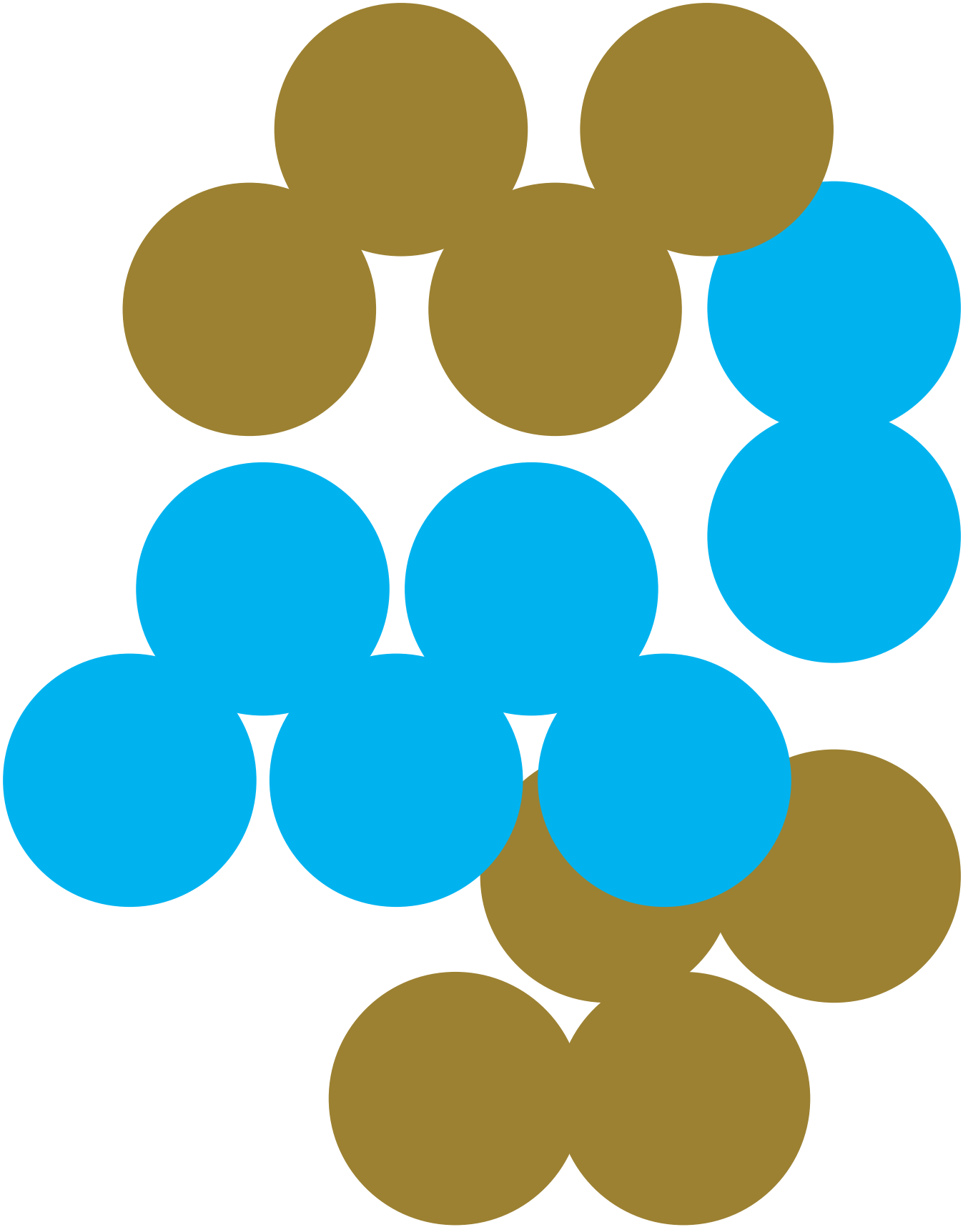
NIMS

National Institute
for Materials Science

www.nims.go.jp



Materials research that changes the world

All things necessary to our lives—
such as lighting, roads, bridges, buildings, vehicles and airplanes—
are made of "materials."
Research on materials has contributed
to the prosperity of humankind in many ways.

NIMS is Japan's sole public research institute
specialized in materials science.
We have created a number of materials
that made a global impact.

Our mission is
to pave the way for a better future for humankind
by solving issues in environment, energy,
medicine, and infrastructure,
focusing on advanced research
and development of innovative materials
including metals, ceramics, polymers and optical materials.

