グリーン科学技術研究所

Research Institute of Green Science and Technology

国立大学法人
静岡大学







The Research Institute of Green Science and Technology was established to promote green innovation, ranging from basic research to practical applications. It focuses on developing new science and technology in the fields of environment, energy, biotechnology, and chemistry. Its mission is to contribute to the realization of a sustainable, low-carbon society in harmony with nature through the regeneration and utilization of Earth's resources and energy.

Director's Greeting



Deepening, Evolving, and Flowering Green Science and Technology, and Creating a Green Society

The impact of global environmental degradation and climate change is now widely recognized as a serious threat to the survival of all living organisms. Addressing these challenges requires an interdisciplinary approach that integrates cutting-edge research from diverse fields. The Research Institute of Green Science and Technology (RIGST) was established in April 2013 with the mission of developing advanced science and technology to tackle these pressing social and environmental issues. Since then, with the adoption of the Sustainable Development Goals (SDGs) in 2015 and the declaration of carbon neutrality (CN) in 2019, the Institute has positioned itself as a pioneering organization dedicated to addressing these global challenges.

History of RIGST: From Phase I to Phase 3 (2013–2021)
Under the leadership of Director Park, the Institute was structured into three divisions:
1. Green Energy Research Division
2. Green Biotechnology Research Division
3. Green Chemistry Research Division

Additionally, a Research Support Office was established to provide technical assistance to these divisions. Throughout the first three phases (2013–2021), researchers engaged in fundamental and innovative studies to establish a systematic framework for green science and technology.

As a result, in FY2022, RIGST achieved the highest national performance in Japan in the Integrated Science Division in terms of:
1. The number of peer-reviewed research publications per faculty member
2. The number of Grants-in-Aid for Scientific Research per faculty member
3. The total amount of Grants-in-Aid for Scientific Research per faculty member

Furthermore, we have strengthened collaborations with companies and local governments both in Japan and internationally, fulfilling our social responsibility. Special emphasis was placed on global outreach, particularly in fostering cooperation with Asian countries, laying a solid foundation for the advancement of green science and technology.

Initiatives for the Fourth Phase of RIGST (2022–2024)
During the fourth phase (2022–2024), under Director Mase, we promoted the deepening, evolution, and flowering of green science and technology in the fields of health, food, and the environment, building upon our accumulated achievements.
1. Deepening refers to advancing fundamental research and exploration.
2. Evolution represents the development of interdisciplinary research.
3. Flowering signifies the realization of social implementation.

Through these initiatives, we sought to enhance institutional growth while leveraging the expertise of each researcher. Furthermore, we prioritized the establishment of a robust institutional framework that enables young researchers to be active.

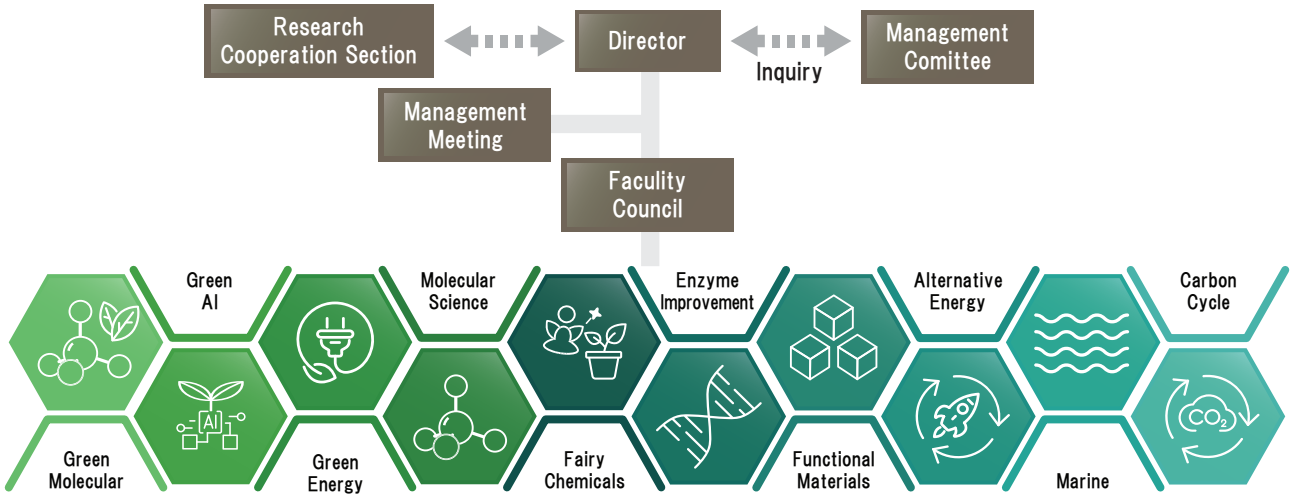
Prospects for the Fifth Phase of RIGST (2025–2027)
In the fifth phase (2025–2027), the Institute will align with Shizuoka University's core philosophy, "Free Enlightenment and Future Creation," and continue to lead advancements in green science and technology. Specifically, we will establish an organizational structure focused on:
GII: Building a Green Society
GIII: Promoting Ocean Research

