



Activities of FRIS
[April, 2018 to March, 2019]

213

Number of papers

4.13

Number of papers by young researchers/person

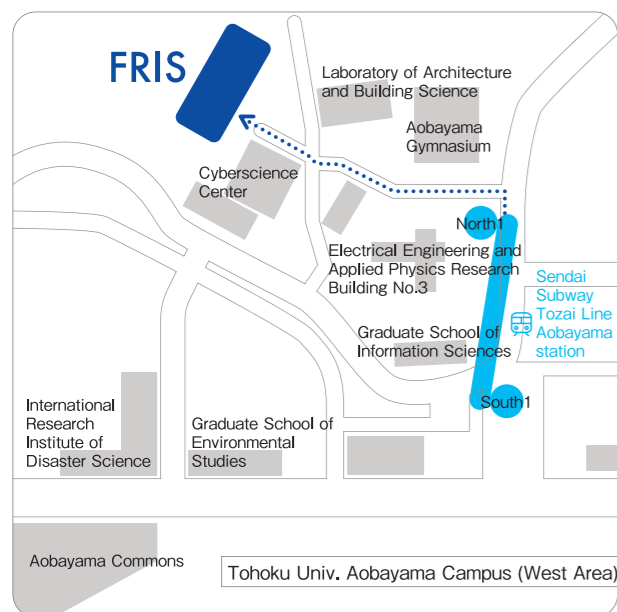
9

Number of young researchers dispatched overseas for over a month

23

Number of academic events organized by young researchers

Frontier Research Institute for Interdisciplinary Sciences, Tohoku University



Location
Aramaki aza Aoba 6-3, Aoba-ku, Sendai 980-8578, Japan

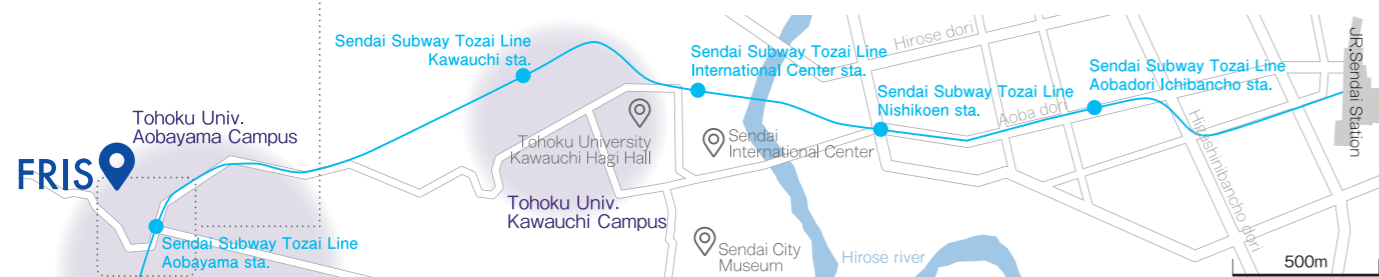
TEL
+81-22-795-5755

FAX
+81-22-795-5756

WEB
<https://www.fris.tohoku.ac.jp/en/>

Access
Subway "Sendai Subway Tozai Line"
from Sendai station Time:15min, Fare:250yen
(10min. on a train to Aobayama station, and 5min. on foot from Exit North 1 of Aobayama station) * As of May 2019

