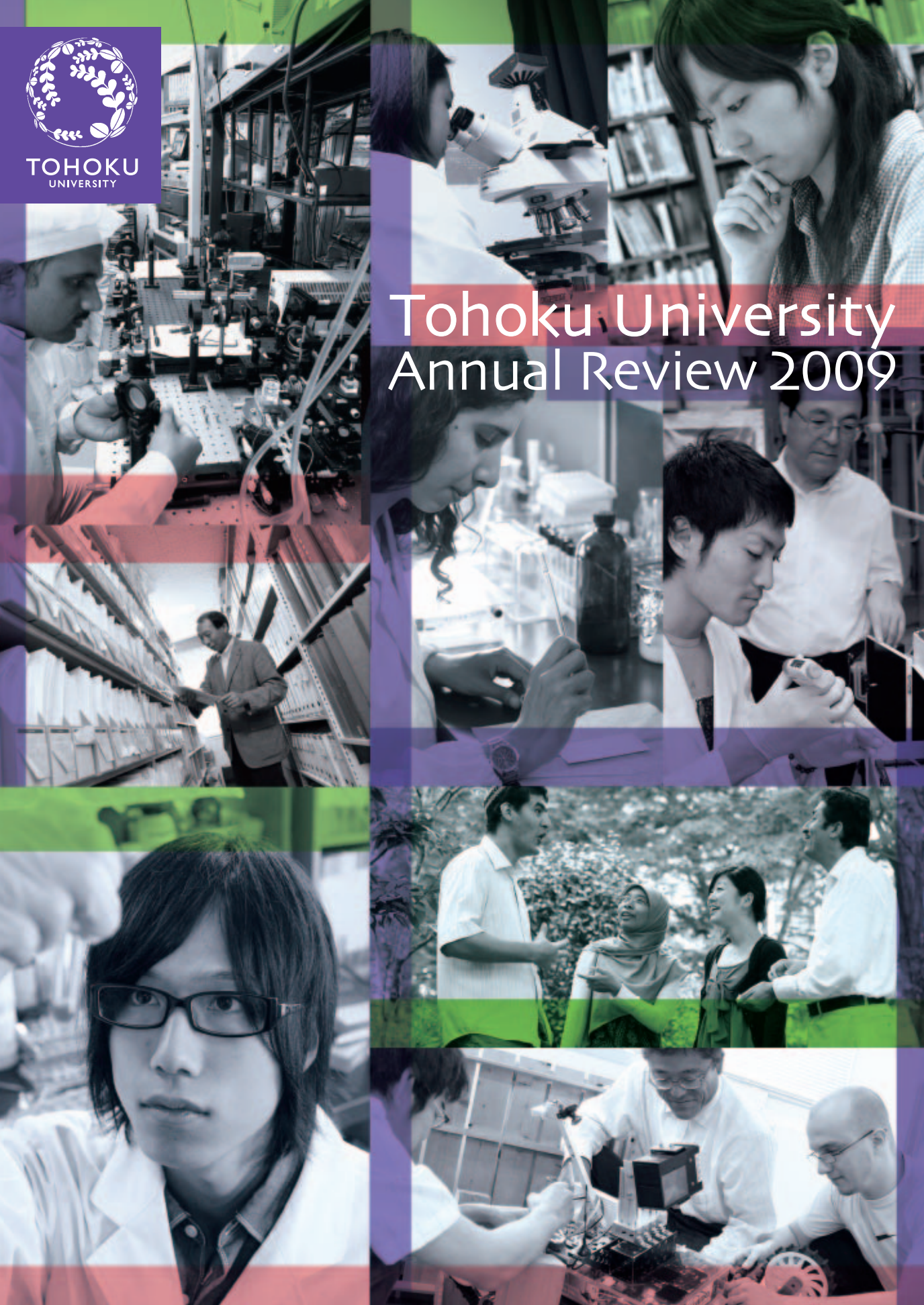
TOHOKU
UNIVERSITY

# Tohoku University
# Annual Review 2009



## MISSION STATEMENT

Since its foundation, Tohoku University has been committed to a "Research First" and "Open-Door" policy, and conducted researches and education at the world's highest level.
The university contributes to realizing a peaceful and fair society by using research results to solve social problems and by developing leadership qualities in students.

## HISTORY

Tohoku University was founded in 1907 as the third Imperial University of Japan, following Tokyo Imperial University and Kyoto Imperial University.
From the start, Tohoku University has displayed to the world an unswerving commitment to an "Open-Door" admission policy. In contrast to the other Imperial Universities, it accepted graduates from technical schools and higher normal schools. The University became Japan's first National University to admit three female students in 1913 despite opposition from the government at that time.
Tohoku University was able to attract a group of talented young researchers who had trained in international academic circles to serve on its faculties. Partly because of this fact, a "Research First" principle came to develop, which calls upon the scholars to pursue highly productive researches, and to use their findings in classes.
In addition, Tohoku University has nurtured a traditional policy of "Practical Sciences First." We have used the most advanced research results to make a society and our daily lives productive. The university has established venture businesses to develop local industries before the World War II, and played a central role in researches on Family Law that is closely associated with daily lives.
Since World War II and the rapid economic growth of the postwar period, the above spirit has been continued to be alive in the modern era of advanced globalization.

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This Annual Review 2009 covers activities conducted from April 2008 to July 2009.
*Personal information of those who are in this Annual Review including affiliation, position, and age is uncurrent.

Tohoku University Kawauchi Kita Campus

# Aiming to Be a World's Leading University

Ever since its foundation in 1907, Tohoku University has continued to promote "Research First," "Open-Door," and "Practical Sciences First" policies. We have conducted researches and education at the world's highest level. Tohoku University's Annual Review 2009 describes our remarkable achievements and highlights of the previous year.

Human society today faces with a variety of difficult and complex challenges to globally overcome. With our accumulated knowledge and achievements in research and education over the past century, Tohoku University has determined to take a leadership to tackle challenges ahead, and to be a World's Leading University to contribute to the development of human society.

Tohoku University has formulated "Inoue Plan 2007" in March 2007, an action plan which consists of five pillars such as education, research, social contribution, campus environment, and organization/management. We have been steadily progressed for two years since the plan started. In education, we have worked on a new liberal arts curriculum including overseas internship system. In research, our university has established the International Advanced Research and Education Organization to provide researchers with creative and comprehensive knowledge to take an academic leadership in the 21st century. These efforts were approved for World Premier International Research Center Initiative (WPI) by Japan Society for the Promotion of Science (JSPS,) and Tohoku University established Advanced Institute for Materials Research (WPI-AIMR.)

We also take various actions such as improving our global presence by participation in the Association of Pacific Rim Universities (APRU) and Top Industrial Managers for Europe (T.I.M.E.,) promoting new businesses by projects including industry-academia collaboration, developing our campus to meet international standards, introducing the personnel system to improve global competitiveness, and establishment of Tohoku University Foundation.

In 2009 when the speed of changing environment for the university has been accelerated, our aim to be a World's Leading University is not easy to achieve in a short period of time. However, we will contribute to developing human society as the university trusted, respected, and loved by the local community. We hope to share with the general public our missions and actions, and to challenge together.

Akihisa INOUE
President of Tohoku University

## Tohoku University News and Events (April 2008-July 2009)

**2008**

| | |
|---|---|
| Apr 1 | Graduate School of Biomedical Engineering Established |
| Apr 1 | 25 Distinguished Professors Appointed |
| Apr 2 | "Inoue Plan 2007 (Tohoku University Action Plan, Revised 2008)" Announced |
| Apr 2 | 2008 Tohoku University Entrance Ceremony |
| Jun 14 | Website for the Iwate-Miyagi Inland Earthquake (M7.2) Hazards Opened by the Researchers on the Earthquake |
| Jul 30, 31 | Tohoku University Open Campus |
| Aug 1 | 5 Distinguished Professors Appointed |
| Sep 25 | Tohoku University Commencement Ceremony |
| Oct 6 | The 2nd Cafeteria "Bee ARENA Cafe" on Kawauchi Campus Opened |
| October 10 | Concert to celebrate the opening of Tohoku University Centennial Hall (Kawauchi Hagi Hall) |
| Oct 10-12 | Tohoku University Homecoming Day |
| Dec 13 | The 3rd Tohoku University Sendai Seminar "A Gift from the Universe" |
| Dec 31 | Tohoku University Silvester Concert 2008-2009 |

**2009**

| | |
|---|---|
| Feb 25, 26 | 2009 Tohoku University Entrance Examination: First Examination for General Admission |
| Mar 12 | 2009 Tohoku University Entrance Examination: Second Examination for General Admission |
| Mar 25 | Tohoku University Commencement Ceremony |
| Apr 3 | "Inoue Plan 2007 (Tohoku University Action Plan、Revised 2009)" Announced |
| Apr 7 | 2009 Tohoku University Entrance Ceremony |
| Jul 30, 31 | Tohoku University Open Campus |

## Inoue Plan 2007, Revised 2009

This is the latest edition of the Tohoku University Action Plan that the Office of the President led by President Inoue has put together in the academic year 2007. The plan consists of 5 pillars. The university reviews the plan according to the rapid changes in domestic and global situations, and updates the contents to make further progress.


http://www.bureau.tohoku.ac.jp/president/open/plan/plan2009.pdf

### 1 Education

As a "Transmitter of Knowledge," Tohoku University has been rebuilding its education system to provide students with advanced expertise that the university has accumulated through its history. We also foster international leaders as a "Creator of Knowledge."

### 2 Research

As a "Creator of Knowledge," Tohoku University has been restructuring its most advanced research system to produce the world's highest achievements by promoting long-term fundamental and strategic researches.

### 3 Social Contribution

As a university open to the world and the local community, Tohoku University has been contributing to the development of human society by extensively returning its human and intellectual resources to society.

### 4 Campus Environment

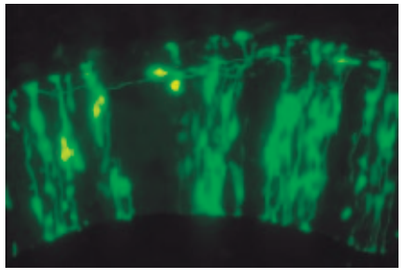
As a "Creator of Knowledge," Tohoku University has been improving its global-standard campus environment to support various education and research activities.

### 5 Organization and Management

Tohoku University has been changing into an "Enterprise of Knowledge," and aims to establish a management base including a financial base to deal with changes in the university environment and to meet demands of the times.

# Possibilities for Arachidonic Acid and Future Brain Sciences

"Diseases may be cured, but a person's life is unhappy if he/she is depressed and feels miserable. I would like to continue the research to make the brain and the mind healthy," said Prof. Osumi.



Neuroepithelial cells labeled with a fluorescent protein to be visualized. Cells with intense fluorescence in the upper part are neurons produced from neuroepithelial cells that have finished the final divisions.

"Young Forum," one of the Neuroscience GCOE Programs. New collaborations have been created from various activities, and new research projects have started this year. The activities of, and communication among young researchers, exert great power.

Items carried by Prof. Osumi, who travels around the world, including PC memory and a transformer connector. The fountain pen is a source of ideas for her, who values a sense of an analog world. The green notebook returned from Greece across the seas, a lucky item?


Professor **Noriko Osumi**

Division of Developmental Neuroscience, Department of Functional Genomics, Tohoku University Graduate School of Medicine, Center for Translation and Advanced Animal Research on Human Diseases

Born in 1960. Graduated from Tokyo Medical and Dental University, Graduate School of Medical and Dental Sciences. PhD in dental science. In her current position since 1998 as Director of Tohoku Neuroscience Global CEO, and representative for Core Research for Evolution Science and Technology (CREST) of Japan Science and Technology Agency (JST). Titled as Distinguished Professor.


Prof. Osumi's group discovered that arachidonic acid, a polyunsaturated fatty acid (PUFA), promotes neurogenesis in the brain, which might prevent the mental illness such as depression. The development of the brain is not complete in the embryonic period, but new nerve cells (neurons) are produced in the brain. In the hippocampus, among others, which is the entrance gate to learning or memory, many neural stem cells, i.e., "seed cells," divide, proliferate, and are differentiated into neurons and glial cells. In this neogenesis process, glia cells support the functions of neurons, and develop, interacting with blood vessels to take in oxygen and nutrients. In the process, proteins produced by genes play important roles and PUFAs that bind to such proteins are also greatly involved.

