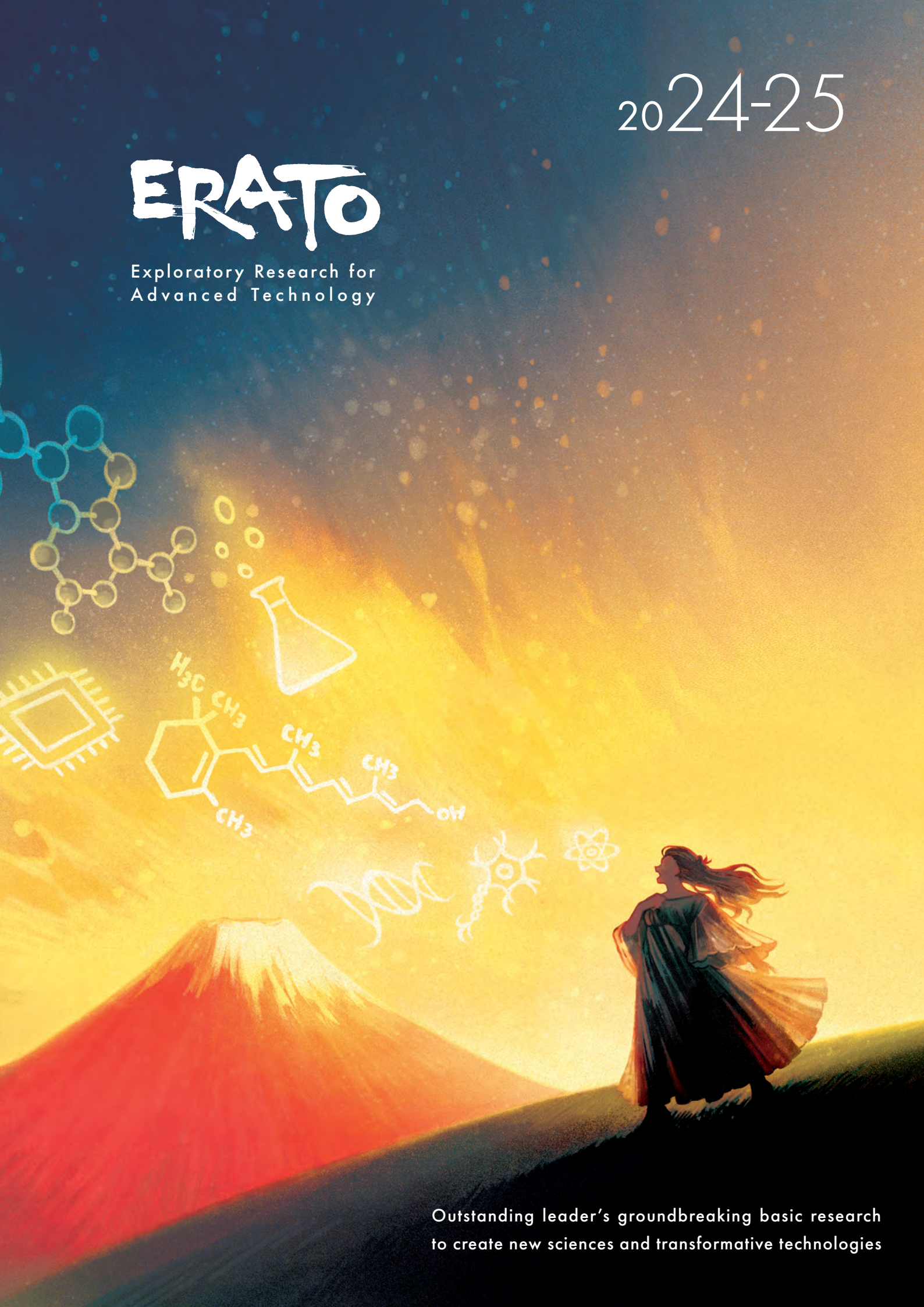
2024-25

ERATO

Exploratory Research for
Advanced Technology



Outstanding leader's groundbreaking basic research
to create new sciences and transformative technologies

ERATO

Contents

History of ERATO

ERATO is a historic research funding program which has been developing new science and technology trends through its unique research promotion system. In the 1970s, Japan experienced significant economic development but basic research within Japan was understrength to create original intellectual properties to develop new industries. Against this backdrop, ERATO was established in 1981 to pioneer innovative basic research. ERATO focuses on "people," respecting the originality and leadership of Principal Investigators (Research Directors), and builds a desirable environment for researchers. ERATO demonstrated a brand-new method of research promotion and eventually influenced other funding organizations. To date, a total of 152 ERATO projects have contributed to the development of researchers who are leaders in their academic fields, as well as to excellent research achievements.

ERATO

Development of ERATO

ERATO established

Exploratory Research for Advanced Technology (ERATO) is set up under JRDC, the predecessor of JST. The abbreviation "ERATO," which is also the name of the Greek Goddess of romantic poetry, has since become widely known.

ERATO reorganization

Strategic Basic Research Programs is created to respond to the demands of a new era, and ERATO is reorganized to play a role in it.

ERATO's current status

ERATO has carried out as many as 152 projects contributing to the development of science and technology. Former ERATO researchers are still pursuing and deepening their themes via basic research basic research or developing new technologies to the stage of application.

1957 1961 1981 1996 2002 2003 2015 2024

History of JST

1957 Japan Information Center of Science and Technology (JICST) is established.

1961 Research Development Corporation of Japan (JRDC) is established.

1996 JICST and JRDC are merged to create the Japan Science and Technology Agency (JST).

2003 JST is reorganized to become an independent administrative institution.

2015 To enhance its functions, the status of JST is changed from an "independent administrative institution" to a "national research and development agency."

Japan Science and Technology Agency

What Is ERATO?

Exploratory Research for Advanced Technology (ERATO) is a research funding program of the Japan Science and Technology Agency (JST), which aims to lead science and technology-based innovations through novel, unique, and transformative basic research. In an ERATO project, the Research Director together with diverse team members devote themselves to challenging themes that drive forward new areas of science and technology. ERATO greatly values the leadership and originality of Research Directors and builds project systems with a focus on “people.”

Outline

Objective	To achieve a significant advance in science and technology through novel and unique basic research, and ultimately contribute to science and technology-based innovation that shapes the future society and economy.
Research System	Each Principal Investigator of ERATO (Research Director) establishes an original project named after him/herself. The project is implemented in collaboration between the host institute and JST for the research period.
Research Period	Approximately 5 years
Research Expenses	A maximum of 1.2 billion yen (direct cost) per project
Research Venues	Research Director sets up an exclusive research venue in his/her affiliated research institute for his/her ERATO project composed of a headquarters in charge of planning and promotion of the project and several reseach groups.

Features

Research Director designs his/her ERATO project based on own unique concepts, brings together researchers with various expertise and backgrounds, organizes around three to four research groups of different scientific fields or functions, and supervises the project to develop new fields in science and technology.

Selection of Research Directors

JST identifies prospective Research Directors through surveys and references from outside experts rather than through a public call for proposals.

Collaboration framework

The host research institute and JST build a collaboration framework to support the ERATO project.

Research venues

A research venue will be set up to accommodate human resources and facilities necessary for the ERATO project within the Research Director's research institute.

Diverse and open project team

Research Director establishes several research groups by recruiting human resources with different scientific fields from domestic and overseas research institutes and industries.

Flexible project management

ERATO projects are flexibly managed enabling revision of the research plan and budget allocation based on the progress of the project.

Stages of ERATO Project

Selection of Research Directors

- Seeking suitable candidates through surveys and public calls for nominations
- Narrowing down candidates with cooperation from outside experts (Panel Officers)
- Inviting selected candidates to submit a research proposal for review to decide new Research Directors

See our website for details:

ERATO nomination

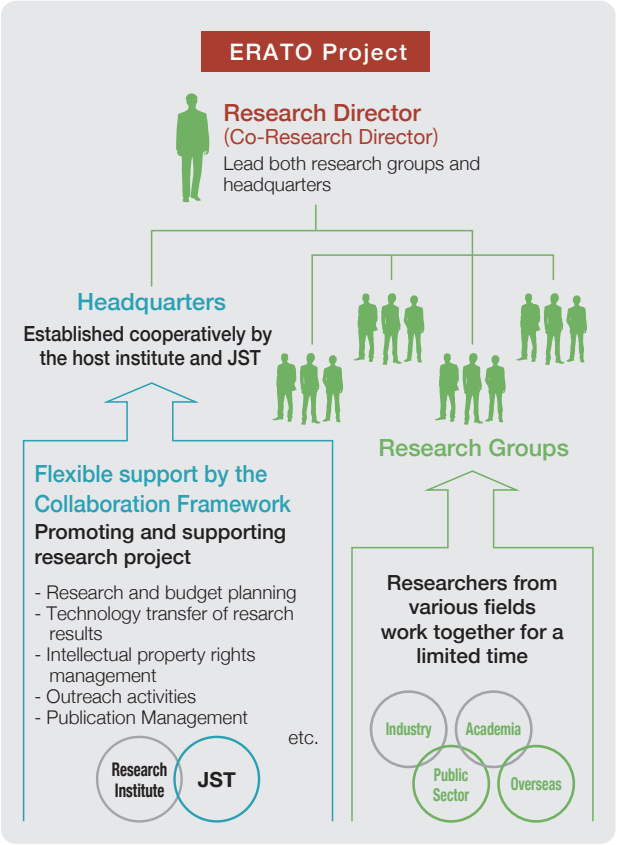
Period for preparation

- Forming research groups
- Setting up headquarters and laboratories
- Designing a project website

Research period

- Carrying out research
- Research promotion
  Headquarters will assist the Research Director regarding budget, schedule control, intellectual property management, outreach activities, etc.
- Site Visit
  Review on the project's progress and advice to the project by Panel Officer and outside experts (subcommittee).
- Mid-term evaluationn
  Mid-term evaluation will be conducted at a certain point of the project to assess the achievement of the project's objectives and review the project's status.

See page 5 for details about on-going projects.



Additional Support Period

- Additional Support Period may be granted depending on the project's progress and institution's commitment.

See page 16 for details about Additional Support Period.

Completion of project

- Final evaluation
  Final evaluation will be conducted right before or right after the end of the project.
- Transition to more extensive basic research or transfer of research results to practical applications
- Follow-up evaluation

See page 20 for details about completed projects.

On-going Projects

ERATO projects provide a rich environment where researchers with different values come together from diverse disciplines, inspire each other, create a new way of thinking, and pursue innovative science and technology.