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Vice President
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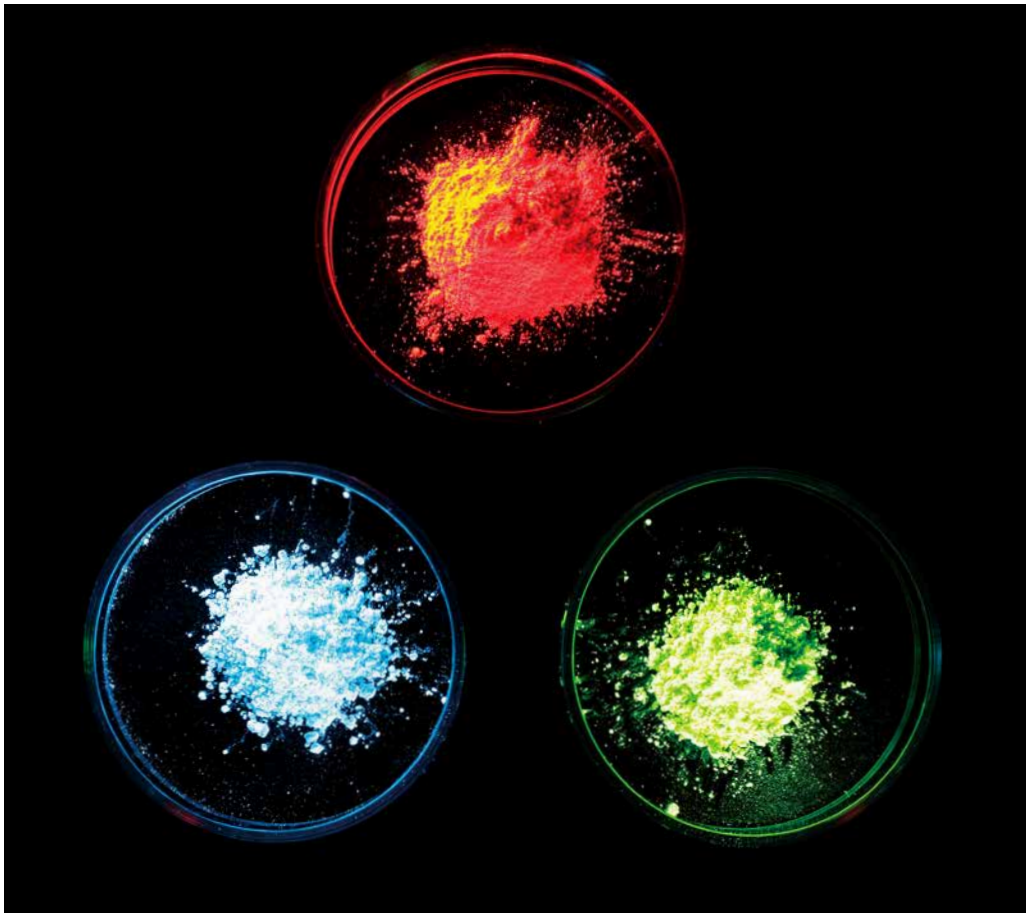
Executive Advisor
to the President
SASAKI Takayoshi

Changing the World of Lighting

Rich colored LEDs using Sialon phosphors — Innovation for energy conservation

LEDs are a vital energy-saving technology. The earlier white LED bulbs consisted of a blue LED chip and yellow phosphor that coated the chip. The white light generated by these bulbs, however, had a bluish tinge, making their use as interior lighting undesirable. To create more natural white light, the addition of a red light component was necessary. NIMS successfully developed "Sialon phosphors" capable of emitting red light. Subsequently, this technology contributed to the development of natural white LEDs and their worldwide use as indoor lighting. Sialon phosphors invented by NIMS have become the global standard today.

White LED bulb



Saving Japan's Aging Infrastructure

Long-life structural materials — Reliability for buildings, bridges, and transportation systems

There is an urgent need for Japan to deal with its aging social infrastructure such as roads and buildings. NIMS' approach to this challenge is to develop: reinforced concrete that resists corrosion for 100 years, ultra-steel which is far stronger than conventional steel, and a vibration damper with the world's highest fatigue durability, capable of safeguarding tall buildings from massive earthquakes which may occur from time to time. NIMS contributes to realizing a safe society through tireless efforts in infrastructure materials research.

