

2024

Devices and Technology

Advanced Basic Science

Information and Systems

RESEARCH INSTITUTE FOR

Life and Environments

INTERDISCIPLINARY

Materials and Energy

SCIENCES

Humans and Society

Frontier Research Institute for Interdisciplinary Sciences Tohoku University



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, and the Creative Interdisciplinary Research Division. The Managing and Planning Division and the Advanced Interdisciplinary Research Division are staffed with five professors, two associate professors, and two university research administrators (a specially appointed associate professor and a specially appointed lecturer), while the Creative Interdisciplinary Research Division is staffed with young researchers holding tenure-track positions (forty assistant professors, seven associate professors as of June 1, 2024). 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."

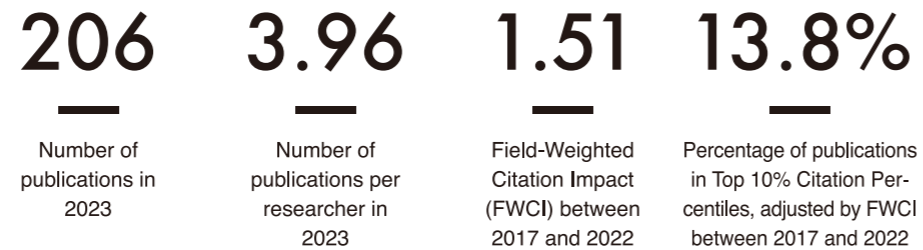
What We Do

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 facilitate 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



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 our young researchers to be active around the world

and strengthening the FRIS alumni network by promoting further exchange among researchers from different disciplines in the Tohoku Initiative for Fostering Global Researchers for Interdisciplinary Sciences (TI-FRIS) program.

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 Toshiyuki Hayase
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.



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.

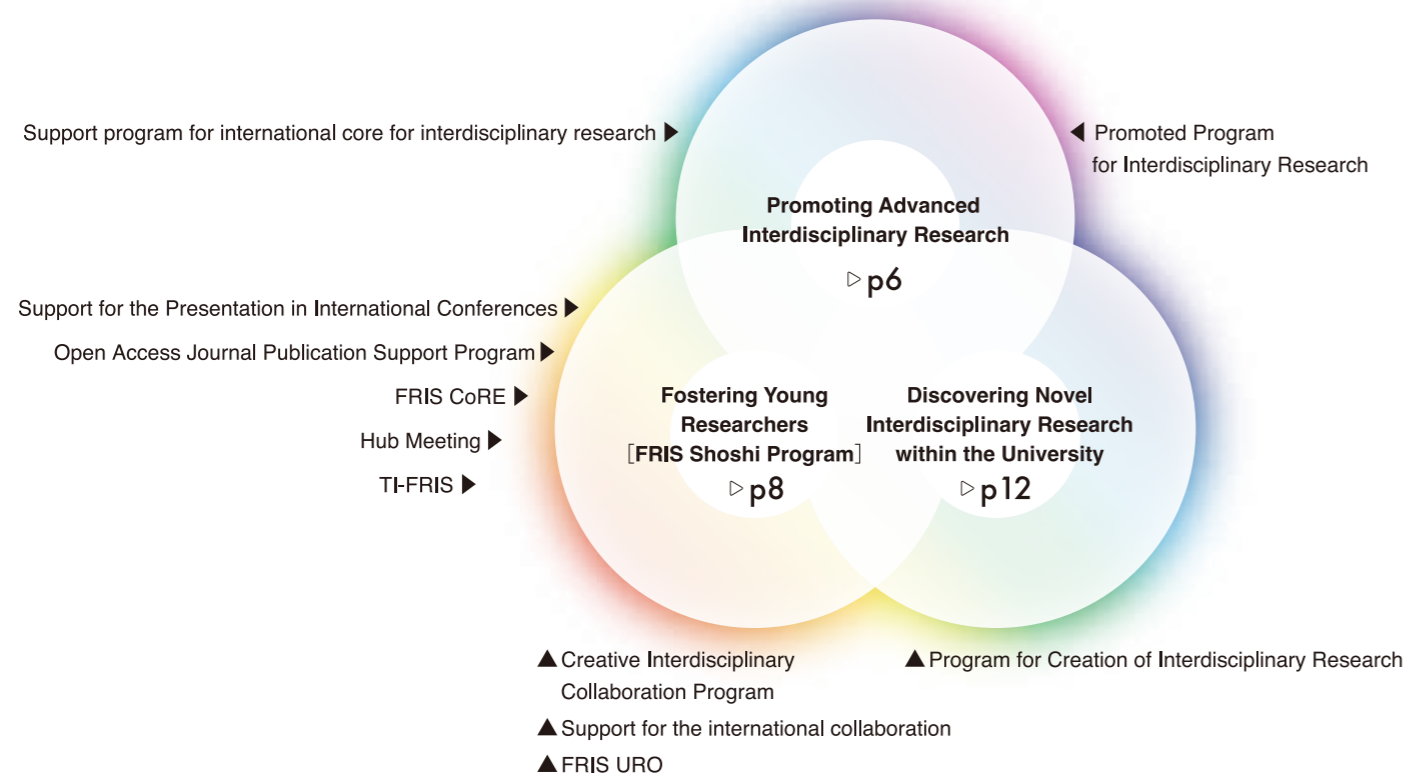
Fostering Young Researchers [FRIS Shoshi Program]