These initiatives will contribute to realizing the Shizuoka University Vision for the Creation of the Future. Additionally, we will introduce a hierarchical organizational research promotion system, refining it through iterative trials and improvements to ensure a sustainable research framework.

Furthermore, we will implement data-driven faculty quality assurance in research, fostering an environment where faculty members can fully dedicate themselves to their research.

The RIGST will remain committed to deepening, evolving, and flowering, striving to address critical social and environmental challenges.

Organization Chart









SUSTAINABLE DEVELOPMENT GOALS

Introduction

Research Institute for Green Science and Technology
– Pioneering a Green Society through Interdisciplinary Innovation –

The Research Institute for Green Science and Technology at Shizuoka University serves as a hub for scientific and technological advancement aimed at preserving the global environment and addressing challenges related to resources and energy. Since its establishment in 2013, the Institute has pursued comprehensive green innovation—integrating diverse fields such as environmental science, energy, biotechnology, and chemistry—from fundamental research to practical applications and societal implementation.

The Institute is organized around eight research cores, each driven by a distinct vision. These include the cutting-edge "Excellence Cores" (Green Energy, Green Molecules, Green AI), which lead future innovation, and the forward-looking "Next-Generation Cores" (New Energy, Solid-State Materials, Molecular Chemistry, Functional Enzymes, Fairy Chemicals), which foster emerging technologies. Working collaboratively, these cores inspire one another and generate new value through interdisciplinary synergy.

Our approach is simple but powerful: when diverse perspectives and technologies converge, solutions emerge that would be impossible to discover in isolation. The outcomes of our research extend to education, industry–government–academia partnerships, and international collaboration—contributing directly to solving real-world issues.

Through "deepening research," "advancing interdisciplinary research," and "blossoming into societal implementation," we continue to shape the future of green science and technology.

Goals

Mission of the Research Institute for Green Science and Technology
The Research Institute for Green Science and Technology at Shizuoka University is committed to building a sustainable future society through green science and technology. Our mission is founded on the following three pillars:

1. Promoting technology transfer and human resource development for the realization of a low-carbon, resource-circulating society
We aim to create and implement innovative technologies that contribute to the regeneration and effective use of natural resources and renewable energy. At the same time, we foster the development of highly skilled researchers and engineers while advancing glocal (global + local) education and research that bridges communities and the world.

2. Developing technologies in harmony with nature and establishing methods to assess their social and environmental impact
By advancing eco-friendly technologies such as renewable energy use, resource recycling, and systems for environmental preservation, we contribute to the conservation of ecosystems and coexistence with natural systems. We also work to establish robust methodologies to evaluate these technologies' environmental, ethical, and social impacts in practical applications.

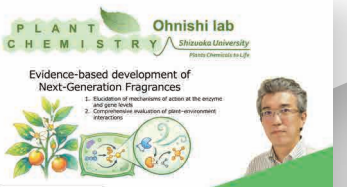
3. Pioneering new academic contributions to a safe, secure, and circular society through the application of biological functions
By leveraging biological capabilities such as molecular recognition and enzyme functions, we aim to develop technologies that address societal challenges, including aging populations, health, and welfare. Our goal is to contribute to a more sustainable and inclusive society grounded in bio-based and renewable resources.

