



KYUSHU
UNIVERSITY



Global Innovation Center Kyushu University

INFORMATION
FY2023



Global Innovation Center Kyushu University



| | | Page |
|--|---|-------|
| Address by Director | | 02 |
| - About KOINE | | 03 |
| <hr/> | | |
| About GIC | | |
| - History | | 04 |
| - About the Global Innovation Center | | 05 |
| <hr/> | | |
| - Members | | 06-07 |
| <hr/> | | |
| Divisions | | 08 |
| Advanced Project Division/KOINE Project Division/Visitors Division | | |
| <hr/> | | |
| Advanced Project Division | | |
| [Functional Devices] | Prof. Reiji Hattori | 09 |
| | Prof. Dong Wang (Cooperating Researchers) | 09 |
| | Associate Prof. Keisuke Yamamoto (Cooperating Researchers) | 09 |
| [Functional Materials] | Prof. Shigeru Fujino | 10 |
| [New Energy] | * Prof. Hiroki Ago | 11 |
| [Photonic Systems] | Prof. Reiji Hattori | 12 |
| [International Atmospheric Environment] | Prof. Daewoong Kim | 13 |
| | Associate Prof. Yuriko Hayabuchi | 13 |
| [Research area of social value creation type collaboration project] | Prof. Katsuhiko Furukawa | 14 |
| * : Distinguished Professor | | |
| KOINE Project Division | | |
| [NanoFactory Research Platform] | Prof. Yuichi Harada | 15 |
| [Smart Community Research Platform] | Prof. Yuichi Harada | 16 |
| <hr/> | | |
| Floor Maps | | |
| - GIC Bldg., Chikushi Campus of Kyushu University | | 17 |
| - GIC Advanced Design Project Bldg., Ohashi Campus of Kyushu University | | 18 |

Towards the Further Development of Industry-Academia-Government Collaborations at Kyushu University



Director of GIC
(Global Innovation Center,
Kyushu University)
Executive Vice President

Susumu FUKUDA

The importance of industry-academia-government collaborations is commonly recognized in the world as a matter of creating new technologies and new industries for our country and the world. When we look back at the history of science and technology, the technology supported by academia being genuine, is the only such technology that can survive. Also, the fundamental science developed during the creation process of new technology is not only the common asset of humans but also contribute greatly to human resources, etc. Therefore, there is great expectation that successfully constructing the industry-academia-government collaboration mechanism will create the necessary technology for the next generation of new industries.

At Kyushu University, the Advanced Science and Technology Center for Cooperative Research started in 1994 as an industry-academia-government collaboration contact site for private industries. In 1999, the center was restructured into the Liaison Division and Project Division. Then in 2003, in line with the integration of the Kyushu University and the Kyushu Institute of Design, a General Design Division was added, and the organization's name was changed to the "Art, Science and Technology Center for Cooperative Research, Kyushu University (KASTEC)". Thereafter, when the importance of innovation was emphasized in the 5th Science and Technology Basic Plan, a major change took place in the focus of research and development: from a domain once based on traditional fields, to one aimed at problem-solving. Accordingly, the center was reorganized as the Global Innovation Center (GIC), a structure combining the Advanced Project Division and KOINE (Kyudai global Open Innovation Network Engine) Project Division. In this way, GIC and its predecessor organization transformed according to the changing needs of the society of the time, and led in industry-academia-government collaboration and open innovation.

From FY2020, under the leadership of the President, the University's industry-academia-government collaboration organizations, including GIC, gathered to discuss how industry-academia-government collaboration organizations should be organized for the further development of education and research at Kyushu University. This discussion led to the establishment of the "Open Innovation Platform" in April 2022, which aimed to advance Kyushu University's education and research by supporting industry-academia-government collaboration projects. The function of the GIC's KOINE Division was transferred to the Open Innovation Platform. The Advanced Project Division has been moving forward with activities to fulfill its mission of leading industry-academia joint research and open innovation research for all schools of the University since 1999. Twenty-five years after its establishment, however, industry-academia joint research has largely taken root in all schools. Therefore, its function will be transferred to the Faculty of Engineering Sciences and Faculty of Design in FY2024 to strengthen industry-academia-government collaboration for the two faculties.

In the thirty years since the establishment of GIC's predecessor, the Advanced Science and Technology Center for Cooperative Research, GIC has been leading Kyushu University's industry-academia-government collaboration and open innovation. In order to further advance the development of industry-academia-government collaboration and open innovation of the University, GIC will be dissolved in FY2023. Starting in FY2024, the functions, accumulated knowledge, and networks possessed by GIC will be handed over to the Faculty of Engineering Sciences, the Faculty of Design, and the Open Innovation Platform, which is the industry-academia-government collaboration support organization for all of Kyushu University.