List of Research Projects

*Affiliation and position of the Research Directors are as of November 2024.
*2016 is shortened to '16. Same for following years.
*Research fields are lined up in order of the most relevant one from the left.

Inauguration year	Project Title / Research Director / Title and Affiliation	Research Term '16–'29	Research Field	page
2024	**SAKAI Real and Abstract Gels Project** **Takamasa SAKAI** Professor, Department of Chemistry and Biotechnology, Graduate School of Engineering, The University of Tokyo	'24–'29	Chemistry・Materials, Physics, Life Sciences	6
	TAKEUCHI Super Quantum Entanglement Project **Shigeki TAKEUCHI** Professor, Graduate School of Engineering, Kyoto University	'24–'29	Physics, Informatics・Mathematics	7
	TOYOTA Plant Sensory Transduction Project **Masatsugu TOYOTA** Professor, Department of Biochemistry & Molecular Biology, Saitama University	'24–'29	Life Sciences, Physics	7
2023	**KOJIMA Market Design Project** **Fuhito KOJIMA** Professor, Department of Economics, The University of Tokyo	'23–'29	Informatics・Mathematics	8
	SAGAWA Information-to-Energy Interconversion Project **Takahiro SAGAWA** Professor, Graduate School of Engineering, The University of Tokyo	'23–'29	Physics, Informatics・Mathematics, Life Sciences	8
	SATO Organoid Design Project **Toshiro SATO** Professor, Keio University School of Medicine	'23–'29	Life Sciences, Informatics・Mathematics	9
	SEKIGUCHI Three-nucleon Forces Project **Kimiko SEKIGUCHI** Professor, School of Science, Institute of Science Tokyo	'23–'29	Physics, Informatics・Mathematics, Life Sciences	9
2022	**UCHIDA Magnetic Thermal Management Materials Project** **Ken-ichi UCHIDA** Distinguished Group Leader, Research Center for Magnetic and Spintronic Materials, National Institute for Materials Science / Professor, Department of Advanced Materials Science, Graduate school of Frontier Science, The University of Tokyo	'22–'27	Physics, Chemistry・Materials	10
	SHIBATA Ultra-atomic Resolution Electron Microscopy Project **Naoya SHIBATA** Professor, Institute of Engineering Innovation, School of Engineering, The University of Tokyo	'22–'27	Physics, Chemistry・Materials, Life Sciences	10
2021	**ARITA Lipidome Atlas Project** **Makoto ARITA** Professor, Keio University Faculty of Pharmacy / Team leader, RIKEN Center for Integrative Medical Science	'21–'26	Life Sciences, Informatics・Mathematics	11
	KATAOKA Line X-ray and Gamma-ray Imaging Project **Jun KATAOKA** Professor, School of Advanced Science and Engineering, Faculty of Science and Engineering, Waseda University	'21–'26	Physics, Life Sciences, Informatics・Mathematics, Chemistry・Materials	11
	NOZAKI Resin-Degradation Catalyst Project **Kyoko NOZAKI** Professor, Graduate School of Engineering, The University of Tokyo	'21–'26	Chemistry・Materials, Physics, Life Sciences	12

'16 '17 '18 '19 '20 '21 '22 '23 '24 '25 '26 '27 '28 '29

Chemistry・Materials　Physics　Life Sciences　Informatics・Mathematics

Inauguration year	Project Title / Research Director / Title and Affiliation	Research Term '16 '17 '18 '19 '20 '21 '22 '23 '24 '25 '26 '27 '28 '29	Research Field	page
2020	**UEDA Biological Timing Project** **Hiroki R. UEDA** Professor, Graduate School of Medicine, The University of Tokyo / Team leader, RIKEN Center for Biosystems Dynamics Research / Distinguished Visiting Professor, Institute of Life Science, Kurume University			12
	SUZUKI RNA Modification Project **Tsutomu SUZUKI** Professor, Graduate School of Engineering, The University of Tokyo			13
	YAMAUCHI Materials Space-Tectonics Project **Yusuke YAMAUCHI** Distinguished Professor, Department of Materials Science and Engineering, School of Engineering, Nagoya University / Professor, The University of Queensland / Satellite PI MANA Principal Investigator (PI), National Institute for Materials Science			13
2019	**KURUMIZAKA Chromatin Atlas Project** **Hitoshi KURUMIZAKA** Professor, Institute for Quantitative Biosciences, The University of Tokyo			14
	FUKATSU Evolving Symbiosis Project **Takema FUKATSU** Prime Senior Researcher, Bioproduction Research Institute, National Institute of Advanced Industrial Science and Technology (AIST)			14
	MAEDA Artificial Intelligence in Chemical Reaction Design and Discovery Project **Satoshi MAEDA** Director, WPI-ICReDD / Professor, Faculty of Science, Hokkaido University			15
2018	**IKEGAYA Brain-AI Hybrid Project** **Yuji IKEGAYA** Professor, Graduate School of Pharmaceutical Sciences, The University of Tokyo			16
	HAMACHI Innovative Molecular Technology for Neuroscience Project **Itaru HAMACHI** Professor, Graduate School of Engineering, Kyoto University			17
2016	**HASUO Metamathematics for Systems Design Project** **Ichiro HASUO** Professor, Information Systems Architecture Science Research Division, National Institute of Informatics			17
		'16 '17 '18 '19 '20 '21 '22 '23 '24 '25 '26 '27 '28 '29		

SAKAI Real and Abstract Gels Project

2024 ▸ 2029

Takamasa SAKAI

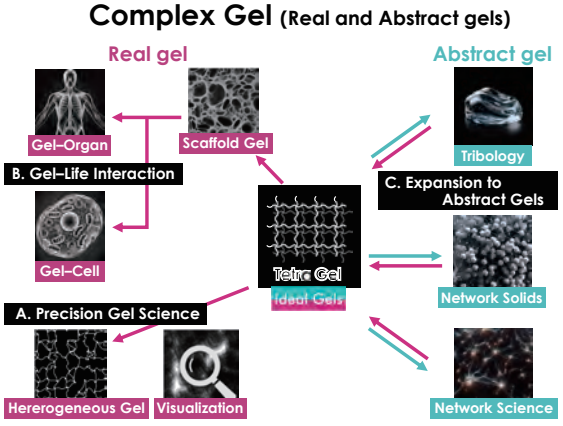
Professor, Department of Chemistry and Biotechnology, Graduate School of Engineering, The University of Tokyo

Research Groups Precision Gel Science / Gel–Life Interaction / Expansion to Abstract Gels

WEBSITE https://www.jst.go.jp/erato/en/research_area/ongoing/jpmjer2401_en.html

Polymer gels, comprising polymer networks infused with solvents, are ubiquitous in everyday life, from foods to soft contact lenses and diapers. These viscoelastic substances exhibit an extraordinary range of elastic moduli, spanning six orders of magnitude. Historically, their complex, heterogeneous structures have challenged precise property control. However, Tetra gels allow meticulous manipulation of microstructures, enabling precise and continuous control of macroscopic properties.

For real gels, this research aims to advance gel science by constructing new theoretical frameworks and exploring gel-biological interactions for tissue regeneration. The study also extends to abstract gels, investigating viscoelastic simulators and exploring universal laws governing network-like solids. Ultimately, it seeks to establish a comprehensive scientific framework applicable to both real and abstract gels.



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TAKEUCHI Super Quantum Entanglement Project

2024 ▸ 2029

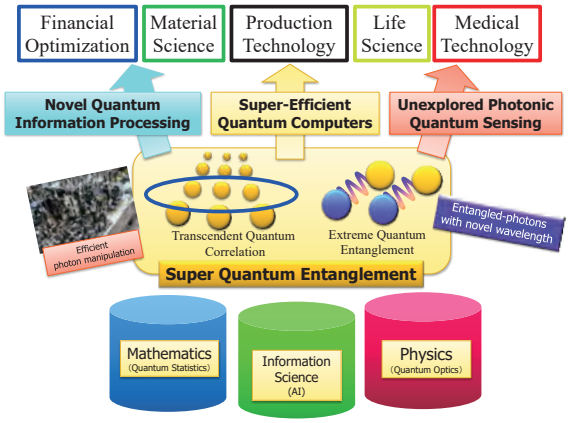
Shigeki TAKEUCHI

Professor, Graduate School of Engineering, Kyoto University

Research Groups	Theory / Transcendent Quantum Correlation / Extreme Quantum Entanglement
WEBSITE	https://www.jst.go.jp/erato/en/research_area/ongoing/jpmjer2402_en.html

Quantum technology has attracted significant attention. Ten million qubits are expected to be necessary for practical applications of quantum computers; however, as the number of qubits increases, the number of parameters determining a quantum state explodes exponentially. Nevertheless, methods for efficiently implementing and extracting information from such complex quantum states are still not fully understood.

In this project, information science, mathematics, and theoretical and experimental physics researchers will join forces to promote research on understanding and utilizing “super quantum-entangled states.” One focus is to explore novel efficient methods to encode and decode information to/from transcendent quantum correlations with multiple particles. Another focus is realizing “extreme quantum-entangled states” in the unexplored wavelength range and their application to novel photonic quantum sensing.



TOYOTA Plant Sensory Transduction Project

2024 ▸ 2029

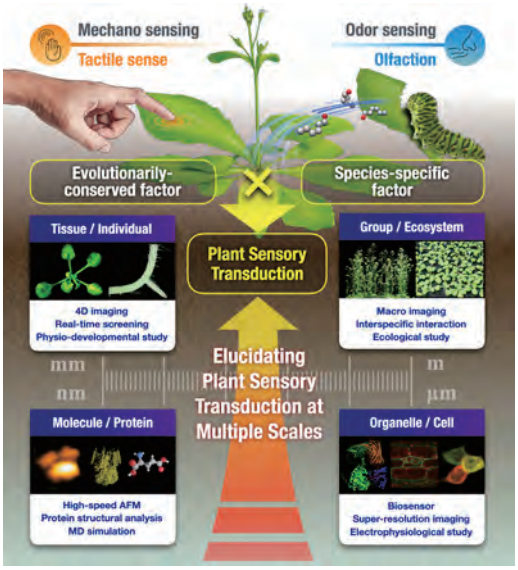
Masatsugu TOYOTA

Professor, Department of Biochemistry & Molecular Biology, Saitama University

Research Groups	Plant Molecular Genetics / Electrophysiology/Structural Biology / Biophysics / Optical Device Development
WEBSITE	https://www.jst.go.jp/erato/en/research_area/ongoing/jpmjer2403_en.html

Plants adapt to complex environmental conditions by detecting dynamic external signals. They can sense mechanical stimuli (touch) to regulate growth and defense responses and communicate with one another through volatile organic compounds (odors). However, the molecular mechanisms underlying their sensory transduction systems remain largely unknown, primarily due to challenges in visualizing plant responses to external stimuli in real time.

