

# Organization and Outline



## “Open Innovation” of AIST

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# To meet expectations for scientific and technological innovation

– AIST promotes science, technology and innovation integrally –

**Ryoji Chubachi**

President

National Institute of Advanced Industrial  
Science and Technology (AIST)



In present-day Japan, we can just feel that the air is filled with high hopes for scientific and technological innovation. This includes the hope that scientific and technological innovation can become an engine for the economic growth that leads Japan's industry in the midst of our present problems. These problems include the decreasing and aging population, the need to reconstruct a deteriorating social infrastructure, the expansion of the information society and globalization, and the changes in global society due to the growth of emerging countries. There is also the hope that scientific and technological innovation can provide solutions to global issues, for example, population; resources and energy; climate change and the environment; water and food; and so on.

In 2001, AIST was reorganized through the integration of 15 research institutes under the former Agency of Industrial Science and Technology. With the aims of developing industries and ensuring a stable supply of energy resources, AIST has conducted R&D related to mining and industries. This institute is one of the leading public research institutions in Japan, where about 10,000 staff members, including about 3,000 full-time employees, part-time staff and visiting researchers, are engaged in their activities. AIST has six research fields classified into environment and energy, life science and biotechnology, information technology and electronics, nanotechnology, materials and manufacturing, metrology and measurement science, and geological survey and applied geoscience. For solutions of various issues in society, we at AIST are promoting science, technology and innovation integrally, not only by conducting interdisciplinary collaboration within and between the fields of AIST but also by building various collaborations with external parties.

To enable swift and flexible research activities, AIST is divided into three research units: a "research institute" for continuous research, a "research center" for intensive research to meet high needs, and a "research laboratory" aiming for a future research center. Each research unit pursues research efforts with its own clear goal. As of July 2014, there are 42 research units at AIST.

In addition, in order to promote science, technology and innovation integrally, AIST, since its establishment, has implemented various pursuits such as collaboration with

universities, public testing and research institutions and companies on a one-to-one basis or in consortiums; and collaboration by organizing joint research projects, or data base construction and sharing. In particular, reinforcing "functions of open innovation hub" by utilization of "human resources" and "research platforms" of AIST is one of our current important missions. Under this mission, we at AIST are promoting R&D, technology evaluation and standardization by industry-academia-government collaboration. In addition, AIST is promoting open and active large-scale collaborations through, for example, participation in technology research associations. As of July 2014, AIST is a member of 25 technology research associations and is also pursuing large-scale collaborations, including the Tsukuba Innovation Arena (TIA-nano).

It is important that comprehensive integration of science, technology and innovation utilizes Japan's regional resources and stimulates the development of our regional industries. AIST has research bases throughout the nation. Each research base focuses on specific issues based on the regional needs and conducts R&D to solve the issues. In order to cope with diverse research needs, we at AIST are making efforts to provide appropriate services to local communities through close communication and sharing of information with our research bases in different regions.

Support for recovery from the unprecedented damage caused by the Great East Japan Earthquake is also an important role of AIST as a public research institution. AIST has been providing support for radiation measurement, the development of decontamination techniques, and other projects. In April of this year, we opened the Fukushima Renewable Energy Institute in Koriyama, Fukushima Prefecture, and began R&D on hydrogen carriers, next-generation photovoltaic power generation, ground source heat and geothermal energy, etc., with the cooperation of companies and universities in Japan and research institutes overseas.

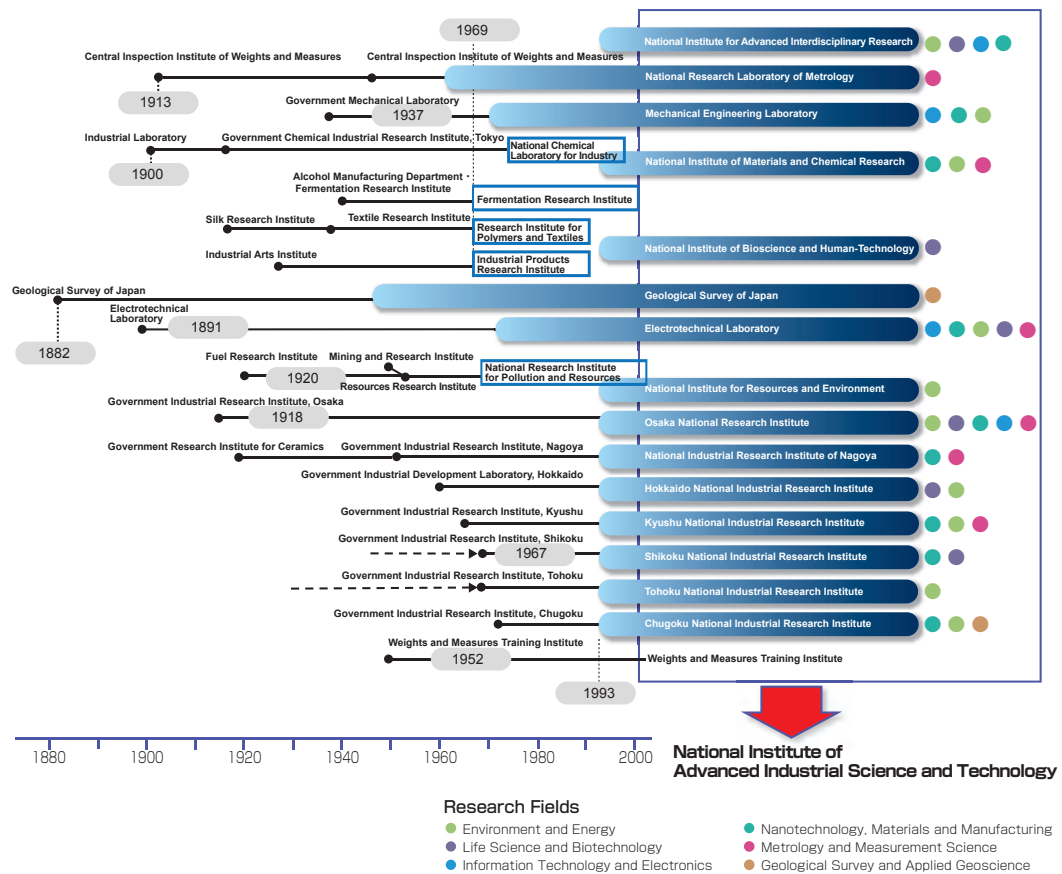
The integrated promotion of science, technology and innovation leads to the creation of new economic and social values which will realize growth involving innovation. Now, is the time when AIST, as a leading public research institution, will play a significant role in contributing to the development of Japan.

(written in July 2014)








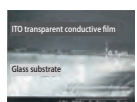


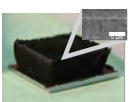


# Brief History

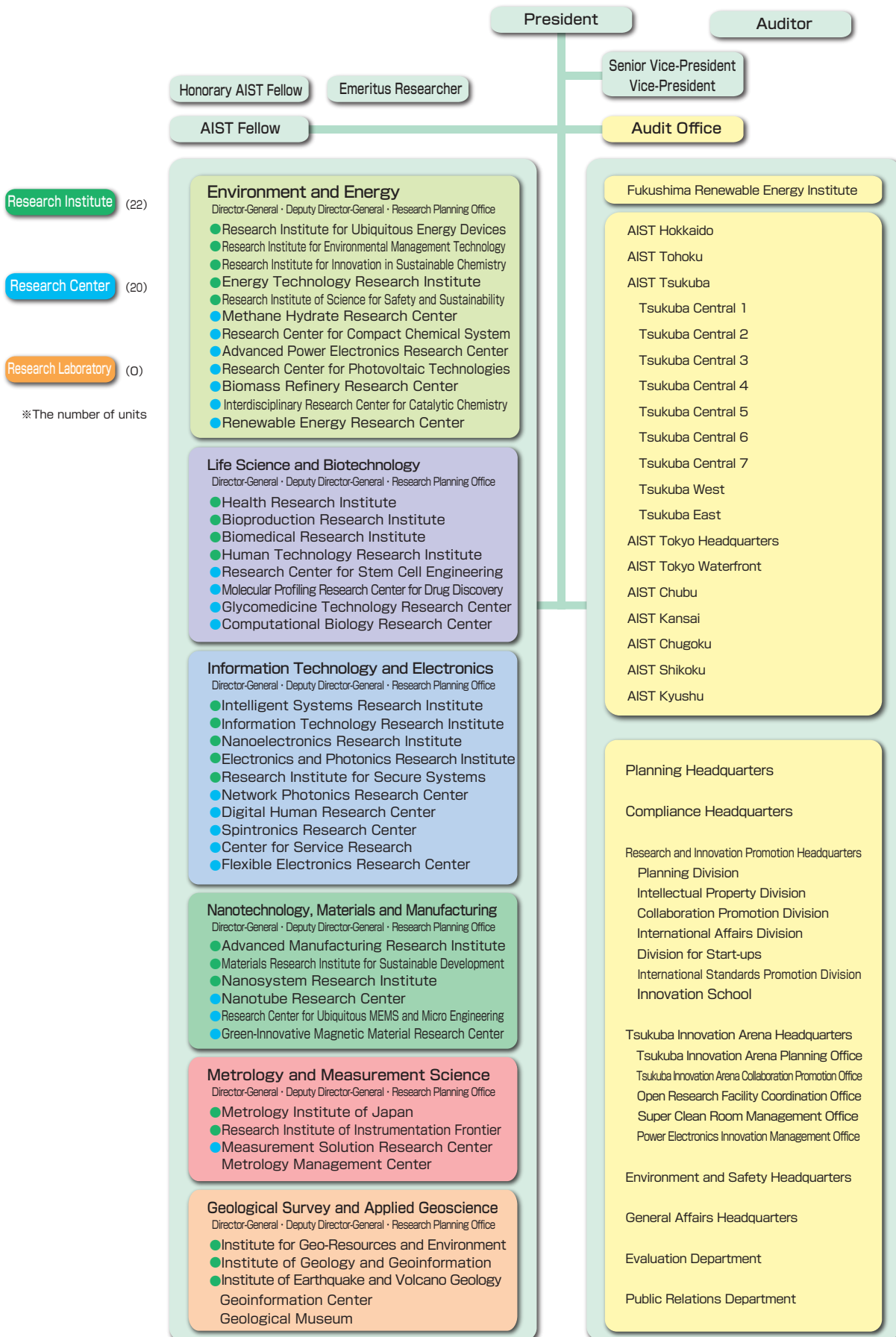
The National Institute of Advanced Industrial Science and Technology (AIST) was reorganized in April 2001 as an incorporated administrative agency upon the integration of the 15 research institutes of the former Agency of Industrial Science and Technology, the former Ministry of International Trade and Industry (MITI) and the Weights and Measures Training Institute under MITI. AIST's history dates back to the Geological Survey of Japan established in 1882 under the Ministry of Agriculture and Commerce. The ministry was subsequently transformed into the Ministry of Commerce and Industry in 1925, under which the Industrial Technology Agency was established in 1948. Following the establishment of MITI in 1949, the Industrial Technology Agency was reorganized as the Agency of Industrial Science and

Technology three years later, in 1952. Through a succession of name changes and reorganizations, AIST became an incorporated administrative agency after the central government reform in January 2001. Some of the founding institutions of AIST have a history of more than 100 years and have achieved many prominent records of technological development. As a public research institute, AIST is required to function as a platform for developing technologies for innovation in Japan and to play proactive roles as an organization that directly promotes such innovations in industry. While constantly stimulating new industries, AIST takes initiative as a leading research institute for innovation while placing its major emphasis on research that offers practical benefits to the world.



## Noteworthy research results

 <p><b>1890s</b> Establishment of the weights and measures (Japanese Prototype Kilogram)</p>	 <p><b>1890s</b> Geological Map of Japan (1:3,000,000)</p>	 <p><b>1920s</b> Development of an ammonia synthesis process using home-grown technology</p>	 <p><b>1950s</b> Transistor computer MARK-IV</p>	 <p><b>1950s</b> Development of PAN based carbon fiber</p>	 <p><b>1960s</b> Senior Researcher Jun Kondo published the theory of the resistance minimum in dilute magnetic alloys</p>	 <p><b>1960s</b> Development of production process for glucose isomerase used to make soft drink sweetener</p>
 <p><b>1960s</b> Development of a production method for transparent conductive film (ITO = indium tin-doped oxide)</p>	 <p><b>1980s</b> Development of anode alloys as the foundation for nickel metal hydride batteries</p>	 <p><b>1990s</b> Development of humidity controlling material using porous ceramics</p>	 <p><b>2000s</b> A breakthrough in single-wall carbon nanotube synthesis</p>	 <p><b>2000s</b> Development of closed-type transgenic plant factory</p>	 <p><b>2000s</b> Development of high-performance TMR element optimal for HDD magnetic heads</p>	



# Research Units of AIST


AIST's research is advanced by its research units. They are classified into three types: a "research center" is a temporary research unit which intensively conducts top-notch R&D to meet high social needs; a "research institute" is a continual and fundamental research unit from which novel research centers diverge and with which terminated research centers converge; a "research laboratory" is established with a swift and flexible strategic decision and acts as a precursor to a future research center. From a strategic point of view, AIST continually and flexibly reviews and reconstructs these research units.

We have set up new positions in each six research fields: director-generals, deputy director-generals, and directors of the Research Planning Office. This is in order to create

research strategies of the field and to promote R&D in close coordination with corresponding directors of the research units. We facilitate interdisciplinary researches within and/or between research fields of AIST and coalition with private sectors and academics. We timely recruit excellent domestic and foreign researchers and endeavor to find and to address the most current issues we face today.

As the world-wide competition of innovation becomes keener, AIST's role as a hub of the public research domain has become critically important. Therefore, along with many activities promoting the nation's industrial science and technology, AIST proactively participates in "technology research associations," aiming to accomplish its primary mission of reinforcement of its open innovation hub functions.

As of July 1, 2014

President	Field name	Research Institute	Research Center
	<b>Environment and Energy</b> Director-General Deputy Director-General Research Planning Office <span style="float: right;">477</span>	Research Institute for Ubiquitous Energy Devices Research Institute for Environmental Management Technology Research Institute for Innovation in Sustainable Chemistry Energy Technology Research Institute Research Institute of Science for Safety and Sustainability	Methane Hydrate Research Center Research Center for Compact Chemical System Advanced Power Electronics Research Center Research Center for Photovoltaic Technologies Biomass Refinery Research Center Interdisciplinary Research Center for Catalytic Chemistry Renewable Energy Research Center
	<b>Life Science and Biotechnology</b> Director-General Deputy Director-General Research Planning Office <span style="float: right;">346</span>	Health Research Institute Bioproduction Research Institute Biomedical Research Institute Human Technology Research Institute	Research Center for Stem Cell Engineering Molecular Profiling Research Center for Drug Discovery Glycomedicine Technology Research Center Computational Biology Research Center
	<b>Information Technology and Electronics</b> Director-General Deputy Director-General Research Planning Office <span style="float: right;">336</span>	Intelligent Systems Research Institute Information Technology Research Institute Nanoelectronics Research Institute Electronics and Photonics Research Institute Research Institute for Secure Systems	Network Photonics Research Center Digital Human Research Center Spintronics Research Center Center for Service Research Flexible Electronics Research Center
	<b>Nanotechnology, Materials and Manufacturing</b> Director-General Deputy Director-General Research Planning Office <span style="float: right;">299</span>	Advanced Manufacturing Research Institute Materials Research Institute for Sustainable Development Nanosystem Research Institute	Nanotube Research Center Research Center for Ubiquitous MEMS and Micro Engineering Green-Innovative Magnetic Material Research Center
	<b>Metrology and Measurement Science</b> Director-General Deputy Director-General Research Planning Office <span style="float: right;">325</span>	Metrology Institute of Japan Research Institute of Instrumentation Frontier	Measurement Solution Research Center
	<b>Geological Survey and Applied Geoscience</b> Director-General Deputy Director-General Research Planning Office <span style="float: right;">195</span>	Institute for Geo-Resources and Environment Institute of Geology and Geoinformation Institute of Earthquake and Volcano Geology	

Note: The numbers indicate the research employees belonging to Research Units.

### Research Institute (22)

A Research Institute continuously conducts research to achieve the missions and Medium-Term strategies of AIST based on scenarios defined by the research unit director and research themes defined by the initiatives of researchers.

### Research Center (20)

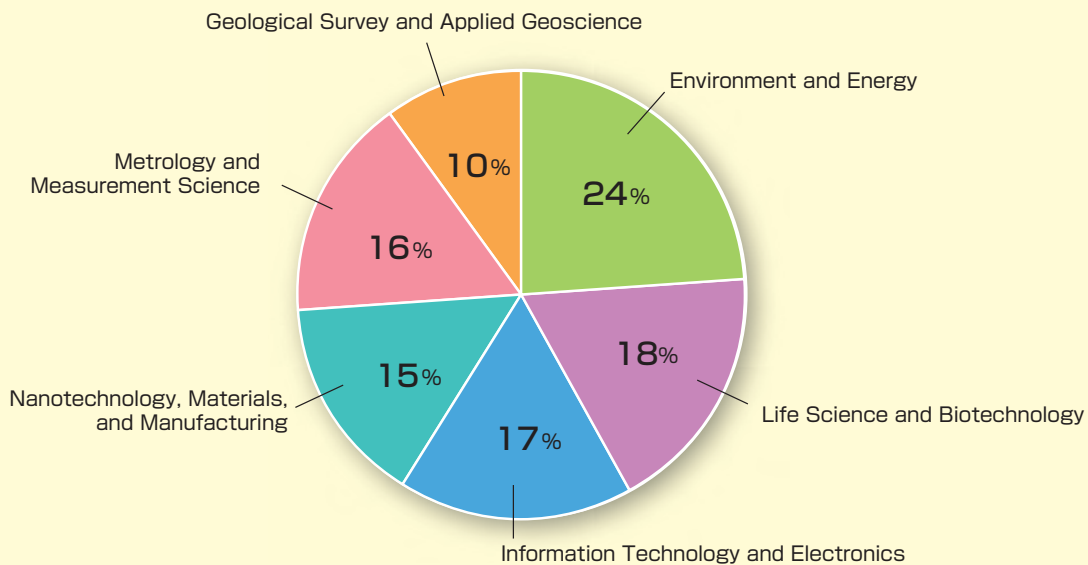
Originating from a Research Institute or as a result of social need, a Research Center intensively conducts research for a period of three to seven years under the strong leadership of the research unit director to swiftly produce technologies and knowledge to solve specific issues.

# Employees and Budget

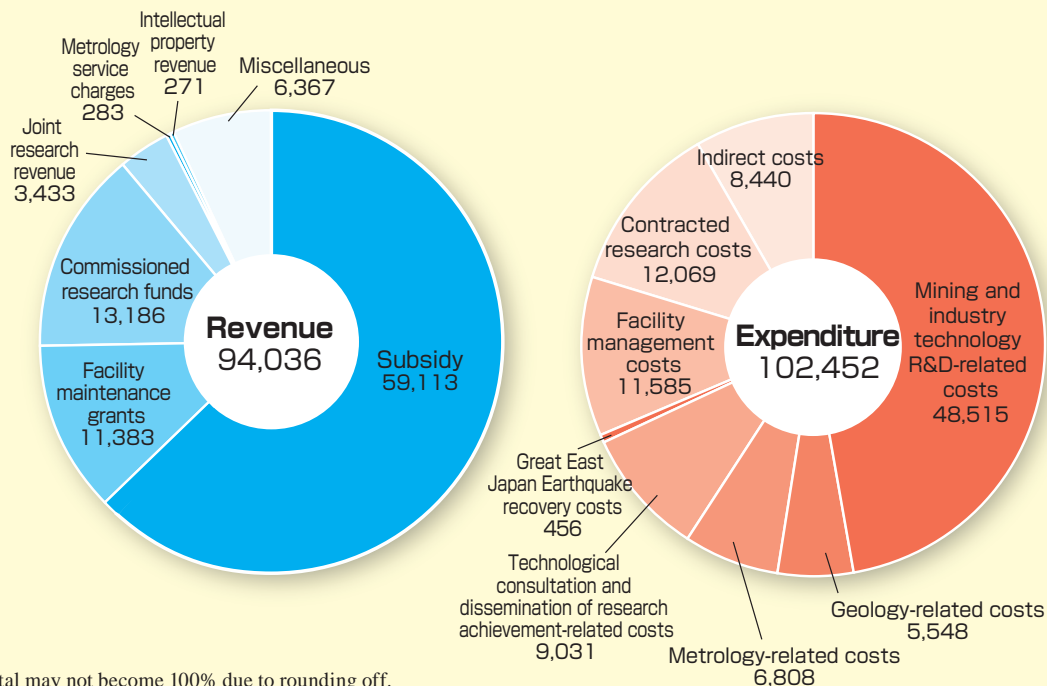
- Researchers (foreign nationals) ..... 2,255(88)
    - [ Permanent ] [ 1,948]
    - [ Fixed term ] [ 307 ]
  - Administrative employees (foreign nationals) ..... 666(1)
- As of July 1, 2014 ; total number of employees : 2,921 (89)
- Executives (full time) ..... 13
  - Visiting researchers ..... 153
  - Postdoctoral researchers ..... 245
  - Technical staff ..... 1,695

- Number of researchers accepted through industry/academia/government partnerships
- Companies ..... 1,774
  - Universities ..... 1,852
  - Other organizations ..... 972
- (foreign nationals : 426)  
(Total number of researchers accepted in FY 2013)

Composition of researchers by research field (As of July 1, 2014)



Financial Results for FY 2013 (unit : million yen)



Notes 1: Total may not become 100% due to rounding off.  
 Notes 2: The amounts of revenue and expenditure are adapted from the "Financial Statement" prescribed in Article 38 of the General Rule Act for Independent Administrative Corporations. The expenditure outreaches the revenue as we carried forward the balance of previous years.

For the Japanese industry to recover its dynamism and to grow, industrial re-creation based on industrial technologies is essential. Leading the world in the creation of businesses of innovative technologies, in other words, the enhancement of industrial competitiveness through continuous creation of innovations is required.

On the other hand, shifting production overseas is inevitable for Japanese enterprises due to market reduction in Japan and rapid growth of market size in emergent countries. Moreover, it is getting more and more difficult for private companies to do basic research and development independently. Under these circumstances it is necessary for a governmental research institute to try to establish hubs for R&D, standardizations and human resource developments, for example, which promote innovations inside the country in order to maintain domestic employment both in quality and in quantity.

Being one of the largest public research institutions in Japan, AIST plays a central role as the open innovation hub for government-industry-academia collaboration by utilizing its human resources in various research fields, leading-edge infrastructures, accumulated research findings, systems for technology fusions and personnel training, and regional research bases and their networks.

On this account, AIST promotes appealing research projects for industry by gathering a variety of personnel, organizations

and institutes, and an effective utilization of international networks.

Furthermore, AIST continuously promotes the accumulation of research findings, upgrading of leading-edge infrastructures, and training of personnel, and enhances the support system for research development and industrialization from mid-and long-term perspectives.

In concrete terms, we try to deliver on our strategy in 3 stages for reinforcing functions of an open innovation hub, and promote green innovation, life science-based innovation etc.

Stage 1: creating promising seeds

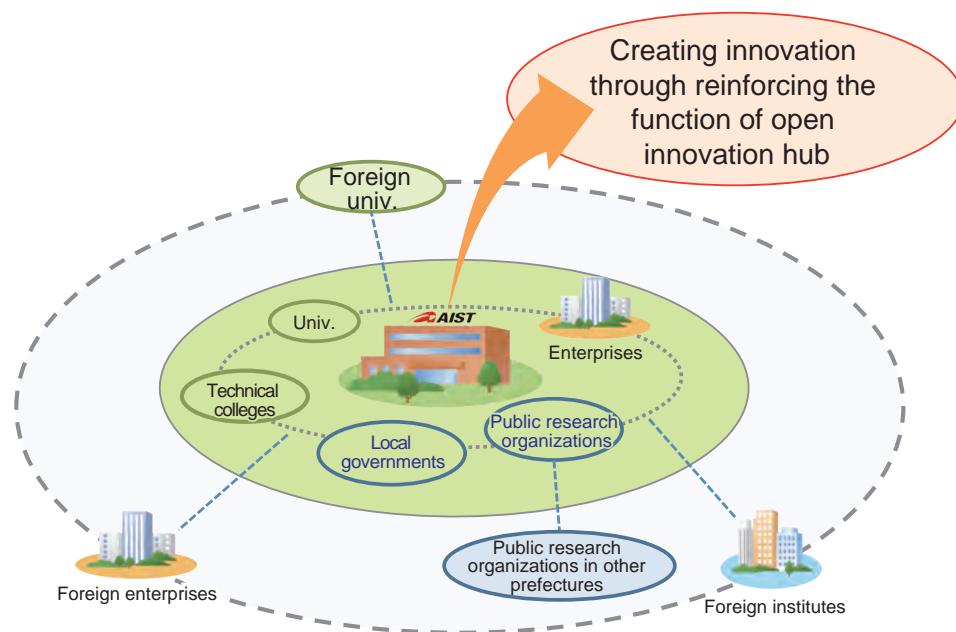
- Development of function of utilizing research achievements
- Gathering and development of talents

Stage 2: developing outstanding technology

- Enhancement of collaboration with industry
- Promotion of open innovation in regions
- Reinforcement of hub function by internationalization

Stage 3: establishing paths to the market

- Preparation of strongholds
- Enhancement of networks with industry



For inquiries and consultation about industry-academia-government collaboration and technology licensing, please contact the following:

- Planning Division  
 Research and Innovation Promotion Headquarters  
 FAX : 029-862-6130  
 (from outside Japan: +81-29-862-6130)

**Locations of regional research bases and directions of research focus**

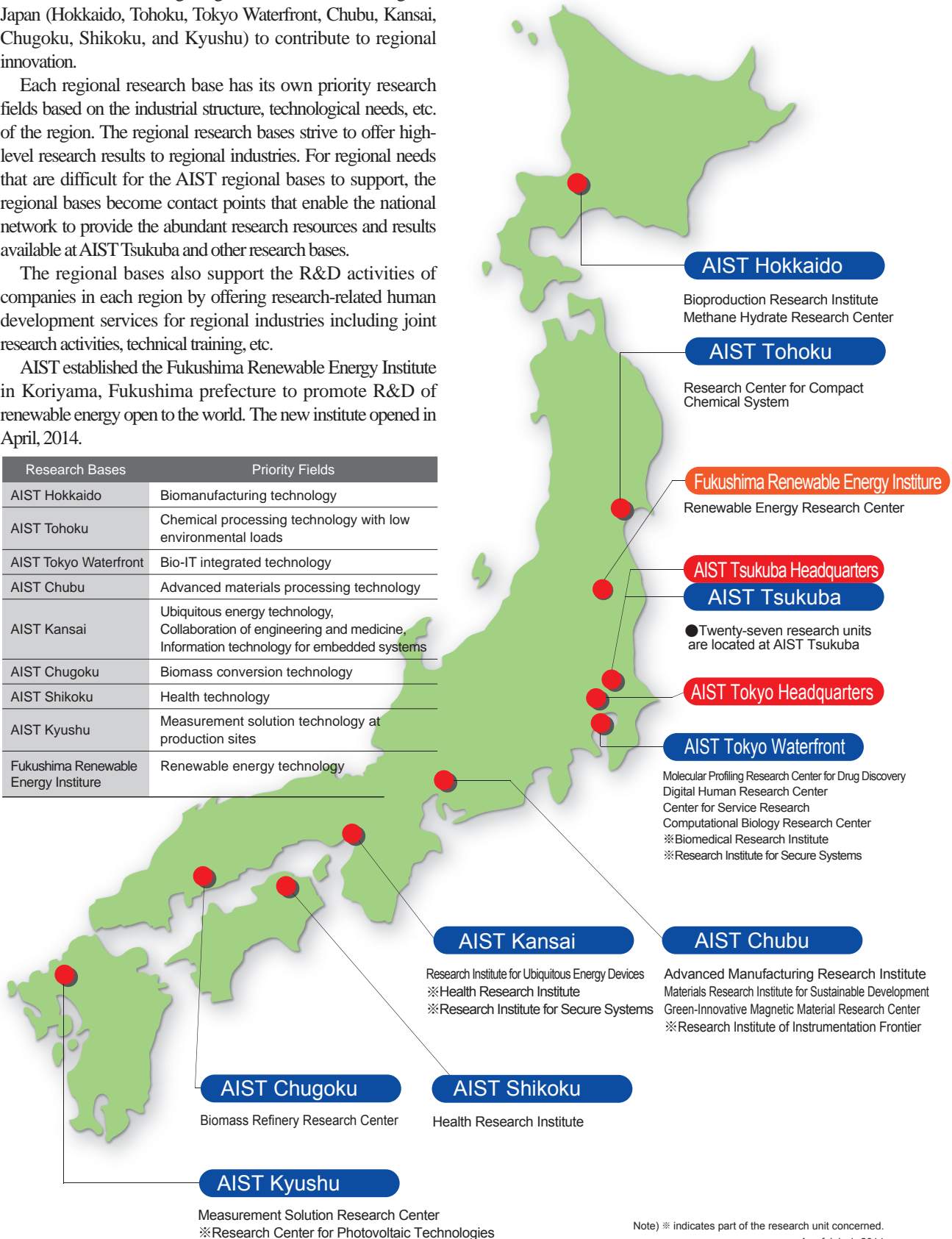
Innovations created by companies in each region of Japan are expected to play an important role in regional economic revitalization. AIST has eight regional research bases throughout Japan (Hokkaido, Tohoku, Tokyo Waterfront, Chubu, Kansai, Chugoku, Shikoku, and Kyushu) to contribute to regional innovation.