I would like to express my deepest appreciation for the tremendous support and cooperation given to the GIC over the years, and ask for your continued support and understanding.



About KOINE Kyudai global Open Innovation Network Engine

KOINE is the abbreviation of Kyudai global Open Innovation Network Engine but is also an English word originated from ancient Greek to represent common language and common understanding.

KOINE indicates the framework of collaborative idea creation based on open innovation scheme by Kyushu University.

KOINE provides opportunities for its members to discuss complex problems in research, business, and society from many viewpoints of members with different backgrounds and disciplines. Eventually discussion forms the common basis for tackling such problems for everyone and could bring unexpected idea and means for solving problems.

01

KOINE meetings provide the opportunities for solving industrial/social problems.

Feel freely to bring your industrial/social problems and patents not to serve any purpose to the KOINE office. We will consult you and if it is fundamental and necessary to discuss with many others, KOINE meeting in a specific research platform will be set up. The information on KOINE meeting only shared among members.

KOINE meetings are held once a month and you can join when you sign the non-disclosure agreement which claim you to manage disclosed information in your organization by yourself.

KOINE



02

KOINE meetings provide practical solutions for your problems.

After finding the solution for your problem, you can tackle it by making the research/development contract among members. Discussion among members is open, but the practical solution would direct by closed members to secure its value.

03

KOINE provides sharing resources globally.

Each KOINE research platform shares various resources, such as shared knowledge on subjects, know-hows and equipment, via open-source software, Jupyter notebook and you can collaborate globally.

04

KOINE meetings nurture prominent researchers/managers with leadership

KOINE meetings encourage you to take leadership. In the collaborations with QREC or Robert T. Hung Entrepreneurship Centre, you can gain an understanding an entrepreneurship and obtain a mindset of entrepreneur.



KOINE Research Platforms

Currently we offer six KOINE research platforms. However, new research platforms can be made by your request.

(example of platform)

PF1: NanoFactory

Aim to realize material growth, fabrication process development and various analysis in the nano-scale.

PF2: NanoFoundry

Investigation for two dimensional materials from fundamental synthesis to the industrial applications.

PF3: Cold Tech

Aim to gain total energy efficiency for complex industrial systems based on thermal energy.

PF4: Agri-Food

Stimulated discussion among farmers, researchers, and restaurant chefs that could find out specific local products and sustainable and effective circulations for products.

PF5: Open Data & Analysis

Aim to establish the ways to use specific big data as open data and to find out the analytical methods to handle huge data.

PF6: Quantum Science & Technology

Aim to establish quantum computation system in collaborations with foreign institutes.

Contact:

KOINE meeting Office

Global Innovation Center, Kyushu University
6-1 Kasuga-koen Kasuga-city Fukuoka 816-8580 JAPAN
Email: koine_jimu@gic.kyushu-u.ac.jp



History

During the 1980s, university missions promoted collaboration and cooperation between industry and each university. To this effect, from 1987, a “Regional Joint Research Center” was established at various universities for the purpose of promoting cooperation in research with the regional community. At Kyushu University, the “Advanced, Science and Technology Center for Cooperative Research, Kyushu University” was established on June 1994 to strengthen the ability to match functions for collaborative research between private enterprise and Kyushu University. In 1999, the “Liaison Division,” “Project Division” and “Visitors Division” were established accompanied with a large-scale expansion of personnel. Meanwhile, at the Kyushu Institute of Design, the “Design Research Center” was established in 1997 to strengthen the matching functions for industry-university-government collaboration.

In October 2003, with the integration of Kyushu University and Kyushu Institute of Design as an opportunity to move forward, the “Art, Science and Technology Center for Cooperative Research, Kyushu University (KASTECC)” was established, named to reflect concepts common to both institutions. The new organization was established by adding the “General Design Division” to the aforementioned three divisions. Thereafter, the “Collaborative Research Division” was established in 2008, and the “Joint Research Division” in 2015 to satisfy the demands of the times.

The Liaison Division has actively promoted education and research activities including research on establishment of an industry-academia-government collaboration system and nurturing regional policy leaders, in addition to education and research on entrepreneurship focusing on practical support for industry-academia-government collaboration. The General Design Division has conducted planning and promotion of research for industry-university joint projects in new interdisciplinary integrated fields of design. The Project Division has developed industry-university-government collaborative activities through four specified major disciplines to be promoted by KASTECC by acquiring a number of projects targeting “Creation of Leading Industry Technological Seeds through Advanced Project Research.”