This project aims to uncover the mechanisms of plant sensory transduction, with a specific focus on touch and odor sensing. Advanced imaging techniques enable spatiotemporal analysis of these dynamic processes across multiple scales, ranging from the molecular to the ecological level. Unraveling these sensory systems in plants could lead to groundbreaking advancements across diverse scientific fields, including biology, agronomy, and ecology.



KOJIMA Market Design Project

2023 ▸ 2028

Fuhito KOJIMA

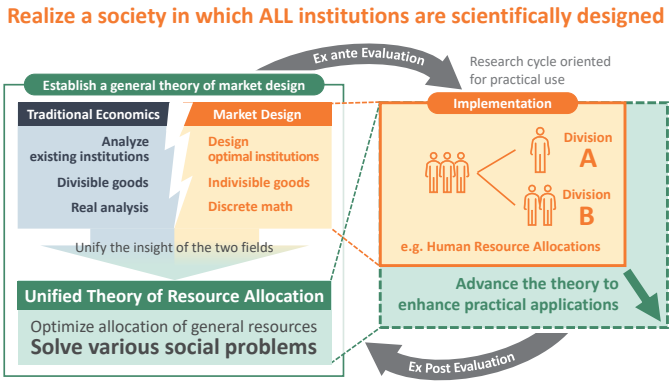
Professor, Department of Economics, The University of Tokyo

Photo: Toru Hasumi

Research Groups	Economic theory / Empirical economics / Computer science / Discrete mathematics / Implementation
WEBSITE	https://www.jst.go.jp/erato/kojima/en/index.html

The recent development of market design has allowed us to design institutions for various resource allocation problems. However, compared to its great potential, the number of successful practical applications is still limited because a highly versatile general theory has not been established and rigorous evaluation of policy effects is often unavailable.

This project aims to address these issues. We pursue a unified theory of resource allocation that integrates insights from traditional economics and market design. We develop a cycle that puts the theory into practice and then feeds the empirical evidence back into the theory. In doing so, we establish a broadly applicable theory of market design and engineering methods for implementing scientifically designed institutions.



SAGAWA Information-to-Energy Interconversion Project

2023 ▸ 2028

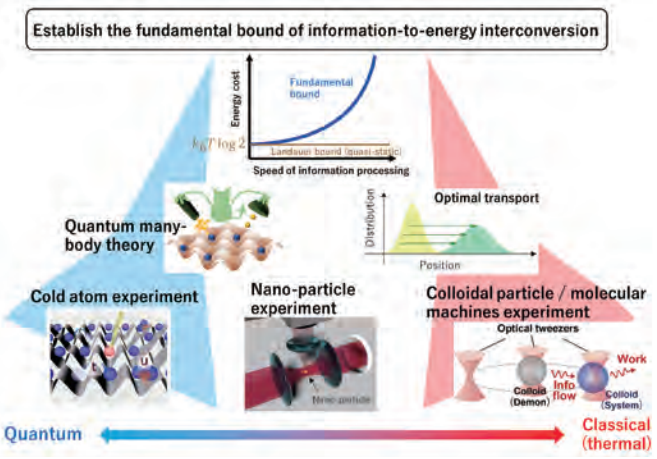
Takahiro SAGAWA

Professor, Graduate School of Engineering, The University of Tokyo

Research Groups	Information thermodynamics theory / Optimal transport theory / Quantum many-body theory / Molecular machine experiment / Nano-particle experiment / Ultracold atom experiment
WEBSITE	https://www.jst.go.jp/erato/sagawa/en/

Currently available computers consume much more energy than the fundamental bound, and the increase in energy consumption associated with computation is a serious problem.

This Research Project sets the problem of how to simultaneously achieve fast information processing and high energy efficiency, which are in a trade-off relationship. The research will be conducted both theoretically and experimentally from the perspective of thermodynamics of information, which has been pioneered by the Research Director. Specifically, we will establish a theory of the fundamental bound of energy required for fast information processing. Experimentally, interconversion between information and thermodynamic energy will be verified through control of thermal and quantum fluctuations. The obtained results would lead to new design principles of computers in the future.



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SATO Organoid Design Project

2023 ▸ 2028

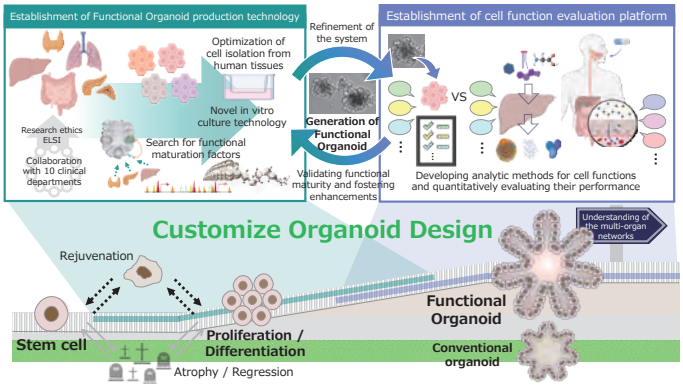
Toshiro SATO

Professor, Keio University School of Medicine

Research Groups	Organoid development / Structure analysis / Metabolic analysis / Informatic analysis
WEBSITE	https://www.jst.go.jp/erato/satot/

Organoids are structures that mimic living tissue and are established by culturing stem cells in specific environments. Organoids enable us to recapitulate gene expression and the self-organization of tissues. However, achieving functional maturation in organoids has proven extremely challenging, creating a bottleneck in our understanding of the multi-organ networks regulating human homeostasis.

Our project is dedicated to the development of 'functional organoids' that possess mature, organ-level functions at the cellular level. We are accomplishing this by developing novel cell culturing methods and a technological breakthrough for analyzing the physiological and biochemical functions of human tissues. Functional organoids hold the promise of advancing research into various biological phenomena and have significant potential for clinical applications, including drug development and regenerative medicine.



SEKIGUCHI Three-nucleon Forces Project

2023 ▸ 2028

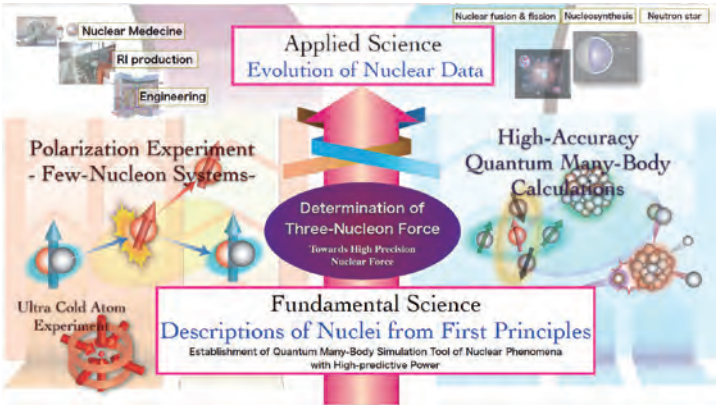
Kimiko SEKIGUCHI

Professor, School of Science, Institute of Science Tokyo

Research Groups	Determination of three-nucleon force / Accurate quantum many-body calculations / Quantum simulation experiment of nucleon systems with cold atoms / Extension to the applied science - evolution of nuclear data -
WEBSITE	https://www.jst.go.jp/erato/sekiguchi/

Understanding nuclear properties such as half-lives, reaction rates, etc., from first principles is a great dream of nuclear physicists. Nuclear properties are determined by forces that act between nucleons.

In the project, in order to establish accurate and precise nuclear interactions, the three-nucleon forces are determined from high-precision experiments on few-nucleon systems using chiral effective field theory. A precise quantum many-body calculation method based on the nuclear forces is established, which will allow us to compute nuclear properties with extremely high predictive power. Cold-atom systems are considered to validate the accuracy of the computational method. The newly established calculation framework for nuclear systems will be extended to applied science.



UCHIDA Magnetic Thermal Management Materials Project

2022 ▸ 2027

Ken-ichi UCHIDA

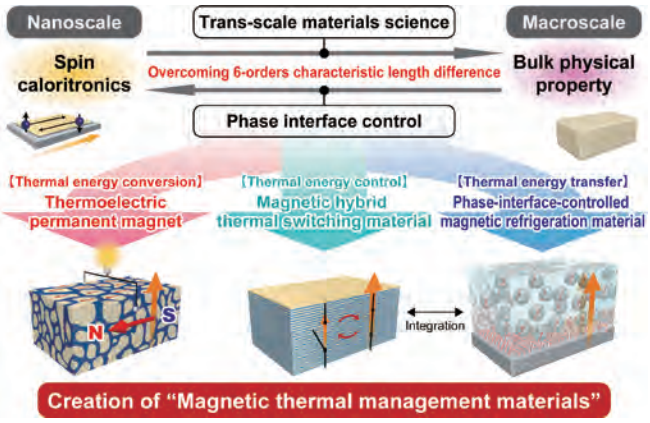
Distinguished Group Leader, Research Center for Magnetic and Spintronic Materials, National Institute for Materials Science /
Professor, Department of Advanced Materials Science, Graduate school of Frontier Science, The University of Tokyo

Research Groups: Thermal Management Principle and Functionality Development / Multi-hierarchical Structure Analysis / Magnetic Thermal Management Device / Hierarchy-controlled Material Synthesis / Spatiotemporal Thermal Measurement / Thermal Control Engineering Fusion /

WEBSITE: https://www.jst.go.jp/erato/uchida/en/index.html

Magnets are used in electric vehicle motors and power generators, and are essential materials for human life. The fusion research field on the interaction of electron spin (origin of magnetism), charge, and heat is called spin caloritronics. In this field, new phenomena are being discovered one after another, and are expected to lead to new energy-saving technologies. However, most of the spin-caloritronic phenomena are only observed at the nanoscale, and it has been difficult to use these phenomena in macroscale materials that contribute to energy applications.

