Laboratory List

Creative Society Design

Professor	FUJINAMI Tsutomu	searching for knowledge in between mind and body
Professor	HAYASHI Yukio	Join us to explore future design of stronger networks in disasters and daily life.
Professor	MIYATA Kazunori	Make it fun with media technology
Vice President	NAGAI Yukari	Challenge to solve the social problems using Design Thinking
Professor	NISHIMOTO Kazushi	Creating novel media for creation, expression and communication to make people more creative
Professor	YUIZONO Takaya	Technology for Collaboration & Creative Society ~ Creativity, Community, and Culture ~
Associate Professor	GOKON Hideomi	Optimize disaster management with big data
Associate Professor	KANAI Hideaki	ICT R&D for next-generation human-centered computing which enriches human activities in everyday life
Associate Professor	LAM Chi Yung	Risk and Disaster Management for Safe and Secure Society
Associate Professor	SATO Toshiki	Explore exciting experiences in the field of HCI!
Senior Lecturer	XIE Haoran	Augmenting Human Capabilities with User Interfaces
Senior Lecturer	TAKASHIMA Kentaro	Research and development of methods and tools to support creative work activity

Transformative Knowledge Management

Professor	ITO Yasunobu	Intellectual discoveries through field-oriented research
Professor	KOHDA Youji	Understanding Service Value through Case Study Research
Professor	SHIKIDA Asami	Use of Knowledge for Community Development
Professor	UCHIHIRA Naoshi	Service System Design & Innovation Management: Models, Methods, Tools, and Practices
Associate Professor	KANG Rihyei	Explore management fostering innovation and Aim to be a creative and innovative talent.
Associate Professor	SHIRAHADA Kunio	Institutional design for creating a sustainable society under dynamic environments

Co-creative Intelligence

Professor	DAM Hieu Chi	Let's Start Thinking Like a Data Scientist
Professor	HASHIMOTO Takashi	Considering the creation, sharing, and utilization of knowledge from viewpoint of language, communication, and social institutions
Professor	HONDA Hiroyuki	Exploring the Relationship between the Language and Society
Professor	HUYNH Nam Van	Knowledge Modelling and Decision Making
Professor	IKEDA Mitsuru	
Associate Professor	HIDAKA Shohei	Create an intelligent system by understanding cognition, and understand cognition by the metaphor on the intelligent system.
Associate Professor	KIM Eunyoung	Design a learning process that can create social innovations
Associate Professor	MIZUMOTO Masaharu	Language and Mind through Experimental Philosophy

Computing Science

Professor	FUJISAKI Eiichiro	Cryptography: A mathematical method to secure communication rigorously.
Professor	HIRAISHI Kunihiko	Mathematical methods to know the past, the present, and the future
Professor	KURKOSKI Brian (Michael)	BITS: Bits of Information, Transmitted and Stored
Professor	NGUYEN Minh Le	Deep Learning, Natural Language Understanding, Legal Text Processing
Professor	OGATA Kazuhiro	Make your programs run exactly as intended!
Professor	OGAWA Mizuhito	Bridging Theory and Practice: Dependable Software and Secure systems
Professor	UEHARA Ryuhei	Intelligence through computational origami, puzzles, games
Associate Professor	HIROKAWA Nao	Programming Languages and Automated Deduction
Associate Professor	SCHWARTZMAN Gregory	Algorithm design for the 21st century

Next-generation Digital Infrastructure

Professor	AOKI Toshiaki	Realize Safety and Security by Advanced Science and Technology
Professor	INOGUCHI Yasushi	Research about basic technology of next generation supercomputers
Professor	KANEKO Mineo	Advanced ICT-Society is supported by reliable, high-performance LSIs
Professor	SHINODA Yoichi	
Professor	TAN Yasuo	Advancing Research on ICT support systems in the home
Professor	TANAKA Kiyofumi	Let's build high-performance computers
Associate Professor	ISHII Daisuke	Embedding Trustworthy Software into the Real World
Associate Professor	LIM Yuto	For Forthcoming Research on Wireless, Sensor and Energy
Associate Professor	SUZUKI Masato	We support large and complex software development with architecture and visualization technologies.
Senior Lecturer	TOMITA Takashi	Towards Realization of Highly Safe and Reliable Systems

