

# FACULTY OF ENGINEERING GRADUATE SCHOOL OF ENGINEERING **KOBE UNIVERSITY 2011**

- ARCHITECTURE
- CIVIL ENGINEERING
- ELECTRICAL AND ELECTRONIC ENGINEERING
- MECHANICAL ENGINEERING
- CHEMICAL SCIENCE AND ENGINEERING
- COMPUTER SCIENCE AND SYSTEMS ENGINEERING





# MESSAGE

## WELCOME TO GRADUATE SCHOOL/ FACULTY OF ENGINEERING

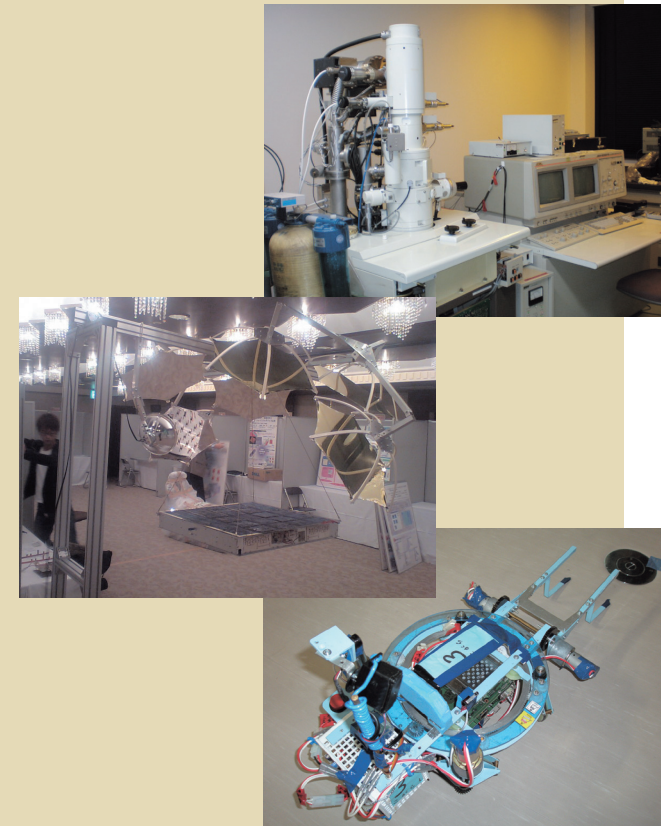


Dean,  
Graduate School  
of Engineering  
Professor  
Matsuto Ogawa

**G**raduate School/ Faculty of Engineering of Kobe University has developed a very wide spectrum of education and research in the fields of natural science ranging from basic science to applied engineering. In order that the results of engineering research should be returned to benefit human society, the Faculty aims at educating engineers and researchers who have a dual focus on both basic and applied aspects of engineering.

**M**odern technology has developed very rapidly, in particular, in the fields of new functional material creation, innovation in production engineering, upgrading of information and communication technology, and assessment and management of the human environment. Research in these areas requires leading-edge facilities. The six departments (Department of Architecture and Civil Engineering, Department of Electric and Electronic Engineering, Department of Mechanical Engineering, Department of Chemical Science and Engineering, and Department of Computer Science and Systems Engineering) are equipped with unique research facilities which are also available for educational purposes.

**A**t present, 1000 overseas students study at Kobe University; 270 out of them are either in Graduate School and Faculty of Engineering. Human resources development from a global perspective is one of the policies of Kobe University. It is also one of the most important aims of us. The Faculty offers an excellent research and education environment and heartily welcomes students who wish to take on the challenge of exploring new corridors and fields in engineering.



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# HISTORY

## FACULTY OF ENGINEERING

**T**he Faculty of Engineering was established in 1949, growing out of the former Kobe Technical College, which was originally established in 1921. Since then, the Faculty has contributed to the development of modern industrial society in the latter half of the 20th Century through its education and research. The aim of the Faculty in the new millennium is to educate future researchers and engineers to be able to contribute to the welfare of humankind through cutting-edge technologies.

The Faculty now has six departments: Architecture, Civil Engineering, Electrical and Electronic Engineering, Mechanical Engineering, Chemical Science and Engineering, and Computer Science and Systems Engineering, each of which consists of several divisions areas dedicated to the specific purposes of education and research. Approximately two-thirds of students continue on to Master's program for higher education.

## GRADUATE SCHOOL OF ENGINEERING

**T**he Graduate School of Engineering was established in April 2007 as an educational and research institute aimed at providing engineering knowledge, fundamental and applied technologies directly related to a symbiosis and sustainable development of society, reorganizing of the Graduate School of Science and Technology which was established in 1981. The Graduate School of Engineering offers a consistent educational system from undergraduate to graduate school.

The Graduate School of Engineering offers the following five departments in both Master's and Doctor's Degree Programs: Architecture, Civil Engineering, Electrical and Electronic Engineering, Mechanical Engineering, Chemical Science and Engineering. By Covering a wide range of interdisciplinary academic fields (environment,

nanomaterial, information and telecommunication, life science, energy, robot, safety etc.), these five departments will create new technologies for the betterment of the society.

The Graduate School of Engineering offers the following six departments in both the Master's and Doctor's Degree Program: Architecture, Civil Engineering, Electrical and Electronic Engineering, Mechanical Engineering, Chemical Science and Engineering, Computer Science and Systems Engineering. By covering a wide range of interdisciplinary academic fields (environment, nanomaterial, information and telecommunication, life science, energy, robot, safety etc.), these six departments will create new technologies for the betterment of the society





# ADMISSIONS POLICY

## FACULTY OF ENGINEERING

With six courses of study in the Faculty of Engineering, we seek to nurture the researchers and engineers who will open the path to the next generation. Students perform original and advanced work on the international stage, in addition to understanding the basic learning essential in each cutting-edge technological and scientific field. After graduation, the road to move forward to studies at the Graduate School of Engineering is wide open, allowing students to cultivate an even higher level of expertise and obtain the abilities needed for self-motivated research and development.

Moreover, since students can choose to go abroad to study for a fixed period at overseas universities with partner relationships with the faculty through education and research, we have created a system to enable students to gain an international viewpoint at the same time as they study in their chosen field of expertise.

## GRADUATE SCHOOL OF ENGINEERING

Although policies and standards for student admission differ depending on the homeland organization of those students wishing to enter the Graduate School and the major or field welcoming the student, we have drawn up the following common guidelines for prospective students.

- 1) Applicants displaying enthusiasm for clarifying the principles behind natural phenomena, as well as application and development of technology, and having a strong desire to discover their own problems and attempt to resolve them
- 2) Applicants equipped with creativity and practical abilities

To ensure that students are able to comfortably understand their foundation and major concentration courses after admission to the faculty, students must be equipped with an extensive range of basic knowledge and thoroughly understand the different subjects on the designated Center Examination and the individual examinations which serve as the faculty's entrance selection examinations. The Faculty of Engineering at Kobe University cherishes those people with lively curiosity and inquisitive minds with a critical nature towards those things that cannot be understood merely by applying common sense, and we offer an environment where these traits can be taken full advantage of. The faculty welcomes all who are full of the desire to contribute to the harmonious co-existence of the natural world and human society in the near future, through scientific and technological fields.

- 3) Applicants having logical thinking abilities and persuasive power when presenting the results of research and in similar situations
- 4) Applicants having ethical standards and the ability to understand and question the effects of technology on society
- 5) Applicants having a clear awareness of their future direction (becoming researchers or professionals with a high level of expertise)
- 6) Applicants with a strong desire to acquire even higher-level and more advanced knowledge and technology among professionals who already have a great deal of experience in the world

overseas university will be accepted at their home university.

Based on these set programs, many students from the Graduate School and Faculty of Engineering go abroad to study at the partner universities, under a credit transfer system for the course credits these students obtain at their overseas universities. We also accept a number of exchange students coming from overseas to pursue their studies in the international atmosphere of the city of Kobe.

