry. High-performance and highly efficient instruments are equipped in ICR. These equipments are essential elements to enable advanced research in chemistry.

Joint Research Laboratory Building



Matrix-Assisted Laser Desorption Ionization Time-Of-Flight Mass Spectrometry (MALDI-TOFMS)

A MALDI-TOFMS can easily analyze molecular masses of macromolecules including proteins and synthetic polymers at high mass resolving powers of 15,000 with mass range greater than 100kDa.



High-Pressure Synthesis Equipment

This apparatus enables us to make samples under extreme conditions up to 50,000 atm and 2000°C (1cc sample volume). We also have another apparatus for material synthesis at 100,000 atm (0.04cc sample volume).



Electron Spin Resonance Spectrometer

Bruker Model EMX 8/2.7. Equipped with a 9.5-kG magnet and a variable low temperature controller. Organic free radicals and inorganic paramagnetic materials can be studied.



Angle-Resolved Photoemission Spectrometer

An apparatus to observe electronic states in solids and thin films using X-ray and/or vacuum ultraviolet light; information of geometrical as well as electronic structures is available with angle-resolved measurements.

Uji Research Building



GenomeNet Server

Origin3800 supercomputer systems and Sun Fire 15K systems are used for research in computational chemistry and bioinformatics as well as for the GenomeNet Service.



Low-Temperature Laboratory



High-Temperature and High-Resolution Nuclear Magnetic Resonance Apparatus

A molecular-level observation is made directly possible for noncatalytic organic chemical reactions in supercritical water, in strong connections to the development of environmentally friendly processes and to the understanding of the chemical evolution.



Electron Beam Writer

The electron beam writer is used for nano-scale patterning.

Nucleic Acids Laboratory

P3-Level Bio-Safety Room

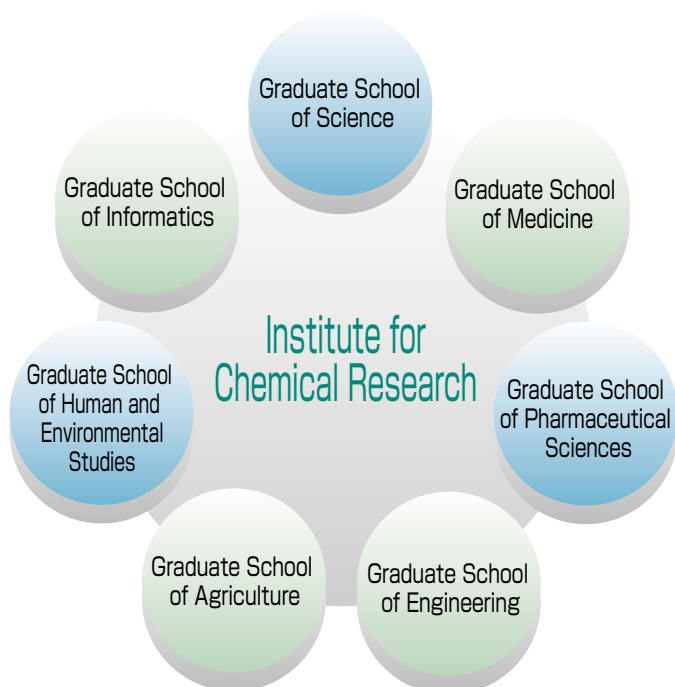
A specific laboratory for recombinant DNA experiments requiring physical containment up to the P3 level



Education

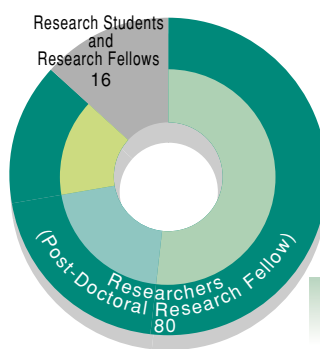
Education in the Graduate Schools

Every laboratory is affiliated with one of the Graduate Schools and has contributions to education.

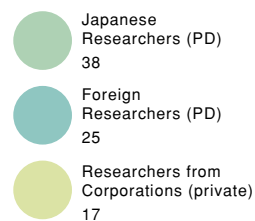


Training of Younger Researchers

Details of Researchers in ICR, 2006
(without Faculties and Graduate Students)



Details of Researchers
(Post-Doctoral Research Fellows)



Affiliation of Researchers from Corporation (private), 2006

C.P.R.	Sekisui Chemical
Credia Japan	Shionogi
GUNZE	Sumitomo Electric Industries
Kirin Brewery	Takeda Pharmaceutical
KONICA MINOLTA	The Nippon Synthetic Chemical Industry
Ohcera	The Yokohama Rubber

Doctoral and Master's Degrees

Doctoral Degrees

(January 1-December 31, 2005)

Science	Engineering	Agricultural Sc.	Pharmaceutical Sc.	Medical Sc.	Informatics	Total
12	8	8	6	0	1	35

Master's Degrees

(April 1, 2005-March 31, 2006)

Graduate School of Science	Graduate School of Engineering	Graduate School of Agriculture	Graduate School of Pharmaceutical Sc.	Graduate School of Informatics	Total
22	24	11	5	1	63

Graduate Students and their Origins

As of May 1, 2006

Graduate Schools	Course	Domestic		Foreign							Total
		Kyoto University	Other Universities	Canada	China, P.R.	Indonesia	Italy	Korea, R.	Thailand	USA	
Science	M C	20	37								57
	D C	29	14			1	1				45
Engineering	M C	41	5								46
	D C	7	6								13
Agriculture	M C	2	23	1	1						27
	D C	8	4		1						13
Pharmaceutical Sciences	M C	2	9								11
	D C	4	6					1			11
Medicine	M C		2								2
	D C	1									1
Informatics	M C	2	3							1	7
	D C	1	2								3
Human and Environmental Studies	M C		2								2
	D C										0
Sub-total	M C	67	81	1	1	0	0	0	1	1	152
	D C	50	32	0	1	1	1	1	0	0	86
Total		117	113	1	2	1	1	1	1	1	238

"Excellent Science" can only be achieved by "Excellent Scientists".
It is the responsibility of ICR to participate in the Education of the younger scientists.
ICR provides various opportunities for the next generation.

Training Programs for Young Researchers

Annual Schedule (from April, 2006 to March, 2007)

<p>April</p> <p>May</p> <p>July</p> <p>September</p> <p>October</p> <p>December</p> <p>February</p>	<p>Orientation for New Graduate Students</p> <p>Education about Safety and Health for New Graduate Students</p> <p>Spring Sports Tournaments (HEKISUIKAI)</p> <p>Summer Party (HEKISUIKAI)</p> <p>The 9th Chemical Research for High School Students</p> <p>Autumn Sports Tournaments (HEKISUIKAI)</p> <p>The 13th Public Lectures</p> <p>The 106th ICR Annual Symposium</p> <p>The 11th ICR Award for Young Scientists and ICR Award for Graduate Students</p> <p>Symposium of Graduate Students</p>	  
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ICR holds various programs to educate young researchers and graduate students. Symposiums and poster sessions are held for the young scientists to discuss their latest research activities. Parties and sport events are also held to form the network among each other.



ICR Annual Symposium

This Annual Symposium will count its 106th meeting this December 2006. Many young scientists and graduate students give oral and poster presentations about their latest researches. There, ICR Award for Young Scientists and ICR Award for Graduate Students are presented to young scientists with excellent research.

"ICR Award for Young Scientists" and "ICR Award for Graduate Students"

"ICR AWARD" was established to celebrate the 70th Anniversary of ICR. In 2006, on the occasion of ICR celebrating its 80th Anniversary, "ICR AWARD" has evolved into two distinct awards; "ICR Award for Young Scientists" and "ICR Award for Graduate Students". These awards commend young scientists and graduate students who has conducted excellent research.



After Graduation

The list of Corporation (private) and Universities, where ICR graduates work at (From 2002).

Master's Course Graduates

Corporation (private)

Accenture, AIR LIQUIDE Japan, Ajinomoto, API Corporation, ARKRAY, Asahi Glass, Asahi Kasei, Canon, Central Glass, Daiichi Pharmaceutical, Dowa Mining, Earth Chemical, EZAKI GLICO, Fuji Photo Film, Fuji Xerox, Fujisawa Pharmaceutical, Fullcast Technology, Furukawa Electric, Glico Dairy Products, HITEC, HOUSE FOODS CORPORATION, HOUSE WELLNESS FOODS CORPORATION, Inoue Tenyokudo, Ishihara Sangyo Kaisha, ITO EN, JAFCO, Japan Tobacco, JAPAN ENERGY CORPORATION, JASCO Corporation, JSR Corporation, Kansai Paint, Kansai TLO, Kao, Kikkoman, KIRIN Beverage, Knorr Foods, Kowa Company, Kyoto Pharmaceutical Industries, KYOWA HAKKO KOGYO, LOTTE, Marukin Bio, Matsushita Electric Industrial, Mazda Motor Corporation, Mitsui Chemicals, MITSUI OIL, Mochida Pharmaceutical, Morgan Stanley, Murata Manufacturing, NAIGAI Yakuhin, Nihon Unisys, Nippon Light Metal, Nippon Paint, Nippon Sheet Glass, Nippon Shokubai, Nippon Soda, Nissei, Ricoh, ROHM, SANWA SHURUI, Sanyo Chemical Industries, Sekisui Chemical, Sekisui Jushi, Sharp Corporation, SHIMADZU CORPORATION, Shin-Etsu Chemical, Shionogi, SUMITOMO BAKELITE, Sumitomo Chemical, Sumitomo Electric Industries, Sumitomo Pharmaceuticals, Sumitomo Rubber Industries, TAIHO PHARMACEUTICAL, TAIYO KAGAKU, Takara Shuzo, Takeda Analytical Research Laboratories, Takeda Pharmaceutical, The Kansai Electric Power, Toppan Printing, Toray Industries, TOWA Pharmaceutical, Toyama Chemical, Toyo Ink, Toyobo, Toyoda Gosei, Unicharm Corporation, etc.

