Frontier Research Institute for Interdisciplinary Sciences

Tohoku University

fris.tohoku.ac.jp

FRIS

2025.11

東北大学 学際科学フロンティア研究所｜Frontier Research Institute for Interdisciplinary Sciences

2025

Overview

The Frontier Research Institute for Interdisciplinary Sciences (FRIS) was established in April 2013. It consists of the Managing and Planning Division, the Advanced Interdisciplinary Research Division, the Creative Interdisciplinary Research Division, and the Endowed Research Divisions. The Managing and Planning Division and the Advanced Interdisciplinary Research Division are staffed with five professors, two associate professors, and two research administrators (two specially appointed associate professors), while the Creative Interdisciplinary Research Division is staffed with young researchers (10 associate professors and 33 assistant professors, as of May 1, 2025). The faculty members are categorized into one of six areas of interdisciplinary research: “Materials and Energy,” “Life and Environments,” “Information and Systems,” “Devices and Technology,” “Humans and Society,” and “Advanced Basic Science.”

What We Do

Our goal is to enrich human society by supporting the work of young researchers through collaboration with graduate schools and research institutes, as well as the Division for Interdisciplinary Advanced Research and Education at Tohoku University. We aim to pioneer and promote interdisciplinary research by fostering collaboration across different fields.

How We Do It

Researchers focus on their disciplines, but they also encourage interdisciplinary research by collaborating and exchanging ideas with experts from different fields. To support these efforts, FRIS has established the Managing and Planning Division to facilitates cooperation among the six research areas. Furthermore, this division supports collaboration with other departments of Tohoku University, as well as other universities.

Performance of FRIS

204	3.71	1.47	15.8%
Number of publications in 2024	Number of publications per researcher in 2024	Field-Weighted Citation Impact (FWCI) between 2018 and 2023	Percentage of publications in Top 10% Citation Percentiles, adjusted by FWCI between 2018 and 2023

Message

FRIS is a unique research institute whose goal is to create new wisdom and value through interdisciplinary research that fuses different fields, thereby contributing to the enrichment of human society.

FRIS’s achievements to date include progressing advanced interdisciplinary research, such as the research and development of novel functional materials and the device application of materials with distinctive properties by full-time faculty from a wide range of specialized fields. These results have led to many collaborative research projects with industry partners. FRIS has also produced outstanding results in life sciences and astrophysics.

A key feature of FRIS is fostering young researchers who promote interdisciplinary research across academic fields through the cooperation of the entire university. Every year, we recruit young researchers from all disciplines from around the world. In our selection process, we emphasize the perspectives of diversity of research domain, gender, and nationality, as well as interdisciplinary aspects. FRIS provides opportunities for exchange between researchers from different fields, offers a mentor system through cooperation with other departments/institutes, and secures an independent research environment for developing principal investigators (PIs). Furthermore, Tohoku University provides budget support to allow young researchers to focus on their own research.

Furthermore, our young researchers are producing world-class research that has opened doors to new fields of study. Twenty researchers have won the Young Scientists' Award of the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, thirteen have been selected for the PRESTO program, and twelve have been chosen for the FOREST program.

Recently, FRIS has been focusing on establishing a mechanism through our tenure-track system to enable young researchers to play active roles globally, strengthening the network among FRIS alumni, and promoting further research exchange among interdisciplinary researchers through the Tohoku Initiative for Fostering Global Researchers for Interdisciplinary Sciences (TI-FRIS), a collaborative program among universities in the Tohoku region.

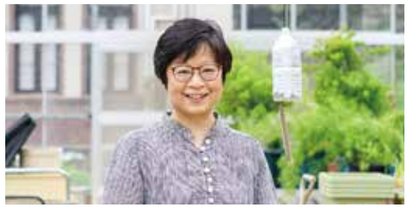
As an international and interdisciplinary research institute, FRIS will continue to support researchers to create new interdisciplinary science, promote world-class research, stimulate exchange among researchers from different disciplines, build networks, and disseminate research results. I hope that researchers who understand the importance of interdisciplinary exchange and pioneer new interdisciplinary research will illuminate the future of the world by joining FRIS.

The aspirations of researchers pioneering new interdisciplinary science will open the gates to the future of advanced research.

Professor HAYASE Toshiyuki

Director,
Frontier Research Institute for Interdisciplinary Sciences,
Tohoku University

Professor Hayase has been the director of FRIS since 2018. His research interests are flow stability, flow control, flow in living organisms e.g., blood, its application to medical engineering, and the integration of flow simulation and measurement methods.



Professor KYOZUKA Junko

Assistant Director,
Frontier Research Institute for Interdisciplinary Sciences, Tohoku University

Professor Kyozuka was appointed Assistant Director in April 2025. She is also a Distinguished Professor at the Graduate School of Life Sciences. Her research focuses on plant development and growth, including the mechanisms determining branching patterns, as well as the origin and evolution of plant hormone signaling pathways.

FRIS Triangle

FRIS has three missions at the heart of its activities.

Promoting Advanced Interdisciplinary Research

Faculty members of the Advanced Interdisciplinary Research Division promote advanced, highly interdisciplinary research internationally by integrating different fields of study, based on their own specialized research fields.