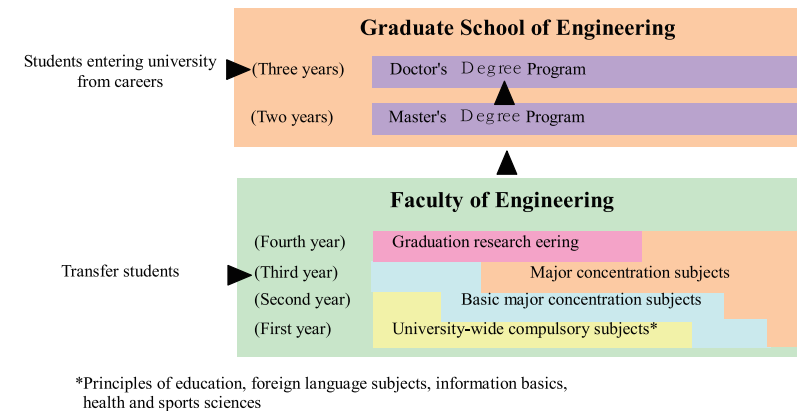
# STUDYING



## FACULTY OF ENGINEERING

University students enrolled in the Faculty of Engineering are expected to obtain an extensive education and fundamental knowledge, and be able to develop technology with an eye on the future of humanity. To this end, we believe our students, with their youthful, flexible intellects, need to be able to study freely and independently to become full-fledged members of society, while getting a feel for the advanced, high-level technology around them. While about 70% of Faculty of Engineering students go on to graduate school after completing the undergraduate program, graduates who leave us directly for the business world do not necessarily proceed in their own field of study, but rather advance in a wide variety of different fields. Taking this into consideration, we have prepared a range of course subjects, with the aim of training generalists in many differing fields. Along with strong grounding in the fields of the core curriculum, which is based on the central fields of study in Engineering, the Faculty of Engineering at

Kobe University endeavors to instill in our engineers a strong engineering ethical standards. After passing the graduate research examination in the fourth year, students are awarded a Bachelor's degree.



## GRADUATE SCHOOL

At graduate school, students first do the coursework part of the graduate program and then the dissertation-writing phase of the doctoral program. September 2007 saw the reorganization of the existing Graduate School of Science and Technology and the start of its new incarnation. In addition to systematically developing a consistent educational program from the start of undergraduate studies until the completion of graduate work, the Graduate School of Engineering also looks to present a fundamental way of thinking for

education and research that stresses original research into basic knowledge and the student's specialization. The framework of the Graduate School of Engineering's educational program is a curriculum of engineering courses thoroughly covering the traditional areas of engineering scholarship, including a rich variety of programs (program course, multiple major course, cooperative education programs) to enhance the level of graduate school education.

## INTERNATIONAL ACTIVITIES AT THE KOBE UNIVERSITY GRADUATE SCHOOL OF ENGINEERING AND FACULTY OF ENGINEERING

Kobe University has concluded several academic exchange agreements with other educational and research organizations at universities overseas, either between the universities themselves or between departments. We then work together on joint research, exchanging teaching staff, students and information in fields of mutual academic and educational concern. For student exchanges, we have put into place detailed agreements on the mutual non-collection of tuition and other fees, and students can go on exchange with the knowledge that course credits they obtain at their

Number of Faculties (As of May 1, 2010)

Number of Positions		Faculty of Engineering (as of May 1, 2019)				Total
		Professors				
		Associate Professors				
		Assistant Professors				
		Research Associates				
Faculty of Engineering	65	68	32	9		174
Total of Kobe Univ.	531	506	238	34		1,309

Number of Students (As of May 1, 2010)

	Undergraduate Students				Graduate Students				Total
			Intl. Students				Intl. Students		
Faculty of Engineering	2,447	(325)	45	(13)	1,047	(127)	117	(40)	3,494
Total of Kobe Univ.	11,924	(4,036)	198	(92)	4,822	(1,506)	948	(509)	16,746

( ) : Number of female students



# DEGREE PROGRAM

## MASTER'S DEGREE PROGRAM

The Graduate School of Engineering's education and research is dedicated to cultivate human resources with a wide range of knowledge in their specialized field, and interdisciplinary perspectives. The school especially focuses on fostering researchers and highly specialized professionals who are rich in creativity, and possess multifaceted perspectives. Students are granted a Master's Degree in Engineering when they complete this program.

► Highly specialized main courses established through

further development and deepening of the undergraduate engineering courses.

- Education in the area of integrated engineering with a number of advanced courses for interdisciplinary engineering education.
- Fostering of human resources educated through multi-major course (a major and several sub-majors).
- Medical Engineering Course for people who hold a full time job. (Master program to foster core human resources for manufacturing)

## DOCTOR'S DEGREE PROGRAM

Further developing and deepening of courses offered in the Master's Degree Program. This program is to foster researchers, academic members of higher education and research institutions, and highly specialized professionals who are highly creative, international-minded, and have an excellent ability to establish, explore, and solve problems by themselves. A Doctor's Degree, either a Dr. of Engineering or a PhD will

be granted upon completion of the program.

- A strict coursework of research for dissertation.
- Finding problems, designing research plans, conducting research, organizing research results, finding possible ways to solve unsolved problems and then organizing and reporting these possibilities.
- Fostering of human resources educated through multi-major course (a major and several sub-majors)

# COMMON-USE FACILITIES

## -INTERNATIONAL STUDENT CENTER

The International Student Center is one of university wide research/teaching facilities established in April 1993. This Center provides international students with education in Japanese language and Japanese studies. It also offers consultations on problems encountered in studying or living in Japan.

In its aim to promote international academic exchange programs, the Center supports overseas study for Japanese students studying at Kobe University. The local community is very important for the International Student Center; therefore, it is actively promoting projects to strengthen ties between international students and local organizations, as well as programs to help international students improve their Japanese language abilities. ([http://www.kobe-u.ac.jp/~kisc/english/i\\_topics.html](http://www.kobe-u.ac.jp/~kisc/english/i_topics.html))

Kobe University. SOLAC aims to provide language-related support to the greater University community by introducing self-access rooms and CALL facilities for independent study, as well as developing more effective curricula, methodologies and teaching materials for language courses. SOLAC, in addition, plays an active role in promoting research and education at post-graduate levels in the fields of language, culture, and communication.

(<http://solac.cla.kobe-u.ac.jp/index-e.html>)

## -MEDICAL CENTER FOR STUDENT HEALTH

The Medical Center for Student Health was established in April 1970. Services provided by the Center include annual medical checkup for all students and staff, special checkups for X-ray and/or radioisotope users, as well as new overseas students. Emergency medical treatment is also available. There are doctors and nurses as well as counselors to provide consultation or advisory service on physical and mental problems.

(<http://www.kobe-u.ac.jp/medical/index-j.html>)

## -SCHOOL OF LANGUAGES AND COMMUNICATION

The School of Languages and Communication (SOLAC) was established in October 2003 in response to a call for more international communication at



# STRUCTURE AND DIVISIONS



## Faculty of Engineering /Graduate School of Engineering

Departments	Divisions	Education/Research Fields
<b>Architecture</b> Staff 28 (8 Professors / 12 Assoc.Professors )	<b>Spatial Design</b>	Architectural and Urban Design/ Housing and Community Design/ Structural Engineering and Design/ Building Management
	<b>Architectural Planning, History and Theory</b>	History and Theory of Architecture, Theory of Historical Environments/ Planning Theory of Built Environment/ Urban and Architectural Safety Planning
	<b>Engineering of Building Structures</b>	Structural Performance Engineering/ Structural Control in Dynamics/ Structural Systems Engineering
	<b>Architectural Environmental Engineering</b>	Planning of Acoustical and Lighting Environments/ Thermal Environmental Planning/ Planning of Urban Environment and M&E Services
	<b>Cooperative Division</b>	Disaster Mitigation Planning
<b>Civil Engineering</b> Staff 16 (9 Professors / 4 Assoc. Professors )	<b>Engineering of Human Safety</b>	Structural Engineering for Urban Safety/ Geotechnical Engineering for Urban Safety/ Transport Systems Engineering/ Geotechnical Engineering for Disaster Reduction/ Earthquake Disaster Mitigation Engineering/ Disaster-prevention Engineering for River Basin
	<b>Engineering of Environmental Symbiosis</b>	Environmental Fluid Engineering/ Engineering of Hydrospheric Environment/ Geo-environmental Engineering/ Urban Preservation Engineering/ Urban Preservation Engineering/ Urban and Transport Planning and Management
<b>Electrical and Electronics Engineering</b> Staff 28 (10 Professors / 11 Assoc. Professors )	<b>Physical Electronics</b>	Mesoscopic Materials/ Photonic Materials/ Quantum Functional Engineering/ Nano-Structure Electronics/ Electromagnetic Energy Physics
	<b>Computer and Information</b>	Integrated Circuit Information/ Computer Engineering/ Information and Communication Engineering/ Algorithms/ Intelligent Learning Theory
	<b>Cooperative Division</b>	Functional Thin-Film Engineering
<b>Mechanical Engineering</b> Staff 31 (9 Professors / 14 Assoc. Professors )	<b>Thermo-Fluid and Energy</b>	Applied Fluid Engineering/ Multiphase Thermo-fluid Dynamics/ Energy Conversion Engineering/ Energy and Environmental Engineering
	<b>Mechanics and Physics of Materials</b>	Solid Mechanics/ Fracture Control Engineering / Material Science/ Surface, Interface and Tribology
	<b>Design and Manufacturing</b>	Complex Mechanical Engineering/ Machine Dynamics/ Computer Integrated Manufacturing/ Intelligent Artifacts and Manufacturing Systems/ Creative Design
	<b>Cooperative Divisions</b>	Intelligent Production Systems/ Adaptive Function Model
<b>Chemical Science and Engineering</b> Staff 29 (9 Professors / 13 Assoc. Professors )	<b>Applied Chemistry</b>	Applied Physical Chemistry/ Applied Inorganic Chemistry/ Applied Organic Chemistry/ Applied Polymer Chemistry/ Advanced Analytical Chemistry/ Advanced Polymer Colloids/ Advanced Molecular Chemistry
	<b>Chemical Engineering</b>	Catalysis and Catalytic Reaction Engineering/ Transport Science and Engineering / Process System Engineering/ Fluid and Particle Engineering/ Biochemical Engineering/ Bioprocess Engineering/ Materials Processing Engineering
	<b>Chemical</b>	Localized Reactions and Physical Properties of Materials, Chemical Energy Conversion Process, Biofunctional Engineering, Pharmaceutical Design and Production Engineering
<b>*Computer Science and Systems Engineering</b> Staff 42 (20 Professors / 14 Assoc. Professors )	<b>Informatics</b>	Media Informatics/ Programming Languages/ Intelligent Systems/ Artificial Intelligence/ Intelligent Software/ Intelligent Software/ Mathematics of Informatics
	<b>Information Systems</b>	Intelligent Robotics/ Wireless Telecommunication/ Information Photonics/ Computer System/ Processor Architecture
	<b>Systems Design</b>	Systems Planning/ Optimum System Design/ System Control/ System Informatics/ System Structure Analysis/ Identification Theory for Distributed Parameter Systems and Applied Functional Analysis/ Control of Distributed Parameter Systems and Nonlinear Analysis
	<b>Cooperative Divisions</b>	Applied Systems/ Kansei and Media Art