Each regional research base has its own priority research fields based on the industrial structure, technological needs, etc. of the region. The regional research bases strive to offer high-level research results to regional industries. For regional needs that are difficult for the AIST regional bases to support, the regional bases become contact points that enable the national network to provide the abundant research resources and results available at AIST Tsukuba and other research bases.

The regional bases also support the R&D activities of companies in each region by offering research-related human development services for regional industries including joint research activities, technical training, etc.

AIST established the Fukushima Renewable Energy Institute in Koriyama, Fukushima prefecture to promote R&D of renewable energy open to the world. The new institute opened in April, 2014.

Research Bases	Priority Fields
AIST Hokkaido	Biomanufacturing technology
AIST Tohoku	Chemical processing technology with low environmental loads
AIST Tokyo Waterfront	Bio-IT integrated technology
AIST Chubu	Advanced materials processing technology
AIST Kansai	Ubiquitous energy technology, Collaboration of engineering and medicine, Information technology for embedded systems
AIST Chugoku	Biomass conversion technology
AIST Shikoku	Health technology
AIST Kyushu	Measurement solution technology at production sites
Fukushima Renewable Energy Institute	Renewable energy technology



Note) ※ indicates part of the research unit concerned.  
As of July 1, 2014

# AIST's Network of Research Bases Throughout Japan



## AIST Tsukuba

### Toshihiko Kanayama

Director-General, AIST Tsukuba :  
Senior Vice-President of AIST

● Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan  
TEL: (029) 861-2000 (from outside Japan: +81-29-861-2000)

As a core research facility AIST Tsukuba conducts research in the six areas and serves as an international open innovation hub working in close collaboration with the private sector and domestic and overseas universities and research institutions. We also train young researchers through the Innovation School program, disseminate research results to industries and research institutions through presentations at the Science Square and the Industry-Academia-Government Collaboration Salon, and transfer research results through collaborative research and technical consultations. Through these activities we are providing technology-based solutions to problems of society and industry from both the regional and global perspectives.



## AIST Hokkaido

### Yoichi Kamagata

Director-General, AIST Hokkaido

● 2-17-2-1 Tsukisamu-Higashi, Toyohira-ku, Sapporo, Hokkaido 062-8517, Japan  
TEL: (011) 857-8400 (from outside Japan: +81-11-857-8400)

AIST Hokkaido conducts research focusing on biomanufacturing (biotechnology-based material production technology), including drug development using the world's first closed-type transgenic plant production system ("plant factory"), and transfers the results of this research to industry. AIST Hokkaido is collaborating with the agriculture, forestry, and fishery industries and the food industry, which are the major industries in Hokkaido, to contribute to the development of a new industrial infrastructure based on biomanufacturing.



## AIST Tohoku

### Yasushi Mitsuishi

Director-General, AIST Tohoku

● 4-2-1 Nigatake, Miyagino-ku, Sendai, Miyagi 983-8551, Japan  
TEL: (022) 237-5211 (from outside Japan: +81-22-237-5211)

In the Tohoku Center, studies for integration of the technologies of chemical reactions, processes, and materials are conducted to contribute to the reduction of environmental burdens from chemical and manufacturing industries, and these studies can lead innovations in the industries. We are transferring the results of these research activities to the industries and also supporting creation of new industrial fundamentals and reconstruction from the earthquake disaster by providing environmentally benign technologies and value-adding technologies to local resources.



## AIST Chubu

### Hiroshi Tateishi

Director-General, AIST Chubu

● 2266-98 Anagahora, Shimo-Shidami, Moriyama-ku, Nagoya, Aichi 463-8560, Japan  
TEL: (052) 736-7000 (from outside Japan: +81-52-736-7000)

As a multidisciplinary research and development facility for material manufacturing focusing on ceramics and metals, AIST Chubu conducts R&D of manufacturing technologies to produce various materials and devices, particularly those expected to reduce energy and resource consumption. Through these activities, we are contributing to the development of a next-generation industrial infrastructure in collaboration with industries, universities, and public research institutions in the Chubu region, Japan's major industrial area.



## AIST Kansai

### Yasuo Hasegawa

Director-General, AIST Kansai

● 1-8-31 Midorigaoka, Ikeda, Osaka 563-8577, Japan  
TEL: (072) 751-9601 (from outside Japan: +81-72-751-9601)

AIST Kansai develops green technologies, which provide environmental suitability and sustainability of society, for electro-products such as secondary batteries made with the high industrial potential of the Kansai region. We focus our R&D also on collaboration of engineering and medicine for the development of healthcare and medical equipments based on biotechnology. We are contributing to system verification and training of software engineers to make the Kansai region a major center for the embedded system industry.



## AIST Chugoku

**Hiroshi Yanagishita**  
Director-General, AIST Chugoku

● 3-11-32 Kagami-yama, Higashi-hiroshima, Hiroshima 739-0046, Japan  
TEL: (082) 420-8230 (from outside Japan: +81-82-420-8230)

AIST Chugoku conducts research and development toward a sustainable society, with an emphasis on the biomass conversion technologies to produce chemicals, materials, and biofuels from wood-based biomass resources abundant in the Chugoku region. We have been working toward innovation to activate regional industries in cooperation with METI Chugoku and public research institutions in the Chugoku region, and constructing the network between companies in the region, based on "San-yuu-kai" (AIST Chugoku regional collaboration consortium).



## AIST Shikoku

**Hiroaki Tao**  
Director-General, AIST Shikoku

● 2217-14 Hayashi-cho, Takamatsu, Kagawa 761-0395, Japan  
TEL: (087) 869-3511 (from outside Japan: +81-87-869-3511)

AIST Shikoku conducts research on predictive disease diagnosis based on the evaluation of physical conditions, and on technologies to eliminate and detoxify health risk factors in daily life and the environment. We aim to ensure that research results obtained by combining leading-edge biotechnology, materials technology, and system development technology are used by local industries to help them enter new industries and revitalize the Shikoku region.



## AIST Kyushu

**Masanobu Watanabe**  
Director-General, AIST Kyushu

● 807-1 Shuku-machi, Tosu, Saga 841-0052, Japan  
TEL: (0942) 81-3600 (from outside Japan: +81-942-81-3600)

AIST Kyushu is engaged in research on measurement solution technologies to solve measurement problems at production sites of the regional key industries such as semiconductor, food and livestock industries. We are pursuing collaborations with industries on evaluation of long-term reliabilities of photovoltaics, and also with manufacturers, particularly in the semiconductor industry. We are also serving as a focal point for collaboration between all AIST researchers and companies, universities, and public research institutions in Kyushu.



## AIST Tokyo Waterfront

**Yasuyuki Yagi**  
Director-General, AIST Tokyo Waterfront

● 2-3-26 Aomi, Koto-ku, Tokyo 135-0064, Japan  
TEL: (03) 3599-8001 (from outside Japan: +81-3-3599-8001)

AIST Tokyo Waterfront promotes cutting-edge research and development and aims at innovation in human life, social system and services, focusing on fusion of bio and information technologies, such as bioinformatics, post-genome sequence, digitization of human functions and behaviors, interaction of information systems between men and social systems, etc. Located in Tokyo, public-private-partnership through various collaborations, technology transfer, fostering of young researchers, outreach activities, etc. are performed proactively.



## Fukushima Renewable Energy Institute

**Yoshiro Owadano**  
Director-General, Fukushima Renewable Energy Institute

● 2-2-9 Machiike-dai, Koriyama, Fukushima 963-0298, Japan  
TEL: (024) 963-1805 (from outside Japan: +81-24-963-1805)

Following the government's policy, "Basic Policy of Reconstruction after the Great East Japan Earthquake" (issued in July, 2011), the establishment of the Fukushima Renewable Energy Institute was decided. The new institute has two essential missions: "Promotion of R&D of renewable energy which is open to the world," and "Contribution to industrial reconstruction." The new institute opened in April, 2014, to develop innovative technologies in collaboration with domestic as well as international partners who gather there.

For your further interest, We have established Tsukuba Innovation Arena for Nanotechnology (TIA-nano) to promote open innovation. (For details, see p.43-p.44)



## Toward green innovation

For the purpose of green innovation, AIST is promoting the development of technologies for increased use of renewable energy and energy saving to reduce greenhouse gas emissions, the securing and effective use of natural resources, reduction of environmental loads of industry, and evaluation and risk management of various new technologies.



**Akira Yabe**  
Vice-President



**Tetsuhiko Kobayashi**  
Director-General



**Masaru Nakaiwa**  
Deputy Director-General



**Yuji Yoshida**  
Director, Research Planning Office

TEL : 029-862-6033 (from outside Japan: +81-29-862-6033)  
E-mail : envene-liaison-ml@aist.go.jp

## [Outline of priority strategies]

### Expanding the use of renewable energy

The use of inexhaustible renewable energy must be promoted to achieve a low-carbon society. In order to make optimal use of renewable energy, we are conducting research to improve the performance and reliability of solar and wind power systems and research on liquid fuel production from biomass.

### Energy saving

Improving energy efficiency has the direct and immediate effect of reducing greenhouse gas emissions. We are developing high-performance power storage devices and fuel cells to increase the efficiency of energy use as well as energy management systems to reduce energy use.

### Securing and effective use of natural resources

Securing and efficient use of diverse natural resources, such as biomass and mineral resources, must be ensured to achieve a material-recycling society. We are developing and improving processes to produce chemicals and fuels from biomass and other renewable sources. We are also developing technologies for the efficient use of exhaustible fossil resources such as coal and methane hydrates, and mineral resources such as rare metals, as well as recycling technologies.

### Reduction of environmental loads

Manufacturing processes in various industries must be improved for higher efficiency and for the reduction of the environmental load. We are developing green sustainable chemistry technologies to minimize environmental emissions from chemical manufacturing processes and improve the energy efficiency of processes. We are also developing technologies to reduce the environmental load generated by industrial activities and restore the environment.

### Evaluation and risk management

New energy technologies and advanced materials must be properly evaluated, and managed to achieve a sustainable society. We are analyzing and evaluating scenarios for introducing new energy technologies, and evaluating CO<sub>2</sub> emission reduction activities. In addition, we are developing technologies to appropriately evaluate risks of chemicals and the environmental impact of substances produced by industrial activities.



## Research Institute for Ubiquitous Energy Devices

**Toward secondary batteries and other energy-efficiency technologies for daily life**

URL : [http://unit.aist.go.jp/ubiqen/index\\_e.html](http://unit.aist.go.jp/ubiqen/index_e.html)  
 E-mail : [ubiqen-kansai-ml@aist.go.jp](mailto:ubiqen-kansai-ml@aist.go.jp)  
 1-8-31 Midorigaoka, Ikeda, Osaka 563-8577, Japan  
 Tel: (072) 751-8528 / Fax: (072) 751-9629  
 (from outside Japan: Tel: +81-72-751-8528 / Fax: +81-72-751-9629)

[ Research Base ] AIST Kansai

[ AIST Participating Technology Research Association ]

Fuel Cell Cutting-Edge Research Center Technology Research Association (FC-Cubic TRA)  
 Lithium Ion Battery Technology and Evaluation Center (LIBTEC)

[ Outline ]

In order to promote “green innovation,” in which efforts are made to achieve compatibility between economic growth and the environment in order to realize a low-carbon society, it is necessary to decrease the energy consumption of energy-using equipment such as home appliances and vehicles. High levels of safety and environmental compatibility must also be assured from the perspective of daily life. We are conducting research, from the level of materials through to systems, aimed at reducing the energy and resource consumption of new small mobile power supplies, including secondary batteries and fuel cells, as well as lighting and other appliances.



[ Director ]  
**Kazumi Tanimoto**



[ Deputy Director ]  
**Kazuaki Yasuda**



Cylindrical lithium-ion battery (model 18650) fabricated by our Institute

## Research Institute for Environmental Management Technology

**Development of new environmentally sound technologies to harmonize industrial activities and environmental protection**

URL : <http://unit.aist.go.jp/emtech-ri/e/>  
 E-mail : [emtech-web-ml@aist.go.jp](mailto:emtech-web-ml@aist.go.jp)  
 AIST Tsukuba West, 16-1 Onogawa, Tsukuba, Ibaraki 305-8569, Japan  
 Tel: (029) 861-8250 / Fax: (029) 861-8258  
 (from outside Japan: Tel: +81-29-861-8250 / Fax: +81-29-861-8258)

[ Research Base ] AIST Tsukuba (West) \*

[ Outline ]

We are conducting research to address environmental issues such as deterioration of the living environment and health due to hazardous chemicals and global warming in order to harmonize our industrial activities with a safe and secure environment. The areas that we are focusing on include the following:

- 1) development of next-generation environmental diagnostic technologies upgrading conventional environmental measurement techniques with bio- and nanotechnology
- 2) development of technologies to reduce health risks from hazardous chemicals in the air, water, and soil in an energy- and resource-efficient manner
- 3) development of compact recycling technologies to increase recycling rates in urban areas where huge wastes are generated
- 4) research on carbon cycling, which will contribute to the prevention of global warming, and on assessment methodologies for evaluation of CO<sub>2</sub> emission reduction technologies.



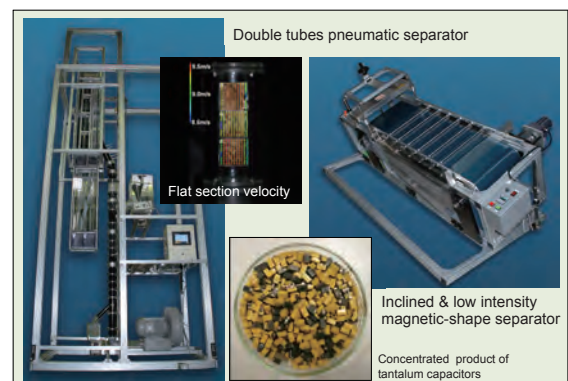
[ Director ]  
**Mikiya Tanaka**



[ Deputy Director ]  
**Hiroaki Kondo**



[ Deputy Director ]  
**Atsushi Ogata**



Recycling of tantalum capacitors from printed circuit boards

\* Note: AIST Tsukuba has Central (No. 1 to No. 7), West, and East.



## Research Institute for Innovation in Sustainable Chemistry

Research and development in the fields of chemistry and chemical engineering to achieve a sustainable society

URL : <http://unit.aist.go.jp/isc/ci/english/index.html>

E-mail : [isc-web-ml@aist.go.jp](mailto:isc-web-ml@aist.go.jp)

AIST Tsukuba Central 5, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8565, Japan

Tel: (029) 862-6792 / Fax: (029) 861-4457

(from outside Japan: Tel: +81-29-862-6792 / Fax: +81-29-861-4457)

[ Research Base ] AIST Tsukuba (Central, West)

[ AIST Participating Technology Research Association ]

Chemical Materials Evaluation and Research Base (CEREBA)

Advanced Laser and Process Technology Research Association (ALPROT)

Thermal Management Materials and Technology Research Association (TherMAT)

### [ Outline ]

The ultimate goal in the field of chemical technology is to develop technologies to selectively produce desired products using renewable resources and minimum energy but without generating wastes. We are engaged in the research and development (R&D) of innovative industrial technologies to achieve the ultimate goal described above from a long-term perspective, and the R&D of technologies to reduce the environmental load in existing industries and improve energy efficiency from a short-term perspective. In the longer term, we aim to develop technologies to produce chemical products from the biomass with the view of introducing renewable resources. In the short term, we conduct the R&D of technologies to produce high value products, as well as green sustainable chemistry (GSC) technologies, process efficiency improvement technologies, chemical laser technologies, and evaluation technologies for chemical materials.



[ Director ]  
Dai Kitamoto



[ Deputy Director ]  
Keiji Sakaki



## Energy Technology Research Institute

Development of energy technologies providing the basis for a sustainable society

URL : [http://unit.aist.go.jp/energy/index\\_e.htm](http://unit.aist.go.jp/energy/index_e.htm)

E-mail : [energy-info-ml@aist.go.jp](mailto:energy-info-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-5280 / Fax: (029) 861-5149

(from outside Japan: Tel: +81-29-861-5280 / Fax: +81-29-861-5149)

[ Research Base ] AIST Tsukuba (Central, West, East)

[ AIST Participating Technology Research Association ]

Thermal Management Materials and Technology Research Association (TherMAT)

The Research Association of Automotive Internal Combustion Engines (AICE)

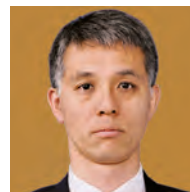
### [ Outline ]

We are conducting research and development in the following four areas to prevent global warming and ensure the supply and use of stable and easy-to-use energy sources.

- Clean technologies such as the use of natural energy sources, the production and high-density storage of hydrogen, and the cleaning of hydrocarbon resources
- Energy device and material technologies to develop high-performance solid oxide fuel cells, thermoelectric devices, and energy-storage capacitors, using advanced energy materials
- An energy network to achieve high efficiency of energy use by combining various energy sources, energy storage and transportation technologies, high-efficiency power conversion technologies, and power system control technologies
- Innovative and emerging energy technologies to realize breakthroughs



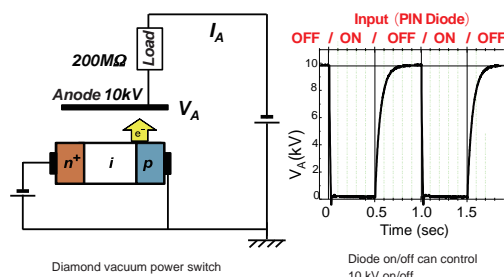
[ Director ]  
Haruhiko Obara



[ Deputy Director ]  
Fumio Takemura



[ Deputy Director ]  
Hiroaki Hatori



The world's first vacuum power switch with diamond PIN diode emitter (Time constant is determined by circuit LC. In principle it is less than msec.)



# Research Institute of Science for Safety and Sustainability

Scientific evaluations of safety and the sustainability of society

URL : [http://www.aist-riss.jp/main/?ml\\_lang=en](http://www.aist-riss.jp/main/?ml_lang=en)

E-mail : [webmaster\\_riss-ml@aist.go.jp](mailto:webmaster_riss-ml@aist.go.jp)

AIST Tsukuba West, 16-1 Onogawa, Tsukuba, Ibaraki 305-8569, Japan

Tel: (029) 861-8452 / Fax: (029) 861-8422

(from outside Japan: Tel: +81-29-861-8452 / Fax: +81-29-861-8422)

[ Research Base ] AIST Tsukuba (West, Central)

[ AIST Participating Technology Research Association ]

Technology Research Association for Single Wall Carbon Nanotubes (TASC)

## [ Outline ]

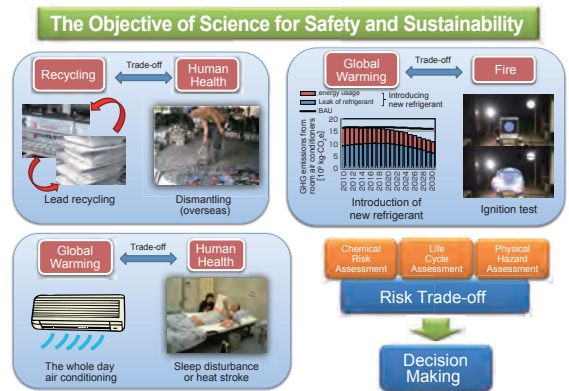
In our research, we are pursuing the science for the sustainability of society and safety from physical hazards and risks. This is because there are increasing cases of safety and social sustainability issues having a trade-off relationship and it is not enough to address only individual safety issues. We are conducting research on safety evaluations to meet the demand for a safer society and present scientifically sound guidelines for solving multiple trade-off issues based on the results of these evaluations. We are also disseminating the results of these evaluations to help the public, communities, industries, governments, and international organizations make rational decisions and develop realistic standards, thereby contributing to the strengthening of Japan's industrial competitiveness.



[ Director ]  
Hiroki Yotsumoto



[ Deputy Director ]  
Kazumasa Honda



Through developing methods and tools for chemical risk assessment, life cycle assessment and the evaluation of physical hazards, we aim to lead trans-disciplinary research to quantify the multifold trade-off issues and give the best solution for launching new technologies into society.

# Methane Hydrate Research Center

Combustible ice: Energy of the future

URL : <http://unit.aist.go.jp/mhrc/>

E-mail : [info-mhrc-ml@aist.go.jp](mailto:info-mhrc-ml@aist.go.jp)

2-17-2-1 Tsukisamu-Higashi, Toyohira-ku, Sapporo, Hokkaido 062-8517, Japan

Tel: (011) 857-8945 / Fax: (011) 857-8417

(from outside Japan: Tel: +81-11-857-8945 / Fax: +81-11-857-8417)

[ Research Bases ] AIST Hokkaido, AIST Tsukuba (West)

## [ Outline ]

After the Great East Japan Earthquake, natural gas consumption for securing electricity is increasing rapidly in Japan, and securing of a long-term steady supply and improvement of the self-sufficiency ratio have become urgent issues. Our research center is carrying out R&D on the production methods to recover natural gas stably and economically from the methane hydrate resources which exists in the exclusive economic zone of Japan. And the developed "depressurization method" has demonstrated continuous production by the world's first offshore production test. Furthermore, we are developing natural gas transportation and storage technologies by using the physical properties of gas hydrates, for the creation of new industrial technologies. We are also executing a research alliance program as a global platform, to promote technology transfers, human resources development, organizing of symposiums for the innovation of the technologies.



[ Director ]  
Hideo Narita



[ Deputy Director ]  
Takao Ebinuma



[ Deputy Director ]  
Norio Temma



Large-scale methane gas production system



## Research Center for Compact Chemical System

Development of simple and compact chemical systems with low environmental impact

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

E-mail : [ccs-o-ml@aist.go.jp](mailto:ccs-o-ml@aist.go.jp)

4-2-1 Nigatake, Miyagino-ku, Sendai, Miyagi 983-8551, Japan

Tel: (022) 237-5208 / Fax: (022) 232-7002

(from outside Japan: Tel: +81-22-237-5208 / Fax: +81-22-232-7002)

[ Research Base ] AIST Tohoku

### [ Outline ]

Under the AIST's mission statement, i.e. "contribution to a sustainable society," we are pursuing process innovations of the chemical and a related industries. Our main objective is to develop simple and compact production systems which provide a variety of products of adequate quantities with efficient energy use and minimum environmental impact. By these process innovations we ultimately aim to create recycling based industrial structures. We are investigating the following core technologies to realize this goal:

- 1) high temperature, high pressure chemical engineering technology
- 2) inorganic material processing technology
- 3) mutual integration of these technologies.

We also make use of AIST's network to achieve our research objectives. Along with these R & D efforts we are contributing to local industrial communities, particularly the manufacturing industries, by creating new additional values of their products and of the local natural resources.



[ Director ]

Takaaki Hanaoka

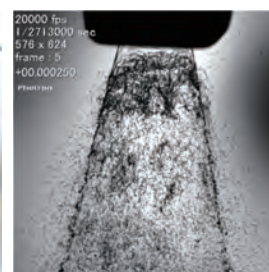


[ Deputy Director ]

Tatsuo Tsunoda



Lightweight hydrogen tank with hydrogen barrier clay-layer



High speed camera image of coating spray pattern using supercritical carbon dioxide

## Advanced Power Electronics Research Center

Efficient handling of electric power based on new electronics using widegap semiconductors

URL : <https://unit.aist.go.jp/adperc/cie/>

E-mail : [adperc\\_info-ml@aist.go.jp](mailto:adperc_info-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-5050 / Fax: (029) 861-5032

(from outside Japan: Tel: +81-29-861-5050 / Fax: +81-29-861-5032)

[ Research Base ] AIST Tsukuba (Central, West)

[ AIST Participating Technology Research Association ]

R&D Partnership for Future Power Electronics Technology (FUPET)

### [ Outline ]

Power electronics, represented by inverters used in home appliances and industrial equipment, is a key technology to control electric energy, and is currently based on silicon power devices. However, their performance limits will be revealed. Our goals are to develop wafer technology of widegap semiconductors such as silicon carbide (SiC) and gallium nitride (GaN) and their power device technology; to extend such technologies to a power electronics integration technology consisting of circuit, module/packaging, and control that makes full use of the performance of widegap semiconductor devices; and to make a breakthrough for the current performance limits by making optimal use of this system. The ultimate goal is to establish fundamentals of novel electronics for energy handling.



[ Director ]

Hajime Okumura



[ Deputy Director ]

Hiroshi Yamaguchi



[ Deputy Director ]

Kunihiko Sakamoto

45 mmΦ4H-SiC bulk single crystal



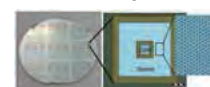
3 inch 4H-SiC wafer



Small-size, high-efficiency inverter using SiC semiconductor devices



4H-SiC switching device





## Research Center for Photovoltaic Technologies

### Development of clean next-generation energy sources

URL : <http://unit.aist.go.jp/rcpvt/cie/>

E-mail : [rcpvt-info-ml@aist.go.jp](mailto:rcpvt-info-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-5110 / Fax: (029) 861-5615

(from outside Japan: Tel: +81-29-861-5110 / Fax: +81-29-861-5615)

[ Research Bases ] AIST Tsukuba (Central), AIST Kyushu

[ AIST Participating Technology Research Association ]

Photovoltaic Power Generation Technology Research Association (PVTEC)

#### [ Outline ]

Research Center for Photovoltaic Technologies is aiming at a sustainable development of photovoltaic technologies to realize the national energy security, low carbon society, economic growth and domestic job creation at the same time with a comprehensive and systematic approach. To this end, we are investigating:

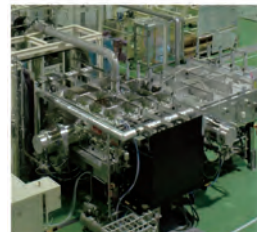
- 1) device and system technologies under the intimate collaboration with private sectors
- 2) primary reference cell calibration and neutral characterization of devices and systems
- 3) fundamental researches for next-generation innovative devices. We are also emphasizing the international standardization and regional collaboration of the outcome of our research.



[ Director ]  
**Shigeru Niki**



[ Deputy Director ]  
**Koji Matsubara**



The G5 size (1.1 mx1.4 m) CVD machine development activity by collaboration of consortium companies



High efficiency (15.9 %) flexible CIGS sub-module fabricated on stainless substrate

## Biomass Refinery Research Center

### Establishment of fundamental technology to convert biomass resources into chemicals, materials and fuels

URL : <https://unit.aist.go.jp/brrc/eng/>

E-mail : [brrc-ml@aist.go.jp](mailto:brrc-ml@aist.go.jp)

3-11-32 Kagamiyama, Higashi-hiroshima, Hiroshima 739-0046, Japan

Tel & Fax: (082) 420-8250 / Fax: (082) 420-8251

(from outside Japan: Tel: +81-82-420-8250 / Fax: +81-82-420-8251)

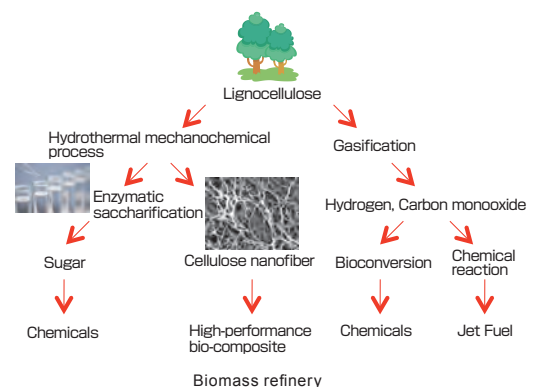
[ Research Base ] AIST Chugoku

#### [ Outline ]

The fundamental technologies to decompose lignocellulose, which is most abundant non-edible biomass resources, and to convert into chemicals, materials and fuels are developing by cooperation with the related research units in the AIST. As biomass refinery consists of many processes, the increase in efficiency and the acceleration of the research and development are aimed at by integration of a series of processes from pretreatment of materials, decomposition, and refining as the upper process to manufacture of the last products as the lower process. Moreover, as a core research base of the biomass in Asia, we contribute to technology transfer abroad, standardization and utilization of research products.