Human Information Science

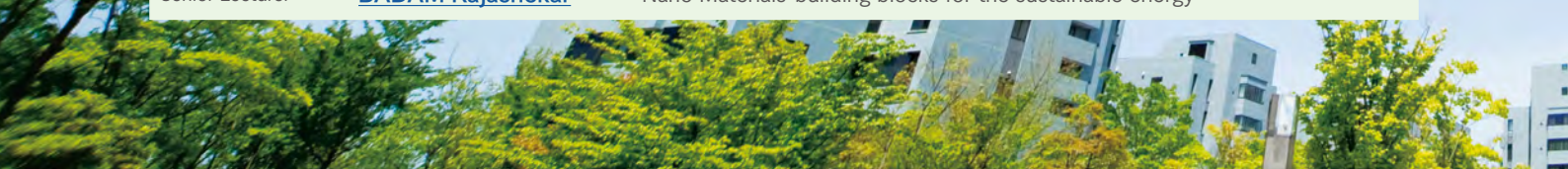
Professor	CHONG Nak-Young	Toward Realizing Intelligent Robots Leveraging Perception and Cognitive Information Processing
Vice President	IIDA Hiroyuki	Going to the future is searching the past
Professor	IKEDA Kokolo	Not only Strong, but also Human-like, Entertaining or Educating Computer Game Players
Professor	KOTANI Kazunori	Image Processing, Computer Vision
Professor	UNOKI Masashi	How can we implement a computational auditory model?
Associate Professor	ASANO Fumihiko	Understanding natural, efficient, and skillful motions and its application to advanced robot technologies
Associate Professor	HASEGAWA Shinobu	Interdisciplinary Research to Support Learning “How to Learn”
Associate Professor	HO Anh Van	Utilization of materials softness in development of novel robotic mechanisms
Associate Professor	JI Yonghoon	Pioneering Technology for Intelligent Environmental Sensing Using Unmanned Mobile Robot
Associate Professor	OKADA Shogo	Computational modeling for understanding and generating multimodal social signal patterns
Associate Professor	SHIRAI Kiyoaki	Understanding Language by Computer
Associate Professor	YOSHITAKA Atsuo	Comprehensive studies including image/video processing and user interfaces

Sustainable Innovation

Professor	KANEKO Tatsuo	Nature-guided Polymer Design Aiming at Environmentally-Harmonized Materials
Professor	KOYANO Mikio	
Professor	MAEZONO Ryo	World-largest class materials simulations using JAIST supercomputers
Professor	MIZUTA Hiroshi	Develop Innovative Energy & Environmental Devices using Atom-scale Nanotechnologies!
Professor	OHDAIRA Keisuke	Develop next-generation Si-based solar cells through novel process technologies
Associate Professor	HONGO Kenta	The Advent of Materials Informatics - Novel Materials Design Based on Computational and Data Sciences
Associate Professor	OKEYOSHI Kosuke	Polymeric organization inspired from natural environment and biomaterials
Senior Lecturer	CHAMMINGKWAN Patchanee	Catalyst to Polymer: Synergistic Materials Design

Materials Chemistry Frontiers

Professor	MATSUMI Noriyoshi	From Heteroatom Chemistry to Future Energy
Professor	MATSUMURA Kazuaki	Functional polymeric biomaterials for controlling the functions of living systems
Professor	TANIIKE Toshiaki	Advanced Material Design based on Synergetic Exploration, Learning, and Prediction
Professor	YAMAGUCHI Masayuki	Design of High-Performance Polymer Materials by Rheological Approach
Associate Professor	MIYAKO Eijiro	Creation of Game-Changing-Technology by Functional Materials and Bioengineering
Associate Professor	NAGAO Yuki	Nanoprotonics : Design of Materials Interface by Highly-Proton Conductive Organized Polymers
Associate Professor	NISHIMURA Shun	Development of new solid catalyst process Challenge the issues on energy & resources!
Associate Professor	SHINOHARA Ken-ichi	Polymer Molecular Motor: Unidirectional Processive Walk along a Chiral Helical Chain
Senior Lecturer	BADAM Rajashekar	Nano Materials-building blocks for the sustainable energy



Nanomaterials and Devices

Professor	HORITA Susumu	Creation of electronic films and electron devices by your own energy-saving technique
Professor	MAENOSONO Shinya	Nanoparticle Science and Technology From Synthesis to Applications
Professor	MIZUTANI Goro	Development of nonlinear optical microscopy and spectroscopy for micro world study
Professor	MURATA Hideyuki	Development of High Performance and Stable Organic Electronic Devices
Professor	OSHIMA Yoshifumi	Nano-Characterization for innovation - In-situ TEM/SEM Observation -
Professor	SUZUKI Toshi-kazu	Compound semiconductor devices for functional diversification of electronics
Professor	TOKUMITSU Eisuke	Create new high-performance electron devices using functional materials
Professor	YAMADA-TAKAMURA Yukiko	Development of nanomaterials based on the understanding of surface and interface
Associate Professor	AKABORI Masashi	Spintronics Research in Semiconductor Nanowires
Associate Professor	AN Toshu	Quantum spin dynamics; sensing, control, and imaging
Associate Professor	YAMAMOTO Yuko S.	Exploring the nanoworld using surface enhanced spectroscopy