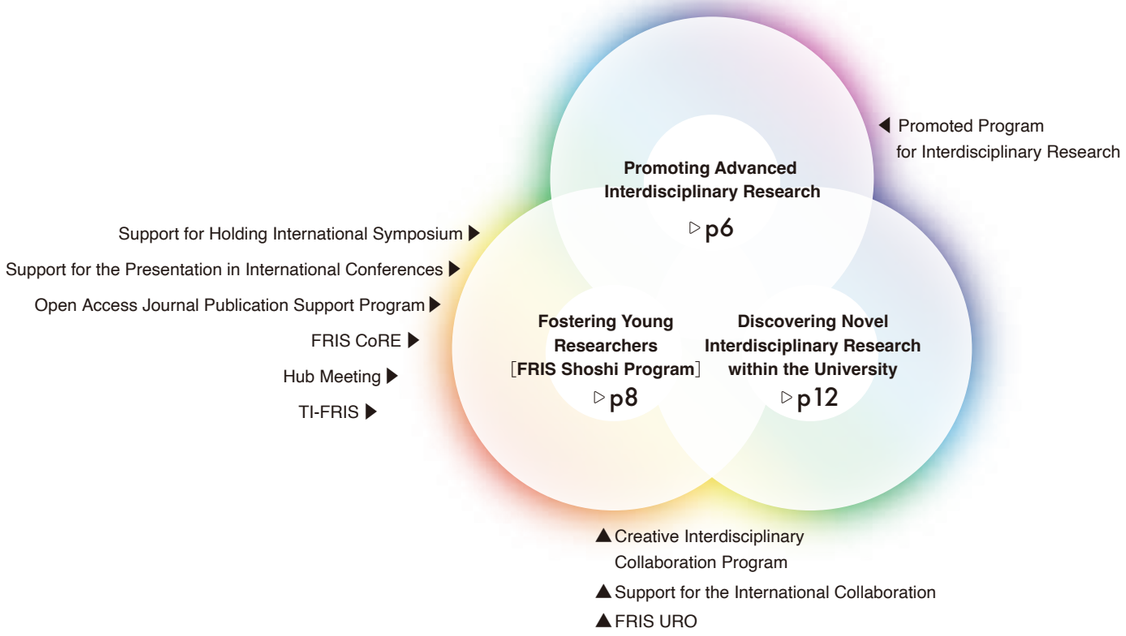
Fostering Young Researchers［FRIS Shoshi Program］

FRIS actively supports young researchers in the Creative Interdisciplinary Research Division from various perspectives in the planning, promotion, and development of new international interdisciplinary research as principal investigators (PIs), thereby fostering researchers with advanced research skills for the next generation.

Discovering Novel Interdisciplinary Research within the University

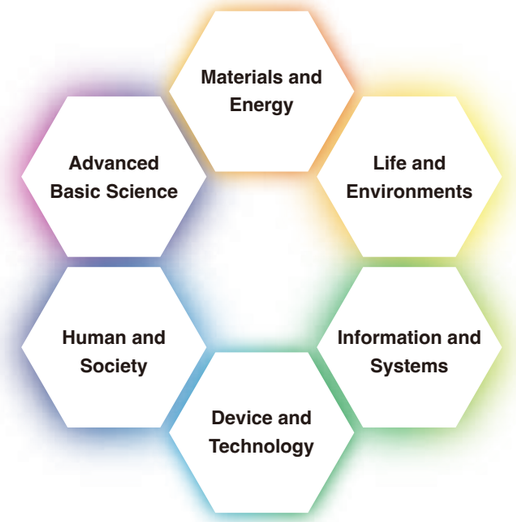
Working with young researchers within the Institute and various departments at Tohoku University, FRIS aims to create new research fields by discovering and supporting next-generation interdisciplinary research projects that are emerging, innovative, pioneering, and rich in individuality.

To realize these missions, FRIS has taken a unique initiative, whereby it implemented a variety of research support programs that are easy for researchers to utilize. The FRIS identity incorporates three missions: promoting interdisciplinary research, fostering young researchers, and discovering and supporting new interdisciplinary research.



Six Research Areas

FRIS has established six research areas covering almost all academic disciplines.



FRIS researchers focus on their own research fields, but they also aim to go beyond their core research fields to pursue cross-disciplinary fusion and actively engage in exchange and collaboration with researchers in other fields.

International Excellence

Toward the University for International Research Excellence

Tohoku University was accredited in November 2024 as Japan's first University for International Research Excellence. In the University's Plan for Enhancement of Reseacrch System and Environment, it is explicitly stated that the "FRIS Young Researcher Model," which enables early- and mid-career researchers (EMCRs) to pursue independent research as principal investigators (PIs), will be implemented across the entire university. Building on its past achievements, FRIS is now working to establish a next-generation system for fostering EMCRs that is worthy of this status.

☐ **Establishment of "Working Group on International Research Excellence"**
Examination of future plans and initiatives

☐ **Development of "New Human Resource Strategies of FRIS"**
Recruitment of approximately 60 PIs for International Excellence

☐ **Enhancement of the Research Environment and Support Systems**
Introduction of new start-up and specific research funds
Initiatives to expand research space
Enhancement of FRIS Cooperative Research Environment (FRIS CoRE)

☐ **Advancement of Institute Management**
Strengthening of administrative structures
Reinforcement of the research administrator organization
New appointments of core facility staff

Promoting Advanced Interdisciplinary Research

Full-time faculty members of the Advanced Interdisciplinary Research Division are assigned to various research areas, and by fusing different disciplines around their specialized research fields, advanced, highly interdisciplinary research is promoted internationally to create new knowledge and value.
Full-time faculty members in the Advanced Interdisciplinary Research Division aim to pioneer new academic fields by actively utilizing not only their own research resources but also various support programs within the Institute, and by collaborating with researchers from inside and outside the University to establish the necessary research organization.

