



Research Institute for Electronic Science, Hokkaido University

Message from RIES Director

The Research Institute for Electronic Science (RIES) at Hokkaido University was originally established as the Ultra-Shortwave Research Institute in 1943. It was later renamed the Institute of Applied Electricity in 1946 and reorganized into its current form in 1992. With a history spanning over 80 years, our institute has continuously evolved with the changing times, advancing cutting-edge research that spans optical science, materials science, life sciences, and mathematical sciences under our mission to pioneer new interdisciplinary fields.

Our research extends beyond pure academic inquiry. In pursuit of a sustainable society, we are dedicated to developing materials and devices that enhance energy efficiency and reduce environmental impact. In 1973, we established the affiliated Electronic Measurement Development Facility (now the Green Nanotechnology Research Center), focusing on creating next-generation environmentally harmonized technologies. Additionally, in 2015, we launched the Social Creativity Mathematics Research Center, integrating mathematical sciences to explore new research frontiers.

Advancing fundamental research into large-scale interdisciplinary domains requires robust collaboration. Since 2009, our institute has been a key participant in the Ministry of Education, Culture, Sports, Science and Technology's (MEXT) "Network Joint Research Center for Materials and Devices." We have formed strategic alliances with research institutions such as the Institute of Multidisciplinary Research for Advanced Materials at Tohoku University, the Chemical and Life Science Research Institute at Tokyo University of Science, the Institute of Scientific and Industrial Research at Osaka University, and the Institute for Materials Chemistry and Engineering at Kyushu University. Through these partnerships, we conduct over 400 joint research projects annually, generating numerous groundbreaking scientific achievements. Furthermore, we actively foster international research networks and cultivate young researchers through academic agreements with universities in Europe, the Americas, and Asia.

Our institute is also deeply committed to education. In collaboration with Hokkaido University's Graduate Schools of Information Science and Technology, Environmental Science, Life Science, Science, and Chemical Sciences and Engineering, we provide interdisciplinary research guidance to undergraduate and graduate students, nurturing the next generation of scientists and engineers.

The advancement of science and technology is the driving force shaping our future. At the Research Institute for Electronic Science, we will continue to embrace unrestricted and innovative thinking to create new knowledge and technologies. By translating our research findings into real-world applications, we strive to contribute to the realization of a sustainable future. We sincerely appreciate and look forward to your continued support and collaboration.



RIES Director **OHTA Hiromichi**

Organization

Section of Photonics and Optical Science

- Laboratory of Nanomaterials and Nanoscopy
- Laboratory of Coherent X-ray Optics
- Laboratory of Nanosystem Optical Manipulation
- Laboratory of Organic Quantum Optoelectronics

Section of Material and Molecular Sciences

- Laboratory of Photonic Nanomaterials
- Laboratory of Emergent Electronic Materials
- Laboratory of Advanced Supramolecular Materials

Section of Biology and Life Sciences

- Laboratory of Information Biophotonics
- Laboratory of Molecular Device
- Laboratory of Biomedical Data Science

Green Nanotechnology Research Center

- Laboratory of Nanostructured Functional Materials
- Laboratory of Functional Thin Film Materials
- Laboratory of Interactive Functional Material
- Office of Materials and Devices Research Strategies

Research Center of Mathematics for Social Creativity

- Laboratory of Mathematical Modeling
- Laboratory of Molecule and Life Nonlinear Sciences
- Laboratory of Mathematical and Physical Ethology
- Laboratory of Experimental Mathematics

Cooperative Research

- Laboratory of Social Cooperation Advisory
- Alliance Collaborative Research Laboratory
- Laboratory of New-paradigm computing
- Collaboration with the Center for Human Nature, Artificial Intelligence, and Neuroscience
- Joint Research and Education Center with College of Science, National Yang Ming Chiao Tung University (Taiwan)

Co-creative Research Support Department

- Nikon Imaging Center
- Promotion Office for International Alliance
- Nanotechnology and DX Center
- RIES-COS Joint Research and Education Center

Section of Technical Staffs

- System/Equipment Development Team
- Nanofabrication/Imaging Analysis Team

Section of Photonics and Optical Science

LABORATORY OF NANOMATERIALS AND NANOSCOPY

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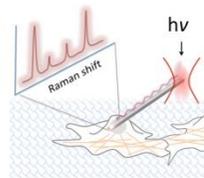
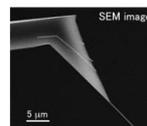
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PI: Prof. Hiroshi UJI-I, PhD; Assoc. Prof. Kenji HIRAI, PhD;
Assist. Prof. Farsai TAEMAITREE, PhD

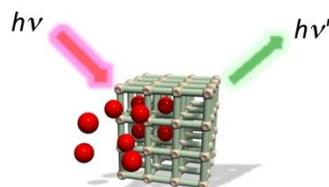
Outline

We develop novel nanoscopy based on nanomaterials and nano-photonics. Main research topics are control of chemical reactions via strong/weak coupling, and single-molecule Raman/fluorescence super resolution microscopy/spectroscopy using nanomaterials.



Research highlights

- Length-controllable gold-coated silver nanowire probes for high AFM-TERS activity, *Nano Lett.*, 2023, **23**, 1615–1621.
- Modulation of Prins cyclization by vibrational strong coupling, *Angew. Chem. Int. Ed.*, 2020, **59**, 5332–5335.
- FRET-based intracellular investigation of nanopodrugs toward highly efficient anticancer drug delivery, *Nanoscale*, 2020, **12**, 16710–16715.