Bioscience, Biotechnology, and Biomedical Engineering

Professor	FUJIMOTO Kenzo	Development of nucleic acids drug based on creation of designed molecules
Professor	HOHSAKA Takahiro	Synthesis of artificial proteins by combining biological and chemical techniques
Professor	OHKI Shinya	Exploring structure-function relationship of proteins using NMR spectroscopy
Professor	TAKAGI Masahiro	Organization and Dynamics of Biological Systems
Professor	TAKAMURA Yuzuru	Microfluidic devices and sensors for biochemical and medical applications
Associate Professor	HAMADA Tsutomu	Dynamics of artificial cell membranes
Associate Professor	HIRATSUKA Yuichi	Micro-mechanical devices powered by motor proteins
Associate Professor	TSUTSUI Hidekazu	Molecular sensors & devices for interfacing with electrical activities in live cells.
Associate Professor	YAMAGUCHI Takumi	Sweet Science: Analytical and applicative research of bio-functional sugars

Creative Society Design

Designing a creative society, where everyone's ability brilliantly shines.
An intellectual odyssey towards achieving rich quality of life by integrating and transcending science, technology and art.

■ Overview:

The creative society design research area aims to design a creative society, where everyone can lead a radiant and enriched life, we will take an intellectual odyssey that integrates and transcends science, technology, and art, approaching it from both the human element and the machine element (or both analog and digital elements). Specifically, we will conduct: 1) research on information technology and interaction related to expression and collaborative activities that take human creativity into account; 2) research on social systems using simulation technology and network science to realize safety and security; and 3) research on design that brings innovation in products and services by incorporating human sensibilities and values. Through these three research areas, we aim to realize a human society in which everyone can contribute to innovation to improve QoL (Quality of Life) and achieve the SDGs (Sustainable Development Goals).

■ Keywords:

Creativity Support, Social Network, Design Thinking, Human Computer Interaction, Media Interaction, Visual Computing, Disaster Science, Resilience Engineering, Network Science, Collaboration, Intercultural Communication, Pervasive Technology, Embodied Cognition, STEAM Education, Data Science/AI Applications

■ Education policy:

This research area promotes interdisciplinary research that spans a variety of specialized fields, including information systems, mathematical systems, interaction, media, design, and skill science, with the aim of realizing a creative society in which everyone can play an active role. Therefore, we look forward to the participation of students who are full of creativity and have the spirit to integrate and transcend science, technology, and art. In education, students have research and development of social systems using Information Systems, Data Science, and AI technology, etc. to support people's intellectual activities, and design research on various products and services. They will become advanced scientific and technological human resources, who can integrate human factors and science and technology, and they will contribute to Society 5.0-type innovation based on the premise of improving QoL and achieving the SDGs.

A research environment that integrates and transcends diverse disciplines such as information systems, mathematical systems, interaction, media, design, and skill science.

Transformative Knowledge Management

Our mission is to develop Next-generation knowledge management theories to promote social transformation and apply for practical problem-solving to build a wellbeing society.

■ Overview:

Knowledge management has mainly focused on how to share and utilize knowledge in order to make the employees' tacit knowledge as a competitive resource for organizations. However, the key to next generation knowledge management will be how to bring about change and contribute to human wellbeing through knowledge creation, sharing, and transformation. We consider knowledge as a transformational resource for building a society where people can experience and pursue wellbeing, and we share the common questions of what is the nature of knowledge and knowledge creation that promotes radical change, and how do we need to renew knowledge management in order to develop the ability to change? In this research area, we will define "knowledge management" from the perspective of "transformation through knowledge", and aim to construct theories and solve practical problems through transformation.

■ Keywords:

Wellbeing, Knowledge Creation, Organizational Transformation, Sustainability, Value Design, IoT design, Entrepreneurship Education, Ethnography in a Medical Setting, Business Ethnography, Next Generation Tourism

■ Education policy:

We will create and propose the next generation knowledge management models to the world. Specifically, we will promote research on service systems that contribute to the improvement of various issues related to human wellbeing, such as medical services and regional sustainability, as well as the exploration of managerial methods that transcend the challenges latent in an advanced technological society driven by digitalization. In this process, students will develop the ability to co-creatively create knowledge with various stakeholders about what a desirable society is, and to set their own research agenda. In addition, we cultivate the ability to design a value by effectively integrating science and technology with human knowledge in response to the issues we set. Overall, the research area fosters new knowledge management personnel who have the conceptual ability to apply cutting-edge technology to management as change agents. These are the abilities needed by consultants, system engineers, government employee active in the community, and entrepreneurs in the digital age.

Co-creative Intelligence

Our mission is to explore new intelligence that sustainably promotes the development and evolution of the advanced knowledge society through research on the human – technology co-creation of knowledge.