High corrosion-resistant steel reinforced concrete

Energy-Saving Jet Engines

World's most heat-resistant superalloy used in the Boeing 787
— High combustion temperatures reduce fuel consumption

Airplanes are a common means of international travel. To improve their fuel efficiency, higher fuel combustion temperature is required. However, problems with heat resistance in engine materials made this difficult. Consequently, NIMS developed a superalloy which broke the world record for heat resistance. The new material has been integrated into the latest Boeing model, the 787 Dreamliner, saving annual fuel cost by 1 million dollars per plane and contributing to the reduction of CO_2 emissions. NIMS is continuously producing environmentally friendly materials.

Turbine blade using heat-resistant superalloy

Revolutionizing Energy Transmission

Superconductive materials for loss-less electrical transmission cables
— Reduced energy consumption for a sustainable society

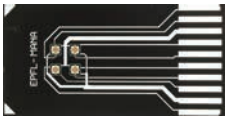
Superconducting materials are most well known for their application in maglev trains. However, they are also playing a vital role in the development of highly efficient power lines capable of carrying electricity from power plants to very distant places without losing any energy. These power lines have already been in practical trials. The most promising materials for practical use—bismuth-based superconducting materials—were discovered by NIMS researchers. Using a superconducting wire material, NIMS has also developed the world's first magnet field NMR above 1 GHz.

Superconducting cable model

Changing the Future of Medical Care

Smart Polymers to save lives and cure physical problems
— Realizing a system where all people can receive appropriate medical treatment easily

Medical treatments are becoming more sophisticated and expensive. As a result, only a handful of patients can receive treatments using high-priced devices. NIMS has developed highly functional "smart polymers," made of inexpensive plastics, which enable cancer treatments and artificial dialysis without depending on conventional infrastructure. This technology is expected to play a vital role in saving lives in developing countries as well as disaster-affected areas in developed nations. Furthermore, NIMS has delivered innovative medical materials to the world such as fish-derived, high-performance surgical adhesives and compact breath sensors enabling instant, easy health checks.



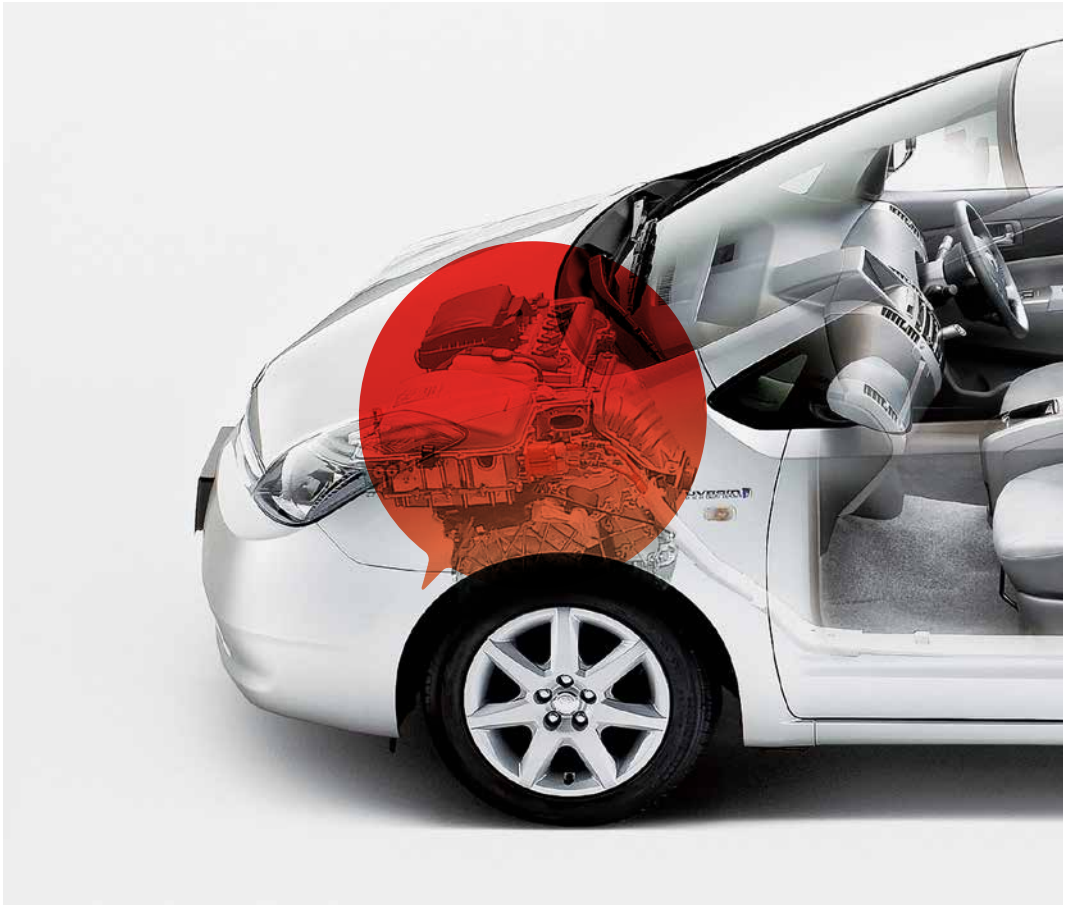
Membrane-type Surface stress Sensor (MSS) for odor-sensing system