Education

Graduate School of Information Science and Technology, Division of Information Science and Technology, Course of Bioengineering and Bioinformatics

Section of Photonics and Optical Science

LABORATORY OF COHERENT X-RAY OPTICS

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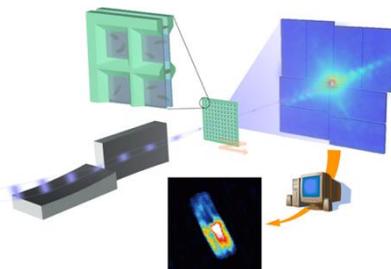
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PI: Prof. Yoshinori NISHINO, PhD;
Assoc. Prof. Akihiro SUZUKI, PhD

Outline

We are developing novel X-ray microscopy techniques using state-of-the-art X-rays such as X-ray free-electron lasers and synchrotron radiation, combined with information science approaches including deep learning.



We also develop custom sample cells using nanofabrication technologies. Our research aims to contribute to solving a wide range of challenges, from life sciences to environmental and energy issues.

Research highlights

- High-fluence and high-gain multilayer focusing optics to enhance spatial resolution in femtosecond X-ray laser imaging, *Nat. Commun.*, 2022, **13**, 5300.
- Femtosecond X-ray laser reveals intact sea-island structures of metastable solid-state electrolytes for batteries, *Nano Lett.*, 2022, **11**, 4603–4607.
- Imaging live cell in micro-liquid enclosure by X-ray laser diffraction, *Nat. Commun.*, 2014, **5**, 3052.

Education

Graduate School of Information Science and Technology, Division of Information Science and Technology, Course of Bioengineering and Bioinformatics

Section of Photonics and Optical Science

LABORATORY OF NANOSYSTEM OPTICAL MANIPULATION

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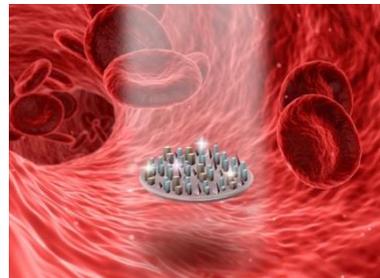
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PI: Prof. Yoshito TANAKA, PhD; Assoc. Prof. Ryuichi OHTA, PhD;
Assist. Prof. Shun HASHIYADA, PhD

Outline

We study the interactions of light with precisely designed artificial nanostructures, including plasmonic nanostructures, photonic crystals, metamaterials, and metasurfaces, from a viewpoint of optical momentum and angular momentum. Our goal is to create novel all-optical nanomanipulation and nanoactuators, by understanding and controlling these interactions, that will revolutionize a wide range of science and technology, from future medicine in nanosurgery, drug delivery, and healthcare to quantum mechanics and astronomy.



Research highlights

- Plasmonic linear nanomotor using lateral optical forces, *Sci. Adv.*, 2020, **6**, eabc3726.
- Radially Polarized Second-Harmonic Generation from a Single-Element Nanoantenna via Dark Plasmon Coupling of Nonlinear Polarization, *ACS Photon.*, 2022, **9**, 3649–3655.
- Rapid modulation of left- and right-handed optical vortices for precise measurements of helical dichroism, *Rev. Sci. Instrum.*, 2024, **95**, 053101.

Education

Graduate School of Information Science and Technology, Division of Information Science and Technology, Course of Bioengineering and Bioinformatics

Section of Photonics and Optical Science

LABORATORY OF ORGANIC QUANTUM OPTOELECTRONICS

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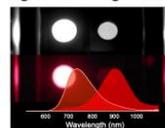


PI: Prof. Hajime NAKANOTANI, PhD; Assoc. Prof. Atsushi TAGUCHI, PhD;
Assist. Prof. Tomohiro ISHII, PhD

Outline

Manipulating light through matter and controlling matter through light represent crucial research themes for creating exciting value, including next-generation optoelectronic devices and novel optical measurement and manipulation technologies. Our research group aims to develop innovative optoelectronic devices and light manipulation techniques that will contribute to building a prosperous future society. This is achieved through comprehensive research from fundamental studies in condensed matter physics, semiconductor physics, photochemistry, quantum optics, and nano-optics.

Light-emitting device



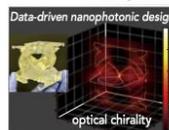
Quantum sensing



Energy harvesting



Nanoscale optics



Research highlights

- Anti-Stokes emission utilizing reverse intersystem crossing, *Angew. Chem. Int. Ed.*, 2025, **64**, e202419323.
- Nanoscale chirality enhancement using topology-designed 3D dielectric nanogap antennas, *Phys. Rev. Appl.*, 2025, **23**, L021002.
- Three-dimensional sensing of surfaces by projection of invisible electroluminescence from organic light-emitting diodes, *Sci. Adv.*, 2024, **10**, eadj6583.

Education

Graduate School of Information Science and Technology, Division of Information Science and Technology, Course of Electronics for Informatics

Section of Material and Molecular Science

LABORATORY OF PHOTONIC NANOMATERIALS

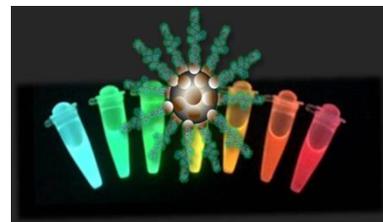
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PI: Prof. Vasudevan Pillai BIJU, PhD; **Assoc. Prof.** Yuta TAKANO, PhD;
Assist. Prof. Takuya OKAMOTO, PhD

Outline

Our research focuses on developing cutting-edge semiconductor nanomaterials and organic molecular tool boxes for next generation nanophotonics and biophotonics. Our main research interests are in light-matter-life interactions encompassing optically active functional nanomaterials, photofunctional molecules, and living cells.