They found that arachidonic acid, one of the major PUFAs, like docosahexaenoic acid (DHA), switches on the activation of the brain, promoting the neurogenesis in the brain. In addition, they discovered that, because mental problems such as depression have a relationship with a decrease in the neurogenesis, arachidonic acid may prevent/improve such problems.

Prof. Osumi is also Director of Tohoku Neuroscience Global COE (GCOE), which aims at encouraging opening new scientific areas in neuroscience and communicating with the public.

This GCOE includes the "Young Forum" planned and operated by postgraduate students and postdoctoral researchers, where they exchange knowledge by discussing their own research with researchers in different fields.

It also holds "Open Lab" to allow people to experience some part of the neuroscience, and "Brain Café" for interaction with citizens.

Thus it explores the great possibilities of neuroscience together with young researchers.

http://www.dev-neurobio.med.tohoku.ac.jp/en/ | http://www.sendaibrain.org/

# Extremely Exact "Freshness Checker" Freshness of Food Seen Simply and Fast


Professor **Minoru Sato**

Marine Biochemistry, Department of Applied Aquatic Bio-Science, Division of Biological Resource Sciences, Graduate Shool of Agricultural Science

Born in 1948. Graduated from the Department of Fisheries, Faculty of Agriculture, Tohoku University. Worked for Nissin Food Products, Central Research Institute, School of Fisheries Sciences, Kitasato University as associate professor, and Faculty of Agriculture, Tohoku University as associate professor. In his current position since 1999. PhD in agricultural science. Appointed as advisory professor at Shanghai Fisheries University in 2001.

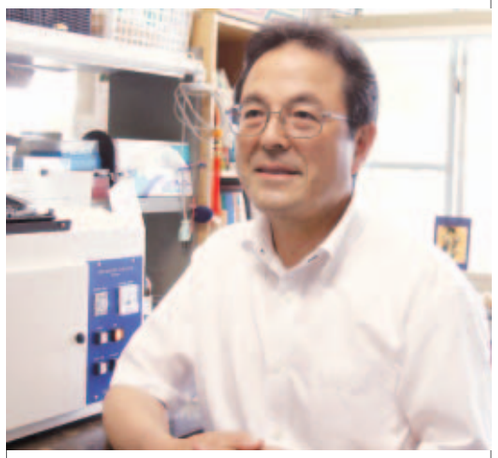

While consumers' interest in food safety and security has been increasing, this "freshness checker" enables measuring the freshness of food in approximate real-time.

Freshness is extremely important for the quality and safety of food. However, measurement has problems of accuracy, required time, and cost.

The freshness checker developed by Prof. Minoru Sato can check the freshness in approximately eight minutes. The checker is available for anything that contains cells including fresh fish, meat, and frozen or processed products. The checker measures substances, i.e., inosine and hypoxanthine, which are produced when a fish or an animal dies and loses freshness. When the ratio of the total of the two substances to the whole nucleotide related compounds (K value) is low, freshness is high. The flow of measurement of the K value is as follows: ①A drop of extract from fish or meat is spotted on filter paper, and DC electricity is applied there for five minutes. In this stage, the substances associated with nucleotide related compounds, contained in the spot, are divided into a group of acidic substances and a group of neutral substances, ②Ultraviolet rays are applied to the spot, and separated spot appears in blue (Fig. 1), and ③The spots are photographed by a digital camera, and the picture is processed by dedicated calculation software, and the K value is automatically indicated. A half century has passed since the idea of K value was proposed (i.e., Prof. Tsuneyuki Saito, Faculty of Fisheries, Hokkaido University, proposed K value measurement), however, nobody has conceived this method until now.

Prof. Sato had an opportunity to measure the freshness of tuna meat on a commission from the Fisheries Research Agency. The captain of a fishing boat asked him "Is there any way of measuring the K value on board?" It was a trigger for the development of this checker.

The freshness checker that shows the freshness index simply and fast on a scientific basis at any scene at low running cost can become a global standard.



Freshness checker that measures freshness simply and fast, is used in domestic and overseas fish markets, supermarkets, food processing industries, research institutes, universities.

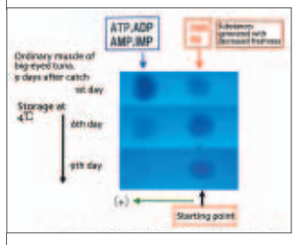
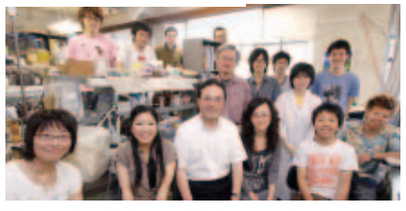



Fig. 1 Determination of freshness by means of electrophoresis (K value measurement)



Many students belong to this laboratory. A student from Peru is researching agar.

"I like to do home carpentry using a soldering iron etc. Having nothing in mind might help me create a new idea," said Prof. Sato. The first generation of freshness checker was made by himself, by painting black a piece of foam styrol in the laboratory, and setting it under an ultraviolet lamp.

http://www.agri.tohoku.ac.jp/suika/index-j.htm

# Shedding Light on Historical Japanese through the Genes of Dialects

"While many dialects are disappearing, such words associated with emotions or feelings are more likely to survive. *Izui* is representative of such cases," said Prof. Kobayashi.

The Japanese Linguistics Laboratory of Tohoku University has conducted field research since 1955, together with students. They are centered on descriptive research of basic fields of language, such as phonology, accents, grammar, and vocabulary, and also cover studies of dialect geography and social dialectology.

"Sendai dialect *karuta*" (Japanese playing cards) manufactured under the supervision of Prof. Kobayashi.

Dialect postcards presented to the participants of dialect surveys. The surveys, conducted at 2,000 locations across the country, have already collected more than 400 items of data. From these items, postcards such as *karada* (body), *obake* (ghost), and *kanemochi* (rich person) were created.


Professor **Takashi Kobayashi**

Department of Japanese Linguistics, Division of Linguistic Studies, Graduate School of Arts and Letters

Born in Niigata Prefecture, 1957. Studied Japanese linguistics at Tohoku University, continuing onto the doctoral program at the Graduate School of Arts and Letters. Worked as a researcher at the Department of Language Change and the National Institute of Japanese Language before assuming his current position. PhD Literature. Titled as Distinguished Professor.


As the common Japanese speech prevails more and more, dialects are destined to disappear rapidly. However, if we observe dialects very carefully, we can find words in dialects that persistently survive. *Izui* in the Sendai dialect is symbolic of one of these words. *Izui* describes a feeling as if a foreign substance were to come into the eye, or an indefinable feeling of unpleasantness sensed by the surface of the body. This subtle meaning, which cannot be represented in common Japanese, is hidden in this word.

When we study ancient Japanese, we read classical literature such as *The Tale of Genji* or *The Pillow Book.* We use the literary language of the nobility, centered in Kyoto, from the Heian Period (794-1192) as materials. However, we must ask whether or not such materials reflect the entire scope of ancient Japanese.

Prof. Kobayashi aims to shed light on the history of Japanese through the study of dialects. His research covers a wide perspective, such as geography and social stature. By exploring dialects, Prof. Kobayashi is digging into the history of the Japanese vernacular, hidden from literature. Many ancient Japanese words have spread form the central region to the periphery and live on in local dialects. The mechanism by which words used in central Japan in the past have changed into local dialects is quite interesting. *Menkoi* (lovely) of the Sendai dialect, for example, originated from the word *megushi,* which appears in the *Manyoshu* (the oldest Japanese poetry anthology). The word has changed forms to *megoshi, megoi,* and eventually *menkoi.* In this way, a word which has vanished from the central region now exists in a new form in the Tohoku region. Even the meaning of the word has changed uniquely in the region.

It is obvious that dialects are a cultural heritage. Not much time remains to record dialects to be passed down to future generations. Prof. Kobayashi has surveyed 2,000 locations across the country and will be traveling in the Tohoku region together with students later this year to conduct a dialect survey.

http://www.sal.tohoku.ac.jp/hougen/

# A Multidisciplinary Optical Microscope of Ultra-High Definition Imaging


Professor **Masaki Yamamoto**

Center for Advanced Microscopy and Spectroscopy, Institute of Multidisciplinary Research for Advanced Materials

Born in 1947. Given D. Sc., (Physics) from the Department of Physics, Graduate School of Science, Gakushuin University in 1974. Started working as a research fellow at the University of York in the United Kingdom from 1975. Became a research associate at the Research Institute for Scientific Measurements, Tohoku University, in 1981 and promoted to a professor in 1998. He continued the professorship at the current Institute since 2001 after the reorganization of the Institute.

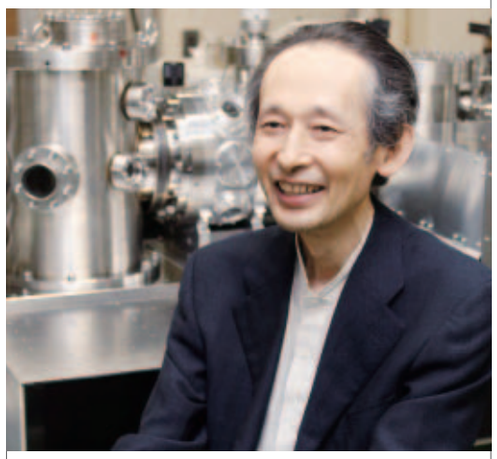

Prof. Masaki Yamamoto, et al., Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, developed a "multidisciplinary optical microscope" characterized by its wide optical field of view with ultra-high resolution of soft X-rays. This ultra-high definition imaging microscope is formally called a "Transmission X-ray Multilayer Mirror Microscope: TXM³."

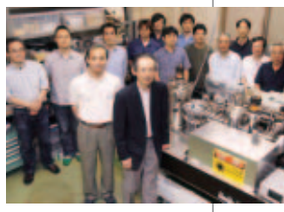
An observation of a piece of material as small as 1/10000 millimeter uses an electron microscope. However, an object needs to be dried because water interferes. In particular, a living object cannot be observed as it lives.

On the other hand, a TXM³ captures and fixes the action of living cells at a particular moment, and is powerful in multidisciplinary research including hybrids such as plastic and polymer. More specifically, this microscope fits for soft material sciences.

Prof. Yamamoto's group had been working on soft X-ray optics. Soft X-rays, safely absorbed in the air, do not penetrate a lens nor are reflected by a metal mirror, and thus, no standard optics is available. Therefore, his group made a multilayer reflective mirror where molybdenum and silicon is coated in many alternate layers. They also developed a device to control the thicknesses of layers at a precision of 1/100 of the size of an atom so that an image is exactly in focus. As a result, they have achieved one shot imaging of a 0.2mm wide field of view at a resolution of 100 nanometer(1/10000 mm) for the first time, which is to be improved further to 1/3. Soft X-rays, like light, are insensitive to electric or magnetic field disturbance, which is essential advantage in the field of nanotechnology and beyond.

This optical microscope capable of ultra-high definition imaging with the largest size of the image data, recorded by one shot, will innovate the uses of a microscope.

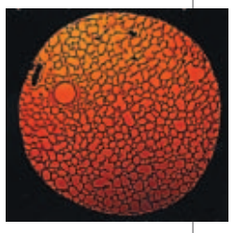




Staff in the research laboratories of Prof. Masaki Yamamoto and Prof. Mihiro Yanagihara, and technical room. The microscope main body and its precision components were made in affiliated factories.

Soft X-ray multi-layer coater for an imaging mirror. Slight unevenness in the molybdenum and silicon coatings on the curved surface of a mirror could easily distort the image. Adjusting the mirror surface by 0.1 nanometer.

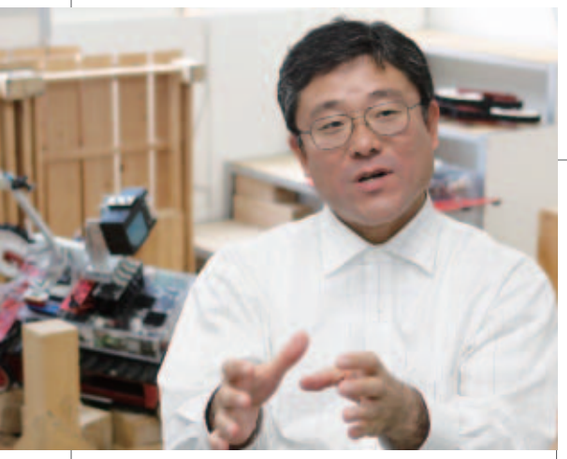
One shot imaging of a polymer micro grid by TXM³. Its diameter is 0.1 mm. A field of view of 0.2 mm can be imaged in one picture at a resolution of 100 nanometer. A polymer made of light elements is transparent to electrons, and is used as a support mesh for a sample of an electron microscope.