TAXI
from JR.Sendai Station Time:15min, Fare:About 2,000yen



FRONTIER

Materials and Energy

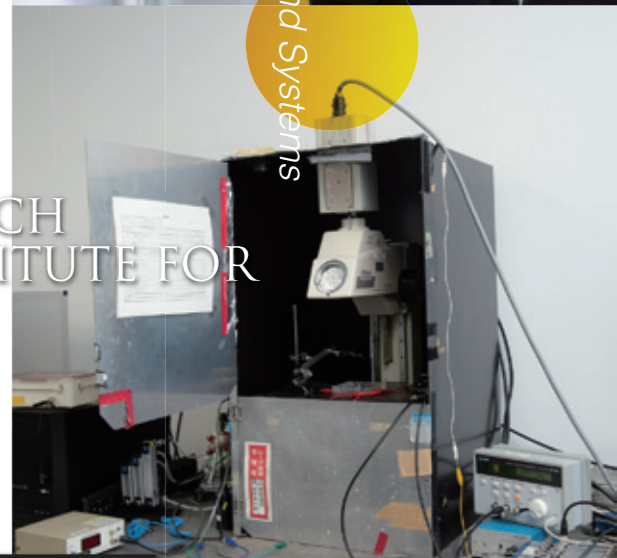


Information and Systems



RESEARCH INSTITUTE FOR

Life and Environments



Devices and Technology



INTERDISCIPLINARY



Advanced Basic Science



SCIENCES

Human and Society



FRIS was established in 2013 through the integration of the Center for Interdisciplinary Research (CIR) and the Institute for Synergistic Interdisciplinary Research, and started its mission: “FRIS pioneers and promotes interdisciplinary studies in various academic fields. Under the auspices of partnerships with all university faculty and research institutions, including the Division for Interdisciplinary Advanced Research and Education of the Institute for Promoting Graduate Degree Programs, we are advancing knowledge and creating new values by supporting young researchers, with the ultimate goal of contributing to the enrichment of human society.”

FRIS is composed of the managing & planning division, the advanced interdisciplinary research division, and the creative interdisciplinary research division. The managing & planning division and the advanced interdisciplinary research division are staffed with full-time faculty members (four professors, four associate professors, and one university research administrator). The creative interdisciplinary research division is staffed with fixed-term young researchers (forty-one assistant professors, as of April 2019). All FRIS researchers belong to either of six research fields which are established by organizing all of Tohoku University’s areas of study from an interdisciplinary point of view: Materials and Energy, Life and Environments, Information and Systems, Devices and Technology, Humans and Society, and Advanced Basic Science.

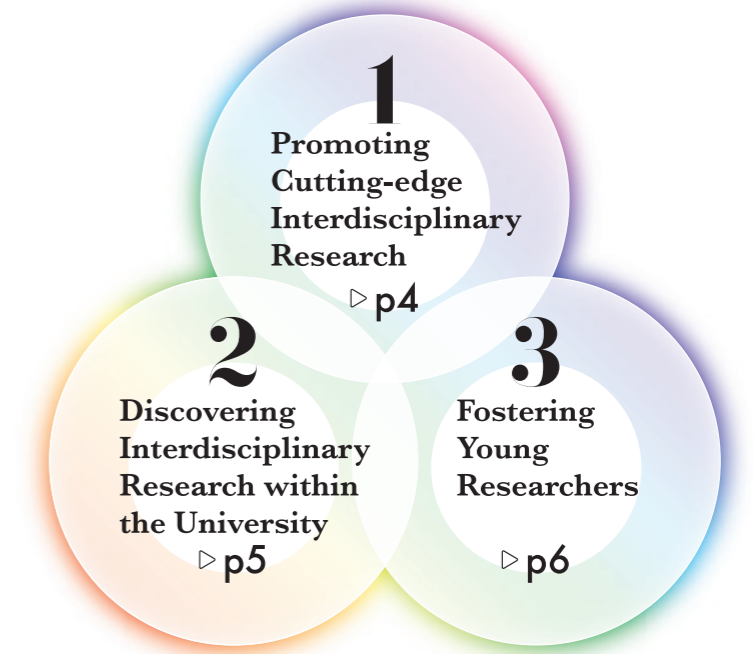
FRIS focuses on the activities (1) to promote cutting-edge interdisciplinary research, (2) to explore intra-university interdisciplinary research, and (3) to foster young researchers of interdisciplinary sciences worldwide. To promote these activities FRIS carries out the following programs: Program to Promote Interdisciplinary Research, Program to Support Interdisciplinary Research Activities, Fostering Young Researchers Program (Shoushi Program), Program to Support Establishment of International Research Center, Program to Support International Collaboration, and Program to Support for Presentation in International Conferences. Assistant professors of the creative interdisciplinary research division carry out their own research subjects under a mentor selected from Tohoku University faculty members. Furthermore, young researchers have mutually close links with students of doctorate and master’s courses in the Division for Interdisciplinary Advanced Research and Education of the Institute for Promoting Graduate Degree Programs through research and education.