Research highlights

- Mechano-optical modulation of excitons and carrier recombination in self-assembled halide perovskite quantum dots, *ACS Nano*, 2022, **16**, 160–168.
- Multimodal CTC detection using stem cell antigen-specific immunosilica particles and immunofluorescent quantum dots, *NPG Asia Mater.*, 2022, **14**, 1–8.
- Shape-dependent kinetics of halide vacancy filling in organolead halide perovskites, *Adv. Opt. Mater.*, 2021, **9**, 2170078.

Education

Graduate School of Environmental Science, Division of Environmental Materials Science, Course in Molecular Photonics and Electronics Science

Section of Material and Molecular Science

LABORATORY OF EMERGENT ELECTRONIC MATERIALS

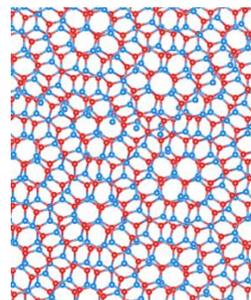
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PI: Prof. Kaya KOBAYASHI, PhD; **Assoc. Prof.** Kenji KONDO, PhD;
Assist. Prof. Ryohei OISHI, PhD

Outline

The devices we rely on every day are becoming increasingly compact and less noticeable, thanks to ongoing miniaturization efforts. This progress is driven not only by the development of smarter designs but also by the discovery of new materials and innovative device architectures. Our group focuses on the synthesis of novel materials and the exploration of their unique electronic properties—particularly those of materials that lack inversion symmetry.



Research highlights

- Chiral phonons: circularly polarized Raman spectroscopy and ab initio calculations in a chiral crystal tellurium, *Chirality*, 2023, **35**, 338–345.
- Hole doping and chemical pressure effects on the strong coupling superconductor PdTe, *Phys. Chem. Chem. Phys.*, 2022, **23**, 13331.
- Superconducting $3R\text{-Ta}_{1+x}\text{Se}_2$ with giant in-plane upper critical fields, *Nano Lett.*, 2020, **20**, 1725.

Education

School of Science, Department of Physics, Condensed Matter Physics

Section of Material and Molecular Science

LABORATORY OF ADVANCED SUPRAMOLECULAR MATERIALS

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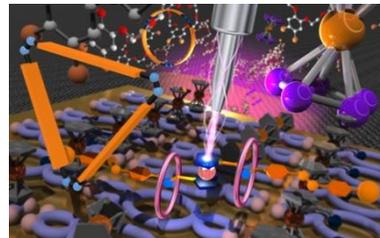
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PI: Prof. Masaki HORIE, PhD;
Assist. Prof. Kai-Jen CHEN, PhD

Outline

We develop advanced photo- and electronic materials based on organic molecules, tackling key challenges in materials science. Our work includes light-driven supramolecular machines in crystals and films, and the world's first molecule with reversible triangle-to-circle transformation. We also design conjugated molecules with tunable properties for innovative photoelectronic applications.



Research highlights

- Tris-azo triangular paraphenylenes: Synthesis and reversible interconversion into radial π -conjugated macrocycles, *J. Am. Chem. Soc.*, 2024, **146**, 10246–10250.
- Enhanced photorefractive performance by controlling ion-assisted charge injection and accumulation with random biphenyl co-polymerized poly(carbazoyl-amine), *Adv. Funct. Mater.*, 2024, **34**, 2409659.
- Photosalience and thermal phase transitions of azobenzene- and crown ether-based complexes in polymorphic crystals, *J. Am. Chem. Soc.*, 2023, **145**, 21378–21386.

Education

Graduate School of Environmental Science, Division of Environmental Materials Science, Course in Molecular Photonics and Electronics Science

Section of Biology and Life Sciences

LABORATORY OF INFORMATION BIOPHYSICS

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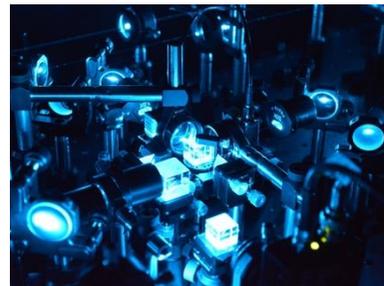
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PI: Prof. Hideharu MIKAMI, PhD; Assoc. Prof. Atsushi SHIBUKAWA, PhD;
Assist. Prof. Ayumu ISHIJIMA, PhD

Outline

The goal of our research is to bring revolutionary progress to life science through the creation of cutting-edge optical and information technologies. We will create new technologies that integrate photonics and information technology to provide unconventional measurement and experimental methods, thereby creating new developments in life science. Furthermore, we aim to give back to society through the practical application and commercialization of our research results. Through our research activities, we will create a new trend that spans academia and industry.



Research highlights

- Virtual-freezing fluorescence imaging flow cytometry, *Nat. Commun.*, 2020, **11**, 1162.
- Intelligent image-activated cell sorting, *Cell*, 2018, **175**, 266–276.e13.
- Wavefront engineering with disorder-engineered metasurfaces, *Nat. Photon.*, 2018, **12**, 84–90.