Against this background, this research project creates “magnetic thermal management materials," a group of energy materials that realize highly efficient thermal energy conversion, control, and transfer. Magnetic thermal management materials are defined as a generic term for new magnetic hybrid/ composite materials in which the thermo-spin conversion capability, which has been available only on the nanoscale, plays an essential role on the macroscale and the thermal management performance and functionality are improved through nanostructure and interface control. Through this project, we will develop materials science that links nanoscale spin physics and macroscale thermophysical properties, and bring about thermal energy device applications of spin caloritronics.



SHIBATA Ultra-atomic Resolution Electron Microsopy Project

2022 ▸ 2027

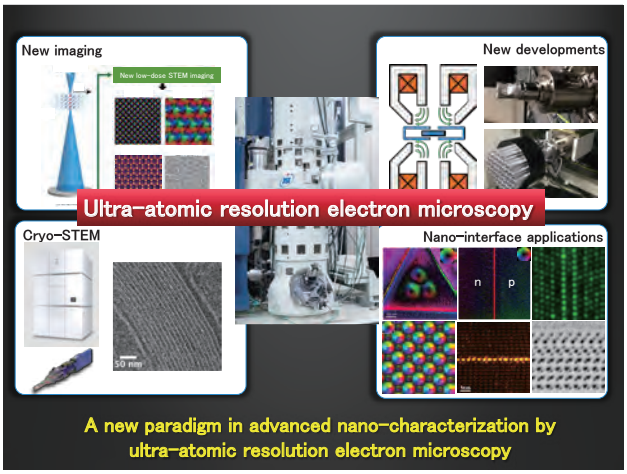
Naoya SHIBATA

Professor, Institute of Engineering Innovation, School of Engineering, The University of Tokyo

Research Groups: Imaging method and application / Microscope development / Cryo-STEM / Quantum Thin Filme

WEBSITE: https://www.jst.go.jp/erato/shibata/en/index.html

We will develop an innovative electron microscope that enables direct observation of atomic-scale structures and phenomena directly related to material properties, but which have been impossible to observe using conventional microscopy techniques. Using this microscope, we will establish atomic-scale "direct observation" methods to elucidate the microscopic origin of physical and functional properties, from high temperatures all the way down to very low temperatures, and across a wide range of specimens from nanomaterials to biological samples. We will apply these methods to solving problems at the cutting-edge of the materials and life sciences, and so contribute to tackling society's most important issues.



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ARITA Lipidome Atlas Project

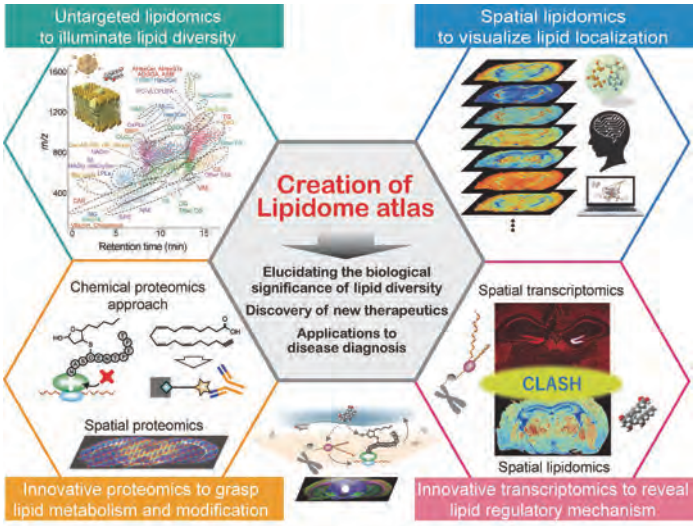
2021 ▸ 2026

Makoto ARITA

Professor, Keio University Faculty of Pharmacy /
Team leader, RIKEN Center for Integrative Medical Science

Research Groups	Lipid diversity / Lipid functional genomics / Lipid functional proteins / Lipid information analysis / Lipid life function
WEBSITE	https://www.jst.go.jp/erato/arita/en

In this project, we will create a "lipidome atlas" that captures lipid diversity, distribution, localization, and lipid modification in life as a whole. Based on the non-targeted lipidomics, we will build a basic technology that combines spatial lipidomics to investigate the localization of lipids, innovative proteomics to understand lipid metabolic enzymes and modifications, and spatial transcriptomics to elucidate the factors of lipid localization. In this way, we will visualize the effects of the local environment created by specific lipids on the dynamics and functions of multicellular systems. In addition, we will elucidate the mechanisms that regulate lipid diversity and its localization in vivo, to understand the biological significance of lipid diversity, and to elucidate diseases caused by its disruption.



KATAOKA Line X-ray and Gamma-ray Imaging Project

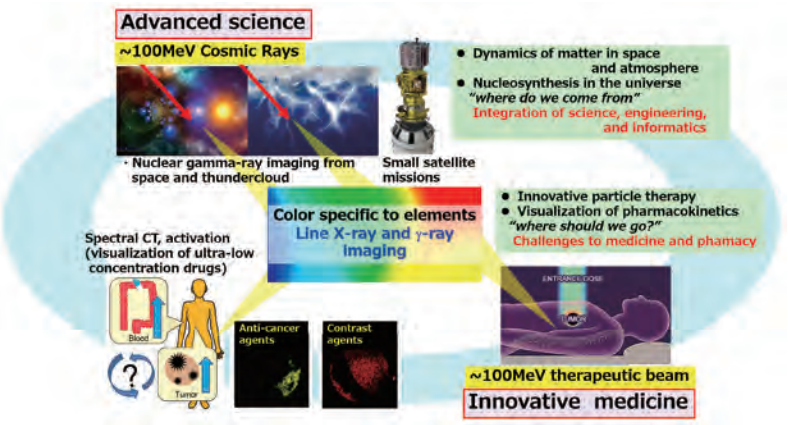
2021 ▸ 2026

Jun KATAOKA

Professor, School of Advanced Science and Engineering,
Faculty of Science and Engineering, Waseda University

Research Groups	Spectral photon counting CT / Nuclear medicine and particle therapy / Astrophysics and atmospheric physics
WEBSITE	https://www.jst.go.jp/erato/kataoka/?lang=en

Cosmic rays below 100 MeV are key to the origin of life and the evolution of stars, and they activate interstellar matter to emit spectral emission lines of X-rays and gamma rays specific to the elements. In this research, we will establish an imaging method to visualize line X-ray and gamma-rays from activated materials in general. We will expand this method to the fields of space, medicine, and pharmacology, and establish a new interdisciplinary framework for imaging “dynamics of materials” in a unified manner. We will make a breakthrough not only in space science but in particle therapy and pharmacokinetics of ultra-low concentration drugs to visualize their therapeutic effects.



NOZAKI Resin-Degradation Catalyst Project

2021 ▸ 2026

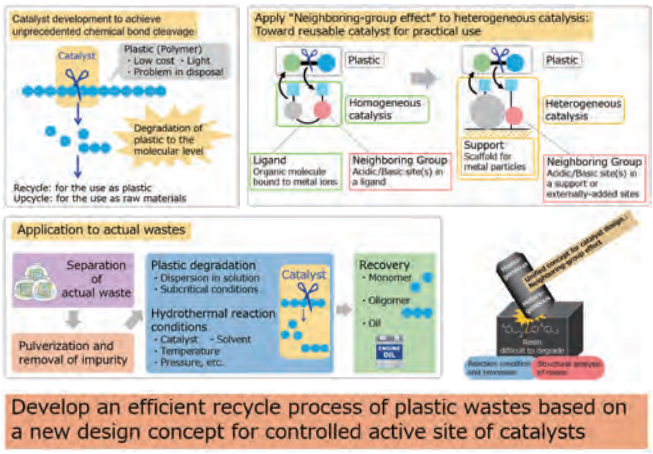
Kyoko NOZAKI

Professor, Graduate School of Engineering, The University of Tokyo

Research Groups	Degradation catalyst for persistent resins / Introduction of breakable bonds to polyolefins / Reaction system design / Structural evaluation / Biodegradability evaluation
WEBSITE	https://www.jst.go.jp/erato/nozaki/english/

Our modern life is supported by macromolecules made by connecting small molecules using "synthetic chemistry". Synthetic resin (plastic) thus created has rapidly become widespread. In spite of its enormous benefit, we face their disposal issues. To solve this problem, "degradation chemistry" is indispensable developing reactions to decompose macromolecules or tools (catalyst) to be used for decomposition.

In this project, we develop catalysts for degrading plastics for recycling and/or upcycling. We extend concept of “adjacent group contribution in catalysis”, commonly accepted in homogeneous catalysts (soluble in solution), to heterogeneous catalysts (insoluble in solution) widely used industrially. Through this project, we expect to develop a plastic reuse process for solving social issues and to build a new academic field "degradation chemistry".



UEDA Biological Timing Project

2020 ▸ 2025

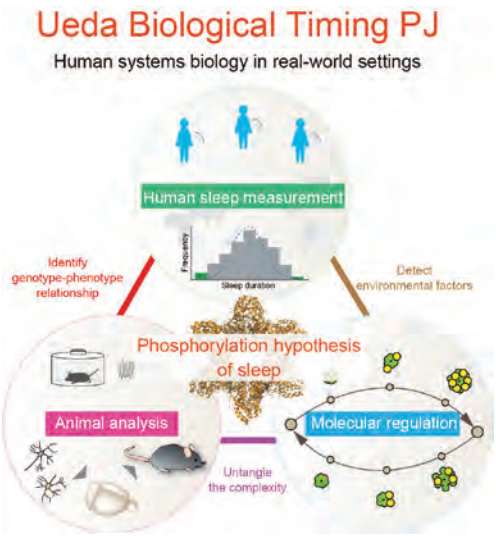
Hiroki R. UEDA

Professor, Graduate School of Medicine, The University of Tokyo / Team leader, RIKEN Center for Biosystems Dynamics Research / Distinguished Visiting Professor, Institute of Life Science, Kurume University

Research Groups	Human sleep measurement / Animal analysis / Molecular regulation
WEBSITE	https://www.jst.go.jp/erato/uedah/

Based on the determination of the genome sequence, systems biology, which is the study of the function of biological systems based on the interactions among its components, has been developed. However, since mammals, especially humans have extremely complex biological systems including social and environmental factors in real-world settings, human systems biology not yet been fully established.

This project aims to elucidate the biological timing mechanisms underlying sleep-wake cycles by applying state-of-the-art technology in mouse genetics and human sleep measurement techniques. Centered on the phosphorylation hypothesis of sleep proposed by Ueda, this project explores relevant genes from human population data, identify genotype-phenotype causality relationships, and control gene product activities.