Academic Institutions

Japan: Kanazawa University, Kyoto University, MEXT, Private Junior and Senior High School, Shiga Prefecture, The Graduate University for Advanced Studies, The University of Tokyo, Tokyo Institute of Technology, USA; University of Pittsburgh, etc., as Graduate Students of Doctoral Course, Academic Staffs, Faculties, and Researchers (PD)

Doctoral Course Graduates

Corporation (private)

Affymetrix Japan, Asahi Glass, Asahi Kasei, Diamond Phoenix, Hitachi Chemical Company, Hitachi, Kaneka Corporation, Kobe Steel, KYOWA HAKKO KOGYO, Nissan Chemical Industries, Novartis Pharma, Sekisui Chemical, Shiraimita, SUMITOMO BAKELITE, Sumitomo Chemical, Takeda Pharmaceutical, etc.

Academic Institutions in Japan

AIST, JAMSTEC, JAEA, Kochi University, Kyoto University, Nagaoka University of Technology, Nagoya University, National Institute of Informatics, NIMS, Osaka Bioscience Institute, Osaka Prefecture University, Osaka University, Public High School in Kyoto Prefecture, Public High School in Hyogo Prefecture, RIKEN, The Institute of Statistical Mathematics, The University of Tokyo, etc., as Academic Staffs, Faculties, and Researchers (PD)

Foreign Academic Institutions

Canada: Queens University, Denmark: Royal Veterinary and Agricultural University, France: Ecole des Mines de Paris, Germany: Max-Planck Institute for Kernphysik, Mongolia: National University of Mongolia, Switzerland: University of Geneva, Thailand: Chulalongkorn University, USA; Georgia Institute of Technology, USA; The Scripps Research Institute, USA; University of California, USA; University of Washington, USA; Virginia Polytechnic Institute and State University, etc., as Academic Staffs, and Researchers (PD)

Positions after ICR

From 2002

Researchers (PD etc.)

Corporation (private)

Accelerator Engineering Corporation, JSR Corporation, Hitachi Chemical, Sumitomo Chemical, Sumitomo Electric Industries, Tokyo Kasei Kogyo, Toray Research Center, etc.

Academic Institutions in Japan

AIST, Doshisha Woman's College of Liberal Arts, FFPRI, JAXA, Kyoto Academy of Health Science and Technology, Kyoto University, Kyushu University, Saitama University, Tohoku University, Toyama Prefectural University, University of Hyogo etc., as Academic Staffs, Faculties, and Researchers (PD)

Foreign Academic Institutions

Denmark: Royal Veterinary and Agricultural University, Germany: Max-Planck Institute for Kernphysik, India: Tripura University, Korea, R.: Ajou University, Taiwan: Academia Sinica, UK: Trinity College, USA; Barn Institute, USA; National Institute of Health, USA; Princeton University etc., as Academic Staffs, Faculties and Researchers (PD)

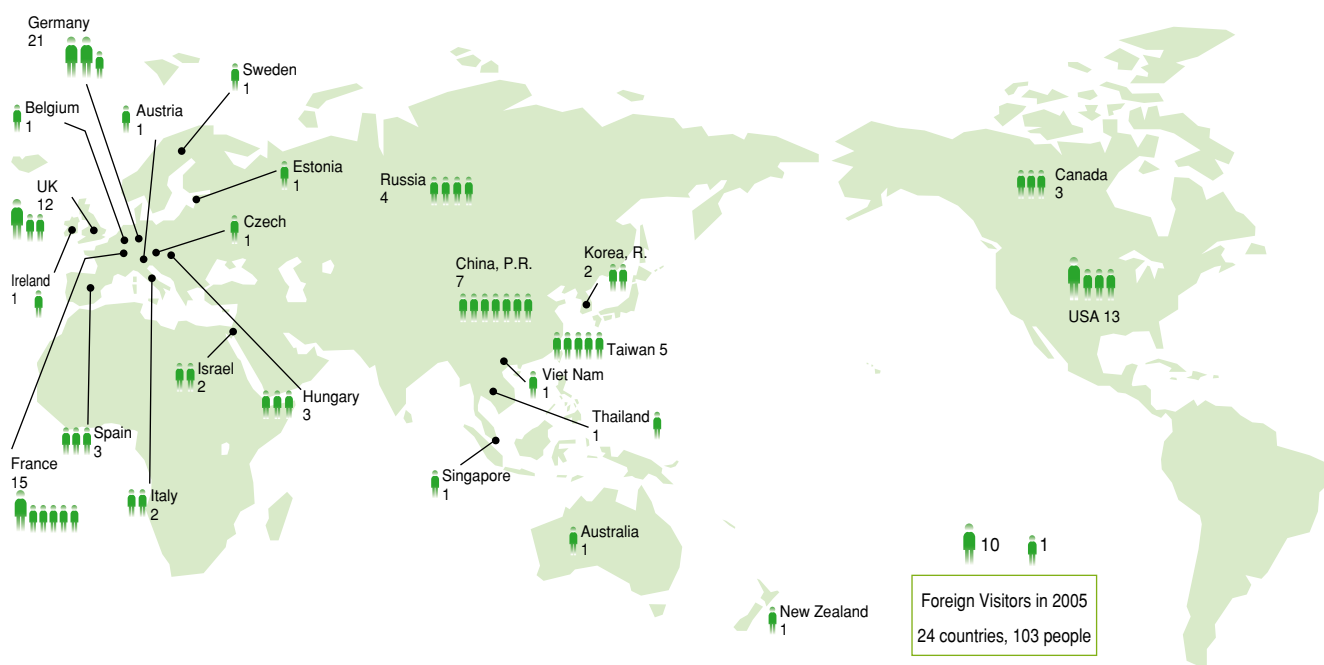
Research Students and Research Fellows

Kyoto University, Sumitomo Electric Industries, The University of Tokyo etc., as Graduate Students, Academic Staffs, Faculties, and Researchers (PD)



International Communication

Visitors from Foreign Countries



Visiting Professors from Foreign Countries

2005~2006



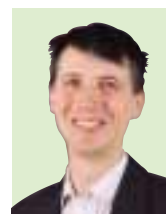
DEMÉ, Bruno

Associate Professor, Laboratory of Molecular Rheology, Division of Multidisciplinary Chemistry (January - March, 2006)
Chief Beam Line Scientist, Institut Laue-Langevin, France



WANG, Yu

Professor, Laboratory of Organotransition Metal Chemistry, International Research Center for Elements Science (October - November, 2005)
Professor, National Taiwan University, Taiwan



ATTFIELD, John Paul

Professor, Laboratory of Advanced Solid State Chemistry, International Research Center for Elements Science (January - March, 2005)
Professor, University of Edinburgh, UK

Researchers and Students from Foreign Countries

Researchers and Students from Foreign Countries, and their Origins, 2006

Researchers (PD)

Canada	2
China, P. R.	11
France	2
India	1
Korea, R.	2
Malaysia	1
Spain	2
Taiwan	1
UK	1
USA	1
Viet Nam	1
Total	25

Students

Canada	1
China, P. R.	2
Indonesia	1
Italy	1
Korea, R.	1
Thailand	1
USA	1
Total	8



ICR is always promoting global research activities.
 Many scientists from all over the world visit here for collaboration.
 ICR has become the hub station for world-wide research.

General Memorandum for Academic Cooperation and Exchange

Universities and Institutes	Countries	Date of Agreement	Universities and Institutes	Countries	Date of Agreement
Faculty of Physics-Technology, University of Duisburg	Germany	May 31, 1984	Laboratori Nazionali di Legnaro, Istituto Nazionale di Fisica Nucleare	Italy	March 27, 1995
Central Research Institute for Chemistry of the Hungarian Academy of Sciences	Hungary	March 19, 1987	Faculty of Pharmaceutical Sciences, Chulalongkorn University	Thailand	January 10, 1996
University of Mainz and Max-Planck Institute for Polymer Research	Germany	March 30, 1987	Max-Planck Institute for Kernphysik	Germany	May 25, 1997
Higher Institute of Chemical Technology Sofia, Bulgaria	Bulgaria	June 22, 1988	Pohang Accelerator Laboratory, Pohang Institute of Science and Technology	Korea, R.	March 15, 2000
Shanghai Institute of Optics & Fine Mechanics, Chinese Academy of Sciences	China, P. R.	January 27, 1989	Bordeaux Institute of Condensed Matter Chemistry	France	May 22, 2003
Royal Institute of Technology	Sweden	July 4, 1989	Joint Institute for Nuclear Research, Dubna	Russia	July 31, 2003
Institute of Biotechnology, Korea University	Korea, R.	May 1, 1990	State Key Laboratory of Bioreactor Engineering (SKLBE), East China University of Science and Technology	China, P. R.	November 29, 2003
Moscow Engineering Physics Institute	Russia	December 3, 1992	Institute of Chemistry, Chinese Academy of Sciences	China, P. R.	December 24, 2003
Institute of Nuclear Research of the Hungarian Academy of Sciences	Hungary	September 4, 1993	Brain Korea 21 Program in Chemical Engineering, School of Chemical and Biological Engineering, Seoul National University	Korea, R.	March 9, 2006
Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung	Germany	September 14, 1994			
				Total	19

International Meetings and Symposiums

The list below is about meetings and symposiums sponsored, or organized by ICR faculties. (Last 3 years, from ICR Annual Report)

January 10-11, 2003 (Kyoto)

The 2nd International Symposium of the Kyoto COE Project "Elements Science": "Elements Selection Rule and Materials Science"

April 2-4, 2003 (Kyoto)

The 9th International Seminar on Elastomers (ISE 2003) by Institute for Chemical Research, Kyoto University

January 9-10, 2004 (Kyoto)

The 3rd International Symposium of the Kyoto COE Project "Elements Science": "Elements Selection Rule and Materials Science" in Commemoration of the Opening of International Research Center for Elements Science

April 1-2, 2004 (Uji, Kyoto)

UK-JPN Polymer Workshop 2004

January 6-7, 2005 (Kyoto)

The 4th International Symposium of the Kyoto COE Project "Elements Science": "Elements Selection Rule and Materials Science", and The 2nd International Symposium of International Research Center for Elements Science (IRCELS)

October 17-21, 2005 (Uji, Kyoto)

Workshop on Nano Scale Beams (NANOBEAM 2005), 36th ICFA Advanced Beam Dynamics Workshop



Social Activities

Outreaching Programs

Chemical Research for High School Students

Every summer, ICR provides courses for high school students to experience the joy of "Chemical Research". Each year, more than 100 students join to undergo chemical experiments and operation of huge research equipments. Scientists and graduate students give each unique and enjoyable program.