KASTECC, which had thus played a leading role in industry-university-government collaborative activities at Kyushu University for more than twenty years, was reborn as the Global Innovation Center (GIC) on October 1, 2016 as a research promotion organization focusing on open innovation in order to satisfy current demands and expectations. GIC has been promoting the KOINE (Kyudai global Open Innovation Network Engine) Model as well as joint research/technology development based on collaboration with industry circles, which have been inherited from its predecessor KASTECC, and has offered six KOINE research platforms (see p.03), each addressing a specific task.

● Chronological Outline

- June 1994 **Advanced Science and Technology Center for Cooperative Research (Kyushu University) established**
- April 1997 **Design Research Center (Kyushu Institute of Design) established**
- April 1999 **Advanced Science and Technology Center for Cooperative Research
Liaison Division, Project Division, Visitors Division established**
- September 2003 **Advanced Science and Technology Center for Cooperative Research abolished
Design Research Center abolished**
- October 2003 **[Kyushu University and Kyushu Institute of Design combined]
Art, Science and Technology Center for Cooperative Research, Kyushu University
Liaison Division, General Design Division, Project Division, Visitors Division established**
- May 2008 **Collaborative Research Division established**
- April 2015 **Joint Research Division (Industry-University Collaboration Research Project) established**
- October 2016 **Reorganized as Global Innovation Center**

About the Global Innovation Center (GIC)

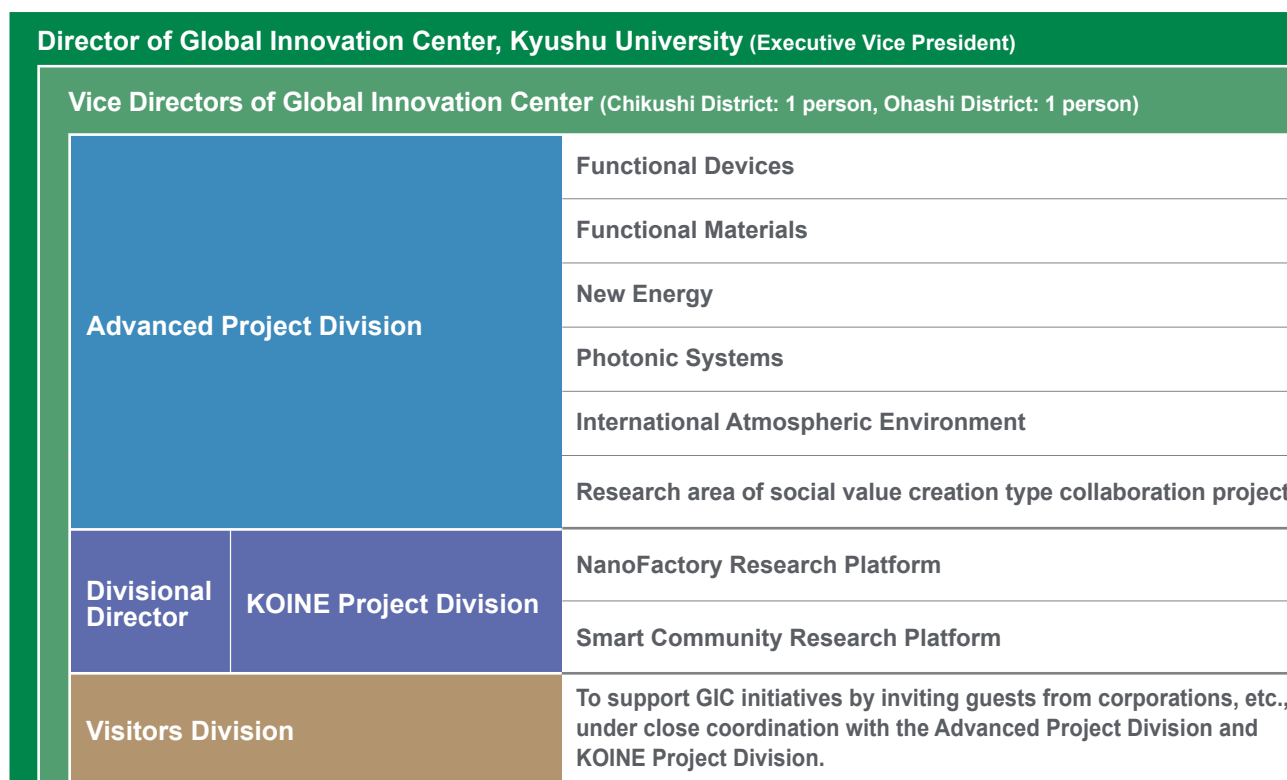
GIC consists of the Advanced Project Division, KOINE Project Division, and Visitors Division, as shown in the table below. Each division features and promotes a novel type of industry-academia-government collaboration based on the KOINE concept.