\*With respect to this department, a new Graduate School of System Informatics is established in 2010 with three departments in both the Master's and Doctor's Degree Programs.



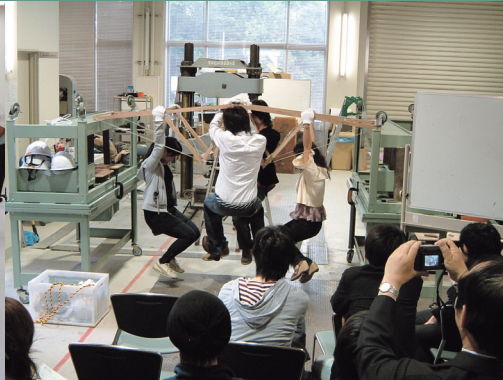
# ARCHITECTURE

SYMBIOSIS OF ARCHITECTURE AND ENVIRONMENT, CREATION OF SAFE AND COMFORTABLE LIVING SPACE

<http://www.arch.kobe-u.ac.jp>



Exercise of architectural design and planning at studio



Practical design and fabrication of Wood-Truss, verified Strength by their own weight



Presentation of design projects



Measurement of thermal environment



Exercise on drawing and painting



Listening test in anechoic room

## PHILOSOPHY OF THE DEPARTMENT

Architecture is eminently universal field of learning, concerning the creation of housing, architectural facilities, - basis of human life. In order to respond to both universal and up-to-date architectural problems, it is necessary not only to study basic fields of architecture (design and planning, structural engineering,

environmental engineering) but also to synthesize them for spatial and temporal design problems. Department of architecture, Kobe University aims to produce talent who can correspond synthetically to contemporary architectural challenges by educating with specialty and synthesis.

## CONTENT OF THE EDUCATION

Undergraduate program starts with liberal arts and basic subjects on natural and information science, succeeded by basic and applied subjects of architecture extending over design and planning, structural engineering and environmental engineering, and continues to synthetic and practical spatial design education.

Master program aims at acquirement of higher knowledge of design and planning, structural engineering and

environmental engineering. And at the same time, training for deducing specific answer to spatial and temporal design problem.

Doctoral program aims at construction and cultivation of theory associated with design and planning, structural engineering and environmental engineering to produce international talent who provides sophisticated special knowledge.

## STRUCTURE AND DIVISIONS

### -SPATIAL DESIGN DIVISION

**Synthetic and practical education and research for the creation of space:**

Architectural and Urban Design, Housing and Community Design, Structural Engineering and Design Building Management

### -ARCHITECTURAL PLANNING, HISTORY AND THEORY DIVISION

**Basic education and research of the architectural design:**

History and Theory of Architecture, Theory of Historical Environments, Planning Theory of Built Environment, Urban and Architectural Safety Planning

### -ENGINEERING OF BUILDING STRUCTURES DIVISION

**Education and research for the safety of buildings in the case of earthquakes, improvement of building materials and structural systems:**

Structural Performance Engineering, Structural Control in Dynamics, Structural Systems Engineering

### -ARCHITECTURAL ENVIRONMENTAL ENGINEERING DIVISION

**Education and research on analysis, control and planning of architectural and urban environment:**

Planning of Acoustical and Lighting Environments, Thermal Environmental Planning, Planning of Urban Environment and M & E Services

## MESSAGES FROM FOREIGN STUDENTS STUDYING IN THE DEPARTMENT



### ABDUL MUNIR [from Indonesia]

It is a great educational experience for me to be a graduate student in Kobe University, which has very well organized academic activities and very good official services. I enjoy the academic atmospheres in the campus as well as the daily life in Japan, as a beautiful country, with generous and friendly people, and rich of cultural values. Thanks to Kobe University for this opportunity.



### FARAMARZ RAHIMINIA [from Iran]

I had always dream of continuing my education in Japan which is leader in the field of earthquake resisting structures. It is a very valuable experience for me to be involved as a PhD candidate in steel structure laboratory in the architectural department of Kobe University. I enjoy living in Japan with my family while developing my skills in the academic filed.



### MIAO DA FU [from China]

I was interested in architecture before coming to Japan. I applied to Department of Architecture in Kobe University, which has a long history and has produced many talents. When I entered, I sometimes became nervous. However, I have had a happy school life thanks to friendly Japanese students and kind teachers & staffs. In the specialized subjects, I could touch the knowledge that I did not know so far and they were very stimulating. It is unforgettable how I was pleased when I designed my first architectural presentation with my ideas. At the same time, the experiments and simulations shown in the classes on structural & environmental engineering were very interesting. After I belonged to a laboratory at fourth grade, I took part in

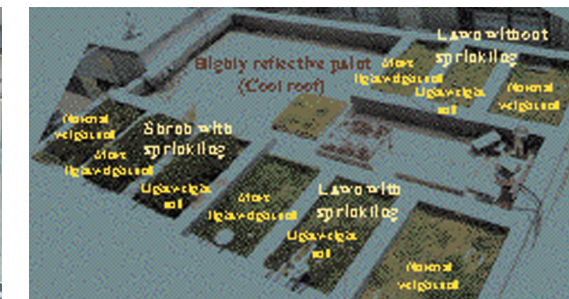
many seminars, discussions and investigations, and deepened my academic interests. Of course, not only study. Kobe University has many chances of exchanging with foreign students. I made friends with many persons. This is a very blessed environment to enlarge visions through touching other cultures. My four years in Kobe was very massive. I enter the master course of Kobe University to raise my technical knowledge more. Interesting classes, charming professors, and above all, fun of architecture which enables to express dreams as a shape ... Don't you realize your dreams in Department of Architecture in Kobe University?

## RESEARCH TOPIC



### Experiment on semi-rigid composite connection

(Study on Composite Structures by Assoc. Prof. Ohtani)



### Experimental roof for surface cover technology of urban structure in Kobe University

(Study on urban thermal environment by Assoc. Prof. Takebayashi)



### Temporary housing model made of bamboo and plaster on a disaster area of the Central-Java earthquake

(Study on reconstruction processes by Environmental Planning & Design Lab.)



# CIVIL ENGINEERING

NEW CIVIL ENGINEERING TOWARDS SAFETY AND SYMBIOSIS OF URBAN AND REGIONAL SYSTEMS

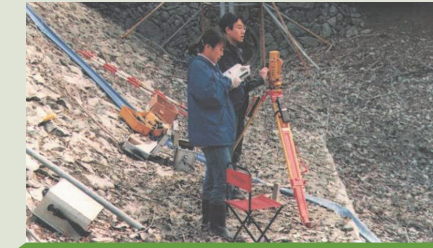
<http://www.shimin.eng.kobe-u.ac.jp>



Field survey for saving human lives from natural disaster

SAFETY

Risk management seminar for preventing damage spreading



Field survey for designing environmentally-balanced life

SYMBIOSIS

Design exercise of urban system with minimized load to earth environment

SOCIETY

## PHILOSOPHY

Civil Engineering aims at creating a safe society in harmony with the environment, through the construction and preservation of the infrastructure. Civil Engineering Education help us create urban and regional environment safe from natural and social disasters, and live in symbiosis with nature, through preservation,

lifetime management and revival of city facilities. We admit students' ambitious to become the pillars of public service needed in our society, and we develop them into individuals with broad academic background with specialist knowledge and high level practical skills.

