

YNU

Rapidly advancing research center



YOKOHAMA
National University

YOKOHAMA National University

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YNU YOKOHAMA
National University

YNU is strengthening researches.



As bodies responsible for science and technology, universities have duties to promote sciences and are demanded to contribute to further development of globalized and advanced information-oriented society.

Yokohama National University, which was founded in Yokohama soon after the port was opened to the world, has sincerely responded to the demands of society, which have changed with times, and has steadily progressed as a prominent international base for practical science and academic endeavor open to the entire world. We are aware that we should further strengthen academic researches, which are a university function.

Essentials for strengthening researches include abilities for drawing up study plans that can obtain scientific research funds and win competitive funds, active communication of study results, including making patent applications, and systematic academia-industry cooperation for supporting joint studies and entrusted researches. YNU will fortify these capacities and powers by making use of the geographical advantage of being located in Yokohama, which is an international city, and the tradition of advanced and practical academic researches in cooperation with the industrial circle.

YNU is evolving every day without forgetting that its power base always lies in the human resource development and arts and sciences generated from professional knowledge.

President
Kunio SUZUKI



Rapidly advancing research center: Yokohama National University

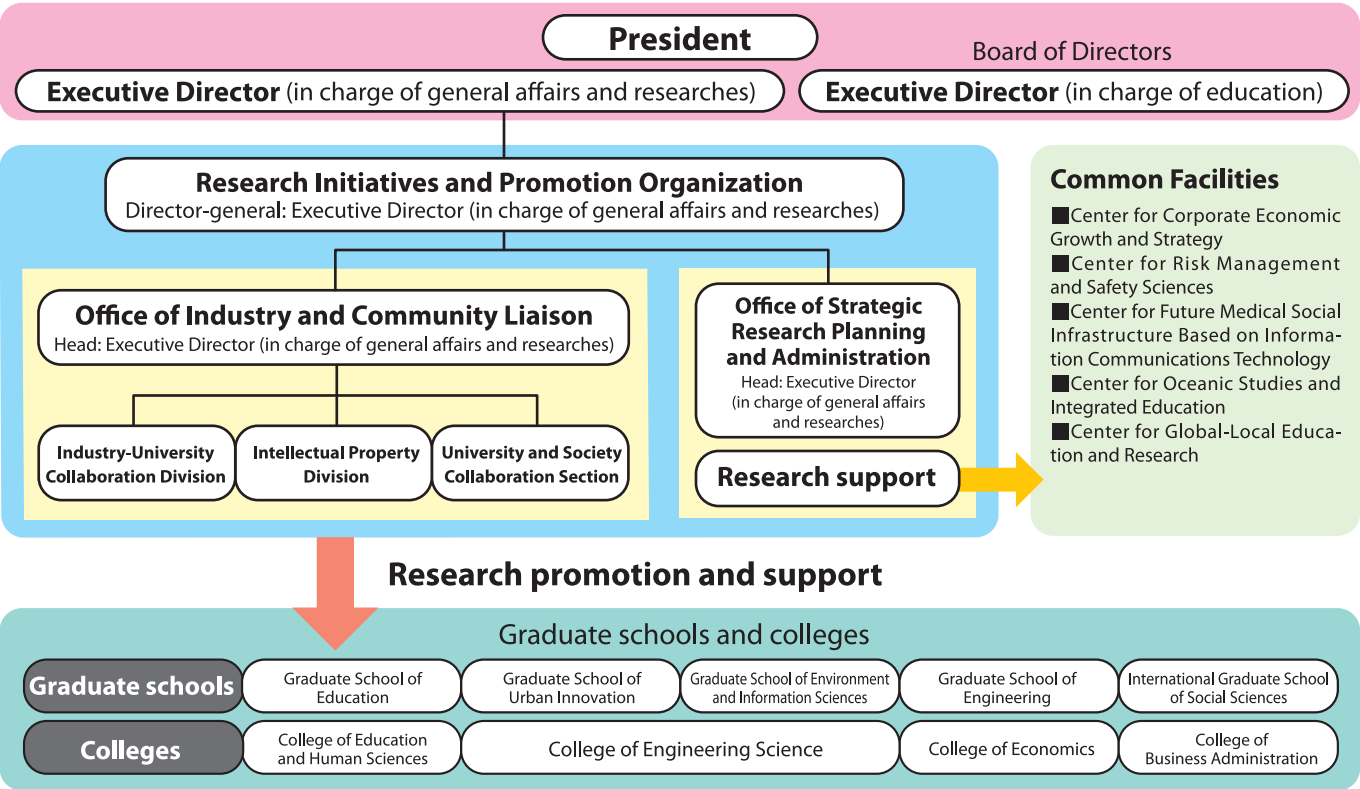


Executive Director / Vice President Yasuo KOKUBUN

As one can see from our website pages on Academic Research Staff (URL: <http://er-web.jmk.ynu.ac.jp/>), some staff members in YNU have study projects headed by world-leading scientists who have created groups (research centers) and are in the process of conducting research. This brochure was prepared in order to spread knowledge on the research centers and deepen cooperation with society.

Organization: As shown in the organization diagram at the bottom of this page, the educational and research section of YNU consists of four undergraduate colleges and five graduate schools. The graduate schools are divided into educational institutions called “Graduate Schools” to which students belong and the research organizations called “Faculties” for the faculty members. In July 2010, in order to strengthen the promotion of research, we established the Office of Strategic Research Planning and Administration alongside the existing Office of Industry and Community Liaison. The two offices are both under the management of the Research Initiatives and Promotion Organization and are fully geared to provide plans on strategic research and conduct research assistance.

Basic policies for promoting researches: We formulated the YNU research initiatives in 2010 as the basic policies for promoting researches. Based on the fundamental concept of “creation and practice of wisdom”, the initiatives aims to propel high-level researches, and continuous evolution, eventually tie up with society to “practice wisdom and deepen practical sciences”. Please visit our website for more information (URL: <http://www.ynu.ac.jp/education/research/initiative/index.html>).





Outline

With the rapid aging of population, advanced countries are facing serious social problems including the medical issue, such as shortage of health care facilities and workers, medical malpractice, rising medical costs, and regional disparities. There is an urgent need of cultivating scientists, engineers and physicians who have a thorough knowledge in both medicine and engineering. At this base, we are researching a new field of "Medical ICT" aiming to fuse the world leading information and communication technologies (ICT) and highly demanded high-technology healthcare practices. By investigating and implementing "Body Area Network (BAN)", which is communication technologies on, near and around the human body, as the core technology, we are propelling education and researches toward creation of innovations.

BAN is broadly classified into "Implant BAN" for technology inside the human body, "Wearable BAN" for technology near the human body, and "Ubiquitous medicine" for integration with communication networks. Specific goals include construction of a medical system connected to sensors and actuators in and on the human body via BAN, effective diagnosis, prediction and prevention of diseases by freely sharing, processing and analyzing information via ground and satellite network infrastructures, daily medical care including drug delivery, and formation of comprehensive and ubiquitous systems. We are also working toward revisions of the laws and legislations related to medicine, pharmaceuticals, and radio so as to allow the practices, and also toward standardization of the technologies.

To achieve the goals, five technological fields: information, device, mechanics, somatology, and medicine will integrate and cooperate with each other. Each field will be classified into three classes from basics to applications to propel systematic studies. (1) BAN core studies focus on the basic theories and technologies necessary for advanced BAN, (2) BAN peripheral studies are on fusing theories and technologies, which are essentials for realizing BAN applications, and (3) BAN application researches will focus on development, clinical implementation, ethics investigations, and industrialization of new BAN-based health care systems and services.