[ Director ]  
**Satoshi Hirata**





## Interdisciplinary Research Center for Catalytic Chemistry (IRC<sup>3</sup>)

### Open a new field of catalytic chemistry

URL : <http://irc3.aist.go.jp/en/>

E-mail : [irc3-web-ml@aist.go.jp](mailto:irc3-web-ml@aist.go.jp)

AIST Tsukuba Central 5-2, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8565, Japan

Tel & Fax: (029) 861-6052 (from outside Japan: Tel & Fax: +81-29-861-6052)

[ Research Base ] AIST Tsukuba (Central)

#### [ Outline ]

Interdisciplinary Research Center for Catalytic Chemistry is aiming at innovating synthetic processes of functional chemical products and development of catalyst technologies that will contribute to maintain and strengthen global competitiveness of Japanese chemical industry with its comprehensive approach through four catalytic technologies on “Silicon Chemistry”, “Innovative Oxidation”, “Functional Group Transformation” and “Catalyst Immobilization”, which are core subjects of this center.

More specifically, we investigate the above topics based on three concepts to innovate catalytic technologies for the production of functional chemical materials:

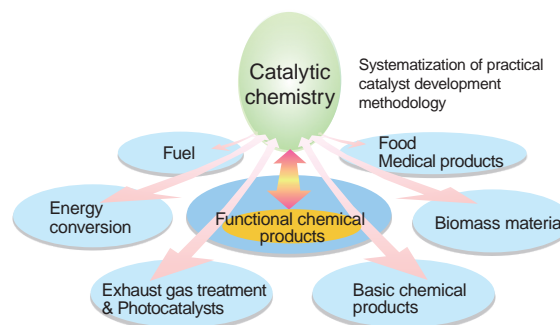
1. Saving energy with highly active catalyst (less heating, shorter reaction time, etc.)
2. Saving energy with highly selectivity catalyst (least by-products and less process steps)
3. Substantial reduction of rare metal dependence: shifting out from precious metal catalyst systems.



[ Director ]  
**Kazuhiko Sato**



[ Deputy Director ]  
**Masumi Asakawa**



## Renewable Energy Research Center

### Technology development for the high-rate introduction of renewable energy

URL : <http://www.fukushima.aist.go.jp/rerc/en/>

E-mail : [frea-info-ml@aist.go.jp](mailto:frea-info-ml@aist.go.jp)

Fukushima Renewable Energy Institute, 2-2-9 Machiikedai, Koriyama,

Fukushima 963-0298, Japan

[ Research Base ] Fukushima Renewable Energy Institute

#### [ Outline ]

In order to promote intensive utilization of renewable energy, it is necessary to match Intermittent power sources to power demand, to reduce costs of power generation and environmental assessment, and to harmonize local energy resources and optimum technology with the environment. Our research center promotes the following R&D by utilizing a demonstration field in our institute.

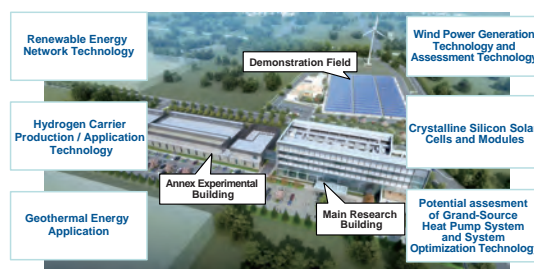
- Integration of intermittent renewable energy sources with energy storage, hydrogen and batteries, and power electronics; and demonstration of an energy management system with a high level of renewable energy use
- Develop innovative ultra-thin crystalline silicon solar cell technologies with higher efficiency and lower cost, to be utilized for light weight PV modules
- Development of geothermal databases for proper utilization and social acceptance of geothermal power generation and ground-coupled heat pump systems



[ Director ]  
**Yoshiro Owadano**



[ Deputy Director ]  
**Hirohide Furutani**



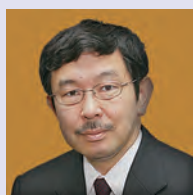
Main research themes



# Life Science and Biotechnology

## Toward a sustainable society in which people live a long life with health and vigor

It is necessary to build a healthy longevity society where people can live their lives in a state of well-being and security, as well as a sustainable society with less burden on the environment. We are contributing to life innovation by developing new technologies to evaluate health and assisting in the creation of new medicines as well as in the maintenance, improvement, and recovery of health according to the individual's condition. We are also contributing to green innovation by developing technologies to reduce environmental loads using bioprocesses.



**Noboru Yumoto**  
Vice-President



**Katsunori Matsuoka**  
Director-General



**Masanao Oda**  
Deputy Director-General



**Yoshiaki Onishi**  
Director, Research Planning Office

TEL : 029-862-6032 (from outside Japan: +81-29-862-6032)  
E-mail : life-liaison-ml@aist.go.jp

### [Outline of priority strategies]

#### Development of technologies to create advanced and comprehensive drugs and medical technologies to protect health

In order to solve issues such as disease prevention, early treatment, and personalized medicine, we are developing regenerative-medicine technologies and advanced healthcare support technologies using cell-manipulation and biomaterial technologies, and an infrastructure for the development of medical equipment. For disease prevention and early diagnosis, we are developing technologies to characterize and analyze the functions of biomolecules. We are also developing high-efficiency drug discovery techniques to cut development costs without compromising safety through the amalgamation of information processing and bioanalysis.

#### Development of technologies to achieve healthy life

In order to ensure a healthy life both mentally and physically, it is important to solve the issues of elderly care and maintenance and improvement of health, as well as mental issues associated with social anxiety. We are developing technologies to quantitatively evaluate mental and physical conditions, including stress, and to restore, maintain, and improve health through personalized medication and rehabilitation, with a view to developing technologies to facilitate healthy living.

#### Development of technologies to efficiently manufacture high-quality substances using bioprocesses that help to reduce industrial environmental loads

With a view to extending the range of application of bioprocesses (material production using microbes and enzymes) that provide much higher reaction selectivity than chemical processes and allow efficient production of high-value-added compounds, we are searching for microbial resources and useful genes and characterizing their functions. We are also developing high-efficiency biomanufacturing technologies, including technologies to improve the functions of biopolymers and improve and design bioprocesses, technologies to produce transgenic modified plants, and technologies to bring a closed system for transgenic plant production into practical use.



# Health Research Institute

Contributing to the realization of a sustainable society by scientifically understanding and elucidating human health

URL : <http://unit.aist.go.jp/hri/en/>

E-mail : [hri-webmaster-ml@aist.go.jp](mailto:hri-webmaster-ml@aist.go.jp)

2217-14 Hayashi-cho, Takamatsu, Kagawa 761-0395, Japan

Tel: (087) 869-3526 / Fax: (087) 869-4178

(from outside Japan: Tel: +81-87-869-3526 / Fax: +81-87-869-4178)

**[ Research Bases ]** AIST Shikoku, AIST Kansai

**[ AIST Participating Technology Research Association ]**

Stem Cell Evaluation Technology Research Association (SCETRA)

## [ Outline ]

Enjoying longevity in health is a key issue for achieving a sustainable society. "Health" means the state that we are sound enough mentally as well as physically to constructively participate in social activities. In order to create such a society, we intensively perform the following scientific and technological researches.

- Advanced technologies for prediction and diagnosis of diseases and the development of their measurement systems
- Technologies to evaluate and eliminate health risks in living and working environments
- Technologies to regenerate tissue and cell functions and to create alternative devices
- Technologies to design and synthesize functional compounds based on analysis of cell functions
- Technologies to assist daily living based on measurement and analysis of the body's physiological and cognitive functions

We aim to create a new health industry and an interdisciplinary science field of health through cooperative and integrated works with related research areas of AIST.



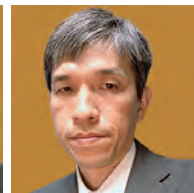
[ Director ]

Yasukazu Yoshida



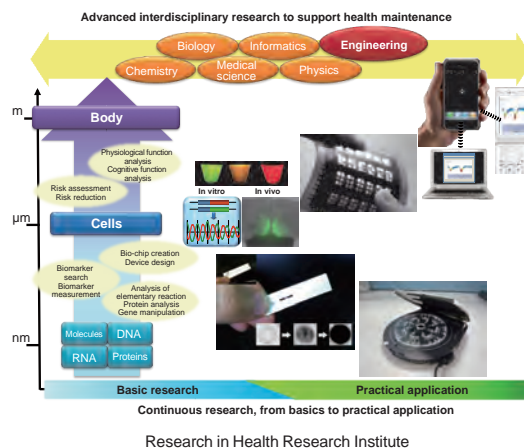
[ Deputy Director ]

Yoshiro Tatsu



[ Deputy Director ]

Toshihiko Ooie



# Bioproduction Research Institute

From basic to manufacturing research based on living organisms

URL:[http://unit.aist.go.jp/bpri/index\\_e.html](http://unit.aist.go.jp/bpri/index_e.html)

E-mail : [bpri-webmaster-ml@aist.go.jp](mailto:bpri-webmaster-ml@aist.go.jp)

2-17-2-1 Tsukisamu-Higashi, Toyohira-ku, Sapporo, Hokkaido

062-8517, Japan Tel: (011) 857-8537 / Fax: (011) 857-8915

(from outside Japan: Tel: +81-11-857-8537 / Fax: +81-11-857-8915)

**[ Research Bases ]** AIST Hokkaido, AIST Tsukuba (Central)

**[ AIST Participating Technology Research Association ]**

Technology Research Association of Highly Efficient Gene Design (TRAHED)

Manufacturing Technology Research Association of Biologics (MAB)

## [ Outline ]

The Bioproduction Research Institute conducts research, from basic to practical application research, aimed at high-efficiency material production using bioprocesses in order to contribute to the attainment of a sustainable society, as well as to the development of technologies for the production of materials of high quality, such as biofuels, chemicals, drugs, useful proteins, biological materials, and new functional plants. To achieve these goals, we are developing the following:

- (1) technologies for discovering microbes and various genetic resources
- (2) technologies to analyze and search for genetic information at high speed
- (3) technologies for the production of useful materials based on genetically modified plants, microbes, and animals
- (4) technologies for producing protein- and nucleic acid-related biological chemicals.



[ Director ]

Tomohiro Tamura



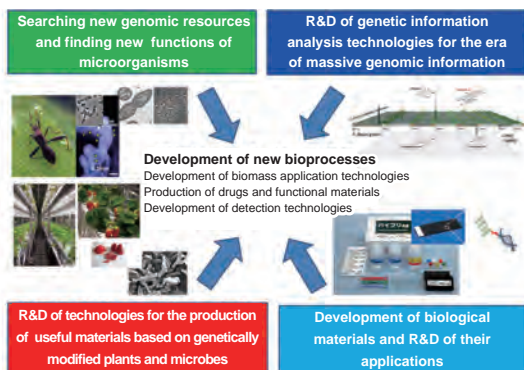
[ Deputy Director ]

Isao Yumoto



[ Deputy Director ]

Satoru Ohgiya



Research activities at the Bioproduction Research Institute



# Biomedical Research Institute

Developing new technology for drug discovery and medical treatment

URL : <http://unit.aist.go.jp/biomed-ri/cie/>

E-mail : [bmd-webmaster-ml@aist.go.jp](mailto:bmd-webmaster-ml@aist.go.jp)

AIST Tsukuba Central 6, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8566, Japan

Tel: (029) 861-6022 / Fax: (029) 858-3282

(from outside Japan: Tel: +81-29-861-6022 / Fax: +81-29-856-3282)

**[ Research Bases ]** AIST Tsukuba (Central), AIST Tokyo Waterfront

**[ AIST Participating Technology Research Association ]**

Technology Research Association for Next Generation Natural Products Chemistry  
 Technology Research Association of Highly Efficient Gene Design (TRAHED)  
 Manufacturing Technology Research Association of Biologics (MAB)

## [ Outline ]

We are conducting research and development to clarify the structure and functions of biomolecules and develop new basic technology for drug discovery and medical treatment using knowledge including our study results.

It is required for development of new drugs and new treatment of the disease that biomolecules involved in the diseases are studied and abnormal biomolecules are removed or normalized. We are characterizing the functions and structures of genes and proteins that are involved in diseases, developing regulatory techniques of mechanisms that control many biological functions in the cells and the organ, and developing sensors for highly sensitive detection of markers required for disease diagnosis. Through these research activities, we contribute to the development of new drugs and the promotion of the healthcare industry, and also create research outcomes in cooperation with companies and international organizations.

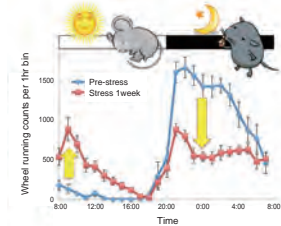


[ Director ]

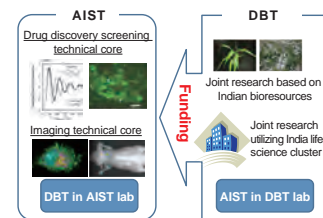
**Yoshihiro Ohmiya**

[ Deputy Director ]

**Shinya Honda**



Circadian locomotor disruption in model mice of stress-induced sleep disorder



Create innovation base for Japan-India research assimilation

# Human Technology Research Institute

Creating products and living environments through a scientific understanding of human characteristics

URL : [http://unit.aist.go.jp/htri/htri\\_e/index\\_e.html](http://unit.aist.go.jp/htri/htri_e/index_e.html)

E-mail : [htri-webmaster-ml@aist.go.jp](mailto:htri-webmaster-ml@aist.go.jp)

AIST Tsukuba Central 6, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8566, Japan

Tel: (029) 861-9488 / Fax: (029) 861-6636

(from outside Japan: Tel: +81-29-861-9488 / Fax: +81-29-861-6636)

**[ Research Base ]** AIST Tsukuba (Central, East)

## [ Outline ]

Our institute is a unique research organization consisting of researchers in a wide range of disciplines such as ergonomics, psychology, physiology, brain science, bioengineering, and mathematical science. This allows multidisciplinary approaches to the scientific understanding of human characteristics. The results would enable the development of products and living environments that are highly compatible with human characteristics. In close cooperation with the related industries, we conduct researches on higher brain functions for cognitive and knowledge-based skills relevant to the information society, and on technologies to evaluate and improve health and mind-body fitness, restore physical functions for independent living, and develop medical devices that are safe and less burdensome for patients. Researches are also carried out to promote industrial standardization applicable to product design for the elderly and people with disabilities, and to develop guidelines to facilitate speedy development of medical devices. The main focus of our research activities is to produce research outcomes that are useful to society.



[ Director ]

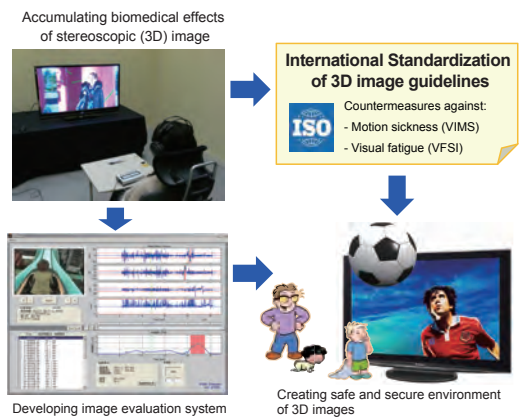
**Motoyuki Akamatsu**

[ Deputy Director ]

**Kiyoyuki Chinzei**

[ Deputy Director ]

**Koji Hyodo**





## Research Center for Stem Cell Engineering

**Toward establishing stem cell techniques as the basis for regenerative medicine and drug development and creating a stem cell industry**

URL : [http://unit.aist.go.jp/scrc/cie/index\\_en.html](http://unit.aist.go.jp/scrc/cie/index_en.html)

E-mail : [stemcell\\_c-ml@aist.go.jp](mailto:stemcell_c-ml@aist.go.jp)

AIST Tsukuba Central 4, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8562, Japan

Tel: (029) 861-2529 / Fax: (029) 861-3273

(from outside Japan: Tel: +81-29-861-2529 / Fax: +81-29-861-3273)

**[ Research Base ]** AIST Tsukuba (Central)

**[ AIST Participating Technology Research Association ]**

Stem Cell Evaluation Technology Research Association (SCETRA)

Manufacturing Technology Research Association of Biologics (MAB)

### [ Outline ]

In recent years, the application of cells, tissues, and organs generated from multipotent stem cells (ES cells, iPS cells, MSC) to drug discovery screening and regenerative medicine is expected to become a next-generation innovation ensuring good health and security. In order to realize this expectation, we are developing techniques to establish stem cell lines and isolate stem cells for obtaining standard stem cell lines. We are also developing techniques to effectively differentiate stem cells and to create desired cell types, as well as a drug discovery screening system and medical drugs using the created cell types. Through these research activities, we develop basic technologies to accelerate the practical application of stem cells.



[ Director ]

**Makoto Asashima**



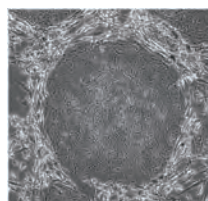
[ Deputy Director ]

**Mahito Nakanishi**

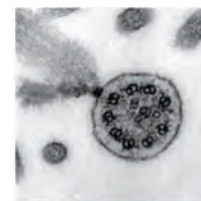


[ Deputy Director ]

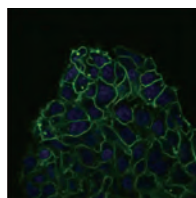
**Masashi Suzuki**



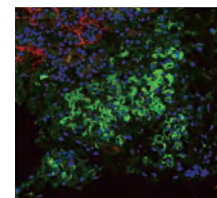
Human iPS cells generated with SeVdp-iPS vector



Electron microscopy of cilia of the ciliated cells differentiated from ES cells



ES cell colony stained with an ES/iPS-cell-specific probe "AiLec-S1" (Green: AiLec-S1 staining, Blue: nuclei staining with DAPI)



Pancreatic tissue cells differentiated from ES cells (Green: Pancreatic beta cells expressing insulin, Red: Exocrine cells expressing amylase, Blue: Nucleus)

## Molecular Profiling Research Center for Drug Discovery

**Construction of Rational System for Molecular Profiling in Drug Discovery**

URL : <http://www.molprof.jp/english/index.html>

E-mail : [molprof-contact-ml@aist.go.jp](mailto:molprof-contact-ml@aist.go.jp)

2-4-7 Aomi, Koto-ku, Tokyo 135-0064, Japan

Tel: (03) 3599-8100 / Fax: (03) 5530-2064

(from outside Japan: Tel: +81-3-3599-8100 / Fax: +81-3-5530-2064)

**[ Research Base ]** AIST Tokyo Waterfront

**[ AIST Participating Technology Research Association ]**

Technology Research Association for Next Generation Natural Products Chemistry  
Epigenomics Technology Research Association (EPIRA)

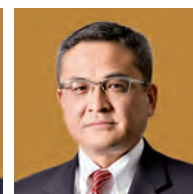
### [ Outline ]

The aim of our center is to bring immediate and effective innovation to drug discovery in Japan. In our fusion of experimental and computational biology, we can redesign previously rejected chemical compounds and promote newly designed chemical compounds to clinical tests by sophisticated molecular profiling methods and strengthened chemical design techniques. For these purposes, we systematically unify the following 5 steps for drug discovery: Systematic molecular profiling by measuring the absolute amounts of all of the proteins and antibodies in a cell; Estimation of activated pathways and drug-efficacy mechanisms; Construction of workflows for utilizing vast data resources by using semantic technology; Computer-aided drug development for lead optimization based on protein-compound docking and molecular dynamics simulations; and Estimation of structural aspects of molecular recognition, especially between small-molecule ligands and drug target proteins, by NMR.



[ Director ]

**Tohru Natsume**



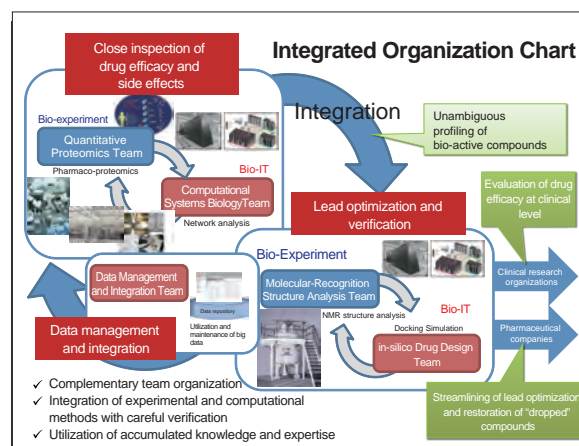
[ Deputy Director ]

**Katsuhisa Horimoto**



[ Deputy Director ]

**Tai Kubo**





## Glycomedicine Technology Research Center

**Glycomedicine: carbohydrate-based drug discovery**

URL : [https://unit.aist.go.jp/gtrc/cie/index\\_e.html](https://unit.aist.go.jp/gtrc/cie/index_e.html)

E-mail : [gtrc\\_h-ml@aist.go.jp](mailto:gtrc_h-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-3253 / Fax: (029) 861-3252

(from outside Japan: Tel: +81-29-861-3253 / Fax: +81-29-861-3252)

**[ Research Base ]** AIST Tsukuba (Central)

**[ AIST Participating Technology Research Association ]**

Manufacturing Technology Research Association of Biologics (MAB)

### [ Outline ]

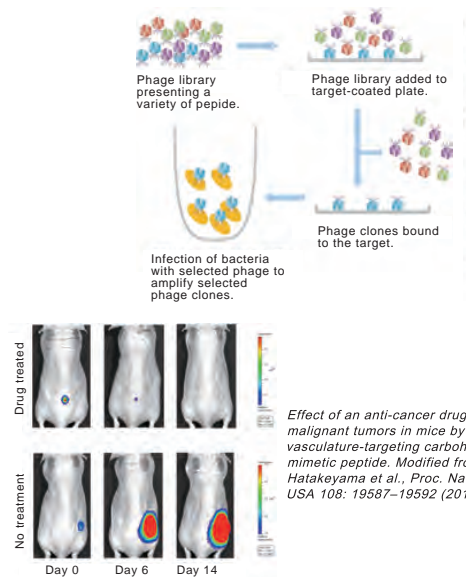
The glycans conform the third category of macromolecules, or the third chain, besides DNA and proteins. However, studies on glycans are lagging behind to the other macromolecules in both basic and clinical research area. Carbohydrate-based drug discovery is yet unexplored, providing a good opportunity for new drug discovery. We will focus, but not limitingly, on studying complex glycans for better understanding the mechanism causing diseases. Our studies will ultimately be promoting clinically relevant diagnostics and therapeutics, to improve health and well-being of the people.



[ Director ]  
**Michiko Fukuda**



[ Deputy Director ]  
**Junichi Takehara**



## Computational Biology Research Center

**Developing computational methods to accelerate the effective use of the coming landslide of genomic data**

URL : <http://www.cbrc.jp/index.eng.html>

E-mail : [info@cbrc.jp](mailto:info@cbrc.jp)

AIST Tokyo Waterfront Bio-IT Research Building 2-4-7 Aomi, Koto-ku, Tokyo, 135-0064, Japan

Tel: (03) 3599-8080 / Fax: (03) 3599-8081

(from outside Japan: Tel: +81-3-3599-8080 / Fax: +81-3-3599-8081)

**[ Research Base ]** AIST Tokyo Waterfront

**[ AIST Participating Technology Research Association ]**

Epigenomics Technology Research Association (EPIRA)

Technology Research Association of Highly Efficient Gene Design (TRAHED)

### [ Outline ]

In recent years DNA sequencing and synthesis technology has progressed at a staggering rate and is rapidly being employed in medicine, biotechnology, and other industries. Unfortunately, development of the computational methods needed to make full use of genomic data has not kept up with the instrument technology.

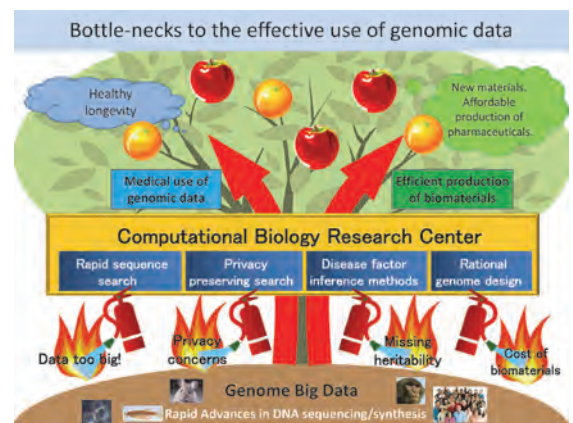
Our center aims to accelerate the effective use of genomic data by developing computational methods for identifying potential disease related factors from genomic data, querying genomic databases in a privacy-preserving fashion and designing genomic sequences for efficient production of biomaterials. By developing this technology we hope to contribute to industrial activity and an increasingly healthy society.



[ Director ]  
**Paul Horton**



[ Deputy Director ]  
**Hiroyuki Toh**



Development of the life science information analysis platform



## Toward improved social vitality and safety through green-IT

Rapid growth and spread of IT have increased energy consumption and imposed threats on information security and reliability issues. AIST is contributing to the development of energy-efficient IT devices and IT services to reduce energy consumption, which are supported by safe and reliable software technologies.



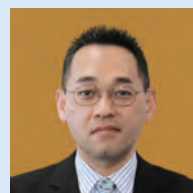
**Toshihiko Kanayama**  
Senior Vice-President



**Seigo Kanemaru**  
Director-General



**Satoshi Sekiguchi**  
Deputy Director-General



**Yoshio Tanaka**  
Director, Research Planning Office

TEL : 029-862-6028 (from outside Japan: +81-29-862-6028)  
E-mail : it-liaison-ml@aist.go.jp

### [Outline of priority strategies]

#### Green-IT: Conserving energy in / by IT

The energy consumption of computers, networks, and other IT equipment has reached 5% of the total electricity generated in Japan, and continues to increase as network traffic expands at an annual rate of 40%. In order to significantly improve the energy efficiency of the data centers and computer networks, we are developing nonvolatile memories that do not require refreshing, logic devices that operate at very low voltages, and all-optical-path network technology, based on the IMPULSE project of the strategic AIST integrated R&D program. We are also developing 'Minimal Fab' for manufacturing many kinds of semiconductor chips in small quantities, as well as a solar panel monitoring system via high-speed power-line communication. These technologies contribute to IT-based reduction of environmental load.

#### Ensuring safety by means of IT

Innovations utilizing new hardware and software require careful examination to ensure their safety and reliability. We are developing safety standards and safety certification technologies for the life-support robots that provide nursing care in daily life. We propose and promote the 'Kids Design' concept which is based on the digitalized human body data as well as the injury-incident database. Our research activities also cover the technologies for improving the reliability of embedded systems by automated software testing and model checking, as well as the information

security technologies that allow prompt system recovery upon password-leakage incidents.

#### Innovative electronic devices

Since the invention of the transistor, new electronic devices such as the IC and the CCD sensor have prompted innovation. We are engaged in research on devices that trigger innovation, such as new logic devices to replace Si-based CMOS, organic transistors suitable for flexible displays, strongly correlated electronic devices that produce new functions based on electrical, magnetic, and optical interaction, and superconducting materials and circuits with the world's highest performances.

#### Science-based innovation of service industry

The service industry accounts for 70% of the GDP of Japan. We are performing scientific analyses of the behaviors of service providers and recipients to improve service productivity. Efficient methods for designing new services not only in commercial areas but also in public spaces are being developed. We are also integrating various contents such as data from earth observatory satellites and geological survey, information regarding human activities and energy consumptions, and data available on the web (texts, images, voices, music), in order to create new service innovation. In addition, we are developing fundamental information technologies for providing the platforms for these IT-based services.



## Intelligent Systems Research Institute

### Innovation with robot technology (RT)

URL : [http://unit.aist.go.jp/is/cie/index\\_e.html](http://unit.aist.go.jp/is/cie/index_e.html)

E-mail : [is-inquiry-ml@aist.go.jp](mailto:is-inquiry-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-5201 / Fax: (029) 861-5989

(from outside Japan: Tel: +81-29-861-5201 / Fax: +81-29-861-5989)

**[ Research Base ]** AIST Tsukuba (Central, East)

#### **[ Outline ]**

We study intelligent system technologies that are defined as technologies in the fields of intelligent information processing, robotics, and mechatronic systems that support intellectual activities and physical operations performed by humans, or perform these activities for humans. We are conducting research and development of basic principles, elemental technologies, and system architecture in this field. The targets of our research include safety technologies for life-support robots, basic life-support robot technologies to improve quality of life, robot technologies to increase efficiency and save labor in the service and manufacturing industries, technologies to improve the energy efficiency of transportation systems, disaster response robots and fundamental humanoid technologies.