Research Cores and Researchers

Excellence Cores
Fostering
Emerging Technologies

Green Molecular
Research Core

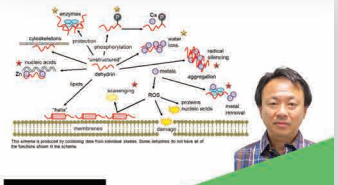
Our goal is to improve the productivity of crops with enhanced resistance to environmental stresses such as climate change. This involves exploring and developing stress management compounds at the molecular level, as well as elucidating new molecular mechanisms to reduce environmental stress.



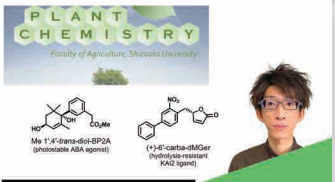
Professor
Toshiyuki Ohnishi
Our goal is that elucidation of plant chemical defensive system against multiple and pressing environmental stress.



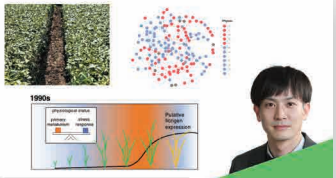
Professor
Hideo Dohra
Studies on the molecular mechanisms of physiological functions in mushrooms and entomopathogenic fungi using genomic functional analysis



Professor
Masakazu Hara
Research and development of plant heat tolerance enhancers which are agricultural technologies for adapting to global warming



Associate Professor
Jun Takeuchi
Development of plant growth regulators that control plant hormone responses and Elucidation of their molecular mechanisms of action



Assistant Professor
Hiroto Yamashita
Studies on adaptation strategies of plants to several environments based on omics science and its application to crop production

Green AI
Research Core

In addition to aiming to maximise the performance and efficiency of artificial intelligence technology while minimising its environmental impact, we are also conducting applied research into the use of green AI to solve environmental problems and achieve a sustainable society.



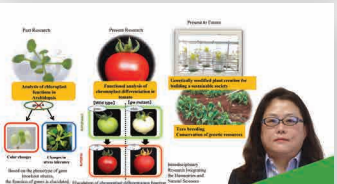
Professor
Hiroshi Mineno
Multimodal IoT/AI for field-informatics



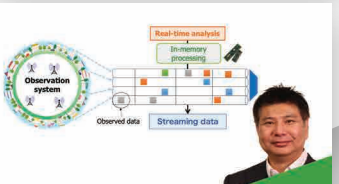
Professor
Takashi Ikka
Research and development of plant heat tolerance enhancers which are agricultural technologies for adapting to global warming



Professor
Yoshinobu Kano
Natural language processing for clinical applications



Professor
Reiko Motohashi
Mechanism of plastid development and differentiation in plant cells

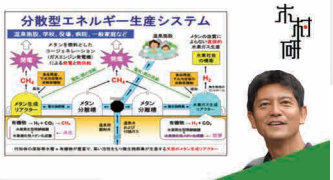


Associate Professor
Yoshitaka Yamamoto
Real-time sensor information processing and intelligent manufacturing

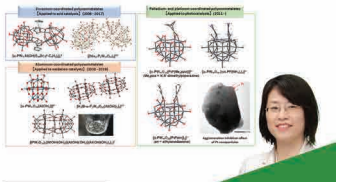
Research Cores and Researchers

Green Energy
Research Core

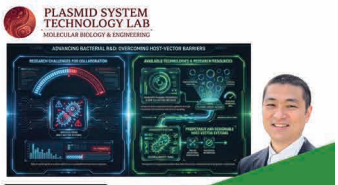
With the aim of reducing carbon dioxide emissions, achieving carbon neutrality, preventing global warming, and improving Japan's energy self-sufficiency, we are promoting the creation of new energy production technologies that utilize microbial complexes and chemical catalysts, and their social implementation through industry-government-academia collaboration.