In this COE program, we are focusing on studies that will be the seeds of novel technologies for fusing medicine and engineering, including the following priority projects.

Clinical application of wireless body area network (WBAN)

Application of information and communications technologies to emergency medical treatment: Deployment for triage

Field test of remote treatment and diagnosis

via medical internet satellite (WINDS)

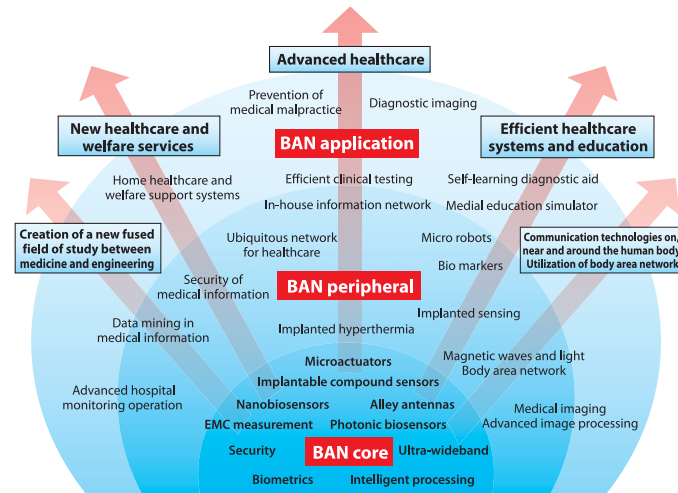
Use of MRI for animal hyperthermia experiment

Study on medical devices using haptics (tactile feedback technology)

Study on drug delivery treatment using magnetic nanoparticles

Image analysis and image reading aids

In this program, Yokohama National University plays the central role and cooperates with Yokohama City University, National Institute of Information and Communication Technology (NICT), and University of Oulu (Finland). YNU is also taking the leadership in personnel exchange among the organization, promoting joint studies with the Center for Future Medical Social Infrastructure Based on Information Communications Technology of YNU, and standardization and legislation by the industry-academia-government joint consortium.



Members

(*YNUe: Graduate School of Engineering, Yokohama National University, YNUi: Graduate School of Environment and Information Sciences, Yokohama National University, MICT: Center for Future Medical Social Infrastructure Based on Information Communications Technology, YCU: Yokohama City University, NICT: National Institute of Information and Communication Technology, UO: University of Oulu)

- **Ryuji KOHNO** (Professor, Division of Intelligent Systems Engineering, YNUe), Leader, Medical ICT, Standardization of BAN
- **Atsuo KAWAMURA** (Professor, Division of Intelligent Systems Engineering, YNUe), Vice-leader, Medical actuator
- **Nobuyuki YOSHIKAWA** (Professor, Division of Intelligent Systems Engineering, YNUe), Vice-leader, Super-conducting sensor device
- **Hiroyuki ARAI** (Professor, Division of Intelligent Systems Engineering, YNUe), Analysis and measures of medical EMC
- **Toshihiko BABA** (Professor, Division of Intelligent Systems Engineering, YNUe), Photonic crystal sensor device
- **Yasushi TAKEMURA** (Professor, Division of Intelligent Systems Engineering, YNUe), Hyperthermia
- **Tomoki HAMAGAMI** (Professor, Division of Intelligent Systems Engineering, YNUe), Information processing of medical welfare
- **Tadashi SHIOMI** (Professor, MICT), Researching and legislating of medical ICT
- **Tomoharu NAGAO** (Professor, Division of Social Environment and Information, YNUi), Medical imaging
- **Shin MORISHITA** (Professor, Division of Artificial Environment and Information, YNUi), Biomechanics, Cellular automata
- **Tomio INOUE** (Professor, School of Medicine, YCU), Imaging and clinical trial
- **Toshio OGINO** (Professor, Division of Intelligent Systems Engineering, YNUe), Nano biosensor device

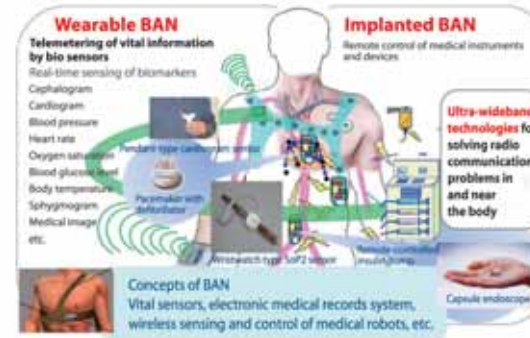
- **Yasuo KOKUBUN** (Professor, Division of Intelligent Systems Engineering, YNUe), Medical optical electronics
- **Hideki OCHIAI** (Associate Professor, Division of Intelligent Systems Engineering, YNUe), Medical communication method, protocol
- **Hiroshi FUJIMOTO** (Associate Professor, Division of Intelligent Systems Engineering, YNUe), Medical robot control, biosensor
- **Masatoshi WATANABE** (Professor, Division of Systems Research, YNUe), Carcinogenesis pathology, biotechnology process
- **Shoji MARUO** (Associate Professor, Division of Systems Research, YNUe), Micro-nano machine in the body, biochip
- **Tsutomu MATSUMOTO** (Professor, Division of Social Environment and Information, YNUi), Medical information security, personal authentication
- **Takahisa GOTO** (Professor, School of Medicine, YCU), Anesthetizing network, ubiquitous medical treatment
- **Tomoyuki SAITO** (Professor, School of Medicine, YCU), Integrated medicine sensor, module
- **Akinobu NEMOTO** (Associate Professor, School of Medicine, YCU), Medical information, rehabilitation
- **Yashushi ICHIKAWA** (Associate Professor, School of Medicine, YCU), Electronic medical record, in-house network
- **Hiroshi KUMAGAYA** (Director, NICT & Professor, YNU), Satellite telemedicine network
- **Pentti LEPPÄNEN** (Professor, Department of Communications Engineering, UO), High-reliability medical ICT system

For more information, please contact:

Global COE Office in the Computer Lab of Division of Electrical and Computer Engineering, Yokohama National University
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TEL: 045-339-4120 E-mail: khono@ynu.ac.jp (group leader) <http://gcoe.mict.ynu.ac.jp/>

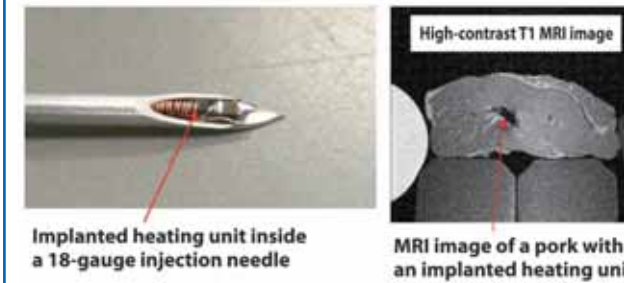
Research topics

■ Implanted nano-sensors and nano-robots for ultimate preventive medicine



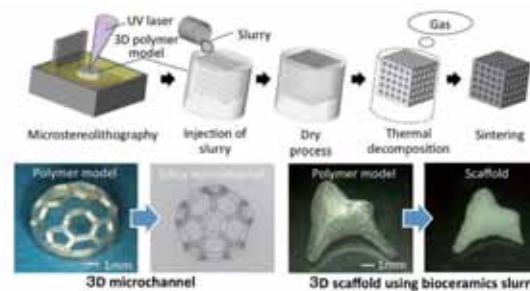
Based on UWB wireless communication and Body Area Network (BAN), we are researching ultimate near-future health monitoring systems, such as implanted multi-function sensors for monitoring the health states, preventing diseases and treating the parts of the body and distributed cooperative systems with intelligent micro/nano-robots.

