

# AIST REPORT 2016

Social and Environmental Report

*Full Research in Society, for Society*



## CHARTER

# *Full Research in Society, for Society*

## **National Institute of Advanced Industrial Science and Technology (AIST), An Independent Administrative Institution**

The common goal of humankind is to realize a society in which every person can enjoy a comfortable life. Science and technology can lead the way to such a society. The mission entrusted to AIST and its staff, as members of the scientific community, is to develop science and technology that complements society and the environment.

We, the staff members of AIST, recognize our mission and responsibility to society. We work towards the realization of such a society through research and development in industrial science and technology.

### ■ **Accurate Assessment of Social Trends**

We endeavor to ascertain social trends and needs at every level of society from local communities to the international stage, to identify key issues promptly, and to propose scientific and technological solutions in collaboration with other organizations.

### ■ **Creation of Knowledge and Technology**

We value each person's autonomy and creativity and display our collective strength through collaboration and synergy, creating new knowledge and innovative technology based on advanced research efforts.

### ■ **Application of Research Findings**

We contribute to Japan's industrial development by applying our research findings to academic pursuits, intellectual infrastructure development, technology transfer, and policy proposals. We endeavor to enhance and disseminate science and technology through human resources development and the open sharing of information.

### ■ **Responsible Conduct**

We are actively involved in improving our own abilities and our working environment in order to perform our duties more effectively. We respect both the letter and the spirit of the law and maintain a strict sense of ethics in all our affairs.

## Charter of the Environmental Safety

- We strive to promote research activities that contribute to the global environmental protection and the security of mankind and pursue our work to realize a safe and reliable society of high quality of life harmonious with the environment.
- In compliance with the applicable laws and regulations related to environmental protection, we establish the autonomous standards of the institute such as Safety Guideline, etc. and with this in mind, we shall endeavor to conserve environment and promote health and safety at all times.
- We promote the dissemination of information related to the environmental protection and make every effort to be in harmony with and coexist with the local community. Naturally, in case of disasters or emergencies, we take prompt and proper measures to deal with the situation.

Furthermore, in conformity with the 'principles of disclosure,' we shall endeavor to return the knowledge acquired and accumulated to society.

## Editorial Policy

The National Institute of Advanced Industrial Science and Technology (AIST) first published an environmental report in the fiscal year (FY) 2004. Since FY 2010, AIST has published the AIST Report, which is an environmental report combined with a report on its activities on corporate social responsibility (CSR).

AIST Report 2016 Social and Environmental Report describes its activities in society by reporting on roundtable talks with female researchers and administrators involved in management and research of high interest among the press releases of this year. It also reports its endeavors to link its scientific and technological outcomes effectively to businesses. Through these contents, we wish that the various stakeholders will understand AIST's activities, and that a deeper relationship of trust will be built between AIST and society.

Detailed data on environmental report-related activities at each research base are available on AIST's website.

### AIST's official website :

[http://www.aist.go.jp/index\\_en.html](http://www.aist.go.jp/index_en.html)

#### ◆ Activities covered by the report

Research activities at all AIST research bases

#### ◆ Period covered by the report

April 2015 to March 2016

#### ◆ Areas covered by the report

Key areas covered include organizational governance, human rights, labor practice, fair operating practice, community involvement, environmental report, occupational health and safety and open innovation activities.

#### ◆ Rounding of numbers

Numbers are rounded off to the specified whole number.

#### ◆ Referenced guidelines and other sources

- 2012 Environmental Report Guidelines, Ministry of the Environment
- Law Concerning the Promotion of Business Activities with Environmental Consideration by Specified Corporations, etc., by Facilitating Access to Environmental Information, and Other Measures
- Guidance on Information to be Provided in the Environmental Report (3rd Edition), Ministry of the Environment
- ISO 26000: 2010 Guidance on Social Responsibility, Japanese Version, Japanese Standards Association

#### ◆ Scheduled date of the next edition

September 2017 (Japanese edition)

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President  
National Institute of Advanced Industrial  
Science and Technology (AIST)

**Ryoji Chubachi**

Since the National Institute of Advanced Industrial Science and Technology (AIST) was established in 2001, the guiding principle of our activities has been “technology for society”; we have continued to pursue research offering solutions and new directions to various issues affecting society and industry in Japan. Since embarking on the Fourth Medium- to Long-term Plan (five years) in April 2015, we have promoted activities in order to make more direct contributions to society and industry in Japan, with “transfers of innovative technologies” and “goal-oriented basic research that leads to technology transfers” at the heart of our activities.

Japanese society is facing a range of problems. For industry, it has been observed that Japanese companies’ ability to generate innovations is weakening and that its international competitiveness is declining. These problems lead to difficulties with employment and wage growth in the country and to the decline of regional economies. People are increasingly worried about the future.

Meanwhile, many places of Japan continue to suffer the influence of earthquakes and typhoons; the need for warning systems and disaster prevention measures against these natural disasters is becoming more urgent. As the social infrastructure that was built up in the period of high economic growth from the 1950s to mid-1970s deteriorates, measures to counter this deterioration are another major issue that directly affects people’s lives.

The role played by science and technology in facing these economic and social problems is greater than before. Science and technology, by providing routes to solutions to the problems facing society, producing next innovations and creating next-generation industries, is the greatest driving force for continuing growth of Japan’s economy.

Under a special measures act that came into force in October 2016, AIST has become one of Japan’s designated national research and development institutes. The purpose of this designation is to promote the research and development of some central research institutes which can be expected to produce R&D outcomes at a world-leading level. Through this, the standards of science and technology in Japan are expected to be greatly improved, which will improve the quality of life for citizens and will contribute to economic development.

To meet these expectations, we will both continue with R&D and staff development at a world-leading level worthy of a designated national research and development institute and keep striving to return the fruits of our efforts to society. I look forward to AIST playing a role as the central body of a national system for cooperation between industry, academia and government with the goals of generating innovation and developing next-generation industries throughout the nation.

Particularly focusing on green technologies, life technologies, and information technologies, AIST has made progress seamless from fundamental and basic research in non-competitive areas, which are difficult for businesses to address, to technological developments that can be commercialized and industrialized in cooperation with business.

AIST spans many fields of research; we are actively promoting cooperation and collaborative activities with universities, other research institutes, and corporate R&D departments. For example, starting this year we are establishing Open Innovation Laboratories (OIL), which are AIST laboratories within the grounds of universities. We have already set up and begun activities

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# Meeting society and industry's expectations of a designated national research and development institute

—Producing innovation and creating next-generation industries—

at six universities, leveraging the research that those universities excel in and laying a direct path from basic research to applications research, testing and practical development.

Businesses are focused on future commercialization. We are establishing collaborative laboratories under the names of our business partners. So far we have set up and begun activities at four collaborative laboratories, proceeding with collaborative development in research fields that are particular to the needs of those businesses.

In addition, AIST's Fukushima Renewable Energy Institute and the Tokyo Waterfront Bio-IT Integrated Technology Base are positioned as world-class open innovation platforms, recruiting top-level researchers from Japan and abroad and providing an environment in which they can pursue their R&D in collaboration with AIST. At present, AIST has about 2300 full-time employees engaged in research. Together with visiting researchers from businesses, universities, and elsewhere, we have 8000 to 9000 researchers in total.

To energize and develop our staff, we adopted the cross-appointment system, inviting researchers from universities and businesses, and working to integrate the technologies of AIST with the technologies of academia and business. We also have been holding the AIST Innovation School, directed at postdocs and graduate students, to provide practical experience of research activities at AIST and business practices; we are nurturing and delivering research personnel who can immediately contribute to industry and society. To support financial resources for graduate students to continue the research they are interested in, we are running a research assistant system in which graduate students are employed as researchers in AIST, thus

supporting the development of future research personnel.

Another aspect of AIST's research activities is the seven regional research bases that we have around the country, each of which is focused on R&D addressing the characteristics and needs of its region and is engaged in activities to return the fruits of its research to local businesses. This year, we have opened the Fukui site and the Ishikawa site, which function as branches of the regional bases, and we have set up a system to closely align our activities with the needs of each region. AIST will continue to collaborate closely with universities and public institutes in each region, concentrating on research that is focused on the region in order to invigorate the regional economy.

This report outlines our major research activities and our future research strategy. It also describes our efforts in many institutional matters: governance and welfare programs; staff training initiatives; support for a proper work-life balance; the promotion of diversity in aspects such as support for the participation of female staff and foreign researchers, and the employment of people with disabilities; strengthening compliance; environmental safety management; and the establishment of fair business practices such as reasonable procurement.

As a designated national research and development institute, for AIST to be understood by society and play a central role in the national system for innovation, we must earn the trust of society by making the fruits of our research activities useful to society, by showing social responsibility as a public body in all our business operations, and by ensuring transparency.

Through this report, we hope that you will understand our work and we look forward to receiving your continued support.



Inaugural  
round table  
for female staff

— Flourishing as individuals, not just as a gender —

# Diversity in AIST

**AIST is promoting gender equality and work-life balance. In this round table discussion, Shigeko Togashi, the board member responsible for implementation in AIST, and five female researchers and administrators involved in management discussed their day-to-day experiences and offered advice to younger colleagues.**

## AIST: a workplace that can properly use the abilities of diverse individuals

**Togashi:** These days, society is promoting workforce diversity and female participation. I want to hear about your experiences in the AIST work environment as female employees involved in management. In 2016, AIST has around 5600 permanent and contract employees, of whom about 35 % are women. In the five years to 2014, the proportion of new research staffs who were women was 16.7 %. We are aiming to get that to over 18 %. One reason it is difficult to raise the proportion of female research employees is that in Japan, few women go to science and technology universities. To increase the numbers of women seeking to become researchers, AIST intends to raise awareness of research as a worthwhile career. In administrative positions, there is no imbalance in the proportions of men and women recruited now, but only a small proportion of the women are of an age to be promoted to management. At the end of 2015, barely 5 % of managers were female. Questions for the future are how to improve working styles for men and women and how to nurture future leaders from the young generation. What are

your feelings about the differences between men and women working in AIST?

**Takatsu:** For a researcher, his/her gender is usually not even noticed. Even now that I have management responsibilities, it is understood as being simply a matter of age. When researchers get to a certain age, I think that they are not just absorbed in their own research but they understand that they need to work for their team.

**Urai:** Working in administration, I see no difference between men and women. There are still only a few women in management but the number seems to be steadily increasing. I think that regardless of gender, management is about considering how to properly assign personnel and being able to provide opportunities. What is important, therefore, is being ready to earnestly take any task on.

**Kobayashi:** I too think that AIST has created an environment in which you can actively participate whatever your gender. When I joined the organization, I was hearing that other research institutes did not employ women. I could not even get interviews in those days. But I never heard that about AIST. Since I joined, it has given me experience in a range of departments and opportunity for long-term training. I wanted to continue working if I got married and AIST is an ideal workplace for that.



**Yasukawa:** I am currently principal research manager at the Renewable Energy Research Center in Fukushima. I too have not experienced any particular problems with being a woman in AIST. While I understand that AIST is trying to increase the proportion of women in management, there is surely no need to promote women just because they are women. People have different aptitudes and some people can best use their abilities by concentrating on their research. While anyone should have the possibility of going into management, they should be free to choose not to.

**Togashi:** It's clear that AIST is trying to improve the proportion of women in management. Gender ratios vary between the different age groups of people working for AIST; so, it seems likely that the proportion of managers who are women will continue to rise. Whether someone is suited for management does not depend on their gender; much can be learned by experiences. Regardless of gender, diversity means encouraging people to challenge a range of duties, including management, and to build their capacities. Because AIST is a large organization, diverse research is possible. Therefore, I want to see people taking on a variety of roles.

**Work-life balance brought forth through personal planning and the understanding of colleagues**

**Togashi:** I have felt that AIST is a good workplace for either gender to work in since I first joined. I would particularly like to mention that in over 30 years I have seen hardly any women leave AIST for childbirth or child-rearing. How has it

been for all of you? Please tell me about matters such as the understanding of colleagues for pregnancy and childcare.

**Kobayashi:** I have two children. When I had the first, there was no maternity leave law and I returned to work eight weeks after giving birth. When I had the second, a maternity leave law had been established and I was able to take three months of maternity leave. I think the male staff have shown great understanding of childcare since those days.

**Urai:** For me too, there was no maternity leave system at the time. When I came back to work after the second birth, my husband was working in Tokyo, the children were going to different nurseries, and it was very hard to juggle work and childcare. I'm not really sure how I got through it. Even so, I was able to continue my work thanks to support from managers, colleagues and family.

**Takatsu:** For researchers, it seems quite easy to get time off for childcare in AIST, for both men and women. Because each person is basically working at their own pace, someone taking time off for childcare does not place much of a burden on other team members. People are often absent for long periods anyway, for business trips and study in other countries.

**Kobayashi:** Now AIST as a whole is advancing support for working women. There are also increasing numbers of men taking periods of special childcare leave and extended childcare leave.

**Azumi:** Many of our male colleagues have children. Even where their wives are fulltime homemakers, many of them are going home early. Greater numbers of male staff are not just "helping" with childcare but taking an active part in it.

**Togashi:** I'm delighted that AIST staff are showing a good understanding of childcare. Nonetheless, dealing both with

Profile



**Reiko Azumi**

Deputy Director  
Electronics and Photonics Research  
Institute (ESPRIT)

Specialist in materials chemistry and organic electronics. Worked for 10 years as a group leader in the Photonics Research Institute and ESPRIT. Appointed deputy director in April 2015. Chaired the AIST Charter Drafting Committee.

Profile



**Akiko Takatsu**

Deputy Director  
Research Institute for Material and  
Chemical Measurement

Engaged in developing reference materials for environmental and bio-clinical testing fields. Currently working both as deputy director of NMIJ and as group leader of the Biomedical Standards Group.

Profile



**Shigeko Togashi**

Vice-President  
Special responsibilities  
for promoting diversity and gender equality  
and for improving working practices

Joined the Geological Survey of Japan in 1978, specializing in geochemistry. Had a number of positions relating to geology, including research institute director. Later worked as principal reviewer in the Evaluation Department; appointed vice-president in 2014. Now working to promote diversity and gender equality in AIST.

work and with childcare or nursing care demands time management. I'm sure you are all busy, but how have you been able to maintain your work-life balance?

**Takatsu:** I prioritize my work. When time is limited, by means such as leaving the things that don't need to be done today till tomorrow and concentrating on the work that needs to be done now, I try to get home at a certain time. I have acquired this attitude to time management while child-rearing. I had to pick up my child; so, I had to finish up before that time.

**Azumi:** Anyone taking care of children must face up to what is required and take that attitude. When working on a job from day to day, it is a natural habit to finish up your work in a limited time. In my area of work, many people, both men and women, work late into the night but recently the number of people going home early has increased. Reasons for going home late include "I love my work" and "I have too much work" but there also used to be "I can't go early because other people will notice," but I think that this attitude is becoming less common.

## Messages to those who will carry AIST into the future

**Togashi:** You've all accumulated experience and developed effective ways to get on with your work. I am heartened that awareness of work-life balance is spreading throughout the workplace. I hope to see the young people who come after you boldly acquiring wide-ranging experience, taking on leadership positions, and tackling work of a larger scale. To finish, what advice do you have for the young people who

will carry AIST into the future?

**Urai:** You should do whatever you can in your department to the best of your ability. As long as you apply yourself earnestly, when you run into problems there will always be people there to help you and you will find answers. You should keep asking yourself "how can I myself contribute to the organization" and "where should I stand within the organization". When something comes up, having the judgment to tackle it firmly and determine how to deal with it is one of the most important things. On the other hand, sometimes you will come under severe pressure. At these times, you must not let it damage your mental or physical health; it is important to believe in yourself and sometimes brush aside what other people are saying. What this all means is that I think you have to grow a thick skin.

**Yasukawa:** In AIST, there are many people who have always been "honor students" and who cannot admit that they are having problems. But when things are difficult, it is better to just admit that and ask for help. Through your work, please try to make many acquaintances and colleagues with whom you feel comfortable. The higher your position becomes in the future, the more formal meetings you will need to attend, where there will be lots of strangers which will make you nervous. But if you find some close friends among them, you may feel at ease and things may go much easier.

**Togashi:** I too still seek advice from different people when I have problems, and I aim to be someone that other people come to for advice. Let's all work together to make AIST an organization that society can further rely on.

Profile



Satoko Urai

Director  
Tsukuba West General Affairs Division

Joined the Geological Survey of Japan. Worked in the Audit Office, the General Affairs Planning Office, and the Tsukuba East General Affairs Office. Appointed to current position in October 2015. Handles duties relating to all office matters, including health and safety, facilities management, supplies, general affairs, and support of research units.

Profile



Kasumi Yasukawa

Principal Research Manager  
Renewable Energy Research Center

Geothermal specialist. Researched geothermy at the Geological Survey of Japan for 26 years and moved to Fukushima Renewable Energy Institute (FREIA) in 2014 as principal research manager supervising six research teams.

Profile



Kyoko Kobayashi

Manager  
General Affairs Headquarters Accounting  
Division Treasury Operations Office

Joined the Electrotechnical Laboratory. Has worked for AIST in finance, HR, innovation promotion and unit support. As manager of the Treasury Operations Office, currently overseeing 19 staff handling tasks relating to travel reimbursement, receipts and expenditures.

# Organizational Governance

Aiming to create a genuine and transparent organization based on the principle of developing a sustainable society.

## AIST Research Strategy for 2030

### Introduction

Since the establishment of AIST in 2001, we have conducted research to develop Japan's industrial technology and enhance its innovation, with the slogan "bring technology to society." During the 4th medium-to long-term goal period (FY 2015 to 2019), AIST is promoting research and development focusing on "bridge-building between technology and industries," and "goal-oriented basic research for bridge-building."

In recent years, scientific technology has advanced and the trends of industries and society have changed with remarkable speed. In 10 to 15 years from now, scientific technology will have deepened and will have become more complex, creating new academic fields that will surely resonate and integrate with industries and society to build a new world. Therefore, by focusing on the vision of industries and society in 2030, AIST formulated the "AIST Research Strategy for 2030" and released it to the press on June 28, 2016.

### Research Strategy

The research strategy includes the following four new industries and societies (goals). By using the technological seeds and research and development potential that AIST has fostered, we aim to advance research and development and lead innovations in scientific technology so as to realize our goals. With the creation of next-generation industries in mind, AIST will work to create new industries, aiming to overcome Japan's declining population and aging society as well as global warming and infectious disease problems. We also aim to ensure the security of our information society in the Internet of Things era and to develop safe and secure industries and society.

### Four goals and efforts (excerpt)

#### 1. Super-smart industries and society based on the creation of new values through information and data

The rapid development and popularization of information and communications technology has enabled us to collect large amounts of information and data and to thus create new knowledge and values. Developing technology that highly integrates cyber and physical spaces will free people from simple tasks to create a super-smart society (Society 5.0) in which all individuals can live a rich life.

<Main topics of research in this strategy>

- Technology of human augmentation that will enable perception and control in cyber-physical systems (integration of cyber and physical spaces)
- Hardware for innovative artificial intelligence, and the evolution of systems that use the hardware
- Security technology to enhance data distribution in a super-smart society
- Information input-output devices and efficient networks for a super information-connected society
- Next-generation manufacturing systems for mass customization
- Innovative measurement technology for digital manufacturing

#### 2. Sustainable industries and society based on low carbon and resource circulation

We will proceed with the introduction of renewable energy to create a society independent of fossil fuels and to help reduce Japan's greenhouse gas emissions by 80% by 2050. In addition, we will build an environmentally friendly society by not depending on scarce resources but developing new functional materials comprising common elements and create more efficient recycling technologies.

<Main topics of research in this strategy>

- Appropriate popularization and expansion of renewable energy
- Development of unused energy
- Energy conservation and storage technology to create a smart energy society

- Realization of a hydrogen society
- Promotion of resource development and recycling compatible with environmental preservation
- New material and new chemical process technology for environmental harmony

### 3. Industries and society where people understand, control, and use the nature of matter and life

It is becoming possible not only to elucidate the mechanisms of matter and life but also to design and control them. We will advance this technology to develop technologies to create novel highly functional materials, devices, physiologically active substances, cells, and plants and animals, which will serve as a driving force to establish new industries and a healthy and long-living society.

<Main topics of research in this strategy>

- Ultraprecise measurement technology to detect a single electron, photon, or atom
- Development of new functional materials by computational design
- High-value-added materials that actively respond to environmental changes
- Devices with new principles and functions by atomic and molecular control
- Development of innovative manufacturing technology by biodesign
- Elucidation of bodily mechanisms to enable efficient drug discovery and personalized medicine
- Visualization of health data with biological devices

### 4. Safe and secure industries and society based on scientific technology

We need comprehensive scientific and technological capabilities to obviate various risks, to reduce the damage from disasters and environmental changes, and to recover early. We will help to build a safe and secure social infrastructure by predicting and reducing huge natural disasters, ensuring a stable supply of resources, and reducing the impacts of industries on the environment and health.