Prof. Yamamoto got a new idea of 3D shape measurement from his favorite prism, and aims for practical use.
"I catch principles, have a wide range of interest, and spread the imagination. It's a pleasure for me to come to new ideas, that drive me to continue," said Prof. Yamamoto.

http://www.tagen.tohoku.ac.jp/labo/m_yamamoto/indexTok.htm

# From a Laboratory to Sites of Disaster Save Lives with Rescue Robots



Kenaf (a tracked vehicle for exploration). This is remotely operated from a safe place by means of wireless LAN, and is capable of measuring 3D shapes.

Active Scope Camera. Operated through a controller, this camera crawls along on the ground, vibrating short hair covering its surface, and can go into a gap size of 3 cm. It was awarded the 2008 Robot Award, Prize for Excellence.

"Because we study for disaster response, our goal is to have good results at sites. A rescue robot still has a lot of problems to arrive at that level. We have to solve those problems one by one," said Prof. Tadokoro.


Professor **Satoshi Tadokoro**

Human-Robot Informatics Laboratory, Department of Applied Information Sciences, Graduate School of Information Sciences

Born in Ehime Prefecture in 1960. Graduated from the master's course of the Department of Precision Engineering, Graduate School of Engineering, The University of Tokyo. Dr. of Engineering. Worked as an associate professor at Kobe University, and then, assumed his current position in 2005.


In 1995 Prof. Satoshi Tadokoro experienced the Great Hanshin-Awaji Earthquake in Kobe. Standing on a devastated urban area, he resolved that "as a researcher, I should create a robot that can support rescue work in a disaster and save human lives." Since then, he has done research to use robot technologies for search and rescue.

He, however, was then in a blank state, e.g., about what is needed at a disaster site, and so on. Prof. Tadokoro has continued trials and errors. He has had detailed interviews with rescuers, collected knowledge of researchers in various related fields, and developed various necessary functions in cooperation with such researchers. They have gradually approached using a "robot that can be used as a tool."

When an earthquake, a flood, or a terrorist attack occurs, there may be devastated sites where rescuers cannot go into because of a high risk of secondary disasters. In that case, rescue robots named Kenaf have a role to play in substitution for humans in searching for victims or collecting disaster information. Kenaf can go over the rubble by looking at the surrounding state through compact cameras and measuring the shapes of obstacles. When equipped with a 3D scanner using a laser range finder, this robot is capable of creating a 3D map. When equipped with a FLIR, this robot is capable of sensing temperatures to find the locations of victims.

Active Scope Camera capable of going into a narrow place is a video scope with a compact camera installed on the top end of the robot, and can take image under rubble piles.

In 2002, Prof. Tadokoro set up a non-profit organization named International Rescue System Institute, establishing the R&D system by doing grass-root activities. It is important not to make a robot but to create systems useful for search and rescue in disasters, in addition to constructing a social system where such robots can be used. The professor aims to make rescue results by robots and put the robots into practical application.

http://www.rm.is.tohoku.ac.jp/

# Economic Growth Compatible with Environment What We Can Do Not TO Leave Negative Legacy

At Hayashiyama Laboratory, students and researchers always discuss how the environment should be from an economic point of view and how economic growth should be, presenting their own views.


Environmental measures involving economic and social sustainability are essential. Prof. Hayashiyama has analyzed how environmental education and corporate behavior should be.

The professor cannot go anywhere without a waist bag. "Comfortable because my hands are free," said Professor Hayashiyama. He does field work with his laboratory students and researchers to experience the environment, going to Shirakami Mountains or Niseko.


Professor **Yasuhisa Hayashiyama**

Modern Economy, Department of Economics and Management, Graduate School of Economics and Management

Born in 1962. Graduated from the Graduate School of Science and Engineering, Tokyo Institute of Technology. PhD in engineering. Became an assistant at the Department of Social Engineering, School of Engineering, Tokyo Institute of Technology, then an associate professor at Graduate School of Economics and Management, Tohoku University, then a guest researcher at the University of California, Berkeley. Has been in his current position since 2004.


It is known that oxygen is indispensable in order for us to breathe naturally. Have you, however, ever thought that oxygen has some value? Have you ever thought that the natural environment such as beautiful seas and forests has some value?

Industrial development since the 19th century has brought great material affluence and convenience to humans. Meanwhile the global environment has drastically changed. Various environmental problems such as climate changes and ecological changes because of global warming have occurred. In the face of this critical situation, approaches on a global scale such as reduction of greenhouse effect gases have been taken.

Prof. Hayashiyama has analyzed the interaction between socioeconomic activities and nature from an economic perspective. He has made economic assessments of the environment and analyzed the effects of environmental policies by using theoretical economic models. The environmental load should be reduced to form "sustainable society" without lowering of the future income level. The environment and the economy should be assessed by the same standards to help society get out of the industry-oriented market economy, and be sustainable.

What we can do now for next 100 years is prevention. It is essential to act at the local level not to leave negative legacy to future generations. Industries competitive in international natural energy-related markets and those supplying natural energies in local areas should be developed. A price cap regulation efficiently ensures resources. Such environmental approaches will lead to a society where businesses can be profitable. To nurture leaders of the next generation to promote environmental education, dietary education, and local production for local consumption will lead to economic growth.

http://www.econ.tohoku.ac.jp/~yhaya/index.htm

# *In Situ* Observation of Crystal Growth under Zero-Gravity Conditions:
## from the Origin of the Solar System to Environment and Energy


Professor **Katsuo Tsukamoto**

Department of Earth and Planetary Materials Science
Graduate School of Science, Tohoku University, Japan


Professor Tsukamoto was born in Osaka Prefecture, Japan in 1948. He got his Masters and Ph.D. degrees in Science from Tohoku University, Japan. For the next few years, he worked in University of Nijmegen, The Netherlands and IBM Zurich Research Laboratory. His research work during this period primarily focused on understanding the crystal growth mechanisms at a fundamental level. After his tenures in these foreign universities, he joined the Graduate School of Science, Tohoku University as a faculty member. Currently, he is also a professor in the Center for Interdisciplinary Research, Tohoku University, Japan.

4.6 billion years ago, ultra fine crystals were formed from the gas nebula as the first condensates in the solar system, merged with each other, melted and consolidated to form solar system bodiers. But the crystallization conditions, like the rate of crystallization and the change of environmental temperature are still unknown.

Meteorites contain abundant small spheres called “chondrule” with several millimeters, which provide useful information to exploit the formation of the primitive solar system. However the big question is whether it is valid to extend knowledge acquired on earth to space phenomena. One of the ways to address this question is to have experiences on crystallization under zero-gravity conditions. This was the primary motivation of the group lead by Professor Tsukamoto to carry out space-based experiments by airplane and rockets.

Since the evolutions in crystal growth processes are crucial to elucidate the mechanism from a fundamental view point, varieties of *in-situ* observation techniques were developed in his laboratory. It is capable of determining extremely low growth velocities, 1 micrometer per year in a very short experimental run time.

Results from these *in situ* observations show that instead of several months to tens of thousands of years in space for chondrule crystallization, this process was completed in several seconds (!) time and hence indicates towards rapid crystallization of chondrules.

Facing the global warming, extended his research interests to environment and energy. He has been developing new techniques to convert carbon dioxide in the atmosphere into calcium carbonate crystal and assessing the chronic safety of radioactive waste underground storage.




A crystalline chondrule are contained in meteorites. The earth-borne crystal is surrounded by flat faces, whereas a crystal produced in space is spherical in shape. This example clearly illustrates that the direct way to master the mechanism of crystal growth in space is carrying out experiments in zero-gravity conditions and learning the characteristics of zero-gravity.

In microgravity condition lasting about 20 seconds created by airplane, highly sensitive “on-site” observation instruments can provide enough data relevant to crystal growth. These instruments developed in his laboratory are also being employed in the Japanese Experiment Module (JEM). called Kibo that has recently started its functioning in the International Space Station (ISS).

Looking at phenomena from close quarters is a fundamental need for “on-site” observation of crystal growth processes.

http://www.ganko.tohoku.ac.jp/shigen/tsukamoto.html

# Applied Accelerator Science for Preserving the Environment and the Human Health


Professor **Keizo Ishii**

Department of Quantum Science and Energy Engineering, School of Engineering


Born in Shizuoka Prefecture in 1948. Graduated from the doctoral course of the Graduate School of Science, Tohoku University. PhD in science. Worked as an associate professor at the Cyclotron and Radioisotope Center, and has been in his current position since 1994. Director of the Cyclotron and Radioisotope Center.

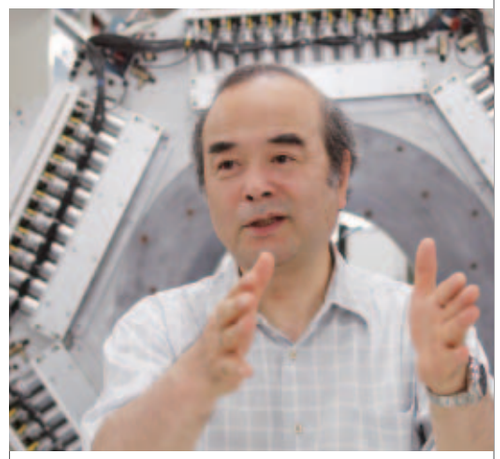
Tohoku University is the first state-run university in Japan that started the medical research using Positron Emission Tomography(PET). The history of PET study at Tohoku University played an important role in this field in Japan. PET is capable of imaging the functions of organs in a living body. By the use of the characteristic of cancer cells taking much more glucose than normal cells, it can image the degree of malignancy or growth of cancer. The process in PET study is that fluoro-deoxy-glucose (FDG) containing F18 nuclides produced by a cyclotron accelerator is injected into the body and, by the measurement of positron annihilation $\gamma$ rays, the images of glucose metabolism can be obtained.

Prof. Ishii was the first to develop a highly sensitive 3D PET in Japan. This apparatus is 10 times more sensitive than the conventional 2D PET, and can reduce the exposure dosage to one-tenth of the conventional dosage, and thus, makes it possible to apply PET diagnosis to young patients. Recently, he developed a small animal semiconductor PET with a high spatial resolution of less than 1mm FWHM which was achieved for the first time in the world, and succeeded in imaging cancers with the size of approximately 1 mm.

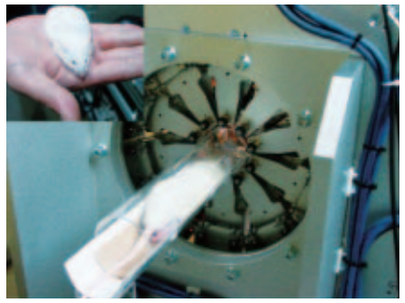
In addition to research in medical applications of radiation, Prof. Ishii is doing research on environmental contamination by analyzing suspended dust in the air, river water, etc., by means of Particle-induced X-ray Emission (PIXE) Analysis using particle beams from an accelerator such as a cyclotron.

The Cyclotron and Radioisotope Center, headed by Prof. Ishii, is engaged in a 5-year project since 2009 on research and education for advanced uses of radiation in cooperation with the Hachinohe Institute of Technology and Aomori Prefecture.

The Center has also engaged in a human resources development project to help laborers to acquire a master’s degree or a doctor’s degree in Rokkasho Village, Aomori Prefecture by providing lectures every week.



Behind Prof. Ishii is the first PET that Tohoku University introduced. PET has since evolved and developed over more than 30 years, and R&D on the first technologies in the world still continues.



Small animal semiconductor PET that has a high spatial resolution of less than1 mm FWHM for the first time in the world. This makes it possible to do biomedical experiments with mice.


Complete works of World Heritage. “I want students to relax even when they are busy,” said Prof. Ishii. The picture of Château de Chambord, designed by Leonard Da Vinci, reminds him of his staying in Europe for research.

http://pixe.qse.tohoku.ac.jp/ishiilab/index.html

# Prize Winners 2008
**(August 2008-July 2009)**

## The American Institute of Physics

The American Institute of Physics Prize was awarded to President Akihisa Inoue and Professor Terunobu Miyazaki. The award ceremony was held in Pittsburgh, Pennsylvania, U.S., on March 16, 2009.