Public Lectures

Public Lectures are held on the same day of "Open Campus in Uji". This is a fruitful time for ICR to interact with the community. The professors introduce their latest research and the frontier of their science. These lectures are quite popular for their comprehensive presentation. The audience enjoys asking questions directly to the lecturers.



Open Campus in Uji

4 institutes and laboratories located in the Uji Campus hold this event to show their advanced research of science. From ICR, some laboratories participate as Open Laboratories, where they demonstrate their research activities and experiments.



Super Science High School (SSH)

MEXT designates "Super Science High Schools" that emphasize education on science, technology and mathematics. ICR sends its faculties as lecturers for SSH. In return, high school students will get the opportunity to visit the institute.



Science Partnership Program (SPP)

This program is promoted by MEXT to emphasize education on science, technology and mathematics with cooperation of high schools and universities. ICR scientists join it as lecturers for high school students and the institute accepts the visit of students.



Visit to ICR, and Open Campus (2005)

- May 20 Tottori Keiai High School
- June 17 Rakuho Junior High School, Kyoto (SSH)
- July 5 Kokutaiji High School, Hiroshima (SSH)
- July 16 Momoyama Senior High School, Kyoto (SPP)
- July 22 Koyo Senior High School, Wakayama
- July 30 The 8th Chemical Research for High School Students
- October 7-8 Open Campus in Uji
- October 8 The 12th Public Lectures
- November 16 Rakuho Junior High School, Kyoto (SSH)
- January 21 Todo High School, Kyoto (SPP)

Outreaching Activities (2005)

- April 25 Ibaraki High School, Osaka Ibako Forum
- June 4 Momoyama Senior High School, Kyoto SPP Invited Lecture
- June 13 Rakuho Junior High School, Kyoto SPP Program
- July 16 Ibaraki High School, Osaka Ibako Lecture
- September 23 Kyoto University Junior Campus Special Lecture
- October 6 Matsusaka Senior High School, Mie Guidance for First-year Students
- November 5 Tawara Elementary School, Kyoto Chemical Research for Elementary School Students
- November 15 Rakuho Junior High School, Kyoto SPP Program

ICR aims to raise the level of Science by enlightening the society with its achievements in frontier.

Honors

Nobel Prize

Period of one's tenure of ICR

YUKAWA, Hideki	1949	Physics	1943~1968
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Order of Culture

YUKAWA, Hideki	1943	Atomic Physics	1943~1968
HAYAISHI, Osamu	1972	Biochemistry	1959~1976
SAKURADA, Ichiro	1977	Polymer	1936~1967
MITSTUDA, Hisateru	1994	Food Science	1955

Persons of Cultural Merits

YUKAWA, Hideki	1951	Atomic Physics	1943~1968
HORIBA, Shinkichi	1966	Physical Chemistry	1927~1947
HAYAISHI, Osamu	1972	Biochemistry	1959~1976
SAKURADA, Ichiro	1977	Polymer	1936~1967
MITSTUDA, Hisateru	1989	Nutrition, Food Science	1955
HORIO, Masao	1993	Polymer, Materials	1955~1970

The Japan Academy Prize

SASAKI, Nobuji	1944	1942~1959
SAKURADA, Ichiro	1955	1936~1967
INOUE, Yoshiyuki	1959	1943~1959
KIMURA, Ren	1959	1939~1956
KATAGIRI, Hideo	1960	1942~1960
HAYAISHI, Osamu	1967	1959~1976
SUZUKI, Tomoji	1979	1957~1965
MITSTUDA, Hisateru	1980	1955

Medal of Honor with Purple Ribbon

SAKURADA, Ichiro	1956	1936~1967
TAKEI, Sankichi	1961	1937~1959
ODA, Ryohei	1972	1955~1970
SUITO, Eiji	1977	1951~1975
TAKADA, Toshio	1987	1963~1986
SAKKA, Sumio	1996	1963~72/1983~94
SODA, Kenji	1997	1965~1996
SHINJO, Teruya	2000	1966~2002
TAMAO, Kohei	2004	1993~2005

Awards

Last 5 years

2006	KOMATSU, Koichi MURATA, Yasujiro MURATA, Yasujiro OHNO, Kohji	The Chemical Society of Japan (CSJ) Award Young Scientists' Prize, The Commendation for Science and Technology by the MEXT Osawa Award, The Fullerenes and Nanotubes Research Society Award for Encouragement of Research in Polymer Science; The Society of Polymer Science, Japan
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	UESUGI, Motonari MATUBAYASI, Nobuyuki KANEMITSU, Yoshihiko KANEMITSU, Yoshihiko MATSUDA, Kazunari	Gold Medal Award, Tokyo TechnoForum 21 Young Scientists' Prize, The Commendation for Science and Technology by the MEXT Yazaki Memorial Foundation Award Inoue Prize for Science Young Scientists' Prize, The Commendation for Science and Technology by the MEXT
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2005	AZUMA, Masaki TSUJII, Yoshinobu ONO, Teruo TAKANO, Mikio IKEDA, Yasunori SAITO, Takashi KANEMITSU, Yoshihiko	Young Scientists' Prize, The Commendation for Science and Technology by the MEXT The Award of the Society of Fiber Science and Technology, Japan Marubun Academic Award The L'ORÉAL Art & Science of Color Prizes, The 8th Gold Prize Encouragement Prize of the Japan Society of High Pressure Science and Technology The Ichimura Prize
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2004	MURATA, Yasujiro TSUBAKI, Kazunori KUSUDA, Toshiyuki NAKAHARA, Masaru MATUBAYASI, Nobuyuki KURIHARA, Tatsuo NISHIDA, Koji HASHIDA, Masaki TAMAO, Kohei TSUJII, Hayato KANEMITSU, Yoshihiko INOUE, Hideyuki TOH, Hiroyuki	The Chemical Society of Japan Award for Distinguished Young Chemists Kansai Branch Award, The Society of Synthetic Organic Chemistry, Japan Kyoto Prefecture Governor's Award Award of the Japan Society of High Pressure Science and Technology, 2004 Morino Award for Promotion of Molecular Sciences The Japan Bioscience, Biotechnology and Agrochemistry Society Award for the Encouragement of Young Scientists Promotive Award of the Society of Fiber Science and Technology, Japan, Kansai 2003 LSJ Award for Distinguished Achievements in Research Herbert C. Brown Lecturer The Society of Silicon Chemistry, Japan Award for Young Chemists Phosphor Award Best Young Presenter Award, Society of Nano Science and Technology The Okawa Publications Prize
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2003	KURATA, Hiroki SOHRIN, Yoshiki TAKAHASHI, Masahide TSUJII, Yoshinobu NISHINAGA, Tohru TOKITOH, Norihiro TOKITOH, Norihiro TAKEDA, Nobuhiro TAMAO, Kohei TAMAO, Kohei TAKANO, Mikio	The Japanese Society of Microscopy Award (Setou Award) The 18th Oceanchemistry Award (Research Institute of Oceanchemistry) Ceramic Society of Japan / The Australian Ceramic Society (CJS/ACS) Joint Ceramic Award for 2003 SPSJ Wiley Award Konica Minolta Technology Center Award in Synthetic Organic Chemistry, Japan The Division Award of the Chemical Society of Japan Alexander von Humboldt Research Award The Society of Silicon Chemistry, Japan Award for Young Chemists The Asahi Prize 2002 (Asahi Culture Foundation) The 14th Mukai Prize (Tokyo Ohka Foundation for the Promotion of Science and Technology) 2002 JSPM Award for Distinguished Achievements in Research
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2002	AZUMA, Masaki KANAYA, Toshiiji KOMATSU, Koichi TAMAO, Kohei TAMAO, Kohei YAMAGUCHI, Shigehiro	Japan Society of Powder and Powder Metallurgy Award for Innovatory Research The Society of Fiber Science and Technology, Japan Prize for Excellence in Fiber Research Alexander von Humboldt Research Award The 42nd Toray Science & Technology Prize (2002) (Toray Science Foundation) Frederic Stanley Kipping Award 2002, The American Chemical Society The Chemical Society of Japan Award for Distinguished Young Chemists
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Publications



News Letter, "Obaku" (Japanese)



Profile of ICR (Japanese & English)