ERATO

SUZUKI RNA Modification Project

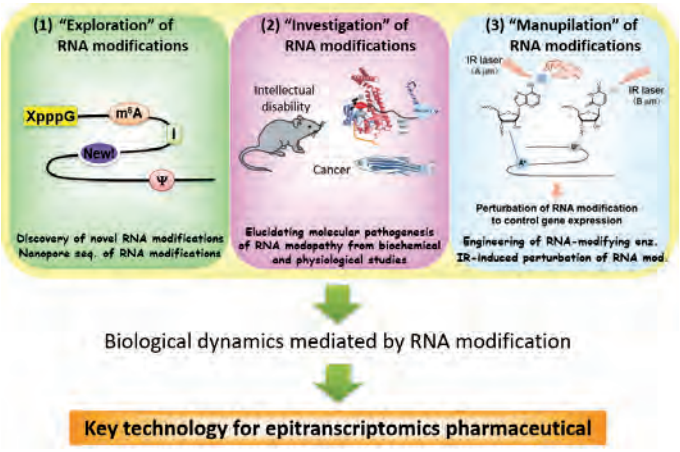
2020 ▸ 2025

Tsutomu SUZUKI

Professor, Graduate School of Engineering, The University of Tokyo

Research Groups	Biochemistry / Physiology / Bioinformatics / Single-Molecule Analysis
WEBSITE	https://www.jst.go.jp/erato/suzuki/english/index.html

This project aims to unveil physiological roles of RNA modifications associated with fundamental biological processes. We search for novel RNA modifications from human cells and other organisms, and determine their chemical structures by RNA mass spectrometry. We are also developing nanopore sequencing of RNA modifications assisted by neural networks and deep learning. In this project, we identify novel RNA-modifying enzymes and their genes, and study biogenesis and physiological function of the RNA modifications by generating knockout mice. We aim to elucidate molecular pathogenesis of "RNA modopathies", human diseases caused by abnormal RNA modification. Furthermore, we attempt to control cellular processes by artificially manipulating RNA modifications, thereby establishing a technological basis for future drug discovery and therapeutic measures.



YAMAUCHI Materials Space-Tectonics Project

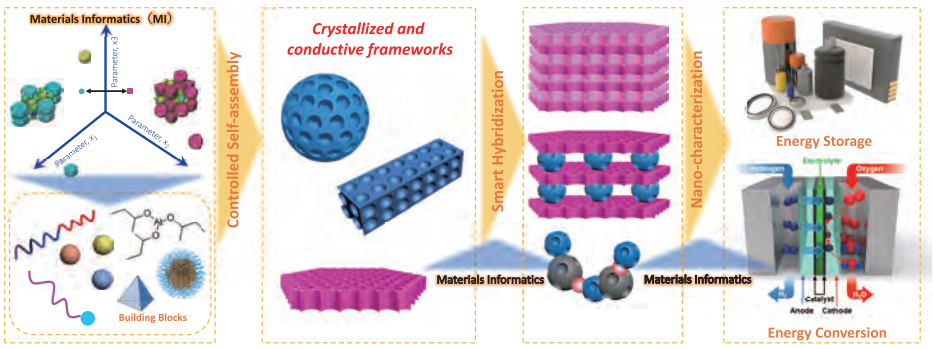
2020 ▸ 2025

Yusuke YAMAUCHI

Distinguished Professor, Department of Materials Science and Engineering, School of Engineering,
Nagoya University / Professor, The University of Queensland /Satellite PI MANA Principal Investigator (PI), National Institute for Materials Science

Research Groups	Function Integration Tecton / MI Tecton / Nano-instrumentation Tecton / Interface Control Tecton / Nano-structural Control Tecton / New Materials Exploration
WEBSITE	https://www.jst.go.jp/erato/yamauchi/

In this ERATO, we will create novel "inorganic nanosolids" containing internal nanospaces, as unprecedented nanospace materials, and develop several methodologies for their effective integration with the aim of exploiting functions obtained based on the synergistic fusion of various supramolecular, photonic, and magnetic behaviors occurring in nanospace. We will cover a wide range of various porous systems such as metals, carbons, sulfides, phosphides, transition metal oxides, etc. We will efficiently combine 'machine learning' with our inorganic synthesis methods to accelerate the optimization of synthetic parameters for the design of target materials, and to select proper patterns of combination of each inorganic block for the integration of materials.



KURUMIZAKA Chromatin Atlas Project

2019 ▸ 2024

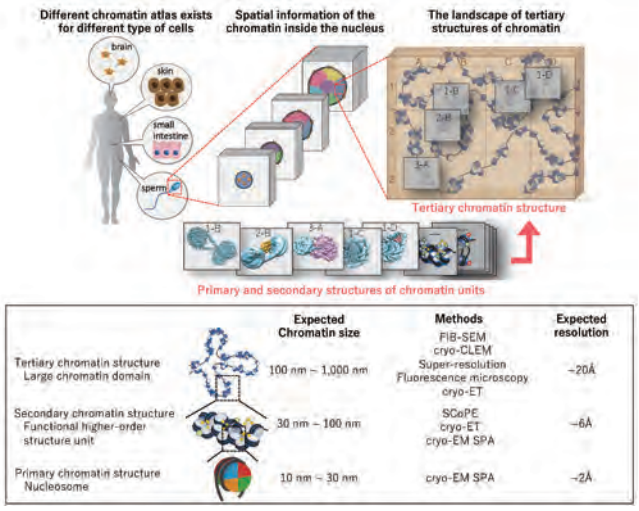
Hitoshi KURUMIZAKA

Professor, Institute for Quantitative Biosciences, The University of Tokyo

Research Groups	Chromatin structure research / Organic Synthesis chemistry research and development / Phenotype analysis research
WEBSITE	https://www.jst.go.jp/erato/kurumizaka/

In eukaryotes, genomic DNA is stored in the nucleus as nucleosomes, interacting with a set of proteins, forming a molecular complex called chromatin. The proper folding of the chromatin structure plays a crucial role in the regulation of genomic DNA functions, its disruption leading to various diseases. Therefore, understanding the chromatin structure-based mechanisms that regulate the use of the genetic information is crucial for designing new therapeutic strategies.

Based on advanced cryo-electron microscopy technology we try to determine the structures and functions of various chromatin units. Our project goal is to elucidate “chromatin atlas” representing the ensemble of these structures. Through these studies, we aim to create a new concept in regulatory mechanisms of genetic information.



FUKATSU Evolving Symbiosis Project

2019 ▸ 2024

Takema FUKATSU

Prime Senior Researcher, Bioproduction Research Institute, National Institute of Advanced Industrial Science and Technology (AIST)

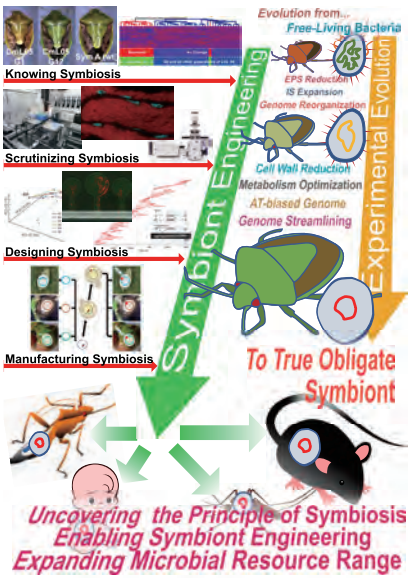
Co-research director

Shinji FUKUDA — Project Professor, Institute for Advanced Biosciences, Keio University

Chikara FURUSAWA — Team Leader, Center for Biosystems Dynamics Research, RIKEN

Research Groups	Experimental Symbiotic Evolution/Genomics / Symbiotic Evolution Analysis/Evaluation/Control / Symbiont Genome Manipulation / Symbiotic Interactions/Communication / Symbiotic System Analysis/Reconstruction / Interspecific Symbiont Transfer/Experimental Evolution
WEBSITE	https://www.jst.go.jp/erato/fukatsu/english/

Symbiotic associations with microorganisms play pivotal roles in animals, plants and human. Now "symbiosis" and "microbiome" are important keywords in basic biology, agriculture and medical science. However, highly intimate symbiotic associations are difficult to investigate experimentally, because the symbiotic partners are usually non-model organisms that are integrated into an almost inseparable biological entity. Consequently, such microorganisms cannot survive outside the host and are mostly uncultivable. For a long time, these conditions have severely hindered our understanding of symbiosis. This project aims at bringing about breakthroughs to overcome these difficulties, on the basis of the establishment of novel insect-E. coli and mammal-E. coli experimental symbiotic systems and the development of recent genome engineering technologies, thereby drastically promoting our understanding of symbiosis.



MAEDA Artificial Intelligence in Chemical Reaction Design and Discovery Project

2019 ▸ 2024

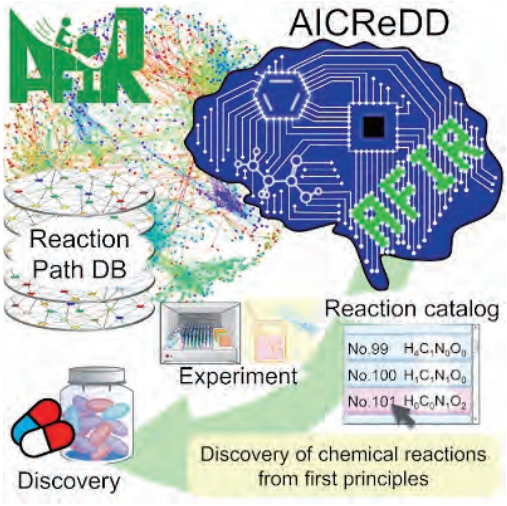
Satoshi MAEDA Director, WPI-ICReDD / Professor, Faculty of Science, Hokkaido University

Co-research director
Satoru IWATA Professor, Graduate School of Information Science and Technology, The University of Tokyo / Project Professor, WPI-ICReDD, Hokkaido University

Research Groups	Project Management / Quantum Chemistry / Materials Informatics / Organic Synthesis / Robot Synthesis / Optimization / Machine Learning
WEBSITE	https://www.jst.go.jp/erato/maeda/en/

This project aims to generate “Artificial Intelligence in Chemical Reaction Design Discovery” (AICReDD) that predicts “the whole picture of the behavior of atoms” in chemical reactions and suggests useful and unknown chemical reactions one after another. This will be done by integrating technologies in computational chemistry, information science, and materials informatics. Particularly, our highly versatile automated reaction path method called the Artificial Force Induced Reaction (AFIR) method and combinatorial optimization theory and algorithms are the bases of the AICReDD.