Education

Graduate School of Information Science and Technology, Division of Information Science and Technology, Course of Bioengineering and Bioinformatics

Section of Biology and Life Sciences

LABORATORY OF MOLECULAR DEVICE

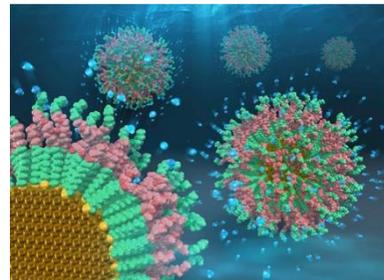
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Assoc. Prof. Hideyuki MITOMO, PhD

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Outline

Biomolecules autonomously assemble and show higher functionalities in the cell. By learning the nature system, our group is working on development of nanoparticle assemblies with controlled structures via self-assembly focusing on the surface properties derived from ligand coating and shape of the nanoparticles. As the gold nanoparticles show unique properties related to electronic, optical and biomedical applications, their assemblies are expected to be novel functional materials.



Research highlights

- Versatile nanoparticle capsule formation with enhanced encapsulation efficiency via solute-induced liquid-liquid phase separation, *Small*, 2025, **21**, 2502573.
- Chiral shape engineering combined with bimetallic nanostructures for high-performance plasmonic sulfide sensors, *Chem. Mater.*, 2025, **37**, 1221–1230.
- An ultra-sensitive surface-enhanced Raman scattering platform for protein detection via active delivery to nanogaps as a hotspot, *ACS Nano*, 2024, **18**, 21593–21606.

Education

Graduate School of Life Science, Division of Soft Matter

Section of Biology and Life Sciences

LABORATORY OF BIOMEDICAL DATA SCIENCE

PI: Prof. Koichi FUJIWARA, PhD;
Assist. Prof. Padinhare Kayakali HASHIM, PhD

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Outline

Deep learning has developed and achieved great success by relying on big data. In contrast, small data, which are rare in occurrence and costly to collect, have largely been neglected. We deliberately focus on such small data and aim to create new value unattainable by conventional approaches by incorporating human experience and tacit knowledge into our analyses. Specifically, we utilize clinical data to promote the development and practical implementation of novel medical devices and medical AI, ultimately contributing to the elucidation of disease mechanisms.



Research highlights

- IoT-based atrial fibrillation screening system, development and prospective study, *IEEE Internet Things J.*, 2025, **12**, 17661–17673.
- Polysomnographic features prior to dream enactment behaviors in isolated rapid eye movement sleep behavior disorder, *Clin. Neurophysiol.*, 2024, **166**, 74–84.
- Epileptic Seizure Prediction Based on Multivariate Statistical Process Control of Heart Rate Variability Features, *IEEE Trans. Biomed. Eng.*, 2016, **63**, 1321–1332.

Education

Graduate School of Life Science, Division of Life Science, Transdisciplinary Life Science Course

LABORATORY OF NANOSTRUCTURED FUNCTIONAL MATERIALS

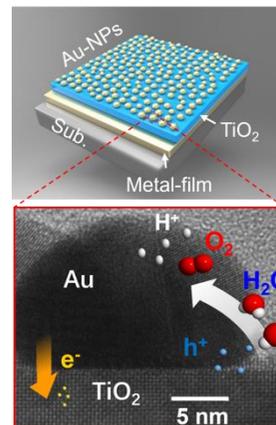
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PI: Prof. Yasutaka MATSUO, PhD;
 Assoc. Prof. Xu SHI, PhD

Outline

We are focusing on the nano- to micrometer-scale structures fabricated on the surfaces of materials and at interfaces between different materials, which induce unique physical and chemical phenomena. In particular, we create biomimetic surfaces based on various surface structures of living organisms and metal/semiconductor nanostructures, and aim to develop novel devices for controlling light, heat, and electrons.



Research highlights

- Friction reduction effect caused by microcontact and load dispersion on the moth-eye structure, *Adv. Eng. Mater.*, 2024, **26**, 2401405.
- A new concept for an adhesive material inspired by clingfish sucker nanofilaments, *Langmuir*, 2022, **38**, 1215–1222.
- Enhanced water splitting under modal strong coupling conditions, *Nat. Nanotechnol.*, 2018, **13**, 953–958.

Education

Graduate School of Engineering, Division of Applied Physics, Nano-scale Applied Physics

LABORATORY OF FUNCTIONAL THIN FILM MATERIALS

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PI: Prof. Hiromichi OHTA, PhD; Assoc. Prof. Tsukasa KATAYAMA, PhD;
 Assoc. Prof. Yuzuru SATO, PhD; Assist. Prof. Ahrong JEONG, PhD

Outline

We fabricate high-quality thin film materials with the atomically flat surface to extract the intrinsic performance and develop novel devices. Especially, we develop thermal switches, which can control heat flow electrically, and novel materials for advanced smartphones.



Research highlights

- High-performance solid-state electrochemical thermal switches with earth-abundant cerium oxide, *Sci. Adv.*, 2025, **11**, eads6137.
- Solid-state electrochemical thermal transistors, *Adv. Funct. Mater.*, 2023, **33**, 2214939.
- Significant suppression of cracks in freestanding perovskite oxide flexible sheets using a capping oxide layer, *ACS Nano*, 2022, **16**, 21013.