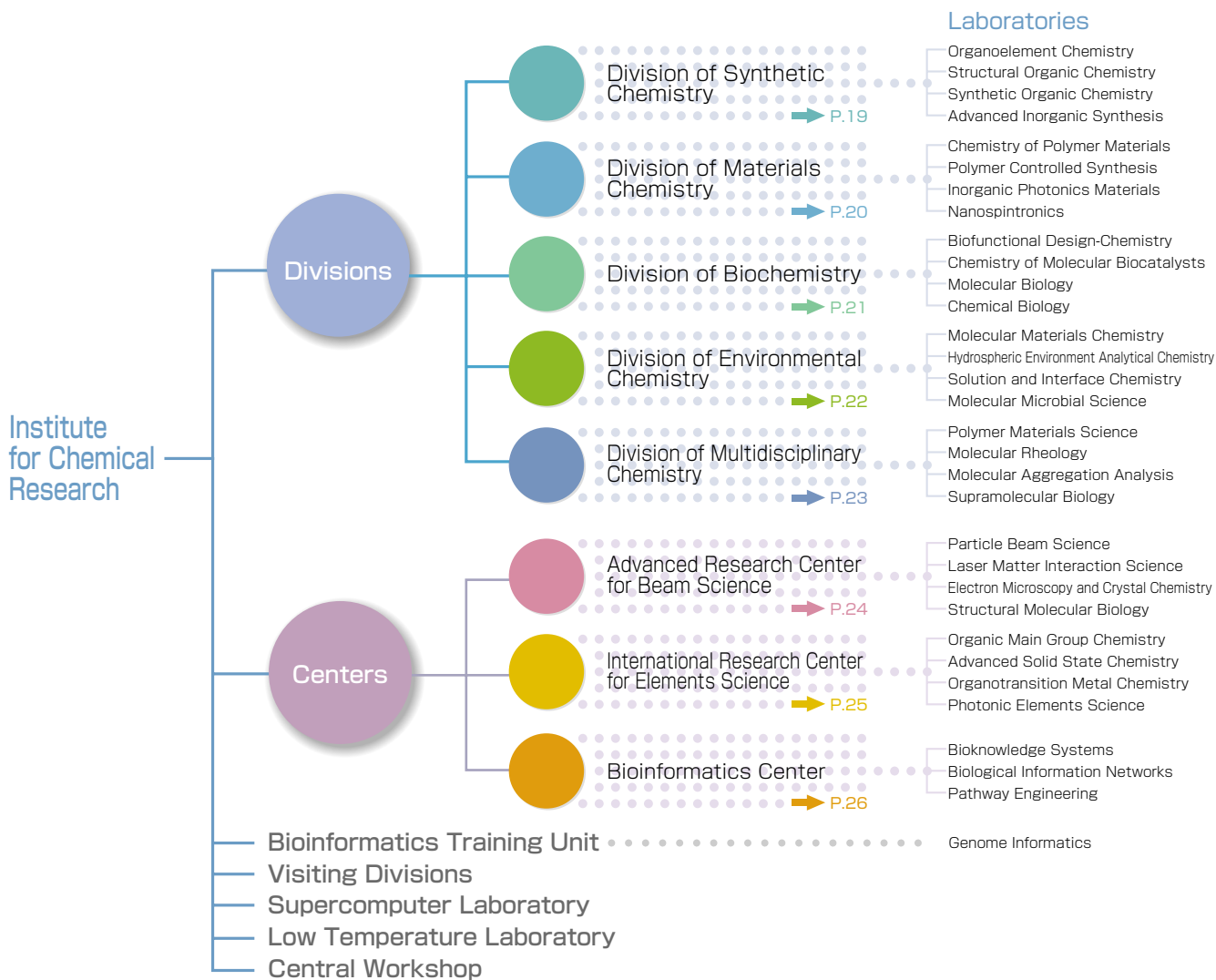
ICR Annual Report (English)



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

Laboratories

5 Research Divisions and 3 Research Centers



Divisions and Their Historical Backgrounds

Original Research Subject	Primary Stage	Secondary Stage	Division / Graduate School	
1939 Nuclear Physics	Nuclear Reaction 1964 Nuclear Science R.F.	Nuclear Science R.F.	Nuclear Science R.F. S	2004 Reorganization
1941 Reaction in Gas Explosion	Crystal and Powder Chemistry 1956 Nuclear Radiation 1965 Polymer Crystals		States and Structures S·E	
1933 Colloidal Drugs-Paints 1944 Dielectrics	Surface Chemistry Dielectrics 1956 Radiochemistry		Interface Science S	
1929 Alloys 1939 Special Glass	Solid State Chemistry Ceramic Chemistry	Solid State Chemistry	Solid State Chemistry S·E	
1939 Rubbers, Resins and Plastics 1943 Synthetic Fibers	Polymer Physical Chemistry Fiber Chemistry	Fundamental Material Properties	Fundamental Material Properties E	
1937 Synthetic Wool 1937 Liquid Fuels	Polymer Separation and Characterization High Pressure Chemistry 1958 Petroleum Chemistry		Organic Materials Chemistry E	
1926 Production of Saviol	Physiological Activity	Cancer Drug Research	Bioorganic Chemistry S·E·M	
1943 Organic Resources	Organic Unit Reaction			
1944 Pyrethroids-Mint Oils 1933 Exploitation of Tundra	Plant Products Chemistry Microbial Biochemistry		Biofunctional Molecules A	
1929 Chemistry of Nutrition 1929 Bacteria and Fungi 1944 Fermentation	Physical Chemistry of Enzyme Molecular Biology	1985 Molecular Design for Physiological Functions	Molecular Biology and Information Science S	
		1981 Nucleic Acids Lab.	2001 Bioinformatics Center S·I	
			1992.4 Reorganization	
			2002 Contributed Chair Proteome Informatics (SGI Japan)	
			2002 Bioinformatics Center Bioinformatics Training Unit	

Graduate School of
S: Science **E**: Engineering **M**: Medicine **A**: Agriculture
P: Pharmaceutical Sciences **I**: Informatics

Numerous researches in "Science Frontier" meet each other to form novel fields of interdisciplinary research. ICR will make the scientists' ideal come true.

Graduate School of **S** Science, **M** Medicine, **P** Pharmaceutical Sc., **E** Engineering, **A** Agriculture, **H** Human and Environmental Studies, **I** Informatics

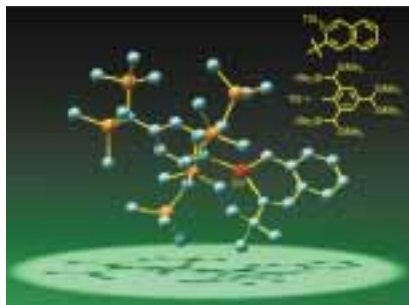
Organoelement Chemistry **S**

TEL 0774-38-3200 FAX 0774-38-3209
E-mail tokitoh@boc.kuicr.kyoto-u.ac.jp

Our research interests are the synthesis of heavier main group element compounds and transition metal complexes having reactive novel bond systems by taking advantage of kinetic stabilization using bulky substituents and the systematic elucidation of their properties, which leads to the application to the synthesis of functional molecules. Transformations using biocatalysts are also studied.



Prof
TOKITOH, Norihiro (D Sc)
Assoc Prof
NAKAMURA, Kaoru (D Sc)
Assist Prof
TAKEDA, Nobuhiro (D Sc)
SASAMORI, Takahiro (D Sc)
Technician
HIRANO, Toshiko

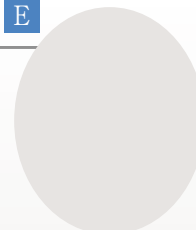


Molecular Structure of the First Stable 2-Stannanaphthalene
(Tbt = 2,4,6-tris[bis(trimethylsilyl)methyl]phenyl)

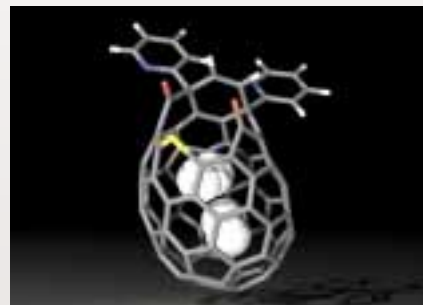
Structural Organic Chemistry **E**

TEL 0774-38-3173 FAX 0774-38-3178
E-mail yasujiro@scl.kyoto-u.ac.jp

Fundamental studies are conducted on design, synthesis, and elucidation of the structure and properties of molecules, ions, and radicals, which have entirely novel π -conjugated structures. Current projects include "Organic synthesis of endohedral fullerenes by use of molecular surgery approach", "Novel reaction utilizing fullereryl cationic species", and "Super-stabilization of cationic species by σ - π conjugation".



Assoc Prof
MURATA, Yasujiro (D Eng)



C₇₀ derivative encapsulating two hydrogen molecules

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

Division of Synthetic Chemistry



Synthetic Organic Chemistry **P**

TEL 0774-38-3190 FAX 0774-38-3197
E-mail kawabata@scl.kyoto-u.ac.jp

Research in this laboratory focuses on molecular chirality. Programs are active in the areas of asymmetric synthesis based on "memory of chirality", nucleophilic catalysis for fine organic synthesis, visualization of molecular information by functionalized phenolphthaleins, and the structural and functional investigation of homo- and heterochiral oligomers.



Prof
KAWABATA, Takeo (D Pharm Sc)
Assoc Prof
TSUBAKI, Kazunori (D Pharm Sc)
Res Assoc
YOSHIMURA, Tomoyuki (D Pharm Sc)
Technician
TERADA, Tomoko

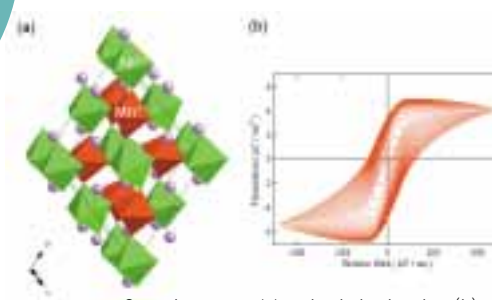
Advanced Inorganic Synthesis **S**

TEL 0774-38-3110 FAX 0774-38-3125
E-mail shimak@scl.kyoto-u.ac.jp

We are focusing on the fundamental physics and chemistry of "functional oxides" and seeking new materials with new functions. We recently pay much attention to researches on multiferroics, which show both ferroelectricity and ferromagnetism. New materials with strong correlation of both properties are expected to be used for new memory devices.



Prof
SHIMAKAWA, Yuichi (D Sc)
Assoc Prof
AZUMA, Masaki (D Sc)
Assist Prof
IKEDA, Yasunori



Crystal structure (a) and polarization data (b) of a new multiferroic material Bi₂NiMnO₆.