Specifically, we will use the AFIR method to calculate “reaction path network” for combinations of various reactants and catalysts and construct a system to quickly design and suggest chemical reactions appropriate for the synthesis of target substances from the obtained reaction path database. In this case, combinatorial optimization is applied to derive combinations of reactants that maximize the yield of the target product. We will further try to implement AICReDD in synthesis robots and aim to greatly accelerate the speed of discovering the most favorable chemical reaction producing the target substance.



ERATO Website

Visit our website for the latest information

News

The latest information about research achievements and public events is available.

About The Program

Funding scheme and features of the ERATO are summarized with its historical views.

Research Area/Projects

Each of the on-going and completed ERATO projects are introduced including research overview and achievement.

Call for nominations

JST calls for recommendation of excellent researchers suitable to become an ERATO Research Director through out the year.

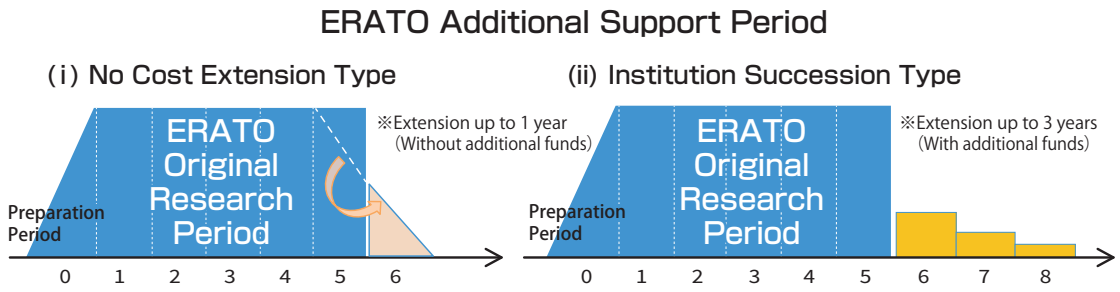
https://www.jst.go.jp/erato/en/ ERATO

Additional Support Period

Depending on the project's development and the host research institution's commitment, an extension period, "Additional Support Period," can be granted continuously after the original five-year project period.

(i) Additional Support Period (No Cost Extension Type) may be granted if the extended period assures an adequate completion of the project and reinforces the research outcome, which leads to a next leap after ERATO. The extended period is up to one year. The budget for the extended period is provided with a reallocation from the final year's funds and is up to 50 million yen for direct cost plus 10 million yen for the Headquarters' cost.

(ii) Additional Support Period (Institution Succession Type) may be granted if the host institution specifically and strongly supports the project during the project's original period and plans a permanent framework to succeed the project on its own initiative, and further the framework will surely develop synergistically with a JST's supplementary support after the original project's period. The extended period is up to three years. The supplemental funds are up to 50 million yen for direct cost plus 20 million yen for the Headquarters' cost annually.



IKEGAYA Brain-AI Hybrid Project (Institution Succession)

2018 ▸ 2026

Yuji IKEGAYA

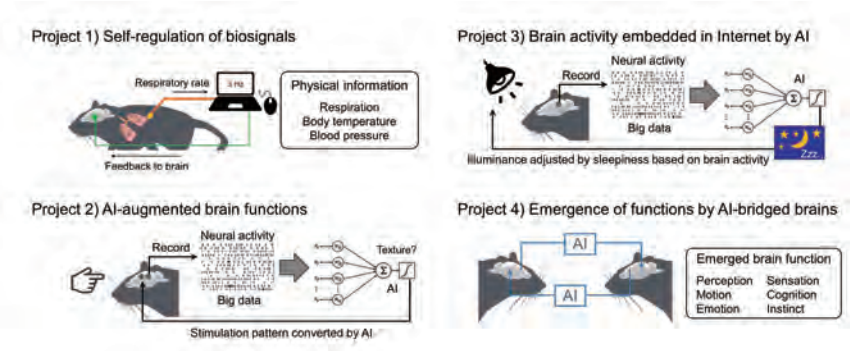
Professor, Graduate School of Pharmaceutical Sciences, The University of Tokyo

Research Groups	Fundamental Research
WEBSITE	https://www.jst.go.jp/erato/ikegaya/english.html

The human brain has evolved by adapting to various tools that humans invented by themselves, including characters and telephones. This fact may indicate that the brain has potential for adapting even to new yet-unknown tools or environments in the future.

In this project, we aim to address, using artificial intelligence (AI), how the brain is plastic enough to handle complex technologies and explore the new dimension of the latent ability of the brain. To unveil the potentials of the brain, we will utilize and develop techniques and tools in neuroscience and machine learning for the brain signals.

In the Additional Research Period, we will expand the ERATO research results that we have achieved and build a path towards future application to humans. Together with the Brain-AI Hybrid Center at the University of Tokyo, we will continue to collaborate with domestic/international research institutions and companies to conduct verification to expand brain functions and clinical application.



HAMACHI Innovative Molecular Technology for Neuroscience Project (No Cost Extention)

2018 ▸ 2024

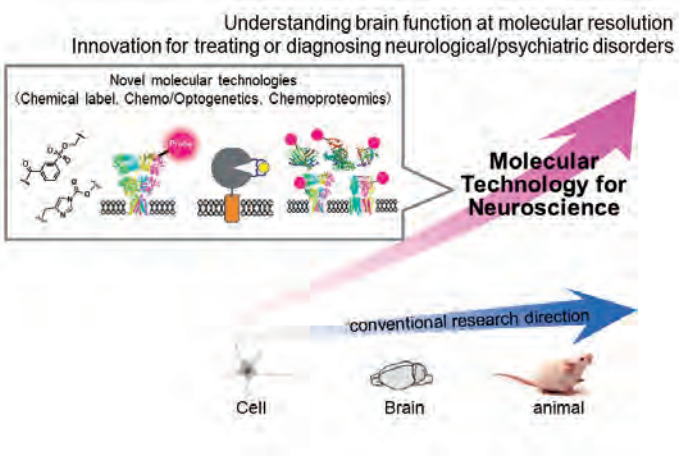
Itaru HAMACHI

Professor, Graduate School of Engineering, Kyoto University

Research Groups	Development of new live-cell organic chemistry / Development of methods for controlling protein activity / Strategies for imaging and regulation of neuron and brain tissue / Clarifying physiological roles in animals using molecular technologies
WEBSITE	https://www.jst.go.jp/erato/hamachi/en/index.html

Our research purpose is developing new molecular technology based on live-cell organic chemistry that can selectively label and modify target proteins under natural habitats. We also aim to develop unique chemical methods (chemical and photo-chemical genetics) for artificially controlling protein functions. These new methodologies are applied not only to model cells but also to complicated biological systems including cultured neurons, brain tissues and live animals. These allow for selective imaging of neurotransmitter receptors and clarification of neuronal networks at molecular resolution.

Based on these efforts, we would like to establish a new technology termed "Innovative molecular technology for neuroscience". We believe that this would contribute to understanding brain function at molecular level, and lead to the diagnosis and therapy for neurological and psychiatric disorders.



HASUO Metamathematics for Systems Design Project (Institution Succession)

2016 ▸ 2024

Ichiro HASUO

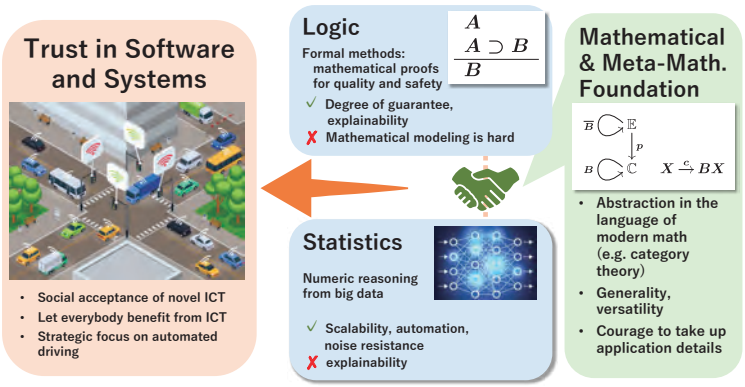
Professor, Information Systems Architecture Science Research Division,
National Institute of Informatics

Research Groups	Metamathematical Integration / Trust in Software and Systems
WEBSITE	https://www.jst.go.jp/erato/hasuo/en/

ICT is changing the landscape of manufacturing with pervasive automation and computer support in design and production processes. Our project aims to leverage techniques from software science—specifically the body of mathematical techniques called formal methods—in manufacturing, eventually leading to software tools that support various stages of design processes.

In doing so we face the challenge of modeling, that is, the difficulty of accommodating massive systems with black-box components and uncertainties in logically rigorous frameworks. Here we need the "top-down" use of formal logic that, unlike the conventional "bottom-up" use that stacks up verified facts only, decomposes quality/safety goals into smaller assumptions that are easier to assert, check, and enforce.

In the Additional Research Period, we will pursue this new use of logic, joining forces with statistical and empirical methodologies. Our characteristic emphasis on abstract (meta)theories will boost this interdisciplinary pursuit. Our project strives to be a hub for comprehensive software research, connecting academia and industry. Our strategic application domain is automated driving.