Professor
Hiroyuki Kimura
Development and social implementation of energy production systems utilizing methane and anaerobic microbial communities from deep aquifers associated with accretionary prisms



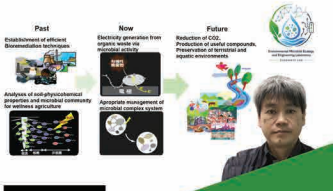
Professor
Chika Kato
Design of High-performance Structures using Cluster Molecules and Application to Environmental Catalysts



Professor
Masaki Shintani
Behaviors of conjugative plasmids in microbial community



Professor
Hirofumi Hirai
Woody biorefinery and bioremediation with white-rot fungi



Professor
Hiroyuki Futamata
Creation of a low-carbon and recycle society by appropriate managing of microbial ecosystems

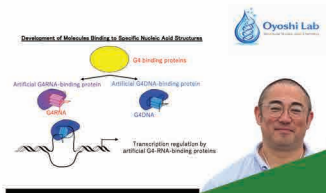
Next-Generation Cores
Fostering
Emerging Technologies

Molecular Science
Research Core

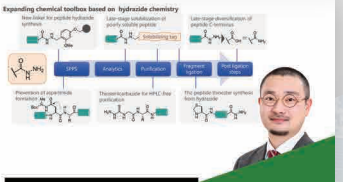
We develop molecular technologies aimed at enhancing and controlling the functions of small molecules and biomolecules. Our research primarily involves the development of artificial molecules and chemical tools for mid-sized drug modalities, including peptides and nucleic acids.



Professor
Tetsuo Narumi
Development of Highly Functional Molecules for Drug Discovery



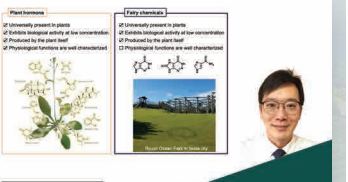
Associate Professor
Takanori Oyoshi
Function of local nucleic acid structures related to disease



Associate Professor
Kohei Sato
Development and applications of chemical toolbox for peptide and protein synthesis

Fairy Chemicals
Research Core

By combining natural products, biotechnology, and manufacturing, we aim to elucidate the interactions between the environment and living organisms, explore the physiological functions of natural compounds, and conduct research into the synthesis of their derivatives for practical application in society, thereby creating science and technology for a sustainable society.



Professor
Choi Jae-Hoon
Biochemical elucidation of the significance of natural products in biological phenomena



Professor
Tatsuya Kato
Production of biomaterials using biotechnology platforms

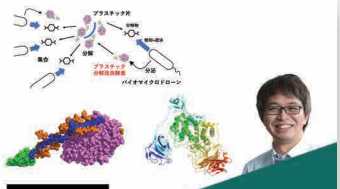


Professor
Nobuyuki Mase
Green organic chemistry: chemical technology can save lives

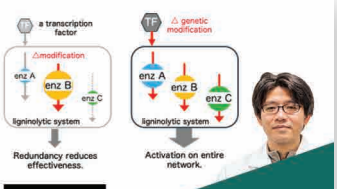
Research Cores and Researchers

Enzyme Improvement
Research Core

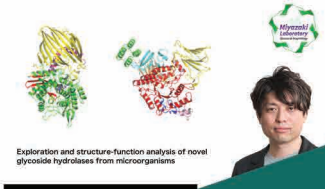
We are exploring the functional analysis of enzymes, artificial evolution, and microbial interactions. We are developing methods to efficiently recycle resources, purify the environment, and produce useful substances using the power of enzymes and the microorganisms that produce them.



Professor
Akihiko Nakamura
Improvement of solid polymer degradation efficiency and microbial control by enzyme engineering



Professor
Toshio Mori
Investigation of microbial functions involved in bacterial–fungal interactions and their application



Associate Professor
Takatsugu Miyazaki
Structural and functional analysis of novel carbohydrate-active enzymes discovered by genome mining and application to production of carbohydrates valuable for food and medicine.

Functional Materials
Research Core

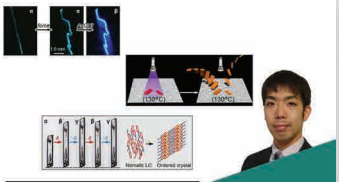
We develop innovative materials by leveraging molecular structural diversity and ordered arrangements. Our research targets energy and environmental applications, including materials for batteries, catalysts, water purification, and stimuli-responsive systems. We aim to implement these advanced materials, driving technological innovation for a more sustainable future.