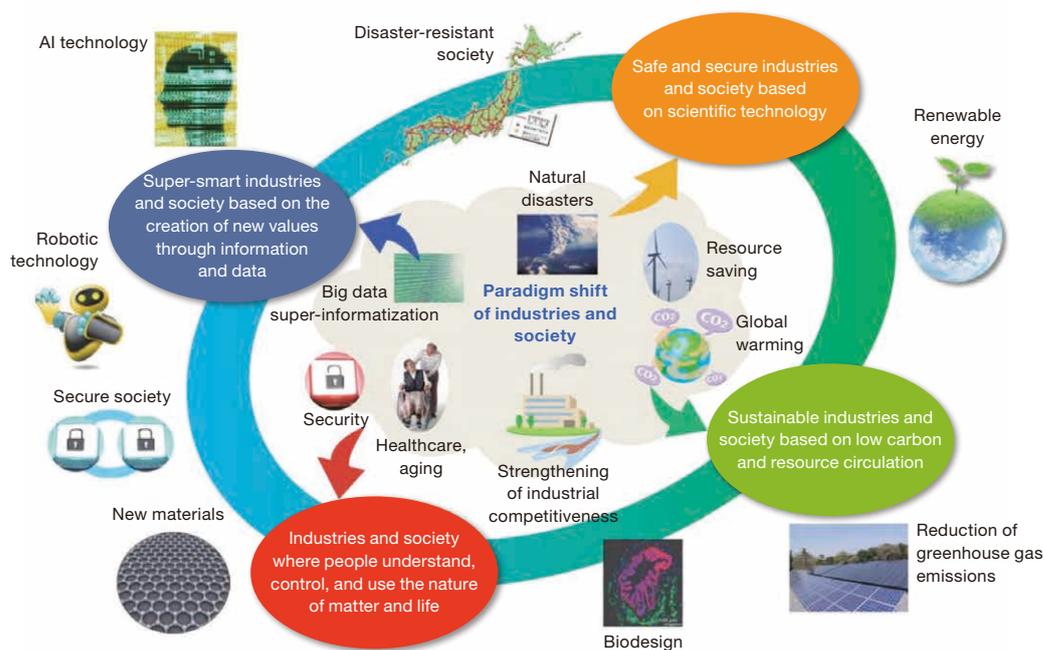
<Main topics of research in this strategy>

- Assessment and reduction of natural disaster risk
- Innovative measurement technology to create a safe, secure, and clean society
- Visualization of geological information
- New materials and systems for a stable supply of food and water

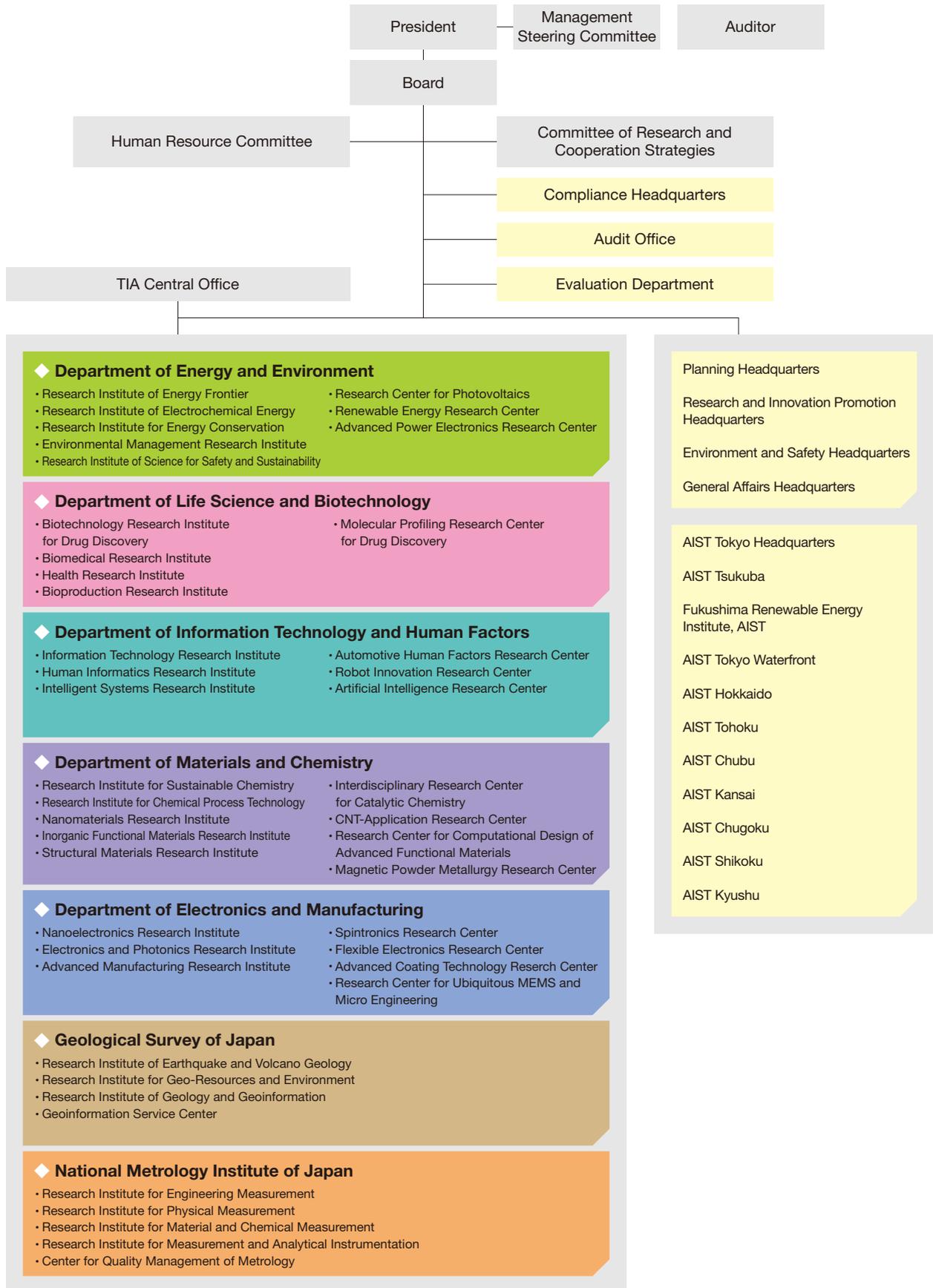
### Conclusion

AIST research strategy describes a future vision for 2030 that is based on current values. However, social structure and the scientific technology needed will further change in 2050. In addition, the values of the new technologies, products, and services that will be created in future may differ greatly from those of today. AIST will therefore continue to examine and update its research strategy through daily research activities, academic interactions between universities and research institutions, cooperation and collaboration with industries, and dialogue with society.

### ● Image of AIST research strategy for 2030

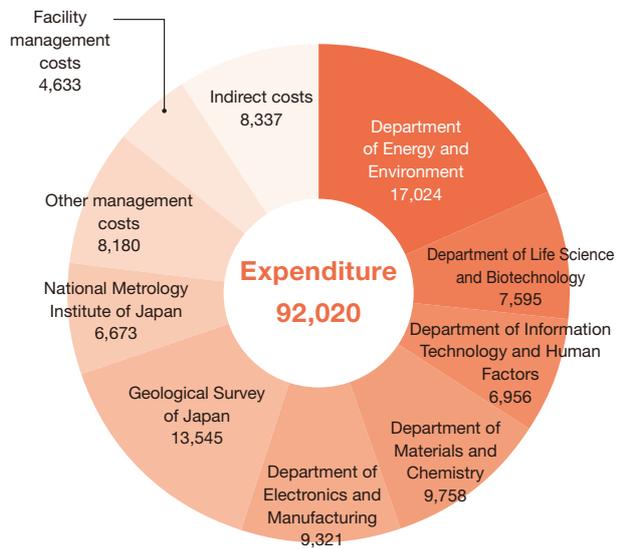
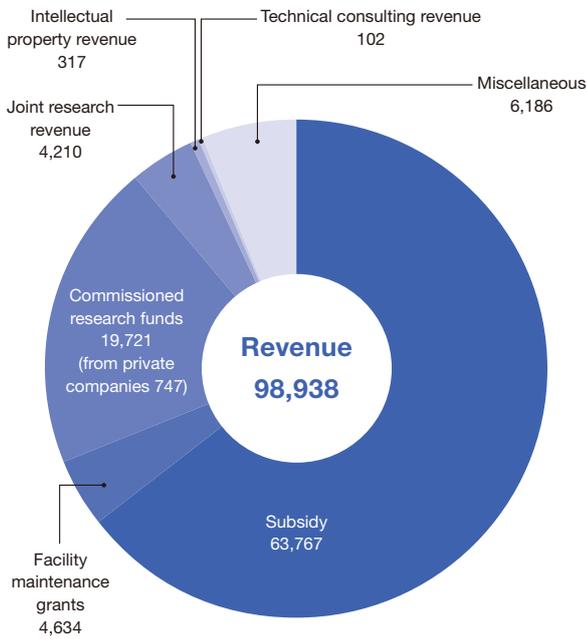


# AIST Organization Chart ( as of May 1, 2016 )

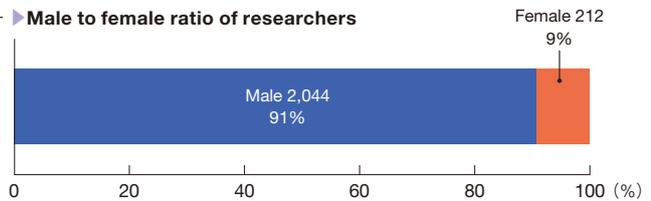
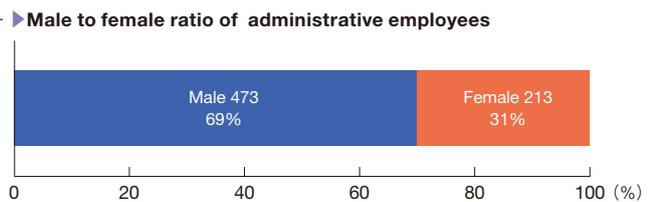
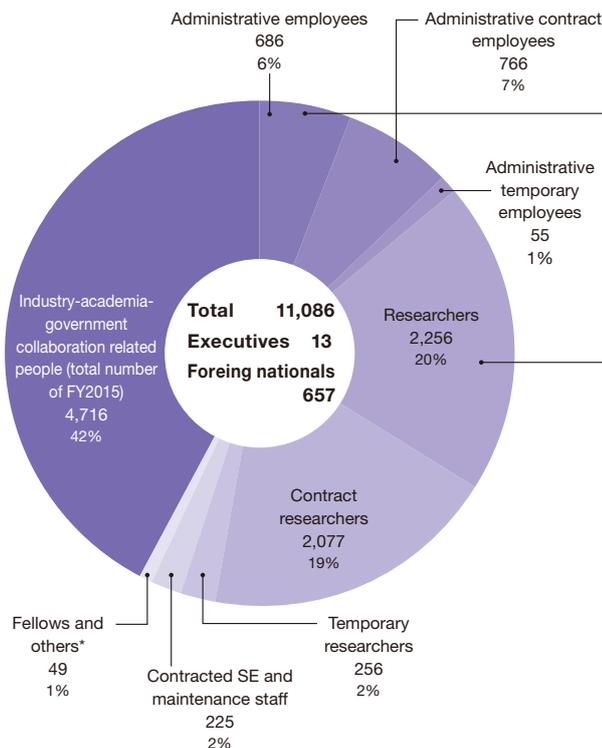


# Revenue and Expenditure

## Financial results for FY 2015 (unit : million yen)



## Staff (as of March 1, 2016)



\* Honorary AIST Fellow, Joint Appointed Fellow, Grand Emeritus Advisor, Special Emeritus Advisor, Research Emeritus Advisor, Research Emeritus Counselor

## Promotion of Compliance

The Compliance Headquarters conducts AIST compliance activities and addresses research misconduct.

### Compliance Activities

AIST conducted the following compliance activities:

- (1) We held weekly meetings at which the president gave instruction on appropriate response policies. We also held monthly liaison meetings with managing staff to share risk information collected from job sites.
- (2) Training was provided to new employees to help them understand the basics of compliance. Training was also provided to group leaders to enable them to review their knowledge of compliance and raise their awareness of management.
- (3) As part of the compliance promotion activities, to deepen employees' understanding of compliance, we produced a monthly educational document, the "Compliance Newsletter (Compla-Dayori)," based on familiar cases. We issued 12 in-house newsletters.

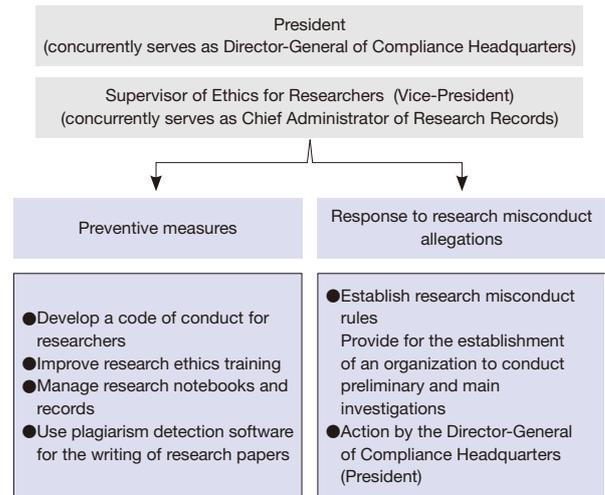
### Addressing research misconduct

- (1) When research misconduct was alleged, AIST

took strict action in accordance with the research misconduct rules and determined that there was no misconduct.

- (2) To prevent research misconduct from occurring, AIST improved its research ethics training through e-learning and other means and introduced plagiarism detection software for the writing of research papers.

### Management of research misconduct at AIST



## Disclosure of Information and Protection of Personal Information

### Disclosure of information

To increase the transparency of AIST's activities and fulfill its accountability requirements, AIST proactively discloses information on its website and by other means in accordance with the Act on Access to Information Held by Independent Administrative Agencies (implemented on October 1, 2002).

### Protection of personal information

In accordance with the Act on the Protection of Personal Information Held by Independent Administrative Agencies, etc. (implemented on April 1, 2005), AIST established the Privacy Policy and the Rules on Protection of Personal Information of the AIST to protect the individual's rights and interests while ensuring that research and related activities at AIST are conducted properly and smoothly.

Each year, each manager and employee conducts a

self-inspection for personal information protection and information security to raise awareness of the proper management of information, including personal information, and of information security compliance.

### Information disclosure desk and personal information protection desk

A request for information disclosure in accordance with the Act on Access to Information Held by Independent Administrative Agencies and the Act on the Protection of Personal Information Held by Independent Administrative Agencies, etc. can be made through the desks and the website of AIST Tsukuba and other regional research bases. Each desk also provides help on the procedures for disclosure and personal information protection. Only requests for information disclosure can be made on the website.

●Year-to-year numbers of requests for disclosure of information and personal information

FY	Information disclosure	Personal information
2012	6	3
2013	6	0

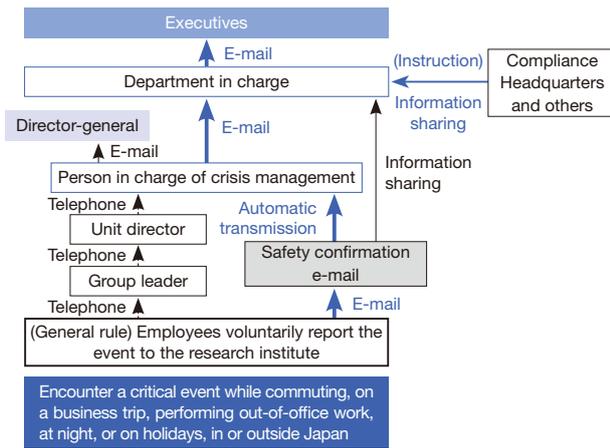
FY	Information disclosure	Personal information
2014	9	2
2015	4	1

Improving the information transmission system in case of critical events

Considering the Joso flood of September 2015 and the terrorist incident in France in November 2015, we improved our in-house information transmission system for rapid crisis responses in cases such as a terrorist act, a disaster (natural or manmade), or an emerging infectious disease outside AIST.

- We:
- introduced a system in which employees voluntarily report the event and the department in charge can manage it
  - made sure that information can rapidly reach AIST executives
  - allocated persons in charge of crisis management at regional centers and at each Tsukuba business facility
  - unified the e-mail address for safety confirmation reporting and disseminated it.

●Information transmission system in case of critical events



Internal Audit

At AIST, in collaboration with the auditor and the accounting auditor, the Audit Office, which is defined as an independent organization under the direct control of the president, monitors whether work is properly and efficiently performed and recommends improvements in work practice on the basis of the results of the monitoring. Its aim is to: (1) improve the effectiveness and efficiency of work; (2) comply with laws relating to research and related activities; (3) protect assets; and (4) ensure the reliability of financial reports. The purpose of an internal audit is not to identify work-related problems and bring up issues (i.e. problem-identifying) but to advise on the most effective improvements based on mutual understanding through a thorough discussion of any identified problems (i.e. problem-solving) and thus to support the audited departments.

whether working hours were being optimally managed in compliance with various regulations focusing on the variable working hours system\* that had been introduced a year previously at several bases as a theme focusing on individual businesses.

AIST continued to perform a comprehensive audit of the activities of each research unit in general since the previous fiscal year and confirmed that, overall, these activities were being properly conducted. AIST made suggestions and advised the audited departments to make improvements as soon as possible to the issues identified in terms of the compliance, effectiveness, and efficiency of activities. In addition, AIST conducted a follow-up audit of the status of the improvements suggested in the previous year's internal audit. Improvements are being made as appropriate.

In FY 2015, AIST conducted an audit to determine

●Collaboration in audit

	Internal audit	Auditor audit	Accounting auditor audit
Scope of audit	<ul style="list-style-type: none"> <li>○Operational audit</li> <li>○Accounting audit</li> <li>○Compliance audit</li> </ul>	<ul style="list-style-type: none"> <li>○Operational audit</li> <li>○Accounting audit</li> </ul>	<ul style="list-style-type: none"> <li>○Accounting audit</li> </ul>
Points of audit	<ul style="list-style-type: none"> <li>○Activities as a whole</li> <li>○Appropriateness of risk management and development and operation of an internal control system</li> <li>○Improvement of work process efficiency</li> </ul>	<ul style="list-style-type: none"> <li>○Activities as a whole</li> <li>○Decision-making by the president</li> <li>○Formation and operation of an internal control system</li> <li>○Appropriateness of financial statements</li> </ul>	<ul style="list-style-type: none"> <li>○Appropriateness of financial statements (Effectiveness of an internal control system)</li> </ul>

\* Since April 14, 2014, twenty-four-hour shift work has been implemented as a monthly variable working hour system. The initial two-shift system was switched to the three-shift system on November 1, 2014.

# Creating a New Picture and Video Experience: An Omnidirectional Display that can be Seen from Anywhere

There are many kinds of display in the world, with different shapes, sizes and systems, but they are all designed to be seen from the front and are very hard to see from some angles, depending on the positions of viewers. One solution to this problem with current displays is an omnidirectional display that AIST has developed.

## Viewable from any direction and unlimited in size: Useful for a wide range of applications

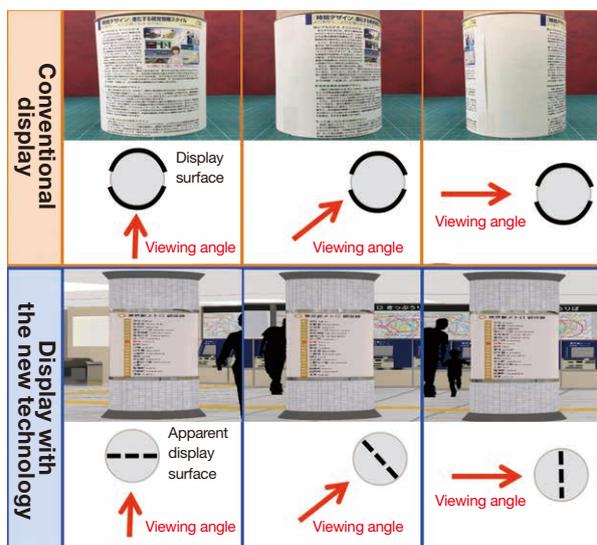
As the Japanese population ages and more visitors come from overseas, there is a rapidly growing need for easy-to-view displays that can show large text, multiple languages and the like. It is now common to see displays on streets and in trains, which are known as digital signage, and giant wall displays showing video images in commercial districts.

Technologically, these displays are fundamentally designed to be seen from the front; they have the structure of a single flat screen, a curved screen that is simply a flat screen in a curved shape, or a display unit combining a number of these screens. As a result, there are angles from which it is difficult to see a screen, depending on where and how viewers are positioned. A revolutionary solution to this problem—the omnidirectional display—has been created by a team working with Junji Ohyama in the Sensory and Perceptual Information Design Research Group at AIST’s Human Informatics Research Institute. The team has developed an original curved-screen display

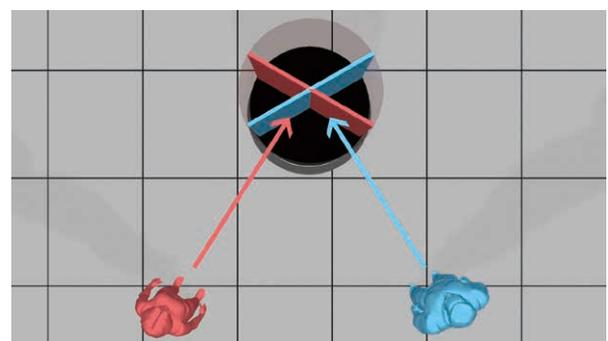
technology using a special lens architecture to create a display with an entirely new concept.

With this display, a screen that appears as if being viewed from the front can be seen from any position in a 360° viewing angle, even from behind or the sides. If this display is wrapped around the surface of a circular pillar in an underground hall, information can be displayed to always appear as if being viewed from directly in front; people passing by can see the same images from every direction. Therefore, many people can see the same screen from different angles at the same time, in addition to which they can make out the details of images without having to walk round in front of the display.

Another excellent feature of the new display is that there is almost no limit on the size of images that can be shown. Poster-size screens can be placed in public buildings such as stations and hospitals, and larger screens can be put on the exterior walls of buildings and used as video displays for showing sports events, concerts and the like. On the other hand, at the small scale, display units can be attached to implements such as pens and pencils and to other small objects that are kept about the person.



Differences in appearance between a conventional display method (above) and the newly developed display (below)



The display looks like screens installed inside the pillar, with the red person seeing the red screen and the blue person seeing the blue screen



If the new technology is used for the station maps, advertisements, etc. that are currently displayed in many stations, congestion within the stations may be reduced and advertising may be more effective

## The goal is practical implementation within two years

The Sensory and Perceptual Information Design Research Group has three hopes for the omnidirectional display.

One is that the information provision conditions in places where large numbers of people gather—department stores, public buildings such as airports, stations and hospitals, and so forth—can be greatly improved and that convenience for the public can be enhanced. It is currently common for people looking for information to have to walk around or stand reading for some time. This is not only inconvenient for the public but can lead to congestion and mishaps. In contrast, if the new display is used, because it can be seen from any direction, the movements of people can be made smoother and burdens on elderly people and the like can be reduced. Increase convenience for the public also leads to improved safety and lower levels of anxiety.

The second hope is for an improvement in the appeal of messages such as advertising. Because the display always appears as if seen from the front even when people are moving, the same effectiveness can be expected for many people at the same time. Moreover, because a single display can be seen from all directions, space for installing multiple displays can be saved and optimum effectiveness in limited timeframes can be achieved. When advertising boards and pillars are installed in front of stores, they may be continuously turned by a motor so as to be seen from many different directions. In contrast, if the new display is used, it is always seen face on from any direction; so, there is no need to use electric power to turn the display.

The third hope is for an improvement in satisfaction and sense of empathy for spectators. For example, when

a large display is currently provided for public viewing, the viewing experience is different depending on the positions of spectators' seats, which may result in dissatisfaction and a sense of unfairness. The same applies on a small scale when a family is watching television. In contrast, if the new display is used, while there are still differences depending on distance, there is no difference caused by viewing angle. Therefore, satisfaction and the empathy of for spectators may be improved.

As of now, we have nearly completed test models of displays for displaying still pictures and video images, and are preparing to show them to the public. The research team is planning for commercialization in collaboration with private enterprise, with an initial goal of putting still picture displays into practical use within two years. The development of video displays using the same technology is also in prospect. If we can succeed in development for still pictures and then for video displays, we can provide enjoyment to large numbers of people at sports contests and live events. For foreign visitors to Japan, it will be possible to offer them information that is easier to understand. The ambition of the team's vision continues to grow.

Researcher  
Sensory and Perceptual Information Design Research Group,  
Human Informatics Research Institute

**Junji Ohyama**

## Developing transistors as flexible as cloth: Towards practical wearable devices that fit well on a person's body

Wearable devices have been attracting increasing interest in recent years. They are starting to play a role in health management and medical care, by sensing and measuring conditions of a person's body, amounts of exercise and such, and communicating with smartphones and computers. AIST is working on the development of new transistors that will greatly influence the evolution of wearable devices.

### Realizing transistors that combine flexibility with toughness

Carbon nanotubes (CNT) are a nanomaterial of tubular molecules formed of carbon, with diameters of 0.4 to 50 nm and lengths of one to tens of micrometers. They have excellent characteristics, including high conductivity. Efforts are gathering momentum to make use of them, particularly in electronic devices.

CNT can be divided into single-walled CNT, formed of a single layer of atoms, and multi-walled CNT, formed of two, three or more layers; these have different characteristics. Single-walled CNT have extremely high conductivity and mass production is greatly desired. In 2004, AIST's CNT-Application Research Center was successful in developing the world's first single-walled CNT mass production technology: the super-growth method.

In developing the super-growth method, AIST made a leap forward in the development of real-world applications for single-walled CNT. In August 2015, AIST announced the development of transistors that are flexible as cloth and bend and stretch like rubber.