■ Cancer treatment by hyperthermia using



Implanting heating units via a catheter or syringe causes little or no mark to remain, causes no side effects, and is an expected low invasive method for treating cancer. We are developing innovative technologies that can diagnose and treat cancer at the same time by using magnetic resonance imaging (MRI) systems.

■ Three-dimensional micro fabrication of ceramics using micro stereolithography



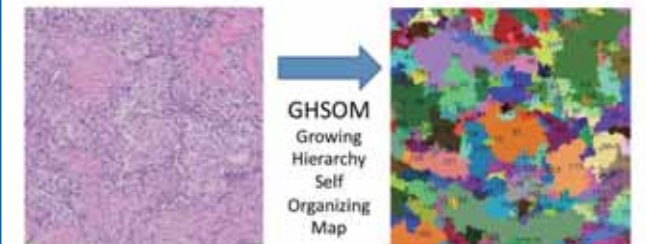
We are developing technologies for copying resin models prepared by laser beam lithography into ceramics using ceramic micro-particle suspensions. We have produced transparent three-dimensional micro-channels from silica micro-particles and cell culture scaffolds from bio ceramics. The technologies are expected to have various applications such as medicine, lab-on-a-chip and micro machines.

■ Study on telemedicine using satellite communication and space technologies



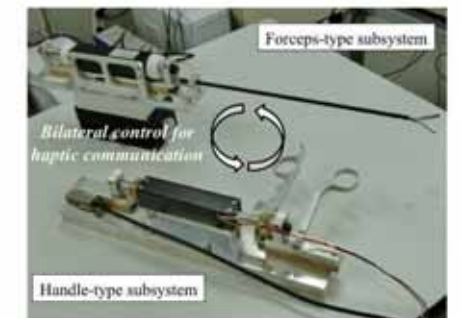
In medical ICT experiments using WINDS satellite, we are testing high-speed transmission of DICOM medical image data and measuring rain attenuation of Ka-band waves, aiming to use space technologies, which are necessary for ground networks crushed by earthquakes and other disasters, for remote medical supports.

■ Automatic extraction of tumor-suspected image regions for supporting image diagnosis and measurement of MIB-1 index

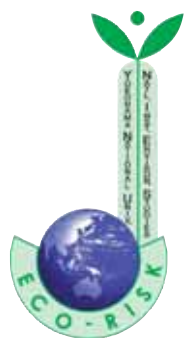


To support MIB-1 index measurement, which is an effective mean for diagnosing the malignance of tumor cells, we are investigating region classification and clustering based on macroscopic characteristics of cells and developing intelligent imaging aids of stable precision. (Joint study with Dr. Furubayashi of Yokohama City University)

■ Application of real-world haptics to medical support systems



We are investigating haptic technologies for actualizing real-time communication, recording, and reproduction of real-world force and tactile senses, aiming to develop medical support systems, such as advanced low-invasive surgery simulators and intelligent operation support systems.



Outline

This Global COE Program aims to contribute to appropriate management of eco-risks in developing nations in Asia, where ecosystems and ecosystem services are rapidly deteriorating due to population increases and economic development. Yokohama National University, which has profound experience in this field including those funded by the 21st Century COE Program of Ministry of Education, Culture, Sports, Science and Technology in Japan, are carrying out studies jointly with the National Institute for Environmental Studies.

- Analyze concepts, basic methods and systems of international risk control from the view points of Asia and propose them to the Millennium Ecosystem Assessment (MA) of the United Nations.**
- Investigate and analyze the functions of ecosystems, such as those in forests, soil, and coastal areas in Asia, and propose detailed methods of adaptive risk management, including control of invasive species.**
- Develop and implement concrete and practical methods for managing risks to ecosystem services in developing nations in Asia, including control of pesticides, fertilizers, and other harmful substances, as well as advanced use of biomass, genetically modified products, and recycling of waste substances.**
- Construct an international network of researchers, municipalities, companies and citizens in order to connect "basic studies", "application case studies", and "proposals of new social systems" based on new policies and ideas.**
- Facilitate attaining these goals, establish an international center for human resource development to culture young researchers into global talents who are creative and capable of exploring their own fields, have wide perspectives and abilities to construct scenarios based on objective and comprehensive analysis, and are capable of forming intra- and international networks and negotiating in communities.**



Members (19, not including those of the National Institute for Environmental Studies)

- **Hiroyuki MATSUDA**, Professor, Program leader
- **Kiminori ITOH**, Professor, Leader of the Eastern and Western Conceptions Working Group
- **Nobuhiro KANEKO**, Professor, Leader of the Ecosystem Functioning Group
- **Satoru SADOHARA**, Professor, Leader of the Ecosystem Services Group
- **Hiroki OIKAWA**, Associate Professor, biodiversity strategies in Asia
- **Makoto ARIMA**, Professor, Geological and geographical risks of ecosystems
- **Fumito KOIKE**, Professor, Forest function diversity in Asia
- **Takashi AMEMIYA**, Professor, Assessment of lake ecosystems and resilience
- **Tomohiko KIKUCHI**, Professor, Functions of coastal ecosystems in Asia
- **Shigeki MASUNAGA**, Professor, Ecological risks of toxic chemical substances
- **Takashi KAMEYA**, Associate Professor, Toxicity assessment of chemical substances in ecosystems
- **Kiyoshi HONDA**, Associate Professor, Effective utilization technologies of biomasses
- **Kazuyuki HIRATSUKA**, Professor, Risks of genetically modified plants
- **Hiroki HONDO**, Associate Professor, Assessment of resources utilization technologies
- **Ryohei KADA**, Professor, Risks to ecosystem by agriculture in Asia
- **Koichi FUJIE**, Professor, Recycling of biological resources in Asia
- **Katsuya KAWAMOTO**, Professor, Use of wastes
- **Akira SAKAI**, Associate Professor, Millennium Ecosystem Assessment (MA) of the United Nations
- **Akira MORI**, Associate Professor, Risks to ecosystems in temperate and cold regions

For more information, please contact:

Office of the Global COE Program "Global Eco-Risk Management from Asian Viewpoints"
Room 101, Environment and Information Sciences I, Faculty of Environment and Information Sciences
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The "Leadership Program in Sustainable Living with Environmental Risk" program is a Ministry of Education Program of Special Coordination Funds for Promoting Science and Technology Training Base of Strategic Leaders for years 2009 to 2013.

The "Leadership Program in Sustainable Living with Environmental Risk" program is a program of the Ministry of Education, Culture, Sports, Science and Technology for "Promoting Science and Technology Training Base of Strategic Leaders". To cope with increasing risks to the environment and damages to the environment in Asian and African regions, the program aims to develop human resources who are ready to contribute to solving environmental issues by linking the results of global COE programs and the academic system of the Graduate School of Environment and Information Sciences of Yokohama National University, which has experiences in studies of ecosystems and environmental risks. The program not only aims to reduce risks but also lay importance on tradeoff between economic development and risks to ecosystems, or a new risk management method called "living with environmental risk". Using the interactive multimedia education system, lectures and classes are shared with universities in the Philippines, Thailand, Malaysia, Indonesia, Kenya and Madagascar. Students are also dispatched and invited to obtain training on environmental leadership.