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.

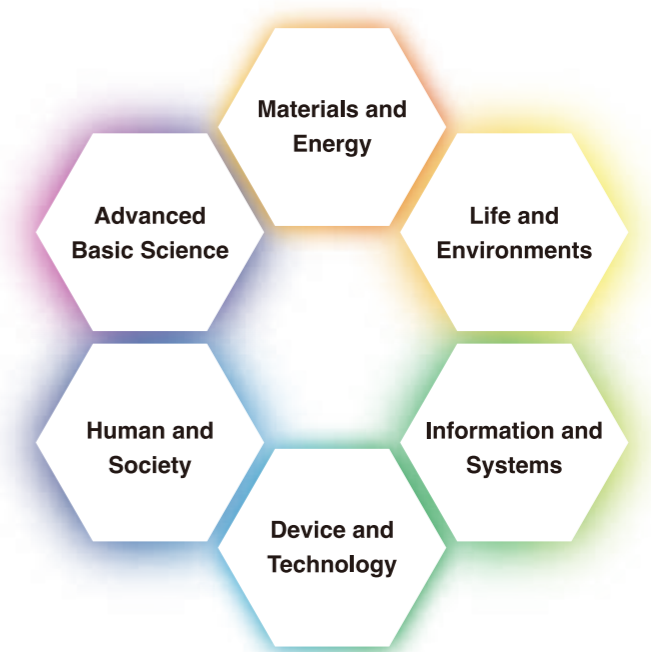


Six Research Areas

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

- **Materials and Energy**
- **Life and Environments**
- **Information and Systems**
- **Device and Technology**
- **Human and Society**
- **Advanced Basic Science**

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.



Divisions

Two Research Divisions, the Managing and Planning Division and the Endowed Research Divisions

FRIS consists of the Advanced Interdisciplinary Research Division, in which full-time faculty members are assigned to each field of study; the Creative Interdisciplinary Research Division, in which young researchers conduct advanced research across disciplines; and the Managing and Planning Division, which supports the research divisions' activities.

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.

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
Hiroshi Masumoto
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 electro-chemical 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
Takashi Itoh
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

Professor
Kenji Toma
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
Takehito Shimatsu
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
Takaaki Tomai
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
Shinsuke Niwa
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
Junji Saida
Advanced Basic Science

RESEARCH TOPICS

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

Performance of FRIS [Senior Researchers]