Highlighted Publications

(April 2023 - March 2024)

Published Date	Project	Title
2023/4/3	MAEDA Artificial Intelligence in Chemical Reaction Design and Discovery	Synthesis of Bicyclo[1.1.1]pentane (BCP)-Based Straight-Shaped Diphosphine Ligands
2023/4/26	KATAOKA Line X-ray and Gamma-ray Imaging	Development of an ultrahigh resolution real time alpha particle imaging system for observing the trajectories of alpha particles in a scintillator
2023/5/16	SUZUKI RNA Modification	Activation of the urotensin-II receptor by remdesivir induces cardiomyocyte dysfunction
2023/5/16	KURUMIZAKA Chromatin Atlas	Structural basis of damaged nucleotide recognition by transcribing RNA polymerase II in the nucleosome
2023/5/17	SUZUKI RNA Modification	Quality control of protein synthesis in the early elongation stage
2023/5/19	NOZAKI Resin-Degradation Catalyst	Synthesis of Multiblock Copolymer Composed of Biodegradable Poly(butylene succinate) and Poly(2-pyrrolidone): Impact of Each Block Length
2023/5/31	SHIBATA Ultra-atomic Resolution Electron Microscopy	Giant Spin-Valve Effect in Planar Spin Devices Using an Artificially Implemented Nanolength Mott-Insulator Region
2023/6/8	NUMATA Organellar Reaction Cluster	Bilirubin is produced non-enzymatically in plants to maintain chloroplast redox status
2023/6/12	NOZAKI Resin-Degradation Catalyst	Chemoselectivity Change in Catalytic Hydrogenolysis enabling Urea-reduction to Formamide/ Amine over More Reactive Carbonyl Compounds
2023/7/5	MAEDA Artificial Intelligence in Chemical Reaction Design and Discovery	Searching Chemical Action and Network (SCAN): Interactive Chemical Reaction Path Network Platform
2023/7/7	FUKATSU Evolving Symbiosis	High body temperature increases gut microbiota-dependent host resistance to influenza A virus and SARS-CoV-2 infection
2023/7/10	KATAOKA Line X-ray and Gamma-ray Imaging	Citizen Science Observation of a Gamma-Ray Glow Associated With the Initiation of a Lightning Flash
2023/7/18	YAMAUCHI Materials Space-Tectonics	Mesoporous multimetallic nanospheres with exposed highly entropic alloy sites
2023/8/3	SHIBATA Ultra-atomic Resolution Electron Microscopy	Direct imaging of local atomic structures in zeolite using optimum bright-field scanning transmission electron microscopy
2023/8/17	NOZAKI Resin-Degradation Catalyst	Hydroxylation-depolymerization of oxyphenylene-based super engineering plastics to regenerate arenols
2023/8/22	NOMURA Microbial Community Control	Alcanivorax borkumensis Biofilms Enhance Oil Degradation By Interfacial Tubulation
2023/9/8	FUKATSU Evolving Symbiosis	Self-stabilization mechanism encoded by a bacterial toxin facilitates reproductive parasitism
2023/9/26	FUKATSU Evolving Symbiosis	Regulation and remodeling of microbial symbiosis in insect metamorphosis
2023/10/5	NUMATA Organellar Reaction Cluster	Fluorescein staining of chloroplast starch granules in living plants
2023/11/6	YAMAUCHI Materials Space-Tectonics	Mesoporous Metastable $CuTe_2$ Semiconductor
2023/11/22	SUZUKI RNA Modification	Glycosylated queuosines in tRNAs optimize translational rate and post-embryonic growth
2023/11/22	HAMACHI Innovative Molecular Technology for Neuroscience	Lysine-reactive N-acyl-N-aryl sulfonamide warheads: Improved reaction properties and application in the covalent inhibition of an ibrutinib-resistant BTK mutant
2023/11/23	SAGAWA Information-to-Energy Interconversion	Universal cost bound of quantum error mitigation based on quantum estimation theory
2023/11/30	IKEGAYA Brain-AI Hybrid	Mental image reconstruction from human brain activity: Neural decoding of mental imagery via deep neural network-based Bayesian estimation
2023/11/30	UCHIDA Magnetic Thermal Management Materials	Hybrid Transverse Magneto-Thermoelectric Cooling in Artificially Tilted Multilayers
2023/12/5	SHIBATA Ultra-atomic Resolution Electron Microscopy	Incommensurate grain-boundary atomic structure

Published Date	Project	Title
2024/1/12	ARITA Lipidome Atlas	Using data-dependent and independent hybrid acquisitions for fast liquid chromatography-based untargeted lipidomic
2024/1/12	MIZUSHIMA Intracellular Degradation	Experimental determination and mathematical modeling of standard shapes of forming autophagosomes
2024/1/24	SAGAWA Information-to-Energy Interconversion	Role of Topology in Relaxation of One-Dimensional Stochastic Processes
2024/2/1	HAMACHI Innovative Molecular Technology for Neuroscience	Bioorthogonal chemical labeling of endogenous neurotransmitter receptors in living mouse brains
2024/2/6	SAITOH Spin Quantum Rectification	Persistent magnetic coherence in magnets
2024/2/14	FUKATSU Evolving Symbiosis	Genetic mutation in *Escherichia coli* genome during adaptation to the murine intestine is optimized for the host diet.
2024/2/22	SUEMATSU Gas Biology	PRMT1 sustains de novo fatty acid synthesis by methylating PHGDH to drive chemoresistance in triple-negative breast cancer
2024/2/29	SHIBATA Ultra-atomic Resolution Electron Microscopy	Real-time tracking of three-dimensional atomic dynamics of Pt-trimer on TiO_2 (110)
2024/2/29	YAMAUCHI Materials Space-Tectonics	Selective Etching of Metal–Organic Frameworks for Open Porous Structures: Mass-Efficient Catalysts with Enhanced Oxygen Reduction Reaction for Fuel Cells
2024/3/7	UCHIDA Magnetic Thermal Management Materials	Direct-contact Seebeck-driven transverse magneto-thermoelectric generation in magnetic/thermoelectric bilayers
2024/3/18	UCHIDA Magnetic Thermal Management Materials	Observation of nonvolatile magneto-thermal switching in superconductors
2024/3/21	KURUMIZAKA Chromatin Atlas	Cryo-EM structures of RAD51 assembled on nucleosomes containing a DSB site
2024/3/27	SUZUKI RNA Modification	Structural insights into the decoding capability of isoleucine tRNAs with lysidine and agmatidine
2024/3/28	UCHIDA Magnetic Thermal Management Materials	Creation of flexible spin-caloritronic material with giant transverse thermoelectric conversion by nanostructure engineering

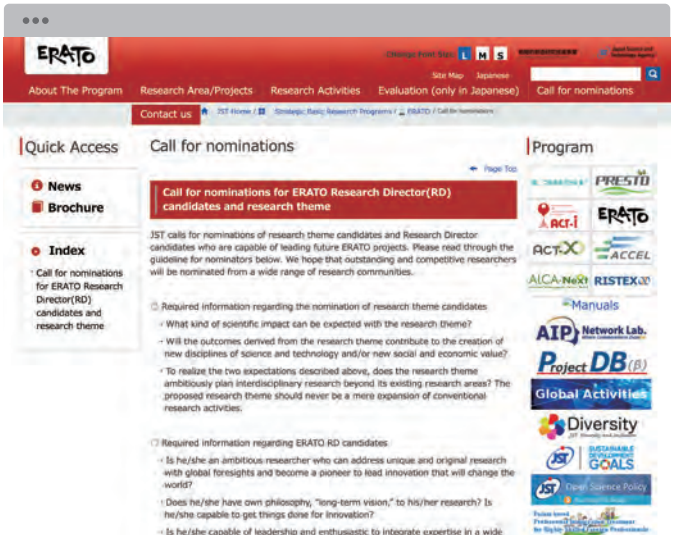
Recruitment of ERATO theme candidate and research director candidate

Overview

This recruitment aims to receive a wide range of information about research trends and researchers as a part of the preliminary selection steps for ERATO research projects and research directors. (This is not a call for proposals for research grants).

Purpose

Based on ERATO's philosophy of "enhancing unique and talented researchers who can change the world and betting on them to create scientific and technological impact", JST conducts surveys throughout the year to determine opportunities to conduct top research with the leading researchers. In order to achieve the ERATO's objectives and make the most of ERATO's features, we would like to ask for information on both "persons" with extremely original ideas and research philosophies, and on unique "themes" to create a new research stream in the future..



See the ERATO website "Call for nominations" for how to apply.

https://www.jst.go.jp/erato/en/call_for_nominations/

ERATO nomination

Completed Projects

ERATO Research Area

Affiliation and position of the Research Directors are as of the time of completion of the research period.

2017 - 2023

MIZUSHIMA Intracellular Degradation

Research Director
Noboru MIZUSHIMA
Professor,
The University of Tokyo

2017 - 2022

INAMI JIZAI Body

Research Director
Masahiko INAMI
Professor,
The University of Tokyo

2016 - 2022

NUMATA Organellar Reaction Cluster

Research Director
Keiji NUMATA
Professor,
Kyoto University /
Team Leader,
RIKEN

2016 - 2021

NAKAMURA Macroscopic Quantum Machines

Research Director
Yasunobu NAKAMURA
Professor,
The University of Tokyo /
Director, RIKEN

2015 - 2023

YAMAMOTO Atom Hybrid

Research Director
Kimihisa YAMAMOTO
Professor,
Tokyo Institute of
Technology

2015 - 2021

KAWAHARA Universal Information Network

Research Director
Yoshihiro KAWAHARA
Professor,
The University of Tokyo

NOMURA Microbial Community Control

Research Director
Nobuhiko NOMURA
Professor,
University of Tsukuba

2014 - 2019

ISHIGURO Symbiotic Human-Robot Interaction

Research Director
Hiroshi ISHIGURO
Professor,
Osaka University /
Director (visiting),
Advanced Telecommunications
Research Institute International

SAITOH Spin Quantum Rectification

Research Director
Eiji SAITOH
Professor,
The University of Tokyo

MOMOSE Quantum Beam Phase Imaging

Research Director
Atsushi MOMOSE
Professor,
Tohoku University

2013 - 2018

ADACHI Molecular Exciton Engineering

Research Director
Chihaya ADACHI
Professor,
Kyushu University

ISOBE Degenerate π-Integration

Research Director
Hiroyuki ISOBE
Professor,
The University of Tokyo

ITAMI Molecular Nanocarbon

Research Director
Kenichiro ITAMI
Professor,
Nagoya University

SATO Live Bio-Forecasting

Research Director
Thomas N. SATO
Director,
Advanced Telecommunications
Research Institute International

MINOSHIMA Intelligent Optical Synthesizer

Research Director
Kaoru MINOSHIMA
Professor,
The University of
Electro-Communications