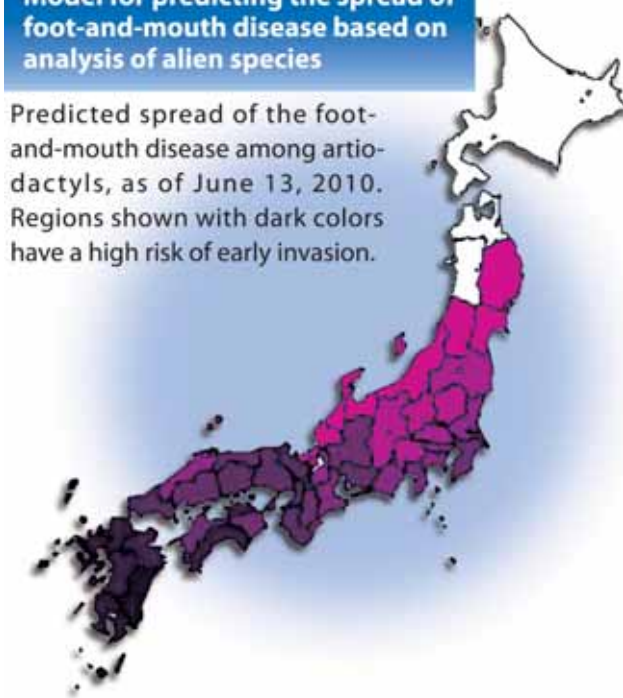
For more information, please contact: Office of the "Leadership Program in Sustainable Living with Environmental Risk" program (TEL & FAX: 045-339-4333, e-mail: re-lead3@ynu.ac.jp4333)
Coordinators: Prof. Nobuhiro Kaneko, Prof. Yukiyoichi Mochida
Members: Prof. Kiyoto Kurokawa, Associate Prof. Masanori Kobayashi, Specially Visiting Teacher (Researcher) Takako Sato



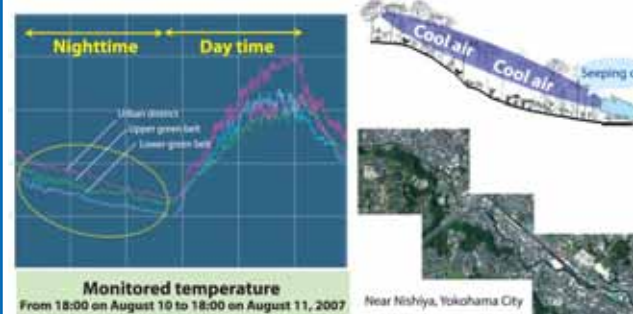
Research topics

Model for predicting the spread of foot-and-mouth disease based on analysis of alien species

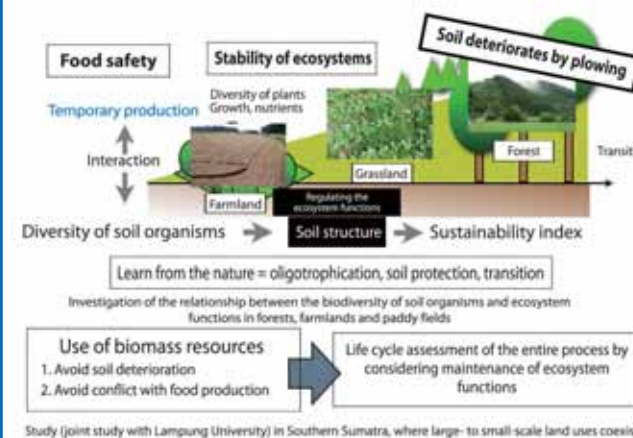
Predicted spread of the foot-and-mouth disease among artiodactyls, as of June 13, 2010. Regions shown with dark colors have a high risk of early invasion.



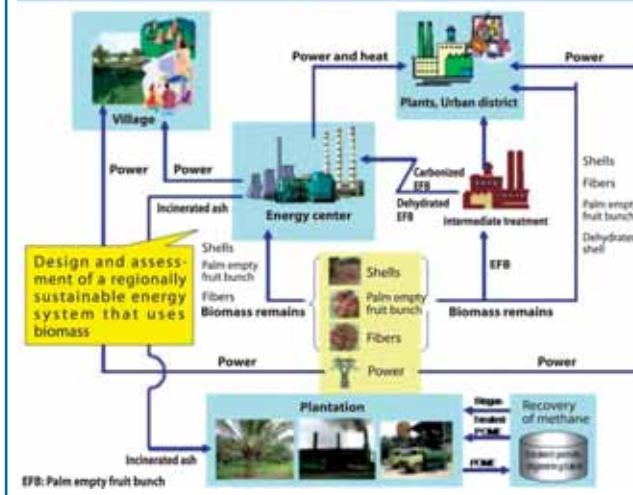
Forest cools residential districts down the slope.



Restoration of deteriorated soil by avoiding plowing



Regionally sustainable energy system using tropical plantations



Biodiversity strategies in Asia Comparison between biodiversity strategies in Asia and Pacific zone



Outline

Yokohama National University established the Japan-first department of safety engineering in 1967 and the Japan-first research center for environmental sciences in 1973. The center carried out a number of research and development activities over many years, such as technologies for preventing disasters and accidents, controlling the safety of chemical substances, evaluating and preserving the environment, and ensuring safety of materials, machines, and systems, etc. Based on the above research activities, the Center for Risk Management and Safety Sciences was established as a common facility of the university for research and education in 2004.

The research of the center focuses on the integration between natural sciences and human and social sciences. Research groups are formed by specially assigned professors and engage in education and R&D activities.

Research towards a safer and sustainable society based on risk management of chemical substances, risk-base maintenance of infrastructures, analysis and assessment of environmental risks, and assessment of social systems and business activities based on energy consumption and environmental loads is carrying out. Future leaders of these fields are also being developed in the center.

For more information, please contact:

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TEL: 045-339-3776
FAX: 045-339-4294
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Members

Infrastructure research group

- Yukihisa KURIYAMA, Professor, Mechanical engineering
- Naoya KASAI, Associate Professor, Material safety engineering
- Shoichi YOSHIDA, Professor, Computational mechanics
- Shigeo KITSUKAWA, Associate Professor, Corrosion engineering
- Tadahiro SHIBUTANI, Associate professor, Faculty of Environment and Information Sciences, Mechanical safety engineering
- Hiroshi FUKUTOMI, Professor, Faculty of Engineering, Materials engineering
- Osamu UMEZAWA, Professor, Faculty of Engineering, Materials engineering
- Hiroshi KATSUCHI, Professor, Faculty of Urban Innovation, Structural engineering
- Akira HOSODA, Professor, Faculty of Urban Innovation, Concrete engineering
- Kazuhiko HAYASHI, Research Associate, Faculty of Urban Innovation, Concrete Engineering
- Tatsuhiko IKEDA, Professor, International Graduate School of Social Sciences, Development economics

Environmental safety research group

- Koichi FUJIE, Director of the Center, Professor, Environmental dynamic analysis
- Yoshimichi HANAI, Lecturer, Environmental chemistry
- Shigeki MASUNAGA, Professor, Faculty of Environment and Information Sciences, Environmental risk management of chemical substances
- Hiroyuki MATSUDA, Professor, Faculty of Environment and Information Sciences, Environmental risk, ecology
- Takashi KAMEYA, Associate Professor, Faculty of Environment and Information Sciences, Environmental impact assessment, environment policies
- Takeshi KOBAYASHI, Associate professor, Faculty of Environment and Information Sciences, Environmental safety
- Satoru SADOHARA, Professor, Faculty of Urban Innovation, Urban environment