[ Director ]

Hirohisa Hirukawa



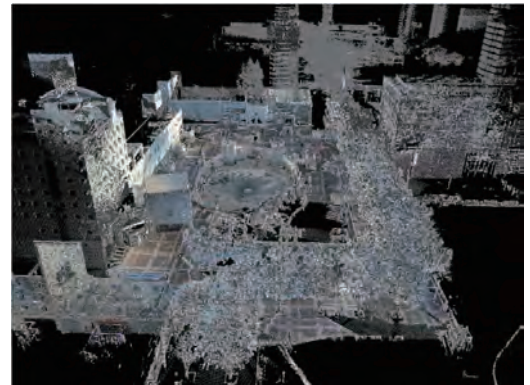
[ Deputy Director ]

Kazuhito Yokoi



[ Deputy Director ]

Kohtaro Ohba



3-dimensional map of urban environment

## Information Technology Research Institute

### From IT infrastructure to application technology: Make, connect, use

URL : <http://itri.aist-go.jp/en/>

E-mail : [itri-webmaster-ml@aist.go.jp](mailto:itri-webmaster-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 862-6600 / Fax: (029) 862-6601

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**[ Research Base ]** AIST Tsukuba (Central)

#### **[ Outline ]**

Our institute is actively conducting research and development in two important areas. The first area focuses on constructing and providing IT infrastructures. Some examples include highly reliable and low power consuming computing platforms, next generation high performance Clouds, and flexible data integration technologies. The second area focuses on facilitating the use of these infrastructures. We are developing interactive information technologies for voice, music, and image data analysis; big data analysis tools such as anomaly detection by machine learning techniques, and infrastructures for the promotion of open research data including geo-spatial, materials and social data. Our technologies will directly contribute to industries both domestically and internationally as well as benefit society as a whole by creating easy-to-use platforms and services.



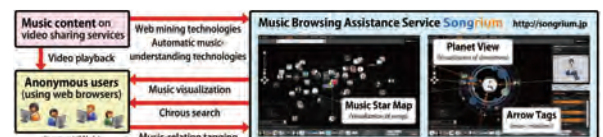
[ Director ]

Tomohiro Kudoh



[ Deputy Director ]

Mikiko Nishikimi



Songrium: A music browsing assistance service with visualization of music relations



# Nanoelectronics Research Institute

Nanoelectronics integration for green innovation

URL : <http://unit.aist.go.jp/neri/index-en.html>

E-mail : [nanoele-web-ml@aist.go.jp](mailto:nanoele-web-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-3483 / Fax: (029) 861-5088

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**[ Research Base ]** AIST Tsukuba (Central, West)

**[ AIST Participating Technology Research Association ]**

Minimal Fab Development Association

## [ Outline ]

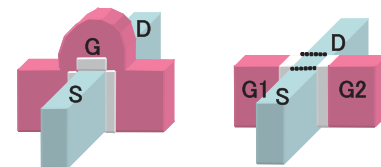
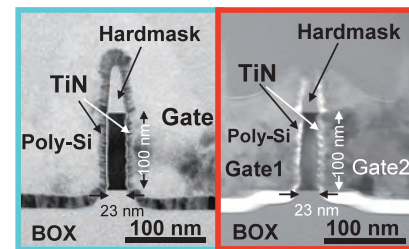
We are developing nano-device and integrated-circuit technologies for the realization of low-power-consumption, high-speed, and multifunctional information devices. Specifically, we are developing the state-of-the-art CMOS integration, new non-volatile memories, and superconductor circuits. In addition, we are establishing Minimal Fab technology for small lot production of many kinds of devices, and aim to create new semiconductor markets.



[ Director ]  
**Tetsuji Yasuda**



[ Deputy Director ]  
**Masahiro Aoyagi**



Fin-typed transistors for sub-20nm generation

# Electronics and Photonics Research Institute

Creating innovations with electronic and photonic technologies: From theory and material to device and system

URL : <http://unit.aist.go.jp/esprit/>

E-mail : [esprit-sec-ml@aist.go.jp](mailto:esprit-sec-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-5338 / Fax: (029) 861-5627

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**[ Research Base ]** AIST Tsukuba (Central, West)

**[ AIST Participating Technology Research Association ]**

Advanced Laser and Process Technology Research Association (ALPROT)  
Photonics Electronics Technology Research Association (PETRA)

## [ Outline ]

We pursue innovative possibility of electronic technologies and photonic technologies in addition to improving information and communication technologies to achieve safe and sustainable society. Concretely, we are developing new technologies used of both electron and light, such as photonic interconnection and the living body information sensing. We are also conducting the research and development of theories, materials, and devices concerning a quantum information processing, a strong correlated electron system, superconducting, and organic material. Moreover, we are promoting innovations of laser induced processing technology based on the laser fundamental research, and of optical or electronic observation and analysis systems.



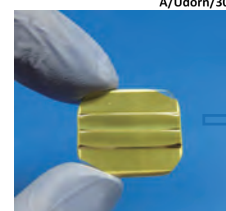
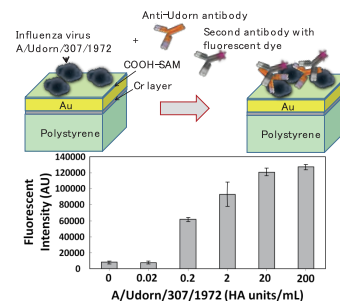
[ Director ]  
**Satoshi Haraichi**



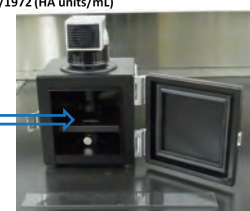
[ Deputy Director ]  
**Masahiko Mori**



[ Deputy Director ]  
**Koichi Awazu**



Biosensor chip having a Au-coated microfluidic channel with V-shaped cross-section.



Sensor system with a light source and a CCD camera in order to observe fluorescence enhanced by SPR.

Small and high sensitivity biosensor system using surface plasmon-enhanced fluorescence



## Research Institute for Secure Systems

Realizing a safer Information-Technology (IT) based society and providing security values to industries

URL : <http://www.risec.aist.go.jp/>

E-mail : [risec-liaison-ml@aist.go.jp](mailto:risec-liaison-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-5284 / Fax:(029) 861-5285

(from outside Japan: Tel: +81-29-861-5284 / Fax: +81-29-861-5285)

[ **Research Bases** ] AIST Tsukuba (Central), AIST Kansai, AIST Tokyo Waterfront

[ **AIST Participating Technology Research Association** ]

Control System Security Center (CSSC)

### [ Outline ]

As IT becomes more prevalent in society, threats that exploit vulnerabilities in information systems that lead to theft of information assets such as intellectual property or privacy information, as well as threats that bring down an IT system, are increasing. Also, since the scale of embedded systems in vehicles, telecommunications, and financial systems continue growing and are becoming increasingly complex, system design and modification relying on traditional manual methods are facing risks of disastrous failures. Through research and development of security for IT services in clouds and for control systems in industrial infrastructures, safe methods for system design and maintenance, security of biometrics for accurate and prompt authentication of people, and security of IC chips, the Research Institute for Secure Systems creates security values in industries. Furthermore, we conduct innovative research on new cryptographic technologies including functional encryption with complete security proofs as countermeasures against new threats breaking out daily.



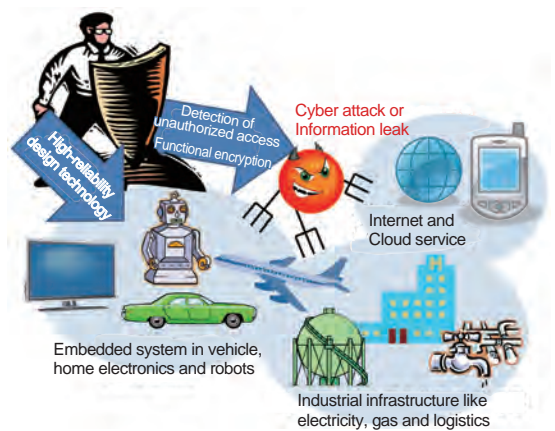
[ Director ]

**Satoshi Itoh**



[ Deputy Director ]

**Kazuo Takaragi**



## Network Photonics Research Center

Development of optical devices and systems for ultra-low energy-consuming optical network for video concentric era

URL : <http://unit.aist.go.jp/nprc/>

E-mail : [nprc-daihyou-ml@aist.go.jp](mailto:nprc-daihyou-ml@aist.go.jp)

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[ **Research Base** ] AIST Tsukuba (Central, West)

### [ Outline ]

Power consumption of internet routers due to the increasing traffic is becoming a crucial problem for the forthcoming video concentric era where huge-capacity video data occupies most of the traffics. We are developing technologies for optical path network based on circuit switching, which can handle huge capacity data with ultimately low power consumption. The developed technologies include, for devices, silicon photonics based optical switches, wavelength selective switches using glass waveguide, and Si-LSI based optical data unit switches, and for network systems, automatic compensation technology of fiber dispersion, multiplexing technologies for efficient use of fibers, and optical node technologies which incorporate all of these technologies. Our goal is to realize networks which enable us to route huge capacity data with power consumption per throughput less than 1/1000 as compared with the present IP networks.



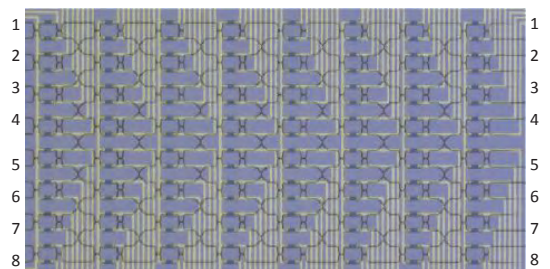
[ Director ]

**Shu Namiki**



[ Deputy Director ]

**Hitoshi Kawashima**



Silicon-photonics based 8 x 8 optical switch

The light signal input to any port on the left side can be routed to any port on the right side. The switch size is 3.4 x 2.4 mm<sup>2</sup>.



## Digital Human Research Center

**Modeling the human body, behavior, and everyday life situations in the computer to assist designs of products and services that fit for the individual and society**

URL : <http://www.dh.aist.go.jp/en/>  
E-mail : [dhrc-liaison-ml@aist.go.jp](mailto:dhrc-liaison-ml@aist.go.jp)  
2-3-26 Aomi, Koto-ku, Tokyo 135-0064, Japan  
Tel: (03) 3599-8201 / Fax: (03) 5530-2066  
(from outside Japan: Tel: +81-3-3599-8201 / Fax: +81-3-5530-2066)

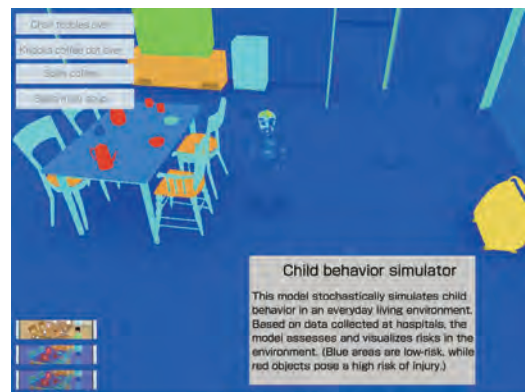
**[ Research Base ]** AIST Tokyo Waterfront

### [ Outline ]

Our scope is to establish a healthy, safe, and sustainable society through provisions of products and services to individuals. Understanding the changes of human factors and behaviors with the intervention of products and services is required. We are researching technologies to represent human functions on the computer. These are digital human technologies that enable observing human factors (body shapes, movements, sensations) and modeling them, as well as monitoring behavior through real services and providing information based on behavioral models. We are developing designs for products and services that support the quality of life for individuals, and designs for communications that motivate individuals to take action with an understanding of society's requirements.



**[ Director ]**  
**Masaaki Mochimaru**



Simulator of children's behavior with visualization of risks in living environments

## Spintronics Research Center

**Creating green innovations based on nonvolatile memory**

URL : [http://unit.aist.go.jp/src/cie/en\\_index.html](http://unit.aist.go.jp/src/cie/en_index.html)  
E-mail : [spin-webmaster-ml@aist.go.jp](mailto:spin-webmaster-ml@aist.go.jp)  
AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan  
Tel: (029) 861-5433 / Fax: (029) 861-3432  
(from outside Japan: Tel: +81-29-861-5433 / Fax: +81-29-861-3432)

**[ Research Base ]** AIST Tsukuba (Central)

### [ Outline ]

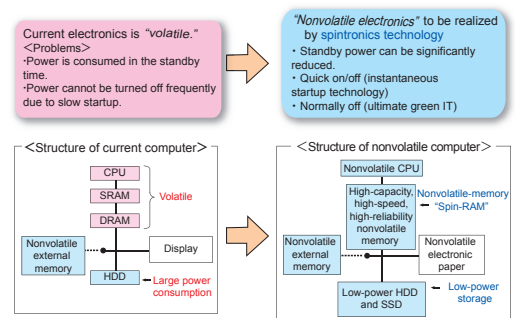
The rapid development of IT society is accompanied with a large increase in the power consumption of electronic devices. To reduce the total power consumption of IT appliances, power consumed during input "standby time" has to be significantly reduced. To achieve this, it is essential to develop nonvolatile memory, which retains data even after the power is turned off. We are developing high-capacity, high-speed, and highly-reliable nonvolatile memory based on spintronics and nanotechnology. Based on these technologies we are also developing basic technologies for a normally-off computer, which is the ultimate green IT solution with no power consumption during the standby time.



**[ Director ]**  
**Shinji Yuasa**



**[ Deputy Director ]**  
**Akio Fukushima**





## Center for Service Research

From “experience and intuition-based” to “scientific and engineering approach-based” services

URL : <http://unit.aist.go.jp/cfsr/en/>

E-mail : [cfsr-liaison-ml@aist.go.jp](mailto:cfsr-liaison-ml@aist.go.jp)

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Tel: (03) 3599-8973 / Fax: (03) 3599-8959

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**[ Research Bases ]** AIST Tokyo Waterfront, AIST Tsukuba (Central)

### **[ Outline ]**

The service industry accounts for 70% of Japan's economy and is expected to serve as an engine of economic growth along with the manufacturing industry. At AIST, with the progress of research in this field, we have an increasing number of research themes whose envisaged outcome is the creation of new services. To address these developments, AIST established the Center for Service Research on April 1, 2008. Here, we are developing a methodology for “service innovation” that increases added value for service recipients and efficiency for service providers through the following steps:

- (1) making a shift from “experience and intuition-based” to “scientific and engineering approach-based” services through research and development
- (2) repeating the phases of observation, analysis, design, and application in services
- (3) coordinating the needs and behavioral patterns of recipients with the contents of services and methods for providing them.



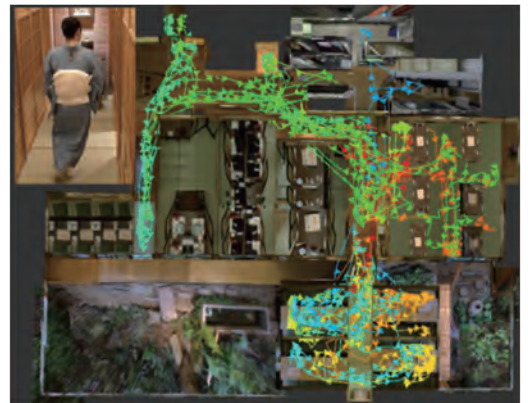
[ Director ]

**Masaaki Mochimaru**



[ Deputy Director ]

**Yoichi Motomura**



Research on behavior analysis for wide-area indoor environments

## Flexible Electronics Research Center

Green Innovation with thin, light, flexible devices

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

E-mail : [flec-webmaster-ml@aist.go.jp](mailto:flec-webmaster-ml@aist.go.jp)

AIST Tsukuba Central 5, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8565, Japan

Tel: (029) 861-4516 / Fax: (029) 849-1047

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**[ Research Base ]** AIST Tsukuba (Central)

**[ AIST Participating Technology Research Association ]**

Chemical Materials Evaluation and Research Base (CEREBA)

Japan Advanced Printed Electronics Technology Research Association (JAPER)

Thermal Management Materials and Technology Research Association (TherMAT)

### **[ Outline ]**

We are developing thin, light and flexible devices with the purpose of improvement of the usability and saving energy of telecommunication interface devices such as displays, sensors and so on. Moreover, we are developing the fabrication techniques of these flexible devices making good use of the print method from the point of view of energy conservation, the saving resource, and the high throughput. It aims wide distribution of information terminal devices into society, and promotion of a green innovation through these technological developments.



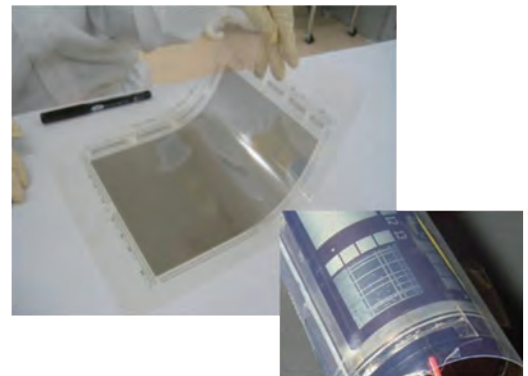
[ Director ]

**Toshihide Kamata**



[ Deputy Director ]

**Hirobumi Ushijima**



Printed TFT array prepared on a plastic film, and a flexible display driven by this printed TFT array



## Toward the development of revolutionary materials and manufacturing technologies that contribute to green innovation

AIST is contributing to green innovation, the aim of which is to achieve enhanced Japanese competitiveness and a sustainable society by creating materials and devices that play a core role in green innovation with nanotechnology as the key technology, and by revolutionizing manufacturing processes in the fields of nanotechnology, materials, and manufacturing.



**Toshihiko Kanayama**  
Senior Vice-President



**Seigo Kanemaru**  
Director-General



**Norimitsu Murayama**  
Deputy Director-General



**Masaru Yoshida**  
Director, Research Planning Office

TEL : 029-862-6031 (from outside Japan: +81-29-862-6031)  
E-mail : nanomatman-liaison-ml@aist.go.jp

### [Outline of priority strategies]

#### **Realization of technologies to reduce CO<sub>2</sub> emissions from transportation equipment, houses, and buildings by the development of highly functional components**

It is important for the prevention of global warming to reduce CO<sub>2</sub> emissions by improving energy use efficiency while maintaining the quality of life. We are conducting research on lightweight alloys used to reduce vehicle weight for improved fuel economy and on technologies for machining these alloys. We are also engaged in the development of building materials such as light-controlling window glass materials and humidity-controlling materials, to improve the energy efficiency and comfort of houses, office buildings, and factories.

#### **Reduction of the use of rare metals and precious metals and development of technologies as alternatives to them, in order to secure and effectively use resources**

Rare metals and other exhaustible mineral resources are commonly used in vehicles and home appliances. We are studying technologies to reduce the use of rare and precious metals such as tungsten and platinum, which are essential for leading-edge industries but very unstable in supply, as well as alternative material technologies.

#### **Development of materials and devices that will play a core role in green innovation through nanosystems**

An innovative technology evolves with the development of a new material or device that has new functions or features not available in conventional technologies. We are developing materials and components that function at the nano level, using nanosystematization combining a theoretical simulation technique and a nanotechnology experimental technique. Another focus of our research is the development of technologies for the mass-production of single-walled carbon nanotubes expected to be used for the reduction of component weights and the realization of low-power consumption devices, the development of technologies for the mass-production of graphene expected to be used for the transparent conductive film.

#### **Development of technologies to reduce the burden on the environment by innovations in manufacturing**

New manufacturing processes are essential to reduce the environmental load of industrial activities without compromising industrial competitiveness. We are developing manufacturing technologies for high-mix, variable-volume production that have a smaller environmental load or take resource productivity into account. In order to improve microelectromechanical systems (MEMS) and promote their widespread use, we are developing manufacturing technologies to combine and integrate MEMS devices in different areas and a system to monitor energy consumption at manufacturing sites using MEMS devices.



## Advanced Manufacturing Research Institute

Development of manufacturing process technologies offering low cost, high resource productivity, and low environmental burden

URL : <http://unit.aist.go.jp/amri/en/>  
 E-mail : [webmaster-amri-ml@aist.go.jp](mailto:webmaster-amri-ml@aist.go.jp)  
 2266-98 Anagahora, Shimo-Shidami, Moriyama-ku, Nagoya, Aichi 463-8560, Japan  
 Tel: (052) 736-7378 / Fax: (052) 736-7405  
 (from outside Japan: Tel: +81-52-736-7378 / Fax: +81-52-736-7405)

[ Research Bases ] AIST Chubu, AIST Tsukuba (East, Central)

[ AIST Participating Technology Research Association ]

Advanced Laser and Process Technology Research Association (ALPROT)  
 R&D Partnership for Future Power Electronics Technology (FUPET)  
 Fine Ceramics Research Association (FCRA)  
 Minimal Fab Development Association  
 Thermal Management Materials and Technology Research Association (TherMAT)  
 Technology Research Association for Future Additive Manufacturing (TRAFAM)

### [ Outline ]

We pursue researches under the banner of Minimal Manufacturing, which is the manufacture of "maximal performance products" through "minimal resource input and minimal energy use" with "minimal environmental load". To realize the "Minimal Manufacturing", we carry out fundamental researches on the innovative materials/devices and revolutionary processing technologies. We disseminate the seeds of the fundamental researches into the wide range of industries through the total design approaches of manufacture, including functionality analysis, lifetime prediction, and assessment of environmental burden. In addition, we contribute to the effective resolution of issues from small and medium-sized manufacturing enterprises, through developing "Monozukuri tools", such as databases on processing technologies and softwares for introduction of IT that are open to public and widely used in industry.



[ Director ]

Masanobu Awano



[ Deputy Director ]

Naoki Ichikawa

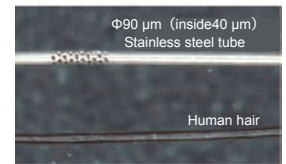


[ Deputy Director ]

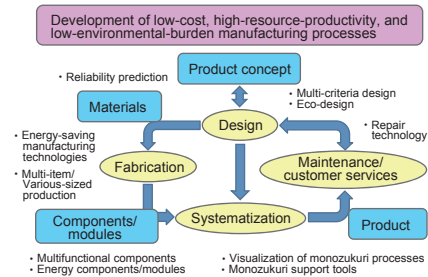
Yu-ichi Yoshizawa



Prototype Portable SOFC System (Max. Power 200W)



Small diameter tube machining with laser and ECM complex machining system



## Materials Research Institute for Sustainable Development

Contributing to the sustainability of industry and society through the development of rare-metal alternatives, less rare-metal-intensive technologies, and advanced lightweight metal components and building components to improve energy efficiency

URL : [http://unit.aist.go.jp/mrisus/index\\_en.html](http://unit.aist.go.jp/mrisus/index_en.html)  
 E-mail : [mrisus\\_info-ml@aist.go.jp](mailto:mrisus_info-ml@aist.go.jp)  
 2266-98 Anagahora, Shimo-Shidami, Moriyama-ku, Nagoya, Aichi 463-8560, Japan  
 Tel: (052) 736-7086 / Fax: (052) 736-7406  
 (from outside Japan: Tel: +81-52-736-7086 / Fax: +81-52-736-7406)

[ Research Base ] AIST Chubu

[ AIST Participating Technology Research Association ]

Innovative Structural Materials Associations (ISMA)  
 Thermal Management Materials and Technology Research Association (TherMAT)

### [ Outline ]

We are engaged in the research and development of materials and components to facilitate the sustainable development of society using limited natural resources and energy sources. In this work we are focusing on the following R&D:

- (1) technologies (rare metal substitute materials technologies, technologies to reduce rare metal consumption) to address the supply of some rare metals (tungsten, platinum group metals, cobalt, etc.), which will be difficult to secure in the near future due to rapidly increasing demand in developing countries and an oligopoly for the rare metal resources, in order to ensure the sustainable development of industry
- (2) lightweight metals to reduce vehicle weight for improved fuel economy (technologies for high-performance magnesium alloys)
- (3) energy-efficient building components (light-controlling glass, advanced wood-based materials, humidity-controlling walls, etc.), which will be effective in reducing energy consumption in the commercial/residential sectors.



[ Director ]

Mamoru Nakamura



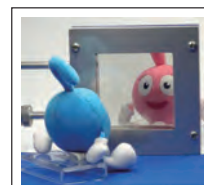
[ Deputy Director ]

Keizo Kobayashi

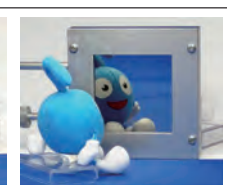


[ Deputy Director ]

Masato Tazawa



Transparent state

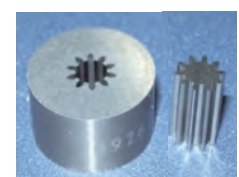


Reflective state

Switching of the switchable mirror using magnesium-alkaline-earth alloy thin film



Rare metal free TiC-FeAl cutting tool and cut stainless bar



WC-FeAl die FeAl substituting Co binder of WC-Co



## Nanosystem Research Institute

Bringing the controlling technology of nanomaterials into the real world

URL : <http://unit.aist.go.jp/nri/>  
E-mail : [nri\\_web-ml@aist.go.jp](mailto:nri_web-ml@aist.go.jp)  
AIST Tsukuba Central 5, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8565, Japan  
Tel: (029) 862-6785 / Fax: (029) 861-4433  
(from outside Japan: Tel: +81-29-862-6785 / Fax: +81-29-861-4433)

- [ Research Base ] AIST Tsukuba (Central, East)
- [ AIST Participating Technology Research Association ]
  - Technology Research Association for Single Wall Carbon Nanotubes (TASC)
  - Chemical Materials Evaluation and Research Base (CEREBA)
  - Minimal Fab Development Association
  - Technology Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM)
  - Fuel Cell Cutting-Edge Center Technology Research Association (FC-Cubic TRA)
  - Thermal Management Materials and Technology Research Association (TherMAT)

### [ Outline ]

The Nanosystem Research Institute (NRI) is a research institute having nanotechnology and computational science as its both wings. Since its inauguration in 2010, NRI has been developing new functional materials, devices, and systems by the development of nano-particle technologies and the innovation of processes, in close cooperation with theory, computational simulation, and measurement technologies. We have also been developing molecular technologies based on soft materials and new technologies to utilize unharnessed heat. Our guiding principle is "Light, Thin, Safe and Soft" instead of familiar "Light, Thin, Short and Small."



[ Director ]

Tomohiko Yamaguchi



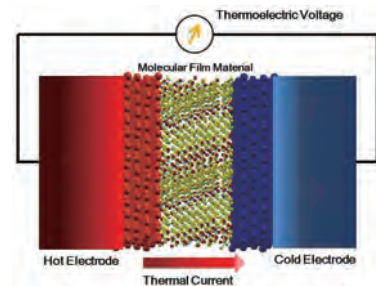
[ Deputy Director ]

Yoshihiro Asai

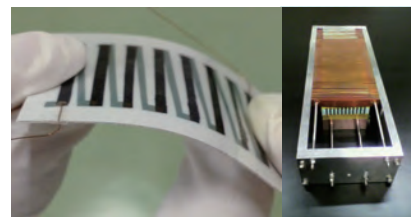


[ Deputy Director ]

Keiichi Ikegami



First Principles simulation of thermoelectric effects



Thermoelectric conversion device (left) and module

## Nanotube Research Center

Toward a world-leading research center covering all aspects of nanocarbon materials

URL : <http://unit.aist.go.jp/ntrc/ci/>  
E-mail : [ntrc-info-ml@aist.go.jp](mailto:ntrc-info-ml@aist.go.jp)  
AIST Tsukuba Central 5, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8565, Japan  
Tel: (029) 861-4551 / Fax: (029) 851-5425  
(from outside Japan: Tel: +81-29-861-4551 / Fax: +81-29-851-5425)

- [ Research Base ] AIST Tsukuba (Central)
- [ AIST Participating Technology Research Association ]
  - Technology Research Association for Single Wall Carbon Nanotubes (TASC)

### [ Outline ]

We are focusing on nanotube structures as typical nanostructures expected to lead to new industries, and the creation of applications, primarily for carbon and graphene developed by AIST, by adding high functionality to them. Our goal is to contribute to the fostering of new industries in Japan through these efforts. We are also developing measurement and analysis techniques for nanostructures, including nanotube and graphene materials, offering the highest levels of performance, and aim to be a world-leading research center covering all aspects of nanocarbon materials.