## EDUCATIONAL CONTENT

Solving safety and environmental problems in urban and regional areas are common interests worldwide. "New civil engineering in the 21st century" focuses on various new engineering aspects while enjoying a well-built and established base of civil engineering. The program also emphasizes on public participation and international cooperation. Courses offered to the students of undergraduate, master's and doctoral levels enable them to have deep knowledge and understanding the safety and

environmental aspects of the modern society. The study area covers a wide range in the fields of disaster prevention and mitigation, environmental assessment and protection, infrastructure planning and management and geotechnical and structural designs. Students who like to make their career in public services at global or local levels, are welcome. Currently, we have more than 10 overseas students from China, Korea, India and other countries

## CONSTITUTION

Civil Engineering is a diverse academic field, and has supported the civil society ever since Roman times. In the core of the curriculum are the Civil Engineering subjects, complemented by subjects dealing with environmental considerations, the status quo of public facilities reflecting public opinion, as well as the internationalization of design codes and standards. The Department of Civil Engineering consists of the Human Safety and Security Engineering section and the

Environmental Symbiosis Engineering section. The Human Safety and Security Engineering section does teaching and research about urban safety against natural disasters and social disasters such as terrorism and accidents. The Environmental Symbiosis Engineering section does teaching and research about creation of urban and regional environment living in symbiosis with nature, as well as the preservation, lifetime management and renewal of city facilities.

## ROLE OF PUBLIC SERVICE

- 1) Safety and security: Save us from natural disaster such as earthquakes and floods and provide safe and secure living environment
- 2) Natural symbiosis: Improve infrastructure symphonic with natural environment and hand the good global environment to future generation

- 3) Community collaboration: Create urban and regional space with great individuality involving public comments
- 4) International cooperation: Support developments of overseas society with infrastructure improvement and disaster relief

## MESSAGE FROM OVERSEA STUDENT



**HAMID SAFFARI** [Ph.D. Student, from Iran, 2008-2011]

I would like to say congratulations to you all were accepted in Kobe University. Study in Kobe University has several good aspects as quality of study, cultural programs, beautiful campus and city. Kobe University has been well known not only in Japan but also in international academic society. In case of me, my professor in Iran had been graduated in Kobe University so he recommended me to continue my doctoral program in Japan, at Kobe University. There are kind professors in several departments who try to educate the students as well conducting the progressive future for the country and society. They try to improve their

students by many activities like seminars, class presentations and so on. Meanwhile you study at Kobe University, you can participate cultural activities, sport teams or music training. You would have nice times visiting Kobe city's sightseeing as bazaars, mountain resorts, ropeways, beach, museums and many other places. I think Kobe city is one of few cities which has complex of natural beauties and industrial scenes. Spread transportation system containing trains, buses, rapid train and near access to airport makes Kobe city unique for life and study!

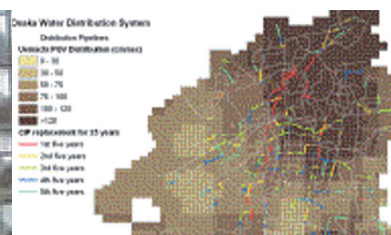
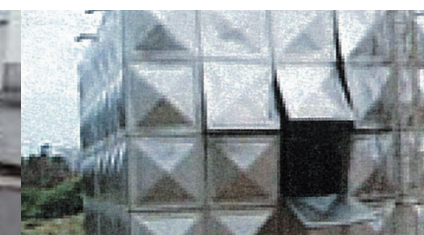
## RESEARCH TOPIC (EARTHQUAKE DISASTER MITIGATION ENGINEERING)

Engineering community has long worked to build safe and reliable lifeline systems, that is, those systems necessary to provide electric power, natural gas, water and wastewater, and transportation facilities and services that are essential to the well being of the community served by these systems. Providing lifeline system function is especially important in assisting rapid recovery following natural hazards. Engineering approaches to limiting damage to lifeline systems from natural hazards have developed specifically for individual natural hazards and individual types of lifeline systems. Division of Earthquake Disaster Mitigation Engineering has contributed to identifying lifeline system risks and

implementing measures to improve earthquake performance of the systems. In this regards, several activities are carrying out as follows: performing field surveys on seismic damage of lifeline systems during each earthquake; elaboration and verification of underground conduit analysis; development of models and methods for reliability analysis of large networks and systems for business interruption analysis; emphasis on measures for lifesaving systems; implementation of an overall seismic mitigation evaluation considering disaster prevention investment in community, economy, and social activity according to function damage of lifelines.



Field surveys on lifeline damages

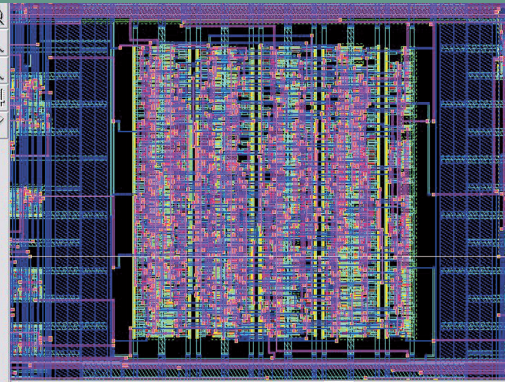


Seismic mitigation prioritization in lifeline systems

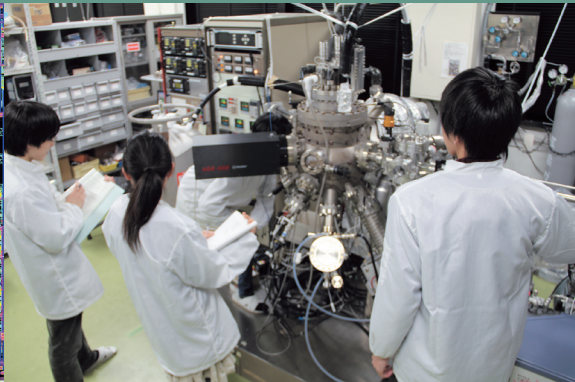




Sputter deposition system



LSI layout design of CAD system



Experimental arrangement for new materials



Face recognition system



Multi-slot antenna and microwave plasma generator

## CONCEPT

In recent years, Electrical and Electronic Engineering/Technology has been more expanding with a rapid advancement in all engineering disciplines which inherently embrace an ever-widening range of academic and professional programs. From a global point of view, the Department of Electrical and Electronic

Engineering basically offers the balanced interdisciplinary core subjects and studies on both education and research in the state-of-the-art scientific and technological fields of Physical Electronics, Computer and Information Engineering, and Functional Thin-Film Engineering.

## EDUCATION

The characterized and professionalized education and research core courses in the department of electrical and electronic engineering are specifically classified into two balanced academic divisions; Physical Electronics and Computer and Information Engineering. Division of Physical Electronics offers the scientific and technological education as well as the interdisciplinary and frontier

research project works, which are mainly concerned with the sectionalized major education and research programs. Division of Computer and Information offers the scientific and technological education as well as the sophisticated hardware and software research project works which are associated with the sectionalized education and research programs.

## STRUCTURE

Physical Electronics Division covers the specialized education and sectionalized research on electromagnetic field and waves, solid-state physical engineering, quantum physics and electronics, electrical and electronic material science, semiconductor electronics, sensor devices, nanoelectronics, photonic devices, surface physics and electronics, super-conducting physics and electronics, optics and optoelectronics, high-energy physics, plasma electronics, and bio-science and engineering in addition to such fundamentals as applied mathematics, physics, chemistry and mechanics.

Computer and Information Engineering Division includes the specialized education and sectionalized research on electric and electronic circuit theory, integrated circuit design and systems, computer and communication systems, wearable computing, ubiquitous and ad-hoc network, information network, information transmission, information theory, coding theory, data compression, digital broadcasting, information and network security, data structures and algorithms, graph theory, software design, image processing, control engineering, optimization theory, pattern recognition, fuzzy theory and neural networks, intelligent machines.

## INTERNATIONAL PROGRAM

According to the academic exchange agreements with overseas universities and institutions, our department is conducting intensive exchanges for education and research. Every year, foreign students from

Korea, Malaysia, etc. enrich the academic and international environment on campus. Some labs cooperate with research institutions of USA, Germany, New Zealand, Korea, England, France, etc.