Transistors control flows of electric current. They are important electronic components, widely used not only in household devices such as computers and refrigerators but also in trains, electric cars and so forth. Electronic components that are capable of flexing and stretching

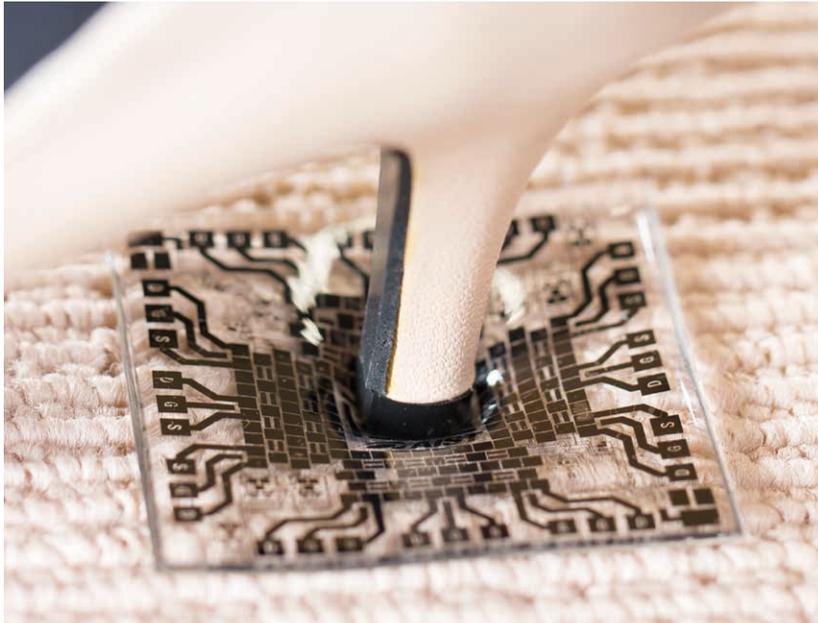
have been developed before, but they used traditional stiff materials such as metals and oxides and required the use of techniques such as pleating a substrate to enable flexing and stretching. In contrast, the greatest attribute of the transistors that AIST has developed is that they are made using flexible materials: single-walled CNT, rubber and gel. They do not use any stiff materials at all. As a result, the whole transistor deforms as a unit and can withstand tension, flexing and stretching, pressure, and impacts. Performance does not deteriorate even if the transistor is run over by a car or stepped on by a high heel.

### Making use of the single-walled CNT brought to mass production by AIST

The dimensions of a single one of the transistors that we have developed are about 1 mm on each side; the electrodes, wiring, etc. are sealed in a silicone rubber block no more than 1 mm thick. Single-walled CNT produced by the super-growth method are mixed into fluorocarbon rubber and applied to the electrodes and wiring to raise conductivity. Previous conductive compound materials have been produced by adding a conductive material to a rubber, but when the added amount is large, the elasticity characterizing the rubber is lost. Therefore, there has been a need for materials that provide high conductivity with small addition amounts.



Made completely of materials that can be flexed and stretched, including electrode insulation layers and the substrate



The new transistor being stepped on by a high heel. Because the entire transistor deforms as a single body, performance does not deteriorate even though strong pressure is applied

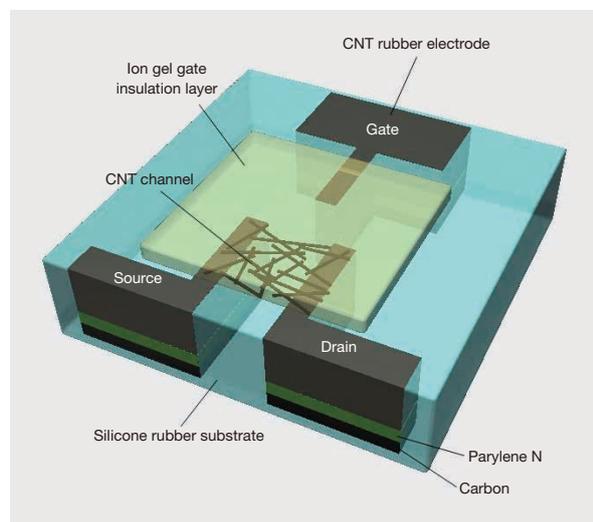
A characteristic of the single-walled CNT produced by the super-growth method is that they can provide high conductivity when added to rubber in very small amounts. Making use of this characteristic, we were able to achieve both high conductivity and elasticity. There are further advantages in that surface areas and production volumes can be increased with ease.

We have confirmed that the transistor's characteristics are equivalent to previous flexible transistors that used CNT for the channel, with an on-state current when the transistor is operating of  $-50 \mu\text{A}$  and an on-off ratio in the order of  $10^4$ . The on-state current is an important characteristic when a transistor is being used as a switch. The on-off ratio is the ratio between current levels in the conducting state and the non-conducting state; the higher the on-off ratio, the better.

### Hopes for application in wearable devices about the body

The goal for the future is to create wearable devices by combining and integrating numbers of electronic components, including not just transistors but also flexible sensors and capacitors. When these transistors that combine flexibility with toughness are put into use, sturdy wearable devices that are little noticed by the wearer when worn can be produced. If integrated in clothing, health management devices that simply monitor heart rates, pulse irregularities and skin temperatures can be created. Moreover, because the transistors are completely sealed in rubber, they are highly water-resistant and will operate even if put in a washing machine accidentally. If these devices are incorporated into bedding, they can collect information on the body during sleep and can gather information necessary for medical treatment

without waking the sleeper. If these devices are attached to the surfaces of nursing care robots, it will become easy to check the health conditions of the elderly people and disabled people who are being cared for. In these and other applications, there are high hopes for devices that can be used about the body in daily life.



The architecture of the newly developed transistor. The electrodes, wiring, channel, and gate insulation layer are sealed in silicone rubber

Senior Researcher  
CNT Application Development Team  
CNT-Application Research Center

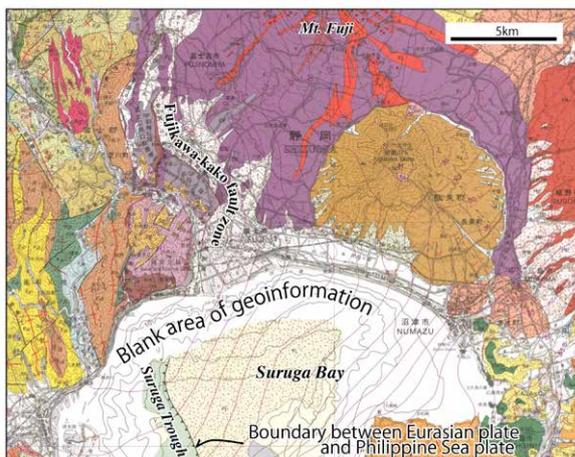
**Atsuko Sekiguchi**



# A Major Project: Filling in Blank Areas of Geoinformation

## Supporting preparation and planning for the northern coastal area of Suruga Bay, at the east end of the Nankai Trough

In the context of expectations of a megathrust earthquake centered on the Nankai Trough, we conducted a survey of the northern coastal area of Suruga Bay. We obtained important information for predicting the scale and timing of future earthquakes.



Geological map of Suruga Bay northern coastal area. The white area at the boundary between land and sea is an area for which sufficient geoinformation had not been obtained previously

### Geological surveys of coastal areas were urgently needed

Readers may recall that there were successive earthquakes in 2007 in the Noto Peninsula and off the coast of Niigata prefecture. These were both large earthquakes, above 6.0 magnitude, that damaged wide areas. What is much less well known is that a common feature of the two earthquakes is that their hypocenters were in blank areas of geoinformation.

Japan is a land of earthquakes, and we are making progress in collecting and providing geological information from many locations around the country and using this information in research to forecast the timing and scale of earthquakes. However, the progress of this research has been impeded because, due to technological limitations in previous surveys of geoinformation, insufficient geoinformation has been collected in coastal areas with relatively shallow water depths of 0 to 50 m. Given that the two earthquakes mentioned above had their centers in just such blank coastal areas, Japan has a great need to collect detailed geoinformation of coastal areas.

Most of Japan's cities are located in coastal plains; industrial infrastructure such as factory zones, power stations and airports is concentrated in areas near the coasts. Therefore, clarifying geoinformation for coastal

areas is very important for disaster prevention and reduction. In this context, AIST's Geological Survey of Japan conducted the Coastal Geological Survey Project from 2008 to 2013 in order to provide geoinformation about active faults and surface geology, particularly in coastal areas. For this project, we selected five coastal areas in Japan that have different characteristic geological structures and contain active faults: the northern coastal area of the Noto Peninsula, the coastal area of Niigata, the coastal area of Fukuoka, the southern coastal area of the Ishikari Lowland area, and the northern coastal area of Suruga Bay. We conducted successive surveys and published the results as "Seamless Geoinformation of Coastal Zone."

We surveyed the northern coastal area of Suruga Bay in 2013 and published the results in Seamless Geoinformation of Coastal Zone "northern coastal area of Suruga Bay" in July 2016. Suruga Bay is located at the east end of the Nankai Trough, which is the boundary between the Eurasian plate and the Philippine Sea plate. Through Suruga Bay to offshore of Shizuoka prefecture, the plate boundary is known as the Suruga Trough. The area extending north along the Fuji River from the north end of the Suruga Trough is known as the Fujikawa-kako fault zone. Active faults with the highest levels of activity in Japan are distributed through this area and part of the plate boundary is exposed on land. When a megaquake occurs in the Nankai Trough, it is likely that massive damage will be caused in neighboring regions, including the possibility of fault activity being triggered. The Fujikawa-kako fault zone is one of the areas for which the collection of geoinformation of coastal areas is considered urgent for disaster prevention and reduction plans.

### The discovery of active faults linked to the Suruga Trough

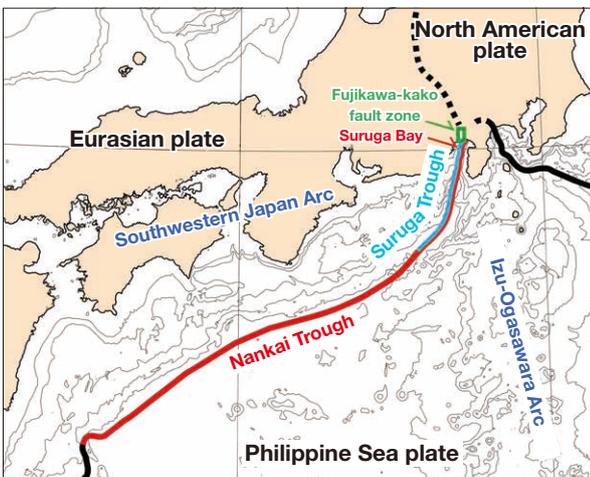
In the survey of the Suruga Bay coastal area, in order to ascertain both activity levels in the Fujikawa-kako fault zone on the land and connections between the Suruga Trough and the Fujikawa-kako fault zone, we surveyed active faults on the land, at the coast, and under the sea. We made a number of new discoveries, of which the

following two are most noteworthy.

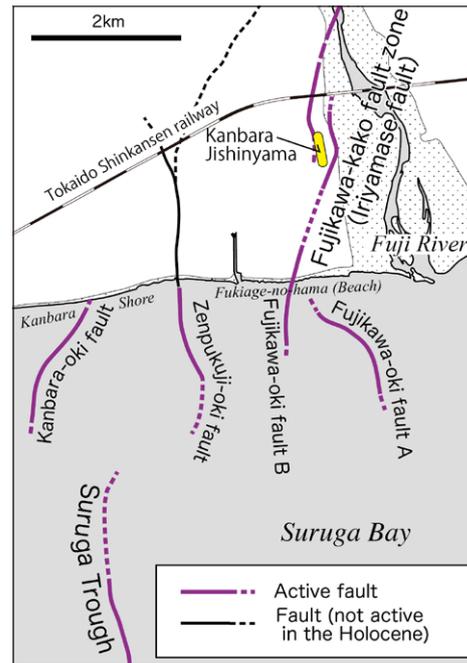
First, in the Fujikawa-kako fault zone, particularly high levels of activity were found in the Iriyamase fault and its surroundings. The Iriyamase fault slips by an average of 7 m per thousand years, which is thought to be the highest level of activity in Japan. However, the details of this fault were very poorly understood, because no traces of its movement could be identified at the surface. When we conducted this survey, in addition to an active fault in the coastal area that was already known about (Fujikawa-oki fault A), we discovered an active fault in the coastal area (Fujikawa-oki fault B) that directly connects with the Iriyamase fault. On the land, we found lots of information that will contribute to long-term assessments of the Fujikawa-kako fault zone, such as establishing whether it is true that the Iriyamase fault splits into two faults and passes each side of the Kanbara Jishinyama (earthquake mound), which was pushed up during the 1854 Tokai megaquake.

The second discovery was the “Zenpukuji fault,” in the land to the west side of the Iriyamase fault. Although we could not confirm whether the Zenpukuji fault itself is active, we did find that the Zenpukuji fault, which stretches to the south under the sea from the Zenpukuji fault, is an active fault. From the position and direction of this fault, we also concluded that it is very likely to connect directly to the Suruga Trough, and thus to the Nankai Trough.

From these survey results, we have learned that a number of active faults are developing in a parallel or echelon pattern in the coastal area at the north end of the Suruga Trough and that they continue to the north into the Fujikawa-kako fault zone. Having obtained this geoinformation about the Suruga Bay coastal area, which was previously a blank area, we hope it will be of great use in future disaster reduction planning.



Relative locations of Fujikawa-kako fault zone, Nankai Trough, and plates



Relative locations of Fujikawa-kako fault zone and Suruga Trough

## Starting surveys of coastal areas by cities on the Pacific coast of Japan

For the sake of preservation and management of the national land, disaster prevention, environmental conservation, and security of natural resources and energy, “providing fundamental geoinformation to be used as basic data of national land” is specified as a measure in the second-period Intellectual Basic Data Provision Policy published by the Ministry of Economy, Trade and Industry in 2013. Accordingly, in 2014 we started a new Coastal Geological Survey Project, scheduled to run for ten years. The goal of this project is to provide accurate and precise geoinformation about distributions of faults, subsurface geology, and surface geology for the coastal areas of three major urban areas (the Kanto Plain southern coastal area, the Ise Bay coastal area and the Osaka Bay coastal area).

The Geological Survey of Japan is starting this project with surveys to fill in blank areas of geoinformation, at the same time submitting data that can clarify how these areas connect up with sea areas. The results will contribute to improvements in forecast accuracy—including forecasts of the scale and timing of earthquakes and the scale of resulting damage—and will aid municipal governments and businesses in disaster prevention and disaster reduction planning, evacuation planning, urban planning and so forth.

Chief Senior Researcher  
Geoinformatics Research Group,  
Research Institute of Geology and Geoinformation

**Masanori Ozaki**



# Promotion of Research and Development

AIST promotes research activities “in society, for society,” with the roles of industrial science and technology in mind.

## Establishing the Ishikawa and Fukui Sites

In April 2016, AIST established two new collaboration bases in Ishikawa Prefecture and Fukui Prefecture: the Ishikawa Site located in the Industrial Research Institute of Ishikawa and the Fukui Site in the Industrial Technology Center of Fukui Prefecture. These are the first sites established by AIST along the Sea of Japan coast to promote collaborative activities among industry, academia, government, and financial institutions in a prefectural framework.

In accordance with the government’s “Comprehensive Strategy for the Creation of Towns, People, and Work,” AIST established these sites to increase its support for many innovative small and medium size enterprises (SMEs) located in both prefectures and to thus contribute to regional development. To attain this purpose AIST in its entirety has to be deeply involved in the activities of the Ishikawa Site and the Fukui Site, although they are branch offices of AIST Chubu and AIST Kansai, respectively. Therefore, Innovation Coordinators (ICs) and other staff members from not only AIST Chubu and AIST Kansai, but also Research and Innovation Promotion Headquarters, visit both sites to promote technology marketing focused on local SMEs.

In addition, five “AIST ICs” (i.e., staff or ex-staff of public research organizations who have been commissioned as ICs by AIST) at the Ishikawa Site and



Governor of Fukui Prefecture Mr. Issei Nishikawa and AIST President Dr. Ryoji Chubachi visiting the Technobridge® Fair in Fukui

six at the Fukui Site closely collaborate with AIST’s regular ICs. They select companies to visit and accompany the regular ICs on visits to the companies. Their collaboration has made it possible to introduce AIST and its technological seeds to more than 50 companies across the two sites by visiting the companies over 100 times in total. A trust relationship between AIST ICs and local companies, which has been built and enhanced through the long-term region-oriented efforts of AIST ICs, serves as a driving force at both sites.

In July 2016, the Technobridge® Fair was held at the Fukui International Activities Plaza to celebrate the opening of AIST Fukui; nine local companies were invited. The companies were keenly interested in the new technologies, and follow-up activities at the Fukui Site are developing the potential for new collaboration. In the same month, the Ishikawa Site, in collaboration with the Industrial Research Institute of Ishikawa, held the Ishikawa Innovation Promotion Seminar to celebrate the opening of AIST Ishikawa. Many of the attending companies showed great interest in AIST’s technological seeds. Activities to develop new collaborations, including the scheduled Technobridge® Fair, are in progress.



(Left to right) Governor of Ishikawa Prefecture Mr. Masanori Tanimoto, AIST President Dr. Ryoji Chubachi, and the then Director-General for Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade, and Industry, Mr. Koji Inoue, shaking hands at the unveiling ceremony at the Ishikawa Site

# Smart System Research Facility at the Fukushima Renewable Energy Institute, AIST( FREA )

The Smart System Research Facility at the Fukushima Renewable Energy Institute, AIST(FREA) officially started operations on April 1, 2016. On April 19, the opening ceremony, facility tour, and lecture were held in the presence of guests from the central government, municipalities, and industry.

The Smart System Research Facility enables researchers to test and assess smart dispersed-power-source systems and megawatt-scale power conditioning systems (PCSs) under various power systems and climatic conditions all over the world. We support R&D of leading-edge technologies such as dispersed-power-source systems and large-scale PCSs.

Through the operation of the Smart System Research Facility, all who are involved will further the introduction of renewable energies, promote the overseas operations of Japanese-made PCSs, and enhance collaboration with local companies to meet a variety of expectations.

## Research facilities and five test chambers at the Smart System Research Facility

### (Research facilities)

- System interconnection test facility  
Assesses whether the PCS functions properly and does not affect power quality.
- Safety test facility  
Assesses the risk of fire and electric shock due to air-temperature changes and thunderstorms.
- Electromagnetic environment test facility  
Assesses the impacts of electromagnetic waves generated by the PCS on peripheral equipment and the impacts of peripheral electromagnetic waves on the PCS.
- System performance test facility  
Assesses the performance of the system, namely the

integration of the dispersed-power-source system and the PCS.

### (Test chambers)

- System interconnection test chamber S  
This chamber room is used for system interconnection testing of PCSs ranging from several dozen kW to 1.5 MW.
- System interconnection test chamber M  
This test chamber and chamber L (mentioned below) are Japan's largest system interconnection test rooms and can hold 20-foot containers. It is used for system interconnection testing of PCSs of up to 1.5 MW.
- System interconnection test chamber L  
This very large test chamber is used for system interconnection testing of PCSs of up to 3 MW. Simulated distribution lines are available.
- Environmental test chamber  
This test chamber is a large constant-temperature and -humidity laboratory used for environmental tests such as temperature and humidity cycle tests for product use in desert areas, high-temperature and high-humidity areas, or extremely cold areas. The available temperature range is - 40 to + 80 °C, and the available relative humidity range is 30% to 90%.
- Anechoic chamber  
This chamber is used for electromagnetic compatibility testing of the power electronics and ICT equipment essential for smart systems. It is the largest anechoic chamber in Japan and has an area equivalent to that of about five tennis courts.



AIST President Dr. Ryoji Chubachi delivering the host opening address at the opening ceremony for the Smart System Research Facility



Guests cutting the ribbon at the opening ceremony



Electromagnetic wave anechoic chamber



Smart System Research Facility



System interconnection test chamber L



Constant-temperature and -humidity tank in the environmental test chamber

## Participation in Technology Research Associations

AIST has become a member of Technology Research Associations, the members of which provide researchers, research funds, and equipment and perform joint research and development of technologies used in industry. AIST contributes to the projects of these Associations by developing research plans, performing research, and using research outcomes.

Particularly by providing our people and place to the Associations, we aim to serve as a place for collaboration and creation where different organizations and people can meet and exchange knowledge through the Associations' projects. We thus aim to help promote open innovation.

AIST's "people" participate in the Associations' projects as researchers, project leaders or board members. We also provide our facilities and equipment as "places" for use by researchers from industries and universities participating in the Associations to intensively

carry out their research.

### ■ Participation in Technology Research Associations in FY 2015

- AIST participated in 22 Associations.
- Intensive research projects were performed at AIST (12 Associations marked with the letter "A" in the table).
- AIST's researchers served as project leaders and managed whole projects (6 Associations marked with the letter "B" in the table).
- AIST's managers served as directors (17 Associations marked with the letter "C" in the table).
- AIST provided technical guidance and support, as well as know-how of equipment use.

### ● Technology Research Associations of which AIST is a member (as of March 31, 2016)

Technology Research Association			
1	Photovoltaic Power Generation Technology Research Association (PVTEC)	A	C
2	Lithium Ion Battery Technology and Evaluation Center (LIBTEC)	A	C
3	Fuel Cell Cutting-Edge Research Center Technology Research Association (FC-Cubic TRA)	A	C
4	Technology Research Association for Single Wall Carbon Nanotubes (TASC)	A	B C
5	Epigenomics Technology Research Association (EPIRA)		
6	International Standard Innovation Technology Research Association (IS-INOTEK)		C
7	Stem Cell Evaluation Technology Research Association (SCA)		C
8	Photonics Electronics Technology Research Association (PETRA)	A	C
9	Chemical Materials Evaluation and Research Base (CEREBA)	A	C
10	Japan Advanced Printed Electronics Technology Research Association (JAPER)	A	C
11	Technology Research Association for Next Generation Natural Products Chemistry	A	B C
12	NMEMS Technology Research Organization Technology Research Association	A	C
13	Control System Security Center (CSSC)		C
14	Minimal Fab Development Association	A	B C
15	Technology Research Association of Highly Efficient Gene Design (TRAHED)	A	
16	Technology Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM)	A	B C
17	International Research Institute for Nuclear Decommissioning (IRID)		C
18	Manufacturing Technology Research Association of Biologics (MAB)		
19	Thermal Management Materials and Technology Research Association (TherMAT)		B C
20	Innovative Structural Materials Association (ISMA)		
21	The Research Association of Automotive Internal Combustion Engines (AICE)		
22	Technology Research Association for Future Additive Manufacturing (TRAFAM)		B C

# Providing Opportunities for Industry–Academia–Government Collaboration and Accepting Researchers

AIST supports R&D and product development of private companies by conducting joint research, commissioned research, and verification services as well as by providing technology consulting, technical advice services, and material samples for research. In addition, AIST explores potential technical applications in collaboration with companies and universities—for example, through the operation of AIST Consortiums—with the aim of developing new markets.

## Active invitation of external researchers

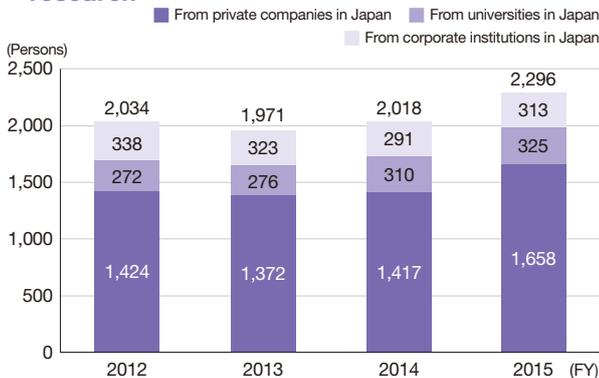
### Acceptance of external researchers for joint research Number of researchers accepted in FY 2015: 2,296

AIST invites researchers from our joint research partner institutions to conduct effective joint research through the use of our state-of-the-art facilities.

### Joint research involving transfer of human resources Number of researchers transferred to AIST under this program in FY 2015: 6

Under this joint research program, researchers from our joint research partner institutions are temporarily transferred to AIST. (The partner institution bears the cost equivalent to the amount of the personnel expenses in the form of research expenses.) Researchers from both our partner institutions and AIST can thus deepen their research collaboration and accelerate their R&D, taking full advantage of our research infrastructure and human resources.