In order to promote frontier research in interdisciplinary sciences, your understanding, support, and encouragement are deeply appreciated.

December, 2019
Prof. Toshiyuki Hayase, Director

What We Do

Our objective is to create new wisdom and values and to contribute to the enrichment of human society by fostering researches of young researchers through collaboration with each graduate school, each research institute and the Division for Interdisciplinary Advanced Research and Education in Tohoku University, while pioneering and promoting interdisciplinary research by fusing different fields.

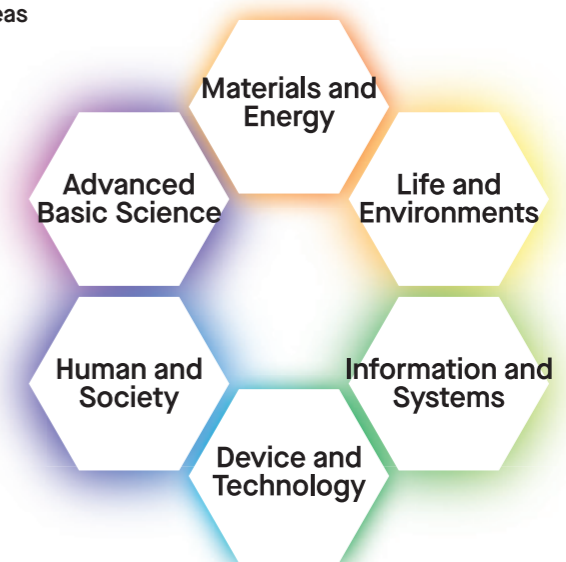


How We Do It

We promote researches that researchers aim at cross-sectoral fusion of a wider range of academic disciplines by actively exchanging and collaborating with researchers in other fields, working mainly on their core research fields.

To support them, we established a Managing & Planning Division to promote mutual understanding and cooperation within and outside the six research areas, further to support human exchange and collaborative research, etc. with other faculties, schools, etc. in Tohoku University and other universities.

6 Research Areas



1

Promoting Cutting-edge Interdisciplinary Research

Full-time faculty members in the Advanced Interdisciplinary Research Division have their own perspectives to promote high-level interdisciplinary research in 6 research domains. FRIS further supports the advancement of cross-sectional research by offering open-space environments to exchange ideas and information among different fields.

2

Discovering Interdisciplinary Research within the University

Part of our core mission is to identify seeds of interdisciplinary research not only within FRIS but across Tohoku University, and provide supports for their exploration through diverse programs.

The achievements of those programs over the past 20 years attest to our leading role of the challenges and activities for the present key areas of academic inquiry.

Research Staff



Hiroshi Masumoto
Professor
Materials and Energy

Multi-functional materials, Thin films processing
Development of new multi-functional (Tunneling Magneto-dielectric effect and Tunneling Magneto-optical effect) materials by metal-ceramic nano-granular films



Takehito Shimatsu
Professor
Information and Systems

Room temperature bonding, Ultra-high density recording media
Atomic diffusion bonding technique for electric/optical devices, High density MAMR/HAMR recording media



Kenji Tsuda
Professor
Advanced Basic Science

Electron crystallography, Nano structural science, Structural phase transformations
Development of local crystal structure analysis method using convergent-beam electron diffraction



Junji Saida
Professor
Advanced Basic Science

Non-equilibrium metallic materials, Metal physics
Structure, transformation and deformation in metallic glasses, Relaxation and rejuvenation phenomena in metallic glasses