The Advanced Project Division promotes joint research in collaboration with the private sector and will focus on basic research to create industrial seeds for the next generation of industry. Furthermore, the Advanced Project Division aims to develop basic to large-scale research projects that will contribute to the creation of new industries. This division is leveraged to promote global industry-academia-government collaboration based on the principles of open innovation.

The KOINE Project Division promotes creation of new research platforms based on industry-academia-government collaboration and Kyushu University's unique open innovation initiative. This division aims to create "new value" based on shared recognition of new research fields and new industries brought forth through discussions among people of various backgrounds from inside and outside of Kyushu University.

The Visitors Division invites researchers from industry as visiting professors who will support GIC initiatives.

● Organization chart



Members

Director

Executive Vice President **Susumu FUKUDA** (Industry-Academia-Government Collaboration and University-Community Relations)

Vice Directors

Prof. **Katsuhiko FURUKAWA** (Concurrent post, Belonging to Academic Research and Industrial Collaboration Management Office)

Prof. **Daewoong Kim** (Concurrent post, Belonging to Faculty of Design)

Advanced Project Division

Prof. **Shigeru FUJINO** Functional Materials

* Prof. **Hiroki AGO** New Energy

Prof. **Reiji HATTORI** Photonic Systems
Functional Devices (Concurrent post)

Prof. **Dong Wang** Functional Devices
(Cooperating Researchers, Belonging to Interdisciplinary Graduate School of Engineering and Sciences)

Associate Prof. **Keisuke YAMAMOTO** Functional Devices
(Cooperating Researchers, Belonging to Interdisciplinary Graduate School of Engineering and Sciences)

Prof. **Daewoong Kim** International Atmospheric Environment
(Concurrent post, Belonging to Faculty of Design)

Associate Prof. **Yuriko HAYABUCHI** International Atmospheric Environment

Prof. **Katsuhiko FURUKAWA** Research area of social value creation type collaboration project
(Concurrent post, Belonging to Academic Research and Industrial Collaboration Management Office)

* : Distinguished Professor

KOINE Project Division

Divisional Director / Prof. **Yuichi HARADA** NanoFactory Research Platform
(Concurrent post, Belonging to Academic Research and Industrial Collaboration Management Office)
Smart Community Research Platform
(Concurrent post, Belonging to Academic Research and Industrial Collaboration Management Office)

Research Professors, etc.

Research Associate Professor **Solís Fernández Pablo** New Energy, Advanced Project Division

Visiting Professors, etc.

Visitors Division

| | | |
|------------------------------|-----------------------------|---|
| Visiting Professor | Kohei ARAKAWA | Zeon Corporation, Master of Engineering |
| Visiting Professor | Shinpei OGAWA | Mitsubishi Electric Corporation, Ph.D. |
| Visiting Professor | Kazumi ONO | WORLD HOLDINGS CO., LTD. |
| Visiting Professor | Tasuku KASHIWAMURA | DAI-ICHI LIFE RESERCH INSTITUTE INC., Master of Management and Information Science |
| Visiting Professor | Akio KOIKE | AGC Inc., Ph.D. |
| Visiting Professor | Alexander Tzalenchuk | National Physical Laboratory (NPL), Ph.D. |
| Visiting Professor | Takatoshi TSUJIMURA | KONICA MINOLTA, INC., Society for Information Display, Ph.D. in Engineering |
| Visiting Professor | Toby Peters | University of Birmingham |
| Visiting Professor | Yukihisa NAMIKI | World Intellectual Property Holdings, Inc., Ph.D. in Engineering |
| Visiting Professor | Akira NISHIYAMA | Kioxia Corp., Ph.D. |
| Visiting Professor | Koji FUJIMOTO | DENTSU CORPORATE ONE INC. |
| Visiting Professor | Yasuo MATSUURA | Deloitte Tohmatsu Financial Advisory LLC, Bachelor (Social Sciences) |
| Visiting Professor | Tasuku MIZUNO | CITY LIGHTS LAW, J.D. |
| Visiting Professor | Haruhiko MIZUNO | JAPAN PATENT OFFICE |
| Visiting Professor | Makoto MIZOGUCHI | AutoNetworks Technologies, Ltd., Ph.D. |
| Visiting Professor | Nobuyuki YAGI | Chuo Records Management Co.,Ltd., Ph.D. in Science |
| Visiting Associate Professor | Fumio MURA | DC Power Vil. Corporation, Bachelor of Engineering |

Divisions

Advanced Project Division

This division promotes collaborative research with industries. Each research field also offers a free and flat platform for intellectual exchange and discussions between industries and the university from which basic research for creating industrial seeds will be performed. The aim is to develop from basic to large-scale research projects that will contribute to and create new industries. Staffed with full-time faculty members in the following 6 research fields closely related to regional industry and some of the world's top-level research achievements, this division is leveraged to promote global industry-academia-government collaboration on the basis of open innovation.