Education

Graduate School of Information Science and Technology, Division of Information Science and Technology, Course of Electronics for Informatics

LABORATORY OF INTERACTIVE FUNCTIONAL MATERIAL

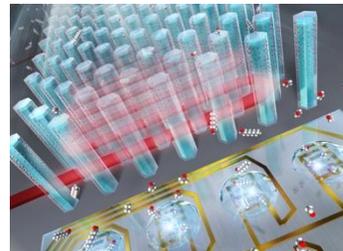
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PI: Prof. Kazuki NAGASHIMA, PhD; **Assoc. Prof.** Yohei YOMOGIDA, PhD;
Assist. Prof. Sayuki OKA, PhD

Outline

While conventional electronic materials and devices have been isolated from the environment, materials/devices for collecting chemical information from humans and environments should positively interact with them. Our lab aims to develop a novel platform of "interactive electronics" by designing electronic materials/devices at atomic/molecular scale. We pursue fusion science over materials, devices and data, and take on the challenge of creating new value through nanomaterial chemistry.



Research highlights

- Water-selective nanostructured dehumidifiers for molecular sensing spaces, ACS Sens., 2022, 7, 534–544.
- Synthesis of arrayed tungsten disulfide nanotubes, Nano Lett., 2024, 24, 14286–14292.
- Selective growth of ZnO nanosheets via ionic layer epitaxy for UV photodetection application, ACS Appl. Nano Mater., 2025, 8, 2623–2631.

Education

Graduate School of Chemical Sciences and Engineering, Materials Chemistry and Engineering Course

LABORATORY OF MATHEMATICAL MODELING

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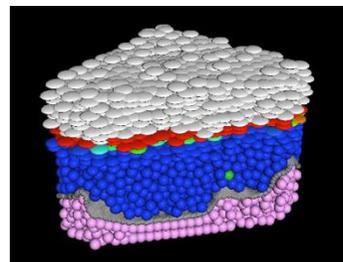


PI: Prof. Masaharu NAGAYAMA, PhD; **Assoc. Prof.** Yuki UEDA, PhD;
Assist. Prof. Hiroshi ISHII, PhD; **Assist. Prof.** Hiroshi NISHINO, PhD

Outline

With mathematical modeling, numerical analysis, and mathematical analysis forming the foundation of our research, we aim to understand biological and other natural phenomena from the perspective of the mathematical sciences. The main research topics are the following:

- Mathematical analysis of self-propelled motion
- Mathematical modeling of life sciences
- Pattern formation problems of reaction-diffusion systems
- Error analysis for the finite element method



Research highlights

- Propagating front solutions in a time-fractional Fisher-KPP equation, Discrete and Dynamical Continuous Dyn. Syst. Ser. B, 2025, 30, 2460–2482.
- On the reaction-diffusion type modelling of the self-propelled object motion, Sci. Rep., 2023, 13, 12633.
- Analysis of fully discrete finite element methods for 2D Navier-Stokes equations with critical initial data. ESAIM: Mathematical Modelling and Numerical Analysis (ESIAM:M2AN), 2022, 56, 2105–2139.

Education

School of Science, Department of Mathematics

LABORATORY OF MOLECULE AND LIFE NONLINEAR SCIENCES

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PI: Prof. Tamiki KOMATSUZAKI, PhD; Assoc. Prof. Koji TABATA, PhD;
 Assist. Prof. Jizhou LI, PhD; Assist. Prof. Goro NISHIMURA, PhD

Outline

The purpose of our laboratory is to understand the fundamental principles of chance and necessity of “change of states”, and to construct new concepts and methodologies in terms of data-driven mathematical sciences, enabling us to unveil the mechanisms that bridge molecules and life across hierarchies in time and space.



Research highlights

- An encompassed representation of timescale hierarchies in first-order reaction network, Proc. Natl. Acad. Sci. USA, 2024, **121**, e2317781121.
- On-the-fly Raman microscopy guaranteeing the accuracy of discrimination, Proc. Natl. Acad. Sci. USA, 2024, **121**, e2304866121.
- Posterior tracking algorithm for classification bandits, Proc. 26th Intern. Conf. on Artificial Intelligence and Statistics (AISTATS), 2023, **206**, 10994–11022.

Education

School of Science, Department of Mathematics

LABORATORY OF MATHEMATICAL AND PHYSICAL ETHOLOGY

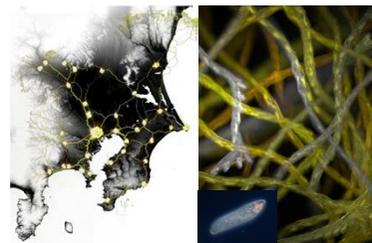
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PI: Prof. Toshiyuki NAKAGAKI, PhD; Assoc. Prof. Yukinori NISHIGAMI, PhD;
 Assist. Prof. Takuya OHMURA, PhD

Outline

Soft matter physics that deals with soft and largely deformable materials is a necessary tool for mechanical understanding of motion, deformation and growth of biological systems such as cells, tissues and organisms. Based on these ideas, we are investigating characteristic and functional behaviors of various biological systems, by inventing unique experimental setup. We focus on unicellular organisms of amoebae and ciliates, and observe how they behave in complicated conditions and propose a mathematical model in terms of soft matter physics. Based on the model simulation and analysis, we seek algorithms of how they process information and behavioral smartness.



Research highlights

- Measurement of protoplasmic streaming over the entire body of Physarum plasmodium, and estimation of the transport and mixing of protoplasm through the intricate vein network. Biophys. Physicobiol., 2025, **22**, e220002.
- Caenorhabditis elegans transfers across a gap under an electric field as dispersal behavior, Curr. Biol., 2023, **33**, 2668–2677.
- Light-sheet microscopy reveals dorsoventral asymmetric membrane dynamics of Amoeba proteus during pressure-driven locomotion, Biol. Open, 2022, **12**, bio059671.