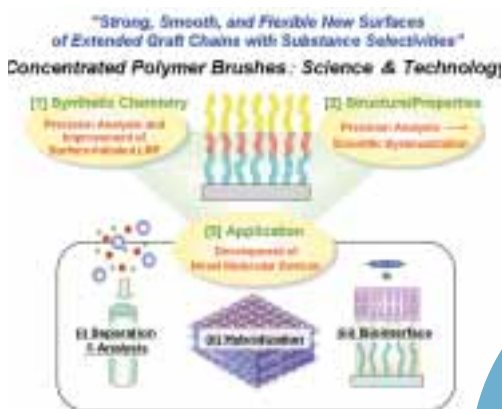
Chemistry of Polymer Materials E

TEL 0774-38-3161 FAX 0774-38-3170
E-mail fukuda@scl.kyoto-u.ac.jp

Fundamental and applied studies on living radical polymerization: current projects include development of living radical graft polymerization initiated from various organic, inorganic, and metallic surfaces and studies on the structure, properties, and functions of thereby created new surfaces "concentrated polymer brushes".



Prof
FUKUDA, Takeshi (D Eng)
Assoc Prof
TSUJII, Yoshinobu (D Eng)
Assist Prof
OHNO, Kohji (D Eng)
GOTO, Atsushi (D Eng)



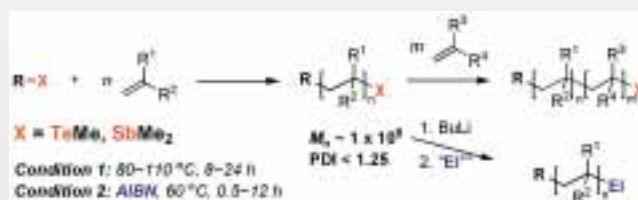
Polymer Controlled Synthesis E

TEL 0774-38-3060 FAX 0774-38-3067
E-mail yamago@scl.kyoto-u.ac.jp

Our research program focuses on development of new synthetic methods, which enable precise control of polymers in terms of their size and structure. Our attention is especially directed to control of reactive carbon species, such as carbon centered radicals and carbocations. We also study various polymer condensed states to understand the relation of physical properties and structures.



Prof
YAMAGO, Shigeru (D Sc)
Assoc Prof
TSUJII, Masaki (D Eng)
Assist Prof
TOSAKA, Masatoshi (D Eng)
SENOO, Kazunobu (D Eng)
Res Associate
YAMADA, Takeshi (D Eng)

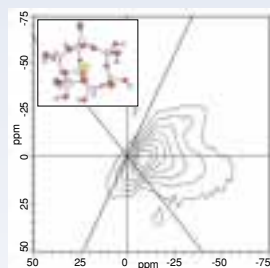


Emphasizing hybridization and/or composite-preparation from incompatible combinations, creation of novel functionality materials is aimed.

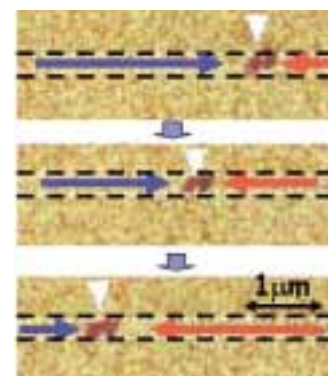
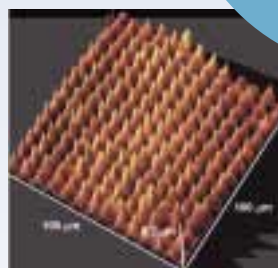
Division of Materials Chemistry

²³Na MQMAS NMR spectra of a sodium silicate glass

Inset: a glass structure model obtained by ab initio molecular orbital calculation



AFM image of TiO₂ film having a 2-D photonic structure prepared by a photo-induced phase separation method



Magnetic force microscopy observation of the current-driven domain wall motion

Inorganic Photonics Materials E

TEL 0774-38-3130 FAX 0774-33-5212
E-mail yokot@vidrio.kuicr.kyoto-u.ac.jp

We are studying on the preparation and characterization of new functional, especially photonics-related inorganic materials such as glasses and ceramics. Our major research subjects are as follows:

- (1) Synthesis of novel organic-inorganic hybrid low-melting glasses for new type photonics applications,
- (2) Glass structure as studied by MQ/MAS NMR spectroscopy and so on,
- (3) Development of optical micro devices utilizing photo-induced phenomena,
- (4) Nanoporous TiO₂ thin films.



Prof
YOKO, Toshinobu (D Eng)
Assoc Prof
TAKAHASHI, Masahide (D Sc)
Assist Prof
TOKUDA, Yomei (D Eng)

Nanospintronics S

TEL 0774-38-3107 FAX 0774-38-3109
E-mail ono@scl.kyoto-u.ac.jp

Spintronics, which aims at the complete control of the spins in solids, is one of the most active fields for its impact on information technology. 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.



Prof
ONO, Teruo (D Sc)
Assoc Prof
KOBAYASHI, Kensuke (D Sc)
Assist Prof
KASAI, Shinya (D Sc)
Technician
KUSUDA, Toshiyuki

Biofunctional Design-Chemistry P

TEL 0774-38-3210 FAX 0774-32-3038
E-mail futaki@scl.kyoto-u.ac.jp

The ultimate goal of our research is the regulation of cellular functions by designed peptides and proteins. Current projects include "Development of membrane permeable peptide vectors", "Creation of novel zinc finger peptides with desired DNA binding characteristics", and "Design of functional peptides responsive to external signals".



Prof
FUTAKI, Shiroh (D Pharm Sc)
Assist Prof
IMANISHI, Miki (D Pharm Sc)
NAKASE, Ikuhiko (D Pharm Sc)

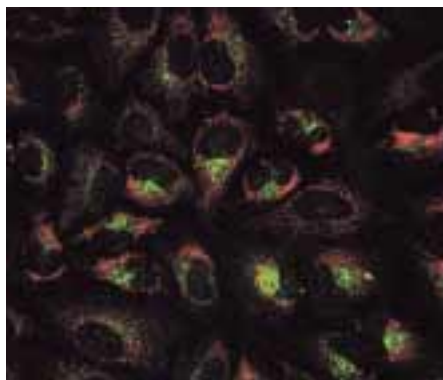
Chemistry of Molecular Biocatalysts A

TEL 0774-38-3230 FAX 0774-38-3229
E-mail ksakata@scl.kyoto-u.ac.jp

The aim of our research is to gain comprehensive understanding of the reaction mechanisms and the specificity of biocatalysts (enzymes) that are involved in important biological and biochemical events. Our studies cover a wide range of research fields from natural product chemistry, organic synthetic chemistry, and biochemistry to molecular biology and structural biology.

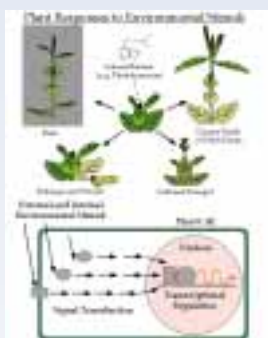


Prof
SAKATA, Kanzo (D Agr)
Assoc Prof
HIRATAKE, Jun (D Agr)
Assist Prof
MIZUTANI, Masaharu (D Agr)
SHIMIZU, Bun-ichi (D Agr)



Biology meets Chemistry; elucidating the mechanisms behind intra/inter-cellular recognition, stimuli response, and biomolecular synthesis in living matters for pioneering novel materials.

Division of Biochemistry



Plants are exposed to a variety of environmental stimuli and respond appropriately through the recognition of stimuli and the subsequent signal transduction, a considerable portion of which includes transcriptional modulation of particular genes by transcription factors (TF).

Molecular Biology S

TEL 0774-38-3260 FAX 0774-38-3259
E-mail oka-lab@molbio.kuicr.kyoto-u.ac.jp

This laboratory aims at clarifying the framework of regulatory network between genetic programs and environmental stress responses through the study on structure-function relationships of genetic materials and cellular proteins in a higher plant, *Arabidopsis thaliana*.



Prof
OKA, Atsuhiko (D Sc)
Assoc Prof
AOYAMA, Takashi (D Sc)
SUGISAKI, Hiroyuki (D Sc)
Assist Prof
TSUGE, Tomohiko (D Sc)
Technician
YASUDA, Keiko

Chemical Biology M

TEL 0774-38-3225 FAX 0774-38-3226
E-mail uesugi@scl.kyoto-u.ac.jp

In human history, small organic molecules have been utilized for improving human health and for revealing secrets of life. Discovery or design of small organic molecules with unique biological activity permits small-molecule-initiated exploration of biology and further understanding of human diseases. Our laboratory has been discovering small organic molecules that modulate transcription or differentiation to use them as tools to explore biology.



Prof
UESUGI, Motonari (D Pharm Sc)
Assist Prof
KAWAZOE, Yoshinori (D Med Sc)

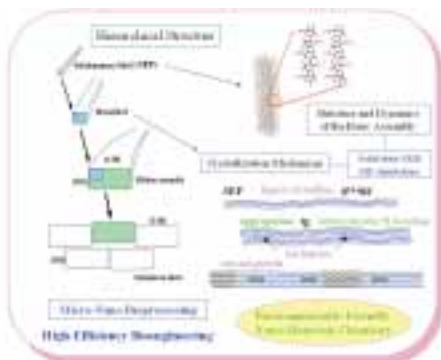
Molecular Materials Chemistry E

TEL 0774-38-3150 FAX 0774-38-3148
E-mail horii@scl.kyoto-u.ac.jp

The structure and dynamics of functional organic thin films and of carrier transport and light-emitting materials in organic EL diodes are characterized by advanced solid-state NMR. Hybridization of bacterial cellulose with functional materials is also examined at different levels of the hierarchical structure.



Prof
HORII, Fumitaka (D Eng)
Assoc Prof
KAJI, Hironori (D Eng)
Assist Prof
HIRAI, Asako (D Eng)
Technician
OHMINE, Kyoko



Elucidation of Hierarchical Structure of Bacterial Cellulose and Functional Materials Design

Hydrospheric Environment Analytical Chemistry S

TEL 0774-38-3100 FAX 0774-38-3099
E-mail sohrin@scl.kyoto-u.ac.jp

(1) Biogeochemistry of trace elements in the hydrosphere: Novel analytical methods are developed for multi-elemental determination, isotope ratio determination, speciation, and in situ measurement. Distribution of trace elements in the hydrosphere and its effects on ecosystem are investigated. The study also covers hydrothermal activity and deep biosphere. (2) Ion recognition: Novel ligands and ion recognition systems are designed, synthesized, and characterized. (3) Simulation of non-linear chemical reactions.