[ Director ]

Sumio Iijima



[ Deputy Director ]

Motoo Yumura



[ Deputy Director ]

Takeshi Sasaki



CNT-Cu composite material possessing 100-times higher current carrying capacity, 40% lower density, and a lower resistivity at elevated temperatures than copper, while also exhibiting the same coefficient of thermal expansion as silicon



## Research Center for Ubiquitous MEMS and Micro Engineering

Toward ubiquitous microsystems watching over people and society

URL : <http://unit.aist.go.jp/umemsme/cie/>

E-mail : [umemsme\\_web-ml@aist.go.jp](mailto:umemsme_web-ml@aist.go.jp)

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**[ Research Base ]** AIST Tsukuba (East)

**[ AIST Participating Technology Research Association ]**

NMEMS Technology Research Organization Technology Research Association  
Minimal Fab Development Association

### [ Outline ]

We are engaged in R&D of microelectromechanical system (MEMS) with special emphasis laid on development of ubiquitous microsystems for a low-carbon, safe, and secure society. We are also creating an open innovation center of R&D and human resources development for leading edge MEMS while providing R&D and prototyping facilities in close collaboration with industry. National projects of wireless networked sensing for Green and Safety are also pursued to realize wearable or ambient devices for "Internet of Things".



[ Director ]

**Ryutaro Maeda**



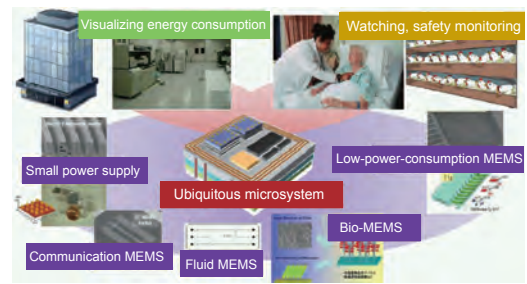
[ Deputy Director ]

**Hiroshi Hiroshima**



[ Deputy Director ]

**Toshihiro Itoh**



Ubiquitous microsystem to watch over people and society

## Green-Innovation Magnetic Material Research Center

Development of high-performance magnetic materials for green innovation

URL : [http://unit.aist.go.jp/g-mag/index\\_en.html](http://unit.aist.go.jp/g-mag/index_en.html)

E-mail : [greimm-inquiry-ml@aist.go.jp](mailto:greimm-inquiry-ml@aist.go.jp)

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**[ Research Base ]** AIST Chubu

**[ AIST Participating Technology Research Association ]**

Technology Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM)

### [ Outline ]

Permanent magnets and soft magnetic materials are important as the construction materials of high-performance motors for next-generation vehicles and electric appliances, whose production volumes are expected to increase in the near future. Magnetocaloric materials are expected to play a role of new refrigerants in the next-generation magnetic refrigeration, which never uses Freon chemicals. With the aim of development of these magnetic materials that resolve problems of resources, environment, and energy, we promote research and development of high-performance magnets with a lower resource risk and of a high-performance magnetic refrigerator.

We are involved in the Future Pioneering Project, Development of magnetic material technology for high-efficiency motors, through the technology research association, MagHEM.



[ Director ]

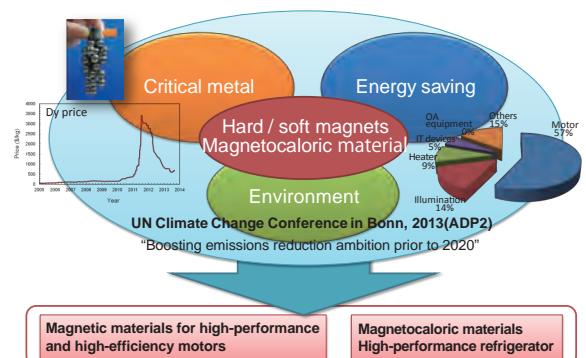
**Kimihiro Ozaki**



[ Deputy Director ]

**Masaki Yasuoka**

Contribute to solving social issues





## Setting measurement standards and developing intellectual techno-infrastructures for measurement, testing, and certification to support technological innovation and a fair and secure society

Measurement is necessary for designing and developing products as well as for testing and certifying their qualities. It serves as a driving force to maintain Japan's industrial competitiveness, and as an intellectual techno-infrastructure for sharing technical policies to maintain the security of society and the lives of individuals, preserve the environment, and maintain energy and resources. AIST develops and maintains national measurement standards in order to ensure global acceptability of consistency, of relevant technologies, and is systematically developing measurement technologies from the standpoint of intellectual infrastructure.



**Yukinobu Miki**

Vice-President  
Director-General



**Kiyoshi Yase**

Deputy Director-General



**Tokihiko Kobata**

Director, Research Planning Office

TEL : 029-861-2698 (from outside Japan: +81-29-861-2698)

E-mail : standard-liaison-ml@aist.go.jp

### [Outline of priority strategies]

#### Development of new national measurement standards and dissemination of measurement standards to industrial and social users

AIST develops new national measurement standards required to specifically support “green innovation” that promotes energy-efficient technologies, also “life innovation” to ensure food safety, and industrial competitiveness such as facilitating the application of advanced industrial technologies to Japanese industry, in response to the rapidly growing global market, and keeps providing national calibration services to users.

#### Development and standardization of advanced measurement technologies

We develop the following techniques in order to improve the development and design of new products and support a fair and secure society: advanced measurement techniques, basic evaluation techniques, industrial standards and conformity assessment techniques, and measurement techniques to solve problems arising at production lines of industrial sectors. We also train measurement experts.

#### Improvement on basic national measurement standards

The improvement on basic national measurement standards required to ensure the reliability of industrial measuring instruments is intended to respond to new measurement needs for high-performance metrology at production sites, refinement

on national traceability hierarchy, direct application of national metrology standards to certification at production sites, and application of on-demand calibration service for small and medium size enterprises to strengthen their R&Ds.

#### Contribution to and leadership in the global metrology system

Our international activities lead the global metrological system for international mutual acceptance of measurement standards and measuring instruments and global standardization on measurement technology, including the cooperation for the redefinition of basic units such as the kilogram and the second. Our dissemination activities also cover the training of metrological experts and verification experts for domestic industrial and regulatory activities, and the metrological administration officers based on the measurement law of Japan.

#### Development and administration of database as intellectual infrastructure for innovation

To support domestic industrial activities for innovations, we continuously update reliable databases and provide the data to the world through our website. It includes spectral database for organic materials and thermal properties for industrially important materials, and it has served more than 50 million visitors a year from the world.



## Metrology Institute of Japan

Precision measurement technologies and metrological traceability supporting R&D, quality control, and international trade

URL : <https://www.nmij.jp/english/info/lab/>

E-mail : [nmij-info-ml@aist.go.jp](mailto:nmij-info-ml@aist.go.jp)

AIST Tsukuba Central 3, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan

Tel: (029) 861-4120 / Fax: (029) 861-4099

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**[ Research Base ]** AIST Tsukuba (Central)

### [ Outline ]

The Metrology Institute of Japan is engaged in technical development and improvement of national metrology standards, and also calibration and testing services using the developed technologies. Furthermore, we are pioneering in advanced research and development on measurement and analysis technology, which is a common infrastructure for various fields, aiming at world-leading research achievements. Through these activities, we are taking the initiative in implementation and management of domestic metrological system from a technical viewpoint so that anyone can choose and utilize a reliable measurement guaranteed by metrological traceability according to cost and time, thereby contributing to the smooth progress of Japan's economic activities in the global market.



[ Director ]  
**Koichi Chiba**



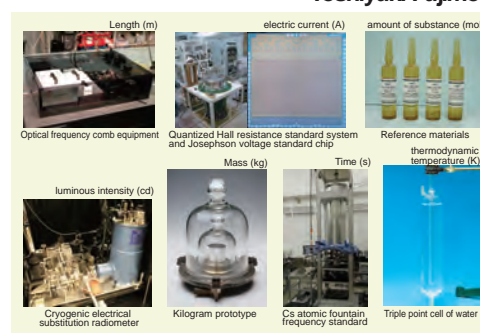
[ Deputy Director ]  
**Masaru Arai**



[ Deputy Director ]  
**Toshiyuki Takatsuj**



[ Deputy Director ]  
**Toshiyuki Fujimoto**



National standards for base units

## Research Institute of Instrumentation Frontier

Evolution from measurement into analysis with the dissemination of advanced instruments

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

E-mail : [riif\\_info-ml@aist.go.jp](mailto:riif_info-ml@aist.go.jp)

AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

Tel: (029) 861-5300 / Fax: (029) 861-5881

(from outside Japan: Tel: +81-29-861-5300 / Fax: +81-29-861-5881)

**[ Research Bases ]** AIST Tsukuba (Central), AIST Chubu

**[ AIST Participating Technology Research Association ]**

Minimal Fab Development Association

Chemical Materials Evaluation and Research Base (CEREBA)

Technology Research Association for Single Wall Carbon Nanotubes (TASC)

### [ Outline ]

From an historical perspective, new scientific and technical disciplines and new industries have often appeared after the invention of novel measurement instruments. For instance, the invention of the scanning tunnel microscope created the modern discipline of nanotechnology. It is said that instrumental observation is the origin of science and technology. Although science and technology are indispensable for our present way of life, we should also be aware of their power for harm. The survival or destruction of the human race depends on how we create and control industries. As such, observation only is insufficient. We have to analyze measurement results, find ways to solve each problem, and explain the findings in a meaningful way. In other words, analytical results should be extracted from measurements. We carry out five strategic action plans by expanding three analytical instrumental frontiers as shown on the right-hand side.



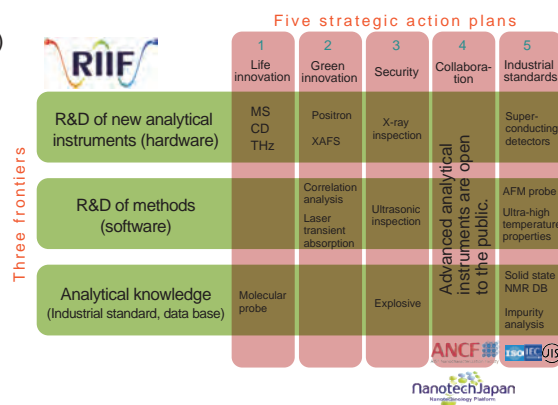
[ Director ]  
**Yukihiko Yamauchi**



[ Deputy Director ]  
**Naoaki Saito**



[ Deputy Director ]  
**Takashi Tokizaki**





## Measurement Solution Research Center

Developing measurement technology solutions for better productivity to keep the safety and security of industry and society.

URL : [http://unit.aist.go.jp/msrc/index\\_en.html](http://unit.aist.go.jp/msrc/index_en.html)  
E-mail : [msrc-webmaster-ml@aist.go.jp](mailto:msrc-webmaster-ml@aist.go.jp)  
807-1 Shuku-machi, Tosu, Saga 841-0052, Japan  
Tel: (0942) 81-3646 / Fax: (0942) 81-3690  
(from outside Japan: Tel: +81-942-81-3646 / Fax: +81-942-81-3690)

**[ Research Base ]** AIST Kyushu

### [ Outline ]

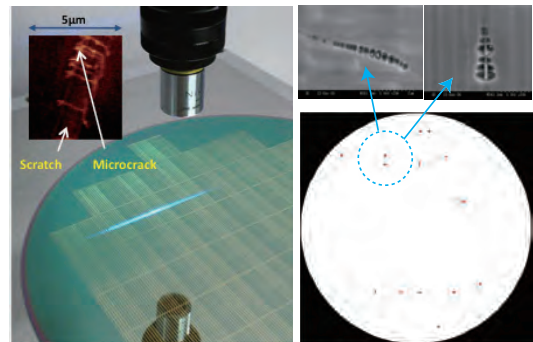
Our mission is to provide the solutions on time to various problems arising at production sites and in society by integrating the research results of measurement, instrumentation and relating technologies. As a means to achieve this, we are promoting the collaboration with “meisters” who are the specialists at the production sites in private sectors and well informed about the measurement problems there (we call this approach the “meister system”). We also take a consortium-type approach if the problems are relatively common in a certain field of industry and society. By accumulating the cases which resulted in the solutions and by sending out the proper information, we contribute to the improvement of the productivity to keep the safety and security of industry and society.



**[ Director ]**  
**Michiru Sakamoto**



**[ Deputy Director ]**  
**Hidehiko Nonaka**



Example of microcracks in the surface of a semiconductor wafer

## Metrology Management Center

For establishment and dissemination of measurement standards in Japan

URL : <https://www.nmij.jp/english/info/center/>  
E-mail : [nmij-info-ml@aist.go.jp](mailto:nmij-info-ml@aist.go.jp)  
AIST Tsukuba Central 3, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan  
Tel : (029) 861-4120 / Fax : (029) 861-4099  
(from outside Japan: Tel: +81-29-861-4120 / Fax: +81-29-861-4099)

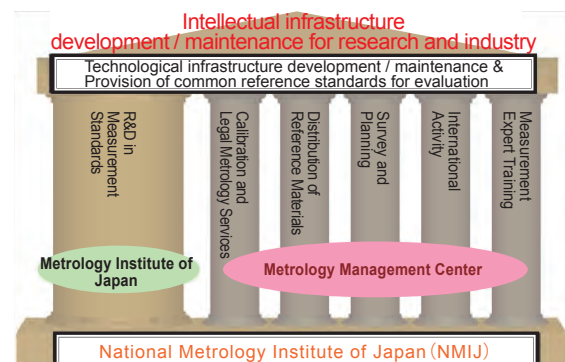
**[ Location ]** AIST Tsukuba (Central)

### [ Outline ]

Metrology Management Center (MMC) in AIST is responsible for establishment and dissemination of the measurement traceability in Japan. In particular, MMC disseminates measurement standards to markets and customers via calibration services, legal metrology and reference materials in cooperation with Metrology Institute of Japan (MIJ) as well as with Japan Calibration Service System (JCSS). Other MMC's important missions are to establish strategies for national measurement standards through surveillance and analysis of users' demands, and to ensure the international equivalence of measurement standards through CIPM under the Metre Convention. Furthermore, under the metrology related laws, MMC is also in charge of training measurement experts and disseminating the outcomes of activities in metrology.



**[ Director ]**  
**Takashi Usuda**





## Understanding of the Earth and coexistence with the Earth

Geological Information is essential for a country like Japan, located at a tectonically active area, to ensure a safe and secure society. We gather, compile, and provide geological information under the name of the Geological Survey of Japan (GSJ) and promote its wider use. We also develop technologies to overcome various difficulties in global environment protection, exploration of minerals and energy resources, and natural disaster mitigation, and coordinate international cooperation as a national representative.



**Eikichi Tsukuda**

Vice-President  
Director-General



**Yusaku Yano**

Deputy Director-General



**Kohsaku Arai**

Director, Research Planning Office

TEL : 029-862-6034 (from outside Japan: +81-29-862-6034)  
E-mail : geo-liaison-ml@aist.go.jp

## [Outline of priority strategies]

### Geological Information

Geological Information is one of the fundamental information of the land and marine that is systematically obtained and arranged through geoscientific research. Carrying out geological surveys, we keep basic geoscientific maps up-to-date to respond to social demands. Focusing on urban and coastal areas, we try to expand the utilization of geological information in society and promote the utilization of satellite data to mitigate urban disasters, to say nothing of improving our research methods and technologies.

### Geosphere Environment and Natural Resources

Geosphere is a basic part of the Earth System. Not only does it provide us natural resources, but also it closely interacts with human activities. We clarify the material circulating system in the geosphere establishing its evaluation technologies, and develop techniques both to conserve and utilize its environment in order to balance development and environment conservation. We promote environment-friendly approaches and seek the realization of a sustainable society.

### Natural Disaster Mitigation

Geohazards are great threats to the people living on an archipelago of significant seismic and volcanic activities like Japan. Precise and detailed information about active faults and volcanoes and the underground structure is crucial for disaster mitigation as well as more accurate forecast of their activities. We carry out research to clarify their past activities, figure out their mechanisms, forecast future activities, and improve disaster assessment technology based on surveys and monitoring information.

### Contribution to Society

We improve the utilization and social receptivity of geological information as a user-friendly intellectual foundation, as well as provide open geological information of global standard enhancing its quality control and guarantee functions. We make continuous efforts to enrich the quality of exhibition of the Geological Museum, which distributes our research outcomes to society, and support Geopark and other activities.

We conduct urgent surveys in a time of geological disasters such as earthquakes and volcanic eruptions and promptly deliver the results.

### International Cooperation

We promote research projects on development of geological information, geological hazards mitigation, resource exploration, and environment protection through international organizations and international research programs. We promote and take leadership in international collaboration on geoscientific research particularly in Asia, Africa and South America, making good use of global networks of geological survey organizations.

### Contribution to the development of renewable energy technologies

The Geothermal Energy Team and the Shallow Geothermal and Hydrogeology Team of the Renewable Energy Research Center develop the technologies for appropriate use of geothermal energy, evaluate the potential of ground source heat pump system, and work on its optimization techniques, as part of the GSJ.



## Institute for Geo-Resources and Environment

Protecting the Earth and exploring its gifts

URL : <http://green.aist.go.jp/>

E-mail : [geore-web-ml@aist.go.jp](mailto:geore-web-ml@aist.go.jp)

AIST Tsukuba Central 7, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8567, Japan

Tel: (029) 861-3633 / Fax: (029) 861-3717

(from outside Japan: Tel: +81-29-861-3633 / Fax: +81-29-861-3717)

**[ Research Base ]** AIST Tsukuba (Central, West)

### **[ Outline ]**

Our research activities cover geological disposal of nuclear wastes, geological storage of CO<sub>2</sub>, soil and groundwater contaminations, rare metal, fossil fuel and groundwater resources. We want to contribute to the sustainable development and betterment of human society through research into the conservation and the wise use of the geosphere and the stable supply of geosphere resources. We also enrich the geoscientific intellectual infrastructure and provide our research outcomes to the public.



[ Director ]

**Shinsuke Nakao**



[ Deputy Director ]

**Yuji Mitsuhashi**



[ Deputy Director ]

**Takayuki Sawaki**



Deployment of the new electromagnetic measurement system at a coastal area



Field survey in Minas Gerais, Brazil

## Institute of Geology and Geoinformation

Disseminating vital information for a safe and sustainable society

URL : <https://unit.aist.go.jp/igg/ci/>

E-mail : [iggweb-ml@aist.go.jp](mailto:iggweb-ml@aist.go.jp)

AIST Tsukuba Central 7, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8567, Japan

Tel: (029) 861-3620 / Fax: (029) 861-3742

(from outside Japan: Tel: +81-29-861-3620 / Fax: +81-29-861-3742)

**[ Research Base ]** AIST Tsukuba (Central)

### **[ Outline ]**

We investigate the geology of both land and ocean around Japan in detail and provide the results as the national geological information that constitutes the intellectual infrastructure of the state. We integrate these geological data and distribute them to society in a user-friendly format. We also produce high quality geological information useful for geohazard mitigation and environmental protection in urban coastal areas. In order to achieve the above missions, we keep improving our techniques for geoinformation analysis, and undertake research to upgrade, integrate, and enhance the usage of the geological information over the Asia region in response to social needs.



[ Director ]

**Masahiko Makino**



[ Deputy Director ]

**Kazuhiro Miyazaki**



[ Deputy Director ]

**Yuichiro Tanaka**



Field survey at an outcrop



## Institute of Earthquake and Volcano Geology

From the past to the future through geology

URL : <https://unit.aist.go.jp/ievg/>  
 E-mail : [ievg-webmaster-ml@aist.go.jp](mailto:ievg-webmaster-ml@aist.go.jp)  
 AIST Tsukuba Central 7, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8567, Japan  
 Tel: (029) 861-3691 / Fax: (029) 861-3803  
 (from outside Japan: Tel: +81-29-861-3691 / Fax: +81-29-861-3803)

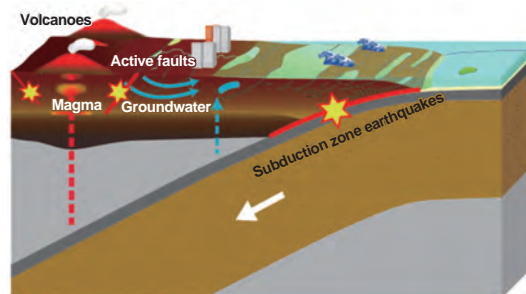
[ Research Base ] AIST Tsukuba (Central)

### [ Outline ]

Our research covers a wide range of areas related to the mitigation of earthquake, tsunami, and volcanic disasters, and the geological information used for safety regulations of radioactive waste disposals, as well as studies to understand, assess, and predict these geological and tectonic phenomena. Responding to today's highly-globalized society, we accumulate and organize risk information for earthquakes and volcanoes especially in Asia, which will be useful for natural disaster mitigation and which will help domestic enterprises in their overseas site selections.



[ Director ] **Yasuto Kuwahara**      [ Deputy Director ] **Koji Masuda**      [ Deputy Director ] **Jun'ichi Itoh**



A schematic explanation of earthquakes, volcanic activities, and groundwater flow around Japanese Islands

## Geoinformation Center

Integrating and providing useful information for society

URL : <https://www.gsj.jp/en/geoinfo-center.html>  
 E-mail : [gicweb-ml@aist.go.jp](mailto:gicweb-ml@aist.go.jp)  
 AIST Tsukuba Central 7, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8567, Japan  
 Tel : (029) 861-3601 / Fax : (029) 861-3602  
 (from outside Japan : Tel: +81-29-861-3601 / Fax: +81-29-861-3602)

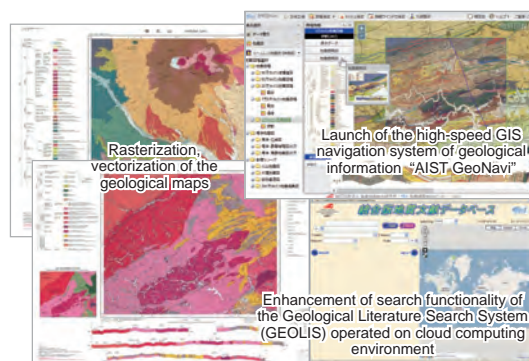
[ Location ] AIST Tsukuba (Central)

### [ Outline ]

In order to play the role of a geological information hub of social activities, we closely coordinate with our research units and promote the development, management, publication, integration and sharing of geological information. We standardize geoscientific maps and scientific reports, and provide reliable and high-quality geoinformation to the public. We collect and organize metadata of geological publications and provide the data on the web. In addition, we systematically integrate geological information and satellite images into interoperable databases and deliver them through the web.



[ Director ] **Yoshio Watanabe**      [ Deputy Director ] **Satoshi Tsuchida**



Electronic publication, cloud computing and improvement of geo-information



## Geological Museum

### Management of geologic specimens and disseminating the geologic information

URL : <https://www.gsj.jp/Muse/>

E-mail : [gm-hq1-ml@aist.go.jp](mailto:gm-hq1-ml@aist.go.jp)

AIST Tsukuba Central 7, 1-1-1 Higashi, Tsukuba, Ibaraki 305-8567, Japan

Tel : (029) 861-3754 / Fax : (029) 861-3746

(from outside Japan: Tel: +81-29-861-3754 / FAX: +81-29-861-3746)

**[ Location ]** AIST Tsukuba (Central)

#### **[ Outline ]**

We conduct research support activities, such as storage and management of geological research materials, provision of these materials for academic use and laboratory preparations such as thin sections for our research activities. Additionally, we carry out outreach and educational activities by enhancing the museum exhibition, planning and organizing special exhibitions, lectures, and other educational events, and offering geological consultation services to the public. We promote and assist other outreach activities such as the Geopark project.



[ Director ]

**Seiichi Toshimitsu**



[ Deputy Director ]

**Koichi Shimokawa**



Special exhibition of the Geological Museum



## Toward reinforcing our functions of open innovation hub

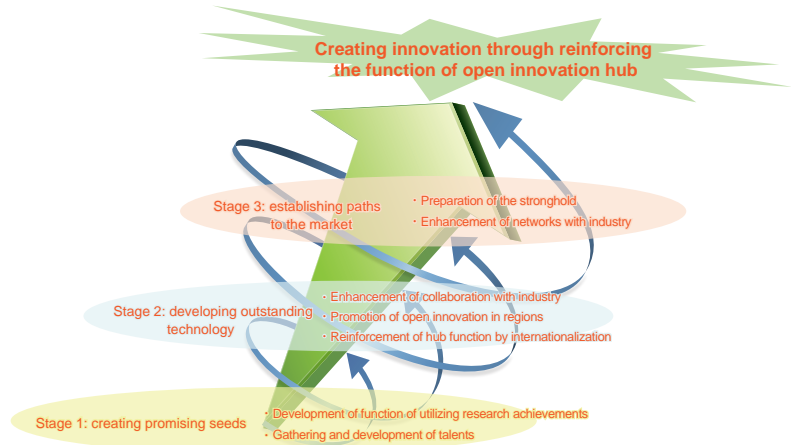
While setting our goal to build Japan's industrial competitive advantage, we demonstrate the function of open innovation 'hub' and create innovations by promoting research projects that may be attractive to industry. In more detail, along with implementing integrated researches of our 6 research fields, we try to deliver on our strategy in 3 stages: creating promising seeds (stage 1); developing outstanding technology (stage 2); and establishing paths to the market (stage 3), and promote green innovation, life science-based innovation etc.



### Masahiro Seto

Vice-president  
Director-General

E-mail : raip-general-ml@aist.go.jp  
AIST Tsukuba Central 2, 1-1-1 Umezono, Tsukuba,  
Ibaraki 305-8568, Japan  
TEL: 029-862-6040 / FAX: 029-862-6130  
(from outside Japan: TEL: +81-29-862-6040 / FAX: +81-29-862-6130)



## [Outline of priority strategies]

### Strengthening function of utilizing research achievements

For practical application of our research results, we decide on policies concerning alliances, licenses, venture businesses and international standardization according to seeds levels or market trends, and we aim for the comprehensive use of the results by preparing a system for implementation.

### Gathering and development of talents

We promote the establishment of a collaboration arena where players who hold a variety of missions and potentials gather, by effectively using our domestic and global network with companies, universities and research institutes. Also we train personnel of high-level industrial technology through collaborative research projects.

### Enhancement of collaboration with industry

To meet the technological challenges, we, with our highly rated potentials and cutting-edge research facilities, encourage a variety of collaborative projects such as R&D providing solutions, R&D providing high technologies, and R&D based on forecasts of future industry.

### Promotion of open innovation in regions

We contribute, as an open innovation hub in local regions, to the vitalization of the regional industry, and support local companies to improve their technologies by using our organizational power and network which covers the whole country.

### Reinforcement of hub function by internationalization

By building partnerships with foreign innovative institutes and universities, we promote strengthening the hub function through globalization of networks with such organizations and within AIST.

### Preparation of the stronghold

We aim at setting up strongholds with necessary systems to utilize human resources and research facilities of AIST in order to realize open innovation.

### Enhancement of networks with industry

We also try to reinforce networks with industry through events, lectures and symposiums.

## Planning Division

### Reinforcement of function of open innovation hub where 'technology' and 'collaboration' unite

E-mail : raip-general-ml@aist.go.jp  
Tel : 029-862-6040 Fax : 029-862-6130  
(from outside Japan: Tel: +81-29-862-6040 / Fax: +81-29-862-6130)

### [ Outline ]

The division pulls together all other divisions of Research and Innovation Promotion Headquarters and formulates strategies for creation and promotion of innovation, drafts plans and implements projects. In addition, it promotes alliances for invigoration of local industry in regional basement areas and open innovation within technology research associations that utilize AIST as a hub. It predominantly supports research that accelerates integration of different fields and collaboration with companies, and encourages the spread of technologies developed by AIST to society.



[ Director ]  
[ Manager, Regional Research Promotion Office ]

Satoshi Hamakawa



[ Manager, Strategic Research Promotion Office ]

Masaya Kodama



## Intellectual Property Division

From strategic and efficient acquisition of rights and maintenance of research outcome to technology transfer

E-mail: [chizai\\_web-ml@aist.go.jp](mailto:chizai_web-ml@aist.go.jp)

Tel: (029)862-6153 / Fax: (029)862-6154

(from outside Japan: Tel: +81-29-862-6153 / Fax: +81-29-862-6154)

### [ Outline ]

We aim to acquire intellectual property rights such as patents and know-how, maintain and take advantage of them strategically and efficiently to transfer our research outcome effectively to industry. Through these activities, we intend not only to create innovation by collaboration with industry but also to maintain and improve the international competitiveness of our country's industry.