Associate Professor
Makoto Moriya
Development of innovative materials for all-solid-state batteries and fuel cells



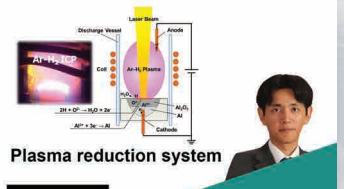
Professor
Mitsuru Kondo
Removals of toxic anions from aqueous environments by metal complexes with cage structures



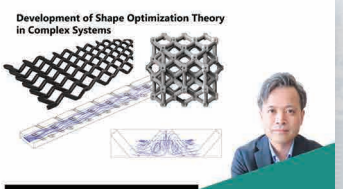
Associate Professor
Tomohiro Seki
Development of stimuli-responsive molecular crystals

Alternative Energy
Research Core

Our mission is to elucidate the mechanisms of transport phenomena in thermos-fluid systems to use clean energy with less environmental load. We aim to create innovations through industry-government-academia collaboration by developing optical measurement technology and optimization models.



Professor
Makoto Matsui
Development of sustainable energy cycling system using laser plasma



Associate Professor
Yoshihiko Sano
Mathematical modeling of heat and mass transport phenomena and its industrial applications

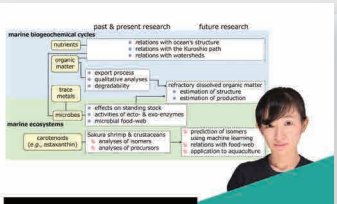


Associate Professor
Yuhki Mizushima
Development of optical flow measurement

Research Cores and Researchers

Marine
Research Core

Elucidate marine biogeochemical cycles involving blue carbon. Develop the tools and procedures for production, utilization and automated identification of marine living resources. These studies are aimed to improve global environmental issues and regional activities.



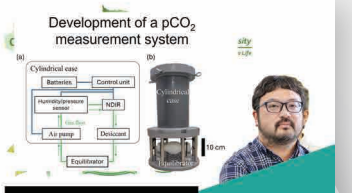
Associate Professor
Rumi Sohrin

Low trophic ecosystem and biogeochemical cycles in marine pelagic environments



Associate Professor
Takako Saito

Molecular basis of Self and Non-self recognition and fertilization



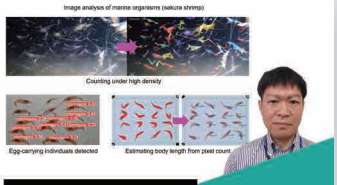
Associate Professor
Atsushi Kubo

Biogeochemical cycles across the land–coastal ocean continuum, including carbon, nitrogen, phosphorus, and silicon cycles.



Associate Professor
Ryo Nagao

Uncovering the molecular mechanisms underlying light harvesting and wastewater treatment in microalgae

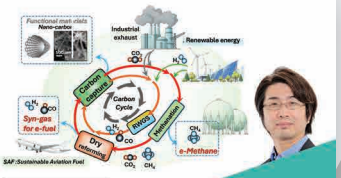


Associate Professor
Masaki Nagata

Social implementation of a next-generation marine information analysis platform using IoT / AI

Carbon Cycle
Research Core

We treat CO2 as a resource and control reaction environments by integrating catalytic reactions with transport phenomena, enabling efficient reduction, decomposition, and solid carbon formation to establish carbon cycling processes.



Professor
Ryo Watanabe

Development of a Carbon-Negative CO2 Valorization Process



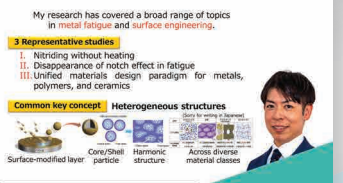
Professor
Toshiyuki Sanada

Microstructure of dispersed multiphase flows and cleaning technologies based on mechanical actions



Associate Professor
Kenji Aoki

Development and social implementation of cellulose/resin composite materials that contribute to carbon neutrality



Associate Professor
Kikuchi Shoichi

Development of multifunctional metallic materials via surface modification



Address

■Shizuoka Campus
836 Ohya, Suruga-ku,
Shizuoka-shi, Shizuoka
■Hamamatsu Campus
3-5-1 Johoku, Chuo-ku,
Hamamatsu-shi, Shizuoka

Phone

054-238-4264
(Weekday 9:00-16:30)
Fax. 054-238-4312

e-Contact

www.green.shizuoka.ac.jp
kenkyu2@adb.shizuoka.ac.jp