28

Number of publications in 2023

4

Number of publications per researcher in 2023

2.31

Field-Weighted Citation Impact (FWCI) between 2017 and 2022

13.1%

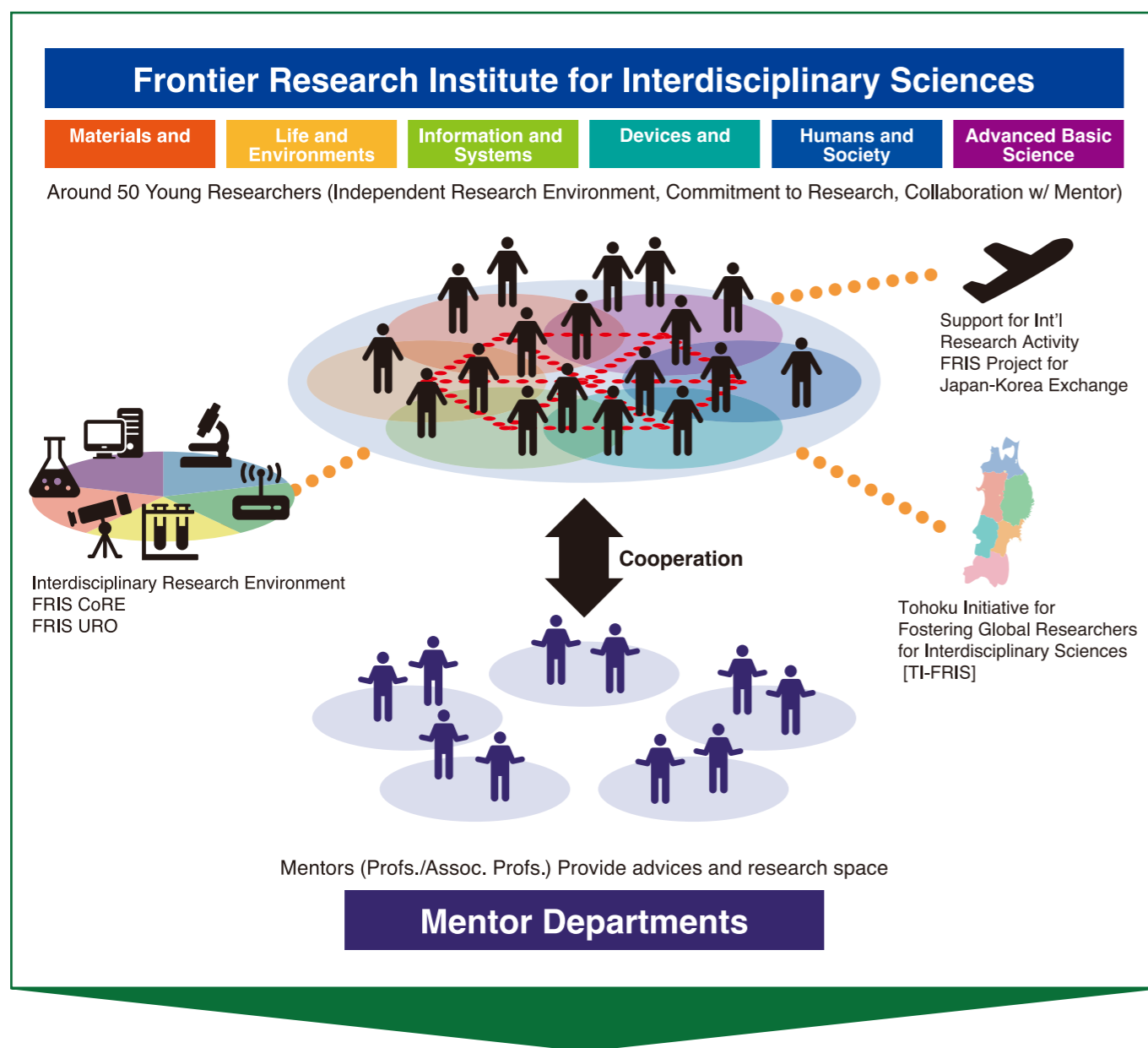
Percentage of publications in Top 10% Citation Percentiles, adjusted by FWCI between 2017 and 2022

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.