### Acceptance of external researchers for joint research



## A platform for industry–academia–government collaboration

AIST recruits from, and collaborates with, various companies and organizations to operate thematic workshops or AIST Consortiums. As of July 1, 2016, there were 41 consortiums; they provide a platform for pairing corporate businesses and exchanging information.

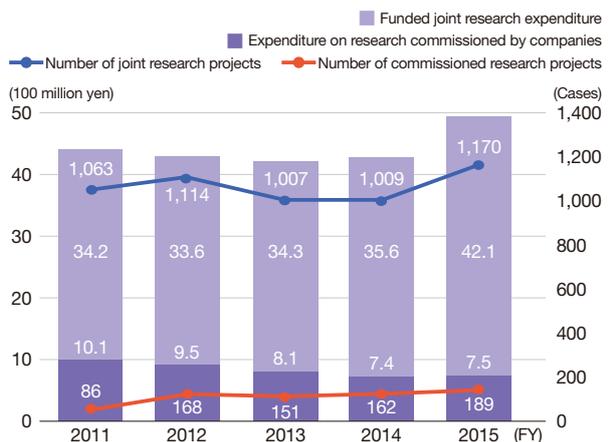
### (Examples of AIST Consortiums)

- **Artificial Intelligence (AI) Technology Consortium**  
This consortium promotes the creation of co-creative value by using AI technology and big data.
- **Fab System Research Consortium**  
This consortium aims to disseminate the use of a new semiconductor production system—namely a minimal fab system—that meets the need for high-mix, low-volume production.

## Joint and commissioned research conducted in past years

Our joint research is R&D projects between AIST and our cooperative partners—companies, universities, or public research institutions with common objectives and goals—with the aim of creating innovative results that cannot be achieved by individual research. Commissioned research is a type of R&D project conducted solely by AIST under contract with a company or other organization. Through this service, companies can use AIST’s research potential to offset their lack of necessary technology to proceed with their own R&D project. Technology consulting is a system by which AIST—a multidisciplinary group of professionals—provides solutions based on its cutting-edge research capability and abundant knowledge to overcome challenges that companies cannot solve by themselves. Eighty-four consultations were conducted in FY 2015 which is the year the project started.

### Joint and commissioned research with companies



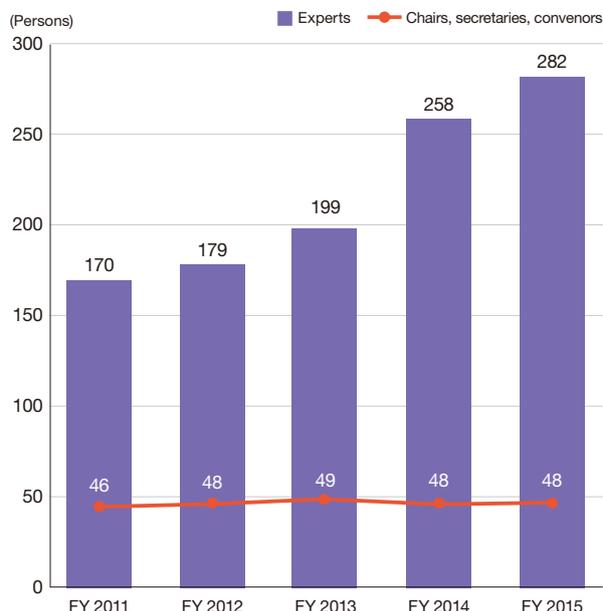
## Promotion of International Standardization

We promote standardization activities utilizing our R&D achievements. AIST staff have been playing a key role in the committees of international standards development organizations, such as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC): 48 employees serve as chairs, secretaries, or convenors, and 282 employees participate as experts.

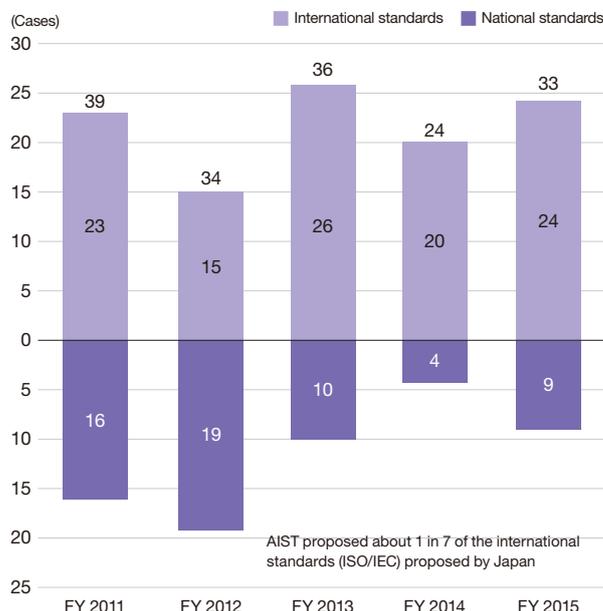
In FY 2015, we proposed 33 national or international standards, including those for information security and materials measuring methods.

From FY 2011, AIST holds the Symposium on Strategies for International Standardization every year to enhance standardization efforts by sharing the importance and issues of standardization and certification with relevant parties in industry, academia, and government sectors. In FY 2015, AIST and NEDO jointly held the symposium with the theme of “Aiming at Strategic Technology Development to advance Japan: integrated promotion of intellectual property utilization and standardization.”

### ● Contribution of AIST staff to international standardization activities



### ● Number of proposed standards



## Increase in Global Presence

AIST has increased its global presence through enhanced cooperation with overseas research institutions and inter-organizational exchange of personnel. As part of the enhancement of the cooperation, in October 2015, AIST and RIKEN co-hosted the 4th Global Summit of Research Institute Leaders. The purpose of this summit is to provide an opportunity for leaders from research institutions to meet and discuss the future of science and technology, the role of each research institution, and collaboration among research institutions. AIST's President Ryoji Chubachi was in attendance, along with representatives from 17 research institutions in 12 countries, and actively discussed “Cooperation and network building between research institutions and universities.”



The 4th Global Summit of Research Institute Leaders

# Building International Research Networks to Address Global Issues

AIST has concluded memorandum of understanding (MOU) on comprehensive research collaboration with 29 research institutions worldwide, and is engaged in the development of international research networks. In accordance with these MOUs, we aim to address global issues through joint research and personnel exchange with overseas research institutions. In June 2015, we held the 5th AIST-ITRI Joint Symposium. At this symposium, AIST and ITRI (Industrial Technology Research Institute, Taiwan) shared the view that steady progress has been made in research areas such as thermoelectric conversion

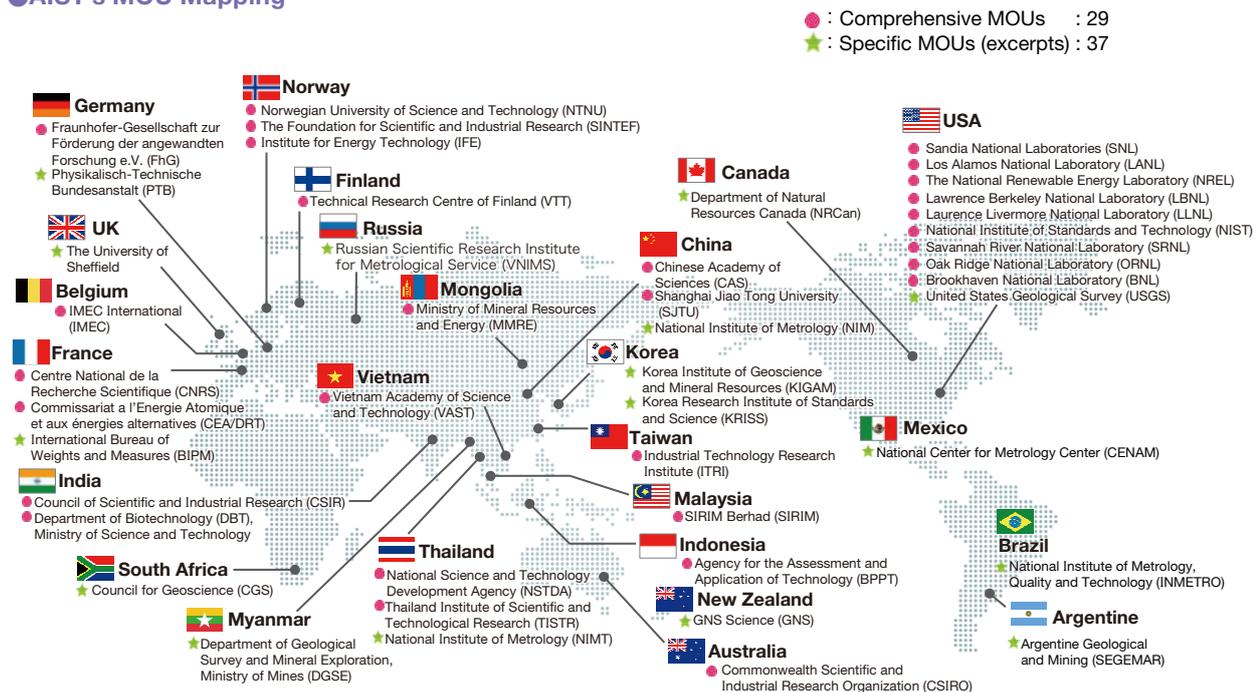
materials and solar power. We also discussed cooperation in other areas such as advanced manufacturing.

Additionally, in November 2015, we held a joint workshop with the Vietnam Academy of Science and Technology (VAST) in Hanoi. Here, research findings were presented on a water project (effluent and drinking water treatment technology), information and communications technology, and geological sciences. The workshop concluded with an agreement to continue proactive research collaboration.



Participants in the AIST-ITRI Joint Symposium (June 2015)

## ● AIST's MOU Mapping



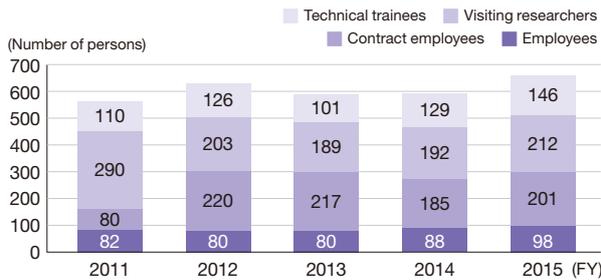
As of July 2016

## Accepting Foreign Researchers

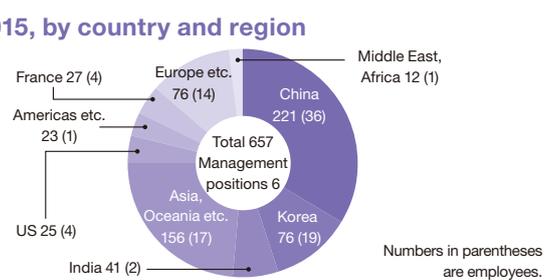
To enhance cooperation with overseas research institutions and to develop an international network of researchers, we actively accept researchers from universities and research institutions overseas. In FY 2015, a total of 657 foreign researchers were engaged in research at AIST.

In terms of regional statistics, 70% were from Asian countries, with those from Europe making up the second largest percentage of accepted researchers. We will continue to develop close collaboration with overseas research institutions through personnel exchange.

### Number of foreign researchers accepted



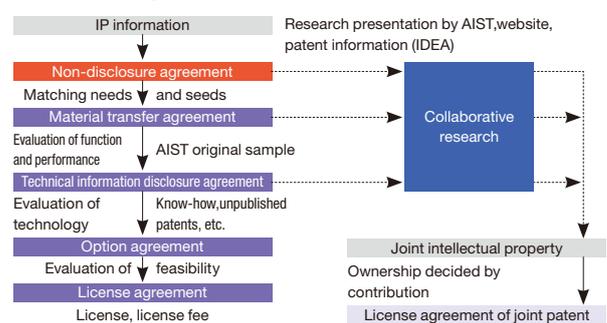
### Number of foreign researchers accepted in FY 2015, by country and region



## Technology Transfer Activities

It is AIST's mission to contribute to the development of the economy and industry by disseminating its research achievements in society. To achieve this mission, AIST develops a strategic approach to obtain intellectual property (IP) rights, and appropriately maintain and manage such IP rights so that the research achievements lead to technology transfer. In addition, AIST is strongly and powerfully promoting technology transfer centering on intellectual property.

### Technology transfer process



## Technical Advice Service

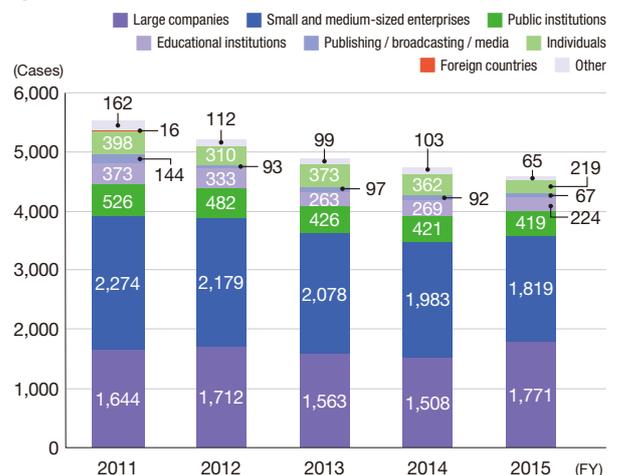
AIST welcomes technical questions and requests of joint research not only from companies but also from academia, media, and others. The general advice desk provides answers to received questions and requests by consulting appropriate scientists at AIST, such as technical advisers, innovation coordinators, and researchers.

### Example of technical advice service

**[Consultation request]** The client is a manufacturer of bathing equipment for nursing homes. They are aware of customers' demand to minimize the risk of drowning. The question is how to estimate the risks and to detect danger, or what improvements can be made to minimize the risks.

**[Actions taken and answers given]** AIST has a parametric simulation model of human body kinetics as an output of a project to measure the body sizes of a large number of Japanese subjects, and, based on the model, an expert provided the client a rough estimation of bathing postures using a variety of users' body figures and bathtub sizes. In addition, some hints on drowning detection and other design solutions were provided by another expert.

### Number of technical consultations



# Innovation School

AIST's Innovation School is working to broaden the horizons of young researchers and to raise their awareness using a specially developed curriculum. It aims to train them to be ready to contribute to innovation.

To address increasingly complicated social issues, we need to develop innovative technologies by combining the ideas and technologies of AIST and external organizations. For this we need personnel who can play a central role in collaboration. AIST actively accepts young researchers with PhDs, and master's and PhD students, and trains them so that they have scientific and technological knowledge in specific areas of expertise. They are given opportunities to develop communication and cooperation skills they need to work with experts in different fields from a broader perspective.

In FY 2015, we employed 15 postdoctoral researchers, and accepted 7 PhD students. We started a short-term program of 6 months for graduate students, and 15 students participated.

From FY 2016, to effectively fulfill the role of training and directing human resources for advanced industry, we intend to develop the Innovation School Program from a pilot project to a full human resource development project. This will further enhance AIST's function to bridge research and industry. We will try new activities inside and outside AIST, such as the expanded training course for basic skills including the short program mentioned above, while considering medium to long term visions for the program in a working group for researcher development.

## Expanding the vision and providing opportunities to young researchers

Students of the school say such things as "My research approach works in the company better than I thought it would," or "My successful completion of the corporate training program gave me a lot of confidence." They realize from experience that there are a variety of opportunities to work as researchers; to develop such insights as "The most important thing is the awareness that I work in an organization," or "You need to share a language with those with expertise in each area;" and to broaden their horizons. Companies that have accepted trainees say that "We gained valuable technological knowledge from the students," or "The students inspired those of our employees who were from the same generation." The companies rate the trainees' research capabilities and work attitudes highly.

Since the school started, 259 students have completed the postdoc course program and have discovered their new potential. They are working in a variety of areas in companies, universities, and public research institutions.

## Curriculum of the Innovation School

### ① Lectures and exercise at AIST

- Lectures on philosophy and management and on the activities of researchers in industry, academia, and government and of corporate executives
- Lectures and exercises on topics such as standardization and research, intellectual property and research, design thinking, risk assessment, and career development
- Lectures on a research approach of integrating and configuring component technologies based on research scenarios
- Exercise to improve skills in presenting research in ways that can be understood by people from different fields

### ② Research at AIST

- Working on research topics in laboratories
- Experiencing research covering the process from basic research to product development in a seamless way

### ③ On-the-job training with companies (about 3 months on average)

Students of the school are sent by AIST to companies to learn the following through experience:

- Importance of the procedures used to conduct research, the speed of technology development, and cost awareness
- Importance of teamwork and collaboration with other departments.



An Innovation School lecture

9th class report session of the Innovation School



## AIST Research Assistant Program

To develop human resources with world-class, high-level expertise and practical research ability that produce results leading to innovation, AIST provides the AIST Research Assistant Program to hire graduate students with high levels of ability. This program allows talented graduate students to focus on research for their degrees without financial difficulties. By participating in AIST's R&D activities which meet social needs, students can develop the ability to plan and conduct the advanced research,

which is crucial for R&D activities. In FY 2015, 29 graduate students in doctoral programs and 76 graduate students in master's programs engaged in R&D at AIST.

### Voices of research assistants

"This program allows graduate students to get their degrees without financial difficulties, which is why I decided to go to graduate school." (first-year master's program student)

"Research work at AIST requires work as a team more than at university, and this enhanced my sense of responsibility for research." (first-year doctoral program student)

### ● Employment requirements for AIST Research Assistants

(as of July 2016)

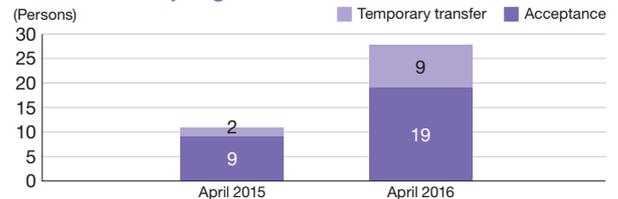
Candidate	Graduate students in PhD programs	Graduate students in master's programs
Requirements	Superb R&D and paper-writing abilities that contribute highly to the promotion of AIST R&D projects, and year-round independent execution of duties with staff guidance.	R&D and paper-writing abilities that help promote of AIST's R&D projects, and year-round independent execution of duties with staff guidance.
Days of employment	14 days/month	Avg. 7 days/month
Salary	1,900 yen/hour (approx. 200,000 yen/month for 14 working days)	1,500 yen/hour (approx. 80,000 yen/month for 7 working days)
Number of employed graduate students in FY 2015	29	76

## Cross-appointment Program

To create a cross-institutional research system, in November 2014 AIST established a cross-appointment program. This program allows a researcher to enter into employment contracts with two institutions or more, and he/she can work as a regular researcher for each of them. Interchange of researchers between AIST and the other institutions will increase mobility of human resources among academic, industrial, and governmental sectors. As a core institution for transfer of technology, AIST is expected to adopt superior technology seeds produced

by fundamental research by universities and to promote transfer of technology for practical application of research outcomes and creation of new industries.

### ● Number of program users



## Nanotech Career-up Alliance: a system for fostering new young research personnel

The Nanotech Career-up Alliance (Nanotech CUPAL) was established in FY 2014 on the basis of a science and technology personnel development cost-subsidy project called the "Science and Technology Personnel Development Consortium Building Project." To enhance career development and improve the mobility of nanotech researchers, Nanotech CUPAL uses the TIA Platform for open Innovation and Kyoto University's Nanotechnology Hub, or industry-academia-government resonance fields in the area of nanotechnology, to foster young researchers via the following two courses.

### ■ A professional course that leads to the creation of new knowledge: Nanotech Research Professional course

This course aims to help young researchers conduct collaborative research, as research principals, with researchers in allied fields to develop new fields of research.

### ■ A professional course that leads to the creation of innovation: Nanotech Innovation Professional course

This course aims to help young researchers achieve their career development goals by mastering various element technologies that will serve as a foundation of R&D and by receiving hands-on training.

## ● Nanotech Innovation Professional courses in FY 2015

AIST	MEMS course, TCAD practical training, SCR nano-device process course
National Institute for Materials Science (NIMS)	Advanced measurement technology course (electron microscopy, surface analysis, structural analysis)
High Energy Accelerator Research Organization (KEK)	Introductory course on Synchrotron radiation technologies introductory course. Advanced course on Synchrotron radiation technologies advanced course
University of Tsukuba	Radiation measurement practice course, High-performance nano fine fabrication practice course, Accelerator/ion beam analysis practice course, summer school, summer lectures
Kyoto University	Introductory/advanced courses on electron beam lithography, MEMS course

## Technical Training

AIST accepts researchers, engineers, and students from companies, universities, and public testing and research institutions for defined periods. This technical training program enables trainees to absorb leading technology under the instruction of AIST researchers. During FY 2015, we accepted 1,248 people into this program.

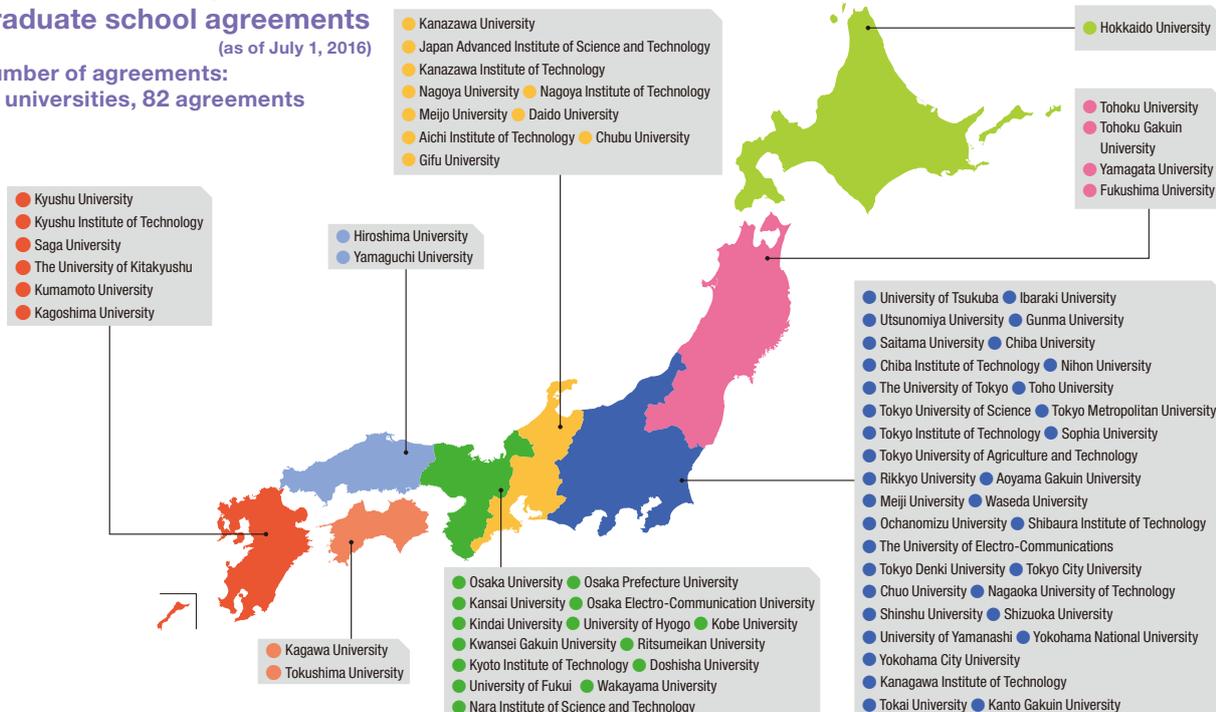
### ■ Collaboration with partner graduate school programs

Using the knowledge and experience gained at AIST, AIST researchers teach as guest professors at graduate schools that have cooperation agreements with AIST. AIST provides technical training to graduate students, and AIST researchers advise them on their research.