■ Overview:

Cutting-edge science and technology are expanding human intellectual, physical, and mental activities and promoting the power of knowledge creation. On the other hand, human beings have intellectual activities unique to them, such as comprehensive judgment to make responsible decisions, intuition to catch faint signals, and creative trial and error to create knowledge by posing new problems and formulating hypotheses. There is a need for research and practice on these intellectual activities and the deep communication and co-creation abilities that humans have with others. In our knowledge society, knowledge creation is the main activity of humans and a resource for organizational competitiveness. The co-creation activities between science and technology and humans are essential for the sustainable creation and development of value. We call the intelligence that creates new knowledge by integrating state-of-the-art science and technology with human intelligence and creativity ""co-creative intelligence."" By exploring this new kind of intelligence that people active in the knowledge society should possess, we aim at clarifying the essence of intelligence and creativity. Simultaneously we conduct research and develop cutting-edge science and technology and propose to the community the ideal form of intelligence and science and technology.

■ Keywords:

Knowledge Science, Knowledge Creation, Cognitive Science, Data Science, Artificial Intelligence, Language and Communication, Philosophy of Language, Decision Theory, Meta-Cognition, Educational Engineering, Complex Systems, Emergence-Evolution-Institution, Machine Learning, Computational Science, Materials Informatics, Social Linguistics, Language Policy, Creation Process, Idea Creation, Experiential Learning, Collaborative Learning, Learning Process Design

■ Education policy:

This research area brings together faculty members who research the nature of intelligence and knowledge creation and its social practice based on the fundamentals of language, cognition, knowledge, and philosophy. We will conduct comprehensive and interdisciplinary education and research from the theoretical level of intelligence and knowledge creation to the level of its application to society to explore the new intelligence necessary for activities in an advanced knowledge society. Students will learn the computational theory of cognition, decision-making theory, philosophy of mind and language, data science, and complex systems science at the theoretical level. Applied research covers, for example, the creation of intelligent systems, the design of institutions and educational programs for a knowledge co-creation society, service knowledge, creativity, and social innovation, and interpretable and symbiotic artificial intelligence. We will deepen students' ability to flexibly co-create knowledge from an interdisciplinary and diverse perspective through education and research. We aim to cultivate leaders who will pioneer the knowledge society by utilizing the most advanced technologies of the future.

Co-Creative Intelligence Research

Computing Science

Study computation, know the limits of computation, and unveil methods of the right conclusion from an ocean of data.

■ Overview:

The world is facing many problems that require urgent solutions, but the use of the computer does not necessarily provide an immediate solution to all of them. Some problems cannot be solved in principle even if we use a supercomputer, and some others would require for their solution a longer time than the life of the universe. How can we create rigorous bug-free programs, extract only meaningful data from a massive amount of data, and get answers that we really need within a reasonable time? How can we guarantee the security, correctness, and validity of these computations?

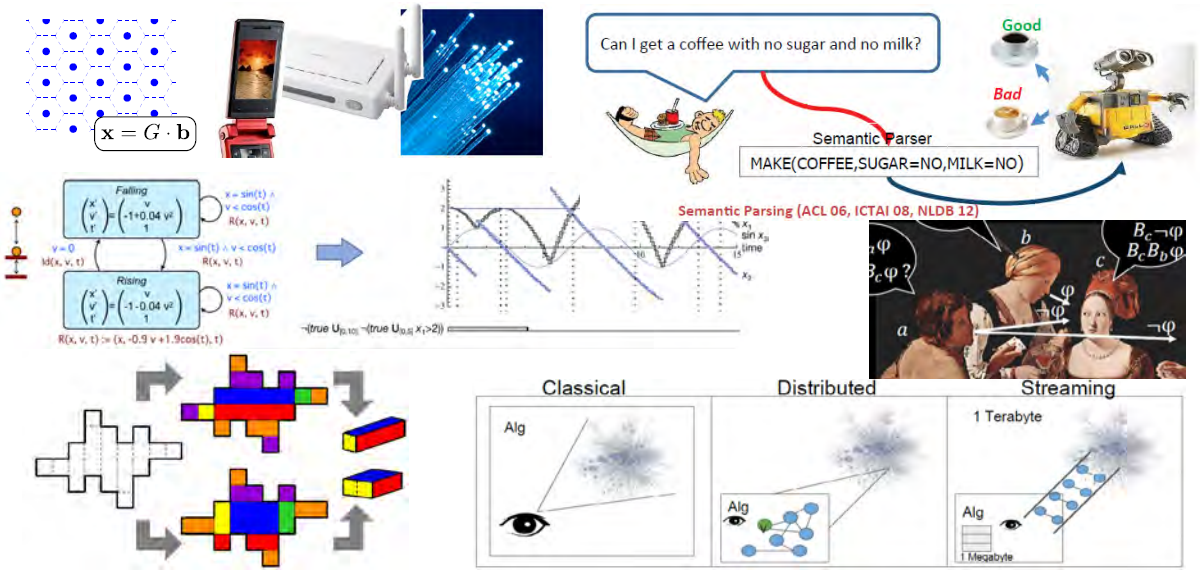
This area is an interdisciplinary research area with cross-disciplinary education and research covering computer science, mathematics, artificial intelligence, data science, and other related fields from basic theory to applications of computing, from the viewpoints of information science. We aim to promote the evolution of the field of computing and artificial intelligence.