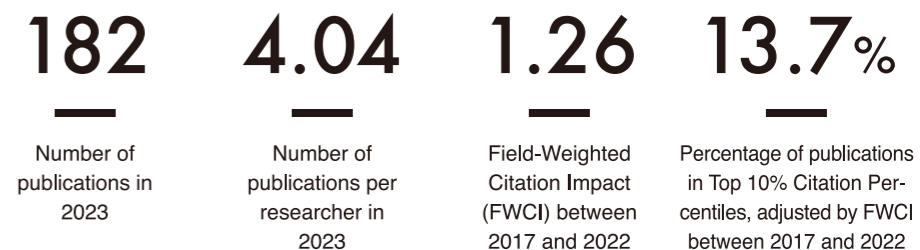
Promotion of world-leading interdisciplinary research and pioneering new academic fields by young researchers in all research areas



World-leading Interdisciplinary Research and Pioneering New Academic Fields

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

Performance of FRIS [Young Researchers]



International Recruitment / Recruiting Fixed-Term Assistant Professors from All Research Areas

Recruiting ambitious young researchers who proactively promote international interdisciplinary scientific research and aim to pioneer new academic fields.

Every year, FRIS recruits about seven young researchers from all research areas as assistant professors in the Creative Interdisciplinary Research Division, with a term of five years. These researchers proactively promote international interdisciplinary scientific research as principal investigators (PIs) and actively collaborate with domestic and international researchers and research institutions to pioneer new academic fields.

Independent Research Environment / Promoting World-Class Research

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

- Basic Research Funds**
FRIS provides a total of 11 million yen over 5 years. Flexible execution is possible through carryovers.
- Support Program for International Collaboration / Support Program for Presentation in International Conferences**
FRIS supports expenses for overseas travel for presentations at international conferences and collaborative research.
- Open Access Journal Publication Support Program**
FRIS supports publication costs when young researchers publish their excellent results in high-impact open access journals.
- Frontier Research Institute for Interdisciplinary Sciences 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 URO**

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 in their career path.
- Support regarding 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 projects 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. FRIS also plans and practices interdisciplinary exchanges with graduate students (→ p.10). Furthermore, FRIS implements the consortium project with universities in the Tohoku region, TI-FRIS (→ p.13), and the Creative Interdisciplinary Collaboration Program for young researchers at FRIS to promote interdisciplinary research activities (→ p.13).

Tenure Track System at FRIS

Supporting faculty's career advancement to focus on research and aim for higher positions both inside and outside the university.

The tenure track system at FRIS allows researchers to focus on research and aim to acquire higher posts both inside and outside the university after the tenure track period.

- Tenure Review / Promotion Review for Fixed-Term Associate Professor**
Tenure-track faculty undergo a tenure review between the third and fifth year of their employment. Those who pass become tenured assistant professors. Following that, those who pass the specific promotion review may become fixed-term associate professors if they so desire. If one fails the tenure review, they will be employed for up to an additional two years as a fixed-term assistant professor after a separate review.
- Liaison with Mentor Department, etc.**
To help young researchers at FRIS acquire even higher positions inside and outside the university, our tenure-track system provides support to acquire higher posts within the university with the cooperation of the entire university.

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 of on-site 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



■ 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 a collaborative research setting known as the FRIS Cooperative Research Environment (FRIS CoRE).

The FRIS CoRE significantly boosts the startup phase for young researchers by providing access to diverse basic research facilities in multiple fields under one roof. This setup promotes daily interactions among researchers from various disciplines, facilitating the emergence of transdisciplinary research themes.

In 2021, FRIS CoRE initiated the "Fund for Supporting Young Interdisciplinary Researchers" to enhance public understanding and support. Additionally, both the Fund and the FRIS CoRE website have been established and updated to improve the dissemination of information.

■ 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."



■ 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. In the future, we will enhance the information regarding procedures and available support on our website, aiming to create an environment where all researchers and staff can effectively engage in research and education.