[ Director ]

**Shigeki Kamiyama**



[ Deputy Director ]

**Kazuya Takai**



[ Manager, Planning Office ]

**Motoki Kato**

Fiscal year	2012	2013
Technology transfer revenue (million yen)	258	265
Number of contracts	882	890
Domestic patent applications	687	740

## Collaboration Promotion Division

To promote collaboration among industry, academia, public research organization, and local government

E-mail: [sgk.plan-ml@aist.go.jp](mailto:sgk.plan-ml@aist.go.jp)

Tel: (029)862-6144 / Fax: (029)862-6148

(from outside Japan: Tel: +81-29-862-6144 / Fax: +81-29-862-6148)

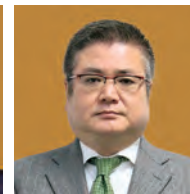
### [ Outline ]

We plan and coordinate collaborative activities among industry, academia, public research organization, and local government to implement the missions of AIST through cooperation with them. Our major responsibilities are as follows: developing regional technology policy, constructing networks among relevant organizations in the Kanto and Koshinetsu Districts, providing technological consultation service, promoting the utilization of our research results for small and medium-sized enterprises, and managing joint research or commissioned research agreements.



[ Director ]

**Kiyoyuki Shimizu**



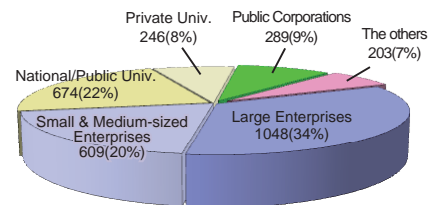
[ Deputy Director ]

**Mitsuo Suzuki**



[ Manager, Planning Office ]

**Ken-ichi Miyamoto**



The Number of Joint Research Projects  
April, 2013-March, 2014

## International Affairs Division

Building global research networks of institutes and human resources

URL: [http://www.aist.go.jp/aist\\_e/international/index.html](http://www.aist.go.jp/aist_e/international/index.html)

E-mail: [kokusai-soukatsu-ml@aist.go.jp](mailto:kokusai-soukatsu-ml@aist.go.jp)

Tel: (029)862-6244 / Fax: (029)862-6249

(from outside Japan: Tel: +81-29-862-6244 / Fax: +81-29-862-6249)

### [ Outline ]

We create the framework of international collaboration by such means as conclusion of memoranda of understanding (MOUs) with the purposes to solve global issues and to enhance industrial competitiveness of Japan. It is also our responsibility to reinforce international network of human resources by planning and managing the exchange of researchers for various occasions and purposes. We are also in charge of ensuring the institute's compliance with export control laws and regulations, which is essential for material or technology transfer associated with international research collaboration.



[ Director ]

**Natsuko Sakai**



[ Manager, Global Collaboration Office ]

**Yumiko Nakamura**



Comprehensive MOU : 34, Specific MOU : 33



## Division for Start-ups

Vitalizes Japan by fostering innovation through venture creation

URL: <http://unit.aist.go.jp/dsu/cie/index.html>  
 E-mail: [dsu-koho-ml@aist.go.jp](mailto:dsu-koho-ml@aist.go.jp)  
 Tel: (029)862-6655 / Fax: (029)862-6656  
 (from outside Japan: Tel: +81-29-862-6655 / Fax: +81-29-862-6656)

### [ Outline ]

DSU's mission is to focus on extracting value from technologies of AIST as well as industry and academia in developing high-tech ventures with high growth potential. DSU provides a founding program named Business Development Task Force in which researcher and experienced business person jointly create business ventures.

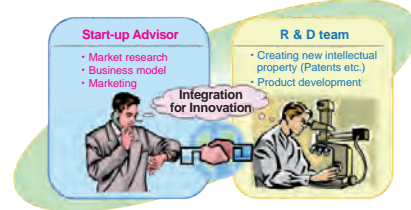


[ Director ] Haruyuki Yoneda [ Deputy Director ] Takashi Iwasaki [ Manager, Planning Office ] Ryouichi Kitagawa

### Business Development Task Forces (TF)

- Research Programs for Creating and Supporting Venture Business -

Project manager for developing new business is assigned as "Startup Advisor", and organizing the Task Forces with researcher.



## International Standards Promotion Division

Contributes to the activation of standardization based on the R&D results

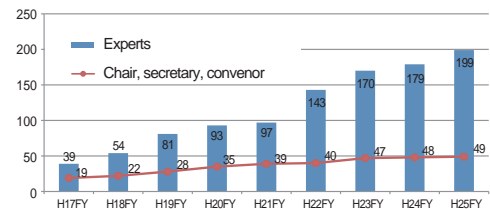
URL: [http://unit.aist.go.jp/ispd/index\\_en.html](http://unit.aist.go.jp/ispd/index_en.html)  
 E-mail: [hyoujunbu-ml@aist.go.jp](mailto:hyoujunbu-ml@aist.go.jp)  
 Tel: (029)862-6221 / Fax: (029)862-6222  
 (from outside Japan: Tel: +81-29-862-6221 / Fax: +81-29-862-6222)

### [ Outline ]

International Standards Promotion Division contributes to the activation of standardization based on the research outputs of AIST. Standardization is one of the most important activities of giving back AIST research outcomes to society. To realize the activities, we provide financial support, both for participation to the ISO/IEC meetings and for R&D activities for developing the new national/international standards. We also hold some symposiums to disseminate the importance of standardization and standards in research activities.



[ Director ] Hiro Matsuda [ Manager, Planning Office ] Koichiro Hattori



Contribution to international standardization activities

## Innovation School

Postdoctoral researchers revitalize Japan

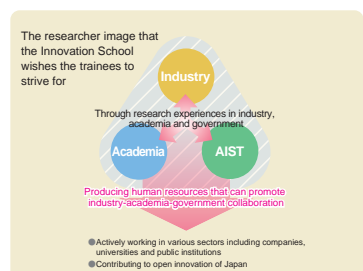
URL: [http://unit.aist.go.jp/inn-s/ci/index\\_e.html](http://unit.aist.go.jp/inn-s/ci/index_e.html)  
 E-mail: [school-jimukyoku-ml@aist.go.jp](mailto:school-jimukyoku-ml@aist.go.jp)  
 Tel: (029)849-1600 / Fax: (029)862-6130  
 (from outside Japan: Tel: +81-29-849-1600 / Fax: +81-29-862-6130)

### [ Outline ]

In FY2008, AIST opened the Innovation School and since then has been training postdoctoral researchers and PhD students for their carrier development and the promotion of industry-academia-government collaboration by giving them various lectures and On-the-Job Training in private companies and AIST. After graduation from the School, over 230 trained researchers have been actively working in various sectors, such as private companies, universities and public institutions toward future innovations.



[ Director ] Masahiro Seto [ Bureau Manager ] Tetsuo Kotoku



## Creating global open innovation hub for nanotechnology — From “Tsukuba” towards future industries

The Tsukuba Innovation Arena (TIA) headquarters is promoting and managing several activities at AIST as a planning and managing office of Tsukuba Innovation Arena for Nanotechnology (TIA-nano). Core infrastructures and state-of-the-art facilities of TIA-nano, such as the Super Clean Room (SCR), the Silicon-Carbide (SiC) power device pilot line, and the open user facilities, are managed by the TIA headquarters.



**Toshihiko Kanayama**  
Senior Vice-President  
Director-General



**Hiroshi Iwata**  
Counselor  
(general management)



**Shigeo Okaya**  
Counselor  
(international and external affairs)



**Koichi Suzuki**  
Counselor  
(collaboration)



**Michiya Okada**  
Counselor  
(power electronics)

### Tsukuba Innovation Arena for Nanotechnology (TIA-nano)

TIA-nano is creating a global nanotechnology research and education center under the leadership of the National Institute of Advanced Industrial Science and Technology (AIST), the National Institute for Materials Science (NIMS), the University of Tsukuba, and the High Energy Accelerator Research Organization (KEK) with the support of Keidanren (Japan Business Federation) in Tsukuba city, where advanced facilities and human resources for nanotechnology are accumulated.

TIA-nano has set six **core research domains** as priority areas where capital and human resources of the public and private sectors are gathered to perform R&D, as well as three **core infrastructures** as systems for carrying out prototype device production and evaluation, shared use of advanced nanotechnology equipment, and promotion of human resources development. In addition, promotion and acceleration of the existing research and creation of new research domains are aimed at by utilizing advanced instrumentation technologies.

#### Core research domain

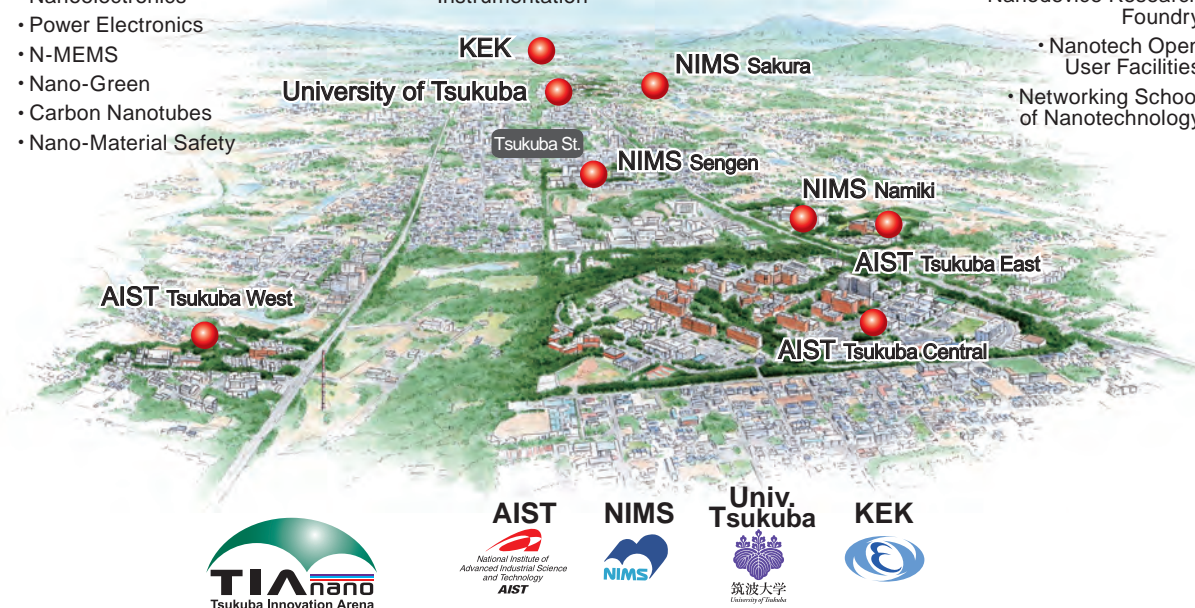
- Nanoelectronics
- Power Electronics
- N-MEMS
- Nano-Green
- Carbon Nanotubes
- Nano-Material Safety

#### Research collaboration domain

- Instrumentation

#### Core infrastructure

- Nanodevice Research Foundry
- Nanotech Open User Facilities
- Networking School of Nanotechnology



TIA-nano four core institutes

TIA projects : 26 (cumulative total)  
Cooperating companies : 220 (4 yr total)  
Total budget sum : 92.0 billion yen (4 yr total)  
Public budget ratio : 73.7 % (FY 2013)

Attending researchers : 934 (FY 2013)  
Publications : 459 (4 yr total)  
Patents : 241 (FY 2013)

Post-grad students in TIA Network School : 709 (4 yr total)

Contact for TIA-nano URL : <http://tia-nano.jp/en> E-mail : [tia-nano\\_info@tia-nano.jp](mailto:tia-nano_info@tia-nano.jp)

### TIA-nano Open User Facilities

In order to disseminate research results of AIST, we offer open use of Super Clean Room (SCR) facilities and other nanotech equipment, for which we have accumulated advanced engineering know-how.

- Super Clean Room (SCR) ([https://unit.aist.go.jp/tia/orf-co/scr/index\\_en.html](https://unit.aist.go.jp/tia/orf-co/scr/index_en.html))
- Innovation-Boosting Equipment Common (IBEC)
- Database of Open Research Facilities in Tsukuba (<http://oft.tsukuba-sogotokku.jp/>)



### Tsukuba Power Electronics Constellations (TPEC) Industry-funded open innovation consortium

TPEC is operated in a self-sustaining manner, with global companies related to power electronics and small and medium-sized entities possessing advanced technologies sharing the research costs and providing most of the R&D funds. In addition to promoting R&D for industrial applications, developing capable human resources who will lead the next generation in power electronics is also an important mission of TPEC.



## Tsukuba Innovation Arena Planning Office

TEL: 029-862-6584 FAX: 029-862-6048 E-mail: [tia-kikaku-ml@aist.go.jp](mailto:tia-kikaku-ml@aist.go.jp)  
(from outside Japan: TEL: +81-29-862-6584 / FAX: +81-29-862-6048)

Engages in planning of basic policies, planning of projects, gathering, analyzing, survey of information, and total management concerning TIA promotion.



[ Director ] **Yoichi Sakakibara**

## Tsukuba Innovation Arena Collaboration Promotion Office

TEL: 029-862-6123 FAX: 029-849-1020 E-mail: [tia-renkei-ml@aist.go.jp](mailto:tia-renkei-ml@aist.go.jp)  
(from outside Japan: TEL: +81-29-862-6123 / FAX: +81-29-849-1020)

Engages in necessary coordinating activities for TIA promotion, such as collaboration with outer organizations and/or related departments.



[ Director ] **Manami Kokufuda**

## Open Research Facility Coordination Office

TEL: 029-862-6592 FAX: 029-862-6048 E-mail: [tia-kyoyo-ml@aist.go.jp](mailto:tia-kyoyo-ml@aist.go.jp)  
(from outside Japan: TEL: +81-29-862-6592 / FAX: +81-29-862-6048)

Engages in maintenance and operation of rules on usage of registered facilities, instruments and equipment (open research facilities, etc.). Performs requested analysis, requested prototype production and manufacturing, which uses open research facilities.



[ Director ] **Morito Akiyama**

## Super Clean Room Management Office

TEL: 029-849-1530 FAX: 029-849-1533 E-mail: [tia-scr-ml@aist.go.jp](mailto:tia-scr-ml@aist.go.jp)  
(from outside Japan: TEL: +81-29-849-1530 / FAX: +81-29-849-1533)

Engages in support for R&D on design, test production, evaluation and demonstration of devices using the Super Clean Room (SCR). Also engages in maintenance and upgrading of technology infrastructure, technical guidance, dissemination of outcomes and operation of SCR.



[ Director ] **Yasuo Inoue**

## Power Electronics Innovation Management Office

TEL: 029-861-8351 FAX: 029-861-8409 E-mail: [tia-power-ml@aist.go.jp](mailto:tia-power-ml@aist.go.jp)  
(from outside Japan: TEL: +81-29-861-8351 / FAX: +81-29-861-8409)

Supports and accelerates radical innovation of power electronics by using the pilot plant for industrial-scale SiC power device production. Also is the managing office of Tsukuba Power Electronics Constellations (TPEC).



[ Director ] **Fujio Okui**

### Contact for TIA Headquarters

URL [https://unit.aist.go.jp/tia/index\\_en.html](https://unit.aist.go.jp/tia/index_en.html)

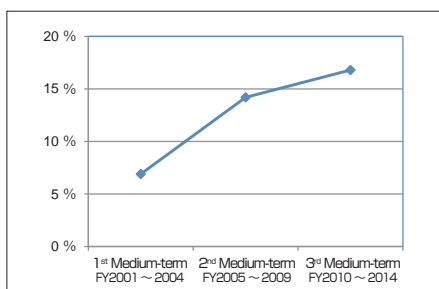
E-mail [tia-soukatsu-ml@aist.go.jp](mailto:tia-soukatsu-ml@aist.go.jp)

## For an environment where employees can manifest their maximum abilities

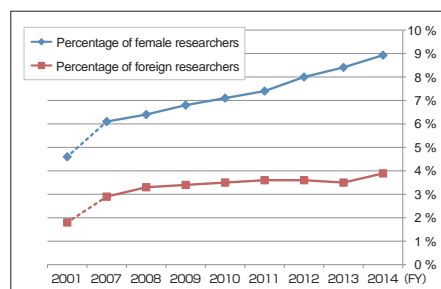
In order to accomplish AIST's mission of strengthening its function as an open innovation hub, diversity, or the active use of its variety of human resources, is essential. AIST aims to provide an environment where diverse employees of different gender, age, and nationality create various values and ideas, and where all employees can manifest their abilities to the maximum. For promoting diversity, various support measures are provided such as for recruitment of female researchers, for foreign researchers, for career building of female researchers, and for work-life balance. Along with these internal activities, AIST is trying to expand collaboration with other research institutes, universities, government, and local government.



**Shigeko Togashi**  
Vice-President



The shift in percentage of female researchers employed during the Medium-term periods (As of April 1, 2014)



The shift in percentage of female and foreign research staff (Based on data of April 1 of each year)

### [Outline of priority strategies]

#### Recruitment support of female researchers

In order to increase gender diversity at AIST, we set as a goal the employment of 15 % or more female researchers in the period of the Third Medium-term Plan (FY2010-2014), and promote active recruitment of excellent female researchers. To attract female students with such potential, we are taking a variety of methods to raise awareness of AIST as an institute that provides a pleasant research environment for women, through public relations activities at job recruitment meetings and through magazines. For example, we distribute role-model essays to female students so that they can picture their future selves at AIST. The female ratio of the cumulative hire during the Third Medium-term Plan period (hire up to April, 2014) is 16.8 %.

#### Support for foreign researchers

In order to receive various human resources with diverse nationalities and backgrounds, AIST promotes active recruitment of competent foreign researchers. AIST provides various kinds of support which includes placement of administrative staff to assist foreign research group leaders who need language support. At the AIST International Center, we intend to uphold the activities of foreign researchers at AIST, through support of their daily lives and by providing information and a place of cultural exchange.

#### Support for career building of female researchers

We assist career building of female researchers by presenting role models (seniors as reference models) and by providing information through seminars. In addition, AIST provides various counseling services to employees, such as career counseling through which they can receive appropriate advice.

#### Support for work-life balance

AIST is addressing issues of work-life balance, in order to create an environment where employees can comfortably raise children and take care of the aged. Flexible working time, various leave systems to support child rearing and nursing care have been introduced, and employees are encouraged to take annually provided paid holidays. Useful information concerning child rearing and nursing care is provided through the intranet and seminars.

#### Collaboration with other research institutes, universities, government, and local government

As the presiding organization of the Diversity Support Office (DSO) in which 21 domestic research and education institutions participate, AIST provides a framework to regularly exchange opinions, and promotes collaboration. We also cooperate with the local government by participating in the Council for Gender Equality of the Tsukuba City.



## Diversity and Equal Opportunity Office

General Affairs Headquarters

Innovation from the promotion of diversity

URL : <https://unit.aist.go.jp/diversity/>  
E-mail : [diversity-web-ml@aist.go.jp](mailto:diversity-web-ml@aist.go.jp)  
Tel : 029-862-6418 / Fax : 029-862-6882  
(from outside Japan: Tel: +81-29-862-6418 / Fax: +81-29-862-6882)

### [ Outline ]

The Diversity and Equal Opportunity Office aims to provide to all employees an environment where they can manifest their abilities to the maximum. It comprehensively promotes the utilization of diversity, or the diverse qualities of gender, age, nationality, etc. of employees by providing recruitment and performance support for female and foreign researchers, and by providing assistance for career building and for work-life balance.



[ Director ]  
**Osamu Yamada**



# AIST Participating Technology Research Associations

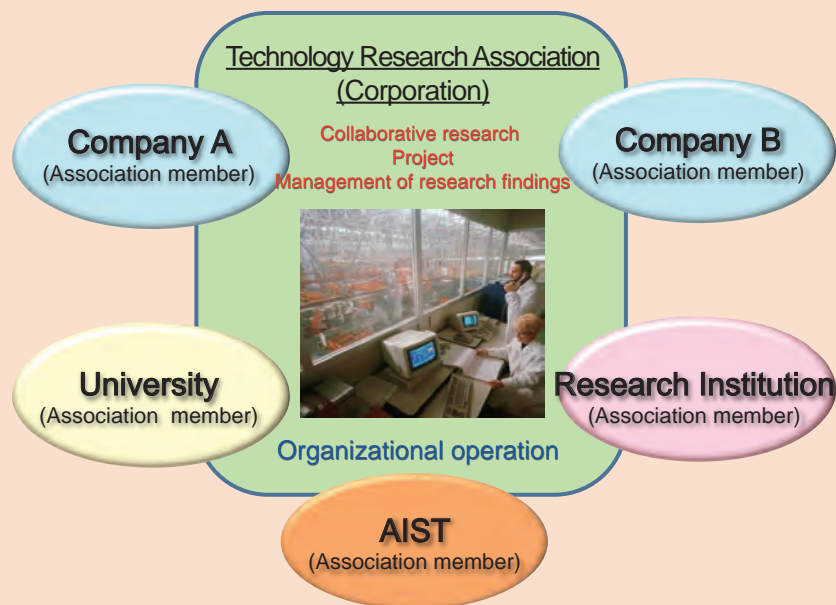
## Participation in technology research associations — A new scheme for “promoting open innovation” —

Joining as a proper member in technology research association — a new way for AIST to cooperate with industry and universities is now open. Up until 2009, AIST had been contributing to those associations as an outside collaborator. Since then, legal reform in 2009 eliminated the restrictions for AIST to become an association member. Now we work within the associations in planning, implementation of research projects and utilization of their achievements.

In the technology research associations, many “human resources” of AIST such as researchers, project leaders or directors are taking important roles. In addition, associations’ main research hubs are mostly placed inside “research facilities” of AIST itself, as AIST offers an ideal environment for researchers in industry and universities to intensively conduct researches. This is the way AIST promotes its functions as an open innovation hub — a collaboration arena consisting of diverse researchers, organizations and knowledge.

AIST regards works on R&D with the associations as a more strategic effort, which will not imply only commencing R&D and commercialization but also sharing the strategies of intellectual property and standardization for maintaining and enhancing the industrial competitiveness of our country.

The followings are 25 associations in which AIST currently participates.



One of the organizational forms for  
actualizing open innovation

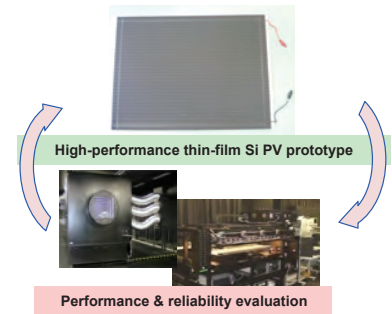


# Photovoltaic Power Generation Technology Research Association (PVTEC)

Research and development of high-performance PV cells and reliability evaluation

- [ Establishment ]** December 1990
- [ President ]** Yukinori Kuwano (Former Executive Director & President of SANYO Electric Co. Ltd)
- [ Month of AIST's participation ]** December 2009
- [ Members ]** 51 companies, 4 organizations (as of Jul. 1, 2014)

Asahi Kasei Chemicals, Asahi Glass, Iwasaki Electric Co., Ltd., EKO Instruments, Espec, FWAVE Company, Ltd., NPC, Onamba Co., Ltd., Okura Industrial, Kaneka, Kikusui Electronics, Kyocera, Kuraray, CHEMITOX, INC., Kobelco Research Institute, Komatsu NTC, Saga Prefecture, C.I. KASEI, SHARP, SHOEI CHEMICAL INC. SHINNIHON KAGAKU MFG., LTD., JX Nippon Oil & Energy, Sumitomo Seika Chemicals CO.,LTD, Sekisui Chemical, Daikin Industries, Daisel, Dai Nippon Printing, Tanaka Holdings, Tabuchi Electric Co.,Ltd., Choshu Industry, DIC, Teijin DuPont Films, Daxerials Corporation, DuPont, Japan Electrical Safety & Environment Technology Laboratories, Denki Kagaku Kogyo, Central Research Institute of Electric Power Industry, Tokyo Electron, Toyo Aluminum, Toyo Ink, TOYOBO, Toray Industries, Toray Engineering, Dow Corning Toray, Nitto Denko, Nippon Sheet Glass, Panasonic, Mitsui Chemicals, Du Pont-Mitsui Polychemicals, Mitsubishi Heavy Industries, Ltd., Mitsubishi Rayon, UL Japan, LINTEC, Lasertec, AIST



## [ Purpose ]

The research and development of PV technology by unifying R&D capabilities of the member companies / Promotion of corporation with universities and public research organizations.

## [ Outline of R&D ]

- R&D of next generation multi junction thin film Si solar cells
- Development of methods for reliability evaluation of PV modules
- Feasibility study on international standardization of building integrated PV

## [ Project ]

- NEDO project: "Research & development of next-generation high-performance PV generation system technologies" (thin-film silicon project)
- METI project: "International standardization activity in government strategic areas"

## Contributions of AIST

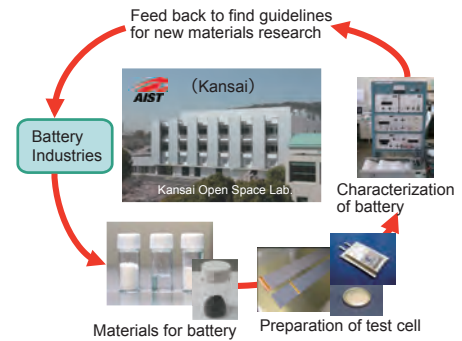
- Research Center for Photovoltaic Technologies contributes to the activities of Technology Research Association.
- Improve visiting researchers' knowledge and technical skills in order to promote Japan's national PV development capability

# Lithium Ion Battery Technology and Evaluation Center (LIBTEC)

Common technology platform for evaluation and analysis of new materials used in battery in AIST Kansai

- [ Establishment ]** April 2010
- [ President ]** Akira Yoshino (Fellow, Asahi Kasei Corporation)
- [ Month of AIST's participation ]** April 2010
- [ Members ]** 19 companies, 1 organization (as of Jul. 1, 2014)

Asahi Kasei Corp., Kaneka Corp., Kuraray Co., Ltd., JSR Corp., JNC Corp., Shin-Etsu Chemical Co., Ltd., Sumitomo Bakelite Co., Ltd., Daikin Industries, Ltd., Dai Nippon Printing Co., Ltd., Toray Industries, Inc., Toppan Printing Co., Ltd., Nitto Denko Corp., Nippon Shokubai Co., Ltd., Zeon Corp., Hitachi Chemical Co., Ltd., Fujifilm Corp., Mitsui Chemicals, Inc., Mitsubishi Chemical Corp., UACJ Corporation, AIST



## [ Purpose ]

Research on test protocols of materials for lithium ion battery and other storage battery in cooperation with members of the association  
Improvement of members' skill, and promotion of putting new materials into practical use

## [ Outline of R&D ]

- Build a common technology platform to characterize novel materials used in batteries
- Evaluate charge-discharge and other characteristics for new materials developed by members using test cells such as coin-type, or laminated-type cells
- Propose "guidelines for new materials development" based on accumulated data so as to reduce of negotiation time between materials supplier and battery industries

## [ Project ]

- NEDO project: "Development of Technology for Assessment of Next-generation Battery Material"
- NEDO project: "Development of Technology for Assessment of Advanced, New Generation Battery Material"

## Contributions of AIST

- Research Institute for Ubiquitous Energy Devices contributes to the activities of Technology Research Association.
- Establish Technology Research Association at Open Space Laboratory in AIST Kansai
- Build and support a network of member companies in which their technologies are integrated to develop standardized evaluation methods



## Fuel Cell Cutting-Edge Research Center Technology Research Association (FC-Cubic TRA)

Improvements of polymer electrolyte fuel cell (PEFC) by advanced analysis technology

【 Establishment 】 April 2010

【 President 】 Nobuyuki Kobayashi (Toyota Motor Corporation, Senior Technical Executive)

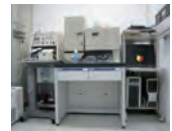
【 Month of AIST's participation 】 April 2010

【 Members 】 5 companies, 6 universities, 1 organization (as of Jul. 1, 2014)

Toyota Motor Corporation, Nissan Motor Co., Ltd., Panasonic Corp., Toshiba Fuel Cell Power Systems Corp., JX Nippon Oil & Energy Corp., Sophia Univ., Japan Advanced Institute of Science and Technology, Ochanomizu Univ., Kyushu Univ., Hokkaido Univ., Tokyo Institute of Technology, AIST



Instruments for gas diffusion and permeation test



Instruments for imaging analysis of degraded electrolyte membranes

### 【 Purpose 】

Research on cutting-edge and fundamental technology about PEFC in cooperation with members of the association  
Improvement of skills of members, and promotion of putting new technologies to practical uses

### 【 Outline of R&D 】

Establish "advanced technology for measurements and analyses" of materials for fuel cells, and contribute to cost reduction, higher performance and reliability for promotion of PEFC  
Propose guidelines for designing new materials through analyses of structure, reaction, and mass transfer concerning "membrane and electrode assembly (MEA)", a key component of PEFC

### 【 Project 】

NEDO project: "Strategic Development of PEFC Technologies for Practical Application, Fundamental Technology Development, Structure, reaction, mass transfer analyses of MEA materials"

### Contributions of AIST

- Research Institute for Ubiquitous Energy Devices and Nanosystem Research Institute contribute to the activities of Technology Research Association.
- Build Technology Research Association Center at AIST waterfront
- Offer the association our infrastructures such as research equipment
- Offer AIST's technology to the association for their research development

## Advanced Laser and Process Technology Research Association (ALPROT)

Research and development of the high power and advanced laser beam machining technology

【 Establishment 】 May 2010

【 President 】 Sadao Nakai (Professor emeritus of Osaka Univ.)