■ Keywords:

Information Science, Information Security, Mathematical Logic,Artificial Intelligence, Automated Theorem Proving, Formal Methods, Theoretical Computer Science, Data Science, Distributed System, Algorithms, Information Theory

■ Education policy:

This area provides you with basic theories and technologies that form the basis of information science. On top of that, it prepares you to become advanced scientists and engineers who acquire elemental technologies in specialized fields, raise a wide range of curiosity in neighboring fields, and keep on learning new things by themselves in coping with major changes expected in the future society. In addition, this area aims to develop social leaders who, beyond the acquisition of specialized knowledge, obtain a series of methodologies, including long-term and short-term research planning, productive discussions with others from diverse backgrounds, technical writing, and effective presentations.



Covering from theory to application

Next-generation Digital Infrastructure

Next-generation Digital Infrastructure Research Area performs research and graduate education on the fundamentals of ICT systems, to realize and extend comfortable, dependable , secure E-Society.

■ Overview:

Computer systems and networks have become increasingly important to our modern life. These information and communications technologies, or ICT, are the foundation that enable applications on our smartphones, that provide information security, that allow our mobile devices to connect wirelessly to the cloud. In the future, this trend is clearly increasing as ""smart technologies"" combine to form the Internet of Things. In addition, ICT investment has a close relationship to corporate performance, and has become a key driver of national growth strategy. The Next-generation Digital Infrastructure Research Area performs research and graduate education on the fundamentals of ICT systems, to make wide-ranging contributions to industry, standardization activities and governmental policy making.

■ Keywords:

Cryptography, Cyber Security, Network Security, Computer Networks, IoT, Embedded Systems, Wireless Communications, Software, High Performance Computer Systems

■ Education policy:

In this area, we are conducting education and research in fields that are the basis of information engineering, such as computer hardware and software, networks and security, and cultivate students who acquire solid theories, technologies and methodologies that are not influenced by trends. Research in this area requires a wide range of knowledge, fundamentall theories and technologies whose necessity has been recognized over time, and are also necessary for developing new ICT systems in the future. We are also focusing on exercises, Project Based Learning and so on, with the goal of developing the practical skills of students.

VLSIs and embedded systems, computer networks, cloud servers, smart houses

Human Information Science

Investigating mechanisms of human information processing and applying them to the advanced information processing systems

■ Overview:

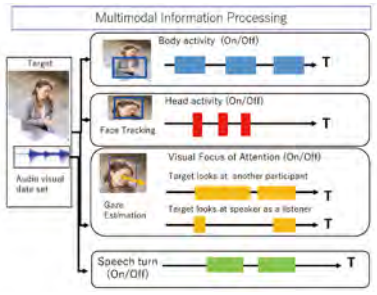
In this research area, our goal is to understand the fundamentals of human perception of multimodal information originated from interaction with the outside world, the mechanism of information transferring, based on a cross-disciplinary approach with focus on information science. Moreover, we also aim for applying new findings to the fields of higher level of information processing and robotics. Our attempt focuses on human-centered study through understanding human-human and human-machine communication, including mechanism of human sensory perception, multisensory modality and human behavior understanding; as well as recognition and understanding of linguistic and non-linguistic information, and human thinking process and its modeling. Our research interests also include engineering implementation such as robot technology based on mechanical and control engineering, sensors and information processing for five-senses based on perceptual and intelligent information processing, and robot engineering as an intelligent agent that adaptively interacts with humans and the environment. These broad range research topics contribute to establish a human-centered society (Society 5.0) where machine interacts with human in harmonic ways.

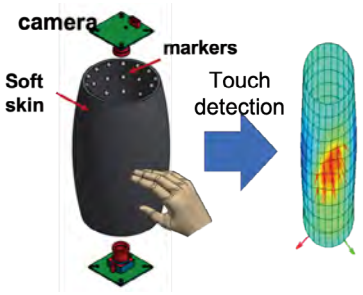
■ Keywords:

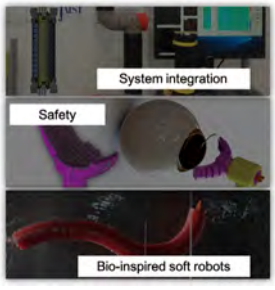
Perceptual and Intelligent Information Processing, Social Signal Processing, Multimodality, Communication, Education/learning Technology, Game Informatics, Natural Language Processing, Audio/speech Signal Processing, Image/video Signal Processing, Human Interface, Intelligent Robotics, Soft Robotics, Tactile Sensing

■ Education policy:

In this research area, we address human-centered research topics covering sensors and information processing for five-senses based on perceptual and intelligent information processing, multisensory modality, human behavior understanding, recognition/understanding of linguistic/non-linguistic information, and human thinking process and its modeling. We also look for novel engineering implementations for sensing technology, multi-agent robotics, and educational technology from human-centric point of view. Coursework is offered to students for understanding theories and fundamental techniques of information science, as well as cross-disciplinary technology such as the basic of signal processing, machine learning/artificial intelligence, natural language processing, and game informatics. Students are expected to develop their abilities required for advanced scientists and engineers, such as problem-finding, modeling, implementation, evaluation, presentation and communication skills through their study.