KOINE Project Division

This division provides to create new research platforms based on open innovation specified by KOINE concept at Kyushu University, where academia, industry and governmental organizations can collaborate together. KOINE is an abbreviation of Kyudai (Kyushu university's) global Open Innovation Network Engine one hand, but actually KOINE is an English word originated from ancient Greek, which represents common language. KOINE division aims to create new research fields as well as industries based on KOINE or common idea and core technology, which is brought from the discussion among people with different backgrounds joining from inside and outside of Kyushu University.

Visitors Division

To support GIC initiatives by inviting guests from corporations, etc., under close coordination with the Advanced Project Division and KOINE Project Division.

As above Advanced Project Division, KOINE Project Division and Visitors Division have set out a goal of promoting research and social contribution initiatives through industry-academia-government collaboration based on open innovation.

Functional Devices



Cooperating Researchers

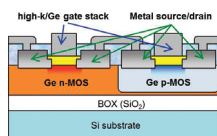
Prof. Dong Wang



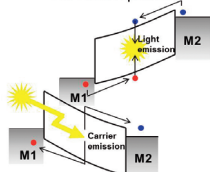
Cooperating Researchers

Associate Prof. Keisuke Yamamoto

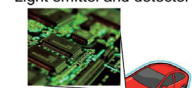
This project division conducts researches on group IV semiconductors, thin films, novel processing, and advanced-functional devices matching requirements from the advanced semiconductor industry. This project division also promotes the advanced and creative research projects related to "semiconductor" on the platform between industry and academic, contributing the realization of a highly progressive information society. A clean room and advanced facilities are well established, which provide suitable circumstances for advanced semiconductor researches.



Ge CMOS process



Ge optoelectronics
-Light emitter and detector



SiC device for high temperature operation

Our research subjects

| | | |
|-------------------------|---|---|
| Project name | Development of Processing and Device for Advanced Semiconductor Contribute to Sophisticated Information Society | |
| Chief administrator | Prof. Reiji Hattori | ROOM: 6F, GIC Bldg., Chikushi Campus |
| Cooperating Researchers | Prof. Dong Wang Interdisciplinary Graduate School of Engineering and Sciences, Kyushu Univ. | ROOM: 415, Faculty of Engineering Sciences building D, Chikushi Campus E-mail: wang.dong.539@m.kyushu-u.ac.jp |
| | Associate Prof. Keisuke Yamamoto Interdisciplinary Graduate School of Engineering and Sciences, Kyushu Univ. | ROOM: 416, Faculty of Engineering Sciences building D, Chikushi Campus E-mail: yamamoto.keisuke.380@m.kyushu-u.ac.jp |

URL: https://www.gic.kyushu-u.ac.jp/functionaldevices/index_e.htm



Research Contents

This project division promotes the following 4 researches.

1. Si/Ge CMOS process and devices
2. Ge/GeSn optoelectronics
3. Advanced Ge applications (GOI, flexible, spin)
4. SiC devices for high temperature operation

KOINE Research Platform: Functional Devices

The Crystalline 3C-SiC is possible to be epitaxial growth on Si, and the 3C-SiC device is possible to use the Si-compatible process, which enable us to low cost fabrication. This platform aims to establish the growth of high quality 3C-SiC on Si and to develop the 3C-SiC device, leading to high temperature operation.

Adopted Projects

1. JST-CREST, Co-Investigator (Wang) (PI: Prof. Nakatsuka (Nagoya Univ.)), FY2021-2026.
2. Mitou challenge 2050 by NEDO, Co-Investigator (Yamamoto) (PI: Prof. Toko (Tsukuba Univ.)), FY2020-2023.
3. Nation-wide Cooperative Research Projects by RIEC, Tohoku Univ. (PI: Yamamoto), FY2021.