Takashi Itoh
Associate Professor
Materials and Energy

Electrochemistry, Industrial physical chemistry, Material chemistry
In situ raman spectroscopy for battery active materials, Development of Zn-air batteries, Li ion batteries and fuel cells



Shinsuke Niwa
Associate Professor
Life and Environments

Cell Biology, Cytoskeleton, Molecular genetics, Neuroscience
Molecular mechanisms of the axonal transport, Neuronal development and neuronal diseases



Kenji Toma
Associate Professor
Advanced Basic Science

Theoretical astrophysics
Extreme phenomena driven by black holes, Polarized light, Dark matter, Objects in the early universe, Collaborative study with observations and numerical simulations

Support Program for Interdisciplinary Research

Three-year grant supports an interdisciplinary subject by researchers from several departments in Tohoku University. This program focuses on promoting a novel interdisciplinary research topic with active exchange, discussion, and cooperation among various fields.

Program for Creation of Interdisciplinary Research

Two-year grant is for putting early-stage pioneering interdisciplinary research. It is open to young researchers in Tohoku University.

Program for Promoting Interdisciplinary Research

Open to research group led by faculty members of the Advanced Interdisciplinary Research Division and three-year grant supports a research project aimed at pioneering a novel interdisciplinary field with growth potential.

Support Program for International Collaborative Research

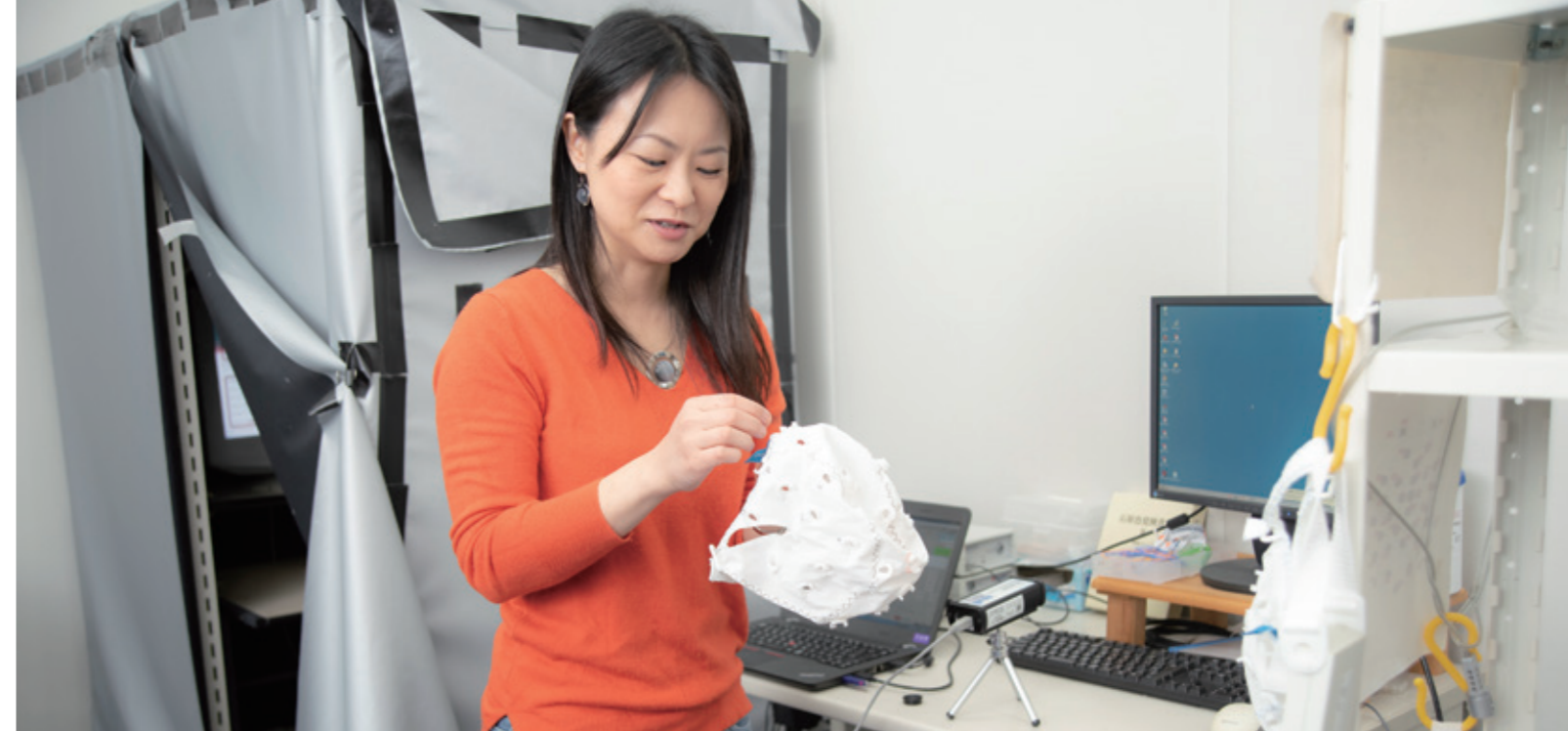
This program supports an interdisciplinary research that opens up new frontiers of science conducted with overseas partners.