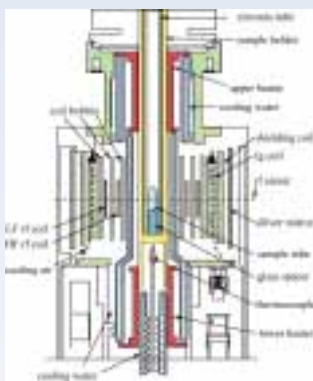


Prof
SOHRIN, Yoshiki (D Sc)
Assoc Prof
UMETANI, Shigeo (D Sc)
Assist Prof
SASAKI, Yoshihiro (D Sc)
NORISUYE, Kazuhiro (D Sc)
Technician
MINAMI, Tomoharu



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, in particular under extreme conditions, biogeochemistry in the hydrosphere, and biotechnology with useful enzymes and microorganisms.

Division of Environmental Chemistry



High-Temperature Multinuclear Field-Gradient NMR Probe

Solution and Interface Chemistry S

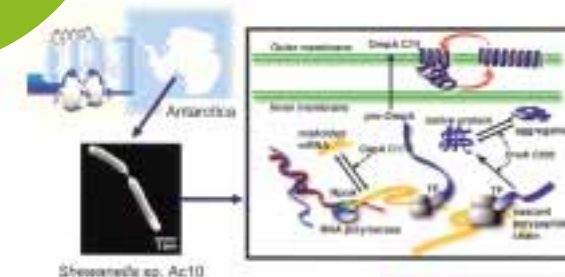
TEL 0774-38-3076 FAX 0774-38-3076
E-mail water@nmr.kuicr.kyoto-u.ac.jp

The structure, dynamics, and reaction of solutions under extreme conditions and/or with nanoscale inhomogeneity are investigated by NMR spectroscopy and computer simulation. Hydration is elucidated in supercritical conditions, and noncatalytic reactions of environmental importance are developed. The role of water is investigated for micelle, vesicle, protein, and membrane.



Prof
NAKAHARA, Masaru (D Sc)
Assoc Prof
MATUBAYASI, Nobuyuki (Ph D)
Assist Prof
OKAMURA, Emiko (D Pharm Sc)
WAKAI, Chihiro (D Sc)

Mechanism of cold adaptation of *Shewanella* sp. Ac10 isolated from Antarctic seawater



Molecular Microbial Science A

TEL 0774-38-3240 FAX 0774-38-3248
E-mail esakin@scl.kyoto-u.ac.jp

Structure and function of biocatalysts are studied to elucidate the fine mechanism of catalysis in the light of recent advances in gene technology, protein engineering and crystallography. Development and application of new biomolecular functions of microorganisms are also studied to open the door to new fields of biotechnology.

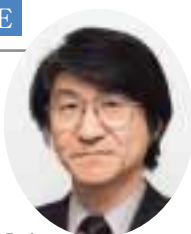


Prof
ESAKI, Nobuyoshi (D Agr)
Assoc Prof
KURIHARA, Tatsuo (D Eng)
Assist Prof
MIHARA, Hisaaki (D Agr)

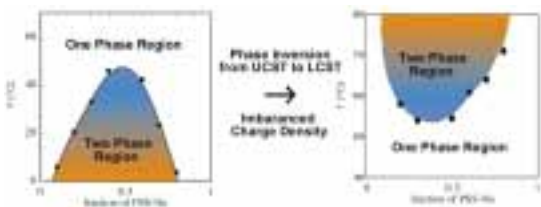
Polymer Materials Science E

TEL 0774-38-3140 FAX 0774-38-3146
E-mail kanaya@scl.kyoto-u.ac.jp

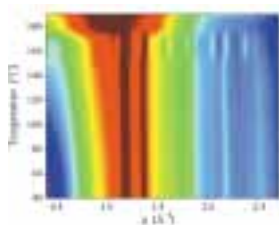
Higher order structure and its formation process of polymer systems are investigated using scattering methods (neutron scattering, X-ray scattering, light scattering) and microscopes (optical microscope, electron microscope, atomic force microscope), aiming at revealing the relationship between higher order structure and polymer properties.



Prof
KANAYA, Toshiji (D Eng)
Assoc Prof
NISHIDA, Koji (D Eng)
Assist Prof
MATSUBA, Go (D Eng)



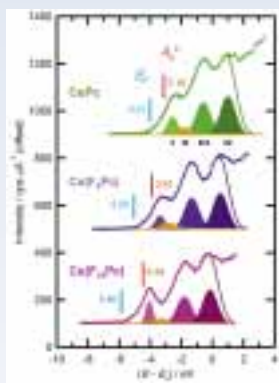
Phase diagrams for blends of aqueous solutions of different polyelectrolytes. Phase inversion occurs when the charge densities of different polyelectrolytes become imbalanced.



Change of wide-angle X-ray scattering pattern of biodegradable poly(L-lactic acid) upon heating.

By exploring viewpoints aiming at merging science with engineering, we are going to upgrade the paradigm of our research in the boundary region among chemistry, physics and biology. In cooperation with other divisions and centers in our institute, we will develop exploratory basic researches for founding advanced materials science.

Division of Multidisciplinary Chemistry



Comparison of inverse photoemission spectra of fluorinated copper phthalocyanine thin films: the abscissa is the state energy with reference to the vacuum level and A_s^{th} and E_F , their determined values in eV, are electron affinity and Fermi energy, respectively.

Molecular Aggregation Analysis S

TEL 0774-38-3080 FAX 0774-38-3084
E-mail naokis@e.kuicr.kyoto-u.ac.jp

Studies on structures and properties of molecular aggregates are carried out; research on solid-state chemistry of organic semiconductor thin films based on direct observation of their frontier electronic states is in progress towards fabrication of new molecular systems to be useful for their electronic applications.



Prof
SATO, Naoki (D Sc)
Assoc Prof
ASAMI, Koji (D Sc)
Assist Prof
KITA, Yasuo (D Sc)
YOSHIDA, Hiroyuki (D Sc)

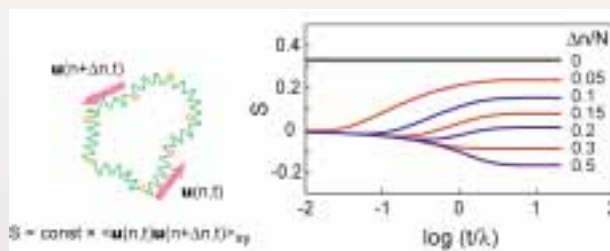
Molecular Rheology E

TEL 0774-38-3135 FAX 0774-38-3139
E-mail hiroshi@scl.kyoto-u.ac.jp

In this laboratory, rheological properties and dynamics of various soft matters (mainly polymers, emulsions, and suspensions) are studied from a molecular point of view. For example, an analytic expression of orientational correlation in a nonentangled ring polymer under constant load has been successfully derived in a recent study.

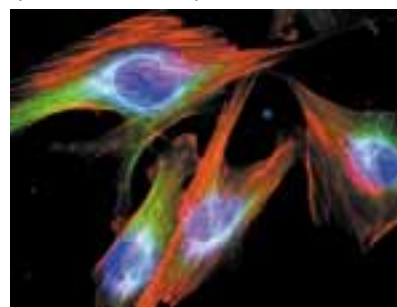


Prof
WATANABE, Hiroshi (D Sc)
Assoc Prof
INOUE, Tadashi (D Eng)
Assist Prof
MATSUMIYA, Yumi (D Eng)
Technician
OKADA, Shinichi



The orientational correlation S_2 of two segments in a nonentangled ring polymer changes its sign (from positive to negative) on an increase of the inter-segment distance $\Delta n/N$. This feature is unique to ring polymers and not seen for linear polymers.

A protein named mROS3 plays a critical role in controlling the size and morphology of cells through regulating reorganization of the cytoskeletal and nuclear systems.



Supramolecular Biology S

TEL 0774-38-3250 FAX 0774-38-3256
E-mail umeda@scl.kyoto-u.ac.jp

Biological membrane is an extremely soft supramolecular complex formed by a self assembly of lipid molecules. We have undertaken molecular biology, cell biology, and behavioral genetics approaches to elucidate the role of molecular motion of membrane lipids in animal morphogenesis and thermoregulation.



Prof
UMEDA, Masato (D Pharm Sc)
Assist Prof
TAKEUCHI, Ken-ichi (D Pharm Sc)
KATO, Utako (D Sc)
Res Associate
INADOME, Hironori (D Agr)

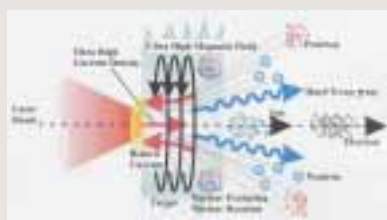
Particle Beam Science S

TEL 0774-38-3281 FAX 0774-38-3289
E-mail noda@kyticr.kuicr.kyoto-u.ac.jp

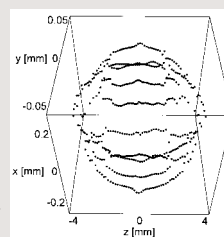
Generation of beam composed of the same particles and its improvement for the high quality beam is our main research scope. Ion production from laser-produced plasma and reduction of its energy spread by phase rotation, approaches to crystalline beam with beam cooling and super-fine beam oriented for linear collider are studied. Downsizing of accelerator for cancer therapy is also pursuit.



Prof
NODA, Akira (D.Sc.)
Assoc Prof
IWASHITA, Yoshihisa (D.Sc.)
Assist Prof
SHIRAI, Toshiyuki
Technician
TONGU, Hiromu



Ion beam generation from laser-produced plasma



Ultra-cold ion beam (crystalline beam) aimed at by beam cooling-expected by the simulation with molecular dynamics



Development of new capabilities with combination of various beams. Development of new method for space-time analysis with extreme resolution. Multidimensional analysis of functional chemical materials oriented for application, and Preparation for collaborative research scheme.