Permanent Magnets for Electric Vehicles

The world's strongest neodymium high-temperature magnet without dysprosium
— A crucial component of electric vehicles

Neodymium (ND) magnets - the world's strongest magnets - are indispensable components of hybrid vehicle motors. However, ND magnets have a drawback in that they lose magnetic force when motor temperature rises while driving. This problem can be solved by using another element, dysprosium (Dy). However, Dy is a rare element and difficult to acquire. Taking account of this situation, NIMS successfully increased the heat resistance capability of motor magnets without using Dy. NIMS reinforces Japan's next-generation vehicle technology.

Dysprosium-free neodymium magnet



Organization

Organization Chart

President

- Advisory Board
- Auditor

- Executive Vice President
- Fellow / Distinguished Fellow / Meister
- Senior Vice President
- Executive Advisor to the President
- Special Assistant to the President

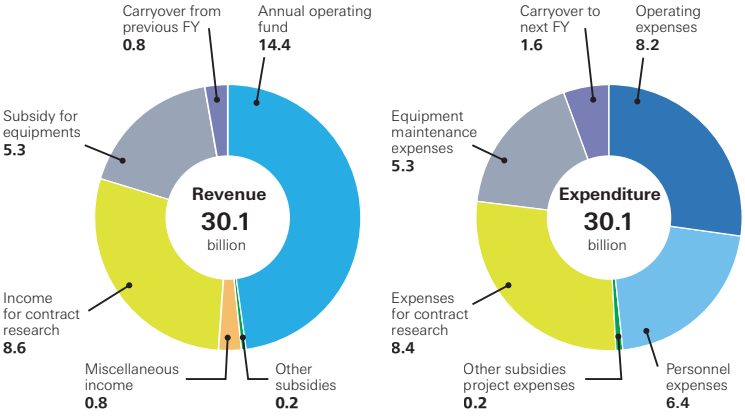
- Auditor Office
- Corporate Planning Office
- Audit Office
- Compliance Office
- Cross-ministerial Strategic Innovation Promotion Program Office

- **Research Center for Energy and Environmental Materials (GREEN)**
  - Battery and Cell Materials Field
  - Hydrogen Technology Materials Field
  - Battery Research Platform
  - Center for Advanced Battery Collaboration
  - Administrative Office
- **Research Center for Electronic and Optical Materials**
  - Functional Materials Field
  - Optical Materials Field
  - Administrative Office
- **Research Center for Magnetic and Spintronic Materials**
  - Magnetic Functional Device Group
  - Magnetic Recording Materials Group
  - Spintronics Group
  - Spin Physics Group
  - Spin Caloritronics Group
  - Nanostructure Analysis Group
  - Spin Theory Group
  - Green Magnetic Materials Group
  - Digital Transformation Initiative Center for Magnetic Materials
  - Administrative Office
- **Research Center for Structural Materials**
  - Materials Manufacturing Field
  - Materials Evaluation Field
  - Administrative Office
- **Research Center for Materials Nanoarchitectonics (MANA)**
  - Quantum Materials Field
  - Nanomaterials Field
  - Administrative Office
- **Research Center for Macromolecules and Biomaterials**
  - Biomaterials Field
  - Macromolecules Field
  - Administrative Office
- **Center for Basic Research on Materials**
  - Advanced Materials Characterization Field
  - Data-driven Materials Research Field
  - Administrative Office
- **International Center for Young Scientists**