### James C. McGroddy Prize for New Materials

Awarded in March 2009

**Akihisa Inoue**
President of Tohoku University

**Development of a Manufacture Method of Bulk Metallic Glasses (BMG) by Gradual Cooling**

James C. McGroddy Prize for New Materials was established in 1975, and is awarded to researchers for their outstanding achievements in material physics. Many Nobel Prize winners were awarded the authoritative prize. Among Japanese winners, Reona Ezaki, winning of the Nobel Prize in physics, and Professor Sumio Iizima at Meijyo University who graduated from Tohoku University, and discovered carbon nanotube (CNT) were awarded James C. McGroddy Prize in 1985 and in 2002, respectively. President Inoue shared the prize with Professor William L. Johnson at California Institute of Technology (CIT.) The reason to be awarded is development of a manufacture method of bulk metallic glasses (BMG) by gradual cooling. President Inoue discovered that the alloy designed by his original theory produces stronger and more elastic amorphous bulk metallic glasses than common metals. This result is expected to be applied in a wide range of fields such as precision machinery components, projection materials, sporting goods, and electromagnetic components.

### Oliver E. Buckley Condensed Matter Prize

Awarded in March 2009

**Terunobu Miyazaki**
Professor, WPI Advanced Institute for Materials Research

**Highly Praised as a Pioneer of Tunnel Magnetoresistance Effect**

Oliver E. Buckley Condensed Matter Prize, established in 1952, commemorates Oliver E. Buckley, a former president of Bell Laboratories. The prize is awarded to researchers for their outstanding theoretical or experimental contributions to solid-state physics.

Many Nobel Prize winners were awarded the prize such as William Bradford Shockley (semiconductor, 1953,) John Bardeen (1954,) and Ivar Giaever (tunnel effect, 1973.) Professor Miyazaki's pioneering work on Tunnel Magnetoresistance Effect and application of his research results to spintronics are highly evaluated. He shared the prize with Professor R. Meservey, Professor J. Moodera, and Professor P. Tedrow at the Massachusetts Institute of Technology (MIT.)

### Lasker-DeBakey Clinical Medical Research Award

Awarded in September 2008

**Akira Endo**
Specially Appointed Professor, Graduate School of Agricultural Science

**Discovered Statin, and contributed to Treatment of Heart Disease**

Specially Appointed Professor Akira Endo was honored with 2008 Lasker-DeBakey Clinical Medical Research Award, the highest prize for medicine called the stepping stone to the Nobel Prize in the U.S. It is a significant outcome that he is the 5th Japanese winner following Professor Susumu Tonegawa at the Massachusetts Institute of Technology (MIT) who is a Nobel Prize laureate in Physiology or Medicine.
Professor Endo discovered the substance that remarkably lowers LDL-cholesterol in blood from blue mold culture fluid. The finding has led to the production of statin drug, the cholesterol-lowering drug that is currently used all over the world. The newly produced drug is called a miracle drug just as penicillin is. The research results with domestic and global cooperation over many years have been highly recognized, and used for treatment including for heart diseases.

### Imperial Prize and Japan Academy Prize

Awarded in March 2009

**Tetsumi Murakami,** Professor Emeritus, Graduate School of Arts and Letters
**Produced Prominent Results in China-Japan Study**

Professor Tetsumi Murakami has systematically and historically pursued Chinese poetry in Sung dynasty. To show the viewpoint of literary history through researches on China-Japan Study has produced his prominent results.

### 2009 Japan Academy Prize

Awarded in March 2009

**Sadafumi Kawato,** Professor, Graduate School of Law
**Showing the Direction of Japanese Politics**

Professor Sadafumi Kawato has combined the qualitative political history research and the quantitative empirical research through cutting-edge theoretic analyses on the themes of "Election System and Political Party System," and "Japanese Parliament System and Party Politics."

### Medal with Purple Ribbon Spring 2009

Awarded in April 2009

**Eimei Sato,** Professor, Graduate School of Agricultural Science
**Act as a Pioneer in Animal Reproduction**

Professor Eimei Sato has produced pioneering achievements in a series of researches including development of in vitro maturation (IVM) using domestic animals, and cultivated the way for advanced use of the ovary and the ovum.

### Elected to IEEE Fellow

Elected in January 2009

**Satoshi Tadokoro,** Professor, Graduate School of Information Sciences
**Leading to the Development of Rescue Robotics**

Professor Satoshi Tadokoro has been elected to Fellow of Institute of Electrical and Electronics Engineers, Inc. (IEEE) that has internationally led the Electrical and Electronic field on January 1, 2009. The reason to be elected is his taking leadership in the development of rescue robotics.

## Topics!

**Selected as No. 1 University by Japanese High School Teachers for 4 consecutive years**

In the "University Ranking" published by the Asahi Shimbun Company, Tohoku University has successively ranked top since 2006. The newspaper conducted a questionnaire survey of high school teachers in charge of the counseling to enter higher educational institutions across Japan. This result may indicate that our research and education have been fairly evaluated in recent years. In the same survey, Tohoku University has been the top for 2 consecutive years among universities where the students show improvements in performance after entering.

**No.1/Tohoku University**
No.2/The University of Tokyo
No.3/Keio University
No.4/Tsukuba University
No.5/Ritsumeikan University
(University Ranking 2010)

**Ranked World's No.3 of ESI's Most Cited Papers in Materials Science**

As of July 2009, Essential Science Indicators (ESI) shows that Tohoku University ranked world's No.3 of paper citation in Materials Science. The university ranked 1st in the same field and 2nd in Physics in Japan. Thomson Reuters has published ESI that provides paper citation ranking.

**3rd in the world (1st in Japan)/Materials Science**
10th in the world (2nd in Japan) /Physics
17th in the world (5th in Japan) /Chemistry
51st in the world (3rd in Japan) /Engineering
(Ranking of Academic Paper Citation 1999 -2009)

System of Smooth Education and Research

# World's Leading Environment, Organization and Operation

## Sessions among Different Fields

A new course, opened in academic year 2009 for postgraduate students, takes advantage of the effectiveness of sessions among different fields based on previous Interdisciplinary Research Joint Lecture. In this course, students can share expertise and researchers in various fields that students do not study as their majors.

The purpose of the cross-departmental lectures is to develop cross-sectional and interdisciplinary perspectives in students. They are expected to be committed to each class while studying their majoring fields. The new course draws attention for presenting a new curriculum as a part of graduate school reform.

**Examples**

| Lecturer | Title (including provisional one) | Outline |
|---|---|---|
| Graduate School of Science **Professor Motoko Kotani** | Introduction of Discrete Geometric Analysis | A macroscopic phenomenon that we observe is determined by a microscopic structure. This lecture will explain how symmetry and periodicity of a microscopic geometric structure controls a phenomenon at the macroscopic level from a standpoint of discrete geometric analysis. |
| Graduate School of Education **Professor Katsutoshi Mizuhara** | Structures and Characteristics of Curricula in Modern Japan | There are harsh arguments about the relationship between yutori education (relaxed education) and declines in the students' scholastic performance. This lecture is to elucidate principles of school curricula including its structure and characteristics. |
| Institute of Development, Aging and Cancer **Professor Ryuta Kawashima** | Most Advanced Brain Sciences and Creation of New Industries | This lecture will present industry-academia joint research projects to return technologies and research results on the brain science to society. We discuss the involvement of the university's science and technology in society, and various problems accompanied including its social and ethical aspects. |

## The completion of Tohoku University Integration Laboratory

Tohoku University Integration Laboratory was completed in March 2009 for joint research by Institute for Materials Research and WPI Advanced Institute for Materials Research (WPI-AIMR.) The new laboratory aims to contribute to the significant development of interdisciplinary researches mainly on material sciences. In commemoration of the completion of the new building, an opening ceremony was held with the attendance of many guests from the Ministry of Education, Culture, Sports, Science and Technology, Japan Society for the Promotion of Science (JSPS,) and domestic and overseas WPI-related organizations on May 22, 2009.

Following the unveiling ceremony by President Inoue, guests participated in the laboratory tour to understand the outline of research in WPI-AIMR.

Appearance of the building

The laboratory tour

## Global COE Program

The Global COE Program aims to support establishment of the world's highest education and research center to develop creative human resources with global leadership. The program is supported by the Ministry of Education, Culture, Sports, Science and Technology. For the designation of Global COE Programs, candidates are evaluated for their possibilities to be the above center on the condition that they have the world's highest research base for particular academic fields.

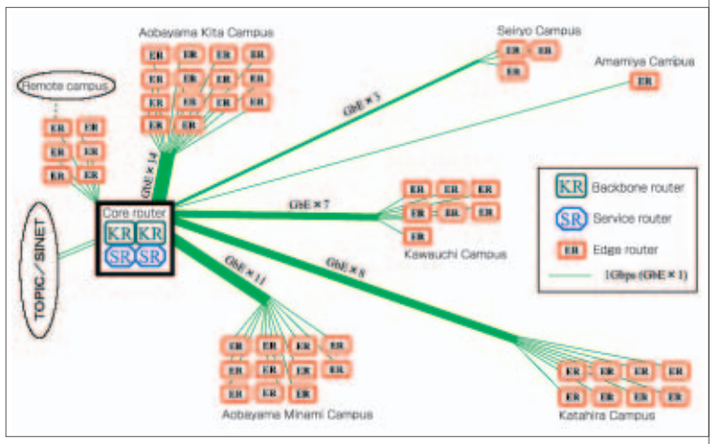
In Tohoku University, 12 programs in eight fields have been designated in academic year 2007 and 2008.

http://www.tohoku.ac.jp/japanese/researcher/coe/

## The Fourth-Generation Campus Network

The Logo of StarTAINS

StarTAINS, the fourth-generation Tohoku University Academic/All-round/Advanced Information Network System (TAINS,) has started. The new star shaped network including a core router has been installed at the Cyberscience Center on Aobayama Kita Campus. StarTAINS is expected to play a role as a "star" of the next-generation powerful information platform that Inoue Plan aims for.




## The Cyberscience Center has been Designated as a Joint Research Center for shared use.

The Cyberscience Center of Tohoku University has been designated as a joint research center to share the large-scale interdisciplinary information platform by the Ministry of Education, Culture, Sports, Science and Technology. Members to use the new center consist of the Hokkaido University Information Initiative Center, the Information Technology Center of the University of Tokyo (as a core organization), the Global Scientific Information and Computing Center of Tokyo Institute of Technology, the Information Technology Center of Nagoya University, Academic Center for Computing and Media Services of Kyoto University, the Cybermedia Center of Osaka University, the Research Institute for Information Technology of Kyushu University, and the Cyberscience Center of Tohoku University. The period of designation is for six years from April 1, 2010 through March 31, 2016.

The networked research center aims to contribute to the further development of academic and research bases in Japan by using information platforms including ultralarge scale computers, large-capacity memory, and a network. The research center will conduct joint researches in interdisciplinary fields that have been difficult to explain such as global environment, energy, materials, genome, academic information, program analysis, and information processing. The achievements produced at the above center are important for challenging researches, and are expected to draw international attention.

## Department of Technical Support

As of April 1, 2009, the technical staff consists of 427 members, and engages in supporting education and research in various fields. Many technical staff members work at Graduate school of Science and laboratories, and continue to keep advanced techniques for the development of our researches.

The Department of Technical Support was established in April 2009 in order to contribute to the development of the support system. Since then, the technical staff members have belonged to the new department, which allows us to study and carry out cross-departmental measures. The university has tried to further improve skills of the technical staff, to ensure talented human resources, and to appropriately arrange personnel.

# Various Education and Student Support Programs to Vitalize the University

## President's Education Award to Excellent Faculty Members

Tohoku University highly evaluates faculty members for their outstanding teaching method and study support including for extracurricular activities and international exchange.

Associate Professor
**Akira Sato**
Graduate School of Medicine

Prof. Sato has introduced cutting-edge classes based on science and culture into his physical education.

Associate Professor
**Kazuko Suematsu**
Graduate School of Economics and Management

Prof. Suematsu has responded to social needs from a students' standpoint, and contributed to promoting international exchanges. She has also encouraged international academic support including education for international students, and to send more students abroad.