Education

Graduate School of Life Science, Division of Soft Matter

LABORATORY OF SOCIAL COOPERATION ADVISORY

Guest Prof. Katsuaki SUGANUMA; Guest Prof. Toyohiko KONNO;
Guest Prof. Naoko OKAMURA

ALLIANCE COLLABORATIVE RESEARCH LABORATORY

Guest Prof. Tomoki NEMOTO; Guest Assoc. Prof. Yoshiaki NISHIJIMA

LABORATORY OF NEW-PARADIGM COMPUTING

Guest Prof. Masanao YAMAOKA; Guest Prof. Takashi TAKEMOTO;
Guest Prof. Takayuki HASHIMOTO

COLLABORATION WITH THE CENTER FOR HUMAN NATURE, ARTIFICIAL INTELLIGENCE, AND NEUROSCIENCE

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(concurrent position) Assoc. Prof. Hiroyuki IIZUKA;
(concurrent position) Assoc. Prof. Katsunori MIYAHARA;
(concurrent position) Assoc. Prof. Keisuke SUZUKI

JOINT RESEARCH AND EDUCATION CENTER WITH COLLEGE OF SCIENCE, NATIONAL YANG MING CHIAO TUNG UNIVERSITY (TAIWAN)

Guest Prof. Yaw-Kuen LI; Guest Prof. Yuan-Pern LEE;
Guest Prof. Eric Wei-Guang DIAU; Guest Prof. Jiunn-Yuan LIN;
Guest Prof. Jiun-Tai CHEN; Guest Prof. Yu-Miin SHEU



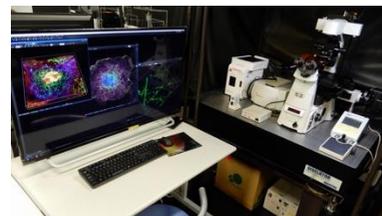


NIKON IMAGING CENTER

Director: Prof. Hideharu MIKAMI, PhD; **Prof.** Yasutaka MATSUO, PhD;
Specially Appointed Assist. Prof. Yusuke TOMINA, PhD;
Tech. staff Kentaro KOBAYASHI, Wakako NAKANO

Outline

Nikon Imaging Center provides cutting edge light microscopy instruments to researchers not only in Hokkaido University but also throughout Japan. Our missions are: To enhance scientific research by providing of advanced microscopy and imaging equipment; To provide technical support for high quality imaging; To hold seminars on basic and advanced light microscopy techniques for users; To develop novel microscope systems and imaging techniques reflecting demands of users.



High Speed Confocal Microscope



Multi-Photon Confocal Microscope

Usage

Usage frequency: 2500 hours, 500 users per year
Publications by users: 114 papers (2005-2022)



NANOTECHNOLOGY AND DX CENTER

Prof. Yasutaka MATSUO, PhD; **Assoc. Prof.** Xu SHI, PhD
Specially Appointed Assist. Prof. Takashi ENDO, PhD

Outline

We support the research and development by nano/ micro fabrication techniques using EB lithography, Atomic Layer Deposition system, Clean Room environment and so on, and advanced characterization of nanomaterials using Cs-STEM, FE-SEM, XPS. Technical consultation, equipment training and technical support will be carried out to other universities, public institutions, corporate users. We also actively accept collaborative research.



Research highlights

- Growth of α -Al₂O₃ layer involving abnormal oxides in FeCrAl alloy tube fabricated by WEDM process and electrical insulating performance in fusion reactor blanket, Surf. Coat. Technol., 2024, **493**, 131250.
- Chiroptical response of an array of isotropic plasmonic particles having a chiral arrangement under coherent interaction, Photochem. Photobiol. Sci., 2025, **24**, 13–21.



SECTION OF TECHNICAL STAFFS

System/Equipment Development Team

Team Leader: Masashi TAKEI

- Equipment Development/Machining Group
Masashi TAKEI (Chief)
- System Development Group
Michiaki ENDO (Chief); Ko ONISHI; Aya TOGASHI
- Public Relations Group
Itsuko IMAMURA;
Wakako NAKANO (concurrent position);
Aya TOGASHI (concurrent position)



Equipment Development/Machining Group designs, develops, and produces laboratory instruments using various machine tools. We receive orders from all departments on campus and off campus through the Global Facility Center's Prototype Machining Solution Project.

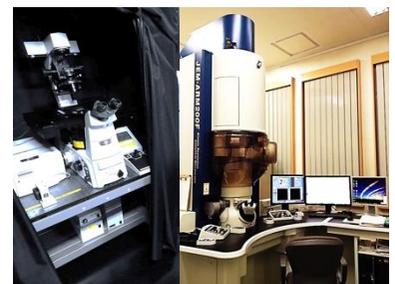
System Development/Public Relations Group provides support for the operation and management of the institute's website, as well as system development using IoT technology, public relations and information network-related tasks.

Nanofabrication/Imaging Analysis Team

Team Leader: Kentaro KOBAYASHI

- Nanofabrication Group
Ko ONISHI (Chief); Toshiya KOJIMA
- Electronic Microscope Analysis Group
Naomi HIRAI (Chief); Yuko MORI
- Optical Microscope Analysis Group
Kentaro KOBAYASHI (Chief); Wakako NAKANO

Nanofabrication/Imaging Analysis Team provides technical support to maintenance and management of clean rooms and common facilities, the Nikon Imaging Center, guidance on use, nano-fabrication and imaging analysis, and also receives technical consultation on them.



Both teams are also provide assistance related to the entire laboratory, such as events and support for liquefied nitrogen training sessions.