Advanced Research Center for Beam Science

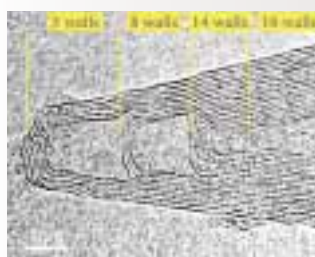
Laser Matter Interaction Science S

TEL 0774-38-3291 FAX 0774-38-3289
E-mail sakabe@laser.kuicr.kyoto-u.ac.jp

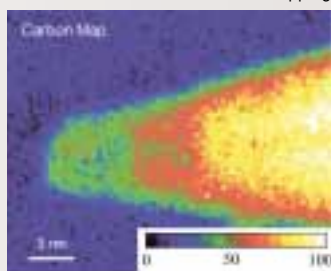
Ultra-intense and ultra-short pulse laser-matter interactions and its applications are studied. The physics of femtosecond laser nano-ablation of solid are investigated for new laser nano-processing. The process of electron ejection from solid with short pulse lasers is also studied to develop time-resolved electron microscopy. The physics of high energy radiation generation and its applications are done research into.



Prof
SAKABE, Shuji (D.Eng.)
Assoc Prof
HASHIDA, Masaki (D.Eng.)



Carbon distribution mapping



High resolution image of carbon-nanotube

Electron Microscopy and Crystal Chemistry S

TEL 0774-38-3051 FAX 0774-38-3055
E-mail post@eels.kuicr.kyoto-u.ac.jp

Direct imaging of structural arrangement of atoms or molecules by high-resolution electron microscopy and scanning probe microscopy is utilized to investigate the crystal growths of organic thin films, surface chemical reactions and the formation of nano-materials. The local electronic structure analysis and elemental mapping are also performed to explore chemical information by measuring the energy of inelastically scattered electrons.



Prof
ISODA, Seiji (D.Sc.)
Assoc Prof
KURATA, Hiroki (D.Sc.)
Assist Prof
OGAWA, Tetsuya (D.Sc.)
NEMOTO, Takashi (D.Sc.)
Res Associate
MORIGUCHI, Sakumi (D.Sc.)

Structural Molecular Biology H

TEL 0774-38-3040 FAX 0774-38-3045
E-mail hata@sci.kyoto-u.ac.jp

X-ray studies to obtain structural information of proteins and inorganic materials are performed by analyzing a distribution and state of electrons. The main themes are structure determination of proteins and structural elucidation of protein functions, and experimental and theoretical investigation of the natural line width of K- and L-emissions.



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



Protein-Protein Interaction in Enzyme-Inhibitor Complex

Organic Main Group Chemistry E

TEL 0774-38-3180 FAX 0774-38-3186
E-mail masaharu@scl.kyoto-u.ac.jp

We are focusing on the discovery, design and development of new molecular transformations which enable efficient utilization of chemical resources, such as unsaturated hydrocarbons, haloalkanes, etc. Scrutiny of the reaction mechanism provides "elements scientific" basis of the molecular transformations.

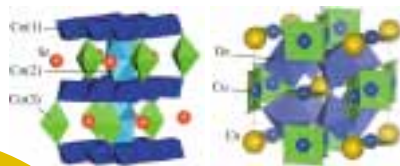


Prof
NAKAMURA, Masaharu (D Sc)
Assist Prof
HATAKEYAMA, Takuji (D Sc)



Proposal of a guideline for the creation of novel elementary materials through uncovering the role of key elements which determine the functions of materials.

International Research Center for Elements Science



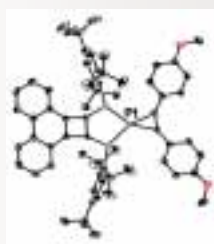
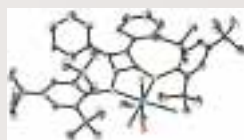
Advanced Solid State Chemistry S

TEL 0774-38-3126 FAX 0774-38-3125
E-mail takano@scl.kyoto-u.ac.jp

We are trying to discover new 3d transition metal oxides using a high-pressure technique (up to 10GPa, 1500°C), film technique (pulsed laser deposition), microfabrication, and a solution technique. The properties and functions of our interest are magnetism, ferroelectricity, high- T_c superconductivity, and photoluminescence.



Prof
TAKANO, Mikio (D Sc)
Assist Prof
SAITO, Takashi (D Sc)
REF Assist Prof
YAMAMOTO, Shinpei (D Eng)



Organotransition Metal Chemistry E

TEL 0774-38-3035 FAX 0774-38-3039
E-mail ozawa@scl.kyoto-u.ac.jp

Our research interest is focused on new organotransition metal complexes with useful chemical properties. Recent topics include: (1) Organometallic complexes with sp^2 -hybridized phosphorus ligands. (2) Transition metal clusters with ethynyl and diethynyl cations. (3) Stereocontrolled synthesis of extended π -conjugation molecules.



Prof
OZAWA, Fumiyuki (D Eng)
Assoc Prof
OKAZAKI, Masaaki (D Sc)
Assist Prof
KATAYAMA, Hiroyuki (D Eng)

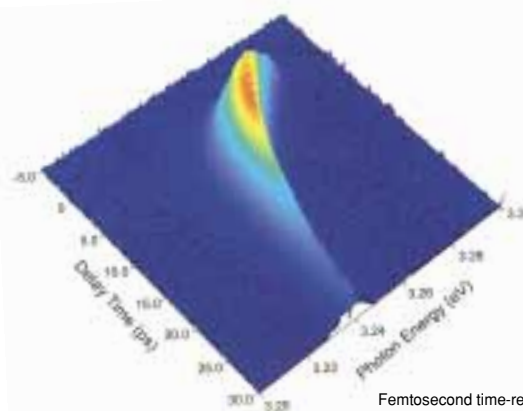
Photonic Elements Science S

TEL 0774-38-4510 FAX 0774-38-4511
E-mail kanemitsu@scl.kyoto-u.ac.jp

Our research interest is to understand optical and quantum properties of nanometer-scale materials and to develop opto-nanosience for creation of innovative functional materials. In particular, we study optical properties of single nanoparticles, single carbon nanotubes, and arranged nanoparticle superlattice solids by means of space- and time-resolved laser spectroscopy.



Prof
KANEMITSU, Yoshihiko (D Eng)
Assoc Prof
MATSUDA, Kazunari (D Eng)
Assist Prof
INOUE, Hideyuki (D Eng)



Femtosecond time-resolved photoluminescence spectrum of $\text{In}_{0.9}\text{Ga}_{0.1}\text{N}$



Bioknowledge Systems S

TEL 0774-38-3270 FAX 0774-38-3269
E-mail kanehisalab@kuicr.kyoto-u.ac.jp

Our objective is to solve life's mysteries from the genome project's massive data. We are engaged in the construction of an advanced database, information technology development for handling this data, functional annotation, and other activities analyzing the biological meaning behind experimental data. These results are available at GenomeNet (<http://www.genome.jp>).



Prof
Kanehisa, Minoru (D Sc)
Assoc Prof
GOTO, Susumu (D Eng)
Assist Prof
HATTORI, Masahiro (D Sc)
Visiting Assist Prof
ITOH, Masumi
YAMANISHI, Yoshihiro (D Sc)
YAMADA, Takuji (D Sc)



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

Bioinformatics Center



Biological Information Networks I

TEL 0774-38-3015 FAX 0774-38-3022
E-mail akutsulab@kuicr.kyoto-u.ac.jp

This laboratory develops algorithms and mathematical models for bioinformatics and systems biology. The research topics include inference and analysis of various types of biological networks, prediction and analysis of protein/RNA structures, statistical models for sequence analysis, and scale-free networks.



Prof
AKUTSU, Tatsuya (D Eng)
Assist Prof
UEDA, Nobuhisa (D Eng)
HAYASHIDA, Morihiro (D Inf)

Pathway Engineering P

TEL 0774-38-3023 FAX 0774-38-3037
E-mail bic4@kuicr.kyoto-u.ac.jp

With the recent advancement of experimental techniques in molecular biology, research in modern life science is shifting to the comprehensive understanding of a biological mechanism consisting of a variety of molecules. Our research objective is to develop techniques based on computer science and/or statistics to systematically understand biological entities at the cellular and organism level.



Prof
MAMITSUKA, Hiroshi (D Sc)
Assist Prof
TAKIGAWA, Ichigaku (D Eng)

Bioinformatics Training Unit Genome Informatics

TEL 0774-38-3094 FAX 0774-38-3059
E-mail kuma@kuicr.kyoto-u.ac.jp

Evolutionary study based on molecular data is called 'molecular evolutionary biology'. Our major research interest is the extraction of biological knowledge from various biological data, such as nucleotide sequences, amino acid sequences, and protein structures, from the evolutionary view points. We also develop new methodologies and tools for the analyses. One of such tools, a multiple alignment program *mafft*, is now widely utilized in the field of molecular biology.

Visiting Assoc Prof
KUMA, Keiichi (D Sc)
Visiting Assist Prof
ICHIHARA, Hisako



Visiting Professors



Prof KISHIDA, Akio

Division of Materials Chemistry

Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University, Professor

A very minute area including the material-living body interface is defined as "Biointerface". I am interested in the various phenomena that happen inside the space and the subsequent biological reactions. In a microscopic environment and very short time-scale, proteins and cells could be assumed as biological colloid (biocolloid). It has been explained that the interactions between biocolloids and materials using physicochemical theory, however, nowadays a new idea that can explain the interaction, especially the long-range interaction more precisely, is needed. In Institute for Chemical Research, Kyoto University, I will try to study/determine the interaction between materials and biocolloids in detail using up-to-date technology. The key factor is the high-density molecular brush. Using this technology, I want to understand the phenomena occurring at biointerface and obtained a brand new idea to develop next-generation biomaterials. Main theme of this my research is "Developing a novel functional materials for medical use" and "Tissue engineering and regenerative medicine". Here I will try to study the interactions between materials and living body using high-density molecular brush technology.