Adopted Scientific Funds (JSPS Grant-in-Aid for Scientific Research / KAKENHI)

1. Scientific Research (C), PI (Wang), FY2023-2025.
2. Early-Career Scientists, PI (Yamamoto), FY2019-2020.
3. Scientific Research (B), PI (Wang), FY2017-2019.
4. Scientific Research (B), PI (Wang), FY2014-2016.
5. Scientific Research (S), Co-Investigator (Yamamoto) (PI: Prof. Hamaya (Osaka Univ.)), FY2019-2023.

Other Adopted programs

1. JSPS Bilateral Joint Research Projects with imec (FWO, Belgium) K. Yamamoto, FY2022-2023.
2. MEXT, Leading Initiative for Excellent Young Researchers (LEADER), K. Yamamoto, FY2016-2020.
3. JSPS research fellowship for young scientists (PD), K. Moto, FY2020-2022.



Clean room at GIC

Functional Materials



Project leader

Prof. **Shigeru Fujino**

This project aims to research advanced functional and environmentally conscious glass-ceramic materials.

They have attracted interest because of its excellent properties such as thermal resistance, chemical durability and mechanical strength, and high optical transmittance.

We are engaged in research and development of transparent optoelectronics materials with nano structures.

We especially focus on new eco-friendly method of preparing functional glass from mesoporous material consisted from nano particle and organic polymer. The excellent characters of the novel transparent materials would be conducive to its use for next generation optoelectronics and bio industry fields (e.g., optical sensor, light guide, optical lens, microchip display).

In addition, we propose a novel noncontact method for measuring the physical properties and structure of high-temperature glass melt. From the view point of environmentally conscious manufacturing, this method enables in situ monitoring of viscosity change in micro-liter order liquids. We have focused on the acoustic properties of functional glass and are developing the world's first silica glass pick for guitar.



Supercheap way of making high-performance silica glass



Advanced functional glass material using 3D laser fabrication method (e.g., crane)

Project name

Development of Functional and Environmentally Conscious Glass-Ceramic Materials

Project leader

Prof.
Shigeru Fujino

ROOM: 4F, GIC Bldg., Chikushi Campus

PHONE: +81-92-583-8773

E-mail: fujino@gic.kyushu-u.ac.jpU R L: <https://www.gic.kyushu-u.ac.jp/fujino/>

Research Contents

- 1. Development of functional glass-ceramic materials**
 - Fabrication of transparent sintered glass using 3D laser method
 - Development of polymer and inorganic mesoporous glass materials
 - Nano structural silica glass by room imprinting
 - Printable photoelectronics
- 2. Measurement of properties and structure of glass melts using laser spectroscopy**
 - In-situ monitoring of microrheology and Raman measurement for glass melts
- 3. Development of musical instruments utilizing the special acoustic properties of functional glass**

KOINE Research Platform : Functional Glass materials

We construct open innovation model for functional glass and ceramics, which leads to create next-generation industries. We also especially focus on material processing and develop application for optical, electronic, and medical fields.

Projects (selected)

- **AGC Research Collaboration Program, FY2020-2021.**
- **START(Program for Creating Start-ups from Advanced Research and Technology, FY2018-2020.**
- **JSPS Grant-in-Aid for Challenging Exploratory Research, FY2012-2014.**
- **JST Adaptable and Seamless Technology Transfer Program through Target-driven R&D, 2011.**
- **JSPS Grant-in-Aid for Scientific Research (C), FY2009-2011.**
- **Asahi Glass Co., Ltd. Research Collaboration Program, FY2007-2010.**
- **JST-project to develop "innovative seeds" 2009.**

Patents

- US10407334, COMPOSITE SHAPED BODY AND SILICA GLASS, AND METHOD FOR PRODUCING THE SAME
- US-2020-140318, EP3626693, EP3266752, ZL201680012043.9

Composition for inorganic molded article production use, and method for producing inorganic molded article and other 20 patents

Awards

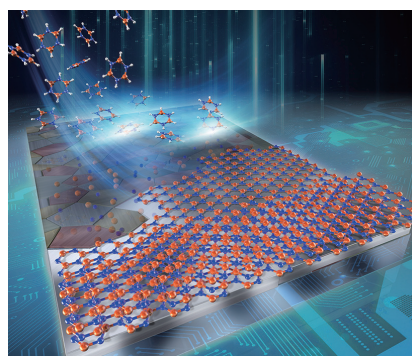
- Powder Metallurgy Young Scientists Award 2010
- Cooperative Research and Development Award, Kyushu University 2008
- Cooperative Research and Development Award, Kyushu University 2007
- MMIJ Young Scientists Award 2003
- Corning Research Grant Award 1998



Project leader

Distinguished Prof. **Hiroki Ago**

We are developing new synthesis methods of novel nanomaterials and applications to energy, environment, and electronics based on nanotechnology. Our research focuses on nanocarbon materials, novel two-dimensional layered materials, and their heterostructures. Energy saving devices and solar cells are fabricated from these new and unique nanomaterials. We are organizing a two-dimensional materials consortium, called "Nanofoundry (KOINE)". Throughout our intensive research activity, we would like to organize and take part in collaborative international projects.