Sustainable Innovation

To produce INNOVATION in building sustainable systems of environment, energy, economy, and society

■ Overview:

The sustainable innovation research area aims to create sustainable energy and materials through new methods such as novel photochemical reactions of natural materials, atomic layer materials, and single nanometer processing technology, and innovative photovoltaic cell/module manufacturing methods. We have taken on global challenges of Sustainable Development Goals (SDGs) based on the following six pillars:

1) Including processability of the liquid supermaterials,
2) Development of sustainable and highly functional nature-derived materials,
3) Ultra-sensitive sensors to detect silent voices of humans and nature and innovative nanoscale thermal control devices,
4) Physics of thermoelectric conversion, sustainable energy materials, and device applications,
5) Development of next-generation silicon-based solar cells through novel process technologies, and
6) Discoverable physical property mining that uses artificial intelligence (AI) theory.

We contribute to realizing a sustainable future symbiotic society by making cutting-edge fusion science through university-wide collaboration among materials science, information science, and knowledge science.

■ Keywords:

Sustainable Energy, Thermoelectrics, Solar Cells, Artificial Photosyntheses, Natural Molecules, Bioplastics, Silent Voice Sensing, Materials Informatics, Artificial Intelligence, Quantum Simulation, Eco-friendly Process

■ Education policy:

This research area is an interdisciplinary advanced research area composed of faculty members gathering from all over the university who have been promoting researches for building a sustainable society. We carry out comprehensive, integrated education and research by dealing with a wide range of science and technology related to the construction of a sustainable society, including basic research on atoms and molecules, material integration research such as bioplastics, energy conversion devices, and zero-power functional integration systems, and research on the development of materials informatics technology by making the most use of computational science. Students belonging to the laboratories in the sustainable innovation research area can gain deep insight based on study and research in the sustainability field and develop themselves to become leaders in the vanguard of contribution to sustainability.

Grobal Research Area Contributing to SDGs Achievement

Materials Chemistry Frontiers

Explore frontier of materials chemistry through molecular/atomic level design of new materials utilizing advanced knowledge in the field of chemistry

■ Overview:

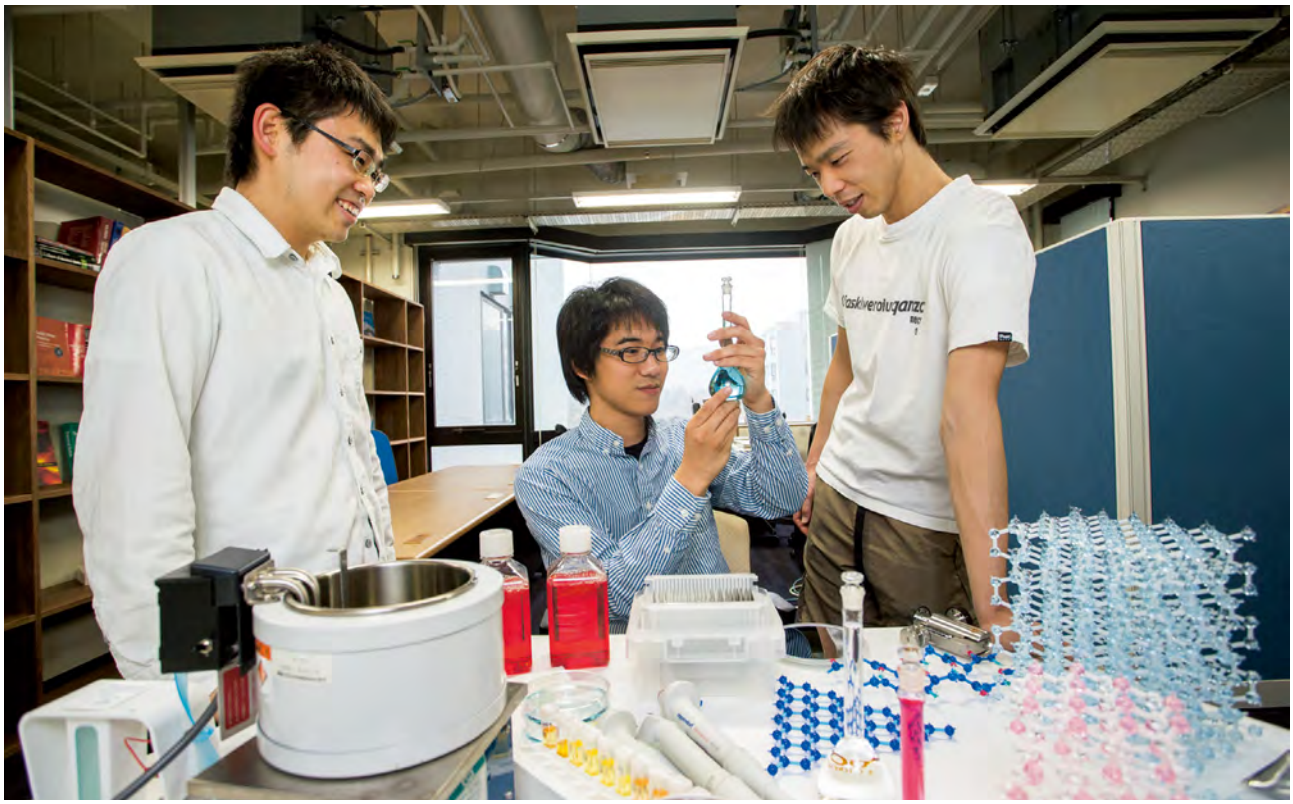
This area focuses on the design of novel functional and high-performance materials through basic and applied chemistry with the aid of advanced characterization facilities. We contribute to society by proposing innovative chemical products and fabrication processes to industries, which needs for the enriched sustainable society. Moreover, we aim to foster future researchers and technical experts who have the ability to develop new materials on the basis of design at the atomic and molecular levels with advanced knowledge of chemistry to explore frontiers of materials chemistry.