Performance of FRIS
[Senior Researchers]

42	6.00	2.00	13.8%
Number of publications in 2024	Number of publications per researcher in 2024	Field-Weighted Citation Impact (FWCI) between 2018 and 2023	Percentage of publications in Top 10% Citation Percentiles, adjusted by FWCI between 2018 and 2023

When metals and ceramics are composited at nanoscale, they exhibit unprecedented functional properties. We have discovered new multi-functional properties such as the Tunneling Magneto-Dielectric (TMD) effect and the Tunneling Magneto-Optical (TMO) effect. Through interdisciplinary research in magnetic physics, medical engineering, and materials science, we are pioneering a new field of nano-composite thin films with new functions.

Professor
MASUMOTO Hiroshi
Materials and Energy

RESEARCH TOPICS
- Tunneling Magneto-Dielectric (TMD) and Tunneling Magneto-Optical (TMO) effect materials by metals-ceramics nano composite structures
- Development of osteoconductive implant materials by plasma oxidation of metallic titanium

Analyzing the interfaces between the electrolyte solutions and the electrodes for lithium secondary batteries, fuel cells, next generation batteries and molecular electronic devices is important for developing electrochemical energy conversion devices. Our present study investigates the behavior of molecules at the interface with In situ Raman spectroscopy and focuses on the dynamical changes in the Raman spectra at different battery conditions.

Associate Professor
ITOH Takashi
Materials and Energy

RESEARCH TOPICS
- In situ Raman spectroscopy for battery active materials
- Development of Zinc-air batteries, Lithium secondary batteries and fuel cells

I am a member of the theory team in the Event Horizon Telescope consortium, which captured the first-ever image of a black hole. Every day at FRIS, I am stimulated by chats with colleagues in other research fields. I also have published omnibus books with young researchers from FRIS and DIARE.

Professor
TOMA Kenji
Advanced Basic Science

RESEARCH TOPICS
- Astrophysics: theory, simulations & observations

We have proposed an atomic diffusion bonding method for bonding wafers of different materials at room temperature using the rearrangement of crystal lattices at the contact interface of thin films. Using this method, we are developing research on new device formation. We are also working on research on functional thin films used in electronic devices using the thin film deposition technology that is the basis of the bonding technique.

Professor
SHIMATSU Takehito
Information and Systems

RESEARCH TOPICS
- Atomic diffusion bonding technique for electric/optical devices.
- High density MAMR/HAMR recording media.

A unique feature of our laboratory is the control of materials and chemical processes using high-temperature, high-pressure fluids including supercritical fluids as reaction medium. Toward the goal of building a carbon-recycling society, we are developing multi-level hierarchical structure control processes for nanomaterials/nanocatalysts that take full advantage of their potential, to improve the efficiency of chemical conversion processes.

Professor
TOMAI Takaaki
Advanced Basic Science

RESEARCH TOPICS
- Chemical conversion processes for carbon circulation
- Multi-level hierarchical structure control of nanomaterials based on science of dynamic interfaces
- Development and application of hydrothermal electrochemical process

We are interested in the relationship between nanomechanics in the cell and cellular morphogenesis. We are analyzing how and why disruption of the cellular nanomachines in our body, such as molecular motor proteins and cytoskeletal proteins, leads to human diseases such as neurodegeneration, infertility, and blindness.

Associate Professor
NIWA Shinsuke
Life and Environments

RESEARCH TOPICS
- Molecular motors
- Axonal transport

Random atomic structured materials such as amorphous or metallic glass have significantly different properties with those of conventional crystalline alloys and are anticipated to have industrial uses in the next generation. We address an important challenge by controlling the relaxation behavior of glasses to improve their mechanical properties and to contribute to their applications.