■ Initiatives to Promote Bilingualization

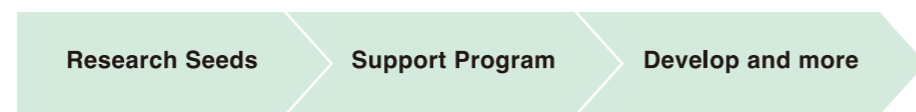
In line with the fundamental commitment to promoting Diversity, Equity, and Inclusion (DEI), FRIS is dedicated to fostering a bilingual environment to support the numerous foreign researchers among Early Career Researchers (ECRs) in the Creative Interdisciplinary Research Division. To achieve this goal, we established a working group in FY2023. All administrative communications directed at ECRs are now available in both English and Japanese. Additionally, English versions of materials for faculty meetings and other essential agenda items have been provided. In FY2023, we also implemented our translation system, which quickly translates Japanese audio into English and displays it on a PC. Looking ahead, we plan to refine our simultaneous translation system, enhance operational efficiency, provide technical support, and broaden the system's applications for faculty meetings and administrative tasks. Moreover, we strive to enhance the skills of our support staff, addressing the challenges that our international colleagues may encounter while performing administrative tasks and dealing various applications.

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 three open research programs at different stages ("Creative Interdisciplinary Collaboration Program," "Program for Creation of Interdisciplinary Research," and "Promoted Program for Interdisciplinary Research"). In addition, since international collaboration is indispensable for fostering world-leading research, the Support Program for International Core for Interdisciplinary Research has been implemented to support international collaborative research.

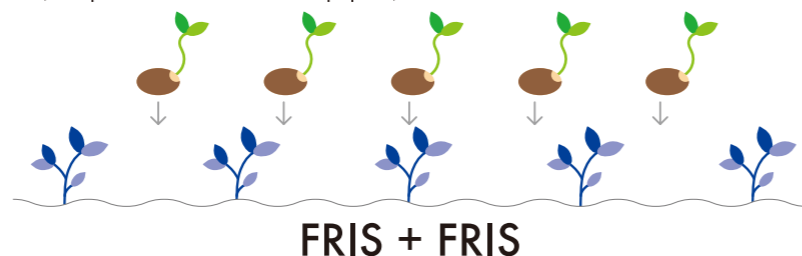
Process



Programs

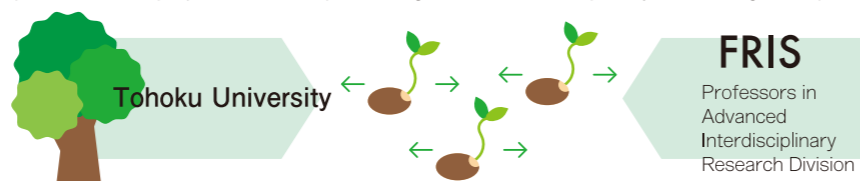
Creative Interdisciplinary Collaboration Program

Promoting Diverse Interdisciplinary Research by Young Researchers: A grant to promote interdisciplinary research activities by young researchers at FRIS. The program aims to respond to a variety of needs, such as research development in new fields, collaborative research with other institutions both in Japan and overseas, research exchanges, academic conferences and seminars, the publication of books and papers, and fieldwork.



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 Program for International Core for Interdisciplinary Research

Forming International Hubs of Interdisciplinary Research: A program to support interdisciplinary research conducted with overseas partners that opens new frontiers of science based on FRIS's goal of "forming a network to promote international interdisciplinary scientific research." This program supports the implementation of interactive interdisciplinary joint research with overseas research institutions, thereby creating a future international research center. The principal investigator is a faculty member of the Advanced Interdisciplinary Research Division.



TI-FRIS

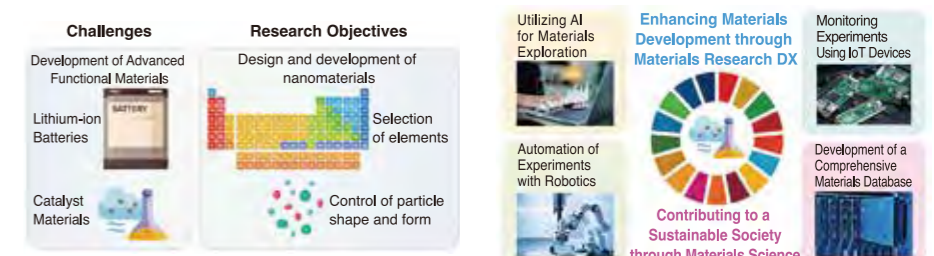
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Endowed Research Division: Nanomaterials Process Data Science Lab

This lab is dedicated to building a data science infrastructure for designing nanomaterials with specific desired functions.