## Contribution Award in Education

Tohoku University praises faculty members for their outstanding education method, study support, and creative approaches. This award aims to promote skills to provide advanced education.

| | |
|---|---|
| Professor<br>**Akira Sato**<br>Graduate School of Medicine | Prof. Sato has presented technical guidance based on scientific-logical thinking, and introduced the traditional culture of Japanese archery into his classes for many years. He also has given physical education to nurture the healthy minds and bodies |
| Graduate School of Science, Graduate School of Engineering, and Center for the Advancement of Higher Education<br>**A working group to open Science Laboratory Class for Liberal Arts Students** | A working group for Science Laboratory Class for Liberal Arts Students was organized when our program was selected for Good Practice (GP) in 2005. The new class has started in the first semester of academic year 2007. This class was highly evaluated by students, and drew attention from mass media. |
| Professor<br>**Shinobu Uno**<br>Graduate School of Education | Prof. Uno has long contributed to improving a class evaluation system and to raising the consciousness of the teaching staff about students' performance. He has laid the base for the current class evaluation questionnaire survey to improve education. |

### Selected as Support Programs for Distinctive University Education by the Ministry of Education, Culture, Sports, Science and Technology in academic year 2008

( ) indicates division/office.
http://www.tohoku.ac.jp/japanese/profi le/about/08/about0803/

**Program for Promoting High-Quality University Education**
- Building a Medical Education System to bring up a Research Mind (Faculty of Medicine)
http://www.gakubu-gp.med.tohoku.ac.jp/
- Measurement of education effect by using a record of learning achievements (Faculty of Engineering)
http://www.eng.tohoku.ac.jp/edu/?menu=edu-gp

**Support Programs for Improving Graduate School Education**
- Program for developing international advanced curators of historical resources (Graduate School of Arts and Letters)
- Program for developing experts in information literacy education (Graduate School of Information Sciences)
http://www.media.is.tohoku.ac.jp/literacy/index.html

**Program for developing experts at A Professional Graduate School**
- Core Curriculum of Accounting Schools (Graduate School of Economics and Management)
http://www.econ.tohoku.ac.jp/.ascc/

**Support Project for Strategic University Collaborations**
- The mutual development among universities and colleges in the Sendai area by their stronger ties (Joint project with Tohoku Gakuin University)
http://gakuto-sendai-senryaku.jp/

**University Hospitals Collaborative Project to Develop Advanced Medical Specialists**
- Tohoku Advanced Medical Specialist Career Path Support System (Hospital)
http://www.hosp.tohoku.ac.jp/careerpath/

**Science Student Support Project**
- Special education project in advanced mathematics and physics (Faculty of Science)

## Support for International Exchange

The Division of International Education and Exchange, Graduate School of Economics and Management has systematically developed the following ideas to meet needs of students, graduate schools, and the university: Support for foreign students, Support for sending students abroad, International education, and International exchange.
A project for promoting the globalization of Tohoku University has continued until March 2008 with financial assistance on and off campus. The Halal food project was for Muslim students to enjoy their meals on campus.
The university has provided support for international students including for job hunting.

International students eating Halal foods at a cafeteria

## University Counseling Center

Clinical psychotherapists and university counselors provide students with counseling sessions about problems including academic work, career options, human relations, personality, and mental health. The Counseling Center may refer students to more appropriate institutions, windows, or faculty members depending on problems. Counseling services for harassment are also available, and full-time counselors provide training for office staff at each department twice a year.
The Counseling Center supports extra classes for science students in collaboration with Graduate Schools of Science and Graduate School of Engineering. These extra classes are given by graduates and senior students to help students who cannot follow classes or did not acquire enough knowledge in high schools. Most of students with the help of supplemental study have improved their performances.
University Counseling Center has taken preventive measures and emphasized cross-departmental cooperation to create the healthier campus environment.

Staff of the Counseling Center, with Kiyomi Yoshitake, Vice Director, at the center front

## Topics! Lecture for Creating Junior Scientists for Senior High School Students

Lectures for Creating Junior Scientists for first and second-grade senior high school students have started in academic year 2009 scheduled over three years. This program aims to develop an interest and understanding of Science, to increase the ability to find and analyze Wonders of Daily Life, and to improve the presentation skill and understanding of scientific terms in English.
The first class was held on June 13, 2009 with high reputation. Such classes and experiments are planned to be developed in stages to nurture future scientists.
http://www.ige.tohoku.ac.jp/mirai/

Day by Day Efforts Lead to Good Results, and a Pleasant and Touched Scene

# Happy and Lively Campus Life

## Tohoku University Won the Championship at the 47th Seven University Athletic Competition

The Seven University Athletic Competition consists of Hokkaido University, Tohoku University, the University of Tokyo, Nagoya University, Kyoto University, Osaka University, and Kyushu University. Each university takes turns as a host university to plan and organize a competition based on five ideas: pursuit of true amateurism, autonomous management by students, improvement in performance, friendship among the universities, and operational costs reduction.

Sports clubs of the seven universities compete with one another in currently 41 games, and get points from the competition results. The winner is a university which gets the highest points. At the 47th competition in 2008 organized by Tohoku University, it won championships in men's table tennis, men's and women's Japanese archery, men's field and track events, women's tennis, women's basket ball, men's judo, equestrian event, ice hockey, and sumo (open event,) which led to the overall title. Tohoku University was the only university which won the overall championship at a competition organized by itself.

The 47th competition was exciting all the while. In the initial stage, Tohoku University was in a dead heat with the University of Tokyo, and in the middle stage, Kyoto University which has been winningest among the seven universities and Osaka University which merged with Osaka University of Foreign Studies to increase the power have gradually improved their ranking.

**47th Seven University Athletic Competition**

**Overall Champion Tohoku University**

| | |
|---|---|
| 2nd place/ Osaka University | 5th place /Hokkaido University |
| 3rd place/Nagoya University | 6th place /University of Tokyo |
| 4th place /Kyoto University | 7th place / Kyushu University |

## Tohoku University Rowing Club Won the Championship at Intercollegiate Boat Racing

At the final meeting of Intercollegiate Boat Racing on August 24, 2008, a pair of Tatsuro Nitta and Daisuke Suzuki won the Championship in Coxless Pair. They were in the lead in the 500-meter, 1000-meter, 1500-meter, and 2000-meter races among other universities.

## Ski Club Won the Championship at Japan Intercollegiate Skiing Competition

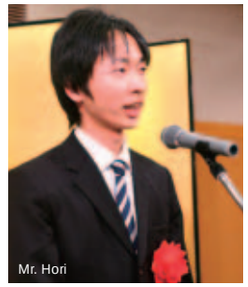
The 82nd Japan Intercollegiate Skiing Competition was held in Hachimantai City, Iwate from January 12 through January 18, 2009. The Ski Club of Tohoku University won the championship in the women's 3 x 5-kilometer relay race in the third division. The Women Ski Club will promote to the second division next season, and is expected to be more successful.

## Japanese Archery Club KUROKAWA Cup, SUZUKI Prize, and OTANI Prize

The Japanese Archery Club that has achieved outstanding performances through the year was awarded the KUROKAWA Cup, SUZUKI Prize, and OTANI Prize.

The presentation ceremony was held at Aoba Memorial Hall on February 17, 2009.

## Two students were awarded Japan Student Services Organization's Student of the Year


**Yuki Yoshino in 6th year of Faculty of Medicine was awarded the Academic Grand Prize**

Mr. Yoshino has developed a technology to suture amputation stump of DNA at a cost of 1/260 of a marketed product. The new technology is as fast as the fastest product in the market.

**Toshimitsu Hori in 3rd year of Faculty of Law received Outstanding Performance Prize for Social Contribution**

Mr. Hori was highly evaluated for his activities such as opening workshops and fairs on agricultural problems including a reform of rice policies.

## Topics!

### Open Campus Most Popular among the National Universities

Open Campus of Tohoku University, held for two days every summer, is popular among high school students because of its rich and selectable content. The number of visitors exceeded 45,000 in academic year 2009. During the Open Campus, each faculty provided events full of ideas. Shuttle buses connected four campuses: Kawauchi, Aobayama, Seiryo, and Amamiya.

Application of Longtime Research Results to Build Bases for a Bright Future …

# Effective Uses of Our Intellectual Resources

## Tohoku University International Industry-Academia Cooperation Symposium Strategies for International Industry-Academia Cooperation: Message from Tohoku University


Tohoku University Industry-Academia Cooperation Symposium was held as a part of the Project for the Strategic Development of Industry-University-Government Collaboration sponsored by the Ministry of Education, Culture, Sports, Science, and Technology at Keidanren Kaikan in Tokyo on March 12, 2009.

Tohoku University has presented its strategic approaches and the future direction of intellectual property to the audience from across the country.

Following the speeches by President Akihisa Inoue and Director Fumio Isoda at Research Promotion Bureau, Ministry of Education, Culture, Sports, Science and Technology, Hiroyuki Abe, Advisor to Japan Science and Technology Agency, and Nobuyoshi Tanaka, Senior Managing Director, Canon, have presented their visions for future collaborations in keynote speeches.

Session 1 has presented Tohoku University's International Strategic Model for the future. In Session 2, Professor Shigetoshi Sugawa and Professor Tadahiro Omi have presented their successful cases and the key points with representatives of joint research partners. Prof. Sugawa's partner was Mr. Toshiyuki Yamazaki, Texas Instruments of Japan, and Mr. Naozumi Koga, Zeon Corporation, and Mr. Hiroaki Tamura, Ube Industries were of Prof. Omi's.

A video message from Professor Reza Abbaschian, University of California, Riverside highlighted our international cooperation. Tohoku University and Sendai City has worked on a project in collaboration with UC Riverside.

At the round–table session, Mr. Abe, Mr. Tanaka, and Professor Omi have shown a plan for Japan's international strategy of intellectual property and the university's strategy for international collaboration on intellectual property. The symposium successfully ended.

Tohoku University will plan to hold symposia like the above regularly to contribute to the promotion of international cooperative projects both in the university and in Japan.

### Systematic collaborations with private organizations by agreement

| Date of agreement | Private organizations | Purpose |
|---|---|---|
| February19,2009 | High Energy Accelerator Research Organization (KEK) | To further promote joint research, its system, human resource development and exchange in particle and nuclear physics, materials and life science, and accelerator science |
| March 9, 2009 | National Institute for Fusion Science, National Institutes of Natural Sciences | To further promote research on a fusion reactor, human resource development and exchange |
| April 14, 2009 | RIKEN | To develop various academic domains such as theories and experiments, and computational science and computer science, to produce innovation by computational science, and to promote human resource development and exchange to play an international role |

Contribution to the Promotion of Industry-Academia Collaboration in both Germany and Japan

## German Innovation Award Won the Second Prize of the Gottfried Wagener Prize 2008

The presentation ceremony for German Innovation Award was held at Grand Hyatt Tokyo on March 6, 2009. A research group led by Associate Professor Akira Yoshikawa at Institute of Multidisciplinary Research for Advanced Materials received the Second Prize of the Gottfried Wagener Prize 2008. The reason to be awarded was the development of an inorganic scintillator and its application in medicine, security, and an industry.

German Innovation Award was established to commemorate Gottfried Wagener, a German scientist who had close ties with Japan, by 12 German companies that emphasize on technologies and the German Chamber of Commerce in Japan. The award aims to support talented young researchers in Japan, to promote industry-academia collaborations between Germany and Japan, and to develop a close partnership among various circles.

## Highly Evaluated Achievements in Industry-University-Government Collaborations

Two faculty members of Tohoku University were commended as Persons of Merit in Industry-University-Government Collaborations for their outstanding achievements.

The commendation ceremony was held at Kyoto International Conference Center on June 20, 2009.

### Prime Minister Award

Given to:

Professor **Masataka Nakazawa,** Research Institute of Electrical Communication, Tohoku University (second from the right in the picture,)

**Mr. Kazuo Hagimoto,** Nippon Telegraph and Telephone Corporation (NTT,) and

**Mr. Haruki Okoshi,** FURUKAWA ELECTRIC CO., LTD

The Development and Advancement of Erbium Doped Fiber Amplifier (EDFA)

### Ministry of Education, Culture, Sports, Science and Technology Award

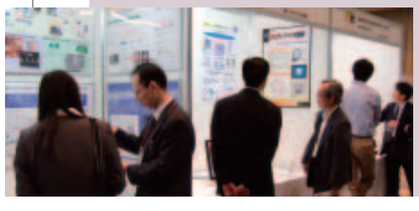
Given to:

Professor **Kazuo Watanabe,** Institute for Materials Research, Tohoku University (at the center in the picture,) and

**Mr. Junji Sakuraba,** Sumitomo Heavy Industries, LTD

The Development of a Cryogen-free High-Magnetic-Field Superconducting Magnet Device

### Topics! 2008 Tohoku University Innovation Fair in Sendai



2008 Tohoku University Innovation Fair in Sendai was held at Sendai International Center on September 30, 2008. The Innovation Fair has presented the most advanced researches and technologies in the following fields at exhibition booths: information and communications, nanotechnologies, materials, medical engineering, life sciences, and robotics. The university created opportunities to meet new people throughout the fair.