3

Fostering Young Researchers

FRIS enlists and supports young researchers who pursue interdisciplinary exploratory research from fresh perspectives through international open recruitment. Selected candidates are assigned to FRIS as associate or assistant professors of the Creative Interdisciplinary Research Division, and collaborate with members of the university's graduate schools, institutes, and Division for Interdisciplinary Advanced Research and Education. By supporting promising, outstanding young researchers, FRIS aims to create new academic fields and nurture top-level researchers active on the global stage.



Collaboration with Division for Interdisciplinary Advanced Research and Education (DIARE): “Yoken” Project

Tohoku University Institute for Promoting Graduate Degree Programs include Division for Interdisciplinary Advanced Research and Education (DIARE) that is in strong partnership with FRIS. The DIARE promotes the education of young world-class researchers capable of forging new research areas by merging different disciplines in collaboration with the students' original graduate schools. Specifically, the DIARE selects outstanding students (approximately 30 master course students and 30 PhD students every year) in interdisciplinary areas, provides with financial aid, and improves their research environments. Recognizing that education and research go hand in hand, FRIS young researchers organize various seminars, workshops, and symposiums in collaboration with the DIARE students.

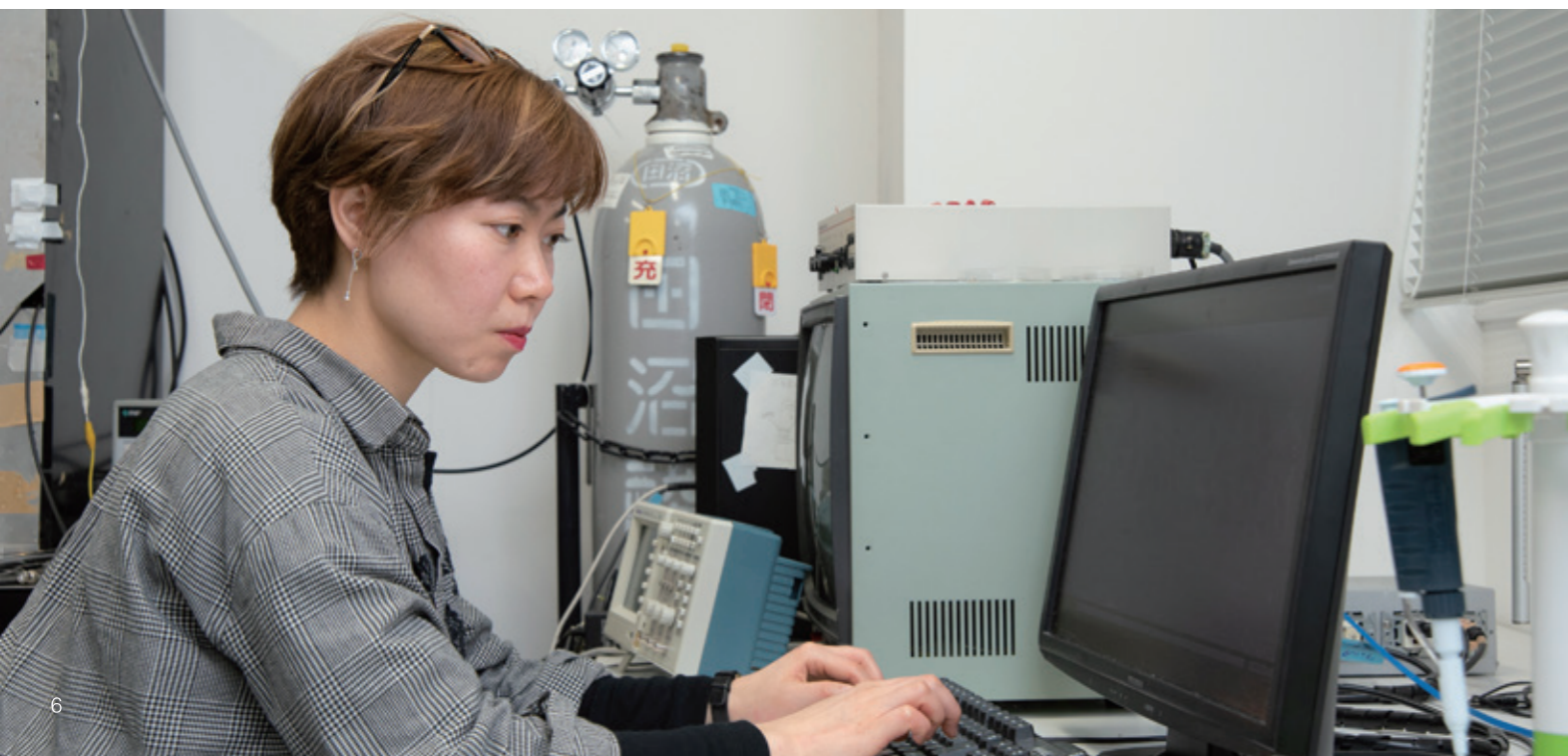
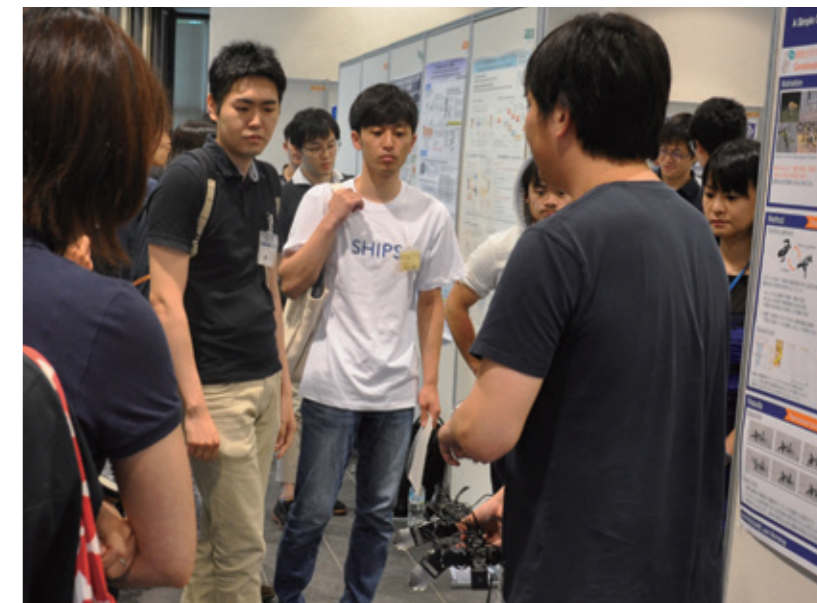
Support Program for Overseas Collaboration and Presentation

The purpose of this program is to foster internationally active young researchers and form networks for international interdisciplinary research. We support the living expenses of young Tohoku University researchers engaged in collaboration research at overseas research institutes for 2 weeks – 1 month, and the travel expenses of young researchers and graduate students giving presentations at academic conferences outside Japan.