## MESSAGE FROM INTERNATIONAL STUDENT



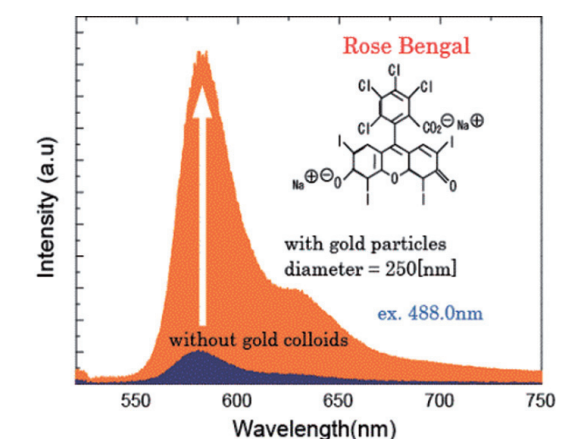
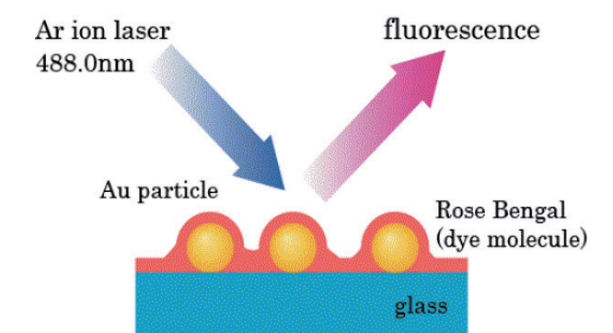
### FADIAH ADLINA BINTI M.GHAZALI [from Malaysia]

It has been a great opportunity to earn my bachelor and master degree at Kobe university with the guidance and help from dedicated and highly acclaimed professors in material mesoscopic laboratory and EE department. Pursuing my research here in plasmonics has given me the chance to use high-tech laboratory facilities and attend international conferences, which has definitely

expanded my horizon in so many levels. It is a wonderful experience to mix with Japanese students, learn the language and interesting culture. Kobe University has by far the most beautiful location beneath mount Rokko and overlooking seaview of Kobe port. Kobe has many foreigners and is not too crowded. I think Kobe is one of the best cities in Japan to live.

## RESEARCH TOPIC: DEVELOPMENT OF PLASMONICS (DIVISION OF PHYSICAL ELECTRONICS, MESOSCOPIC MATERIALS LABORATORY)

Beautiful colors of glass ornaments and stained glasses in churches are generated by metallic fine particles embedded in the glasses. Such coloring phenomena are due to the absorption of light by collective oscillation of free electrons in the fine particles, called surface plasmons. When metallic nanostructures are illuminated, surface plasmons are excited and giant electromagnetic fields are induced in the vicinity of the surface. Plasmonics utilizes such giant electromagnetic fields to realize high-performance optical devices including various sensors. In our laboratory, we are studying the enhancement of light emission from semiconductor nanocrystals and dye molecules in the presence of metallic nanostructures. The figures show the enhancement of photoluminescence from Rose Bengal molecules caused by gold particles.





## CONCEPT

**M**echanical Engineering has been progressing as a basic discipline contributing to modernization and economic development for more than two centuries ever since the industrial revolution. Such development of machinery industry based on mass production/consumption, however, causes the global environmental problems, such as global heating and deficiency of natural resources. Mechanical Engineering is now required to solve these problems by developing technologies for CO<sub>2</sub>-reduction, energy saving, and alternate recourses and must aim at “sustainable manufacturing (MONOZUKURI)”, assuming recycle/reuse and aging societies. To cover such diverse target domains, our department will not stay in the conventional mechanical engineering domains but make a continuous challenge towards “MONOZUKURI Innovation” by collaborating with various different areas including biology, medicine, welfare, electric and electronics technology, and information and communication technology.

## EDUCATION

Our educational goal is to train the students as to become an engineer who can solve even newly faced problems by taking the initiative and cooperating with others. For this purpose, the curriculum is planned to start from basic aspects and proceed to advanced applications. Our educational programs cover lectures on basic engineering, workshop practices, design seminar

and advanced courses in engineering. Lectures in various specialized research fields are also given. Students at the 4th grade study their graduation theses under the guidance of faculty staff. Currently, over 70 % of undergraduate students proceed to the graduate school and continue their studies.

## STRUCTURE AND DIVISIONS

The department of Mechanical Engineering was established in 1921, one of the oldest department in the University. The department is producing many leading engineers in mechanical engineering. The department has three divisions: Thermo-fluid and Energy, Mechanics and Physics of Materials, Design and Manufacturing. Research programs are offered in 13 fields.

## -DIVISION OF THERMO-FLUID AND ENERGY

Towards effective use of energy and bettering the environment, education and research are conducted from both elemental and system aspects. Reliable thermo-fluid-energy machineries and highly efficient energy conversion systems are being developed by theoretically, experimentally, and numerically investigating complex mechanisms governing thermo-fluid phenomena.

materials by designing specific features of surfaces and of "solid mechanics", "fracture control engineering", "materials science" and "surface, interface and tribology".

## -DIVISION OF DESIGN AND MANUFACTURING

The mission of this division is to establish engineering solutions required for developing active but sustainable next generation social systems from the viewpoints of design, manufacturing, operation, and reuse/recycle of artifacts. Towards this goal, we are conducting education and research on system analysis and design, intelligent robots, control theory, emergent systems, and next-generation manufacturing technologies that cover wide range of phenomena in micro and macro levels, such as machine elements, mechanical systems, and social systems.

## -DIVISION OF MECHANICS AND PHYSICS OF MATERIALS

The mission in this division is to promote research and education on multi-scaled analyses and experimental evaluation of structures and machine components, characterizations of mechanical, physical and chemical properties of materials, and formations of advanced

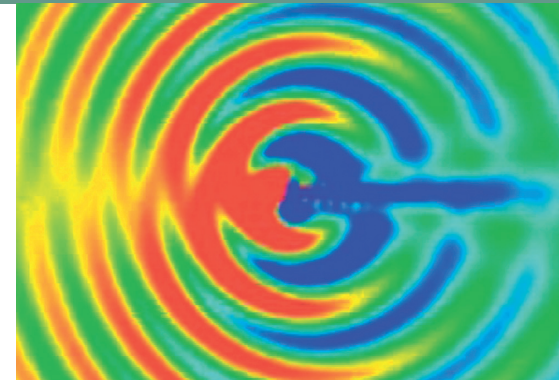
## MESSAGE FROM INTERNATIONAL STUDENT



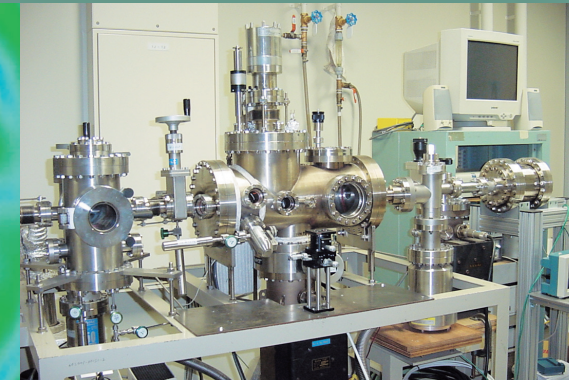
**COI JI SUN** [Undergraduate student from Korea]

Studying in Kobe University brought me wonderful memories. I made my choice to study in Kobe University because of its internationality, and it turned out to be a right choice. Teachers and friends are very kind, so I could study with a peace of mind. There are tutors who support international students in their studies. When I was a freshman, the tutors were very helpful to me.

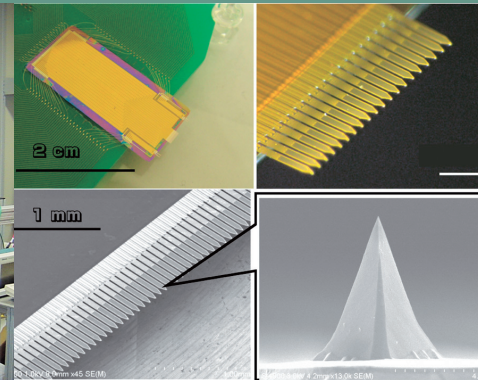
Kobe University has many circles and clubs. I enjoyed my participation in the glider club and met many people that I value very much. Here is a place that I could realize my long-thought dream. Now I' m in the fourth grade and doing research activities freely. I hope to continue on to the Master's program for higher education in this wonderful place.



**Fig.1 Applied Fluid Eng**



### Fig.2 Surface and Interface



**Fig.3 Intelligent Artifacts and Manufacturing System**

## RESEARCH TOPICS

### -DIVISION OF THERMO-FLUID AND ENERGY:

Figure 1 shows the Aeolian tone generated from a cylinder placed in a uniform flow. The detailed structure of the sound wave is clarified by direct numerical simulations of the unsteady motion of fluids using the lattice Boltzmann method.

well as their atomic masses. The design of carbon nanotube field emitter devices is one of the research targets.