NETWORK JOINT RESEARCH CENTER FOR MATERIALS AND DEVICES

【E-mail / Website】
njrc@sanken.osaka-u.ac.jp
<https://five-star.sanken.osaka-u.ac.jp/en/>



Materials-Light-Life-Mathematics Complex Science Research Area

Head: Prof. Yasutaka MATSUO, PhD;

Deputy Head: Prof. Kazuki NAGASHIMA, PhD

Outline

The Joint Research Network of Materials and Devices is a hub network established under the principle of joint usage and collaborative research, designed to enable researchers to carry out joint studies beyond the confines of their respective institutions. The Research Institute for Electronic Science (RIES), Hokkaido University, has been participating since FY2010, and has been actively collaborating with the following institutes:

- Institute of Multidisciplinary Research for Advanced Materials (IMRAM), Tohoku University
- Laboratory for Chemistry and Life Science, Institute for Integrated Research (IIR-CLS), Institute of Science Tokyo
- SANKEN, The University of Osaka
- Institute for Materials Chemistry and Engineering (IMCE), Kyushu University.

Moving forward, we will continue to strengthen collaboration with research communities both domestically and internationally, and support joint research to further advance material innovation.



Open call program

To foster the creation and development of new interdisciplinary research areas in the field of materials and devices, the Network Joint Research Center for Materials and Devices conducts an annual open call for researchers affiliated with national, public, and private universities as well as public research institutions. Various programs are available, including the Basic Joint Research Program for exploratory studies, the Crossover Joint Research Program for interdisciplinary collaboration, and the Collaborative Research Laboratory (CORE-Lab) Program that supports mid- to long-term stays at host institutes. Each year, approximately 500 projects are selected, among which about 90 joint research projects are conducted at the RIES.



At the activity report meeting of the network held at Hokkaido University, the 7th Joint Research Award for Materials and Devices was presented to the award recipients.



RIES Alliance Committee Chair: Prof. Yasutaka MATSUO, PhD;
RIES Alliance Vice Chair : Prof. Kazuki NAGASHIMA, PhD

Outline

The “**Crossover Alliance to Create the Future with People, Intelligence, and Materials**” is a highly unique initiative in which five national and public university research institutes across Japan form a complementary and cooperative network through mutual collaboration in their respective fields of expertise. The alliance comprises approximately 150 Principal Investigators (PIs), and the total number of full-time faculty members, including young researchers, exceeds 400. To provide a comprehensive, cross-sectional perspective that transcends individual fields and institutes, the Alliance is organized and operated through four research groups:

G1: Electronics

G2: Environment and Energy

G3: Biofunction

GC: Information, Mathematics, and Artificial Intelligence



Activity

- CORE²-A Laboratory: Cross-institutional collaborative research aimed at solving social challenges.
- Young Feasibility Study Program: Joint research projects designed to foster and support young researchers.
- Knowledge Ecosystem: Promotes advanced research and the social implementation of its outcomes through data-driven approaches.
- Humanities and Social Science Lectures: Exchange and lecture programs aimed at fostering integration with the humanities and social sciences.

Support

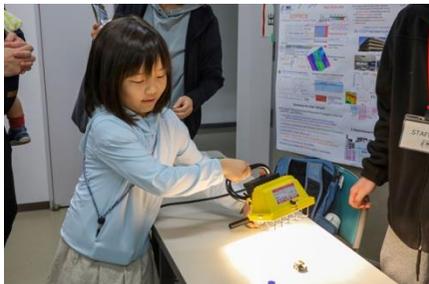
- Organizing subcommittees to promote collaboration among researchers in related fields and to facilitate matching with researchers from different disciplines.
- Providing back-end support for the acquisition of external research funding.
- Promoting collaboration and joint research with other universities, public institutions, and private companies.



G2 Subcommittee at the Stage for Co-creation, Resonac, Yokohama

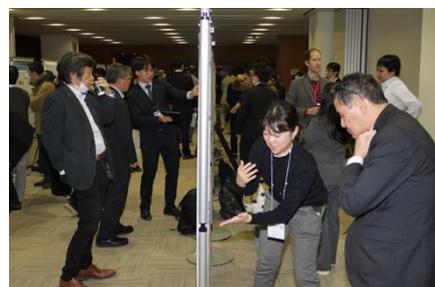
Open day

Every early summer, RIES opens its facilities to the public, offering many booths mainly for elementary school students. It provides a great opportunity to experience science firsthand and is popular as a gateway to discovery.



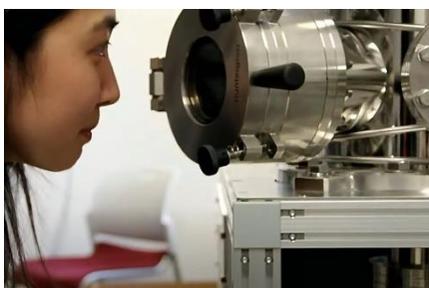
International symposium

The annual international symposium brings leading scientists from around the world to Hokkaido to present and discuss cutting-edge research in light, materials, life sciences, and mathematics.



Global environment

RIES hosts many international students, creating a global atmosphere. It also maintains exchange agreements with universities worldwide, promoting active international collaboration and research exchange.



FOR STUDENTS INTERESTED IN RIES

To those aspiring to become future researchers: Would you like to take on cutting-edge research in a world-class environment?

- About 100 students take part in advanced research while developing their expertise.
- Through leading-edge projects, you can develop the skills to thrive on the global stage.
- With strong mentorship and excellent facilities, we fully support your growth.