- **Research Network and Facility Services Division**
  - Materials Fabrication and Analysis Platform
  - Materials Data Platform
  - Central Hub of Advanced Research Infrastructure for Materials and Nanotechnology
  - Data Transformation Initiative Subcommittee Administrative Office
  - Administrative Office
- **External Collaboration Division**
  - Intellectual Property Office
  - Industrial Collaboration Office
  - Office for Preparation of Semiconductor Materials Research Center
- **Division of International Collaborations and Public Relations**
  - Academic Collaboration Office
  - Public Relations Office
  - International Support Office
- **Human Resources Division**
  - Human Resources Development Office
  - Personnel Office
- **Administration and Safety Management Division**
  - General Affairs Office
  - Facilities Planning and Management Office
  - Safety Management Office
- **Finance Division**
  - Accounting Office
  - Procurement Office
  - Competitive Funds Administration Office
- **Information Infrastructure Management Division**
  - ICT Promotion and Infrastructure Office
  - Information Security Office

NIMS Data

Financial Data for 2021-2022



[Japanese yen]

Personnel by Classification

	Status	Number of Staff	Number of Female Staff (included)	Number of Foreign Staff (included)
Executive		6	1	0
Permanent Employee	Researcher	369	38	47
	Engineer	72	15	0
	Administrative Staff	101	33	0
	Subtotal	542	86	47
Fixed Term Employee, etc.	Researcher (fulltimer)	199	30	118
	Graduate Student	143	41	96
	Other	646	422	30
	Subtotal	988	493	244
Total		**1536**	**580**	**291**
Percentage			**38%**	**19%**

[Apr. 1, 2023]

History

1956 Jul. Establishment of National Research Institute for Metals
1966 Apr. Establishment of National Institute for Research in Inorganic Materials
1972 Mar. National Institute for Research in Inorganic Materials relocated to Tsukuba
1979 Mar. NRIM opens Tsukuba Office, three research departments relocated
1995 Jul. National Research Institute for Metals relocated to Tsukuba
2001 Apr. Establishment of NIMS by merger of National Institute for Research in Inorganic Materials and National Research Institute for Metals. Start of First Five-year Plan
2004 Apr. Start of Doctoral Program in Materials Science and Engineering of Graduate School of Pure and Applied Science, University of Tsukuba
2006 Apr. Start of Second Five-year Plan
2007 Oct. Establishment of International Center for Materials Nanoarchitectonics (MANA) -World Premier International (WPI) Research Center-
2009 Nov. Establishment of Global Research Center for Environment and Energy based on Nanomaterials Science (GREEN)
2010 Dec. Establishment of Center of Materials Research for Low Carbon Emission (CMRLC)
2011 Apr. Start of Third Five-year Plan
2012 Apr. Establishment of Research Center for TIA Nano-Green Open Innovation (renamed to NIMS Open Innovation Center)
2012 Aug. Establishment of Elements Strategy Initiative Center for Magnetic Materials (ESICMM)
Establishment of Center for Nanotechnology Platform
2014 Oct. Establishment of Research Center for Structural Materials (RCSM)
2015 Apr. The Independent Administrative Institution (IAI) system reestablished as the system of the National Research and Development Agency.
2015 Jul. Establishment of Center for Materials Research by Information Integration (cMi^2)
2016 Apr. Start of Fourth Seven-year Plan
2016 Oct. Promoted to a Designated National Research and Development Institute
2017 Apr. Establishment of Research and Services Division of Materials Data and Integrated System (MaDIS)
2023 Apr. Start of Fifth Seven-year Plan

Japan's leader in materials science

Based on the number of high impact papers published by Japanese research institutes surveyed by Clarivate Analytics Japan in 2022, NIMS was ranked No. 1 in the field of materials science and is regarded as Japan's most influential materials science research organization.