### Universities with partner graduate school agreements

(as of July 1, 2016)

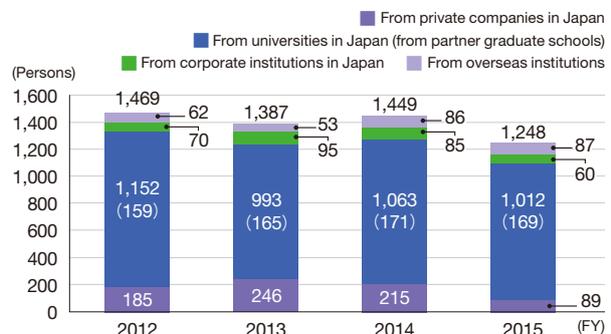
Number of agreements:  
73 universities, 82 agreements



### ■ Internship program

AIST provides short-term technical training, mainly to university students.

### ● Number of trainees for technical training



### Voices of trainees

"I as a learner was always able to conduct research because there were many experienced researchers and technical personnel around me."  
(trainee from a university)

"It was a fruitful experience to have lengthy discussions about earthquakes, volcanoes, and disaster prevention with many researchers."  
(trainee from an autonomous body)

# Labor Practices

We aim to ensure global and local environmental conservation and the safety and health of all AIST employees.

## Occupational Health and Safety

AIST has an Environmental Safety Charter in place to create a work environment in which all people working here can do so in a safe and healthy manner. AIST is also working to improve the health and safety of its employees as a top priority.

### Safety and Health Committee meetings and site meetings of AIST bases

A Safety and Health Committee meeting, which is attended by labor and management representatives, is held at each AIST research base every month to discuss health and safety issues.

At additional monthly meetings of the AIST bases and sites, representatives from each AIST department discuss the results of the discussions at the Safety and Health Committee meetings, along with other safety and health issues. The results of the meeting of the AIST bases are communicated to all employees through departmental meetings.

### Establishing safety guidelines

AIST has safety guidelines in place that set forth a code of conduct to ensure safety in handling hazardous chemicals and high-pressure gas containers and in performing experiments.

The guidelines provide the basis for employee safety education and for laboratory work and are revised once every year. Changes have been made to the guidelines: in FY 2015, specified chemical substances that were added in the revised Ordinance on Prevention of Hazards Due to Specified Chemical Substances (which took effect in November 2015) were incorporated into the appendix table of the guidelines. Moreover, on the basis of the Act on Rational Use and Proper Management of Fluorocarbons (which took effect in April 2015), compulsory inspection of equipment that uses chlorofluorocarbons as refrigerants was added to the guidelines.

### Emergency response management

We run disaster and fire-fighting drills so that we can take prompt action to minimize damage in the event of emergencies such as disasters or accidents.

To ensure a means of communication with the regional research bases in the event of a disaster, we also conduct communications drills by using a radiotelephone system for disaster management; this system has been installed at all of AIST's research bases. Moreover, in FY 2015, a safety confirmation system\* was installed to enable prompt confirmation of employee safety in the event of a disaster.

In FY 2015, using the Earthquake Early Warning reception system, all bases participated in an Earthquake Early Warning drill conducted by the Meteorological Agency on Tsunami Disaster Prevention Day, November 5, 2015. A disaster drill was also conducted at each AIST site.

To prepare for disasters such as earthquakes, we have a stockpile of food and emergency items and rescue supplies; we check, review, and replace them on a regular basis.

\*In the event of a disaster, the system can automatically send bulk safety-confirmation e-mails to employees; it automatically collects the results and shows them on the web.



Scene from a fire-fighting drill

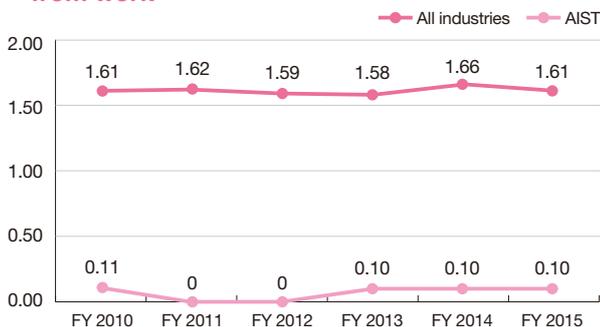
## Prevention of accidents

In the event of a work-related accident, investigations and analyses are conducted to determine the cause. The relevant work is put on hold until recurrence-prevention measures are taken, and information on the accident is communicated to all employees, etc. to prevent similar accidents.

AIST holds a Safety Management Report meeting every morning. At this meeting, AIST connects 13 research bases across the country through a teleconferencing system to exchange information on (1) accidents at the regional research bases, AIST Tsukuba, and other sites, and (2) near-miss incidents and health issues; the aim is to share details of recurrence-prevention measures and thus improve employee health and safety.

We kept the total number of accidents at AIST in FY 2015—as well as the number of accidents resulting in injury associated with laboratory work—at low levels. The number of chemical or gas accidents decreased from FY 2014 to FY 2015; this indicated the effectiveness of our safety education programs, such as the general safety workshop, which was made compulsory in FY 2014.

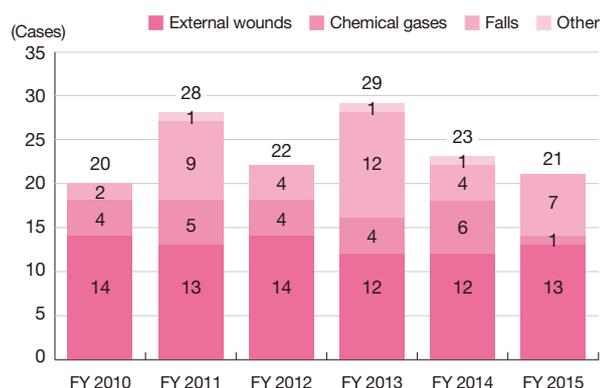
### ● Incidence of accidents resulting in absences from work\*



### \*Incidence of accidents resulting in absences from work

Indicates accident incidence expressed as the number of casualties from industrial accidents per one million cumulative work hours. Incidence of accidents resulting in absence from work = number of casualties from industrial accidents / number of cumulative work hours × 1,000,000.

### ● Number of accidents resulting in injury



## Safety education and support for license acquisition

AIST provides a variety of safety education programs and workshops for accident prevention to all levels of employees, including new employees and those accepted to work at AIST. A program of education and training for animal experiments teaches participants how to design an experimental plan and gives them the knowledge and attitude needed to conducting experiments; it is based on the 3Rs stipulated by law, namely Replacement (i.e., use alternative methods), Reduction (reduce the number of animals used), and Refinement (ease pain).

Safety education provided when employees are hired and when there is a change in work content is managed by an internal safety education management system, allowing participation history and program contents to be checked. To broaden learning opportunities, an e-learning system is used in parts of the safety education and the training for life science experiments.

In FY 2015, AIST held a general safety workshop on instructions for the use of hazardous chemicals and high-pressure gases and provided a lecture to all employees on accident prevention assuming large-scale disasters, which have recently occurred frequently. Moreover, AIST made it compulsory for those responsible for hazardous chemicals in quantities exceeding a given amount to obtain a Hazardous Materials Handler's license. In this way, we are committed to improving safety management in our laboratories. Also, we actively support employees in acquiring licenses. For example, we hold a course on the skills required for a Health Officer's License and a course on the skills required for a Chief Technician's License for Using Organic Solvents.

### ● Main education and training programs and workshops held in FY 2015

Program	No. of sessions held	No. of participants
Course on skills required for a Health Officer's license	2	56
Course on skills required for a Chief Technician's License for Using Organic Solvents	2	91
Course on skills required for a Chief Technician's License for Using Specified Chemical Substances	2	113
Course on the safe use of chemicals and high-pressure gases	4	147
General safety workshop (for all those responsible for hazardous chemicals and high-pressure gases, and other relevant persons)	4	561
Education and training for recombinant DNA experiments (e-learning participants)	1	862
Education and training for animal experiments (e-learning participants)	1	273
Education and training on human ethics	1	198
Education and training for biosafety	1	35
Education and training for those involved in animal experiments	1	88
Course on safe driving	14	1,507
Joint radiation education and training [for radiation workers]	3	265
X-ray education and training [for new users of X-ray equipment]	70	213
Course on compliance with laws and regulations on radioactive materials [for managers]	1	62

## Hiring Regional Employees by Open Recruitment at AIST

The work conducted by AIST's headquarters and operational organizations includes routine work such as purchasing, asset management, and employee benefit management which can be done more effectively by engaging highly experienced employees.

A skilled contractor and a temporary employee who have been working at AIST for a certain period of time can be candidates for employment by AIST under the fixed-term regional employment system (i.e. employing administrative staff who are not transferred from one region to another). AIST has hired 29 people as personnel in total, and these employees have been working at head office and in operational organizations. We receive dozens of applications every year, and 10 applicants were hired at AIST Tsukuba and Fukushima Renewable Energy Institute

in the fiscal year 2016. The employees can work for up to 2 to 3 years, however, they have a chance to be hired under the indefinite-term employment system based on evaluations of their work performance. Six employees have been rehired under the indefinite-term employment system in the fiscal year 2016. AIST will continue to hire fixed-term regional employees to support research and development, innovation, and other activities.

### Number of persons newly employed each year

Year	Number of persons employed
2012	2
2013	5
2014	5
2015	7
2016	10

## Support for Work-life Balance

### Support for compatibility between work and child-raising / nursing-care

AIST is working to develop a work environment that makes it possible to manage work and childcare or nursing-care responsibilities. The tables below show the numbers of employees who used the leave programs and child daycare services.

As a measure to support childcare, child daycare facilities where those who work at AIST can temporarily leave their children are available at three research bases (AIST Tsukuba, Chubu, and Kansai). Private childcare and babysitting services operating under contract with AIST are available for those who visit research bases with no childcare facilities, or major cities. Moreover, to improve the work environment for child-raising employees, a seminar by an outside expert was held in November 2015, on the topic of "communication between child-raising employees and ikuboss (supervisors)."

In support of nursing-care, in June 2015 we invited a lecturer from Tsukuba City Hall to provide information on managing work and nursing-care responsibilities and on nursing-care insurance. Many employees—particularly those wishing to prepare for the future—participated in the seminar. The results of the post-seminar questionnaire showed that the participants were satisfied with the seminar because they had gained sufficient knowledge of nursing care.

Information on childcare and nursing-care services is available on the Intranet sites "Childcare Square" and "Nursing-Care Square," which provide information on the relevant programs.

AIST has a flextime system and a discretionary-work

system in place to allow flexible work arrangements; 35% of employees use the flextime system and 53% of them use the discretionary-work system. These work systems are applied to many employees and support work-life balance, regardless of whether staff have childcare or nursing-care responsibilities. In FY 2015, we also tried and tested teleworking as part of the 4th Medium- to Long-Term Plan.



Seminar on work-life balance

### Numbers of people who used various leave programs (persons)

	FY 2013		FY 2014		FY 2015	
	Male	Female	Male	Female	Male	Female
Leave to care for sick children	86	167	101	178	116	185
Special childcare leave* leave*	27	11	28	13	43	11
Extended childcare leave*	0	35	1	26	3	33
Nursing-care leave	34	17	39	25	47	30
Extended nursing-care leave*	1	0	0	0	0	2

\*Number of employees who started their leave within the fiscal year

## Numbers of employees who used childcare services (totals)

	FY2013		FY2014		FY2015	
	Permanent employees	Contract employees	Permanent employees	Contract employees	Permanent employees	Contract employees
AIST Tsukuba	1,018	678	1,276	971	1,202	864
AIST Chubu	37	66	26	88	43	93
AIST Kansai	175	87	248	115	228	15
Private child daycare facilities and babysitters	20	3	32	0	13	0

## Action Plan to Support the Development of Next-Generation Human Resources

To meet the objectives of the 3rd Action Plan to Support the Development of Next-Generation Human Resources, AIST produced and distributed a leaflet outlining a project to popularize its childcare and nursing-care support program. In FY 2015 AIST also held briefings

on the childcare and nursing-care support program at AIST's research bases, including Fukushima Renewable Energy Institute, AIST Tsukuba, AIST Kansai, and AIST Chugoku. AIST was recognized as a "Childcare Support Organization" by the Minister of Health, Labour, and Welfare and was awarded the next-generation support certification logo Kurumin in 2014. We are using Kurumin, along with the symbol mark Tomonin, the purpose of which is to promote the development of a work environment that makes it possible to manage work and nursing-care responsibilities. The use of Tomonin is promoted by the Ministry of Health, Labour, and Welfare.



The Kurumin logo: We support childcare—a 2014 recognized organization.



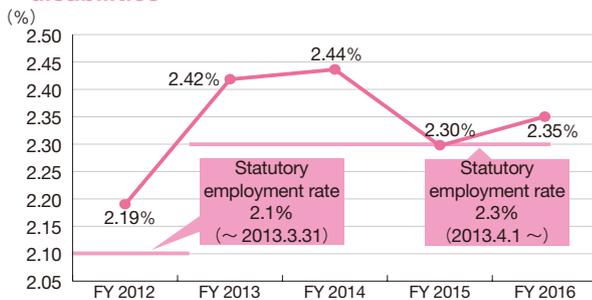
The Tomonin logo: Supporting the management of work and nursing-care responsibilities.

仕事と介護の両立支援

## Efforts to Hire People with Disabilities

AIST actively hires people with disabilities. In April 2013, the statutory employment rate for people with disabilities was increased to 2.3%. We hired people with disabilities at every opportunity and achieved the statutory employment rate. (The disability employment rate as of June 1, 2016 was 2.35%.)

### Change in employment rates for people with disabilities



We create a work environment that helps the physically challenged work with ease and provides support for them in cooperation with each region's Support Center for People with Disabilities. Thus, we aim to increase the

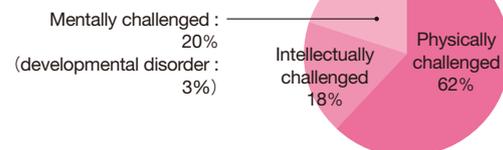
percentage of physically challenged people who are taken on as employees and remain at work. (This percentage was 86.81% in FY 2015.)

### Percentages of people with disabilities remaining at work

FY	2010	2011	2012	2013	2014	2015
Number of people at the beginning of the fiscal year	79	77	80	88	86	91
Number of people who left AIST within the fiscal year	8	5	7	7	14	12
Employee turnover rate	10.13%	6.49%	8.75%	7.95%	16.28%	13.19%
Employee retention rate	89.87%	93.51%	91.25%	92.05%	83.72%	86.81%

### Employment rates by disability type

(As of June 1, 2016)



## Response to the Disability Discrimination Elimination Act

On April 1, 2016, the Act on the Promotion of Elimination of Discrimination against Persons with Disabilities (Disability Discrimination Elimination Act) was implemented. This law aims to create a tolerant and inclusive society in which everyone can live in peace without being discriminated against because of their

disabilities.

In line with the law, AIST, as a public institution, put in place a system to promote the elimination of discrimination against people with disabilities, and we posted these efforts on our official website; we developed guidelines in which employees are instructed how to deal

with things, and we established consultation services at research bases throughout Japan to provide advice to people with disabilities and those involved. Moreover, to further deepen employees' knowledge and understanding of the law, we invited experts to hold study sessions and provided an e-learning system.



Study session on the Disability Discrimination Elimination Act

## Activities of intellectually or developmentally challenged teams

### AIST Tsukuba

The AIST Tsukuba Challenged Team assists with clerical work and development of the work environment; there are now 11 team members and three instructors. At the request of our center's offices, the team transported papers, shredded discarded documents, did recycling and cleaning work, and put leaflets into envelopes, which were later handed out to the public at our open day. Recently, our reuse of box files has received favorable comments, the files being used by many other AIST employees, and are helping to create a comfortable work environment.



Team members are putting leaflets into envelopes that will be handed out to the public at our open day



Cleaning activity at AIST Tsukuba

### AIST Chubu

The number of members of the AIST Chubu Challenged Team was increased from three last year to four this year, and the team works under a new system with a new instructor. They basically perform tasks such as weeding the site, cleaning and setting up meeting rooms, and collecting and sorting waste generated at the center. Their activities help support the work at AIST Chubu and have become essential to the center. In addition, team

members have become adept at making envelopes from recycled maps; since this activity began last year the team has made many envelopes. The envelopes were handed out to the public at our open day.

Members of the Challenged Team



Setting up a meeting room

### AIST Kansai

The AIST Kansai Challenged Team brought in a new employee in July 2016, so that there are now two team members and one instructor. They work to improve the landscape at the center's site; they mainly cut grass and collect fallen leaves. On rainy days and extremely hot days, they shred discarded documents, put stickers on envelopes, and systematically steam-clean the meeting room carpets. They also help to rearrange the furniture in the meeting rooms and carry packages during preparations for the research institute's open day at the request of the offices.



They are cutting grass at the center

## Health management and mental health

General and special medical examinations are performed in spring and autumn every year. We strive to increase the percentage of employees who undergo medical examinations by raising awareness that they are required to take these examinations, including health screening. As follow-up care after medical examinations, an industrial physician and industrial health staff provide health advice. We provide support to improve the performance of individual employees and AIST as a whole by detecting and preventing employees' health disorders and illnesses in their early stages.

To address mental health issues, we have developed

a unified Mental Fitness Program in accordance with the directives and guidelines of the Ministry of Health, Labour, and Welfare. Four programs based on the Mental Fitness Program are implemented in a continuous and planned way. They focus on (1) self-care; (2) line care through implementation of education and training and seminars; (3) care by in-house industrial health staff and others through face-to-face counseling with an industrial physician and industrial health staff and support in returning to work; and (4) care by external resources through the use of external mental health organizations.

## ● Numbers and percentages of permanent and contract employees who underwent periodic medical examinations (including health screening), 2011–2015

Top: percentage of examinees. Bottom: no. of examinees/ total no. of eligible employees

Year	2011	2012	2013	2014	2015
① Employees (excluding ②) *1	98.1% 2934 / 2990	98.4% 2937 / 2986	99.9% 2990 / 2993	99.9% 2965 / 2966	99.6% 2978 / 2989
② Contract employees*2	88.3% 2081 / 2357	88.8% 2072 / 2330	99.9% 2136 / 2139	100.0% 2252 / 2252	100.0% 2150 / 2150

\*1 Excluding those on extended childcare leave and sick leave and those on long leave due to overseas relocation

\*2 Social insurance policyholders only

## ● Numbers of permanent and contract employees (including temporary employees) who underwent special medical examinations in FY 2014–2015

Top: no. of examinees/ total no. of applicable employees in spring. Bottom: no. of examinees/ total no. of applicable employees in autumn

Special medical examination		2014			2015		
		Permanent employee	Contract employee	Total	Permanent employee	Contract employee	Total
Medical examination for organic solvent poisoning prevention	Spring	704 / 704	680 / 680	1384 / 1384	745 / 745	652 / 652	1397 / 1397
	Autumn	714 / 714	731 / 731	1445 / 1445	736 / 736	663 / 663	1399 / 1399
Medical examination for specified-chemical poisoning	Spring	321 / 321	237 / 237	558 / 558	409 / 409	298 / 298	707 / 707
	Autumn	325 / 325	262 / 262	587 / 587	417 / 417	312 / 312	729 / 729
Medical examination for ionizing radiation exposure	Spring	311 / 311	115 / 115	426 / 426	329 / 329	88 / 88	417 / 417
	Autumn	314 / 314	120 / 120	434 / 434	320 / 320	85 / 85	405 / 405
Medical examination for lead poisoning	Spring	8 / 8	8 / 8	16 / 16	8 / 8	6 / 6	14 / 14
	Autumn	7 / 7	6 / 6	13 / 13	8 / 8	6 / 6	14 / 14
Medical examination for laser injury	Spring	179 / 179	68 / 68	247 / 247	216 / 216	72 / 72	288 / 288
	Autumn	49 / 49	18 / 18	67 / 67	66 / 66	31 / 31	97 / 97
Medical examination for pneumoconiosis	Spring	6 / 6	13 / 13	19 / 19	6 / 6	12 / 12	18 / 18
	Autumn	1 / 1	0 / 0	1 / 1	2 / 2	2 / 2	4 / 4
Medical examination for asbestos exposure	Spring	5 / 5	3 / 3	8 / 8	2 / 2	1 / 1	3 / 3
	Autumn	6 / 6	3 / 3	9 / 9	6 / 6	2 / 2	8 / 8

## ● Numbers of employees with significant findings\*1 from AIST's medical examinations, and numbers of employees who received face-to-face counseling

① Number of employees with significant findings, and their percentages of the total

Year	2011	2012	2013	Year	2014	2015	
With significant findings (Rated C)	No. of employees	753	816	785	With significant findings (Rated D)	423	103
	Percentage of employees	17.8%	18.5%	15.3%		8.1%	2.8%
With significant findings (Rated D)	No. of employees	356	481	483	With significant findings (Rated E)	598	818
	Percentage of employees	8.4%	10.9%	9.4%		11.5%	21.0%

\*1 Numbers of C- and D-rated persons cover the period 2011–2013.

Numbers of D- and E-diagnosed persons cover FY 2014–2015/relocation

② Numbers of employees who received counseling, and their percentages to employees with significant findings

Year	2011	2012	2013	Year	2014	2015	
With significant findings (Rated C)	No. of employees who received counseling	660	775	712	With significant findings (D-diagnosed)	350	71
	Percentage of employees who received counseling	87.6%	95.0%	90.7%		82.7%	68.9%
With significant findings (Rated D)	No. of employees who received counseling	309	473	470	With significant findings (E-diagnosed)	569	801
	Percentage of employees who received counseling	86.8%	98.3%	97.3%		95.2%	97.9%

## ● Flu shots (at AIST)

Year	2011	2012	2013	2014	2015
AIST Tsukuba/Tokyo	1,240	1,706	1,782	1,837	1,912
Regional research bases	498	502	532	555	543
Grand total	1,738	2,208	2,314	2,392	2,455

## ● Other activities

Year	2011	2012	2013	2014	2015
Refreshing exercise	281	167	291	304	243
Emergency first-aid workshop	141	148	145	175	188
Seminar	82	10	93	64	73
Workshop (training)	242	179	252	162	180

Definition of criteria:

● Before FY 2013

A: within normal range; B: follow-up examination required; C: detailed examination required; D: treatment required

● After FY 2014

A: no anomalies;

B: mild abnormalities but no interference with daily life;

C: follow-up examination required; D: health advice required;

E: treatment required; F: counseling required (applicable only to special medical examinations)

## ● Face-to-face counseling with an industrial physician, and health consultation FY 2015

		Tsukuba	Hokkaido	Tohoku	Chubu	Kansai	Shikoku	Chugoku	Kyushu	Tokyo	Tokyo Waterfront	Fukushima
Industrial physician	Body	1,271	287	2	96	180	17	51	13	51	34	18
	Mental	380	4	8	35	84	0	4	13	0	57	2
Industrial health staff		1,298	710	47	417	492	72	34	207	60	71	247
Total		2,949	1,001	57	548	756	89	89	233	111	162	267

# Fair Operating Practices

Aiming at an organization that is trusted by society, we conduct our activities with sincerity.

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## Conflict-of-interest Management

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An important mission of AIST is to promote industry-academia-government collaboration and disseminate research achievements. If an executive or staff derives personal gain from industry-academia-government collaboration, he or she needs to properly manage any situation in which there is a conflict of interest between his/her personal gain and the research duties and responsibilities required by his/her role as an executive or staff of AIST as a public research institution. AIST has formulated rules to implement conflict-of-interest management and applies this management to such cases.

In FY 2015, AIST conducted a Periodic Conflict-of-Interest Self-Report Survey of executives or staff and the like twice (in November in the first half of the fiscal year and in March in the second half). All of those surveyed (3095 in the first half and 3117 in the second half) reported on their conflicts of interest. Four of them were considered to have possible conflicts of interest and were interviewed by an external conflict-of-interest counselor.