2012 - 2017

KAWARABAYASHI Large Graph

Research Director
Kenichi KAWARABAYASHI

Professor,
National Institute of Informatics

TOUHARA Chemosensory Signal

Research Director
Kazushige TOUHARA

Professor,
The University of Tokyo

2011 - 2016

AKIYOSHI Bio-Nanotransporter

Research Director
Kazunari AKIYOSHI

Professor,
Kyoto University

ASANO Active Enzyme Molecule

Research Director
Yasuhisa ASANO

Professor,
Toyama Prefectural University

KANAI Life Science Catalysis

Research Director
Motomu KANAI

Professor,
The University of Tokyo

SAITOU Totipotent Epigenome

Research Director
Mitinori SAITOU

Professor,
Kyoto University

2011 - 2016

SOMEYA Bio-Harmonized Electronics

Research Director
Takao SOMEYA

Professor,
The University of Tokyo

2010 - 2015

IYODA Supra-integrated Material

Research Director
Tomokazu IYODA

Professor,
Tokyo Institute of Technology

KATORI Innovative Space-Time

Research Director
Hidetoshi KATORI

Professor,
The University of Tokyo /
Chief Scientist, RIKEN

TAKEUCHI Biohybrid Innovation

Research Director
Shoji TAKEUCHI

Professor,
The University of Tokyo

HIGASHIYAMA Live-Holonics

Research Director
Tetsuya HIGASHIYAMA

Professor,
Nagoya University

MURATA Lipid Active Structure

Research Director
Michio MURATA

Professor,
Osaka University

2009 - 2014

SUEMATSU Gas Biology

Research Director
Makoto SUEMATSU

Professor,
Keio University

Counterpart
Gregg L. SEMENZA

Professor,
Johns Hopkins University

ITO Glycotrilogy

Research Director
Yukishige ITO

Chief Scientist,
RIKEN

TAKAYANAGI Osteonetwork

Research Director
Hiroshi TAKAYANAGI

Professor,
The University of Tokyo

YOMO Dynamical Micro-scale Reaction Environment

Research Director
Tetsuya YOMO

Professor,
Osaka University

MINATO Discrete Structure Manipulation System

Research Director
Shin-ichi MINATO

Professor,
Hokkaido University

2009 - 2014

NAKAJIMA Designer Nanocluster Assembly

Research Director
Atsushi NAKAJIMA

Professor,
Keio University

KAWAOKA Infection-induced Host Responses

Research Director
Yoshihiro KAWAOKA

Professor,
The University of Tokyo

TAKAHARA Soft Interface

Research Director
Atsushi TAKAHARA

Professor,
Kyushu University

OKANOYA Emotional Information

Research Director
Kazuo OKANOYA

Professor,
The University of Tokyo

2008- 2013

SODEOKA Live Cell Chemistry

Research Director
Mikiko SODEOKA

Chief Scientist,
RIKEN

2007 - 2012

HIRAYAMA Nuclear Spin Electronics

Research Director
Yoshiro HIRAYAMA

Professor,
Tohoku University

IGARASHI Design Interface

Research Director
Takeo IGARASHI

Professor,
The University of Tokyo

MAENAKA Human-Sensing Fusion

Research Director
Kazusuke MAENAKA

Professor,
University of Hyogo

KITAGAWA Integrated Pores

Research Director
Susumu KITAGAWA

Professor,
Kyoto University

Counterpart
Omar M. YAGHI

Professor,
University of California,
Los Angeles

NAKAUCHI Stem Cell and Organ Regeneration

Research Director
Hiromitsu NAKAUCHI

Professor,
The University of Tokyo

2006 - 2011

SHIMODA Nano-Liquid Process

Research Director
Tatsuya SHIMODA

Professor,
Japan Advanced
Institute of Science and
Technology

TOKURA Multiferroics

Research Director
Yoshinori TOKURA

Professor,
The University of Tokyo

MIYAWAKI Life Function Dynamics

Research Director
Atsushi MIYAWAKI

Group Director,
RIKEN

HASHIMOTO Light Energy Conversion

Research Director
Kazuhito HASHIMOTO

Professor,
The University of Tokyo

2005- 2010

ASADA Synergistic Intelligence

Research Director
Minoru ASADA

Professor,
Osaka University

2005- 2010

UEDA Macroscopic Quantum Control

Research Director
Masahito UEDA

Professor,
The University of Tokyo

IWATA Human Receptor Crystallography

Research Director
So IWATA

Professor,
Imperial College London

HASEBE Reprogramming Evolution

Research Director
Mitsuyasu HASEBE

Professor,
National Institute for
Basic Biology

2004- 2009

KANEKO Complex Systems Biology

Research Director
Kunihiko KANEKO

Professor,
The University of Tokyo

NAKAMURA Functional Carbon Cluster

Research Director
Eiichi NAKAMURA

Professor,
The University of Tokyo

2004- 2009

SHIMOJO Implicit Brain Function

Research Director
Shinsuke SHIMOJO

Professor,
California Institute of
Technology

KATO Nuclear Complex

Research Director
Shigeaki KATO

Professor,
The University of Tokyo

2003- 2008

AIHARA Complexity Modelling

Research Director
Kazuyuki AIHARA

Professor,
The University of Tokyo

KOSHIHARA Non-Equilibrium Dynamics

Research Director
Shinya KOSHIHARA

Professor,
Tokyo Institute of
Technology

KOBAYASHI Highly Functionalized Reaction Environments

Research Director
Shu KOBAYASHI

Professor,
The University of Tokyo

2003- 2008

MAEDA Actin-Filament Dynamics

Research Director
Yuichiro MAEDA

Professor,
Nagoya University

2002- 2007

OHNO Semiconductor Spintronics

Research Director
Hideo OHNO

Professor,
Tohoku University

YASHIMA Super-structured Helix

Research Director
Eiji YASHIMA

Professor,
Nagoya University

AKIRA Innate Immunity

Research Director
Shizuo AKIRA

Professor,
Osaka University

YAMAMOTO Environmental Response

Research Director
Masayuki YAMAMOTO

Professor,
Tohoku University

2001- 2006

TOKURA Spin Superstructure

Research Director
Yoshinori TOKURA

Professor,
The University of Tokyo

NAKAMURA Inhomogeneous Crystal

Research Director
Shuji NAKAMURA

Professor,
University of California
Santa Barbara

YOSHIDA ATP System

Research Director
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Professor,
Tokyo Institute of
Technology

YANAGISAWA Orphan Receptor

Research Director
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Professor,
The University of Texas
Southwestern Medical
Center

2000- 2005

IMAI Quantum Computation and Information

Research Director
Hiroshi IMAI

Professor,
The University of Tokyo

2000- 2005

AIDA Nanospace

Research Director
Takuzo AIDA

Professor,
The University of Tokyo

KOIKE Photonics Polymer

Research Director
Yasuhiro KOIKE

Professor,
Keio University

SEKIGUCHI Biomatrix Signaling

Research Director
Kiyotoshi SEKIGUCHI

Professor,
Osaka University

1999- 2004

TARUCHA Mesoscopic Correlation

Research Director
Seigo TARUCHA

Professor,
The University of Tokyo

YOKOYAMA Nanostructured Liquid Crystal

Research Director
Hiroshi YOKOYAMA

Director,
National Institute of
Advanced Industrial
Science and Technology

1999- 2004

HOSONO Transparent ElectroActive Materials

Research Director
Hideo HOSONO

Professor,
Tokyo Institute of
Technology

KURODA Chiromorphology

Research Director
Reiko KURODA

Professor,
The University of Tokyo

1998- 2003

OHTSU Localized Photon

Research Director
Motoichi OHTSU

Professor,
Tokyo Institute of
Technology

KITANO Symbiotic Systems

Research Director
Hiroaki KITANO

Senior Researcher,
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Laboratories Inc.

KUSUMI Membrane Organizer

Research Director
Akihiro KUSUMI

Professor,
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1998- 2003

KONDOH Differentiation Signaling

Research Director
Hisato KONDOH

Professor,
Osaka University

1997- 2002

GONOKAMI Cooperative Excitation

Research Director
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INOUE Superliquid Glass

Research Director
Akihisa INOUE

Director,
Tohoku University

NAMBA Protonic Nanomachine

Research Director
Keiichi NAMBA

Professor,
Osaka University

HORIKOSHI Gene Selector

Research Director
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Associate Professor,
The University of Tokyo

1996- 2001

KAWATO Dynamic Brain

Research Director
Mitsuo KAWATO

Project Leader,
Advanced Telecommunications
Research Institute International

INOUE Photochirogenesis

Research Director
Yoshihisa INOUE

Professor,
Osaka University

YOKOYAMA CytoLogic

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Shigeyuki YOKOYAMA

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Project Director, RIKEN

TSUKITA Cell Axis

Research Director
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Professor,
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1995- 2000

MASUMOTO Single Quantum Dot

Research Director
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Professor,
University of Tsukuba

1995- 2000

KATO Cytoprotein Network

Research Director
Seishi KATO

Chief Researcher,
Sagami Chemical
Research Center

DOI Bioasymmetry

Research Director
Hirofumi DOI

President & CEO,
Celestar Lexico-Sciences,
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MIKOSHIBA Calciosignal Net

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1994- 1999

TAKAYANAGI Particle Surface

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HIRAO Active Glass

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Professor,
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1994- 1999

YAMAMOTO Behavior Genes

Research Director
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TAKAI Biotimer

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Professor,
Osaka University

1993- 1998

YAMAMOTO Quantum Fluctuation

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TANAKA Solid Junction

Research Director
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Toshiba Corporation

HASHIMOTO Polymer Phasing

Research Director
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Professor,
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1993- 1998

HIROHASHI Cell-Configuration

Research Director
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1992- 1997

KAWACHI Millibioflight

Research Director
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ITAYA Electro-chemiscopy

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Kingo ITAYA

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Tohoku University

YANAGIDA Biomotron

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YOSHIZATO MorphoMatrix

Research Director
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1991- 1996

YOSHIMURA π- Electron Materials

Research Director
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NOYORI Molecular Catalysis

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FUSETANI Biofouling

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OKAYAMA Cell Switching

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1990 - 1995

KIMURA Metamelt

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1990 - 1995

NAGAYAMA Protein Array

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TORII Nutrient-Stasis

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SHINKAI Chemirecognics

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1989 - 1994

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Research Director
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AONO Atomcraft

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1989 - 1994

IKEDA Genosphere

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1988 - 1993

SAKAKI Quantum Wave

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MASUHARA Microphotoconversion

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MIZUTANI Plant Ecochemicals

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1987 - 1992

NISHIZAWA Terahertz

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1987 - 1992

FURUSAWA MorphoGenes

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KUNITAKE Molecular Architecture

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1986 - 1991

GOTO Quantum Magneto Flux Logic

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HOTANI Molecular Dynamic Assembly

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INABA Biophoton

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1985 - 1990

YOSHIDA Nano-Mechanism

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KURODA Solid Surface

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1984 - 1989

HORIKOSHI Superbugs

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1983 - 1988

HAYAISHI Bioinformation Transfer

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1982 - 1987

MIZUNO Bioholonics

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1981 - 1986

HAYASHI Ultra-Fine Particle

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Chairman,
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MASUMOTO Amorphous &
Intercalation Compounds

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OGATA Fine Polymer

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Naoya OGATA

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NISHIZAWA Perfect Crystal

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＊ Co-Research Director
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