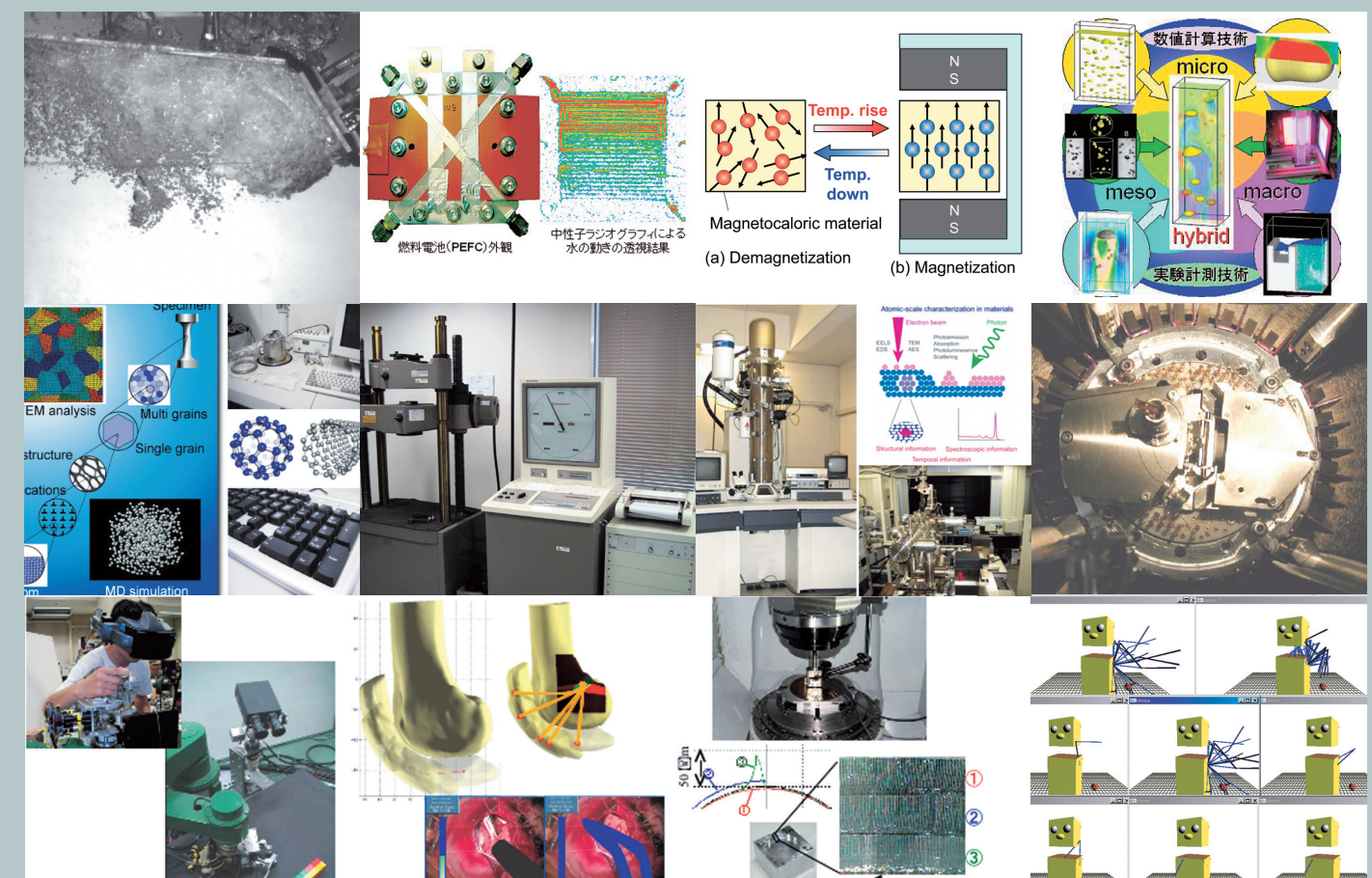
**-DIVISION OF DESIGN AND MANUFACTURING:**

Figure 3 show a multiprobe cantilever array independently driven by MEMS thermal actuators for a new parallel nanolithography system. This device allows creating patterns on main-chain-decompositiontype EB resist film, and nanopatterns with a minimum line width of 50 nm were successfully formed in air.

**-DIVISION OF MECHANICS AND PHYSICS  
OF MATERIALS:**

Figure 2 shows the AP-FIM (Atom Probe Field Ion Microscope) to observe individual surface atoms as

## Other research topics





## CONCEPT

The overall mission of the Department of Chemical Science and Engineering is to foster the next generation of researchers and engineers in the chemistry fields on a global scale by education and research to meet the needs of industry and society in general. The research and educational activities in our department

## EDUCATION

In recent years, significant technological developments and innovations have resulted in rapid and marked changes in the way highly functionalized chemicals and materials are produced, as well as in the chemicals/materials themselves. Thus, it is essential for the future chemical researcher not only to have a sound fundamental knowledge of chemistry, physics, and biology from an engineering viewpoint, but also to have the skills and ability to apply this knowledge with respect

## ORGANIZATION

Our department consists of two divisions: The Division of Applied Chemistry and the Division of Chemical Engineering. Research/education within the Division of Applied Chemistry include generation of functionality of chemicals and materials and elucidation of mechanisms involved, as well as development of techniques for new material production from atomic/molecular level to nano/meso/macro levels to attain a wide range of functionality on a macroscopic level by accumulation of molecules into novel materials.

## INTERNATIONAL ACTIVITIES

The Department of Chemical Science and Engineering at Kobe University has played a leading role in the establishment of a world-wide academic and educational network of chemical scientists and engineers for global sustainability, focusing on production of novel materials and development of chemical production processes with reduced environmental impact. Several faculty members visited Christian-Albrechts University in

cover the fields of fundamental chemical science on the microscopic and molecular level, addition of specific functionality to chemicals and materials, engineering applications of biofunctional materials and process development in industrial scale material production.

to a wide range of chemical products and processes, to be able to analyze and synthesize chemicals, and to design environmentally friendly chemical and biochemical systems. In this vein, the mission of the Department is to provide the students with the skills required to satisfy the needs of the chemical industry and the society in general as chemical researchers and engineers, with an emphasis on fundamental science, analysis, applications and creativity.

Research/education in the Division of Chemical Engineering include development of useful materials and reaction catalysis, establishment of controlled processes involving reaction and mass transfer and development of new production processes based on the clarification of interaction between molecules, functionality of biomaterials and energy and mass transport phenomena. The ultimate goal is the development of new production processes with both high efficiency of material and energy and low environmental impact.

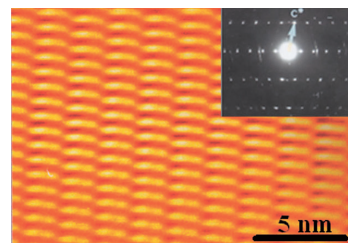
Kiel (Germany) in 2006 as well as Texas University in Austin (U.S.A.) in 2007 in order to establish our collaboration with researchers at these universities. Additional related activities include the organization of an international workshop on Development of Novel Functional Materials and Production Processes with Reduced Environmental Impact in 2006, with participation by Asian and Australian scientists.

## DIVISION OF APPLIED CHEMISTRY

### -CX-1 APPLIED PHYSICAL CHEMISTRY

► Y.Ueda, K.Ishida, M.Misaki, Y.Koshiba

Advanced functional materials based on physical/analytical/quantum chemistry. Preparation and characterization of organic thin films and inorganic fine particles, basic research of molecular nano-technology and development of organic semiconductor lasers.



### -CX-2 APPLIED INORGANIC CHEMISTRY

► M. Mizuhata, A. Kajinami, I. Ayabe

Structure/properties of highly concentrated solutions, analysis and application of heterophase effects. Preparation of metal nanoparticles and metal oxide thin films based on inorganic materials chemistry and electrochemistry.

### -CX-3 APPLIED ORGANIC CHEMISTRY

► A. Mori, E. Okada, Y. Kamitori, A. Sugie

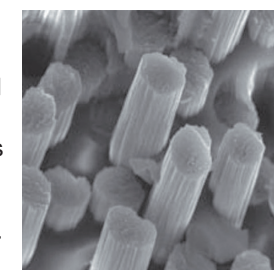
Synthesis, reactions and structures of novel organic compounds and molecular orbital calculations. Synthesis and evaluation of biologically active

compounds for medical and agrochemical purposes, and development of new functional heterocyclic compounds.

### -CX-4 APPLIED POLYMER CHEMISTRY

► T. Nishino, M. Kotera

Microstructure and mechanical, surface and thermal properties of polymeric materials towards production of high performance polymer materials and polymer composites.



### -CX-5 ADVANCED ANALYTICAL CHEMISTRY

► H. Nariai, H. Maki

Synthetic methods, specific reactivity, structural specificity, surface physical properties, polyelectrolyte

effects and hydrophobic interactions in complex formation of phosphates for development of novel materials.

### -CX-6 ADVANCED POLYMER COLLOIDS

► H. Minami, T. Suzuki

Preparation of intelligent polymer particles using environmentally friendly heterogeneous radical polymerization processes. Precise design of smart polymer particles based on colloid chemistry.