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## Information Security

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AIST provides information security training to all users of our information network on a continuous basis, so that they can improve their understanding of the information security policy of AIST. This enables appropriate use of the network with awareness of responsibility. In addition, we confirm the degree of understanding and permeation of our policy among our employees through regular self-inspections for information security and protection of personal information as well as information security audits.

### ■ Information security training

AIST requires all the employees to take information security training every year, to implement and improve information security awareness. The content of the training is reviewed every year and the newest measures on information security are presented.

### ■ Self-inspections for information security and protection of personal information

We implement self-inspections of executives and staff to see whether appropriate measures are taken for information security in accordance with our security policy. 97.19% of our eligible employees conducted self-inspections in FY 2015.

### ■ Information security audit

AIST conducts information security audits of research units to objectively evaluate whether information and the information security system are properly used, managed, and operated. In FY 2015, in order to enhance the information security of AIST as a whole, we conducted information security audits of 47 research units.

## Implementation of Security Export Control

The security export control is an important effort in maintaining peace and security in the international community. In Japan, in addition to the regulations on weapons trade itself, the export of goods and transfer of technologies that may be used for the development and manufacture of weapons are regulated according to the “Foreign Exchange and Foreign Trade Act” to prevent the proliferation of weapons of mass destruction and excessive accumulation of conventional weapons. Therefore, companies and institutions that may develop relationships with overseas companies and institutions must have tight export control.

In FY 2004, AIST formulated Rules for the Security Export Control and gave notification of them under the title “Internal Compliance Program” to the Ministry of Economy, Trade and Industry. In accordance with these rules, we have tight security export controls in

place. Security Export Control activities include: (1) communicating the latest information on export control within AIST; (2) export control training for AIST staff; (3) export control instruction to individual staff members; (4) classification and transaction screening; and (5) conducting internal audits.

In recent years, as collaborative research with overseas research institutes and universities is promoted, there has been an increase in the importance of raising awareness of security export control among employees. Accordingly, security export control is in place as mentioned above, and individual employees are now fully aware of security export control.

AIST will continue to promote further implementation of security export control in the future to maintain peace and safety as a member of the international community.



In-house training on export control

## Implementation of Rational Procurement Processes

AIST entered into contracts on the basis of general competitive bids, competitive proposals, or public tenders, except in the case of truly unavoidable negotiated contracts.

The Cabinet Decision on the “Principle of Independent Administrative Institution Reform, etc.” (December 24, 2013) stipulates as follows: although contracts should, in principle, be based on general competitive bids, fair, transparent, and rational procurement should be

implemented, on the basis of the characteristics of the administrative work or project; reasons why negotiated contracts are allowed should be clarified according to the accounting rules. AIST organized the reasons for negotiated contracts into 19 items and approved them as policy on October 1, 2015. The rules will thus enable rational procurement.

## Test of Procurement of Services from the Market at AIST Tsukuba

In accordance with the Cabinet Decision on the “Principle of Public Service Reform, etc.” (July 15, 2011), concerning facility maintenance at AIST Tsukuba, eight services have been provided for the 3 years from FY 2012 to FY 2014.

To ensure competition in FY 2015 and into the future, these eight services, which had been integrated into one group, were reviewed and reintegrated into five groups. The services will be provided over a 3-year period from FY 2015 to FY 2017.

The five groups are: (1) maintenance and management of facilities, (2) management of planting, (3) security work and building-cleaning work, (4) operation and management of the Research Collaboration Center, Science Square Tsukuba, and at the Geological Museum, and (5) driving, maintenance, and management of cars.

The main results of the services in FY 2015 are as follows:

### Maintenance and improvement of the quality of services

- Understanding each other's work (holding work report meetings)
- Ensuring safety
- Ensuring continuity of work
- Being environmentally friendly
- Ensuring a comfortable facility environment

Average satisfaction rates in a questionnaire survey of facility users:

Operation and management of the Research Collaboration Center (Sakura Kan)  
97% (recommended minimum approval rate 90%)

Operation and management of the Research Collaboration Center (Keyaki Kan)  
99% (recommended minimum approval rate 90%)

Operation and management of Science Square Tsukuba  
95% (recommended minimum approval rate 90%)

Operation and management of the Geological Museum  
92% (recommended minimum approval rate 90%)

# Community Involvement

Building a trusting relationship with the community, including awareness of being a member of society.

## Training Camp at AIST for Japan's Student Representatives in the International Chemistry Olympiad

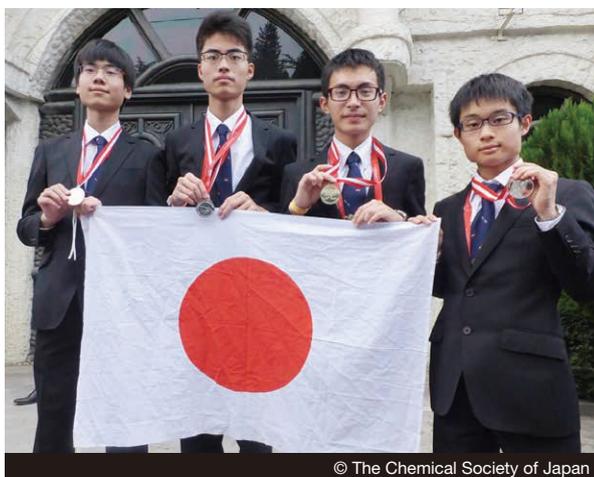
The International Chemistry Olympiad is an annual chemistry competition for high school students. More than 200 students from about 60 countries participate in the competition every year; each one of them sits for 5 hours of experimental and theoretical exams.

Six representative high school student candidates who won the national preliminary round against about 3500 contestants attended an enhancement training camp at AIST Tsukuba on 29 and 30 March 2016.

In Japanese high schools, for safety reasons

experiments are rarely conducted in class. Therefore, at the camp, AIST helped the students, who were aiming for the gold medal, by giving them the opportunity to do experiments using laboratory-scale equipment under the instruction of researchers and to attend lectures delivered by the researchers.

From 23 July to 1 August 2016, four Japanese representatives participated in the 48th competition, held in Tbilisi, Georgia; one student won the gold medal and the other three won silver medals.



© The Chemical Society of Japan

All four Japanese student representatives won medals at the International Chemistry Olympiad



During the training camp, the students conducted experiments by using various items of equipment



A student hard at work on an experiment

## Special Events Held during Science and Technology Week

During Science and Technology Week (18 to 24 April), various events were held throughout Japan; 40 institutions held events at Tsukuba Science City. On 23 April, AIST held special events at Science Square and at the Geological Museum, which had about 350 participants in total.

New exhibition themes were added at Science Square, which was fully renovated a year ago. At the Geological Museum, award-winning works from the Planet Earth Photo Contest were exhibited. We provided projects for everyone—from children to adults—to enjoy, such as the Disaster Medical Care Quest, where participants were able to learn disaster medical care while having fun, and Craft Corner, where participants made wonderful



Children and adults enjoying craftwork at Craft Corner

kaleidoscopes by using a polarizer. Moreover, for the first time, we provided a tour of AIST's historical research heritage storage facility, which is usually closed to the public. These places were filled with smiles all day long.

### Voices of participants (excerpt from a questionnaire)

Making a kaleidoscope was enjoyable, even for adults. I was interested in the tactile touch panel presented at Science Square. I'm curious about how it will be used in our everyday lives.

I saw historical research work that's usually closed from public view, and I received information about technological development from past to present.

The Disaster Medical Care Quest was interesting and enjoyable, because not only adults but also children were able to learn while having fun.

Although I've attended this event several times, the tour of the historical research facility surprised and delighted me. I realized that the present is based on our forebears' efforts.

## AIST Employee Selected as the Second Tsukuba Science Education Meister

The Tsukuba Science Education Meister is an accreditation system run by the city of Tsukuba as part of the 30th anniversary project of the 1985 International Exposition, which was held in the city; a member of the university or of a public research institute in the city who has achieved outstandingly in science education is accredited every year. At the accreditation ceremony in January 2016, the then Senior Planning Manager, Public Relations Information Office, Planning Headquarters, Dr. Masaki Shimomura, was awarded the certification by the then Mayor of Tsukuba, Mr. Kenichi Ichihara.

Dr. Shimomura teaches science not only at science and technology events held by the city, but also at nationwide events. He teaches students how to make light-utilizing items such as kaleidoscopes (by using a simple spectroscope and a polarizer) and straps (by using ultraviolet beads). AIST provides experimental classes for children and delivery lectures for adults. In the experimental classes, Dr. Shimomura teaches the fun of science to children by mixing demonstrations by instructors with experiments and craftwork by the children. In delivery lectures for adults, he introduces basic knowledge and professional research, focusing

on polymeric materials (his field of specialization) in an easy manner. He helps to promote the general public's understanding of science by telling them about AIST's activities and research.



Mr. Kenichi Ichihara (The former mayor of Tsukuba) and Dr. Masaki Shimomura at the accreditation ceremony

If I'm not enjoying myself, no one else will have fun! I always try to enjoy myself first. Particularly when the participants are elementary and junior high school students, I'm careful not to be thought of as an intimidating (old) man!



# Human Rights

We create an environment where all those related to AIST treat each other with respect.

## Respect for Basic Human Rights

A wide variety of people work at AIST, including executives, permanent employees, contract employees, temporary employees, visiting researchers, technical trainees, contractors, visitors participating in industry–academia–government collaborative programs, and visitors participating in international collaborative programs. We work with the awareness that it is important to have an attitude of respect for each other, regardless of title or position.

### From the “Compliance Guideline”

Paragraph 1: Respect for human rights

– We respect human rights. We do not say or act in any way that ignores human rights.

1. We respect basic human rights. We do not discriminate against people on the basis of race, nationality, age, sex, religion, belief, or social status.
2. We do not say or act in any way that ignores human rights, including by harassment.

## Respect for Human Rights in Research Activities

Research involving human subjects and ergonomic experiments, such as measurement of human characteristics, is conducted at AIST. 25 new research projects and 123 ongoing research projects were conducted in FY 2015.

Before an experiment, the Committee for Ergonomic Experiments, which includes 6 external members, reviews and approves experimental protocols in accordance with the Declaration of Helsinki\* to ensure the safety and

scientific validity of experiments. Thus, experiments are conducted in an appropriate manner.

In practice, an oral and written explanation of the details of the experiment and of the right to revoke consent is given to the experimental participants. In this way their human rights and dignity are respected.

\*Ethical Principles for Medical Research Involving Human Subjects is a statement of ethical principles adopted by medical researchers at the 18th WMA General Assembly at Helsinki. It regulates medical research involving human subjects.

## Harassment Prevention

Harassment hurts the dignity of the person being harassed and causes emotional distress and disadvantage. Conversely, if a person who conducted an act of harassment with no intention to do so is held responsible for that act, he or she may suffer from adverse health effects. The presence of harassment may lead to deterioration in the work environment, reduced motivation to work, and adverse effects on the results of research. AIST has internal rules in place and provides training to make the workplace free of harassment.

for harassment victims. This fiscal year, we also held a seminar targeting all employees to re-recognize the need to prevent harassment.

### Harassment prevention measures

- AIST has in place rules for handling workplace harassment (excluding sexual harassment) and sexual harassment and has defined procedures for the prevention of harassment.
- AIST provides employees and managers, and counselors placed at AIST work sites, with training on how to prevent harassment and provide counseling

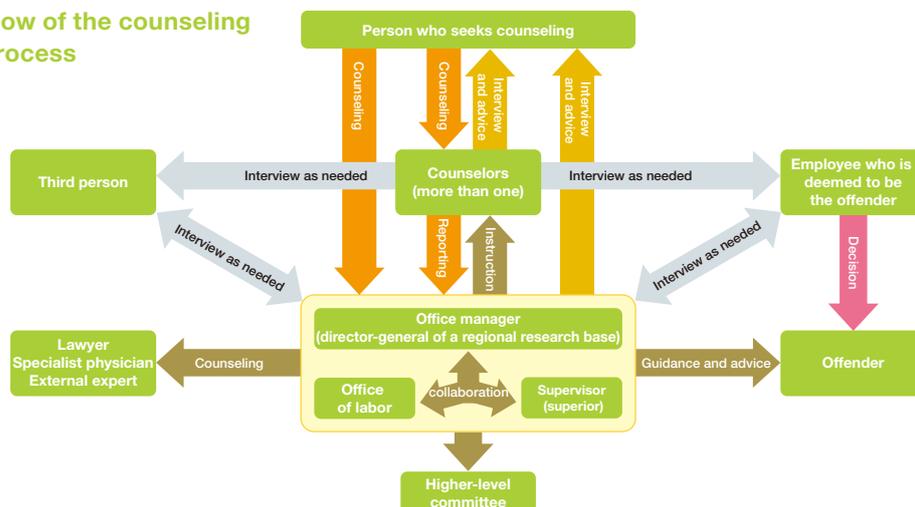
### Counseling system

Each site has workplace harassment counselors and sexual harassment counselors; half of them are women in the latter case. The counselors work to counsel, investigate, and mediate so that harassment victims are not distressed and suffer alone as a result of their experience. If the line of management or a counselor cannot address a harassment issue, a higher-level committee reviews the issue and recommends the appropriate actions, which are then taken. In addition, we create an environment that helps harassment victims to seek counseling. We also provide email and telephone counseling by industrial physicians or external organizations to protect people's privacy.

### ● Training programs provided on harassment in FY 2015

Training program	Trainees	Objectives	Number of trainees in FY 2015
New Employee Training	New AIST employees	As part of training in the attitudes, basic knowledge, and skills required to perform their work, participants learn the basics of harassment issues and harassment prevention.	104
e-learning training	Permanent employees, contract employees	As part of their learning of the basic organizational ethics and rules of AIST, participants learn the basics of harassment issues and harassment prevention.	5,484
Basic Training for Foreign and Contract Employees	Foreign and contract employees who do not understand the Japanese language	Provision of training (in English) in the basics of harassment issues and harassment prevention.	76
Group Leader Training	Newly appointed group leaders (including group leaders who have not undergone this training)	As part of their training in basic management knowledge and skills, newly appointed managers and others learn the basics of harassment issues and harassment prevention.	45
Harassment Counselor and Sexual Harassment Counselor Training	Harassment counselors and sexual harassment counselors	Participants learn the harassment prevention knowledge and skills required by counselors. These include face-to-face counseling techniques based on lectures and role-play sessions.	40
Harassment Prevention Seminar	AIST employees who wish to attend the seminar	Participants learn the basics of harassment issues and harassment prevention through lectures and work.	124

### ● Flow of the counseling process



- Those who seek counseling can include people other than the employees involved (i.e. they can be the employee who is deemed to be the offender, the employee who is deemed to be the victim, or someone else, such as a colleague or supervisor).
- Counseling can be sought by means of a face-to-face meeting, telephone call, email, letter, or fax.
- Seeking counseling causes no disadvantage.
- Adequate consideration is given to the protection of privacy, and any information acquired in the course of counseling is kept strictly confidential.

## Enlightenment and Activities of Diversity Promotion

Diversity is essential for creative research. AIST developed in October 2015 “Measures to promote diversity in the 4th Medium- to Long-term target period”(hereinafter referred to as “promotion measures”). We aim to realize a work environment that can make full use of the value and ideas brought by various attributes (gender, age, nationality etc.) of employees. AIST has set up the following five plans and has been taking a variety of steps to implement them: 1. proactively hiring female researchers and making the most of their abilities; 2. supporting foreign researchers in their recruitment and work; 3. achieving work-life-balance; 4. developing careers; and 5. comprehensively promoting diversity.

The goal for the percentage of female researchers employed at AIST in the Period of the 4th Medium- to Long-Term Plan (FYs 2015 to 2019) is 18% or higher; this exceeds the percentage of women employed in research in the 3rd period (16.7%) (FYs 2010 to 2014). To increase the percentage of female researchers employed at AIST, we ran a recruiting campaign to increase the number of female applicants; since FY 2015, we also held a round-table meeting for female science students and AIST’s female researchers and conducted laboratory tours. We are thus striving to discover and hire talented female researchers. Regarding managerial position, we aim to foster next-generation female managerial personnel and achieve a percentage of females in managerial positions of at least 5% in the 4th period.

We conduct employee seminars and training sessions to raise and disseminate awareness of diversity. We give lectures on the promotion of diversity at each training session for newly hired employees, group leaders, and mid-career researchers to deepen the understanding of diversity among all employees, including male employees. In November 2015, AIST Kansai has held a role model lecture and a panel discussion with a female employee, who, while working at a company, had won a Leader Division prize in the Woman of the Year awards, 2014. In addition, in February 2016, AIST Tsukuba held an encouraging training session for all researchers and clerical staff who wanted to attend the session. We thus support the career development of our employees.

To enhance cooperation with domestic research and educational institutions and further promote diversity, AIST, as the administrative office of the Diversity Support Office (DSO), holds information-exchange meetings and issues a newsletter.

These activities were greatly appreciated and won an encouragement prize in the Women’s Empowerment Awards held in February 2016 by the Working Women’s Empowerment Forum of the Japan Productivity Center bureau. We were also awarded Eruboshi, a certified logo based on the law to promote women in the workplace. We will continue to run a variety of programs to promote diversity.



Round-table discussion with female students and researchers



AIST Vice-President Dr. Shigeko Togashi (right) and Director, Diversity and Equal Opportunity Office, Ms. Yukari Ide (left) at the awards ceremony



The Eruboshi logo: certification mark Level 3

## Support for Foreign Researchers

As part of the development of a work environment for foreign researchers at AIST, we support business, and provide information, in English.

AIST International Center (AIC) provides foreign researchers with guidance, consultation, and help, in English, in relation to living and staying in Japan. AIC staff members, who have authorized proxy qualification by the Tokyo Regional Immigration Bureau, can file applications in proxy for foreign researchers to its Mito Branch Office. This is the service most often requested by foreign researchers. In FY 2015, we filed 114 applications for extension of period of stay or change of status of residence; these accounted for about half of all applications that we filed.

The AIC Japanese language course is the second most popular service. In FY 2015, a total of 48 researchers took the class. Busy foreign researchers can go back to their work in the laboratory after taking a Japanese class within AIST; this is very beneficial to them. We also provide flower arrangement and tea ceremony courses for foreign researchers and their families.

In collaboration with the departments responsible, we hold AIC seminars to introduce various AIST systems to foreign researchers in English; topics are covered in the order of need. In FY 2015, we held three seminars, “AIST’s Leave (Special Leave) Programs,” “AIST’s International Collaboration Contracts,” and “AIST’s Intellectual Property Activities,” with about 20 participants at each seminar. Participants can not only share information but also interact with other participants through questions and discussions.

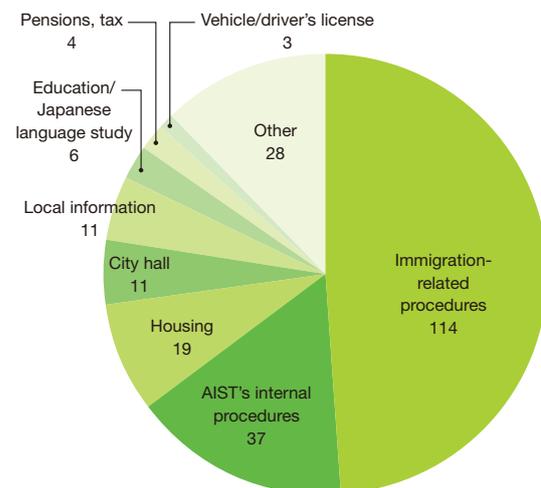
In FY 2015, AIC started an e-mail newsletter (AIC News Letter) service for foreign researchers. We now have about 60 subscribers; although most readers are foreign participants at AIC events and Japanese language courses, and some are Japanese researchers. We provide broad and rapid information on, for example, schedules

for file applications to extend the period of stay, in addition, announcements and reports on AIC events, and links to explanations of AIST’s systems.

This fiscal year, we launched new pages on the AIST English website; this enables overseas people to get information on AIST and allows foreign people living in Japan to get useful information on everyday Japanese life. Foreign visitors to AIST and foreign researchers at AIST can easily obtain useful information through these pages. Moreover, the AIC intranet website enables them to easily access English content on AIST’s intranet website.

These tools provide integrated support—from support for living and staying in Japan to that in learning the language.

### ● Breakdown of consultations in FY 2015



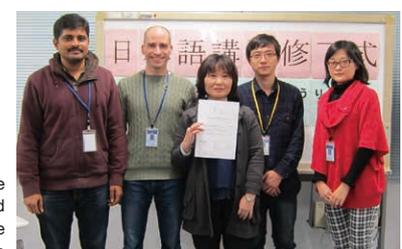
AIC seminar on AIST's Special Leave Program



Flower arrangement course



AIC seminar on AIST's Intellectual Property Activities



Candidates who have successfully completed the Japanese language course

# Environmental Report

Toward realization of a sustainable society,  
we promote environment-minded R&D.

## Environmental Policy

To build a sustainable society, AIST has a Charter of Environment and Safety in place. Its aim is to bring the results of research and development to society, as well as to incorporate environmental considerations into the research and development process. Under the Charter of Environment and Safety, we have set an Environment and Safety Policy to proactively work with a keen awareness of the importance of ensuring global and local environmental conservation, and the health and safety of everyone working at AIST.

### ■ Charter of Environment and Safety

- We promote research that helps to conserve the global environment and human safety; we aim to realize a safe, secure, and high quality life and a society in harmony with the environment.
- We comply with laws and regulations on environment and safety, set our own standards such as guidelines, and seek to increase efforts in environmental conservation and promotion of health and safety on a daily basis.
- We actively disseminate information on environment and safety and seek to achieve harmony and integration with the local community. We take prompt and appropriate actions in the event of an accident or disaster and seek to pass on the lessons learned to society under the principle of disclosure.

### ■ Environment and Safety Policy

1. We proactively conduct research that contributes to conservation of the environment and the development of a healthy and safe society.
2. We comply with laws, regulations, ordinances, and agreements on the environment, health and safety, set our own management standards, and seek to further improve environmental conservation, health and safety.
3. We seek to reduce the consumption of energy and resources and the generation of waste, and thus aim to reduce loads on the environment.
4. We seek to prevent pollution and work-related accidents, to take prompt and appropriate actions in the event of an emergency, and to prevent the spread of damage.
5. We are developing a management system for effectively and efficiently conducting activities to ensure environmental conservation, health and safety with the participation of all members of AIST; we seek continuous improvement.
6. We actively disclose environmental, health and safety information by publishing environmental reports and disclosing information to promote communication with society.

## Environmentally Friendly Research Base Development

AIST is closing or demolishing its research facilities that are disused or that have decreasing research efficiency because of age or safety issues. At the same time, it is developing versatile new research bases where facilities and equipment can be easily changed according to the progress of research.

In our planning and design, to develop facilities with superior environmental quality and performance we seek environmentally friendly technical proposals for tasks such as energy saving, reduction of environmental loads and life-cycle costs, ensuring research safety, and environmental conservation.

The facility of the Next-generation Storage Battery and Health Care Research Base at AIST Kansai was constructed with consideration for universal design. For example, it incorporates natural light, solar power-

generation equipment, LED lighting, a cool pit that uses geothermal heat, storage and reuse of rainwater, energy saving by use of an appropriate air-conditioning system, and greenhouse gas emission reduction. In addition, to reduce environmental loads, we have proactively used eco-materials and reduced and recycled building byproducts.

The facility won the 2015 Osaka Environmentally Friendly Architecture Prize (commercial facilities and others)\* of the City of Osaka for its superior environmental friendliness and its role as a norm.

\*This prize is awarded to the building that receives a high evaluation in the Comprehensive Environmental Assessment of Buildings in the City of Osaka; the assessment is based on the Ordinance on Environmental Conservation for buildings in Osaka.