Research topics



Lab members



JSPS project

| | | |
|----------------|---|---|
| Project name | Synthesis of Nanomaterials for Energy and Electronic Applications | |
| Project leader | Distinguished Prof. Hiroki Ago | ROOM: 5F, GIC Bldg., Chikushi Campus E-mail: ago.hiroki.974@m.kyushu-u.ac.jp U R L: https://www.gic.kyushu-u.ac.jp/ago/index-e.html |



Research Topics

- Synthesis of two-dimensional nanomaterials**
 - Synthesis of large-area, high-quality graphene and hexagonal boron nitride (h-BN) wafers
 - Study of 2D atomic layers and 2D nanospace for the development of 2.5D materials science
- Applications to energy, environment, and electronics**
 - Novel physical properties based on 2D materials
 - High-energy batteries, ultra-low energy devices photovoltaic devices, and wearable devices

KOINE Research Platform : NanoFoundry

We are organizing a 2D materials consortium with members from industry, university, and public sectors.

Recent Research Projects

- **JSPS KAKENHI, Grant-in-Aid for Transformative Research Areas (A),** FY2021~2025
- **JST CREST,** FY2020~2025
- **JST CREST,** FY2018~2023
- **JSPS KAKENHI, Challenging Exploratory Research,** FY2021~2022

Recent Publication

- "Large-area synthesis and transfer of multilayer hexagonal boron nitride for enhanced graphene device arrays", *Nature Electronics*, 6, 126-136 (2023).

Awards

- Young Scientist Award from the MEXT, Japan
- Iijima Award from Fullerene-Nanotube Research Society of Japan
- Excellent Paper Award from Japanese Society of Applied Physics
- Sangyo Times Award from The Society of Nano Science and Technology

Patents

- PCT/JP2010/064848, "Graphene Sheet and Method for Producing the Same", and other 16 patents

Others

- Editorial Board Member of Scientific Reports (Nature Publishing Group)
- International Advisory Board Member of RPGR conference series
- Vice-president of the Fullerene-Nanotube-Graphene Society, Japan



2D materials consortium (KOINE meeting)

Photonic Systems



Project leader

Prof. Reiji Hattori

In this project division, we are engaged in research and development of Flat Panel Displays (FPD's) and its peripheral technologies. Specifically speaking, FPDs currently working in our laboratory are "Organic light-emitting display" and "Micro-LED display." We are also challenging aggressively to develop of a quite new display which the industry cannot challenge.

In addition, we are also conducting the research of organic electronics which are important technology to fabricate a large-area and flexible display. We pick up the promising organic materials and research the device structure and fabrication process to realize the display panels. Organic electronics is a fundamental technology which brings the drastic change in cost and function of the next generation display. It is possible for the chemical suppliers and equipment manufacturers to start at the first stage in the collaboration.

To create a display with new principle, wide range of knowledge from material to system is required. We are eager to collaborate with industry in a new aspect gathering the young and flexible wisdom in university.



Cylindrical Air LED Display

| | | | |
|----------------|--|--|---|
| Project name | Development of Devices and Systems for the Next Generation Display | |  |
| Project leader | Prof. Reiji Hattori | ROOM: 6F, GIC Bldg., Chikushi Campus PHONE: +81-92-583-7887 / F A X: +81-92-583-7887 E-mail: hattori@gic.kyushu-u.ac.jp U R L : https://www.gic.kyushu-u.ac.jp/hattori/e/ | |

Research Contents

- 1. Flat Panel Display**
 - Research of μ -LED display driving
 - Transparent flexible display
 - Research of Oxide TFT
 - Device simulation analysis of OLED and OTFT
 - Free focus AR glass
- 2. Sensor devices**
 - Capacitive coupling ECG sensor
 - OLED/OPS hybrid pulse oximeter device
 - Mental sweating sensor
 - Self-capacitive in-cell touch panel
 - Personal authentication touch panel
- 3. Wireless Power Transmission**
 - Shielded capacitive coupling wireless power transfer
 - Application to EV charging/Drone/Robotics

KOINE Research Platform: Lit Space System

This research platform aims to build a bridge connecting humans and lighting space. We will return to the relationship between natural light and the human living environment, review the concept of lighting environment, and develop a new Human Lighting Space Technology. Regarding the relationship among health, quality of life and lighting illumination, from the building engineering to the neurophysiology, the fundamental theory of interdisciplinary in the humanities and sciences will be constructed, and finally the future lighting space which can activate and improve the living environment of the human being will be achieved.