NIMS' ranking in other scientific fields

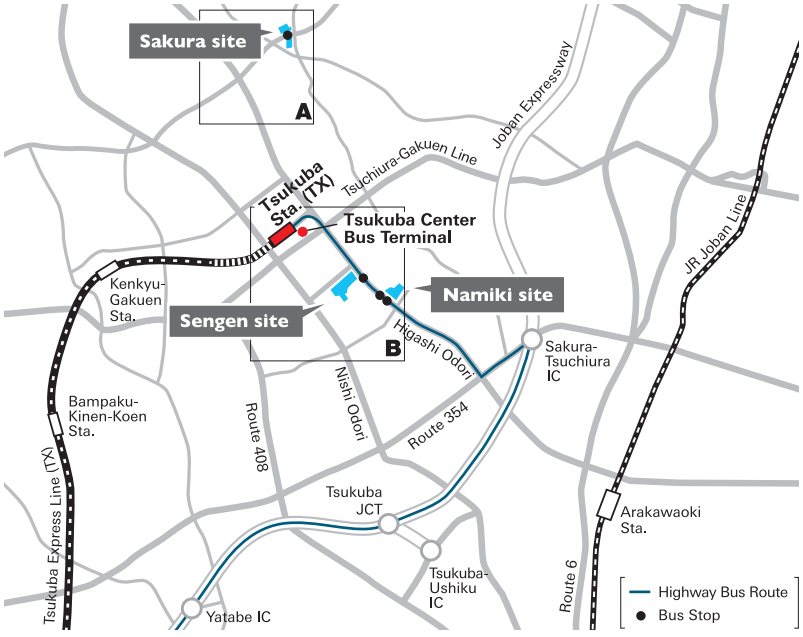
Chemistry 3rd place
Physics 4th place
Overall 6th place

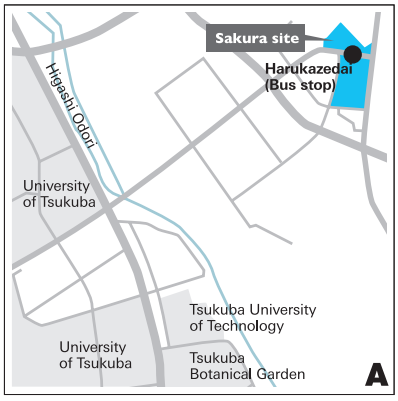
Japan's top 10 materials science organizations

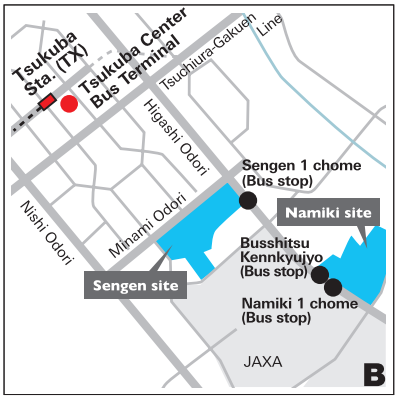
Rank	Organization	No. of frequently cited papers	Proportion of frequently cited papers to total number of papers published
1	**National Institute for Materials Science (NIMS)**	**146**	**2.3%**
2	University of Tokyo	78	1.6%
3	National Institute of Advanced Industrial Science and Technology	55	1.4%
4	Tohoku University	55	0.8%
5	RIKEN	39	3.6%
6	Kyoto University	34	0.9%
7	Kyushu University	27	0.8%
8	Waseda University	25	2.5%
9	Tokyo Institute of Technology	23	0.7%
10	Osaka University	18	0.4%

Source : Clarivate Analytics Japan (https://clarivate.com/ja/blog/hcps-in-japan-2022/)

Map & Directions







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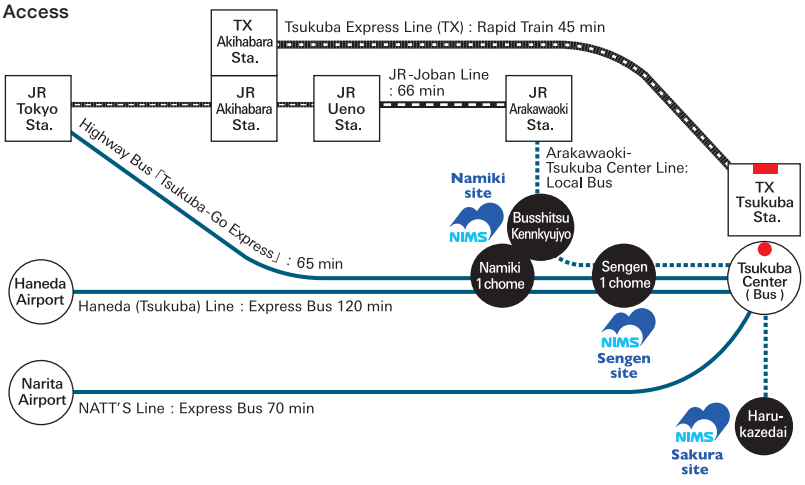

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