Functional inorganic nanoparticles are crucial materials that play a key role in developing a carbon-neutral society. The functionality of a material is influenced not only by its primary structure but also by its higher-order structure. Therefore, controlling particle size and morphology is essential. For instance, in lithium-ion batteries and catalyst materials, research has shown that selecting elements and managing particle size significantly affect performance. Consequently, our lab aims to establish process informatics to control the hierarchical structure of inorganic nanomaterials by combining data science with materials process engineering. Additionally, we strive to create an interdisciplinary academic framework that facilitates the automation of materials synthesis and the construction of databases. This approach will allow us to extract process parameters from the database and quickly guide the design of efficient materials synthesis processes.

Building on the knowledge gained from the supercritical nanoparticle synthesis method, we aim to create a high-speed synthesis process for new materials. This will include the fundamental design of the synthesis equipment needed to implement the new process and expertise in gathering and utilizing experimental process data. Additionally, we plan to develop synthesis process management and automatic optimization technologies that leverage IoT devices and machine learning.



Challenges and Research Objectives

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.



I want to further advance cutting-edge nanoparticle research and eventually help solve energy issues.

● Could you tell us more about the research you are currently conducting?

I am working on organizing nanoparticles to manipulate the path of light and create structures that support catalytic reactions. Nanoparticles are extremely tiny particles, thousands of times smaller than a strand of hair, and they have a variety of unique properties. When materials are reduced to the nanoscale, they acquire special properties that they don't have at their normal size. First, because their size is close to the wavelength of light, their interaction with light changes. Additionally, as they become smaller, they get a larger surface area. This makes them excellent catalysts, allowing them to facilitate chemical reactions.

By creating specific structures, we can unlock properties that single nanoparticles do not have. Even now, we are seeing new properties emerge, such as the manipulation of light, through structural organization.

● Could you tell us what led to your current research theme?

I have always been fascinated by light. In both my bachelor's and master's projects, I focused on two different cases of manipulating light using nanoparticles. During my doctoral studies, I researched the interactions between

nanoparticles and how they can self-assemble into beautiful structures when these interactions are properly designed. As a postdoctoral researcher, I advanced my research on the catalytic effects of nanoparticles and how they can improve efficiency in the chemical industry. Currently, I am combining everything I have learned to break new ground in this research field.

● You joined FRIS in 2023. Could you tell us why you chose FRIS?

I learned about FRIS when a professor from Tohoku University who was in the same research group I was in the Netherlands recommended it. Actually, my wife is Japanese, and she also works in research. After meeting in the Netherlands, we had to live apart for some time due to our respective research situations. Just as I was thinking we'd like to live together in Japan next, I learned about FRIS. Among various positions I considered, I chose FRIS because it allows me to become an independent researcher.

The most significant feature of FRIS is its innovative solutions combining fresh perspectives and interdisciplinarity. This is probably why FRIS is a big part of Tohoku University's plan, which has been selected as a University for International Research Excellence. I hope that FRIS will continue to grow as a pioneer meeting

new challenges in Japan's research community.

● Do you have any role models or a vision for your future as a researcher?

As a physicist, although his work is not directly related to my research, I am inspired by Dr. Stephen Hawking (British theoretical physicist who passed away in 2018). Despite facing numerous difficulties, his unwavering pursuit of knowledge and his accomplishments are truly remarkable.

As a researcher, I want to be involved in energy research. Developing independent energy solutions that don't rely on other countries is a crucial issue, and these solutions should be clean and sustainable. I believe this is a critical issue for Japan (and the Netherlands), and because the transition from conventional energy to new energy sources needs to be swift, I hope to eventually progress into such research.