Keita Inoue, Visiting Professor at Tohoku University, former Director of Toyota Motor Corporation, and former Representative Director and President of GENESIS RESEARCH INSTITUTE, Inc. gave a keynote speech titled "Global Warning and the Future of Automobile." A large audience listened to his prospect and approaches.

Steps to a World-Class University through Global Network Construction

# Promotion of International Exchange

## Becoming a member of The Association of Pacific Rim Universities (APRU,) International University Consortium

Tohoku University has become a member of the Association of Pacific Rim Universities(APRU,)an international consortium of advanced universities in September 2008. APRU was established in 1997,and its main office is at National University of Singapore(NUS.)The membership of APRU helps construct a global network for research and education that is an important measure in Inoue Plan. Tohoku University has first participated in the Annual Presidents Meeting of APRU that was held at California Institute of Technology (CALTECH) in the U.S. in June 2009. President Inoue has presented important measures to be a World-Class University in the Presidents Open Forum.


## Signing Ceremony for France-Japan Joint Laboratory and Workshop

Tohoku University, Ecole Centrale de Lyon (ECL) and INSA de Lyon, French famous universities in science, agreed on establishment of a joint laboratory in December 2007. The first workshop to present research results from the joint laboratory was held at Sakura Hall at Katahira Campus on December 1 and 2, 2008. On the second day, the signing ceremony for a cooperation agreement was held after that the laboratory was accredited as Associated International Laboratory (LIA) by Centre National de la Recherche Scientifique (CNRS.)

## Tohoku University-York University Joint Research Seminar

A joint research seminar with York University in the United Kingdom, one of the members of the Inter-university Academic Exchange Agreements was held at the 2nd Auditorium at the Institute of Materials Research on January 19 and 20, 2009. The seminar aimed to further develop research exchange and mutual cooperation.
Both universities presented their current education and research activities, and held sectional meetings in chemistry, education, and electronic engineering/physics.

## Meeting on International Student Exchanges among Pacific Rim Universities (PRUM)

A meeting on International Student Exchanges among Pacific Rim Universities (PRUM) was held on February 16 and 17, 2009 in Tohoku University with the attendance of staff for international exchange at UC Berkeley, UC Davis, UCLA, UC Riverside, UC Santa Barbara, and the University of Sydney . The PRUM meeting was on the promotion of Program to Promote Internationalization of University Education supported by the Ministry of Education, Culture, Sports, Science and Technology. Staff for international exchange at Tohoku University and other participant universities has discussed the future direction of international joint education in graduate schools and international student exchanges among undergraduates.

## Tohoku University Forum in Beijing

Tohoku University Forum in Beijing and a general meeting of Tohoku University Alumni in China were held on December 13, 2008 in Beijing, China.
The forum, with assistance of Peking University, Tsinghua University, and Japan Society for the Promotion of Science (JSPS) Beijing Office aimed to further develop mutual cooperation with the Chinese universities and also to publicize Tohoku University with professors, administrative staff, and students at the Chinese universities.
Delegates of Tohoku University, Peking University, and Tsinghua University have given speeches, and Distinguished Professors of Tohoku University have presented their researches.

## Tohoku University-Osaka University Joint Forum "Innovative Research and Philosophy of Science"

A Tohoku University-Osaka University Joint Forum titled "Innovative Research and Philosophy of Science" was held in San Francisco on September 18, 2008. The joint forum was planned to promote student exchange and joint research between West Coast areas of the United States and the two Japanese universities, and to present the most advanced researches. The forum was in the collaboration with the Consulate-General of Japan in San Francisco, Japan Society for the Promotion of Science (JSPS,) Japan External Trade Organization (JETRO,) Japanese University Network in the Bay Area (JUNBA,) Japanese Chamber of Commerce of Northern California (JCCNC,) and Japan Society of Northern California.

**Topics!** **11 more universities have signed agreements on Inter-university Academic Exchange Agreements which makes a total of 136 universities (as of July 1,2009)**

| Country | Name of University | Date of Conclusion |
|---|---|---|
| Indonesia | Institut Teknologi Bandung | June 4, 2008 |
| France | Institut d'Études Politiques de Lyon | June 6, 2008 |
| China | Yangzhou University | June 20, 2008 |
| France | Ecole Nomale Supérieure Lettres et Sciences Humaines A de Lyon | August 11, 2008 |
| China | Chinese Academy of Social Sciences | October 15, 2008 |

| Country | Name of University | Date of Conclusion |
|---|---|---|
| U.S.A. | Syracuse University | November 19, 2008 |
| India | Indian Institute of Science | December 18, 2008 |
| U.S.A. | Institute of International Education | January 27, 2009 |
| Taiwan | National Chung Hsing University | March 30, 2009 |
| Canada | University of Ottawa | June 26, 2009 |
| China | Southeast University | June 29, 2009 |

## An Open University Increases Opportunities for Exchanges and Expands Unlimited Possibilities
# Deep Involvement in Social Contribution and Approaches to Gender Equality

## Tohoku University's Approaches to The Iwate-Miyagi Inland Earthquake

At 8:43 a.m. on June 14, 2008, the Iwate-Miyagi Inland Earthquake of Magnitude 7.2 (M7.2) has occurred. The epicenter was in the southern inland of Iwate Prefecture. On June 15, the Japan Association for Earthquake Engineering has put together a joint investigation group lead by Professor Motoki Kazama at Graduate School of Engineering with cooperation of the Japan Society of Civil Engineering and the Japanese Geotechnical Society. Research Center for Prediction of Earthquakes and Volcanic Eruptions, Graduate School of Science has installed the GPS-based observation network for close investigation of the inland earthquake mechanism and the crustal structure around the epicenter. The center played a role as a representative of a joint observation group consisting of universities and research institutions in Japan.

A meeting of Japanese Society of Community Psychology in collaboration with the Center for the Advancement of Higher Education, Tohoku University was held on June 20, 2008, and has provided special lectures on restoration from the Iwate-Miyagi Inland Earthquake and recovery of communities. On July 14, 2008, one month after the Earthquake, the university held a symposium with the attendance of researchers in various fields.

A disk-shaped device in front of a person is a GPS receiving antenna, and a rectangular device on the bank slope in the back is solar panels to supply power. These solar cells make it possible to acquire data during the power outage caused by the earthquake.

A symposium was held by Disaster Control Research Center (DCRC,) Graduate School of Engineering on July 14, 2008.

A series of six books "Considering Disaster Prevention"
As of July 2009, two of them have already been published.
Published by Toshindo,
Tel. 03-3818-5521

Meanwhile, researchers mainly in liberal arts and social sciences of Tohoku University have published a series of six books "Considering Disaster Prevention" to approach from the above field in January 2009. The new perspective has drawn attention, and lectures for Disaster Prevention by our faculty members were carried in a series in the Kahoku Shimpo newspaper from Aril 2009 through June 2009.

## Opening Ceremony of Museum of Past and Future Automobiles

The Museum of Past and Future Automobiles was opened on November 1, 2008. The museum includes 1926 Ford Model T, 1931 Ford Model A, and TOYOTA F1 racing car engine that was donated to cerebrate the Tohoku University 100th Anniversary.
This facility is at the site of Graduate School of Engineering, and its glass-walled building draws attention. It is open to the public free of charge, and has become a popular spot in the university.

## Topics! The 3rd Tohoku University Sendai Seminar "Tohoku Future Project" A Gift from the Universe – To Know the Most Advanced Aerospace

A School of Space

An aerospace seminar was held by Tohoku University, The Japan Aerospace Exploration Agency (JAXA,) and the Kahoku Shimpo at Kawauchi Hagi Hall on December 13, 2008. About 800 people have gathered to listen attentively to the lectures on a clue to the mysteries of the universe and the development of next-generation aircraft. The content of the seminar included a keynote speech by Mr. Yasunori Matogawa, Councilor for technology at JAXA, and a video letter from Ms. Naoko Yamazaki, a Japanese astronaut.
A School of Space also opened to give elementary, junior and senior high school students an opportunity to be familiar with space. Participants learned about the latest aerospace.

## Sparkling ☆ Exciting Science
## For students of elementary, junior and senior high schools

The science program is to provide fifth and sixth graders, junior and senior high school students with a chance to see, hear and be exposed to the most advanced research results in various fields. Students can understand a relation between academic studies and daily lives, and the meaning of science.
Tohoku University carried out two programs in academic year 2008, and other universities has worked on similar programs on other themes.

❶

❷

● **July 27, 2008**

**Exploration of The Mind through Interviews**
**–Let's ask a question of Professional Baseball Players and Professional Musicians – ❶**

Professor **Katsurou Kitamura**
Graduate School of Educational Informatics Research Division

Children conducted interviews with Olympic athletes and world-renowned music players to find out a clue to fully express their potential.

● **August 2 and 9, 2008** (same content for both days)

**Ensuring safety before a great quake comes**
**– The forefront of measures against earthquakes ❷**

Professor **Masato Motosaka**
Disaster Control Research Center (DCRC,) Graduate School of Engineering

Professor Motosaka has presented a technology to precisely predict the occurrence of upcoming Miyagi Offshore Earthquake. A prediction is made by using data on seismic waveforms transmitted to Tohoku University by a seismometer that is installed at a public facility on the Sanriku coast and an earthquake early warning system.

## The 7th Tohoku University Gender Equality Symposium

Tohoku University has established the Gender Equality Committee in 2001, and has held a symposium annually since 2002 to promote gender equality. The university admitted women for the first time in Japan under its Open-Door policy.
The 7th Gender Equality Symposium was held at the Sendai International Center on November 22, 2008. The 6th Sawayanagi Award or Tohoku University Prize for the Encouragement of Gender Equality for academic research was given to the Parents' Association of Kawauchi Keyaki Nursery of Tohoku University. The reason to be awarded is network construction to establish a child-care facility that takes advantage of the university. Ms. T. Odontuya, a doctoral student at Graduate School of Environmental Studies received the special prize for the project category of the same award for her Social Anthropological Analysis on Expansion of Violence to Women in Mongolia.
Award lectures were presented by the Parents' Association of Kawauchi Keyaki Nursery and Associate Professor Koichi Hashimoto at Graduate School of Education, University of Tokyo. His lecture was on Career Development of Women Researchers and the Institutional Environment. The Associate Professor won the 4th Sawayanagi Award for the project category when he was Assistant Professor at Graduate School of Education, Tohoku University.
Mr. Åge B. Grutle, Ambassador of the Kingdom of Norway in Japan has made a keynote speech on the current state of Gender Equality in Norway. Professor Ichiro Yonenaga at Institute for Materials Research and other participants have discussed the same issue in universities.

## Topics! Tohoku University has been on top for three consecutive years of the number of patents publication by university

According to the number of patent publication by university released by the Patent Office, Tohoku University has been on top since 2006. This fact indicates the high level of research and a strong motivation to return research results to society in the university.
Our policy of Research First and Practical Sciences First has brought about the above achievement

**1st place/Tohoku University, 326patents**
2nd place/University of Tokyo,280patents
3rd place/Osaka University,273patents
4th place/Tokyo Institute of Technology,231patents
5th place/Kyoto University,188patents

# Tohoku University Shuyukai (Alumni)

## Forming of Tohoku University Community

Tohoku University Alumni Association was established on the 100th Anniversary in 2007 to lay the foundation for the next 100 years, and was renamed Tohoku University Shuyukai in June 2009. Shuyukai has a membership of more than 140,000 graduates, about 18,000 current students, and about 6,000 faculty members, and the current students' families. The new alumni association aims to contribute to friendship, exchange, and development among members, and to encourage close communications between the university and members. Shuyukai held Tohoku University Home Coming Day and exchange meetings in the Kanto and Kansai areas to form the Tohoku University Community.