Professor
SAIDA Junji
Advanced Basic Science

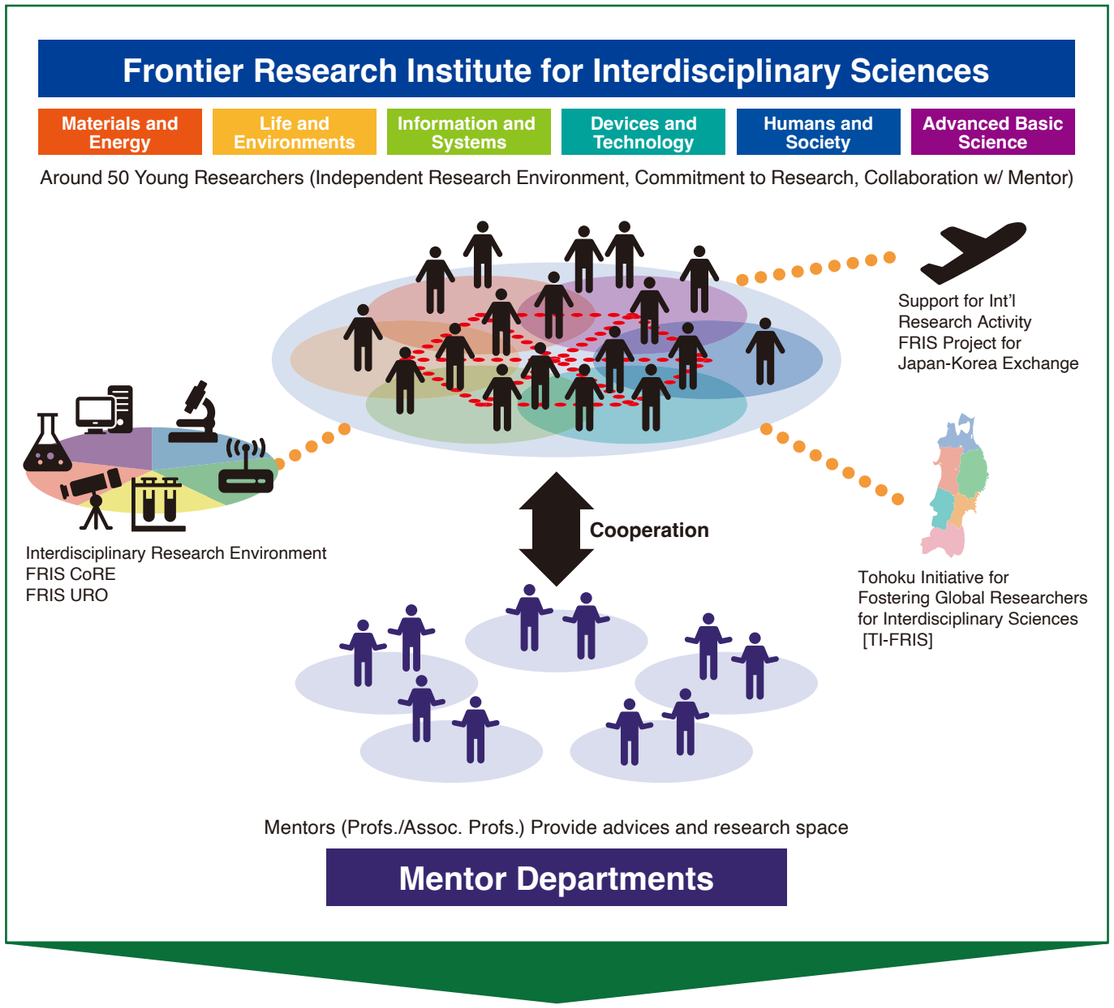
RESEARCH TOPICS
- Control of relaxation state in metallic glass
- Development of mechanical properties of metallic glass

Fostering Young Researchers

FRIS Shoshi Program

Through the FRIS Shoshi Program, young researchers selected through an international recruitment are employed as faculty members of the Creative Interdisciplinary Research Division, FRIS, and are supported in many ways to develop new international interdisciplinary research as Principal Investigators (PIs), thereby fostering researchers with advanced research skills for the next generation.

Promotion of world-leading interdisciplinary research and pioneering new academic fields by young researchers in all research areas



World-leading Interdisciplinary Research and Pioneering New Academic Fields

Publications in High Impact Journals	MEXT Young Scientists' Award	JST PRESTO PIs
Single-authored Books	Tohoku U. Distinguished Researchers Tohoku U. Prominent Research Fellows	JST FOREST PIs

Performance of FRIS [Young Researchers]

172	3.80	1.31	16.2%
Number of publications in 2024	Number of publications per researcher in 2024	Field-Weighted Citation Impact (FWCI) between 2018 and 2023	Percentage of publications in Top 10% Citation Percentiles, adjusted by FWCI between 2018 and 2023

International Recruitment / Recruiting Tenure-Track Assistant Professors from All Research Areas

Recruiting ambitious early-to-mid-career researchers who proactively promote international interdisciplinary research and aim to pioneer new academic fields

Every year, FRIS recruits approximately seven early-to-mid-career researchers (EMCRs) from all academic disciplines as Tenure Track Assistant Professors (PIs) in the Creative Interdisciplinary Research Division, with a term of seven-years. Assistant professors (PIs) at the Frontier Research Institute for Interdisciplinary Sciences are expected to exemplify the following principles of interdisciplinarity, independence and excellence in their research endeavors.

Independent Research Environment / Promoting World-Class Research

Offering various research funds and sharing facilities for interdisciplinary research in addition to basic research funds

☐ **Research Funds**
A total of 12.5 million JPY in basic research funds will be provided over seven years. In addition, FRIS offers up to 3.0 million JPY to support assistant staff, international collaborative research, and research space. Additional funding for interdisciplinary collaboration, organizing international conferences, and presenting at such events may be available upon review.

☐ **Start-up Research Funds**
Start-up research funds of up to 10.0 million JPY will be provided in the first year of appointment for Assistant Professors from 2026 onward.

☐ **FRIS Cooperative Research Environment (FRIS CoRE)**
FRIS is establishing an interdisciplinary collaborative environment where researchers can access basic research facilities in different fields under one roof (→ p.11).

☐ **FRIS Undergraduate Research Work Opportunities (FRIS URO)**
FRIS URO provides Tohoku University undergraduate students with opportunities to work as junior researchers, contributing faculty research while gaining diverse research experience and receiving financial assistance (→ p.11).