### -CX-7 ADVANCED MOLECULAR CHEMISTRY

► T. Takeuchi, T. Ooya

Design and synthesis of functional supramolecular materials by tailor-made molecular assembly using intra- and/or intermolecular interactions, which possess molecular recognition ability, catalytic activity, and other biomimetic functionalities.

## DIVISION OF CHEMICAL ENGINEERING

### -CX-8 CATALYSIS AND CATALYTIC REACTION ENGINEERING

► S. Nishiyama, Y. Ichihashi, N. Kumagai

Utilization and application of catalysis with regards to environmental/energy problems and industrial chemical processes. Selective oxidation, catalyst reduction and photocatalysis for energy/resources conservation.

### -CX-9 TRANSPORT SCIENCE AND ENGINEERING

► N. Ohmura, H. Imakoma, T.Horie

Utilization and application of catalysis with regards to environmental/energy problems and industrial chemical processes. Selective oxidation, catalyst reduction and photocatalysis for energy/resources conservation.

### -CX-10 PROCESS SYSTEM ENGINEERING

► S. Matsuo

Process Systems Engineering (PSE) aimed at development of methodology for sustainable production as a means of solving environmental problems, focusing on process control and chemometrics.

### -CX-11 FLUID AND PARTICLE ENGINEERING

► H. Suzuki, Y. Komoda

Rheological characteristics of complex fluids such as non-Newtonian fluids, suspensions etc. Energy saving air-conditioning systems, highly efficient mixing systems and highly efficient functional thin films.

### -CX-12 BIOCHEMICAL ENGINEERING

► A. Kondo, C. Ogino, F. Matsuda, T. Hasunuma, T. Tanaka

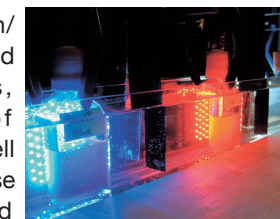
Development of efficient bioprocesses using enzymes, antibodies, microbial, insect, and animal cells by application of molecular biotechnology, enzyme engineering, industrial microbiology, cell culture engineering, and immobilized bioreactor technology.



### -CX-13 BIOPROCESS ENGINEERING

► H. Yamaji, T. Katsuda

Development of production/separation processes based on biological functions, production methods of biofunctional materials in cell culture, bioremediation by use of microorganisms, and utilization of biorecognition between biomolecules for purification and high sensitivity detection methods.

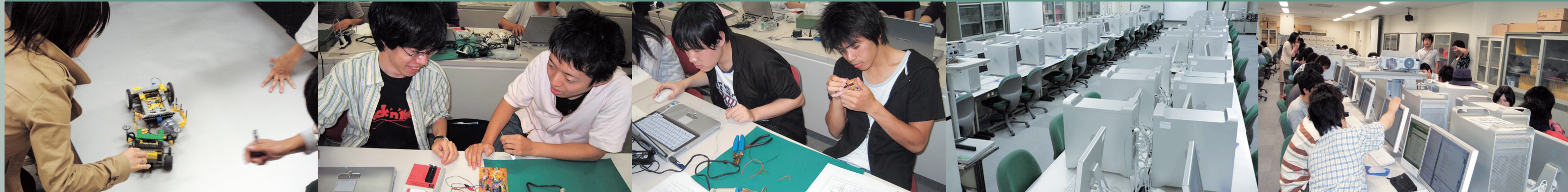


### -CX-14 MATERIALS PROCESSING ENGINEERING

► H. Matsuyama, T. Maruyama, T. Sotani

Application of membrane-based separation technology to environmental protection and drinking-water production. Development of new separation techniques using molecular recognition of biomolecules.

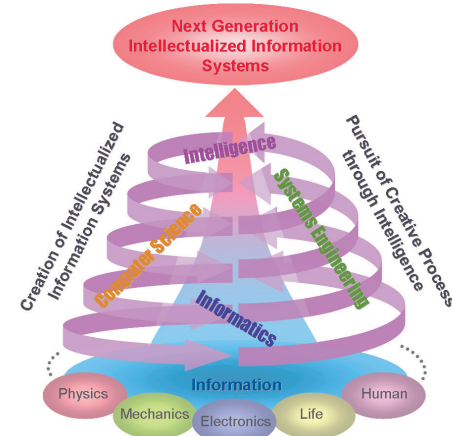




Computer and Systems Laboratory and Practice

## CONCEPT

The Department of Computer Science and Systems Engineering is devoted to such themes as "pursuit of creative process through intelligence" and "creation of the next generation intellectualized information systems". The department aims at one of the newest academic disciplines by integrating not only the fields of computer science and information technology, but also various scientific and engineering fields including electronics, mechanical engineering, life science, social science, and so on. The multi-disciplinary nature of computer science and systems engineering offers an exciting challenge for students thinking of embarking on a career in almost all scientific and engineering fields as well as information



technology fields in advanced and more computerized society.

## EDUCATION

The course structure aims at the wide and deep exploration of education and research relating to computer science and systems engineering. The undergraduate program structure of the department is carefully designed for students to study multi-disciplinary major courses as well as liberal arts. Freshman students start fundamental courses of computer science and systems engineering, such as mathematics, physics, logic circuits, and computer engineering. Sophomore students study both the fundamental and advanced courses including programming languages, spectrum analysis, and system analysis. Further junior students mainly take

advanced such as database systems, sensing technology, and robotics. All senior students are engaged in research projects. Four-year Bachelor's degrees are awarded to undergraduate students. With respect to this department, a new Graduate School of System Informatics is established in 2010 with three departments. Master's and Doctoral degrees are awarded to students who have successfully completed the required subjects of an authorized graduate program. We have accepted many foreign students and young researchers from more than twenty countries around the world.

## MESSAGE FROM INTERNATIONAL STUDENT



### YI QIAN [1st grade of the Doctoral Course]

My name is Yi Qian and I am from China. I came to Kobe University in 2006 to study in the master course about systems planning. Now, I am working hard for my doctoral course further more because I am really attracted by my research on real/virtual manufacturing system. It has been a wonderful experience to study in Kobe University where I could improve the knowledge in my area of research. At

the same time, I had the chance to study the Japanese language and to learn about Japanese culture. Particularly, I really admire the convenience in daily life. You can find convenience stores and vending machines everywhere in streets, and the complex train system could also punctually take you to anywhere you want to go. Kobe is one of the most beautiful cities in Japan, and the life here is really interesting and everyday is a new opportunity and a new challenge to learn something different. I firmly believe my experience here will help me a lot in my future in terms of personal and professional life.

## STRUCTURE AND DIVISIONS

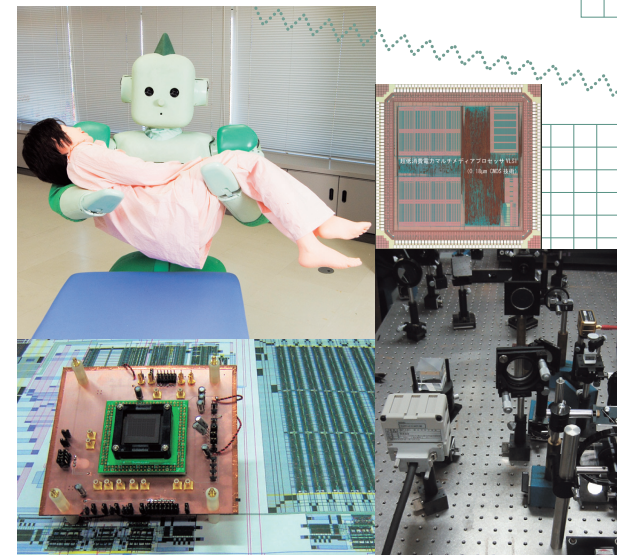
### -THE DIVISION OF INFORMATICS

The Division of Informatics is responsible for education and research on computer science, information processing, and applied informatics. The current research activities cover a wide range of subjects, including information media, programming language, intelligent systems, artificial intelligence, intelligent software, mathematical information science, and art media engineering.



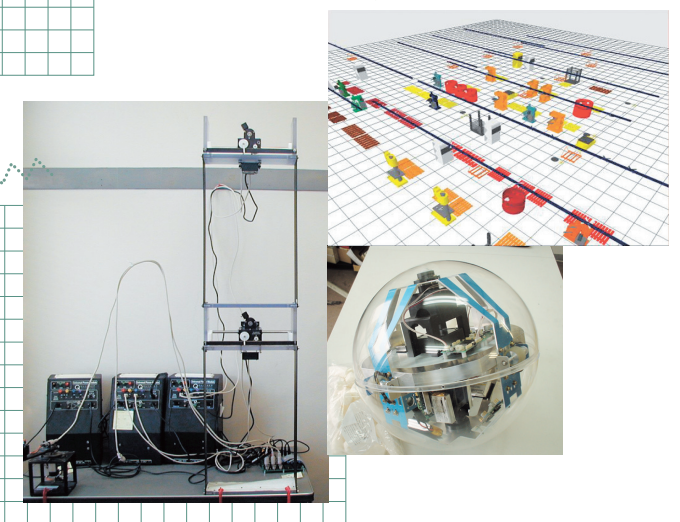
### -THE DIVISION OF INFORMATION SYSTEMS

The Division of Information Systems is responsible for education and research on core technologies for advanced information processing and intellectualized information systems. The research projects cover a wide range of subjects, including intelligent robotics, wireless communication, information photonics, computer systems, and processor architecture.