### The 2nd Tohoku University Home Coming Day

■ Friday, October 10, 2008

Venue: Tohoku University Centennial Hall (Kawauchi Hagi Hall)

◎**Concert to celebrate the completion of Tohoku University Centennial Hall**

■ Saturday, October 11, 2008

Venue: Tohoku University Centennial Hall (Kawauchi Hagi Hall) and lecture buildings at Kawauchi Kita Campus

◎**First general meeting of alumni**

◎**Opening Ceremony of Tohoku University Centennial Hall**

◎**Symposium titled "Local Area and the Automobile Industry"**

◎**Social gathering for current students of 2008 and alumni**

**- Listen to seniors on Kawauchi Kita Campus -**

■ Sunday, October 12, 2008

Venue: Tohoku University Centennial Hall (Kawauchi Hagi Hall)

◎**Autumn cultural festival by Cultural Clubs**

Concert to celebrate the completion of Kawauchi Hagi Hall

Symposium titled "Local Area and the Automobile Industry"

Social gathering for current students and alumni

### Exchange Meeting in Kansai

■ Saturday, February 21, 2009

Venue: WelCity Osaka (Osaka Welfare Pension Fund Center)

◎**Lecture meeting**

◎**Science Cafe**

◎**A general meeting and a social gathering of the Kansai Branch**

Social gathering

### Exchange Meeting in Kanto

■ Sunday, August 2, 2009

Venue: 5th floor of Sapia Tower (Tokyo Conference)

◎**Lecture meeting**

◎**Social gathering**

Lecture meeting



## Project with the Power of Tohoku University

# Completion of Tohoku University Centennial Hall, or Kawauchi Hagi Hall

Tohoku University Centennial Hall

Tohoku University Centennial Hall (nicknamed Kawauchi Hagi Hall) was completed in August 2008 as a part of 100th anniversary commemoration projects by remodeling Kawauchi Memorial Auditorium that was established to celebrate the 50th anniversary and Matsushita Memorial Hall.

Many alumni and faculty members have contributed to the establishment of the new hall by using research results including on architecture and acoustics with donations from people involved in the university.

The old halls have changed into a hall for academic use that has acoustics to meet international standards and 1,235 seats. The remodeling of the hall has tried to remain its original shape 50 years ago, and provided the inside with the university's symbol color and unique atmosphere. The lobby includes an exhibition gallery to display research results and materials. A space for Faculty Club and meeting rooms are at the old part of Matsushita Memorial Hall to use for information and friendship exchange among alumni, current students, faculty members, and the general public.

Kawauchi Hagi Hall contributes to making the basis of Sendai as an academic city. Tohoku University will use the new hall as a center for academic and cultural activities such as international meetings, concerts, and lecture meetings.

Hall

### Outline of the Facility

Site Area: 57,139 m²

Building area: 2,627 m²

Total Floor area: 5,910 m²

Structure and Scale: Steel framed Reinforced Concrete structure, and partially Steel structure, one story underground, and five stories above ground

Utilities: Academic Hall (1,235 seats), exhibition gallery, a space for Faculty Club, 3 meeting rooms

### Tohoku University Silvester Concert

Tohoku University Silvester Concert counting down to A New Year was held. About 1,200 people enjoyed sounds of rich melody of masterpieces at the first concert on New Year's Eve in Sendai.

■ Wednesday, December 31, 2008

**Program:**

◎"Orphee aux Enfers" Overture by Jacques Offenbach (Sendai Philharmonic Orchestra)

◎"O Mio Babbino Caro" from the opera "Gianni Schicchi" by Giacomo Puccini (Soprano: Asako Tamura)

◎"Ah,fors'e lui" and "Sempre libera" from the opera "La Traviata" by Giuseppe Fortunino Francesco Verdi (Soprano: Asako Tamura)

◎"E lucevan le stele" from the opera "Tosca" by Giacomo Puccini (Tenor: Akira Chubachi)

◎"Nessun dorma" from the opera "Turandot" by Giacomo Puccini (Tenor: Akira Chubachi)

◎"Rhapsody in Blue" by George Gershwin (Piano: Yosuke Yamashita and Sendai Philharmonic Orchestra)

◎"Parle-moi de Ma Mere" from the opera "Carmen" by Georges Bizet (Soprano: Asako Tamura and Tenor: Satoshi Chubachi)

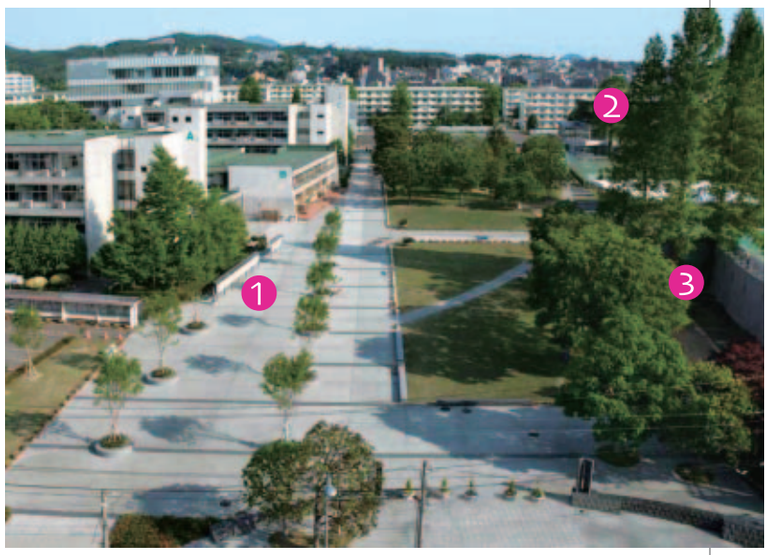
◎"Brindisi" from "La Traviata" by Giuseppe Fortunino Francesco Verdi (Soprano: Asako Tamura and Tenor: Satoshi Chubachi)

◎"Bolero" by Joseph-Maurice Ravel (Sendai Philharmonic Orchestra)

After being loved for half century, Kawauchi Campus is changing into the Brighter and More Open Campus

# Renovation of Kawauchi Campus

Kawauchi Kita Campus provides students with the first year education, which makes this campus recognized as the face of the university. In a framework for a new campus plan, Kawauchi Campus constitutes Aobayama-Kawauchi Green Campus, in which Kawauchi Campus lies in the frontage to the downtown Sendai. The Campus is surrounded by a rich natural and cultural environment including the Sendai Castle Site and Botanical Garden. The Tozai (East-West) Subway Line is now under construction by Sendai City scheduled to open in 2015. The university has been developing campus amenities in harmony with these surrounding resources.




Rich Greenery and Historical Atmosphere

## Kawauchi Campus Plaza —1

The center of Kawauchi Campus, which was formerly in disorder, has been transformed to be an open space suitable for the face of the University. Visitors are welcome into a wide stretch of lawn.

The bike parking lot that blocked the entrance to the campus was moved to make a wide pathway for safety. The north and south campuses divided by a city road now look one campus.

The university preserved old trees and added new Japanese zelkova trees as a new symbol. Flowering trees throughout the campus give pleasure to visitors from overseas in the four seasons.


Soft Colors and materials of the open space are in harmony with a historical atmosphere of the Sendai Castle Site and Tohoku University.

A large wooden deck in front of the conversation room in a class building and an outdoor lunch space in front of the welfare hall are crowded with many students. Benches in various shapes under trees are also for their pleasure.

A wide paved space and the lawn will serve as a stagesetting for annual events including concerts and food stalls in a university festival.

Expansion of Students' Activity Space

## Kawauchi Sub-Arena Building —2

With the construction of the Tozai Subway Line, a cafeteria that has long been popular among students for its reasonable menu, a part of the gymnasium including sub-arena and martial-arts space, and the dressing room were remodeled into a complex facility at the northern edge of the campus. A cafeteria is on the 1st and 2nd floor, and the new gymnasium is above the cafeteria.

Newly opened Bee ARENA Café has the counter and couches in the 2nd-story glass hall. An outdoor terraced garden on the 2nd floor provides a view of greenery.

Students in the terrace that connects to the multi-purpose arena can see sport activities. The arena, the terrace, and the cafeteria can be used as a continuous space for school events.

Local residents share the lively atmosphere through the glasses of the new building from the city road in the north.

Transformed into a Fresh and Warm Space

## Extension and Remodeling of the Welfare Hall —3

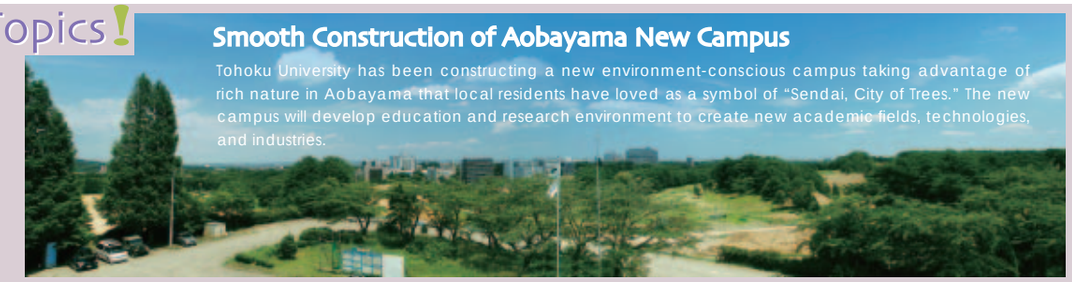
The university has decided to extend and remodel the welfare hall that was built in 1969 because of its getting older and shortage of seats.

The new welfare hall is now under construction scheduled for completion in January 2010. A shop has already opened, and a cafeteria will be completed in March 2010. The new cafeteria in a wooden structure with a gentle curvature will be added to the south side of the existing building. Colorful Kitchen Boxes will serve different types of dishes.

Topics!

### Smooth Construction of Aobayama New Campus

Tohoku University has been constructing a new environment-conscious campus taking advantage of rich nature in Aobayama that local residents have loved as a symbol of "Sendai, City of Trees." The new campus will develop education and research environment to create new academic fields, technologies, and industries.