Mentor System / PI Fostering Support

Providing research space and advice from mentors through close cooperation and collaboration with graduate schools and institutes

To ensure that young researchers at FRIS can promote world-class research in an independent environment, FRIS has a mentor system in cooperation with the departments in the university. Young researchers at FRIS regularly engage in interdisciplinary research exchanges and collaborative research at FRIS and conduct their unique research on a daily basis in the mentor's lab, receiving the following support from mentors (professors or associate professors of Tohoku University):

- Provision of an independent research environment and research support.
- Support for career path.
- Support for safety, hygiene, and research ethics.
- Support for educational opportunities.
- Other requests made by the director of FRIS as needed.

Exchange of Researchers in Different Fields / Promoting Interdisciplinary Research

Events and consortium project to encourage interdisciplinary exchange and fusion of research

FRIS regularly holds seminars and workshops for interdisciplinary exchange and research promotion, in which members from all fields participate and thoroughly discuss their research. Furthermore, FRIS implements the consortium project with universities in Tohoku region, TI-FRIS (→ p.13), and the Creative Interdisciplinary Collaborative Program for young researchers at FRIS to promote interdisciplinary research activities (→ p.13).

Tenure Track System at FRIS

Strengthening Long-term Career Support: A New Tenure Track System at FRIS*

FRIS operates a Tenure Track System that enables assistant professors recruited through international recruitment to concentrate on research and generate meaningful outcomes during the tenure track period. These achievements are intended to support their promotion to higher academic positions both within and beyond the university, thereby facilitating long-term career development.

☐ **Tenure Review**
Assistant professors employed under this system undergo a tenure review between the third and fifth year of their appointment. Successful candidates will be promoted to tenured "International Excellence (IE) Associate Professors," while those who do not pass will remain in a fixed-term position for up to seven years.

*The Tenure Track System described here differs from the one applied to FRIS assistant professors recruited before FY2025. For more details, please refer to the FRIS website.
https://www.fris.tohoku.ac.jp/about/tenure-track.html

Fostering Young Researchers

Seminars, Workshops, Omnibus Lectures

FRIS Shoshi Program

In an effort to promote proactive interdisciplinary research through the exchange of researchers fusing different fields of study, FRIS organizes and runs seminars, workshops, and omnibus lectures to help grow young researchers through open discussions.

Hub Meeting

Once a month, all FRIS members get together for a research presentation seminar. TI-FRIS Fellows and researchers and students from departments and institutes within the university also participate in the meeting, and breakthroughs are shared through cross-disciplinary discussions. The meetings are held in a hybrid format of onsite and online.

FRIS Retreat

Once a year, all FRIS members and TI-FRIS Fellows meet off-campus to exchange ideas from different fields. The free discussions in a place apart from the usual university environment create opportunities for new discoveries.

Collaboration with the Division for Interdisciplinary Advanced Research and Education [DIARE]

DIARE is a graduate school education program for the practical fostering of human resources who will lead the next generation of academia. Receiving a range of support, graduate students selected within the university conduct research in new disciplines through the fusion of fields. In conjunction with research and education graduate students at DIARE, young researchers from FRIS present the Joint Interdisciplinary Research Seminar and the FRIS/DIARE Joint Workshop, promoting interdisciplinary exchange with graduate students through research and education.

Various Research Exchange Activities

FRIS supports the planning of seminars and workshops designed around the independent ideas of young researchers. A wide variety of events are held, including seminars that focus on a specific topic rather than aimed at all disciplines, symposia to discuss relationships between society and research activities as a whole, and symposia run in collaboration with the Tohoku Forum for Creativity at Tohoku University. Young researchers at FRIS gives lectures in an omnibus format as part of Tohoku University' s educational programs.

Posters for various research exchange seminars

FRIS CoRE

An environment where young independent researchers can take on the challenge of pioneering academic fields [FRIS CoRE]

To foster a "free research environment" where young researchers can tackle challenging issues with fresh perspectives, we have developed the FRIS Cooperative Research Environment (FRIS CoRE), which houses diverse basic research facilities across multiple fields and is operated by core facility staff with research backgrounds.

The FRIS CoRE significantly accelerates the startup phase for young researchers by providing access to foundational facilities in various disciplines under one roof. This setup increases daily interactions among researchers from different fields and leads to the creation of transdisciplinary research themes.

Through the "Fund for Early-Career Independent Researchers," FRIS CoRE receives broad understanding and support from society.

Core Facility Manager/Specially Appointed Associate Professor
IUCHI Katsuya

FRIS URO

An environment that promotes innovative interdisciplinary research with undergraduate students [FRIS URO]

FRIS URO (Undergraduate Research Work Opportunities) is an initiative to hire undergraduate students interested in research as Administrative Assistants (AAs). The program aims to advance faculty members' research while providing students with valuable opportunities to engage in innovative research. This initiative enhances their diverse research experiences and offers financial support. Some students who have participated in FRIS URO have gone on to work in laboratories within their departments after graduation from FRIS URO. Alumni have noted that the program offers "an opportunity to experience innovative research in a field different from their own" and describes it as "a great opportunity to witness how academic research comes to life."

FRIS URO Student Exchange Meeting

Initiatives to Promote DEI

FRIS has established a working group (WG) dedicated to promoting diversity, equity, and inclusion (DEI). They not only introduce university support programs but also provide assistance with applications. In addition to offering information about university support programs and guiding applicants, the WG are developing measures and budgets to further support these initiatives. We are also promoting the bilingualization of the institute and develop an environment where all researchers and staff can smoothly engage in research and education.