【 Month of AIST's participation 】 May 2010

【 Members 】 8 companies, 3 organizations (as of Jul. 1, 2014)

Hamamatsu Photonics K.K., ULVAC, Inc., Shin Nippon Koki Co., KATAOKA CORP., FURUKAWA ELECTRIC CO., LTD., Mitsubishi Chemical Corp., Miyachi Corp., ASPECT inc., Manufacturing Science and Technology Center, Institute for Laser Technology (ILT), AIST



Low-carbon society

### 【 Purpose 】

The purpose of this project is to establish non-contact, high-quality and high-speed processing of advanced materials with high-power and high-quality laser, and to develop advanced laser beam machining technologies for manufacturing new products for the low-carbon society, with lower weight, higher strength, and higher performance.

### 【 Outline of R&D 】

Laser beam machining technologies developed by ALPROT will improve basic manufacturing technologies widely contributing to fields of automobile, aircraft, energy, networked home appliances, medical care and nursing, etc.

### 【 Project 】

NEDO project: "Advanced Laser and Processing Technology for Next-generation Materials Project"

### Contributions of AIST

- ISC, ESPRIT and AMRI\* contribute to the activities of Technology Research Association.
- Hiroyuki Niino, Principal Research Manager of ISC, takes initiatives of the project at Processing System Technology Development Center in Tsukuba Central as a project team leader.
- Promote Processing System Development by building platform which enables collaboration with user companies

\*ISC: Research Institute for Innovation in Sustainable Chemistry  
ESPRIT: Electronics and Photonics Research Institute  
AMRI: Advanced Manufacturing Research Institute





## Epigenomics Technology Research Association (EPiRA)

Development of fundamental technology for drug discovery based on epigenomics research

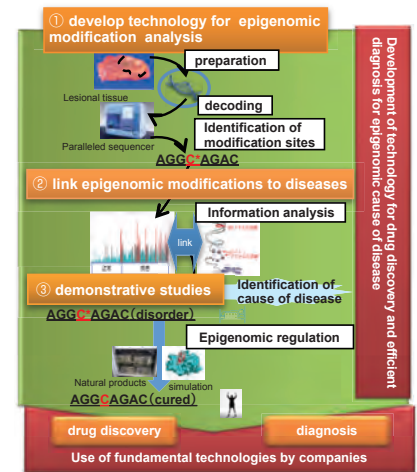
**【 Establishment 】** September 2010

**【 President 】** Hisafumi Okabe (Forerunner Pharma Research Co., Ltd., Director)

**【 Month of AIST's participation 】** September 2010

**【 Members 】** 4 companies, 3 organizations (as of Jul. 1, 2014)

Forerunner Pharma Research Co., Ltd., Kyowa Hakko Kirin Co., Ltd., Kowa Co., Ltd., Sysmex Co., JBIC, JFCR, AIST



### 【 Purpose 】

Conduct experimental epigenomic research on drug discovery and diagnosis  
Improve members' skill and realize practical application of the epigenomic technology through collaboration among members

### 【 Outline of R&D 】

Development of technology for epigenomic modification  
Development of basic technology to link epigenomic modifications to diseases  
Development of screening system for chemical compounds affecting epigenomic modifications

### 【 Project 】

NEDO project: "Development of fundamental technology for drug discovery based on epigenomics research"

### Contributions of AIST

- molprof and CBRC\* contribute to the activities of Technology Research Association.
- Develop and deploy bioinformatics tools and databases

\* molprof: Molecular Profiling Research Center for Drug Discovery  
CBRC: Computational Biology Research Center

## International Standard Innovation Technology Research Association (IS-INOTEK)

Promotion of international standardization activities in close cooperation with Asian-Pacific economies

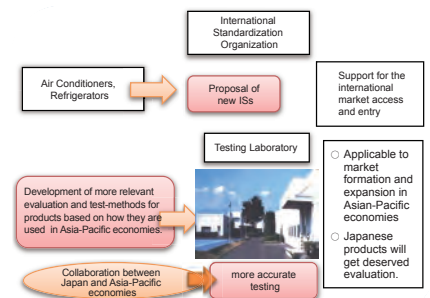
**【 Establishment 】** January 2011

**【 President 】** Naoto Nishida  
(Director, Executive Officer, Corporate Executive Vice President, Toshiba Corporation)

**【 Month of AIST's participation 】** January 2011

**【 Members 】** 15 companies, 1 university, 6 organizations (as of Jul. 1, 2014)

Panasonic Corp., Toshiba Corp., Hitachi Ltd, Mitsubishi Electric Corp., Sony Corp., Fujitsu Ltd., NEC Corp., Technofer Ltd., Intertek Japan k.k., Sharp Corp., Canon Inc., Bridgestone Corp., Tsukuba Wellness Research, Daikin Industries Ltd., AstreX LLC, Kyushu Institute of Technology, Japan Quality Assurance Organization, Japan Electrical Safety & Environment Technology Laboratories, The Japan Electrical Manufacturers' Association, The Japan Refrigeration and Air Conditioning Industry Association, The Society of Japanese Aerospace Companies, AIST



### 【 Purpose 】

Take the initiative in R&D on international standardization and certification technologies originated in Japan, in cooperation with Asian-Pacific economies

### 【 Outline of R&D 】

- International standardization activities for smart grid and smart city
- International standardizing, technical infrastructure, and dissemination for energy saving evaluation method based on the new international standard of air conditioners and refrigerators

### 【 Project 】

METI project: "Asia-Pacific Industrial Science & Technology and International Standardization Cooperation Program"

### Contributions of AIST

- Promotion of standardization in the committee of smart cities standardization working group.
- Promotion of standardization for system certification of smart grid.



## Stem Cell Evaluation Technology Research Association (SCETRA)

Development of evaluation technologies for practical usage of human stem cells

【 Establishment 】 February 2011

【 President 】 Yasuhiro Yoshioka (Corporate Vice President, Fujifilm Corporation)

【 Month of AIST's participation 】 February 2011

【 Members 】 26 companies, 3 organizations (as of Jul. 1, 2014)

Able Co., Bay bioscience Co., Ltd., Cyfuse Biomedical KK, Dai Nippon Printing Co., Ltd., DNA Chip Research Inc., Fujifilm Co., Fujimori Kogyo Co., Ltd., Genetein Co., Ltd., Horiba Ltd., JMS Co., Kuraray Co., Nihon Kohden Co., Nikon Co., Nipro Co., Nissan Chemical Industries, Ltd., On-chip Biotechnologies Co., Panasonic Production Technologies Co., Ltd., ReproCELL Inc., Shibuya Kogyo Co., Ltd., Shimadzu Co., Sumitomo Bakelite Co., Ltd., Taiyo Nippon Sanso Co., Takara Bio Co., Tamai Kasei Co., Wako Pure Chemical Industries, Ltd., Zenoac Resource Co., JBA, National Center for Child Health and Development, AIST

### 【 Purpose 】

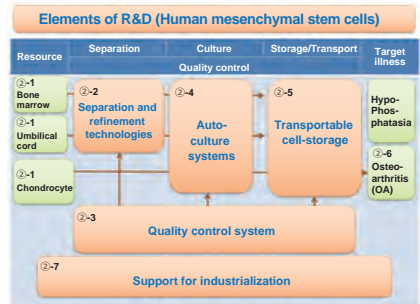
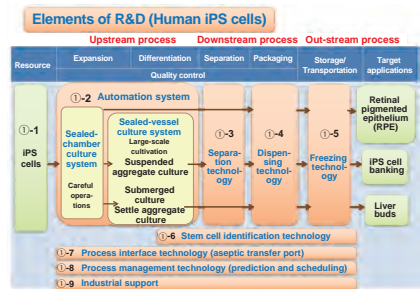
Development of evaluation technologies for practical usage of human stem cells  
Advancement of the technology level of members required for commercial use of the stem cells

### 【 Outline of R&D 】

1. Development of cell engineering system of human pluripotent stem cells for regenerative medicine (retinal epithelial cells, hepatocyte)
2. Development of cell engineering system of human mesenchymal stem cells for regenerative medicine

### 【 Project 】

NEDO project: "Development of cell manufacturing and processing system for industrialization of regenerative medicine, Development of cell engineering system of human pluripotent stem cells for regenerative medicine (cardiac disease, Parkinson's disease, retinal epithelial cells, hepatocyte)"  
NEDO project: "Development of cell manufacturing and processing system for industrialization of regenerative medicine, Development of cell engineering system of human mesenchymal stem cells for regenerative medicine"



### Contributions of AIST

- The project is driven by various core technologies of AIST for cell culture, storage, quality control, standardization and differentiation of human stem cells.

## Photonics Electronics Technology Research Association (PETRA)

Development for new generation device and networking technology by utilizing photonics electronics convergence technology

【 Establishment 】 August 2009

【 President 】 Jiro Otsuki (Corporate Senior Vice President, Fujitsu Limited)

【 Month of AIST's participation 】 February 2011

【 Members 】 9 companies, 2 organizations (as of Jul. 1, 2014)

NTT Electronics Corp., Oki Electric Industry Co., Ltd., Toshiba Corporation, Hitachi, Ltd., NEC Corporation, Nippon Telegraph and Telephone Corporation, Optoelectronic Industry and Technology Development Association, Fujikura Ltd., Fujitsu Limited, Furukawa Electric Co., Ltd., AIST

### 【 Purpose 】

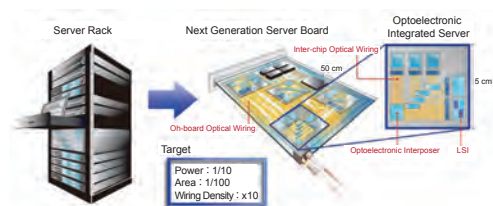
The purpose of this association is to perform project research and development for next generation optoelectronic devices and technologies targeting to realize highly efficient networks and information processing.

### 【 Outline of R&D 】

Basic technologies to realize highly efficient information processing and transmission are being developed with a concept of convergence of optics and electronics. These projects promote research and development of these innovative technologies for photonics-electronics convergence in order to realize an "On-chip data Center" - a data center integrated on a chip.

### 【 Project 】

- \* Future Pioneering Project: "Photonics Electronics Convergence Technology for Power-Reducing Jisso System"



Future Pioneering Project "Photonics Electronics Convergence Technology for Power-Reducing Jisso System"

### Contributions of AIST

- AIST contributes to the activities of Technology Research Association for developing jisso technologies of silicon photonics devices in the Future Pioneering Project.





## Chemical Materials Evaluation and Research Base (CEREBA)

Contribution to rapid product development through R&D of advanced evaluation technology for chemical materials

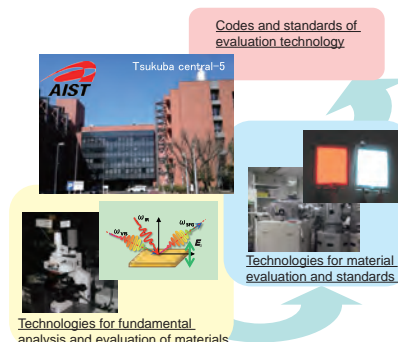
【 Establishment 】 March 2011

【 President 】 Ryuichi Tomizawa (Senior Corporate Adviser, Mitsubishi Chemical Corporation)

【 Month of AIST's participation 】 March 2011

【 Members 】 12 companies, 1 organization (as of Jul. 1, 2014)

Asahi Kasei Corp., KANEKA CORPORATION, KONICA MINOLTA, INC., JSR Corporation, JNC CORPORATION, Sumitomo Chemical Company, Limited, SEKISUI CHEMICAL CO., LTD., Toray Industries, Inc., ZEON CORPORATION, Hitachi Chemical Company, Ltd., FUJIFILM Corporation, Mitsubishi Chemical Corporation, AIST



### 【 Purpose 】

Research on advanced evaluation technologies for new chemical materials to realize rapid product development in cooperation with members of the association  
Improvement of members' skill, and promotion of putting new materials into practical use

### 【 Outline of R&D 】

1. Build an advanced technology platform to characterize advanced materials supplied from the members
2. Develop technologies for evaluation, standardization, and fundamental analysis, especially for the materials used in organic electronics fields
3. Propose a new international code and standards such as IEC from Japan, based on the data obtained through development of evaluation technologies

### 【 Project 】

NEDO project: "Development of Advanced Evaluation Methods for Next-Generation Materials"

### Contributions of AIST

- Research Institute for Innovation in Sustainable Chemistry, Nanosystem Research Institute, Research Center for Photovoltaic Technologies and Research Institute of Instrumentation Frontier contribute to the activities of Technology Research Association.
- Flexible Electronics Research Center collaborates on development of international standards.
- Establish Technology Research Association at Tsukuba Central-5 in AIST Tsukuba
- Utilize our technologies for basic performance analysis
- Build and support a network of member companies to develop for standardized evaluation methods

## Japan Advanced Printed Electronics Technology Research Association (JAPERA)

Development of manufacturing technologies and device technologies for printed flexible devices

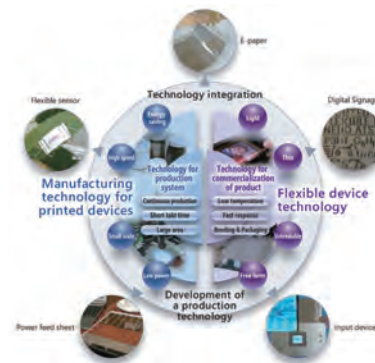
【 Establishment 】 March 2011

【 President 】 Hitoshi Abe (Assistant General Manager, Corporate R&D Division, Dai Nippon Printing Co., Ltd.)

【 Month of AIST's participation 】 March 2011

【 Members 】 26 companies, 1 organization (as of Jul. 1, 2014)

Asahi Kasei Corp., Bando Chemical Industries, Ltd., Dai Nippon Printing Co., Ltd., DIC Corporation, FUJIFILM Corporation, Fujikura Ltd., Hitachi Chemical Co., Ltd., Idemitsu Kosan Co., Ltd., JNC CORPORATION, Komori Corporation, Konica Minolta, Inc., LINTEC Corporation, Mitsubishi Chemical Group Science and Technology Research Center, Inc., NEC Corporation, Nippon Kayaku Co., Ltd., Panasonic Corporation, Ricoh Company, Ltd., Soken Chemical & Engineering Co., Ltd., Sony Corporation, Sumitomo Chemical Company, Limited, TEIJIN LIMITED, Tokyo Electron Limited, TOPPAN PRINTING CO., LTD., TOSHIBA CORPORATION, TOYOBO CO., LTD., ULVAC, Inc., AIST



### 【 Purpose 】

JAPERA aims to achieve early commercialization of printed electronics by developing manufacturing technologies and device technologies for printed flexible devices.

### 【 Outline of R&D 】

1. Development of manufacturing technologies which can make large area electronic circuits with lower power consumption, lower cost, and higher productivity
2. Development of technologies for flexible devices that are thin, lightweight, bendable, shock-resistant, and large area
3. Establishment of methods to evaluate electrical and mechanical properties and reliability of printed devices with high reproducibility, in addition to gathering of data for standardization

### 【 Project 】

NEDO project: "Development of Materials and Process Technology for Advanced Printed Electronics"

### Contributions of AIST

- Flexible Electronics Research Center contributes to the activities of Technology Research Association.
- Development of manufacturing technologies, device technologies, and evaluation methods is carried out at AIST Tsukuba.



## Technology Research Association for Next Generation Natural Products Chemistry

Promote the efficiency of drug discovery by using next-generation natural products chemistry and Information Technology

**【 Establishment 】** April 2011

**【 President 】** Hideyuki Haruyama (Corporate Executive of Daiichi Sankyo RD Novare Co., Ltd.)

**【 Month of AIST's participation 】** April 2011

**【 Members 】** 22 companies, 2 organizations (as of Jul. 1, 2014)

Ajinomoto Co., Inc., Astellas Pharma Inc., Eisai Co., Ltd., OP BIO Factory Co., Ltd., Kyoto Constella Technologies Co., Ltd., Kumiai Chemical Industry Co., Ltd., Godo Shusei Co., Ltd., Sanwa Kagaku Kenkyusho Co., Ltd., Shionogi & Co., Ltd., Information and Mathematical Science and Bioinformatics Co., Ltd., Daiichi Sankyo Co., Ltd., Daiichi Sankyo RD Novare Co., Ltd., Takeda Pharmaceutical Company Limited, Chugai Pharmaceutical Co., Ltd., Toray Industries, Inc., JEOL Ltd., MicroBiopharm Japan Co., Ltd., Hitachi Solutions East Japan Ltd., Fujitsu Ltd., Mitsui Chemicals Agro, Inc., Meiji Seika Pharma Co., Ltd., Yamato Scientific Co., Ltd., JBIC, AIST

### 【 Purpose 】

Conduct experimental research for the stable production technology of useful bioactive natural compounds and for practical use of natural product libraries. Improve members' skills and realize practical application of next generation natural products chemistry through collaboration among association members.

### 【 Outline of R&D 】

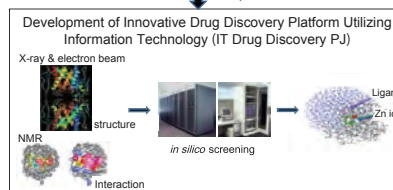
1. Development of the stable production technology of useful bioactive natural compounds, and basic technology for drug discovery
2. Examination of the practical use of the natural product libraries

### 【 Project 】

METI project: "Project focused on developing key technologies of discovering and manufacturing drugs for next-generation treatment and diagnosis (Innovative drug discovery technology using natural compounds and information technology)"



cooperation



### Contributions of AIST

- Biomedical Research institute (BIOMED) and Molecular Profiling Research Center (molprof) contribute to the activity of Technology Research Association.
- Kazuo Shinya, Chief Senior Researcher of BIOMED, leads the Natural Compounds PJ as a project leader.
- Promote the project by establishment of the large-scale natural product library
- Yoshifumi Fukunishi, Team Leader of molprof, leads the IT Drug Discovery PJ.

## NMEMS Technology Research Organization Technology Research Association

Development of green sensor terminal and green sensor network system

**【 Establishment 】** July 2011

**【 President 】** Koichi Imanaka (Director of MNOIC, MMC)

**【 Month of AIST's participation 】** July 2011

**【 Members 】** 26 companies, 1 university, 2 organizations (as of Jul. 1, 2014)

ULVAC Inc., NTT DATA Co., OMRON Co., OLYMPUS Co., CS-solution Co., Suminoe Textile Co., Ltd., Seiko Instruments Inc., Seven-Eleven Japan Co., Ltd., Daikin Industries Ltd., Dai Nippon Printing Co., Ltd., Takasago Thermal Engineering Co., Ltd., TANITA Co., TERUMO Co., DENSO Co., Tokyo Electric Power Co., Ltd., Toko Electronic Co., TOSHIBA Co., Nisshinbo Holdings Inc., Phytoculture Control Co., Ltd., Panasonic Co., Hitachi Ltd., FUJITSU Co., Fuji Electric Co., Ltd., Mitsubishi Electric Co., Yokogawa Electric Co., ROHM Co., Ltd., Tokyo Institute of Technology, MMC, AIST

### 【 Purpose 】

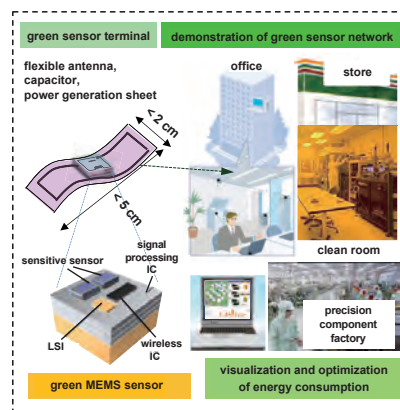
To contribute to the realization of low-carbon society by developing green sensor terminal and green sensor network system

### 【 Outline of R&D 】

1. Development of green MEMS sensor
2. Development of wireless and off-grid power green sensor terminal
3. Construction and development of green sensor network

### 【 Project 】

\*NEDO project: "The sensor system development project to solve social problems"



### Contributions of AIST

- Research Center for Ubiquitous MEMS and Micro Engineering contributes to the activities of Technology Research Association.
- Ryutaro Maeda, Director of Research Center, manages the NEDO project as project leader.
- Offer the association 8/12 inch MEMS lines



## Control System Security Center (CSSC)

**Defending critical infrastructure from cyber attacks and enhance the competitiveness of secured facilities**

**【 Establishment 】** March 2012

**【 President 】** Seiichi Shin (Professor, University of Electro-Communications)

**【 Month of AIST's participation 】** March 2012

**【 Members 】** 20 companies, 1 university, 3 organizations (as of Jul. 1, 2014)

Azbil Corporation, NRI Secure Technologies, Ltd., NTT Communications Corporation, OMRON Corporation, TOSHIBA CORPORATION, Tohoku Information Systems Co., Inc., TOYOTA InfoTechnology Center Co., Ltd., Trend Micro, Inc., NEC Corporation, Hitachi, Ltd., Fujitsu Limited, FUJI ELECTRIC CO., LTD., McAfee Co., Ltd., Mitsubishi Heavy Industries, Ltd., Mitsubishi Research Institute, Inc., Mitsubishi Electric Corporation, MEIDENSHA CORPORATION, Mori Building Co., Ltd., Yokogawa Electric Corporation, LAC Co., Ltd., The University of Electro-Communications, IPA, Japan Quality Assurance Organization, AIST

**【 Purpose 】**

Develop the technology to establish a control system security against the threat of cyber attacks to the critical infrastructure including electricity, gas, water, etc.

**【 Outline of R&D 】**

Build control system test beds for the research and developments of the following technologies:  
 1. Secure design technology to prevent targeted malware codes from intruding control systems  
 2. Security verification and evaluation technology for control systems and their components  
 3. Analysis technology of intrusion incidents to control systems  
 4. International standardization for criteria of safety evaluation, and education of control system safety technologies

**【 Project 】**

Project for Safety Evaluation, Public Awareness Center Development, and Promotion of Information Technology for Critical Infrastructure for the Revival and Recovery of Tohoku (FY2014 Special Account for Reconstruction from the Great East Japan Earthquake)  
 METI project: "Foundation for International Standardization and Dissemination of Energy Conservation (Joint R&D for International Standardization of Energy Conservation FY2014)"



### Contributions of AIST

- Research Institute for Secure Systems contributes to the activities of Technology Research Association.
- Leading the development of highly secure technology for control systems

## Fine Ceramics Research Association (FCRA)

**Development of high-temperature components for SiC semiconductor power modules**

**【 Establishment 】** September 1981

**【 President 】** Nobuo Takahashi (Vice President, New Business Development Electronic Business Group, NGK Insulators, Ltd.)

**【 Month of AIST's participation 】** April 2012

**【 Members 】** 8 companies, 3 organizations (as of Jul. 1, 2014)

NGK Insulators, Ltd., Murata Manufacturing Co., Ltd., KOA Corporation, Taiyo Yuden Co., Ltd., Denki Kagaku Kogyo Kabushiki Kaisha, NGK Spark Plug Co., Ltd., Japan Fine Ceramics Co., Ltd., Noritake Co., Limited., Japan Fine Ceramics Center, Japan Fine Ceramics Association, AIST

**【 Purpose 】**

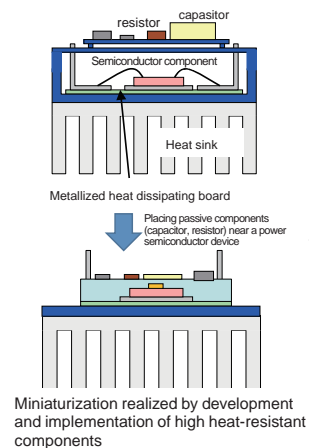
SiC semiconductor power device has an advantage of being operational at higher temperature compared to the conventional device, and it is expected to be applied to a high-performance power converter. These researches are aiming at developing heat-resistant components placeable near the SiC power device which is operational at high temperature.

**【 Outline of R&D 】**

Development of the high-temperature components (capacitor, resistor, metallized heat dissipating board, circuit board) is carried out. R&D Partnership for Future Power Electronics Technology will be responsible for the basic technology for implementation in the NEDO project mentioned below.

**【 Project 】**

NEDO project: "Development of high-temperature components and packing technology for SiC power modules" in "Development of Next-generation Power Electronics Technology (Green IT Project)"



### Contributions of AIST

- Participation of Advanced Manufacturing Research Institute
- Contribution to the promotion of the project by Norimitsu Murayama, Deputy Director-General, as a technical promotion subleader
- Contribution from the research aspect by establishing laboratories of concentrated systems at Chubu Center, and Tsukuba Central 5



## Minimal Fab Development Association

Development of a minimal manufacturing system on half-inch wafers for customizing semiconductor devices



**【 Establishment 】** May 2012

**【 President 】** Yasuyuki Harada (Chairman of Pre-Tech Co., Ltd.)

**【 Month of AIST's participation 】** May 2012

**【 Members 】** 25 companies, 1 organization (as of Jul. 1, 2014)

Pre-Tech Co.,Ltd., Litho Tech Japan Corp., Sanmei Co., Inc., PMT Corp., Fujikoshi Machinery Corp., Fuji Imvac Inc., Sakaguchi E. H. VOC Corp., Aichisystem Corp., Tazmo Co., Ltd., Fujikin Inc., Horiba STEC Co., Ltd., Design Network Co., Ltd., Sanyo Co., Ltd., Taisei Corp., Logic Research Co., Ltd., Jedat Inc., Tool Corp., Yokogawa Solution Service Corp., Okamoto Glass Co., Ltd., Yonekura MFG Co., Ltd., Koyo Thermo Systems Co., Ltd., KURODA PRECISION INDUSTRIES LTD., KATAGIRI ENGINEERING CO.,LTD., Seinan industries, Co.,Ltd., SP Technology Co., Ltd.AIST

**【 Purpose 】**

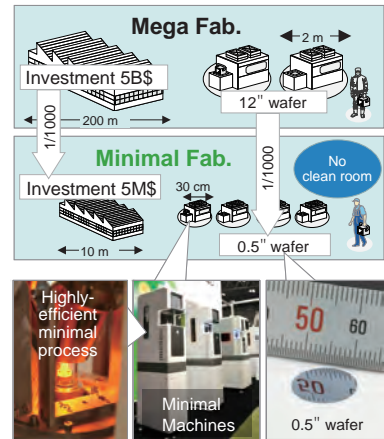
To develop small machines and a process technology for manufacturing semiconductor devices on half-inch wafers without the requirement of a clean room. The developing system promotes the establishment of a device production line with 1/1000 investment of the existing mega-fab. The advantages of minimal fab are low investment cost, user-friendly, low power consumption, and minimum waste.

**【 Outline of R&D 】**

1. Development of minimal manufacturing equipment for semiconductor devices
2. Development of the 0.5" silicon wafers and minimal valves
3. Development of the process technology and fab system technology for high-mix low-volume production.