“Shoshi” Program

It is difficult for young researchers to develop their skills and careers in fields of interdisciplinary research where competitive funding is scarce and the potential for achievement is hard to forecast. Since society needs talented people possessing broad perspectives and multifaceted thinking, MEXT funds programs that encourage the development of such talent. FRIS internationally recruits young researchers interested in interdisciplinary research (for 5 years yen per year) and covers their research expenses (2.5 million maximum).

Selected young researchers appointed as assistant professors carry out research in cooperation with their mentors. Mentors are professors or associate professors who provide the young researchers with a research environment, guidance, and career path support.



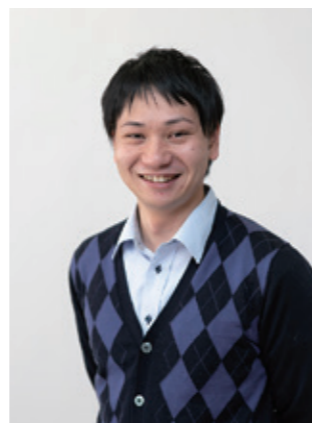
Research Staff

Materials and Energy



Hanae Aoki

High frequency soft magnetic thin film, Multifunctional material



Hiroshi Ueno

Physical organic chemistry, Nanomaterials science



Yuta Kudo

Natural product chemistry, Organic chemistry, Biochemistry



Yasukazu Daigaku

DNA replication, Mutagenesis



Yuichiro Nakajima

Epithelial cell biology, Tissue homeostasis, Environmental responses



Yuji Nashimoto

Biomedical engineering, Electrochemistry, Microengineering



Tuan Hung Nguyen

Fundamental theory and simulation of materials intelligence for energy applications



Takayuki Kojima

Solid catalysts, Magnetic materials, Metallic thin films



Takuya Mabuchi

Quantum engineering, Molecular fluid engineering, Material science and engineering



Rui Yamada

Nonequilibrium materials, Materials processing, Powder metallurgy



Tomomi Tsunematsu

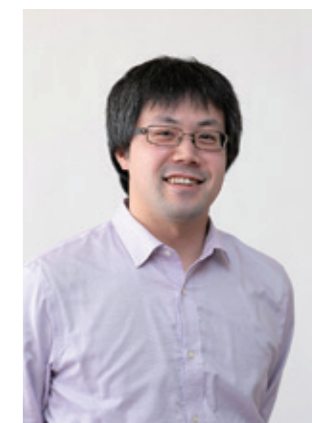
Sleep research using mice, Electrophysiology

Information and Systems



Sae Kaneko

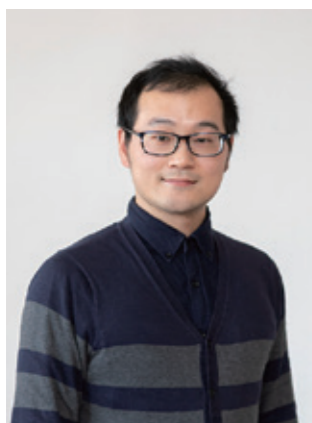
Visual Perception, Experimental Psychology



Fumihiko Kaneda

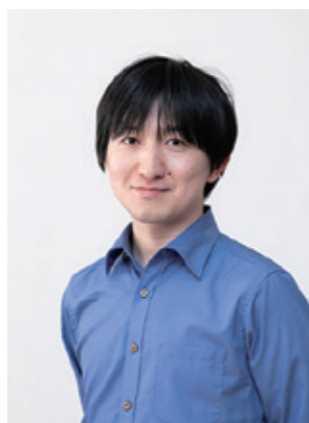
Quantum optics, Quantum measurements, Quantum information technology