If you wish to pursue a **Master's or Doctoral degree at Hokkaido University**,
please contact the laboratory you are interested in directly.

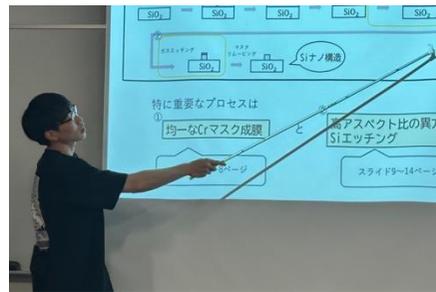
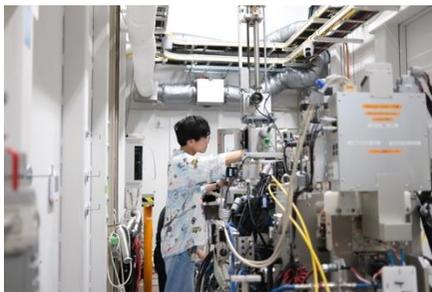
For details on the graduate schools to which each laboratory belongs,
please refer to this brochure or the URL below.

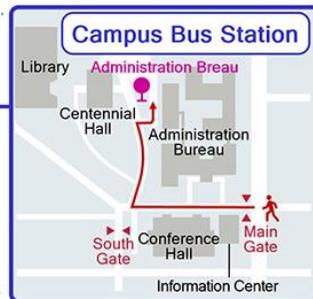
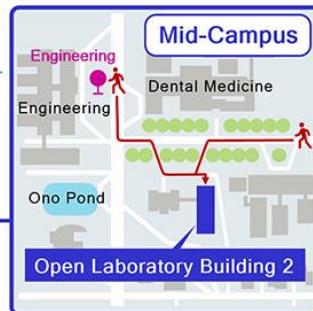
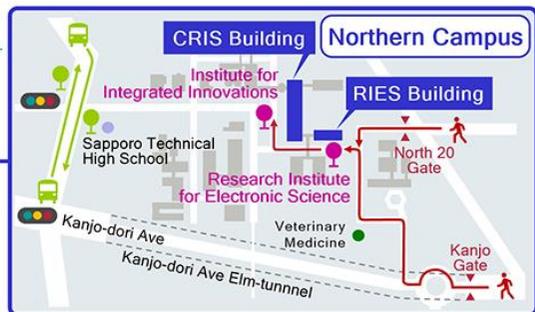
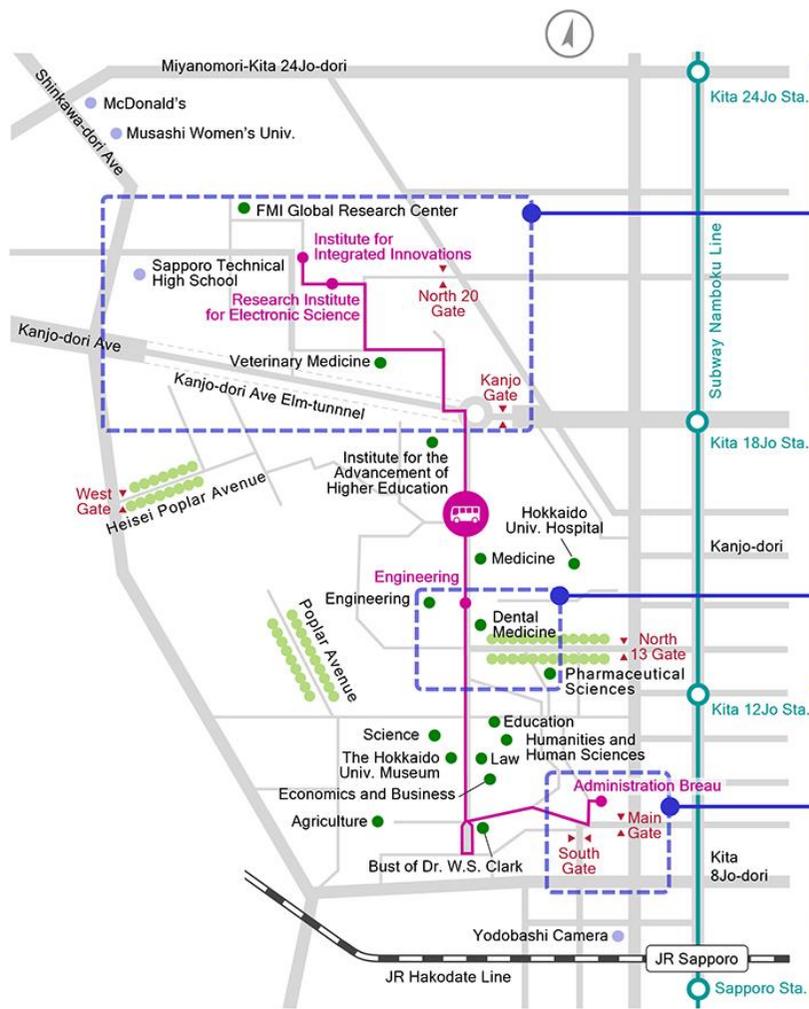
<https://www.es.hokudai.ac.jp/en/education/graduate-students/>



If you wish to enroll as a **research student** before entering a degree program,
please refer to the URL below for more information.

<https://www.es.hokudai.ac.jp/en/education/research-students/>





-  **Campus Bus**
8:15-20:20
Free Every 15-20min
-  **Bus**  **On Foot**