### -THE DIVISION OF SYSTEM DESIGN

The Division of Systems Design is for education and research on analysis and synthesis of intelligent systems and problem-solving processes. The research projects focus on various issues, including systems planning, systems design, control systems theory, systems informatics, systems structure, mathematics of systems, and advanced mechatronics.



\*Information about the Graduate of System Informatics can be found from the following homepage: <http://www.csi.kobe-u.ac.jp>



# ACCESS



- 1 Rokkodai Campus
- 2 Fukae Campus
- 3 Kusunoki Campus
- 4 Myodani Campus
- 5 Sumiyoshi Elementary School, Sumiyoshi Junior High School,
- 6 Akashi Elementary School, Akashi Junior High School, Kindergarten,
- 7 School for Special Needs Education,
- 8 Research Center for Inland Seas
- 9 Food Resources Education and Research Center,
- 10 International Residence Business Incubation Center Kobe Biotechnology Research and Human Resource Development Center



## Kobe City

The City of Kobe is located to the west of center on the Mainland of Japan. It is accessible by land, sea, and air to domestic and international destinations. It takes 2 hours and 50 minutes to get to Tokyo by Shinkansen Bullet Train, and 1 hour and 20 minutes by plane. Within easy reach of Kobe, there are several famous cities with many historical sites and spots of interest, such as Himeji, Kyoto, Nara, and Osaka.

Ever since it was opened to the world, Kobe has developed as a cosmopolitan port city where people, goods, and information from around the globe are in constant motion.

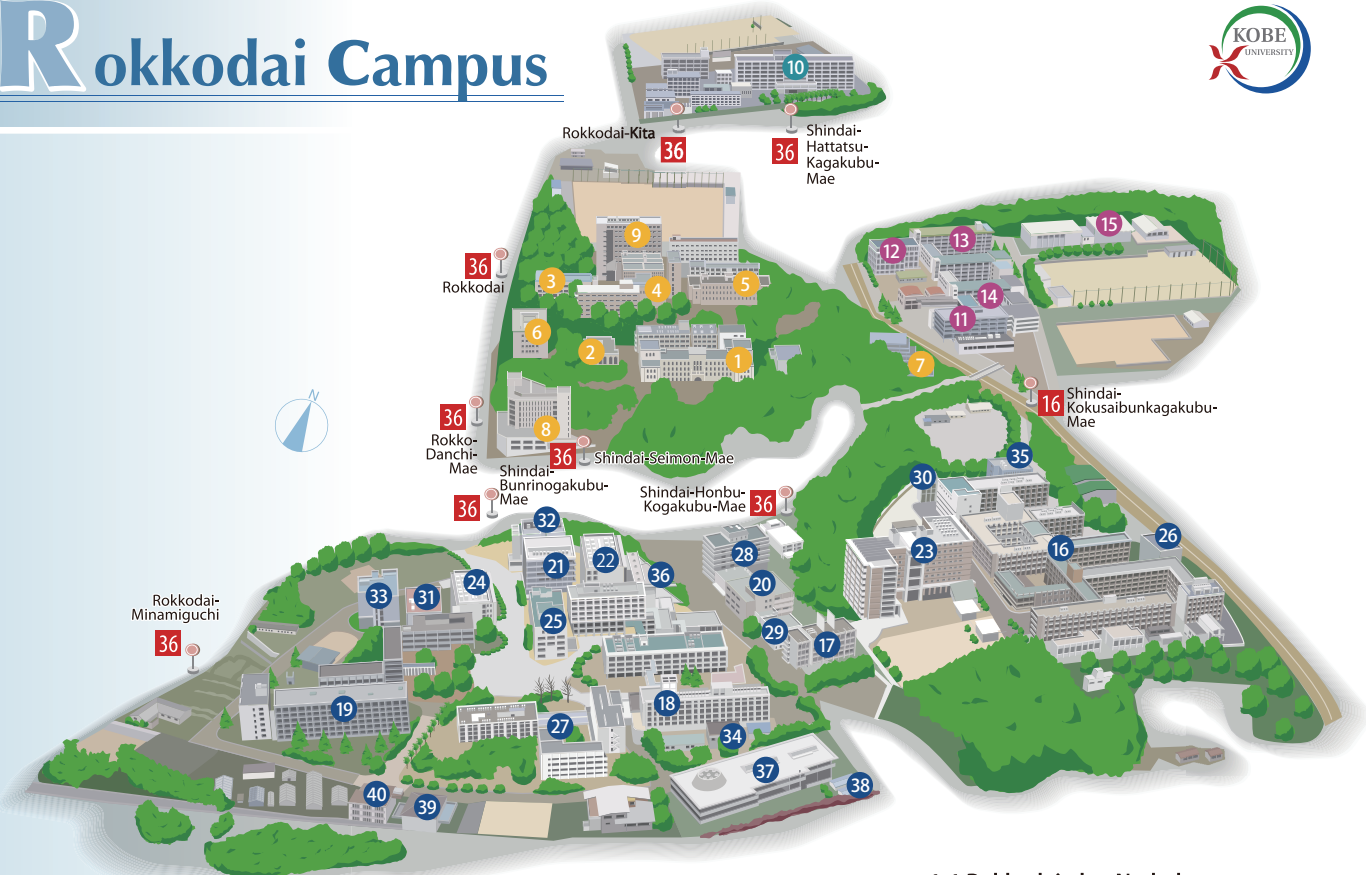
Now, Kobe has a population of 1.5 million including 45,000 foreign residents from as many as 115 different countries, and is well known throughout Japan as being an “international city”. With diverse population of foreign residents and the resulting facilities and amenities established by and for such foreign communities, Kobe is uniquely qualified to support a comfortably refined lifestyle for any individual from any country.

Sandwiched by Mt. Rokko in the north and the Inland Sea of Seto in the South, Kobe is endowed with its overall mild climate averaging 17.1C(62.8F) with four seasonal changes.



Photo courtesy of City of Kobe

# Rokkodai Campus



1-1 Rokkodai-cho, Nada-ku,  
Kobe 657-8501 Japan

- 1 Main Building (Graduate School of Economics / Faculty of Economics Graduate School of Business Administration / School of Business Administration)
- 2 IDEMITSU SAZO Memorial Rokkodai Auditorium
- 3 Graduate School of Law / Faculty of Law
- 4 Library for Social Sciences
- 5 Research Institute for Economics and Business Administration
- 6 Graduate school of International Cooperation Studies
- 7 Student's Hall
- 8 Academic Hall for Social Sciences
- 9 Frontier Hall for Social Sciences (EU Institute in Japan, Kansai)
- 10 Graduate school of Human Development and Environment / Faculty of Human Development (Institute of Human Development Support) Library for Human Development Sciences
- 11 Graduate school of Intercultural Studies / Faculty of Intercultural Studies General Library / Library for Cross-Cultural Studies
- 12 Institute for Promotion of Higher Education
- 13 School of Languages and Communication
- 14 Student Center
- 15 Gymnasium
- 16 Graduate school of Engineering / Faculty of Engineering
- 17 Graduate School of System Informatics
- 18 Graduate School of Science / Faculty of Science
- 19 Graduate School of Agricultural Science / Faculty of Agriculture
- 20 Library for Science and Technology

- 21 Science and Technology Research Building 1 (Organization of Advanced Science and Technology)
- 22 Science and Technology Research Building 2
- 23 Science and Technology Research Building 3
- 24 Science and Technology Research Building 4
- 25 Research Center for Environmental Genomics Biosignal Research Center
- 26 Research Center for Urban Safety and Security
- 27 Graduate School of Humanities / Faculty of Letters Library for Humanities
- 28 Administration Offices (Secretariat / Medical Center for Student Health)
- 29 Information Science and Technology Center (main)
- 30 Information Science and Technology Center (annex)
- 31 Office of Collaborative Research and Technology Development
- 32 Office of Collaborative Research and Technology Development (Venture Business Laboratory)
- 33 Center for Supports to Research and Education Activities, Radioisotope Division
- 34 Center for Supports to Research and Education Activities, Cryogenic Division
- 35 Center for Supports to Research and Education Activities, Instrumental Analysis Division
- 36 Center for Environmental Management
- 37 Kobe University Centennial Hall (Rokko Hall / International Student Center)
- 38 Yamaguchi Seishi Memorial House
- 39 Takikawa Memorial Hall
- 40 Chobo-kan (Guest House)

## Rokkodai Campus

Bus stops around stations

Note: 16 36 Kobe Municipal Bus