■ Keywords:

Nanomaterials Chemistry, Polymer Chemistry, Green Chemistry, Catalytic ChemistryEnergy, Related Materials, Eco-friendly Materials, Biomaterials, Materials Informatics, Nano Machine, High-Speed AFM Imaging, Rheology

■ Education policy:

We aim for students to equip not only the skill of advanced characterization for composition and structure of materials but also the ability to design basic structure of materials with new functions. On the basis of high level knowledge, students are expected to engage in creative academic research activities to explore frontiers of materials chemistry. In addition, we aim to nurture students to understand the technology and materials which are required in industries and contribute to society by the technology development and creation of new materials from the perspective of chemistry.



Nanomaterials and Devices

Our mission is to study cutting-edge science and technology of nanomaterials and devices for the realization of sustainable super-smart society.

■ Overview:

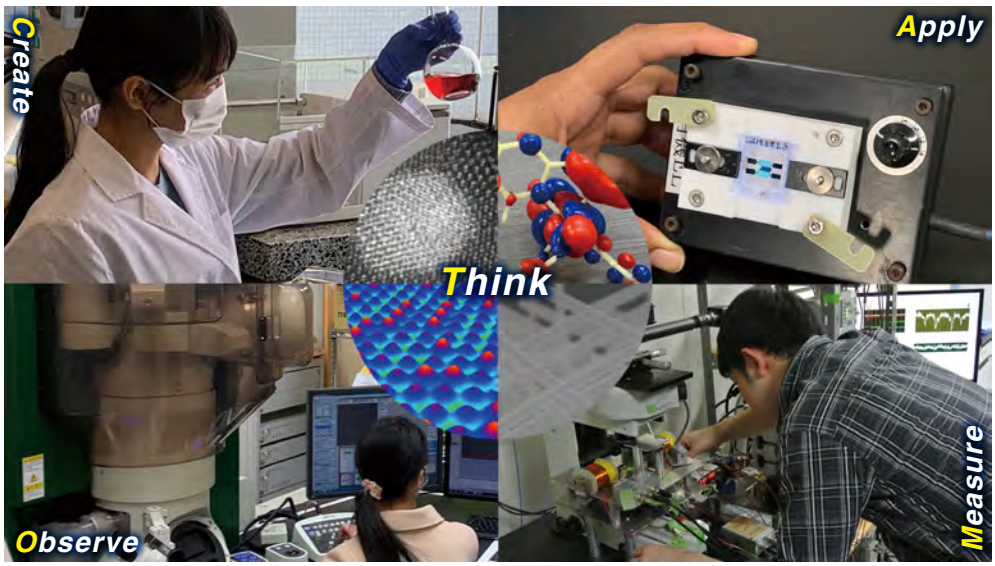
We are working on the synthesis/growth of "emerging nanomaterials" (nanoparticles, nanowires, 2D atomic layer materials, etc.) and their characterization using "cutting-edge methods" (atomic resolution microscopy and spectroscopy, surface-enhanced Raman spectroscopy, etc.) as well as their application in "devices and sensing" (ultrahigh-speed devices, flexible photonic devices, spintronic devices, bio sensing, ultra-trace sensing, quantum sensing, etc.). Furthermore, we aim at opening new frontiers in materials science by actively introducing "artificial intelligence and robotics" to our own research. Faculties and students with diverse backgrounds gather, interact, and carry out collaborative research in order to contribute to "the sustainable development of human society".