Prof GAMO, Toshitaka

Division of Environmental Chemistry

Ocean Research Institute, The University of Tokyo, Professor

My major fields are chemical oceanography and marine environmental sciences, particularly dissolved gas and isotope geochemistry, submarine hydrothermal chemistry, stratospheric isotope chemistry, and development of *in situ* chemical analyzing systems in seawater. Field studies using research vessels and submersibles have been conducted on the circulation and convection mechanisms in the ocean using chemical tracers such as ^3H , ^{14}C , ^{222}Rn , biogeochemical cycles associated with submarine hydrothermal circulation at mid-ocean ridges and cold seepage at subduction zones, non-mass dependent oxygen isotope fractionation between carbon dioxide and ozone in the stratosphere, application of *in situ* chemical analyzer to long-term monitoring of marine environments, etc. I hope to collaborate and interact with the staff of the Institute for Chemical Research in order to advance the studies through wide discussions.



Prof NAKANISHI, Tsutomu

Advanced Research Center for Beam Science

Graduate School of Science, Nagoya University, Professor

We developed spin polarized electron source for a future 1TeV electron-positron collider. It includes 1) GaAs strained-superlattice-photocathode to achieve high polarization ($\geq 85\%$) and quantum efficiency ($\geq 0.5\%$), 2) ultra-high-vacuum and dark-current technologies for long lifetime of NEA surface, 3) study of NEA-surface-charge-limit phenomenon, and 4) high-field-gradient electron gun for low emittance beam. Recently, a JST project to develop a new source for spin electron microscope is started. Various advices are welcome for this subject from ICR members.



Prof EGUCHI, Yukihiro

Bioinformatics Center

Mitsui Knowledge Industry Co., Ltd., Fellow

For the past decade the world pharmaceutical industry has experienced a steady decline in productivity of new chemical entities. My research is aimed to develop safer and more effective drugs utilizing bioinformatics, especially systems biology. Although it is now in a fundamental stage and has been done in a very small company, it is very exciting, because I am working with young excellent researchers from various countries, such as China, UK and New Zealand. When I was an undergraduate student at Kyoto University, the professors of the Institute for Chemical Research invited my classmates and me for the Institute Lab Tour. We were very impressed by their kindness and the new facilities of the Institute. From then on, I have conceived a longing for the Institute. I wish to have an exciting discussion on systems medicine with young researchers at the Institute.



Assoc Prof HWANG, Harold Y.

Division of Synthetic Chemistry

Graduate School of Frontier Sciences, The University of Tokyo, Associate Professor

Perovskite oxides exhibit a wide range of physical properties, including virtually every known ground state. The close lattice match between perovskites allows the creation of thin film heterostructures and devices with unique properties. Towards this end, we are studying the electronic structure of atomically abrupt interfaces grown by pulsed laser deposition. I thank the ICR for hosting me, and I look forward to participating in your community.



Assoc Prof TSUMOTO, Kohei

Division of Biochemistry

Graduate School of Frontier Sciences, The University of Tokyo, Associate Professor

Biological Phenomena can be described by highly organized intermolecular interactions, including specific, semi-specific, and non specific ones. To discuss the nature of interactions from experimental viewpoints, I now focus on analyses of biomolecular interactions using several methods, e.g. protein engineering, calorimetry, SPR, crystallography, NMR, and analytical chromatography. Analytical approaches may lead to discovery and engineering of novel biomolecules. Recently, my research interest includes manipulation of proteins in solution, especially for aggregation suppression and solvent effects of some amino acids and their derivatives on proteins. I would like to discuss about protein science and chemistry from chemical and biological viewpoints, and explore a novel field on researches of protein interactions.



Assoc Prof TAJIMA, Hiroyuki

Division of Multidisciplinary Chemistry

The Institute for Solid State Physics, The University of Tokyo, Associate Professor

My research interests are centered on the electrical properties of junction devices fabricated from biomolecular compounds. This work is related to solid-state physics, surface chemistry, thin-film-fabrication technique, and biochemistry. I am expecting to develop my study through the collaboration with groups in this institute.



Assoc Prof YAMADA, Yoichi

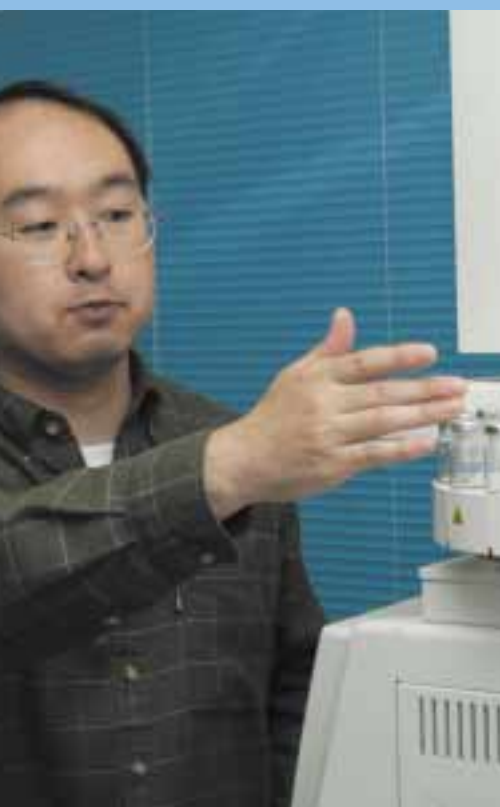
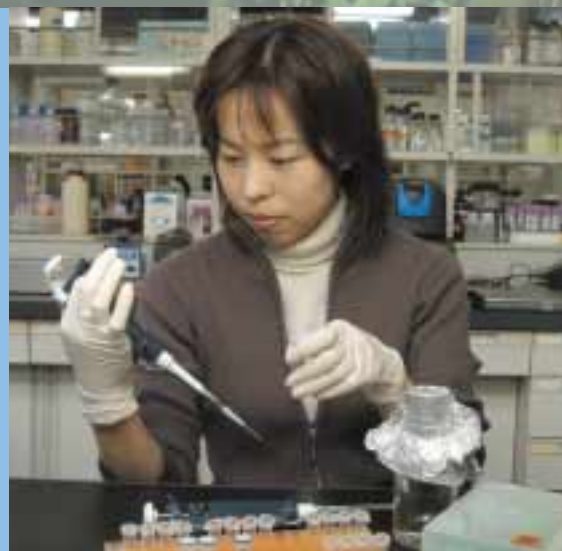
International Research Center for Elements Science

Graduate School of Science and Engineering, Yamaguchi University, Associate Professor

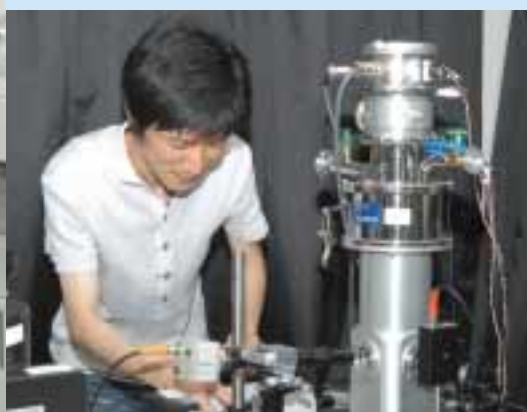
My research interest is to understand excitonic optical properties of wide-gap semiconductors from the viewpoint of exciton engineering. In particular, the optical properties of dense excitonic systems in low-dimensional quantum structures are studied mainly by means of time-resolved and selective excitation spectroscopy. The scope of research at ICR, with Prof. Y. Kanemitsu's research group, is to realize new optical functionalities of low-dimensional excitons in semiconductor nanostructures.



Science for Science and Science for Society



The concept of "Science for Society" originates in "The Declaration on Science and the Use of Scientific Knowledge" presented at UNESCO's "World Conference on Science" in 1999. This concept encourages science to make more contribution to the society. Although Science has made progress hand in hand with economical achievements, Science itself should be the most important interest for the Scientists to answer the unknown questions. Institute for Chemical Research not only recognizes "Science for Society" but also promotes the concept of "Science for Science," the words that the scientists should always keep in their hearts.



Science for Science
and
Science for Society





Our Vision

The founding philosophy of the Institute for Chemical Research is to excel in “the investigation of basic principles of chemistry and chemical 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.

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.



Science for Science
and
Science for Society

Published by;
Institute for Chemical Research, Kyoto University
Director; ESAKI, Nobuyoshi

Editors;
Public Relations Committee
KANAYA, Toshiji KANEMITSU, Yoshihiko
NISHIDA, Koji SASAMORI, Takahiro

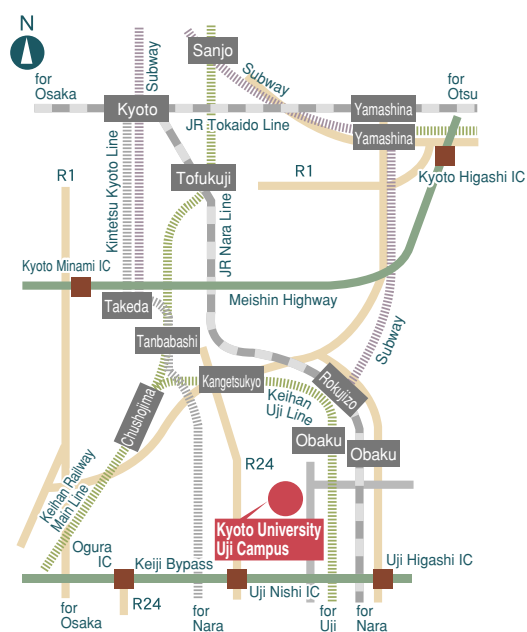
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Location and Transportation

From Obaku Station on the Keihan Uji Line: 10 min by walk
(from Keihan-Sanjo Station to Obaku Station: 35 min)

From Obaku Station on the JR Nara Line: 7 min by walk
(from Kyoto Station to Obaku Station: 20 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