Life and Environments



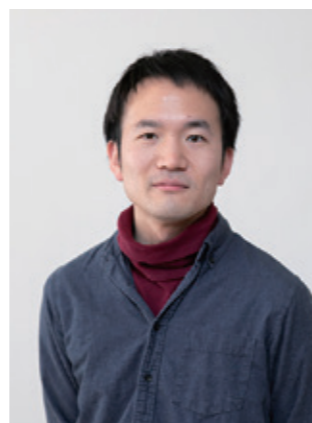
Yang Cao

Nano magnetism, Materials processing engineering



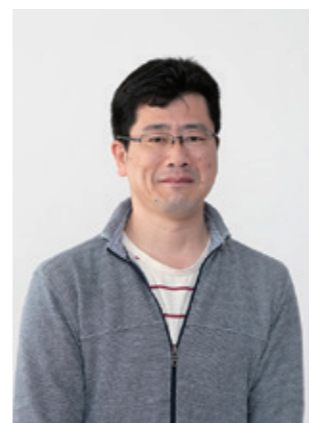
Hiroki Ida

Electrochemistry, Probe microscopy, Live cell imaging



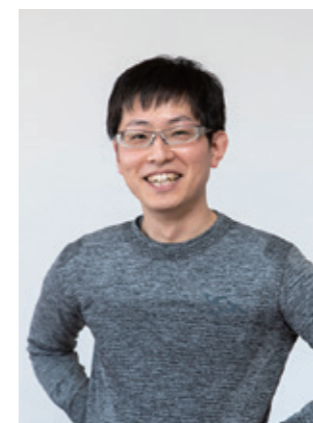
Toshiharu Ichinose

Behavioral genetics, Memory consolidation, Dopamine modulation



Daisuke Suzuki

Computer science, Low-power electronics, Reconfigurable systems



Nobuyuki Matsumoto

Optomechanics

Device and Technology



Hiroya Abe

Biosensor, Energy catalysts, Polymer chemistry, Biomaterials, Bioinspired materials



Hisashi Kino
Semiconductor Engineering



Yuanyuan Guo
Bioelectronics, Multifunctional fibers and sensors, Neural engineering



Yuki Suzuki
Nanobiotechnology



Chrystelle Bernard
Dynamics behavior of polymers, cold-spray

Advanced Basic Science >



Kohei Ichikawa
Observational astronomy, Astrophysics



Hisashi Inoue
Condensed matter physics, Superconductivity, Quantum information technology



Shimpei Endo
Quantum physics, Few- and many-body problem



Chaoliang Zhang
Spintronics, Magnetism, Magnetic materials

Human and Society >



Alimu Tuoheti
History of thought, Religious studies, Theory of comparative culture, Area studies



Tomokatsu Onaga
network science, mathematical modelling



Yasunori Okamoto
Bioinorganic chemistry, Protein engineering, Systems catalysis



Masaki Okumura
Structural biology, Protein Science, Biochemistry



Yohei Kawazura
Plasma physics, Turbulence, Hamiltonian mechanics



Seiji Kamada
High pressure and temperature experiments, High pressure mineral physics



Kohei Tamura
Anthropology, Cultural evolution, Archaeological informatics



Yuta Nakayasu
Materials processing engineering, Eco-friendly lifestyle creation



Yueh Hsuan Weng
AI and Law, Legal informatics, Social robotics, Robot ethics



Kaoru Kakinuma
Sustainability, Socio-ecological system, Climate change and migration



Tomoki Kimura
Planetary physics: dynamics and evolution of planetary interior, surface, atmosphere, and space



Naoya Kitajima
Physics of the early universe, Particle physics beyond the standard model



Daniel Pastor-Galan
Geology