### AIST Kansai, the Next-generation Storage Battery and Health Care Research Base (C-6 building)

■ Building area: 1,821.11m<sup>2</sup> ■ Total floor area: 4,437.47m<sup>2</sup> ■ Structure: steel construction, three stories above ground ■ Completion: March 2015



Existing trees have been left to create harmony with the surrounding environment



Solar power-generating panels installed on the roof of the research base building



Common space incorporating ample natural light



High-efficiency modular chiller system

## Environmental Targets and Results

Major environmental targets and results are summarized below. Details of the content and results for

each item are available on the relevant pages.

### ● Environmental targets and results

CO<sub>2</sub> emissions (details on P. 51)

[Target] Reduce by average of 4% compared with FY 2014 over 3 years from FY 2017 to FY 2019 (target value: 119,000 t-CO<sub>2</sub>)

[Result] 113,000 t-CO<sub>2</sub> in FY 2015 (○)

Promotion of green procurement (details on P. 50)

[Target] 100% procurement rate for designated procurement items

[Result] 100% procurement rate for designated procurement items (○)

Promotion of green contracts (details on P. 51)

[Target] Sign an exemption contract for power supply and industrial waste disposal in principle

[Result] Signed an exemption contract for power supply and industrial waste disposal in principle (○)

(Legends)

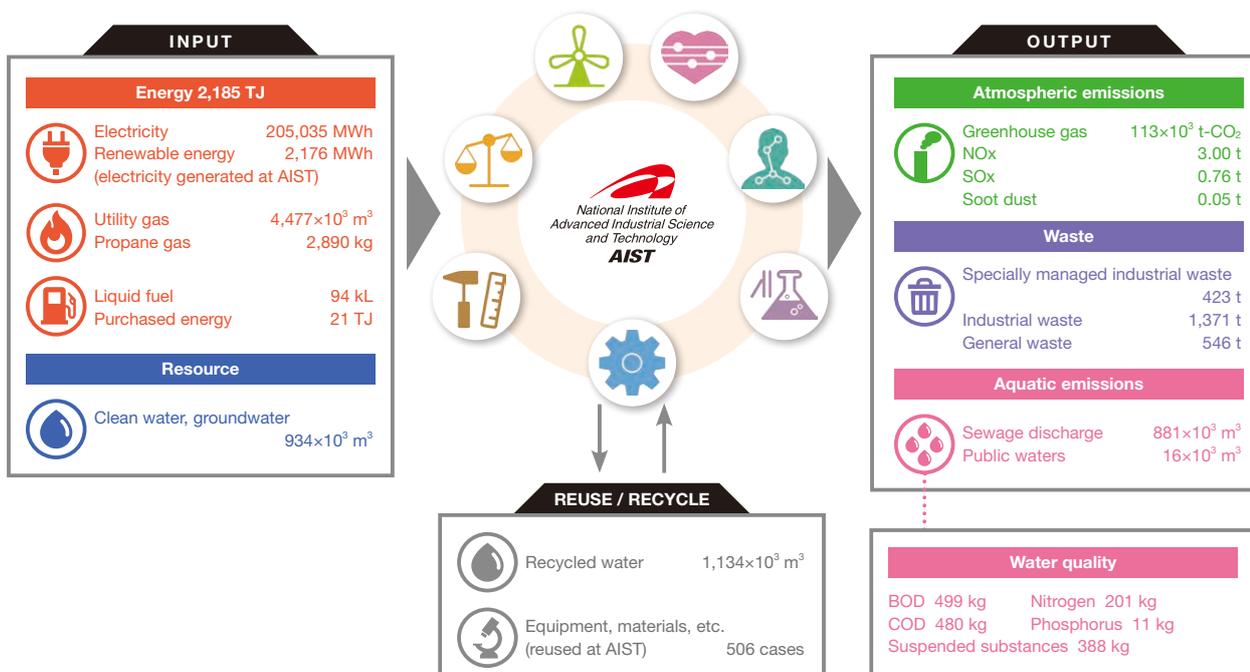
○ above the target; ○ achieved the target; △ almost achieved the target, × below the target

## Overview of Environmental Loads

AIST assesses the environmental loads generated by its business so as to reduce these loads and pay due care to the environmental effects of its activities. The table

below shows the amounts of energy used and the wastes released through AIST's business.

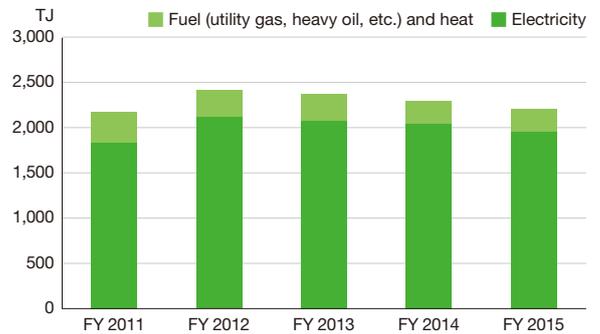
### ● Amounts of energy used and wastes released through AIST's business



## Rationalization of Energy Use

AIST promotes the rationalization of energy use as a specified business stipulated by the law on the rationalization of energy use; the amount of energy used in FY 2015 was 4.2 % lower than that in the previous FY.

### ●Changes in amount of energy used



## Developing a System to Implement Environmental Policies and Actions

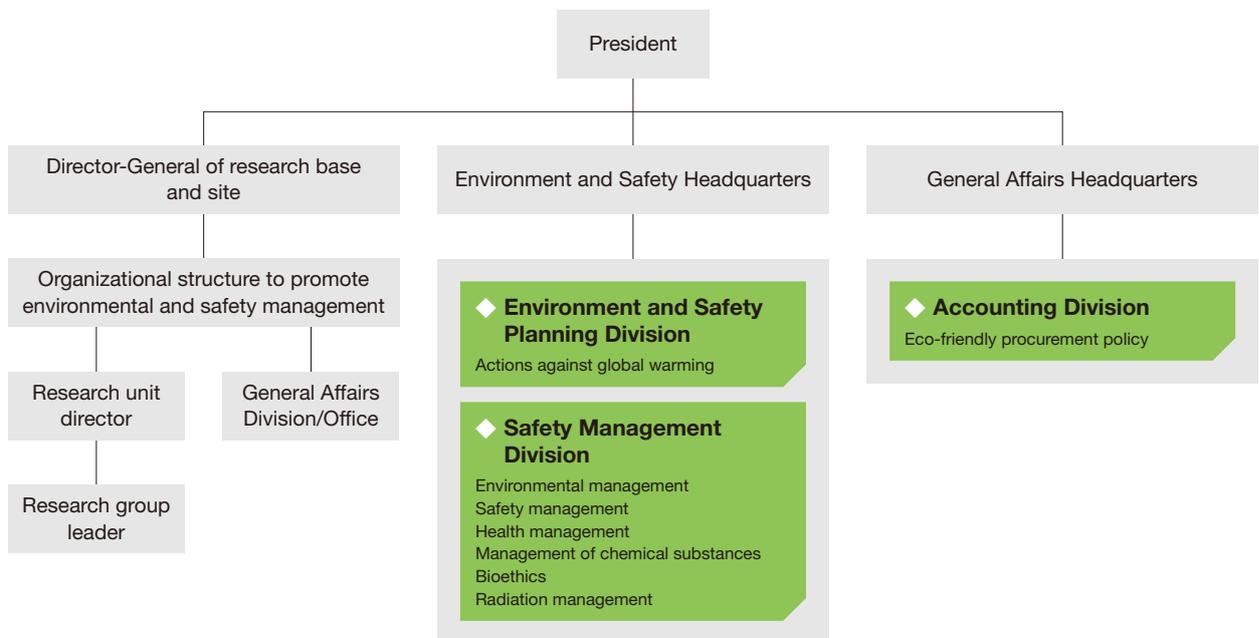
AIST's headquarters organizations (Environment and Safety Headquarters, General Affairs Headquarters) and business organizations (regional research bases and sites) work strongly together to implement our environmental policies and actions.

The Environment and Safety Headquarters determines policy for the reduction of greenhouse gas

emissions—an ongoing issue—and the General Affairs Headquarters develops and monitors AIST's green procurement policy.

These policies are embodied in the implementation plans of each regional research base and site under the leadership of the Director-General.

### ●Structure for environment and safety projects

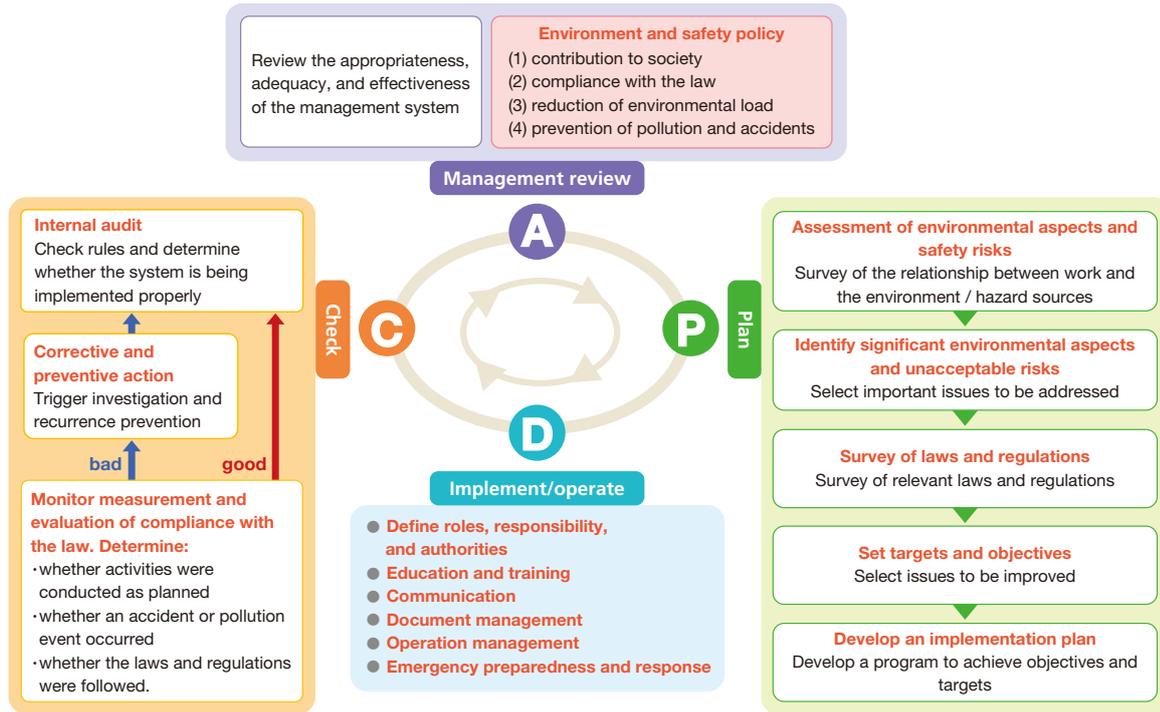


# Environmental Management System

AIST has its own environmental and safety management system (ESMS) in place. It combines two subsystems: an environmental management system to reduce the environmental impacts of its business and preserve the natural environment, and an occupational health and safety management system to reduce potential risks in the workplace and improve health and safety.

In FY 2015, we conducted an internal audit of the environment and safety at each research base and site, and we checked the implementation status of the management program. We shared information on improvements and informative cases at each research base and site and improved our action planning sheet.

## Structure of AIST's environmental and safety management system



# Environmental Education

AIST provides environmental education on issues with significant environmental impacts—such as how to treat liquid wastes and vent gases from research and how to sort and remove waste—to new employees and those who have joined AIST under the industry-academia-

government exchange program, the international exchange program, and dispatched workers. We are continuing to enhance our environmental education and training.

## Green Procurement and Green Contract

### Green procurement activities\*

When purchasing products, parts, or materials that are necessary for conducting R&D and when subcontracting external services for processing and prototype manufacturing, AIST considers not only quality and price but also environmental loads, and engages in green procurement that gives priority to products and services with little environmental load.

To promote green procurement, every year AIST publicizes the procurement policy that sets the procurement goal for eco-friendly goods, based on the “Act on Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities (Green Purchasing Act)” and the “Basic Policy for Promotion of Procurement of Eco-friendly Goods and Services.”

\*For details on green procurement, please refer to the following page:  
[http://www.aist.go.jp/aist\\_j/procure/kouhoyou/green/](http://www.aist.go.jp/aist_j/procure/kouhoyou/green/)

### Status of procurement of eco-friendly goods

In FY 2015, AIST purchased 244 items in 20 categories among the 270 items in 21 categories designated in the

Green Purchasing Act (types of eco-friendly goods and services to be preferentially purchased by the government and other organizations). Excluding one item (media storage cases) because of their required functions and performance, AIST achieved 100 % procurement rate for each designated procurement item (i.e. those that met the criteria established by the government for items that reduce environmental loads). The environmental loads are also considered in purchasing eco-friendly products (such as trash bags) that are not designated procurement items.

### Number of hybrid vehicles owned by AIST

As of April 2016, of the 70 AIST-owned vehicles for business (including research), 4 are hybrid vehicles, 1 is a plug-in hybrid vehicle, and 3 are electric vehicles. In replacing the automobiles, preference will be given to hybrid and low-emission vehicles.

### Purchase results of major designated procurement items

Area	Item	Target	Total quantity purchased	Purchase of specified purchase items	Target attainment	
Paper	Photocopier paper	100%	311,430.8125kg	311,430.8125kg	100%	
	Forms	100%	486.2592kg	486.2592kg	100%	
	Coated paper for inkjet color printers	100%	263.8069467kg	263.8069467kg	100%	
	Toilet rolls	100%	3611.2kg	3611.2kg	100%	
	Tissue paper	100%	9015.1kg	9015.1kg	100%	
Stationery	Mechanical pencils	100%	898	898	100%	
	Mechanical pencil leads	100%	474	474	100%	
	Ballpoint pens	100%	22,291	22,291	100%	
	Marker pens	100%	17,437	17,437	100%	
	Pencils	100%	6,403	6,403	100%	
	Media cases	100%	1,077	693	64%	
	Glue (solid)	100%	2,889	2,889	100%	
	Files	100%	118,289	118,289	100%	
	Office furniture, etc.	Chairs	100%	1,113	1,113	100%
	Desks	100%	717	717	100%	
OA equipment	Photocopiers, etc.*	Purchased	100%	18	18	100%
		Leased/rented (new)		153	153	
		Leased/rented (extension)		74	74	
	Scanners	Purchased	100%	211	211	100%
		Leased/rented (new)		0	0	
		Leased/rented (extension)		0	0	
	Paper shredders	Purchased	100%	64	64	100%
		Leased/rented (new)		0	0	
				0	0	
		Recording media	100%	14,728	14,728	100%
		Toner cartridges	100%	8,122	8,122	100%
	Ink cartridge	100%	6,373	6,373	100%	
Vehicles, etc.	Non-general official vehicles	Purchased	100%	2	2	100%
		Leased/rented (new)		4	4	
		Leased/rented (extension)		1	1	
Fire extinguishers	Fire extinguishers	100%	130	130	100%	
Services	Passenger transportation	100%	2,051	2,051	100%	

\*Photocopiers, combination units, digital photocopiers with expandable functions

## Green Contract Activities

When signing contracts with contractors and suppliers, AIST promotes a green contract that takes into consideration reduction of greenhouse gases on the basis of the “Act on Promotion of Contracts of National Governments and Other Entities Involving Due Care for Reduction of Greenhouse Gas Emission (Green Contract Act).” In FY 2015, we signed the following green contracts.

### ● Number of green contracts

Type of green contract	Number of cases
Automobile purchase	6
Contract for power supply	9
Industrial waste	19

For automobile purchases, we evaluated the price and environmental performance (fuel economy) of six vehicles

for lease in a comprehensive evaluation bidding system in which the bidder with the highest rating entered into the contracts.

For contracts for power supply, we adopted the environmental threshold system\* at AIST Tohoku, Fukushima Renewable Energy Institute AIST, AIST Tsukuba Central and East, AIST West, AIST Tokyo Waterfront, AIST Chubu, AIST Kansai, AIST Chugoku and AIST Kyushu.

The system was also adopted for 19 industrial waste contracts for collection, transport, and disposal.

\*Environmental threshold system

This is a bidding system with screening by the sum of score points of carbon dioxide emission coefficient, unutilized energy usage, new energy usage, and planned amount of green power certificate to be transferred to the purchaser. The bidder that has a certain total score that surpasses the threshold and presents the lowest price has the right to enter into the contract.

## Actions against Global Warming

AIST sets a target and implementation plan for reducing greenhouse gas emissions as part of the effort to reduce environmental load substances generated from our business. In FY 2015, AIST promoted research facility integration and efficient use of laboratory space for its research activities to achieve the target of reducing greenhouse gas emissions by 4 % from the FY 2014 level

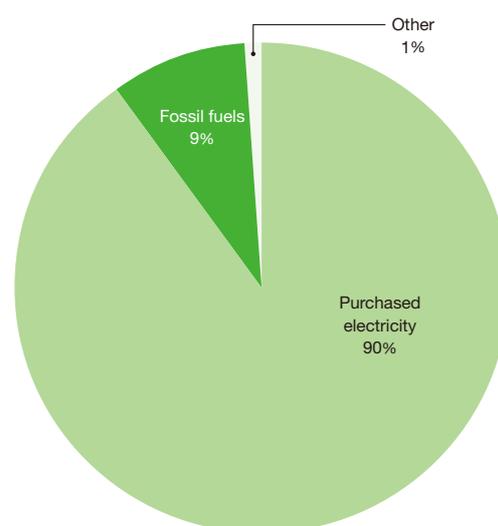
### ● Change in CO<sub>2</sub> emissions for the year



(on average) for the 3 years from FY 2017 through FY 2019. As a result, AIST achieved an 8.9 % reduction in greenhouse gas emissions.

Our greenhouse gas emissions are expected to increase because of an increase in research and development activities promoted by open innovation.

### ● Breakdown of sources of CO<sub>2</sub> emissions



## Reducing CO<sub>2</sub> Emissions by Using Renewable Energy

AIST has introduced solar power-generation facilities to AIST Tsukuba, and also to AIST Tohoku, AIST Tokyo Waterfront, AIST Chubu, AIST Kansai, AIST Chugoku, AIST Shikoku, and AIST Kyushu. Our existing solar power systems are being used effectively, and solar and other renewable energy systems have been installed in our new buildings.



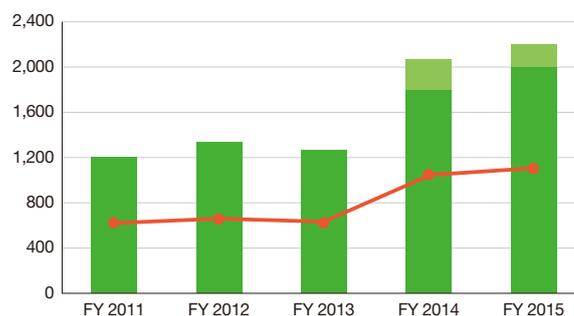
Solar power generation system

The amount of solar power generated in FY 2015 was 1,978 MWh. This is equivalent to the annual power use of 549 households and helped reduce CO<sub>2</sub> emissions by 959 t/year.

In FY 2015, 197 MWh of wind power was generated. This was equivalent to a CO<sub>2</sub> emission reduction of 104 t/year.

### ●Progress in renewable power generation and CO<sub>2</sub> emissions reduction

■ Wind power-generated (kWh) ■ Solar power-generated (kWh)  
● CO<sub>2</sub> emissions reduction effect



## Power-saving During Summer

AIST put in place the following energy-saving measures:

1. Large facilities and equipment (e.g. clean rooms, constant temperature/humidity rooms, large-scale computers, HVAC systems, etc.) were operated in turn to balance the operating load.
2. Infrastructure that consumed large amounts of power (e.g. wastewater treatment facilities) was operated in turn, and operations were shifted to holidays and night-

time.

3. Electrical power usage was visualized by introducing a total power monitoring system.
4. Employees at AIST Tsukuba and regional research bases took holidays in turn, depending on their regional research base or site.
5. AIST requested the cooperation of visiting researchers in cutting peak electricity consumption during summer.

## Green Curtain at AIST's Fukushima Renewable Energy Institute

This is the third year since the Fukushima Renewable Energy Institute (FREA) opened in Koriyama City, Fukushima Prefecture, in April 2014. The photos show the third year's growth of the green curtain on the third building (energy management building), as of August 2016.

The third building has an exhibition facility, the Renewable Energy Hall, which introduces the research conducted at FREA. Many visitors see the green curtain, because the Renewable Energy Hall is included on the tour and inspection route. AIST employees volunteer their time to tend to the curtain.

Mr. Tomohiro Yoshida of the General Affairs Division said, "We'd like to continue to grow green curtains to make visitors feel cool visually and save energy—even a little."



The third year's growth of the green curtain, August 2016

## Appropriate Management of Chemical Substances

As AIST conducts research, it uses a wide variety of chemicals usually in small quantities. Chemicals are properly used and stored to prevent fuming, flaming, and leaking and are properly treated for disposal.

### [Treatment of liquid waste and vent gas after the use of a chemical]

**Liquid waste:** At AIST Tsukuba, inorganic liquid waste is rendered harmless in the treatment facility on the premises and is then discharged into the public sewerage system. AIST Tsukuba decided to outsource the disposal of all organic liquid waste to an industrial waste-treatment service provider, starting in FY 2013. Regional research bases outsource the disposal of their organic and inorganic liquid wastes to industrial waste-disposal service providers.

**Effluent gas:** Toxic vapor-producing chemicals are used in fume hoods, and the toxic vapors are discharged through effluent gas detoxification systems. By using the integrated chemical management system described below, AIST provides each researcher with information on

the chemicals that may be used only in a fume hood and must be discharged only after being rendered harmless.

### Chemical Substances Integrated Management System

A wide variety of chemicals used in research are registered in the Chemical Substances Integrated Management System at the time of delivery. Via AIST's intranet, the Chemical Substances Integrated Management System allows all employees to view, at a glance, information on the laws and regulations applicable to the chemicals being used and on the properties and handling of the chemicals (SDS<sup>※</sup>). Also, the system gives a quick view of the amounts of hazardous materials (under the Fire Service Act) and high-pressure gases that may be stored in each room. The system is used to collect information on chemicals that are subject to the PRTR (Pollutant Releases and Transfer Register) below and should be reported to government agencies.

<sup>※</sup>Safety Data Sheet: a document that provides information on the risks, toxicity, physicochemical properties, handling precautions and so forth of chemicals

## Collecting Information on Released Chemical Substances

AIST reports on the releases and transfers of chemicals subject to the PRTR Act\* and applicable municipal ordinances. At AIST, the following chemicals are used in large quantities: organic solvents to dissolve or extract various organic compounds; hydrogen fluoride to clean semiconductors; and ferric chloride to treat hydrogen fluoride liquid waste. The use of these chemicals

must be reported every year.

#### \*PRTR Act

The official name of the PRTR Act is "The Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof". Facilities that use any of the 462 designated Type 1 chemicals in quantities of more than 1 ton/year (more than 0.5 tons in the case of some chemicals) must report the amount released to the environment and the amount transferred to other facilities (the amount sold and the amount disposed of by waste-disposal service providers).

### ●Amounts of chemicals reported under the Chemical Control Program

Releases and transfers of chemicals subject to the PRTR Act (chemicals used in quantities of more than 1 ton)

Research site	Substance	Amount used	Amount released		
			Air	Sewer	Waste
AIST Tsukuba Central 5	Hexane (kg)	1,087	380	0	710
	Dichloromethane (kg)	1,390	77	0	1,300
AIST Tsukuba West	Hydrogen fluoride and its water-soluble salt (kg)	3,860	0	180	0
	Ferric chloride (kg)	56,420	0	0	0

After use, all of the ferric chloride changes to insoluble ferric fluoride and ferric hydroxide. There are no releases and transfers.