Tom Welling
Assistant Professor

Research Area / Materials and Energy
Research Fields / Materials & Energy, Nanomaterials Science

Main Research Topics / Colloidal self-assembly for optical and energy materials

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 Matsuri 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 research to create experiential exhibits covering themes such as pottery excavation, stereoscopic space travel, life science observations, or energy conversion, in addition to presenting a video message from researchers.

■ 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.

■ Book Publication

FRIS has published two volumes of Hyakkaryoran: Young Researchers' Interdisciplinary Frontiers (Tohoku University Press), omnibus collections of writing expressing the significance and joy of interdisciplinary exchange by young researchers at FRIS together with doctoral research and education graduate students from DIARE. In addition, young researchers at FRIS have also published books covering a range of disciplines.



TI-FRIS/FRIS Symposium



Katahira Matsuri Festival

Managing and Planning Division

Support and Dissemination of Interdisciplinary Research Activities

To strengthen its research capabilities and further increase its impact, FRIS promotes increasingly active cross-disciplinary research activities from the perspective of researchers, with Research Administrators (URAs) 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
Hideaki Fujiwara



◀ Specially Appointed Lecturer
Yohei Koyama



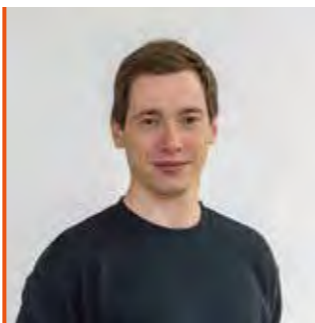
Profiles of young researchers
Materials and Energy



Assistant Professor
Tuan Hung Nguyen
Research Fields Fundamental theory and simulation of materials intelligence for energy applications



Assistant Professor
Hiroshi Ueno
Research Fields Physical organic chemistry, Nanomaterials science



Assistant Professor
Tom Welling
Research Fields Nanomaterials Science, Physical Chemistry, Colloidal self-assembly

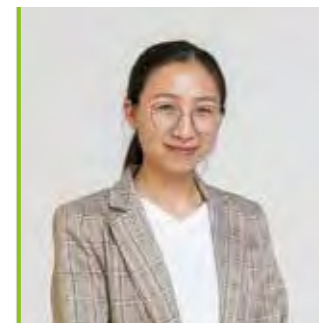


Assistant Professor
Hideaki T. Matsubayashi
Research Fields Synthetic Biology, Cell Biology, Biophysics



Assistant Professor
Fumi Murakoshi
Research Fields Parasitology and Virology

Profiles of young researchers
Information and Systems



Assistant Professor
Sai Sun
Research Fields Cognitive and Social Neuroscience, Psychephysics, Neuroeconomics



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



Assistant Professor
Kohei Shimokawa
Research Fields Energy materials, Electrochemistry



Assistant Professor
Linda Zhang
Research Fields Materials science and engineering



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



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



Assistant Professor
Yuka Fujiki
Research Fields Complex systems, Network science



Assistant Professor
Bin Ho Le
Research Fields Quantum foundation, Quantum measurements, Quantum computing



Assistant Professor
Kotaro Yasui
Research Fields Bioinspired robotics

Profiles of young researchers
Life and Environments



Associate Professor
Toshiharu Ichinose
Research Fields Behavioral genetics, Memory consolidation, Dopamine modulation



Associate Professor
Yuta Kudo
Research Fields Natural product chemistry, Organic chemistry, Biochemistry



Associate Professor
Shinichi Sato
Research Fields Synthetic Organic Chemistry, Chemical Biology

Profiles of young researchers
Device and Technology



Associate Professor
Hiroya Abe
Research Fields Biosensor, Energy catalysts, Polymer chemistry, Biomaterials, Bioinspired materials



Associate Professor
Yuanyuan Guo
Research Fields Bioelectronics, glia-neuron interaction



Assistant Professor
Aakanksha Sud
Research Fields Magnetism and condensed matter Physics, Engineering device and technology, Electronics