Discovering Interdisciplinary Research within the University

FRIS aims to create new research fields by discovering and supporting next-generation interdisciplinary research projects, led by young researchers of Tohoku University, that are emerging, innovative, pioneering, and rich in individuality.

To provide not only funds, equipment, and spaces, but also opportunities for active exchange with researchers in other fields, FRIS offers open research programs tailored to different stages and forms (“Creative Interdisciplinary Collaboration Program” and “Promoted Program for Interdisciplinary Research”). In addition, since international collaboration is indispensable for fostering world-leading research, initiatives to support international collaborative research have also been implemented.

Process

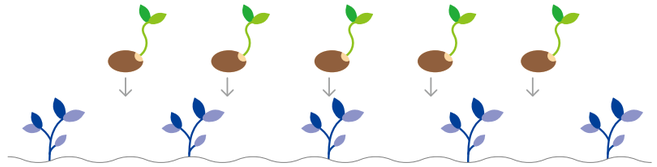
〔Diverse research seeds〕

Research Seeds → **Support Program** → **Develop and more**

Programs

Creative Interdisciplinary Collaboration Program

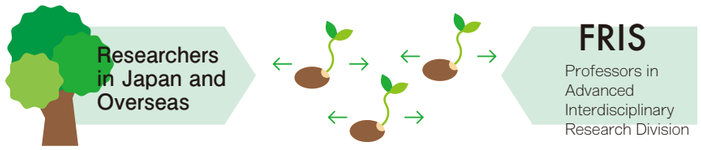
Promoting Diverse Interdisciplinary Research by Young Researchers: A program for young researchers at FRIS to advance interdisciplinary research activities. The program aims to respond to a wide range of needs, including the development of research in new fields, collaborative research with researchers in Japan and overseas (including FRIS alumni), research exchanges, academic conferences and seminars, the publication of books and papers, and fieldwork.



FRIS + Researchers in Japan and Overseas (incl. FRIS Alumni)

Promoted Program for Interdisciplinary Research

Developing Advanced Interdisciplinary Research: A three-year grant open to research groups led by faculty members of the Advanced Interdisciplinary Research Division, which supports research projects aimed at pioneering a novel interdisciplinary field with growth potential.



Support for International Collaborative Research

Based on FRIS’ s goal of “forming a network to promote international interdisciplinary scientific research,” we implement initiatives to promote international collaboration, including research funding support for faculty members engaged in international joint research, support for the organization of international conferences, and assistance for young researchers in presenting their research results abroad.

TI-FRIS
| 学際融合東北拠点 |

Endowed Research Divisions

Nanomaterials Process Data Science Endowed Research Division

This research division will conduct interdisciplinary foundational research to develop a new academic field, “materials process data science,” that integrates data science and materials process engineering. Specifically, the division will target the nanoparticle synthesis process and create a materials process database that links process data and material structure data for particle synthesis. In addition, the division will extract, through data science, the process characteristic factors that determine specific material structures and even material functions from the database. Ultimately, the division will construct “materials process informatics” to rapidly guide the design of synthesis processes for new high-performance nanomaterials and contribute to the creation of new industries. (Duration: Jan. 2024 – Dec. 2026)

Interdisciplinary Platform for Advanced Health Sensing

This division brings together researchers from six different fields: protein science, physical organic chemistry, bio-measurement, mass spectrometry, structural biology, and cosmetic science. The division aims to conduct interdisciplinary research that contributes to the development of cosmetics and quasi-drugs. By integrating knowledge from each field, the division expects to develop advanced measurement techniques for biological systems and gain new insights. Specifically, the research will encompass areas such as proteomics and drug molecular design, contributing to advances in the medical and drug discovery fields, with the goal of exploring new approaches that go beyond traditional cosmetic research. (Duration: Nov. 2024 – Oct. 2026)

Schematic diagram of Materials Science DX

Tohoku Initiative for Fostering Global Researchers for Interdisciplinary Sciences [TI-FRIS]

TI-FRIS is a program that aims to establish and demonstrate the effectiveness of a new researcher development program covering the entire Tohoku region to foster world-class researchers with interdisciplinarity, internationality, and sociability. Launched in 2020 in the "Strategic Professional Development Program for Young Researchers" of the Ministry of Education, Culture, Sports, Science and Technology, and led by Tohoku University, the Initiative has formed a consortium with Hirosaki University, Iwate University, Akita University, Yamagata University, Fukushima University, and Miyagi University of Education. In partnership with cooperating research institutions and companies in Japan and abroad, TI-FRIS Fellows, who are young researchers selected from participating universities, are actively participating in the program.

Maintaining a Bold, Innovative Attitude and Being Passionate about Research in a Freely Discretionary Independent Environment

● Could you tell us about your current research?

I am studying the chemistry of proteins. The chemical modification of proteins through chemical reactions holds great potential for various applications. For instance, it allows us to observe the behavior of proteins in living organisms, understand the state of proteins, and provide antibodies with desired artificial functions. As a foundational technology leading to these applications, my main research focus is developing chemical modification reactions for proteins.

● What can be expected if your research results are applied in society?