#### [Tokyo Metropolitan Government]

Research site	Substance	Amount used	Amount released		
			Air	Sewer	Waste
AIST Tokyo Waterfront	Acetone (kg)	160	30	0	130
	Chloroform (kg)	130	30	0	100
	Methanol (kg)	710	80	0	630

Releases and transfers of chemicals subject to the Ordinance on an Environment to Ensure the Health and Safety of the Residents of Tokyo (chemicals used in quantities of more than 100 kg)

#### [Osaka Prefectural Government]

Research site	Substance	Amount used	Amount released		
			Air	Sewer	Waste
AIST Kansai	VOCs (kg)	2,075	160	1,400	540

Ordinance on the Preservation of the Living Environment of Osaka Prefecture (chemicals used in quantities of more than 1 ton)

## Storage of PCB Waste Materials

At each research base and site, PCB capacitor and transformer waste is stored as specially controlled industrial waste in accordance with statutory guidelines; a Specially Controlled Industrial Waste Manager inspects the stored PCB waste once a month to make sure it is properly stored.

In FY 2015, we focused on packing registration and concentration analysis of highly concentrated PCB waste (capacitors, ballasts, etc.) and classified the waste into PCB waste (high and low concentration) and non-PCB waste. Non-PCB waste was disposed of as industrial waste. We also systematically disposed of low-concentration PCB waste.

We will contract out the disposal of high- and low-concentration PCB waste to the Japan Environmental

Storage & Safety Corporation (JESCO) and a licensed detoxification service provider to complete the disposal within the period specified by law.

### ● Disposal and storage of PCB waste

Waste type	Quantity disposed of in FY 2015	Quantity stored at the end of FY 2015
Capacitors	29	19
Ballasts	0	3,681
Transformers	30	6
Oil/paint	7 L	277 L
Other pollutants	4	4,534

The PCB concentration analysis revealed that 304 capacitors and 1010 ballasts that had been stored as PCB waste were in fact non-PCB waste; we therefore reduced the quantities of these items stored compared with the quantities reported last year as being stored at the end of FY 2014.



Ballasts

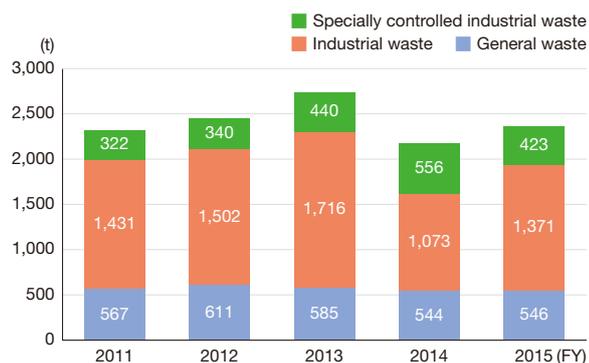


Capacitors

## Reduction in Waste Generation

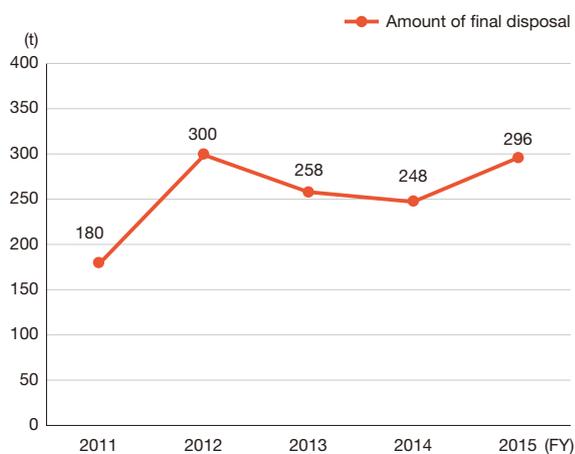
AIST seeks to reduce waste by applying 3R (Reduce, Reuse, and Recycle) principles and thus to reduce environmental loads. We are focusing particularly on the reuse of research equipment, because this reuse can also contribute to cost savings (see “Effective Use of Resources” below).

### Changes in the amount of disposed waste



The increase in waste emissions in 2015 is due to the closure of the AIST Kansai Amagasaki Site.

### Changes in amounts of final disposal



As part of our responsibility as a waste generator, every year we conduct an on-site inspection of waste treatment facilities on a voluntary basis to make sure the waste is appropriately treated and disposed of. In FY 2015, we conducted on-site inspections of 69 intermediate waste treatment and landfill facilities.

### Breakdown of waste generated (FY2015)

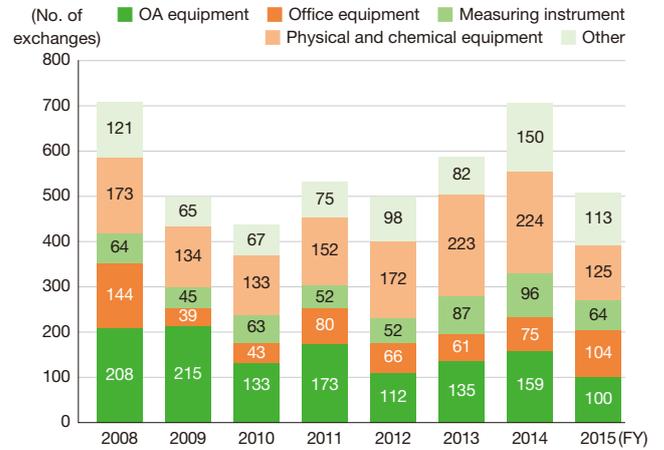
Waste type	Amount disposed (t)	Amount landfilled (t)	Percentage of waste landfilled (%)
General waste	546	86	16
Industrial waste	1,371	186	14
Plastic waste	194	57	29
Metal scrap	97	6	6
Sludge	366	49	13
Wood waste	8	3	34
Glass, concrete/ceramic waste	44	18	40
Mixtures	412	34	8
Slag	79	0	0
Other	171	19	11
Specially controlled industrial waste	423	24	6
Flammable waste oil	114	8	7
Strong acids	261	4	1
Infectious waste	17	11	64
Waste oil (hazardous)	8	0	2
Sludge (hazardous)	8	0	6
Acid waste (hazardous)	2	0	15
Other	13	1	8
<b>Total</b>	<b>2,340</b>	<b>296</b>	<b>13</b>

## Effective Use of Resources

Since 2005, an intranet-based Article Recycling System has been in place to exchange information on necessary and unnecessary items, including research equipment, OA equipment, furniture, and consumables, and to promote recycling within AIST.

We also give away items no longer used at AIST to external organizations. In these ways we facilitate the reduction and reuse of waste.

### Number of exchanges of items for recycling



## Conservation of Water Resources

At AIST Tsukuba and AIST Chubu, research wastewater is neutralized, reduced, and reused for use as water for cooling laboratory equipment and flushing.

### Breakdown of water received in FY 2011–2015

FY	2011	2012	2013	2014	2015
Clean water	1,059	1,082	1,003	964	914
Ground water	33	34	38	30	20
Industrial water	2	0	0	0	0
Total	1,094	1,116	1,041	994	934

### Changes in the amounts of water received and reused



Water reuse plant at AIST Tsukuba

# Compliance with the Convention on Biological Diversity and the Cartagena Act

In 1992, the cooperation of many countries, including Japan, led to the adoption of the Convention on Biological Diversity to allow comprehensive conservation of biodiversity and sustainable use of biological resources. The Cartagena Protocol was created to protect biodiversity through the safe transport, handling, and use of those living modified organisms that could have adverse effects on the conservation and sustainable use of biodiversity. In Japan, the Act on the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms (the Cartagena Act) came into effect in 2004.

To comply with the Cartagena Act, AIST holds committee meetings attended by external experts to conduct preliminary reviews of experiments involving living modified organisms and the handling of living modified organisms. In addition, to obtain the knowledge needed for compliance and to conduct the appropriate

experiments, AIST requires researchers and research assistants to undergo education and training once a year. There were 189 target experiments in FY 2015. We conduct on-site inspections of laboratories that use living modified organisms to ensure that the organisms are labeled as specified in the Act, that they are stored correctly, and that containment measures are taken to prevent dispersal of the organisms. We also provide on-site instruction as needed. By learning from cases of inappropriate handling that have occurred outside AIST, we continue to implement measures to prevent the occurrence of such incidents by confirming the purchase of reagents and microorganisms in advance, and by providing information—and calling attention— as needed to those responsible for experiments. We have a system in place at each research site to provide support and guidance in this regard and thus seek to conserve biodiversity.

## Environmental Compliance

We aim to promote AIST's compliance with laws and regulations, social norms, internal codes of conduct for researchers, and internal rules, and to turn AIST's Charter, "Full Research in Society, for Society," into a reality.

We take the following environmental protection actions to help conserve the global environment and create a sustainable society:

1. We comply with international environmental regulations

and the environmental laws and regulations of the government and municipalities, and we work to prevent pollution and conserve the natural environment.

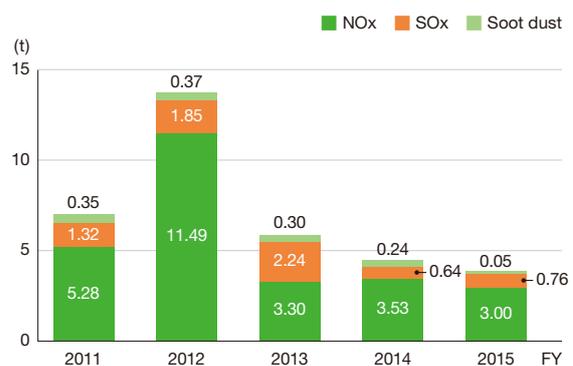
2. We promote research that helps to conserve the global environment and human safety, and we proactively work to improve energy efficiency, save natural resources, and promote recycling.

## Prevention of Air Pollution

The major sources of air pollutants at AIST are the boilers used as cold heat sources in air-conditioning. To reduce sulfur oxide (SOx) emissions, we use mainly city gas and kerosene as fuel for the boilers.

Twice a year (once for heating boilers) we measure the concentrations of NOx, SOx, and soot dust in the exhaust gas generated. The measurement results were all below the regulation standards specified in the Air Pollution Control Act.

● Changes in atmospheric environmental loads



## Prevention of Water Pollution



Wastewater treatment plant at AIST Tsukuba

At AIST, the fourth and subsequent washing waters from the laboratories are sent as research wastewaters to the wastewater treatment plant. The wastewater undergoes processes such as pH adjustment, coagulation and sedimentation, filtration, and activated charcoal absorption to meet municipal effluent standards. It is then discharged into the public sewerage system.

### ■ Monitoring of groundwater

Arsenic exceeding the limit was detected in the groundwater in a groundwater survey conducted in April 2012 at AIST Kansai. The water quality of seven groundwater observation wells is measured on a regular basis under the guidance of the government of the City of Ikeda, where AIST Kansai is located. In the water quality measurements taken in FY 2015, arsenic and its compounds exceeding the limits (the highest concentration was 0.034 mg/L, compared with the reference level of 0.01 mg/L) and boron and its compounds (the highest concentration was 1.3 mg/L, compared with the reference level of 1 mg/L) were detected in the water from seven observation wells. We will continue the monitoring.

Fluorine and its compounds exceeding the limits were detected in the soil in a survey conducted in June

2012 at AIST Chubu. One groundwater observation well was drilled. Under the guidance of the government of the City of Nagoya, where AIST Chubu is located, the quality of the groundwater is measured once a year to prevent the spread of contamination. In the measurements of water quality taken in FY 2015, no particular issues were identified. We will continue the monitoring.

### ■ Periodic inspection of underground research wastewater pipes

AIST conducted periodic inspection of underground research wastewater pipes in accordance with the Water Pollution Prevention Act. Pipe damage was found at AIST Tsukuba and AIST Chubu; however, the effluent contained no hazardous substances and no soil contamination was detected.

### ■ Excess of effluent standards

In FY 2015, the wastewater exceeded the effluent standards once at both AIST Tsukuba and AIST Tokyo Waterfront. Therefore, we reported the results to the respective municipal governments and took measures to prevent recurrence. Since this incident there has been no exceedance of the standard values.

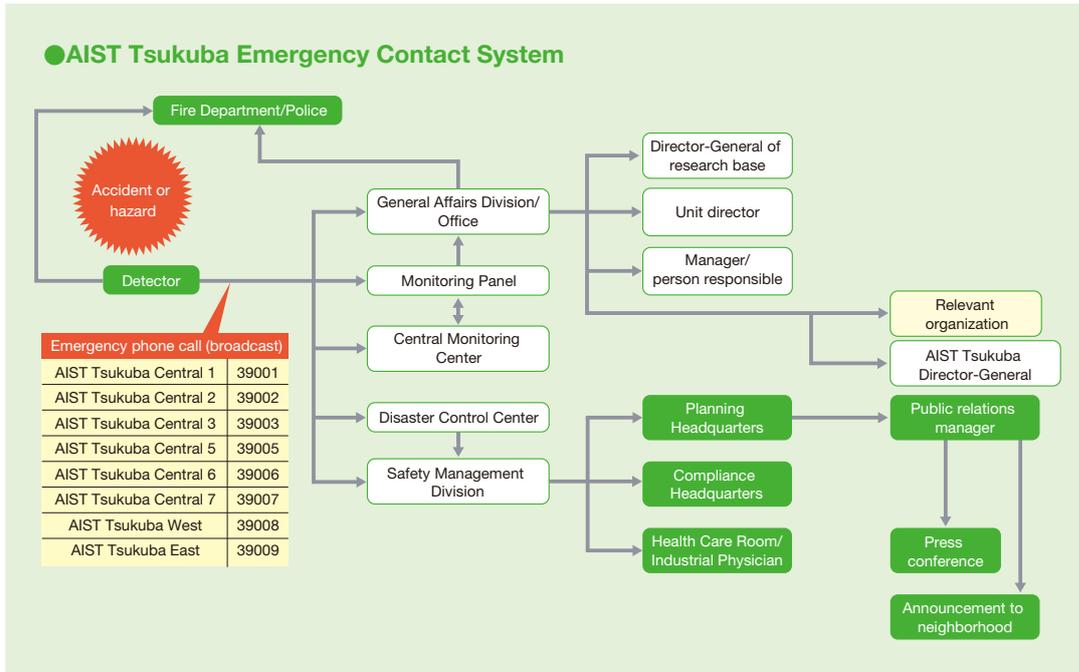
### ● Cases exceeding effluent standards at AIST Tsukuba and AIST Tokyo Waterfront

	Item exceeding the standards	Cause	Countermeasures
AIST Tsukuba	Manganese and its compounds	Cleaning water from the sump tank	Conduct a simple analysis before draining the cleaning water
AIST Tokyo Waterfront	Zinc and its compounds	Roof rainwater	Increase the frequency of water quality monitoring

# Accidents Affecting the Environment

To ensure compliance with environmental laws and regulations, AIST has an Environmental and Safety Management System (ESMS) in place. No accidents

occurred in FY 2015. We have a system to minimize damage in the event of an accident.



## ■ Drills to prepare for environmental accidents

AIST conducts contact, communication, and emergency action drills to minimize damage in the event of an environmental accident such as leakage of oils and chemicals. In FY 2015, we conducted 20 accident drills across all research bases on such events as leakage of hazardous materials from rooftop exhaust cleaning equipment and leakage of research wastewater during transport. We will continue to conduct drills for various environmental accidents on a regular basis.

## ■ Noise measurement

To prevent the noise generated by research institutions and facilities from adversely affecting the surrounding environment, AIST conducted voluntary periodic measurements of noise at all research bases. The results were all below the standards.



Scene of an environmental accident drill

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## Reports on Accidents that Occurred in 2015

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### ■ Fire outbreak due to abnormal heat generation

A fire broke out near a laboratory equipment monitoring computer (24-h operation) and burned out the computer and external HDD and their supporting rack. The fire was extinguished promptly with an extinguisher. We took the following measures to prevent recurrence: secured space around the monitoring computer (e.g., use of a rack); prevention of abnormal heat generation;

ensuring nothing was placed on top of the main body of the computer; and turning off the computer when not in use.

### ■ Complaints from neighborhood residents

AIST Tsukuba and AIST Hokkaido received one complaint each from neighborhood residents about vibration, planting, and noise; measures were taken to prevent further complaints.



Burnt-out computer and other devices

## The AIST Report 2016: Social and Environmental Report

Director, Workers Club  
for Eco-harmonic  
Renewable Society (NPO)

**Tamio  
Yamaguchi**



One of the important features of a CSR report, according to the characteristics of information about social responsibility given in ISO 26000, is “being sensitive.” The principles of conduct given in the charter of AIST include “understanding social developments.” This report does exhibit sensitive understanding in accordance with this principle. One recent development is a rise in understanding of the importance of cooperation between industry, academia and government in innovation.

Pioneering and effective innovation is essential for success in global competition. If we look at the situation in Japan, however, self-sufficiency is the rule. The bulk of development funds are directed to short-term research within companies and within departments, and there is little mobility of personnel. This is not a strong basis for promoting innovation. Accordingly, government ministries and agencies are molding a range of policies to promote innovation.

Given these developments and with AIST being a designated national research and development institute, what initiatives AIST implements must be a matter of great interest for readers. This report describes details and presents quantitative results of initiatives for promoting the creation of innovations, including the provision of opportunities for cooperation between industry, government and academia; strengthening inflow of researchers; opening of the Ishikawa and Fukui sites; participating in technology research associations; the AIST Innovation School; and the cross-appointment system.

One development that cannot be ignored is The Act on Promotion of Women’s Participation and Advancement in the Workplace, which came into force in April 2016. The employment and participation of female researchers has been reported on before, but sensitivity to the new law is apparent and is exhibited in the inaugural round table with the theme “Diversity in AIST.” From that discussion, the true feelings of women, which have not been described in previous reports, and the atmospheres of their workplaces

can be understood. Statements such as “you can actively participate whatever your gender” and “AIST is an ideal workplace” inspire confidence that upcoming goals for gender equality will be achieved. Concerns about working hours are addressed by statements such as “the number of people going home early has increased” and “working more efficiently.” The sense given is of a workplace in which both men and women can keep working for a long time with a good work–life balance.

While this report is highly accomplished, in the future I would like to see more sensitive responses to global developments. For example, in September 2015 the United Nations adopted the 2030 Agenda for Sustainable Development. This agenda calls for actors in various sectors, such as governments, to work towards achieving its Sustainable Development Goals (SDGs). I think the importance of AIST’s research could be even better expressed if the Research Reports indicated how the research relates to the 17 SDGs.

Within Japan, the Ministry of Defense has recently launched a system for public funding of research into dual-use technologies. There are reports that such research has begun in universities and public research institutes. The Science Council of Japan has set up a committee to consider national security and science and discussions are ongoing. I recognize that this is not a simple matter, but I would like to see an introduction of AIST’s thinking or guidelines regarding research on dual-use technologies as well as whether setting such guidelines is being considered.

Workers Club for Eco-harmonic Renewable Society (Junkan Workers Club): A citizens group that investigates, with a global perspective, the form of a society in harmony with the natural ecosystems that will be passed on to the next generation. The goal of the club is to study, support and put into practice measures leading to a sustainable mode of society for regional citizens, businesses and governments. At CSR workshops within the club, the group studies and proposes appropriate forms of CSR.  
URL: <http://junkanken.com/>

### On the publication of the AIST Report 2016

Deputy Director-General, Planning Headquarters

**Hiroki Yotsumoto**

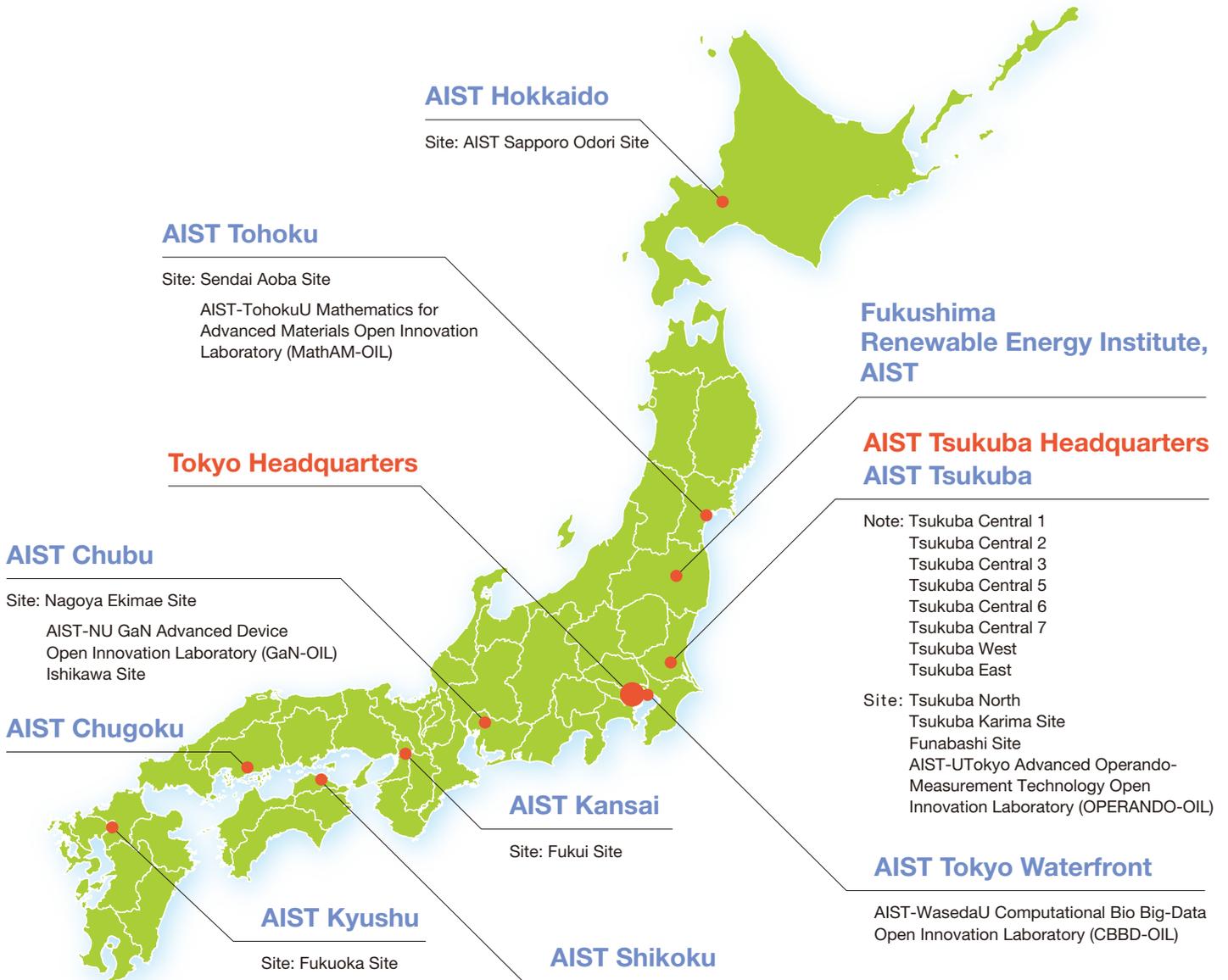
AIST has been publishing environmental reports since 2004. Since 2010, the AIST Report: Social and Environmental Report has been compiled and published in accordance with ISO 26000, widening the scope of the report to cover research bases across the country in addition to AIST Tsukuba and adding reports on initiatives relating to the environment, workplace health and safety, and corporate social responsibility.

This year’s report raises the issue of promoting diversity in AIST in the Lead-off Article and introduces AIST’s research strategy toward 2030. The Research Reports present the results

of research into omnidirectional displays, flexible transistors and geological surveys of coastal areas. The report also covers work on open innovation to transfer the fruits of this research and work on the development of our human resources.

For AIST, with the motto “in society, for society,” it is our duty and our mission to present AIST’s activities to the many stakeholders who want to hear about them in a form that is easy to understand. In this report, we are striving to make connections to build relationships of deeper trust with society.

## Research Bases (as of Sept. 30, 2016)





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