Chemical substance and process safety research group

- Hideo OHTANI, Professor, Faculty of Environment and Information Sciences, Chemical safety engineering
- Atsumi MIYAKE, Professor, Faculty of Environment and Information Sciences, Energy safety engineering
- Yasushi OKA, Associate Professor, Faculty of Environment and Information Sciences, Fire safety engineering
- Mieko KUMASAKI, Associate Professor, Faculty of Environment and Information Sciences, Chemical Reaction safety engineering
- Shinji OKAZAKI, Associate Professor, Faculty of Engineering, Sensor engineering
- Daisuke ITO, Special Researcher, Faculty of Engineering, Corrosion engineering

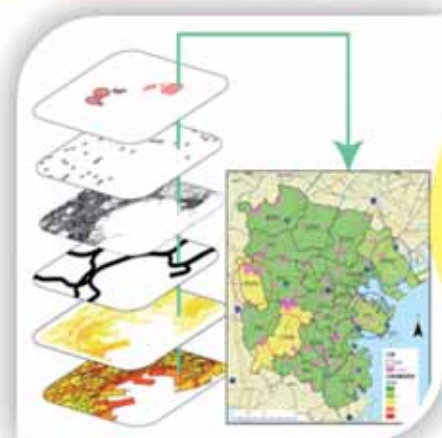
Research on risk management and safety sciences



Risk analysis of damage to above ground oil storage tanks during an earthquake, typhoon, and other natural disasters



Geological information system using hazard information



Education on risk management and safety sciences



Flame behavior and smoke control analysis and development of disaster prevention measures and risk management systems



Open public seminar on risk management and safety sciences



Designing chemical plants based on risk-based modules and improvement of process safety



Environmental risk management based on behavior analysis and exposure assessment of chemical substances



Outline

Protection of the environment and save of the fossil energy resources is a pressing global concern, and actions are being made toward low-carbon society, for which large-scale introduction of renewable energy is indispensable. However, renewable energy, such as solar and wind power, has low energy density and is difficult to secure supply so as to respond to demands, and thus innovative energy networks are required to be built by combining with energy storage and transportation technologies.

Japan is among the countries that has the most thoroughly constructed electric power grid in the world. By taking advantage of such a grid, smart grid technologies are being researched and developed for efficient use of renewable energy. For example, advanced management of the network is attempted by promoting installation of smart meters in homes to enable interactive communication between suppliers and users.

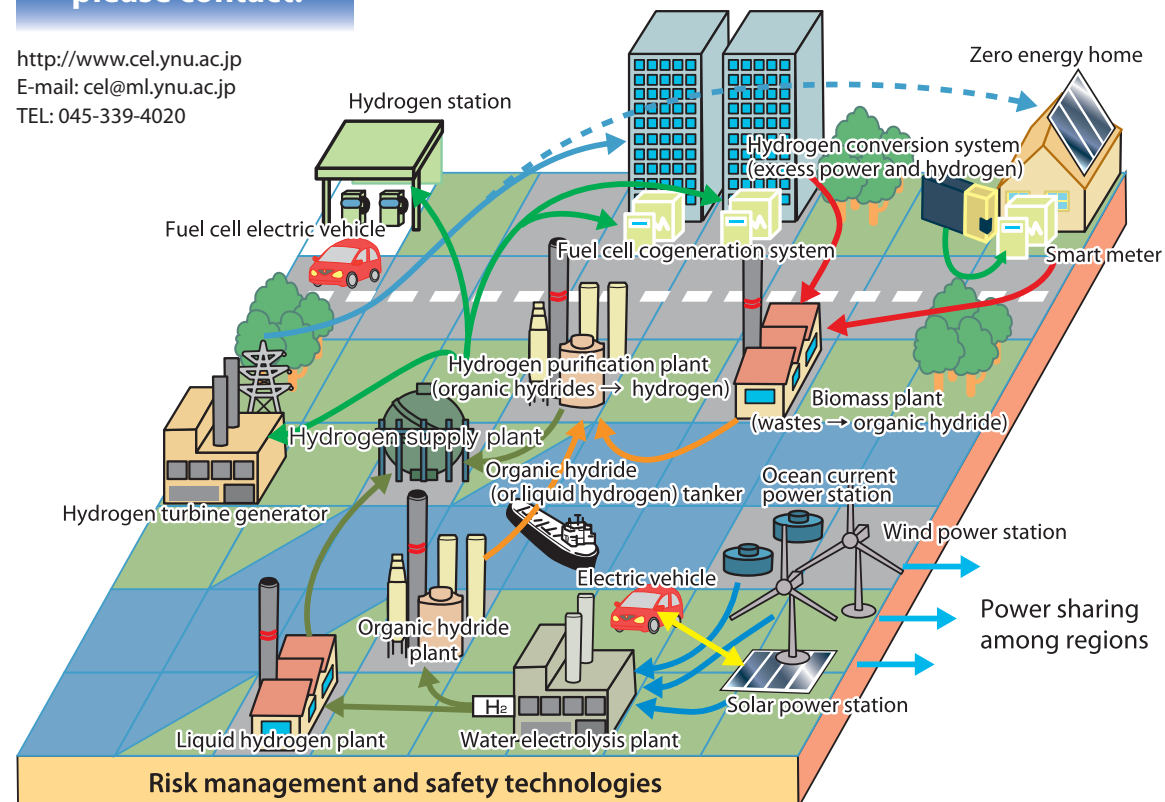
There are regions in the world near the equator, such as in Africa, West Asia, and Australia, where the energy density of solar radiation per unit area is twice as large as that in the temperate zones. There are also spacious lands of strong winds, such as in Patagonia in Argentina, where strong winds always blow from a constant direction, forming an enormous renewable energy resource of energy density 10 times larger than that in the plains in Japan. To transport the energy from such remote areas over a distance of 1,000 km or more, it is efficient to convert the energy into chemical energy.

We are working on innovative "Green Hydrogen" energy systems based on renewable energies. Our academia-industry consortium is investigating researching and developing in technologies for producing green hydrogen, such as water electrolysis with wind or solar power generation, fuel cell technologies for efficient use of the hydrogen, information and control technologies for managing the hydrogen and power grid, which is artery of the systems, and other wide varieties of field, such as fuel cell vehicles, electric vehicles, materials and systems that use or are used in the energy network.

Among them, our unique and innovative electrocatalyst is especially attracting attention. Today, precious metals such as platinum are used as the electrocatalyst for fuel cells of electric vehicles and residential cogeneration systems. The limit of resources and price of the precious metals are impeding real commercialization. We searched for an alternative electrocatalyst to platinum among Groups 4 and 5 transition metal oxides based materials, which are used as photocatalyst, and discovered a candidate. We are working on development of an electrocatalyst for fuel cells from the metal and started investigating deployment of the metal also for other usages.