■ Keywords:

Nanoparticles, Nanowires, Two-dimensional Materials, Emerging Nanomaterials, Nanofabrication, Nanoimaging, Nanometrology, Nanospectroscopy, Quantum Technology, Sensing, Electronics, Spintronics, Nanopaper Devices, Organic Devices, Digital Transformation, Data-driven Materials Science

■ Education policy:

Nanoscience and technology are at the core of the modern materials science. Computational materials science together with nano-level fabrication, imaging, and metrology are utilized to design and analyze nanomaterials. Novel inorganic as well as organic nanomaterials controlled at atomic/molecular level are created, and innovative devices and sensing techniques are developed making full use of these materials. From now on, we expect application of information science, mechanical science, and robotics to materials science research will be further accelerated. We foster globally active researchers and engineers who take part in the sustainable development of our society and who will co-create the future of materials science with us.



Create, Observe, Measure, and Apply novel nanomaterials and devices of your own. Always Think about what is happening at the nanoscale (COMAT).
Outside photos: synthesized nanoparticles in a flask (upper left) a blue organic electroluminescent device (upper right) scanning transmission electron microscope observation (lower left) optically-detected magnetic resonance measurement (lower right)
Inner photos: transmission electron microscope image of nanoparticle (upper left) organic molecular model based on quantum chemical calculations (upper right) scanning tunneling microscope image of a 2D material (lower left) scanning electron microscope image of nanowires (lower right)

Bioscience, Biotechnology, and Biomedical Engineering

We will investigate cutting-edge technologies based on understanding of biological functions, and develop their applications in biomedical fields.

■ Overview:

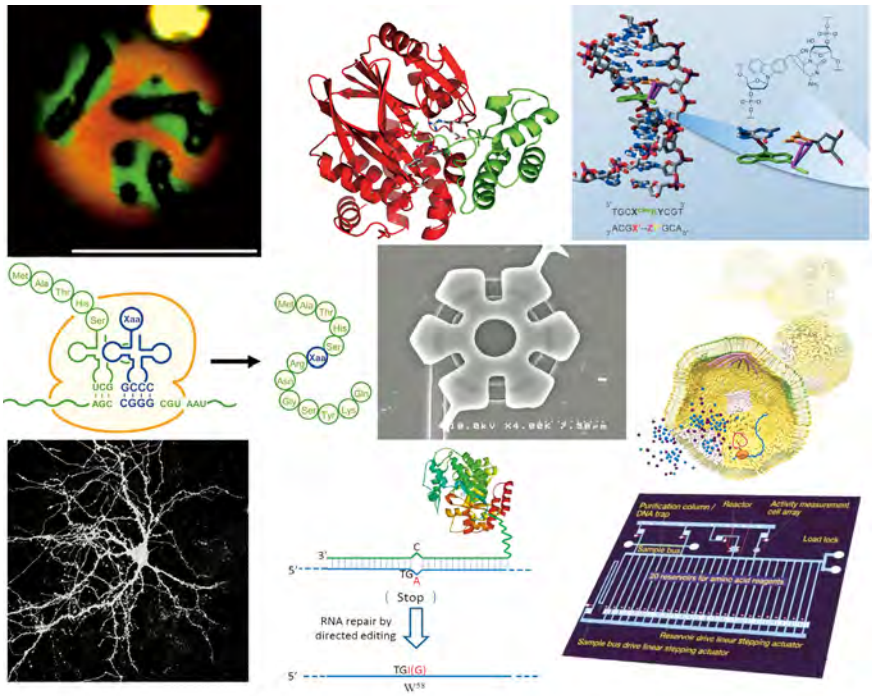
Living organisms exhibit a variety of biological functions derived from various biomolecules such as proteins, nucleic acids, lipid membranes, and sugar chains. In this research area, we investigate biological functions of these biomolecules in molecular and cellular levels through utilization of advanced biotechnologies including our unique biomolecular analysis technology, artificial biomolecule creation technology, biodevice technology, gene editing technology, molecular robotics technology, etc. We expand the application of our research achievements in biomedical and healthcare fields that contribute to the development of human health and medical care. We also work on the practical application and social implementation of our advanced biotechnologies in collaboration with industry.

■ Keywords:

Biotechnology, Biomedical, Protein, DNA/RNA, Biomembrane, Sugar Chain, Biomolecular Analysis, Artificial Biomolecule Creation, Biodevice, Gene Editing, Molecular Robotics

■ Education policy:

This area aims fundamental understanding of biological functions and their applications to biomedical and healthcare fields. Students belonging to this area will study basics and applications of biology and its related subjects including chemistry and physics, and explore advanced and challenging research topics under the excellent research environment equipped with the latest research instruments. Through these activities, they will learn scientific knowledge, experimental skills, and abilities required of researchers in this area. After graduation, they will work as scientists and experts who can contribute to solution of various problems in society from a view point of bioscience, biotechnology, and biomedical engineering.



Research topics in bioscience, biotechnology, and biomedical engineering resaech area