Chemical modification of proteins has a wide range of applications. One example that has been socially implemented is the development of antibody-drug conjugates for cancer therapy, in which it helps attach toxins to antibodies. This technology uses antibodies' high selectivity to deliver toxins specifically to cancer cells, and the chemical modification of proteins is essential for this development. Additionally, protein chemical modifications are necessary for imaging to check whether a patient has a disease-causing protein when diseases are diagnosed or for coating functional proteins onto various materials. In my research, I aim to solve problems that cannot be solved through biological methods alone by using chemistry to combine the strengths of chemistry and biology in this interdisciplinary field.

● Could you tell us why you chose FRIS?

Il didn't know about the system or even the existence of FRIS. In fact, I found out about it while researching employment opportunities under the excellent researcher framework at Tohoku University.

My research involves building foundational technologies, but because my goal is to develop and construct versatile technologies that can be applied to various types of research, it's necessary to prove that these foundational technologies are indeed applicable to a wide range of research. When one tries to apply them to various types of applied research, it's challenging to do it alone, so collaborative research with many researchers becomes important. To conduct joint research at my discretion, I needed to become a PI (principal investigator), and FRIS offered a structure that allowed for this, which was very appealing.

● Do you have a message for researchers aspiring to join FRIS?

In my previous position as an assistant professor in a laboratory system, I was allowed to conduct highly independent research. However, as a researcher, there's a natural desire to develop research at your discretion. I applied to FRIS at that stage of my career. At FRIS, the discretionary power over research is undeniable, and if there are research funds, you can freely employ postdoctoral fellows, technicians, and students. Although it's challenging to become independent at a young age, you will find colleagues who share the same aspirations, even if they are from different fields, and building such relationships will undoubtedly become a valuable asset for your future research career. It is highly recommended for young researchers with a powerful sense of challenge.

As of 2024, I was promoted to Associate Professor, and in 2025, I also secured tenure within the framework of the University for International Research Excellence. I'm determined to create my signature research in this environment. Even though the FRIS researchers are referred to as "young," they are in various stages of their careers. For senior-level researchers like me, I can also highly recommend FRIS as a great environment for nurturing and

SATO Shinichi
Associate Professor
(PI for International Excellence)

Research Area／Life and Environments

Research Fields／Synthetic Organic Chemistry, Chemical Biology

Main Research Topics／Chemical Modification of Proteins, Chemical Proteomics

Others
Outreach Activities, etc.

Outreach Activities, etc.

■ TI-FRIS/FRIS Symposium

The symposium is held jointly with TI-FRIS at the end of each fiscal year as an opportunity for interdisciplinary research exchange, and faculty members and principal investigators from research support programs of FRIS and TI-FRIS Fellows present their research results.

■ Katahira Festival

FRIS participates in the Katahira Festival, a biennial public event jointly organized by Tohoku University's research institutes and centers to present research activities and share the wonders of science. Researchers at FRIS use materials related to their own research to present experiential exhibits, such as energy conversion demonstrations or space travel experience tours, as well as to share video messages from the researchers.

■ Open Campus

FRIS participates in the Tohoku University Open Campus, introducing its research activities while also providing opportunities for visitors to interact with undergraduate students active in FRIS URO and to experience hands-on research activities.

■ Lectures, etc.

FRIS members have individually organized a number of public events related to their research. These have included lectures by researchers as well as writers, artists, astronauts, and other celebrities, and hands-on research events for high school students.

TI-FRIS/FRIS Symposium

Katahira Festival

Managing and Planning Division

Support and Dissemination of Interdisciplinary Research Activities

To strengthen its research capabilities and further enhance its impact, FRIS promotes increasingly active cross-disciplinary research activities from the researchers' perspective, with Research Administrators (URAs) who have solid research backgrounds playing a central role. In particular, FRIS aims to contribute to the creation of new wisdom and value in FRIS by flexibly promoting the analysis and evaluation of research capabilities, the identification of challenges, the maintenance of a strong and multifaceted research support system, career planning for young researchers, the planning and management of events such as seminars, and publicizing research through press releases.

◀ Specially Appointed Associate Professor FUJIWARA Hideaki

◀ Specially Appointed Associate Professor UENO Hiroshi

PIs for International Excellence

Life and Environments

Associate Professor
SATO Shinichi

Research Fields Synthetic Organic Chemistry, Chemical Biology

Device and Technology

Associate Professor
GUO Yuanyuan

Research Fields Bioelectronics, glia-neuron interaction

Advanced Basic Science

Associate Professor
OKUMURA Masaki

Research Fields Structural biology, Protein Science, Biochemistry

Assistant Professor
CHIBA Kyoko

Research Fields Biochemistry

Assistant Professor
IKEUCHI Ken

Research Fields Structural Analysis of translation control mechanism through ribosome binding factors, Research on the function of mRNA binding and delivery proteins, Visualization of RNA/protein modification processes inside cells

Assistant Professor
KUGA Nahoko

Research Fields Neurophysiology

Assistant Professor
MATSUBAYASHI Hideaki

Research Fields Synthetic Biology, Cell Biology, Biophysics

Profiles of young researchers
Materials and Energy

Associate Professor
SAITO Yuji

Research Fields Micro-diffusion flame, Space propulsion, Metal/water combustion, Data-driven sparse sensing

Assistant Professor
NGUYEN Tuan Hung

Research Fields Fundamental theory and simulation of materials intelligence for energy applications

Assistant Professor
SHIMOKAWA Kohei

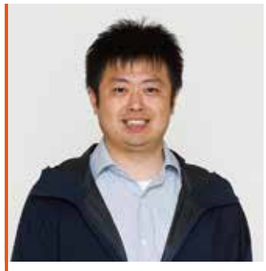
Research Fields Energy materials, Electrochemistry