For more information, please contact:

<http://www.cel.ynu.ac.jp>
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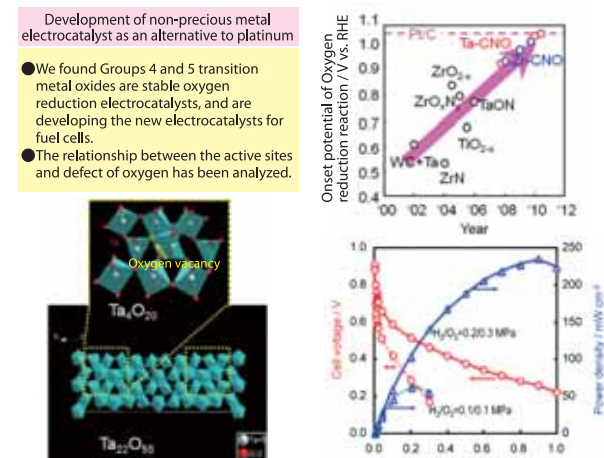


Members

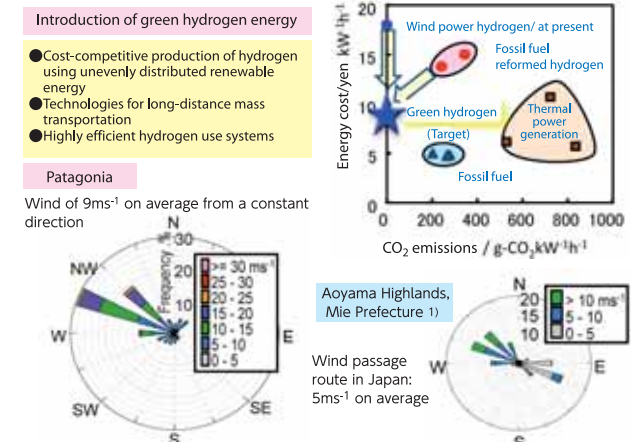
- | | | |
|--|--|---|
| ■ Ken-ichiro OTA, Specially Assigned Professor | ■ Tsutomu OYAMA, Professor | ■ Tomoyuki SHIMONO, Assistant Professor |
| ■ Shigenori MITSUSHIMA, Professor | ■ Tomoki HAMAGAMI, Professor | |
| ■ Koichi MATSUZAWA, Associate Professor | ■ Yasutaka FUJIMOTO, Associate Professor | |
| ■ Atsuo KAWAMURA, Professor | ■ Takao TSUJI, Associate Professor | |

Research topics

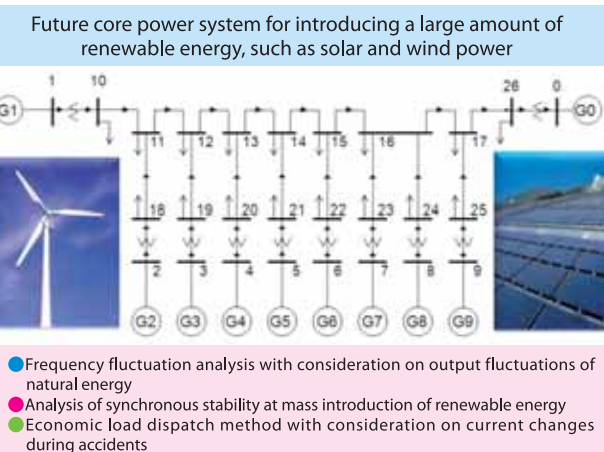
Hydrogen production from renewable energies and hydrogen utilization



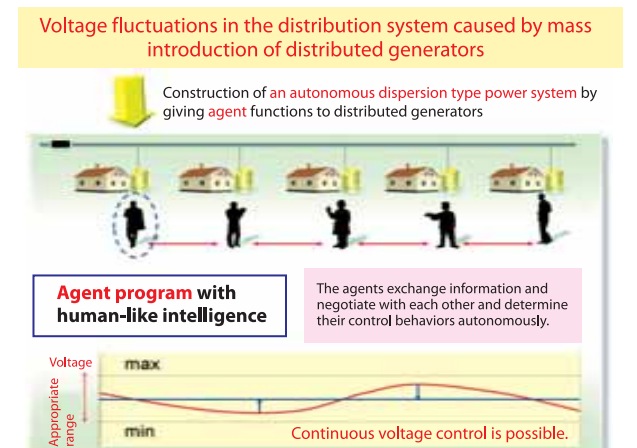
Development of large-scale renewable energy-Wind power in Patagonia



Systematic electric power management of mass use of renewable energy



Advanced power distribution system by using information communication



Highly efficient electric vehicle system

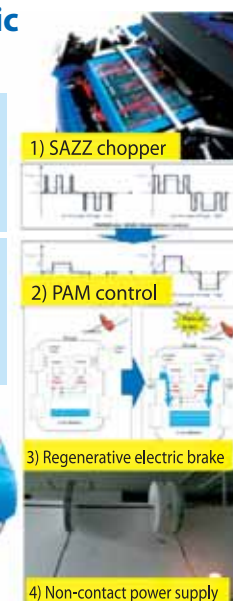
Objectives
*Electric vehicle of the world-highest efficiency
*Target electric power consumption: improve by 10%

New technologies under development

- 1) SAZZ chopper
- 2) PAM control
- 3) Regenerative electric brake
- 4) Non-contact power supply

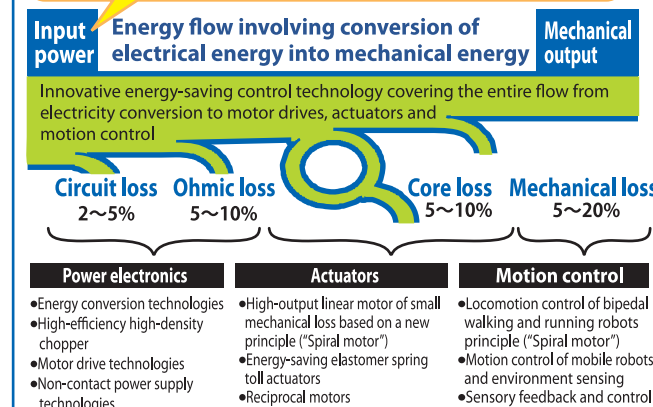


Electric vehicle "KANA"



Green motion-electronics

Accounting for 60% of the total energy consumption in Japan



Outline

The Research Center for Green Material Innovation (GMI) seeks to advance socio-technical innovation for a sustainable, low-carbon society through the improvement and development of clean energy materials and durable infrastructure materials.

We established the "Cross-Sector Research Collaborative for Clean Energy Materials" and the "Cross-Sector Research Collaborative for Ultra-Long-Life Materials" to provide the academia and industry with opportunities to fuse their knowledge. Through the Collaborative we propose practical novel materials and solutions that save resources and environment, and promote socio-technical innovations that meet the demands of the times. We are also spreading information about YNU's research "seeds" as widely as possible through the industry and government sectors and build a platform for cross-sector partnership by pursuing open innovation with the university as the central anchor, where university scholars strengthen their cooperation, and the collaborative members exchange information.

Specifically, we are holding regular symposiums in which our researchers present and debate their recent findings in the fields of Clean-Energy Materials technology and Ultra-Long-Life Materials technology in which YNU is playing a leading role. We also present briefings on recent international conferences to share information on developments overseas as well as in Japan. Through these platform we will not only perform cooperative researches with individual corporations but also create a consortium covering multiple topics with a high potential for cross-fertilization, as well as through participation in national research projects and other large-scale programs. And we develop human resources who will support technologies and innovate socio-technologies, by reeducating working engineers and doctor candidates, promoting internship, and strengthening cooperation with overseas universities.

Taking the technological "seeds" within the university as our starting point, we intend to work closely with all the program's participants, combining the forces of industry, government, and academia to steadily meet and overcome the various challenges to successful development and social deployment of new materials technology. We are waiting for your participation.