| Divisions | Achievements |
|---|---|
| Graduate School / Faculty of Arts and Letters | Prof. Koichi Hasegawa was awarded the 2008 Abe Jiro Cultural Prize.<br>International COE Symposia on Social Stratification and Inequality in twice. |
| Graduate School / Faculty of Education | International Symposium on Schools-Communities Collaboration: Through the Challenges of Citizenship Education in England. |
| Graduate School / School of Law | Tsinghua-Tohoku Workshop: New Social Issues in the Age of Globalization.<br>Kick-off Seminar: Looking for New Social-Justice in a Globalizing World – From the Perspective of Gender Equity and Multicultural Conviviality-. |
| Graduate School of Economics and Management/ Faculty of Economics | Starting Service Innovation and Human Resources Development Program entrusted by Japan Society for the Promotion of Science (JSPS.)<br>Starting Core Curriculum of Accounting Schools sponsored by the Ministry of Education, Culture, Sports, Science and Technology. |
| Graduate School / Faculty of Science | Prof. Kunio Inoue was awarded the 5th Japan Society for the Promotion of Science Prize for The Precision Measurement of Reactor Neutrino Oscillations.<br>Prof. Masahiro Terada received the 26th CSJ Award for Creative Work from the Chemical Society of Japan for Development of Organocatalysts Based on Hydrogen Bonds as Key Interaction.<br>Prof. Akihiko Yukie received 2009 Algebra Prize from the Mathematical Society of Japan for his arithmetic and geometric research on prehomogeneous vector spaces.<br>Assistant Prof. Takafumi Sato received 2009 Young Scientist Award from the Ministry of Education, Culture, Sports, Science and Technology.<br>A group led by Associate Prof. Takeshi Kakegawa has presented a new hypothesis of Origin of Life: Amino acid formation by oceanic meteorite impact. |
| Graduate School / School of Medicine | Opening Health Sciences Program.<br>Starting Global COE for Conquest of Signal Transduction Diseases with Network Medicine.<br>Selected for Good Practice (GP), Program for the Promotion of High-Quality University Education: Building a Medical Education System to bring up a Research Mind.<br>Discovery of Neural Relay Mediating Proliferation of Insulin-Producing Cells.<br>Explaining synchronous activity of neurons in the prefrontal cortex at the moment of problem solving -Creativity emerges from synchronous interactions of neurons.- |
| Graduate School / School of Dentistry | The 3rd International Symposium for Interface Oral Health Science on the theme of tissue regeneration and biomaterials.<br>The 1st Tohoku-Forsyth Symposium that aimed to promote international exchange among young scientists and graduate students.<br>Prof. Osamu Suzuki has developed of a novel biomaterial (low crystalline OCP) to enhance normal bone remodeling.<br>Selected for MEXT Research and Education Funding: Highly-functional Interface Science: Innovation of Biomaterials. |
| Graduate School of Pharmaceutical Sciences / Faculty of Pharmacy and Pharmaceutical Sciences | Associate Prof. Sumio Otsuki received the 2008 ISSX Asian-Pacific New Investigator Award for explaining molecular mechanism of transporting at the blood-brain barrier.<br>Associate Prof. Naoki Kanoh received 2008 Incentive Award in Synthetic Organic Chemistry, Japan for Synthesis and Chemical Biology of Bioactive Natural Products. |
| Graduate School / School of Engineering | Technical Contributions to the investigation of the 2008 Iwate-Miyagi Inland Earthquake by Department of Civil Engineering.<br>Opening a branch school at Rokkasyo Village, Aomori for human resource development by Quantum Science and Energy Engineering Department.<br>A group led by Prof. Junichi Koike has developed a new Cu alloy for low-resistivity TFT electrode in flat-panel displays.<br>A group led by Prof Mikio Konno has developed magnetic particles with uniform sizes and responses to a magnetic field.<br>A group led by Prof. Shigetoshi Sugawa has developed and made a practical use of an image sensor with high sensitivity and wide dynamic range.<br>Prof. Migaku Takahashi received ICHIMURA Industrial Prize for the development and practical application of ultra clean sputtering apparatus for extremely high density hard disk and heads fabrication.<br>Launch of micro-satellite "RISING" developed by a group led by Prof. Kazuya Yoshida |
| Graduate School of Agricultural Science / Faculty of Agriculture | Prof. Kinya Toriyama discovered retrograde signaling of fertility restoration in cytoplasmic male sterility in rice.<br>Prof. Kazuo Morozumi has developed Recycling Basin Economic Area that makes the most use of regional resources.<br>Prof. Tadao Saito has discovered new lactic acid bacteria recognizing human blood type antigen for prevention measures and treatments of intestinal disease. |
| Graduate School of International Cultural Studies | International symposium on Culture in Interaction and Language.<br>Associate Prof. Jeong-soo Yu and Mr. Kosuke Toshiki received Outstanding Paper Award from the Japan Macro-Engineers Society. |
| Graduate School of Information Sciences | Starting The Information Literacy Education Professional Program supported by MEXT Program for Improving Graduate School Education.<br>The 2nd Seminar on Science Integration with the cooperation of alumni and incumbent faculty members. |
| Graduate School of Life Sciences | The International Prize for Biology Commemorative Symposium and Dr. David Tilman's Lecture, "Ecology for the Changing World" sponsored by JSPS, Graduate School of Life Sciences and The global COE program "Center for Ecosystem Management Adapting to Global Change."<br>Finding a male-specific neuronal cluster in the brain that can initiate male-sexual behavior. |
| Graduate School of Environmental Studies | The 18th Environmental Forum: Regional Role to Achieve Sustainable Societies -From View Point of Socio-economic System.<br>The 6th Environmental Technology Symposium: 1 Kw World, How much do you know? |
| Graduate School of Biomedical Engineering | First Anniversary Symposium by Graduate School of Biomedical Engineering. |

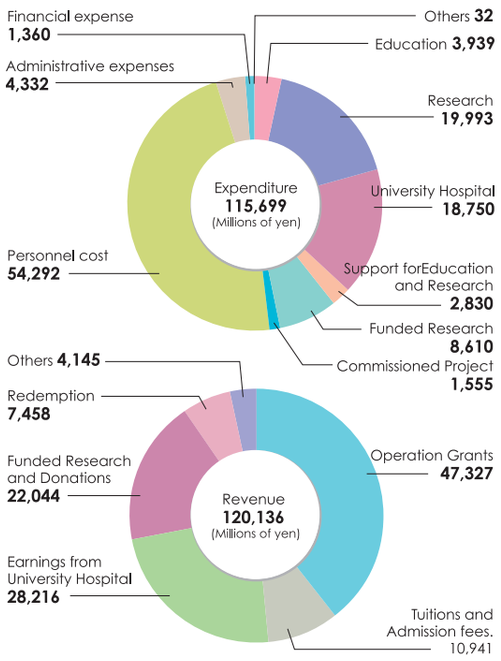
| Divisions | Achievements |
|---|---|
| Graduate School of Educational Informatics Research Division | Development of ICT experts using Internet School of Tohoku University. |
| Institute for Materials Research | Succeeded in realizing spin-motive force, a basis of the conversion of magnetic to electrical energy.<br>Succeeded in synthesis of a hydride with lithium fast-ion conductivity at room temperature.<br>Showing Electric-field-induced Superconductivity in an Insulator. |
| Institute of Development, Aging and Cancer | Explaining molecular mechanisms of regulating fate determination of germ cells that generate next generations.<br>Identification of MDL-1 as a novel osteoclastogenesis-promoting receptor. |
| Institute of Fluid Science | Professor Emeritus Kenichi Nanbu was awarded the Purple Ribbon Medal for his research on fluid science.<br>Prof. Seiji Samukawa received ICHIMURA Academic Award for developing low damage and highly precise processing by Pulse-Time-Modulated Plasma. |
| Research Institute of Electrical Communication | Prof. Masataka Nakazawa received the Prime Minister Prize, the 7th Award for Persons of Merit in Industry-Academia-Government Collaboration.<br>Prof. Kazuo Tsubouchi received the Minister of Education, Culture, Sports, Science and Technology Prize, the 5th Award for Persons of Merit in Industry-Academia-Government Collaboration.<br>Prof. Norio Shiratori received 2009 Prize for Science and Technology (Research Category), the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology. |
| Institute of Multidisciplinary Research for Advanced Materials | Development of a soft-X-ray microscope enabling one shot imaging of cell activities.<br>Application of a new shape memory alloy Cu-Al-Mn for medical devices.<br>Associate Prof. Akira Yoshikawa received The 22th High Technology Award and German Innovation Award 2008.<br>Application of organic-inorganic hybridized nano-crystals array for photonics. |
| Center for Northeast Asian Studies | An exhibition of Ethnography of Siberian Nomads: Reindeer! Reindeer!! Reindeer!!! Lifestyle in the Coldest Place on Earth |
| Center for the Advancement of Higher Education | Development of the Digital Course Wear (DCW) system to release the whole lecture information.<br>Symposium commemorated the University's 60th anniversary of the introduction of a new system: Bringing up of the 21st century citizen and its Liberal Arts Education, |
| The Center for Academic Resources and Archives | "The Story of Tohoku University Treasures" was published in collaboration with Tohoku University Library and others. |
| International Advanced Research and Education Organization | Development of talented young researchers on interdisciplinary studies by selecting Doctoral and Master's course students and employing Research Fellows. |
| Cyclotron and Radioisotope Center | Completed a prototype device for PET with high-speed and high-energy resolution to diagnose breast cancer.<br>Carried out clinical applications of our original [$^{18}$F]Fact, [$^{11}$C]BF-227, medication for early diagnosis of Alzheimer's disease.<br>Conducted an experiment for semiconductor laser irradiation with the world's top-level neutron beam intensity. |
| New Industry Creation Hatchery Center (NICHe) | Prof. Kazushi Yamanaka received the Prize for Science and Technology (Research Category) by the Minister of Education, Culture, Sports, Science and Technology. |
| Center for Interdisciplinary Research | Prof. Tetsuo Endoh has promoted a joint research on a Vertical Structured Device with Stanford University, which led a reciprocal department agreement with CIS of Stanford University. |
| Cyberscience Center | The Supercomputer SX-9 of Cyberscience Center achieves the world's fastest speed in 19 of 28 areas evaluated on the HPC Challenge Benchmark |
| Tohoku University Library | Special exhibition: Happy Arithmetic to commemorate the tercentennial anniversary of Takakazu Seki's demise.<br>Digitizing and posting 7,512 materials for Japanese mathematics on the library's website. |
| Tohoku University Hospital | Starting Tohoku Advanced Medical Specialist Career Path Support System as a part of University Hospitals Collaborative Project to Develop Advanced Medical Specialists by Ministry of Education, Culture, Sports, Science and Technology.<br>Establishment of Career Path Support Center.<br>Promotion of fundamental researches and clinical application by the Innovation of New Biomedical Engineering Center. (Designated as Super Clusters for Innovative Medical Treatment by the Cabinet Office.)<br>Concluded an Agreement on Infection Prevention Measures among Miyagi Prefecture, Tohoku University Graduate School of Medicine and Tohoku University Hospital.<br>Dispatched a Disaster Medical Assistance Team (D-MAT) to the 2008 Iwate-Miyagi Inland Earthquake.<br>Conference for community health.<br>Tohoku University Hospital Open Lecture.<br>Critical Care Center Open Lecture.<br>Lecture on cancer drug therapy, cancer pharmacist, and nurse training. |
| Institute of Liberal Arts and Sciences | Starting lectures and a reform of the liberal arts curriculum by 3 professors emeritus. |
| WPI Advanced Institute for Materials Research | Principal researcher Inoue and Prof. Miyazaki were awarded the American Institute of Physics Prize.<br>President Inoue received the James C. McGroddy Prize for New Materials, and the Oliver E. Buckley Condensed Matter Prize for Prof. Miyazaki.<br>WPI-AIMR Director Yoshinori Yamamoto was selected as a recipient of the 2009 Centenary Prize of Royal Society of Chemistry (RSC.) |

# Data and Overview of Tohoku University

## Number of Students (as of May 1,2009)

| | School enrollment | International students |
|---|---|---|
| Undergraduate students | 10,967 | 127 |
| Graduate students (Master's course, Professional Degree Program) | 4,224 | 366 |
| Graduate students (Doctoral Course) | 2,657 | 457 |
| Students at Affiliated Schools | 35 | 0 |
| Research students and other | 595 | 396 |
| Total | 18,478 | 1,346 |

## FY 2008 Financial Chart




## Number of Faculty and Staff Members (as of May 1,2009)

| | |
|---|---|
| President | 1 |
| Board of Directors | 7 |
| Auditors | 2 |
| Faculty Members | 2,846 |
| Professors | 833 |
| Associate Professors | 685 |
| Senior Assistant Professors | 148 |
| Assistant Professors | 1,067 |
| Research Assistant | 113 |
| Administrative/Technical staff | 2,900 |
| **Total** | **5,756** |

## Agreements on Academic Exchange (as of May, 2009)

| | |
|---|---|
| Agreements on the University Level 26countries/regions | 134 Institutions |
| Agreements on the Department Level 41countries/regions | 307 Institutions |

## Overseas Office (as of May, 2009)

| | | |
|---|---|---|
| Liaison offices | 9 countries | 13 centers |
| Overseas offices | 2 countries | 2 offices |

## Number of International Students (as of May 1,2009)

| | |
|---|---|
| 75 countries and regions | 1,346 |

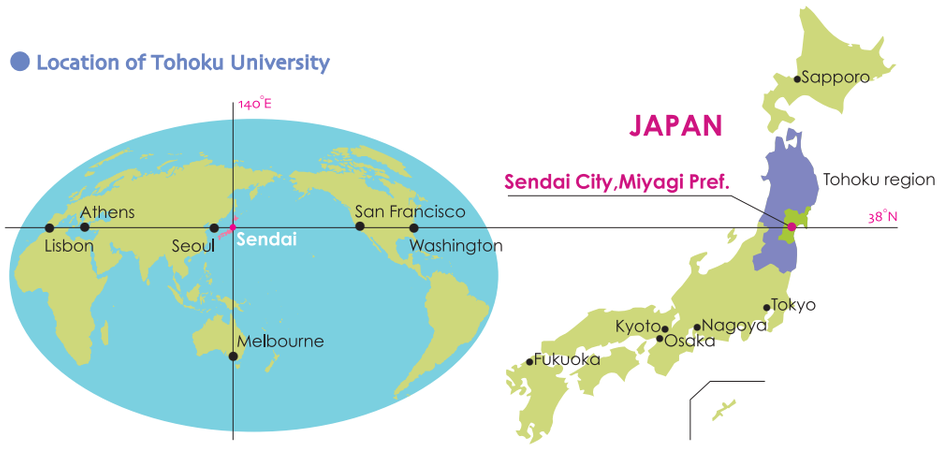
## Number of Exchange Students Based on Academic Agreements (FY 2008)

| | | |
|---|---|---|
| To Overseas | 9 countries | 27 |
| From Overseas | 14 countries | 153 |

## Endowed Chairs and Research Divisions (as of May 1, 2009)

| | |
|---|---|
| Endowed Chairs | 28 |
| Endowed Research Divisions | 18 |

## Location of Tohoku University

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