Assistant Professor
WELLING Thomas Arnoldus Josephus

Research Fields Nanomaterials Science, Physical Chemistry, Colloidal self-assembly

Assistant Professor
XU Sheng

Research Fields Metallurgy,Microstructure, Development of ultra-elastic and super-elastic alloys, Elastic strain engineering



Assistant Professor
YU Wei

Research Fields Materials Science and Engineering

Assistant Professor
ZHANG Linda

Research Fields Materials Science and Engineering

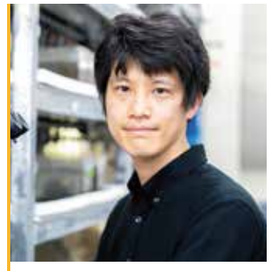
Profiles of young researchers
Life and Environments

Associate Professor
ICHINOSE Toshiharu

Research Fields Behavioral genetics, Memory consolidation, Dopamine modulation

Associate Professor
KUDO Yuta

Research Fields Natural product chemistry, Organic chemistry, Biochemistry



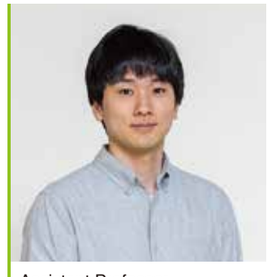
Assistant Professor
BESSHO Manabu

Research Fields Elucidating the mechanism of kleptoprotein uptake, Elucidatiing of the evolutionary origin of bioluminescence, Elucidating of the spatio-temporal control of bioluminescence

Profiles of young researchers
Information and Systems

Assistant Professor
FUJIKI Yuka

Research Fields Complex systems, Network science



Assistant Professor
HASHIDA Hiroaki

Research Fields Design of Radio Propagation Environment in Architectural and Urban Environments, Intelligent Reflecting Surface-aided Wireless Communications

Assistant Professor
LE Bin Ho

Research Fields Quantum foundation, Quantum measurements, Quantum computing

Assistant Professor
SUN Sai

Research Fields Cognitive and Social Neuroscience, Psychephysics, Neuroeconomics

Assistant Professor
YASUI Kotaro

Research Fields Bioinspired robotics

Profiles of young researchers
Device and Technology

Associate Professor
ABE Hiroya

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

Associate Professor
YAMANE Yuta

Research Fields Condensed Matter Physics and Spintronics

Assistant Professor
CHENG Guanghui

Research Fields Two-dimensional magnetism, spintronic devices, superconductivity

Assistant Professor
HIRAMOTO Kaoru

Research Fields Analytical electrochemistry

Assistant Professor
SUD Aakanksha

Research Fields Magnetism and condensed matter Physics, Engineering device and technology, Electronics

Assistant Professor
TANG Chao

Research Fields Terahertz optics, 2D materials and devices

Assistant Professor
KITAJIMA Naoya

Research Fields Physics of the early universe, Particle physics beyond the standard model

Assistant Professor
MARAHLEH Aseel Mahmoud Suleiman

Research Fields Osteoimmunology, Molecular and cell biology

Assistant Professor
PASTOR-GALAN Daniel

Research Fields Geology
(Cross appointment: CSIC)

Assistant Professor
SUZUKI Hakuto

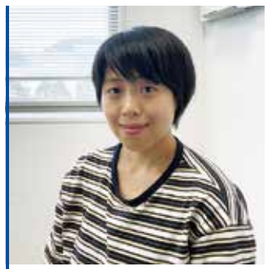
Research Fields Unconventional Superconductivity, Quantum Magnetism, Resonant Inelastic X-ray Scattering

Profiles
of young researchers

Human and Society

Associate Professor
WENG Yueh Hsuan

Research Fields AI and Law, Legal informatics, Social robotics, Robot ethics
(Cross appointment: Kyushu University)



Assistant Professor
HAMAMOTO Yumi

Research Fields Mechanisms underlying body-image disturbance, Establishment of interventions to reduce body-image disturbance

Assistant Professor
HATANO Yuka

Research Fields Anthropology, Dentistry, Forensic medicine, Three-dimensional analysis

Assistant Professor
TAHARA Atsushi

Research Fields
Organometallic/Organic Chemistry, Computational study

Assistant Professor
TATEISHI Tomoki

Research Fields Supramolecular chemistry, Organic chemistry, Materials science

Assistant Professor
YAMADA Satoshi

Research Fields Multiwavelength Astronomy

Assistant Professor
MATSUDAIRA Izumi

Research Fields Neuroscience, Developmental psychology, Biological

Assistant Professor
NAKAYASU Yuta

Research Fields Materials processing engineering, Eco-friendly lifestyle creation

Profiles
of young researchers

Advanced Basic Science

Associate Professor
KIMURA Shigeo

Research Fields Astrophysics, Astroparticle physics

Assistant Professor
FUJIBAYASHI Sho

Research Fields High-energy astrophysical phenomena, Origin of elements in the Universe, Multi-messenger astrophysics

Assistant Professor
KANEMURA Shingo

Research Fields Elucidation of the biological defense system mediated by extracellular redox, Elucidation of redox regulation mechanism

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Phone: 022-795-5755

Fax: 022-795-5756

Website: https://www.fris.tohoku.ac.jp/en/

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