**【 Project 】**

\*METI project: "Innovative fab system technology development by half-inch wafers and minimal equipment (minimal fab)"



### Contributions of AIST

- NERI, NRI, RIIF, AMRI\* contribute to the activities of Technology Research Association.
- Shiro Hara, Director of Minimal System Group, manages the METI Project as project leader.
- Originating the concept of minimal fab system
- Developing wafer transfer system as a core technology of minimal fab system
- Developing the minimal process technology for semiconductor devices manufacturing
- Establishing the minimal fab as an innovation platform for variable researches and industry

\* NERI: Nanoelectronics Research Institute  
NRI: Nanosystem Research Institute  
RIIF: Research Institute of Instrumentation Frontier  
AMRI: Advanced Manufacturing Research Institute

## Technology Research Association of Highly Efficient Gene Design (TRAHED)

Production of high-performance microbe with super high productivity through gene design technology

**【 Establishment 】** September 2012

**【 President 】** Hiroyuki Kojima (Corporate Fellow of Ajinomoto Co., Inc.)

**【 Month of AIST's participation 】** September 2012

**【 Members 】** 10 companies, 1 university, 3 organizations (as of Jul. 1, 2014)

Ajinomoto Co., Inc., Astellas Pharma Inc., in silico biology, Inc., Kaneka Corporation, Kumiai Chemical Industry Co., Ltd., KNC Laboratories Co., Ltd., Kojima Press Industry Co., Ltd., Spiber Inc., Precision System Science Co., Ltd., Mitsubishi Chemical Corporation, Kobe University, Technology Research Association for Next-Generation Natural Product Chemistry, Japan Bioindustry Association, AIST

**【 Purpose 】**

Advancement of the technology level of members required for "Development of artificial gene synthesis technology for creating innovative biomaterial"

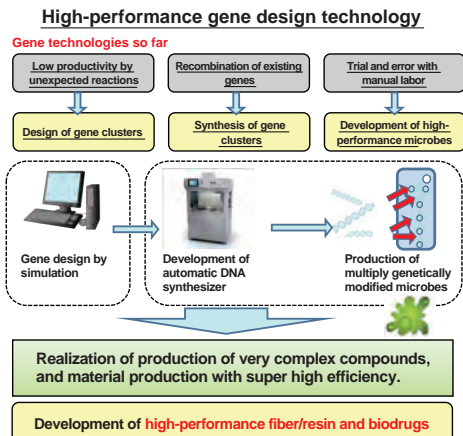
**【 Outline of R&D 】**

We will design gene clusters for material production including a control system of gene expression, then will synthesize long chain DNA according to the design. We aim at the development of effective production technology for innovative biomaterials, such as high-performance fiber/resin which has both strength and elasticity, an anticancer agent with few side effects, a non-natural amino acid, and a pesticide without antibacterial activity, through producing a high-performance genetically-modified microbe with high productivity. We will also develop key technologies for efficient construction of highly productive microbes toward manufacturing of next-generation biodrugs.

**【 Project 】**

METI project: "Development of artificial gene synthesis technology for creating innovative biomaterials",

METI project: "Project focused on developing key technology for discovering and manufacturing drugs for next-generation treatment and diagnosis (technology related to construction of highly productive hosts for manufacturing drugs)"



### Contributions of AIST

- AIST is mainly in charge of development of gene cluster designing technology in cooperation with Kobe Univ. and Keio Univ.
- AIST contributes to development of multi-functional databases for gene design, and production of novel materials of valuable function with yeast, filamentous fungi and actinomycetes
- Bioprocess Research Institute, Computational Biology Research Center, and Biomedical Research Institute contribute to the activities of Technology Research Association

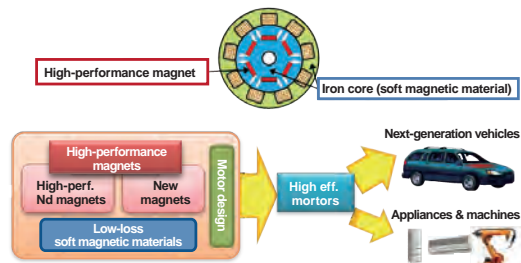


## Technology Research Association of Magnetic Materials for High-Efficiency Motors (MagHEM)

Developing high-performance magnetic materials to realize high-efficiency motors

- 【 Establishment 】 September 2012
- 【 President 】 Michihisa Kyoto, Ph.D. (CEO, T&T Innovations Inc.)
- 【 Month of AIST's participation 】 September 2012
- 【 Members 】 9 companies, 2 organizations (as of Jul. 1, 2014)

T&T Innovations Inc., Aichi Steel Corp., Intermetallics Co. Ltd., NEC Tokin Corp., JFE Steel Corp., Daikin Industries Ltd., Denso Corp., Toyota Motor Corp., Mitsubishi Electric Corp., Japan Research and Development Center for Metals, AIST



Structure of high-efficiency motors (example)

### 【 Purpose 】

Collaborative R&D on magnetic materials for high-efficiency motors and motor design using these materials, and other projects to improve technical potential of members and to promote commercialization

### 【 Outline of R&D 】

1. Development of high-performance Neodymium magnets without Dysprosium
2. Development of new high-performance magnets without rare-earth materials
3. Development of high-performance soft magnetic materials for next-generation high-efficiency motors
4. Development of high-efficiency motors
5. Fundamental investigation and common technologies

### 【 Project 】

NEDO project: "Development of magnetic material technology for high-efficiency motors"

### Contributions of AIST

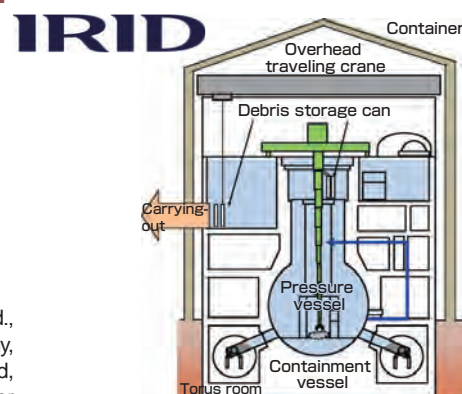
- Project management by an AIST staff as the project leader
- Application of high density sintering technology developed by AIST for sintering new magnetic and soft magnetic materials
- Developing common fundamental research together with analysis and evaluation in Magnetic Materials R&D Center in AIST Chubu

## International Research Institute for Nuclear Decommissioning (IRID)

Research and development for the abolition of the nuclear power plant

- 【 Establishment 】 August 2013
- 【 President 】 Hajimu Yamana (Professor of Kyoto Univ.)
- 【 Month of AIST's participation 】 August 2013
- 【 Members 】 16 companies, 2 organizations (as of Jul. 1, 2014)

TOSHIBA CORPORATION, Hitachi-GE Nuclear Energy, Ltd., Mitsubishi Heavy Industries, Ltd., Hokkaido Electric Power Co., Inc., Tohoku Electric Power Co., Inc., Tokyo Electric Power Company, Incorporated, Chubu Electric Power Co., Inc., Hokuriku Electric Power Company, Incorporated, Kansai Electric Power Co., Inc. The Chugoku Electric Power Co., Inc., Shikoku Electric Power Co., Inc., Kyushu Electric Power Co., Inc., The Japan Atomic Power Company, Electric Power Development Co., Ltd., ATOX Co., Ltd., Japan Nuclear Fuel Limited, Japan Atomic Energy Agency, AIST



A conceptual diagram showing the removal of fuel debris

### 【 Purpose 】

The purpose of this consortium is the research and development for the decommission of nuclear power plants and advancement of the technology level of members.

### 【 Outline of R&D 】

1. R&D related to fuel removal from the spent fuel pool
2. R&D related to preparation for fuel debris removal
3. R&D related to processing/disposal of solid radioactive waste

### 【 Project 】

METI FY2013 Supplementary Budget, Decommissioning and Contaminated Water Management Project Cost Subsidy funded project: "Development of technology for retrieval of fuel debris and in-core structures" etc.

### Contributions of AIST

- Evaluation of research and development technologies for the decommission of nuclear power plants and counsel on improved methods based on on-the-spot proof



# Manufacturing Technology Research Association of Biologics (MAB)

## Development of fundamental manufacturing technology for next generation medicine

**【 Establishment 】** September 2013

**【 President 】** Toshiaki Higashihara (Representative Executive Officer and President & COO, Hitachi Ltd.)

**【 Month of AIST's participation 】** September 2013

**【 Members 】** 25 companies, 2 universities, 3 organizations (as of Jul. 1, 2014)

Asahi Kasei Medical Co., Ltd., ABLE Corporation, Kaneka Corporation, Kyoto Monotech Corporation, chromocenter Inc., Shimadzu Corporation, GL Sciences Inc., JX Nippon Oil & Energy Corporation, JSR Life Sciences Corporation, JNC Corporation, Sharp Corporation, Sumitomo Bakelite Co., Ltd., Sumitomo Electric Industries, Ltd., Daiichi Sankyo Co., Ltd., DAISO Co., Ltd., Tokyo Chemical Industry Co., Ltd., Tosoh Corporation, TOTO Ltd., Neo-Morgan Laboratory Inc., Hitachi, Ltd., Fujimori Kogyo Co., Ltd., Mitsubishi Chemical Corporation, Yokogawa Electric Corporation, YMC Co., Ltd., Nippi. Inc., Kobe Univ., Japan Bioindustry Association, Tokushima Univ., Japan Blood Products Organization, AIST

**【 Purpose 】**

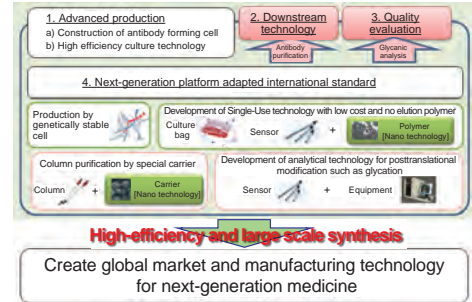
Development of advanced and highly efficient manufacturing technologies for antibody drugs

**【 Outline of R&D 】**

Development of advanced producing, downstream and quality evaluation technologies and establishment of next-generation platform for antibody drugs

**【 Project 】**

METI project: "Project focused on developing key technologies of discovering and manufacturing drugs for next-generation treatment and diagnosis (manufacturing technology for next-generation therapeutic antibodies)"



### Contributions of AIST

- Biomedical Research Institute, Bioprocess Research Institute, Research Center for Stem Cell Engineering, Glycomedicine Technology Research Center and National Metrology Institute of Japan contribute to the activities of Technology Research Association.
- The project is driven by various seed technologies of AIST.

# Thermal Management Materials and Technology Research Association (TherMAT)

## Innovate techniques and systems to reuse, reduce and recover discarded thermal energy

**【 Establishment 】** October 2013

**【 President 】** Osamu Sadakata (Executive Director of Toyota Motor Corporation)

**【 Month of AIST's participation 】** October 2013

**【 Members 】** 18 companies, 2 organizations (as of Jul. 1, 2014)

Toyota Motor Corporation, Aisin Seiki Co., Ltd., Calsonic Kansei Corporation, JRCM, Central Glass Co., Ltd., Toray Industries, Inc., Nippon Thermostat Co., Ltd., Panasonic Corporation, Hitachi Appliances, Inc., Hitachi, Ltd., Fujifilm Corporation, Furukawa Co., Ltd., Furukawa Electric Co., Ltd., Maekawa MFG Co., Ltd., Mazda Motor Corporation, Mitsubishi Heavy Industries, Ltd., Mitsubishi Plastics, Inc., Mino Ceramic Co., Ltd., Yasunaga Corporation, AIST

**【 Purpose 】**

Innovate the techniques and systems to reuse, reduce and recover the waste heat in the field of transportation, industry, etc. The results decrease the energy loss, reduce the CO<sub>2</sub> emissions and improve the competitiveness of the business field.

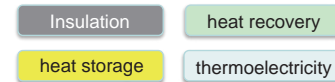
**【 Outline of R&D 】**

1. Insulation, heat storage, thermoelectric, heat pump technologies etc.
2. Thermal management technologies for automobile use etc.

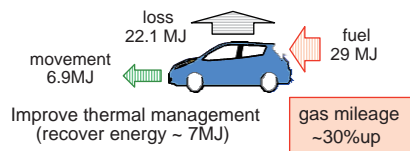
**【 Project 】**

METI project: Future Pioneering Projects "Thermal Management Materials and Technology Research"

Research target of elemental techniques



e.g. Energy efficiently of a hybrid vehicle in winter



### Contributions of AIST

- Project management by AIST staff as project leader and managing director
- Provide technical seeds in basic technologies and develop research fields
- Supporting R&D and commercialization of products



## Innovative Structural Materials Association (ISMA)

### Developing innovative structural material technologies

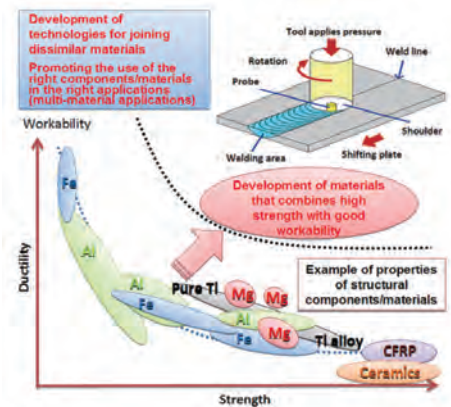
【 Establishment 】 October 2013

【 President 】 Teruo Kishi (Prof. Emeritus, Univ. of Tokyo)

【 Month of AIST's participation 】 October 2013

【 Members 】 36 companies, 1 university, 1 organization (as of Jul. 1, 2014)

Aisin Seiki Co., Ltd., Dai Nippon Teryo Company, Limited, Fuji Heavy Industries Ltd., FUJI LIGHT METAL CO., LTD., Fukui Fibertech Co., Ltd., Hitachi, Ltd., Hitachi Metals, Ltd., Hitachi Metals Precision, Ltd., Hitachi Power Solutions Co., Ltd., Honda R&D Co., Ltd., IHI Corporation, Japan Transport Engineering Company, JFE Steel Corporation, KADO Corporation, Kawasaki Heavy Industries, Ltd., Kobe Steel, Ltd., Komatsu Ltd., Kyowa Industrial Co. Ltd., Mazda Motor Corporation, Mitsubishi Motors Corporation, MITSUBISHI RAYON CO., LTD., NIPPON STEEL & SUMITOMO METAL CORPORATION, Nissan Motor Co., Ltd., Sankyo Tateyama, Inc., Shimadzu Corporation, Sumitomo Electric Industries, Ltd., Sumitomo Heavy Industries, Ltd., Suzuki Motor Corporation, Takagi Seiko Corporation, Tanaka Kikinzoku Kogyo, Toho Tenax Co., Ltd., Toho Titanium Co., Ltd., Toray Industries, Inc., Toyobo Co., Ltd., Toyota Motor Corporation, UACJ Corporation, Nagoya Univ., AIST



#### 【 Purpose 】

For the drastic reduction of weight (by half) of transportation equipment, primarily of automobiles, ISMA promotes the development of innovative materials joining technologies required to properly use newly developed materials in the right applications, combined with the development of technologies involved in enhancement of the strength of major structural materials, such as iron and steel, non-ferrous, carbon-fiber-reinforced plastic (CFRP) materials, for transport equipment.

#### 【 Outline of R&D 】

1. Development of materials joining technologies
2. Development of innovative steel plates
3. Development of non-steel materials
4. Development of CFRP
5. Strategic and basic research

#### 【 Project 】

Innovative Structural Materials Project (Future Pioneering Project of New Energy and Industrial Technology Development Organization)

#### Contributions of AIST

- Participation of Material Research Institute for Sustainable Development, and Advanced Manufacturing Research Institute to the project
- Engagement of AIST staff in several R&D (Al, Mg and CFRP) in the project
- Management of R&D by an AIST staff as a theme leader
- Development of Innovative Structural Materials for drastic weight reduction of transportation equipment based on technological seeds of AIST

## Technology Research Association for Future Additive Manufacturing (TRAFAM)

### Promote two research projects concerning future additive manufacturing

【 Establishment 】 April 2014

【 President 】 Atsushi Maekawa (Mitsubishi Heavy Industries, Ltd.)

【 Month of AIST's participation 】 April 2014

【 Members 】 27 companies, 2 universities, 1 organization (as of Jul. 1, 2014)

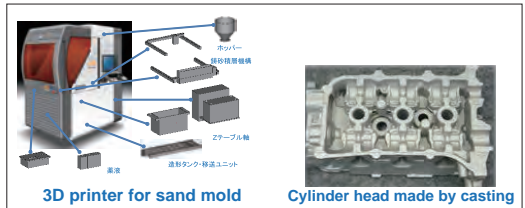
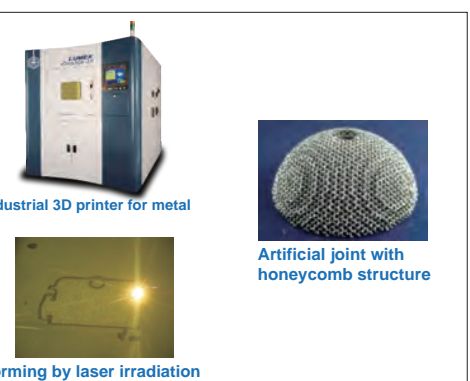
Specific names are omitted.

#### 【 Outline of R&D 】

1. To develop metal 3D printing systems by direct metal powder melting
2. To develop precision sand mold 3D printers for casting monolithic super-complicated shape parts of light weight and high stiffness

#### Contributions of AIST

- Managed by Toshimitsu Okane, Group Leader of Advanced Manufacturing Research Institute, as project leader for the casting project





# The Research Association of Automotive Internal Combustion Engines (AICE)

Basic and applied research on technologies that improve the performance of internal combustion engines

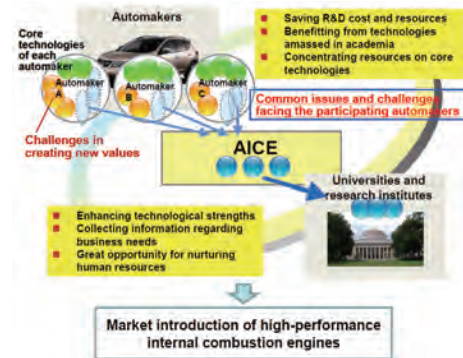
**【 Establishment 】** April 2014

**【 President 】** Keiji Otsu (Managing Officer, Honda R&D Co., Ltd.)

**【 Month of AIST's participation 】** July 2014

**【 Members 】** 8 companies, 2 organizations (as of Jul. 23, 2014)

Suzuki Motor Corporation, Daihatsu Motor Co., Ltd., Toyota Motor Corporation, Nissan Motor Co., Ltd., Fuji Heavy Industries Ltd., Honda R&D Co., Ltd., Mazda Motor Corporation, Mitsubishi Motors Corporation, Japan Automobile Research Institute (JARI), AIST



## 【 Purpose 】

In an effort to realize the further improvement of the fuel economy of automobiles and the reduction of tailpipe emissions, the participating automakers will work together to identify and present research needs that address issues and challenges facing the automakers in the area of combustion technologies for internal combustion engines and technologies which achieve cleaner tailpipe emissions. The AICE members will jointly conduct basic and applied research utilizing knowledge and expertise amassed in academia. The ultimate purpose of AICE is to utilize the research results to help accelerate the development activities of each automaker.

## 【 Outline of R&D 】

1. R&D of diesel engine exhaust aftertreatment technologies
2. R&D of combustion technologies for internal combustion engines

## 【 Project 】

METI project: "Advanced Technology Development for Energy Use Rationalization"

## Contributions of AIST

- Collaborative Engine Research Team for Next Generation Vehicles contributes to the activities of the Technology Research Association.
- Established a laboratory at AIST Tukuba
- Utilizes AIST technologies for engine system research
- Assembles researchers from all-AIST to develop related technologies

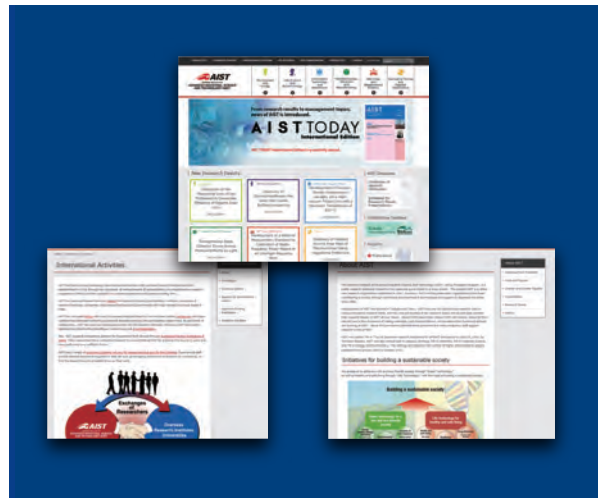


# About AIST's Website and Research Results

## Website

The results of research carried out by AIST and information on AIST's activities can be found on our website. This includes the entire contents of the AIST TODAY public relations magazine, which are provided in HTML and PDF format on the same day that the magazine is issued. An e-mail magazine is also published to deliver the contents of the website as soon as possible. You can subscribe to the magazine from our website.

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



## Research results

In order to develop a knowledge base and contribute to the creation of new industries, we have developed a database of research information and results from many research and development projects and have made it available on the website and other media in an organized, easy-to-use form.

([http://www.aist.go.jp/aist\\_j/aist\\_repository/index.html](http://www.aist.go.jp/aist_j/aist_repository/index.html))

### ● Research Information Database

This is a multimedia-based research information disclosure system to disseminate research results from numerous research and development projects and promote reform of the economic structure by creating new industries.

### ● Research Results Presentation Database (RRPDB)

This database contains research papers published in academic journals and oral presentations given at international conferences since April 2001, geoscientific information such as geological maps, metrology technology information, and knowledge-based results obtained in the process of research.

### ● Search System for Research Papers

This can be used to search and read research papers by AIST researchers published in academic journals.

### ● Information on Development of Technology at AIST (IDEA)

The purpose of IDEA is to widely disclose AIST's patents and other intellectual properties to make research and development results available to industry.

### ● Research Staff Database (RS-DB)

This is a system to search for AIST researchers, designed to reply to questions such as "Is there anyone doing such-and-such research?" "If so, who?"



## Exhibition Facilities

### Science Square Tsukuba (Tsukuba City, Ibaraki)

This museum introduces the latest fruits of research at AIST and its contributions to society. Visit the exhibition and hands-on experience sections, which are based on the concept “Full of Future Technologies!”, to understand more about AIST’s research activities and industrial technologies.

- Closed: Mondays (or the next business day when a national holiday falls on a Monday) and Dec.28 - Jan.4
- Open: 9:30 am to 5:00 pm
- For inquiries, contact the Science Communication Office, Public Relations Department.  
Tel: (029) 862-6215 / Fax: (029) 862-6212  
(from outside Japan: Tel: +81-29-862-6215 / Fax: +81-29-862-6212)  
URL: <http://www.aist.go.jp/sst/en/>



### Geological Museum (Tsukuba City, Ibaraki)

Geological Museum is very unique museum specializing in Earth Sciences. The Museum displays easy-to-understand exhibitions such as Earth's history and mechanisms of geodynamics, the relationship between humankind and the Earth, etc. in addition to a large number of geological samples.

- Closed: Mondays (or the next business day when a national holiday falls on a Monday) and Dec. 28 - Jan. 4
- Open: 9:30 am to 4:30 pm
- For inquiries, contact the Geological Museum.  
Tel: (029) 861-3750 / Fax: (029) 861-3746  
(from outside Japan: Tel: +81-29-861-3750 / Fax: +81-29-861-3746)  
URL: <https://www.gsj.jp/Muse/>

## Training Center

### Metrology Training Center (Tsukuba City, Ibaraki)

The Metrology Training Center, established by the Measurement Act, is the only training center in Japan that teaches knowledge and skills in the field of metrology. The Center provides training to metrology personnel of local governments engaged in metrology activities and measurement engineers (general measurement engineers, environmental measurement engineers) in the private sector, and organizes courses for uncertainty analysis in order to construct traceability systems. It also provides training to metrology personnel from developing countries.

- AIST Tsukuba Central 1 (Sakura-kan Building), 1-1-1 Higashi, Tsukuba, Ibaraki 305 - 8561
- Tel: (029) 861-2422 / Fax: (029) 861-2423  
(from outside Japan: Tel: +81-29-861-2422 / Fax: +81-29-861-2423)
- E-mail: [mettrain-ml@aist.go.jp](mailto:mettrain-ml@aist.go.jp)  
URL: <https://www.nmij.jp/english/info/center/#m5>

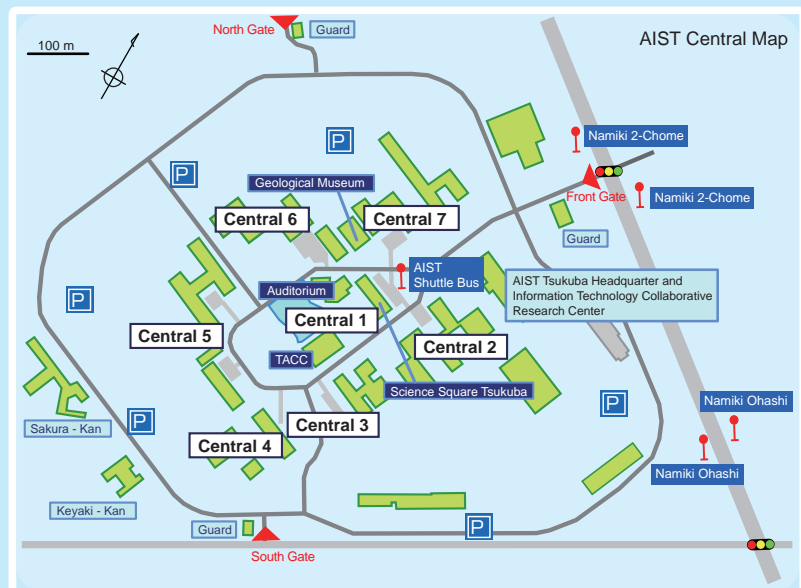
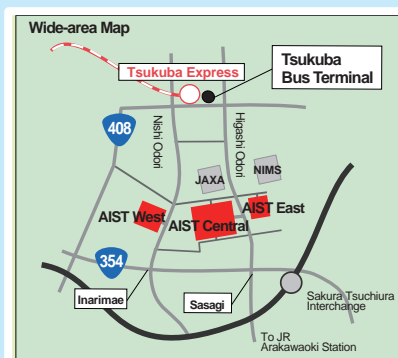


## Contact Information for General Inquiries at Each Research Base

Each AIST research facility has an administrative office that serves as a point of contact for general inquiries. If you have any questions or inquiries concerning a research facility, please contact its administrative office.

- AIST Tokyo Headquarters**  
**General Affairs Office** 1-3-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8921, Japan  
 Tel: (03) 5501-0900 (from outside Japan: +81-3-5501-0900)
- AIST Hokkaido**  
**General Affairs Office** 2-17-2-1 Tsukisamu-Higashi, Toyohira-ku, Sapporo, Hokkaido 062-8517, Japan  
 Tel: (011) 857-8400 (from outside Japan: +81-11-857-8400)
- AIST Tohoku**  
**General Affairs Office** 4-2-1 Nigatake, Miyagino-ku, Sendai, Miyagi 983-8551, Japan  
 Tel: (022) 237-5211 (from outside Japan: +81-22-237-5211)
- Fukushima Renewable Energy Institute**  
**General Affairs Office** 2-2-9 Machiike-dai, Koriyama, Fukushima 963-0298, Japan  
 Tel: (024) 963-1805 (from outside Japan: +81-24-963-1805)
- AIST Tsukuba**  
**General Affairs Support Division** 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan  
 Tel: (029) 861-2067 (from outside Japan: +81-29-861-2067)
- AIST Tokyo Waterfront**  
**General Affairs Division** 2-3-26 Aomi, Koto-ku, Tokyo 135-0064, Japan  
 Tel: (03) 3599-8001 (from outside Japan: +81-3-3599-8001)
- AIST Chubu**  
**General Affairs Division** 2266-98 Anagahora, Shimo-Shidami, Moriyama-ku, Nagoya, Aichi 463-8560, Japan  
 Tel: (052) 736-7000 (from outside Japan: +81-52-736-7000)
- AIST Kansai**  
**General Affairs Division** 1-8-31 Midorigaoka, Ikeda, Osaka 563-8577, Japan  
 Tel: (072) 751-9601 (from outside Japan: +81-72-751-9601)
- AIST Chugoku**  
**General Affairs Office** 3-11-32 Kagamiyama, Higashi-hiroshima, Hiroshima 739-0046, Japan  
 Tel: (082) 420-8230 (from outside Japan: +81-82-420-8230)
- AIST Shikoku**  
**General Affairs Office** 2217-14 Hayashi-cho, Takamatsu, Kagawa 761-0395, Japan  
 Tel: (087) 869-3511 (from outside Japan: +81-87-869-3511)
- AIST Kyushu**  
**General Affairs Office** 807-1 Shuku-machi, Tosu, Saga 841-0052, Japan  
 Tel: (0942) 81-3600 (from outside Japan: +81-942-81-3600)

## AIST Tsukuba Guide Map





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NATIONAL INSTITUTE OF  
**ADVANCED INDUSTRIAL SCIENCE  
AND TECHNOLOGY (AIIST)**

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1-3-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8921, Japan Tel: (03) 5501-0900 (from outside Japan: +81-3-5501-0900)
- AIIST Tsukuba Headquarters (Tsukuba Center)  
Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan Tel: (029) 861-2000 (from outside Japan: +81-29-861-2000)
- Published by the Public Relations Department  
Central 2, 1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan Tel: (029) 862-6217 / Fax: (029) 862-6212 (from outside Japan: +81-29-862-6217 / Fax: +81-29-862-6212)  
E-mail: [prpub-ml@aist.go.jp](mailto:prpub-ml@aist.go.jp) AIIST website: [http://www.aist.go.jp/index\\_en.html](http://www.aist.go.jp/index_en.html)