Assistant Professor
Ken Ikeuchi
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
Hiroyuki Uechi
Research Fields Cell Biology, Developmental Biology, Condensate Biology



Assistant Professor
Kyoko Chiba
Research Fields Biochemistry



Assistant Professor
Manabu Bessho-Uehara
Research Fields Elucidating the mechanism of kleptoprotein uptake, Elucidating of the evolutionary origin of bioluminescence, Elucidating of the spatio-temporal control of bioluminescence



Assistant Professor
Takuro Ishii
Research Fields Medical ultrasound imaging, Biofluid dynamics, Computer-aided diagnostics, Urology



Assistant Professor
Chao Tang
Research Fields Terahertz optics, 2D materials and devices



Assistant Professor
Takahiro Chiba
Research Fields Spintronics, Topological Materials, Thermoelectrics



Assistant Professor
Kaoru Hiramoto
Research Fields Analytical electrochemistry



Profiles of young researchers
Human and Society >

Assistant Professor
Yuta Yamane
Research Fields Condensed Matter Physics and Spintronics



Associate Professor
Yueh Hsuan Weng
Research Fields AI and Law, Legal informatics, Social robotics, Robot ethics (Cross appointments: Kyushu University)



Assistant Professor
Kexin Xiong
Research Fields Psycholinguistics, Neurolinguistics, Second Language Acquisition



Assistant Professor
Hakuto Suzuki
Research Fields Unconventional Superconductivity, Quantum Magnetism, Resonant Inelastic X-ray Scattering



Assistant Professor
Aseel Mahmoud Suleiman Marahleh
Research Fields Osteoimmunology, Molecular and cell biology



Assistant Professor
Atsushi Tahara
Research Fields Organometallic/Organic Chemistry, Computational study



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



Assistant Professor
Sakura Kiuchi
Research Fields Preventive dentistry, Public health



Assistant Professor
Yuta Nakayasu
Research Fields Materials processing engineering, Eco-friendly lifestyle creation



Assistant Professor
Yuka Hatano
Research Fields Anthropology, Dentistry, Forensic medicine, Three-dimensional analysis



Assistant Professor
Yumi Hamamoto
Research Fields Mechanisms underlying body-image disturbance, Establishment of interventions to reduce body-image disturbance



Assistant Professor
Masaki Yamada
Research Fields Particle physics, Cosmology

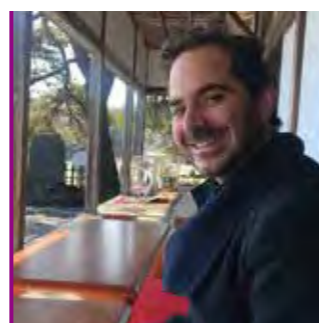


Profiles of young researchers
Advanced Basic Science >

Assistant Professor
Izumi Matsudaira
Research Fields Neuroscience, Developmental psychology, Biological



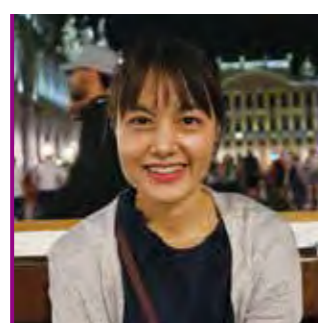
Associate Professor
Masaki Okumura
Research Fields Structural biology, Protein Science, Biochemistry



Assistant Professor
Daniel Pastor-Galan
Research Fields Geology (Cross appointments: Spanish National Research Council)



Assistant Professor
Shingo Kanemura
Research Fields Elucidation of the biological defense system mediated by extracellular redox, Elucidation of redox regulation mechanism



Assistant Professor
Yui Kawashima
Research Fields Theoretical modeling of the atmospheres of exoplanets and brown dwarfs, Observation of the atmospheres of exoplanets and brown dwarfs



Assistant Professor
Naoya Kitajima
Research Fields Physics of the early universe, Particle physics beyond the standard model



Assistant Professor
Shigeo S. Kimura
Research Fields Astrophysics, Astroparticle physics

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Taxi / 15 minutes from Sendai Station. About 2,000 yen.

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