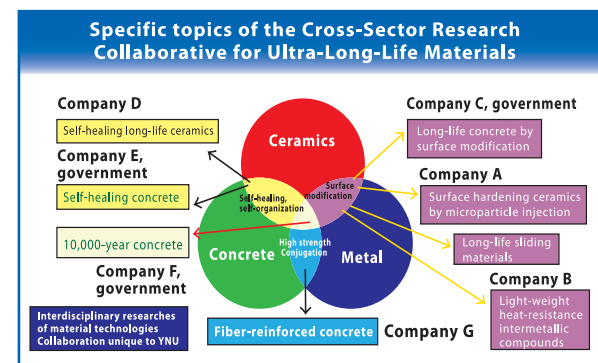
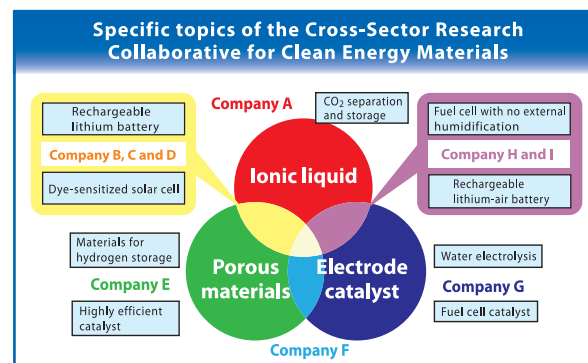
Period: April 2011 to March 2016

Materials R&D and the YNU model of integrated collaboration



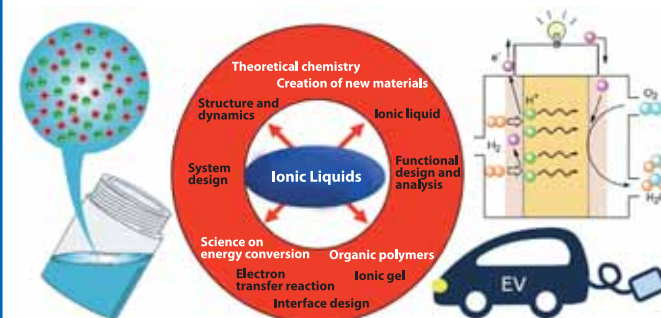
For more information, please contact:

Research Center for Green Material Innovation (GMI), Yokohama National University
Shizuo UMEMURA (Coordinator, Project Professor)
045-339-4389 s-umemura@ynu.ac.jp URL: <http://www.crd.ynu.ac.jp/crd/gmi/>

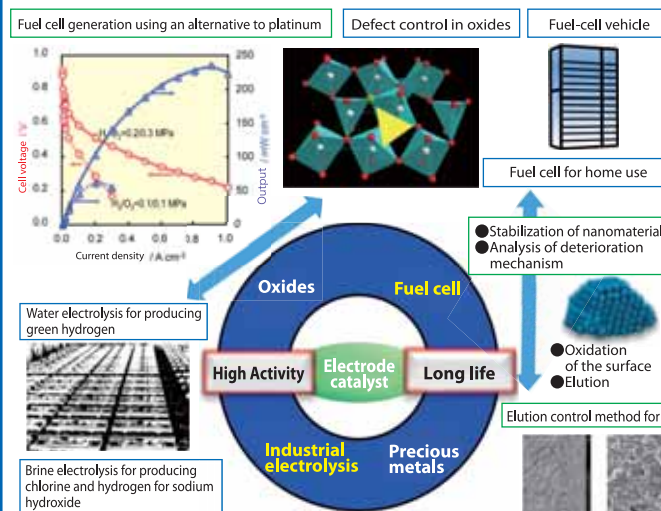


Specific topics of the Cross-Sector Research Collaborative for Clean Energy Materials

Exploring clean energy materials and devices using ionic liquid



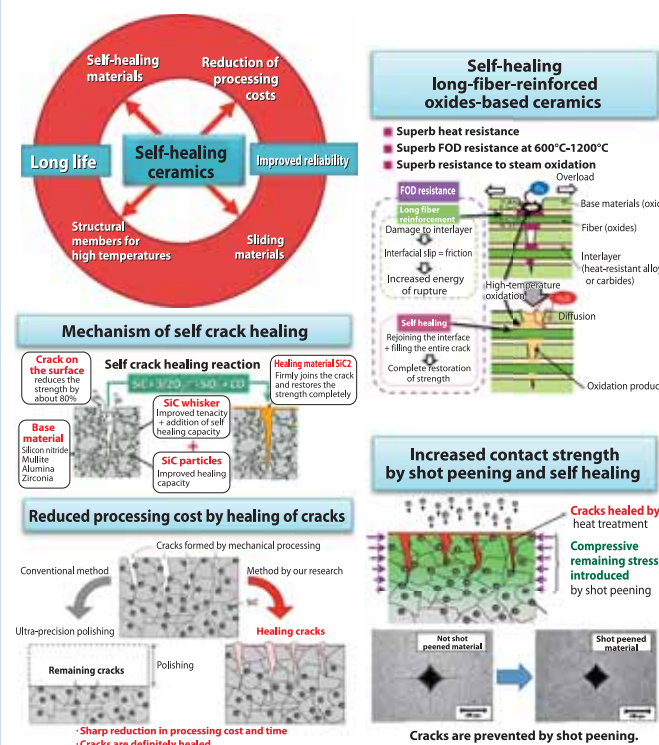
We are searching for novel ionic liquid (IL) and exploring clean energy materials and devices using its properties, including development of LILS (Li | IL | S) cells, which use the abnormal solubility of ionic liquid, and fuel cells with no external humidification, in which protic IL is used.



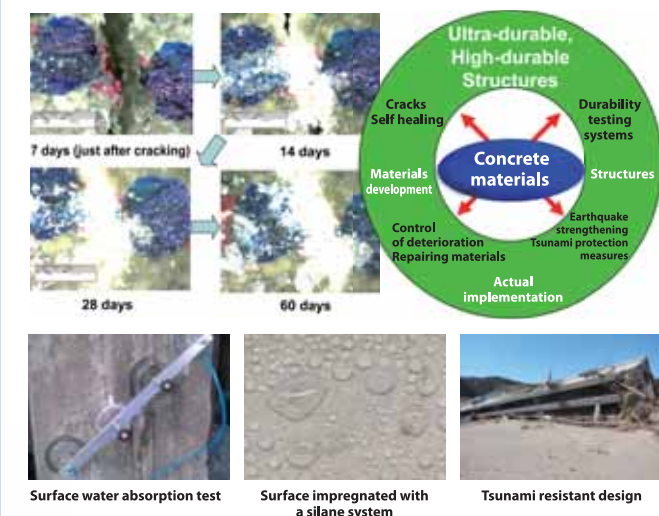
Synthesis of porous materials and applications using their characteristics



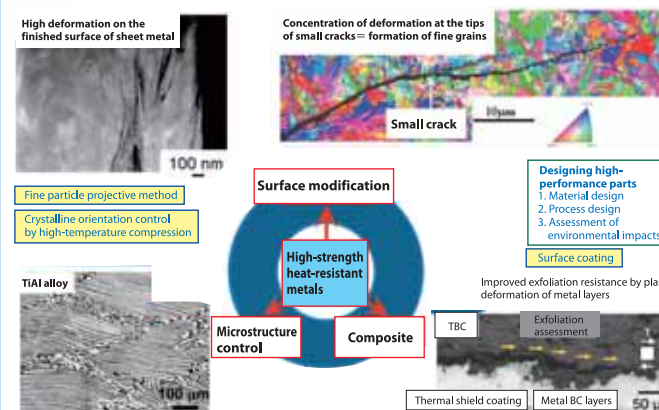
Specific topics of the Cross-Sector Research Collaborative for Ultra-Long-Life Materials



Development and implementation of technologies of ultra-long-life concrete structures



Control of non uniform microstructure for ultra-long-life structural metals



Yokohama National University Statistics

Number of students

Graduate schools	Number of students
Graduate School of Education	295
International Graduate School of Social Sciences	609
Graduate School of Engineering	972
Graduate School of Environment and Information Sciences	571
Graduate School of Urban Innovation	126
Total	2,573

Undergraduate schools

College of Education and Human Sciences	1,956
College of Economics	1,113
College of Business Administration	1,451
College of Engineering Science	815
College of Engineering	2,275
Total	7,610

Total number of students 10,183

One-fourth of students are graduate students

Teaching staff

Teaching staff	
Professors	308
Associate professors	191
Lecturers	24
Assistant professors	17
Special Researcher	27
Researcher	16
Assistant	21
Total	604

Teaching staff of affiliated schools 124

Number of administrative staff and technicians 291

Total 1,019

About 65% (391) of all teaching staff belong to graduate schools

(Cited from the 2011 Bulletin of Yokohama National University)

World University Rankings 2010-2011 (The Times Higher Education World University Rankings)

World ranking	Ranking among national universities in Japan	University	Teaching	International outlook	Industry income	Research	Citations	Overall score
26	1	The University of Tokyo	87.7	18.4	—	91.9	58.1	75.6
57	2	Kyoto University	78.9	18.4	67.1	77.7	46.3	64.6
112	3	Tokyo Institute of Technology ☆	62.9	24.8	60.5	63.4	45.5	55.4
130	4	Osaka University	61.7	20.1	73.4	63.4	40.0	53.4
132	5	Tohoku University	60.3	20.1	82.3	62.5	41.2	53.3
206	6	Nagoya University	56.5	19.9	34.7	48.7	37.6	45.7
217	7	Tokyo Medical and Dental University	67.0	16.6	36.0	44.3	28.2	44.3
261	8	University of Tsukuba	50.0	25.0	32.1	42.0	34.1	40.7
293	9	Hokkaido University	53.4	18.3	46.2	44.4	18.1	37.3
294	10	Kyushu University	52.9	20.2	74.9	41.7	18.2	37.2
317	11	Tokushima University	46.2	16.8	65.0	53.4	5.0	34.0
332	12	Chiba University	42.7	27.0	51.5	39.5	16.1	32.5
335	13	Hiroshima University	44.9	20.2	43.2	38.4	16.2	32.3
359	14	Okayama University	41.1	18.4	37.0	39.6	14.8	30.9
359	14	Kobe University	45.0	19.5	36.6	36.9	13.6	30.9
369	16	Niigata University	47.3	22.7	29.7	32.7	12.2	29.8
371	17	Kanazawa University	40.6	19.3	—	37.0	13.2	29.3
377	18	Yokohama National University ☆	35.4	27.4	47.0	35.5	13.6	28.2
379	19	Toyohashi University of Technology ☆	38.1	40.5	57.9	39.2	4.4	28.1
389	20	Nagasaki University	39.7	19.4	34.9	36.7	5.6	26.6

Note 1: The indicators (and percentages of overall score) are: teaching or the learning environment (30%), international outlook or the percentage of staff and students from abroad (5%), industry income for funding research (2.5%), research in terms of volume, income and reputation (30%), and citations per paper (32.5%)

Note 2: An asterisk (☆) denotes a university that does not have the medical department (Cited from the 2012 University Rankings (Asahi Shimbun Shuppan))

Thomson Reuters' Science Citation Index(for Japan, 2005 ~ 2009)(Cited from the 2012 University Rankings (Asahi Shimbun Shuppan))

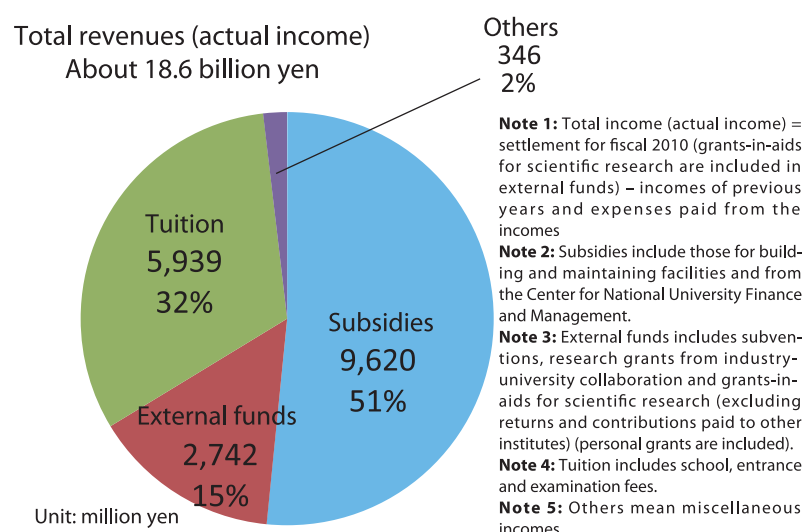
- Computer science: 1st rank (Number of papers: 64, citation index: 130.1)
- Mathematics: 6th (Number of papers: 71, citation index: 120.4)
- Chemistry: 8th (Number of papers: 503, citation index: 128.2)
- Humanities and social sciences: 7th (Number of papers: 97, citation index: 110.2)

Note 1: Field-independent citation index is calculated by converting the citation of papers of each field into deviation values scaled to mean of 100 and standard deviation of 30. A university of citation index of 100 means it is producing papers of average citation. Joint works are multiply used for calculating the index of each relevant institute.

Note 2: Field-independent ranking is calculated by extracting the top 30 institutes or top 1% in the field in the number of papers (institutes less than 25 are excluded) or citations. The institutes are ranked in the order of citation index.

Revenues of Yokohama National University (fiscal 2010)

Total revenues (actual income)
About 18.6 billion yen



Others
346
2%

Note 1: Total income (actual income) = settlement for fiscal 2010 (grants-in-aids for scientific research are included in external funds) – incomes of previous years and expenses paid from the incomes

Note 2: Subsidies include those for building and maintaining facilities and from the Center for National University Finance and Management.

Note 3: External funds includes subventions, research grants from industry-university collaboration and grants-in-aids for scientific research (excluding returns and contributions paid to other institutes) (personal grants are included).

Note 4: Tuition includes school, entrance and examination fees.

Note 5: Others mean miscellaneous incomes.

Research projects

(adopted by the Ministry of Education, Culture, Sports, Science and Technology)
(cited from the 2011 Bulletin of Yokohama National University)

●Global COE Program

- Global Eco-Risk Management from Asian Viewpoints (2007 – 2011)
- Innovative Integration between Medicine and Engineering Based on Information Communications Technology (2008 – 2012)

●Special Coordination Funds for the Promotion of Science and Technology

- Improvement of Research Environment for Young Researchers Development of young human resource by advanced interdisciplinary project (2007 -2011)
- Strategical Environment Leaders Training Program Leadership Program in Sustainable Living with Environmental Risks (2009 - 2013)

Courses in liaison with industry and/or research institutes (13 fields)

- College of Education and Human Sciences (1 field: 1 institute)
- College of Business Administration (3 fields: 3 institutes)
- Graduate School of Engineering (5 fields: 5 institutes)
- Graduate School of Environment and Information Sciences (4 fields: 9 institutes)

(Cited from the 2011 Bulletin of Yokohama National University)

Advanced and distinguished research centers and bases for creating the future as global academic and research bases

Toward creation of social infra-structures for medical welfare

Center for Future Medical Social Infrastructure Based on Information Communications Technology

Towards a safer and sustainable society

Center for Risk Management and Safety Sciences

Cultivation of abilities on integrated ocean management

Center for Oceanic Studies and Integrated Education

Economic growth strategies and creation of venture businesses

Center for Economic Growth Strategy

Green hydrogen for supporting sustainable growth

Green innovation from Yokohama
Green hydrogen and smart energy network base

Promotion of materials research for innovation of social technologies

Green innovation from Yokohama
Research Center for Green Material Innovation