Award

- Distinguished Contributed Paper of SID '04 (Society for Information Display, 2004)
- Best Paper Award (AM-FPD '06)
- IDW Best Paper Award (IDW '07)
- IDW '04, '07, '11 and '13 Outstanding Poster Paper Award

Patents

- PO2007-324453
"Organic field-effect transistor and its application for integrate circuit and electronic device" and other 30 patents.



Clean-room

International Atmospheric Environment



Project leader

Vice-Director / Prof. **Daewoong Kim**



Member

Associate Prof. **Yuriko Hayabuchi**

International atmospheric environment domain acts with task that were performed by former Design Division. The task keeps on promoting and supporting the industry-university-government collaboration project and research contributing to the progress of design activities.

| | | |
|----------------|--|---|
| Project name | Design Management for Sustainable Low Carbon Society | |
| Project leader | Vice-Director / Prof. Daewoong Kim | ROOM: Bldg.5 607, Ohashi Campus PHONE: +81-92-553-4519 / F A X: +81-92-553-4519 E-mail: dwkim@design.kyushu-u.ac.jp |
| Member | Associate Prof. Yuriko Hayabuchi | ROOM: 3F, Advanced Design Project Bldg., Ohashi Campus PHONE: +81-92-553-4585 / F A X: +81-92-553-4584 E-mail: hayabuchi@gic.kyushu-u.ac.jp |

Research Contents

This project aims to conduct practical research of design management for creation of the sustainable low carbon society in the domestic region and Asian countries by industry-university-government collaboration. Specially, the studies contents are as follows:

- 1. Development of energy demand and supply system in the regional scale for analyzing regional development and sustainability**
- 2. Study of design approach for establishing strategic methodology of regional innovation from the plastic recycle loop system and economy in the region**
- 3. Study on climate policies to reduce CO₂ emissions in the regional and Asian countries**
- 4. Analysis of mitigation and adaptation measures to climate change**

Professional and Outreach Activities

Participating in the review process of greenhouse gas emissions and removals inventory annual submissions of the Annex I Parties that are also Parties to the Kyoto Protocol as the UNFCCC (United Nations Framework Convention on Climate Change) expert reviewer

KOINE Research Platform: Digital Content Design

Through supporting the production of environments conducive for experimental work using cutting edge media technology, the department creates unique content and media art through fusing artistic sensitivity and science and conducts scientific research and evaluations of entertainment content.

Research area of social value creation type collaboration project



Project leader

Vice-Director / Prof. **Katsuhiko Furukawa**

In this research area, we will create a social value creation type collaboration projects to seek and build the optimum social system for a sustainable society, by utilizing the research ability, educational ability, and industry-academia-government-citizen network of the universities.

| | | |
|----------------|--|---|
| Project name | Social value creation type collaboration project | |
| Project leader | Vice-Director / Prof. Katsuhiko Furukawa | R O O M: 1F, GIC Bldg., Chikushi Campus PHONE: +81-92-583-7871 E - m a i l: furukawa@airimaq.kyushu-u.ac.jp |

Research Contents

In the next 30 years, Japan will accelerate the declining population, declining birthrate and aging population, and fiscal tightness, as well as increasing risks due to global warming, global pandemic, and destabilization of East Asia. From now on, it is expected to encounter incredibly big social changes that we have never experienced in the past and to be difficult to continue the same life as now. In such a situation, universities are expected to play a part in building a new socio-economic system that allows us to continue a safe, secure, healthy and fulfilling life for the future, by utilizing its research ability, educational ability, and industry-academia-government-citizen network to seek a response to the above social changes.

Regarding the response to the above social changes, the existing value system has collapsed, and a new value system is required. In order to search for the new value system, it is also necessary to have various patterns of logical development, complicated understanding and accumulation of things, which are inherent in the humanities and social research of universities. In addition, in order to realize a desirable society, close cooperation between universities, local governments, and economic organizations is indispensable for demonstrations and policy proposals. Through COVID-19 calamity etc., companies are becoming more aware that sustainable growth of the global economy is essential for long-term return on investment, and they are seeking new action guidelines to replace the traditional capitalist perspective.

In this research area, we will create a social value creation type collaboration projects to seek and build the optimum social system for a sustainable society, by utilizing the research ability, educational ability, and industry-academia-government-citizen network of the universities.

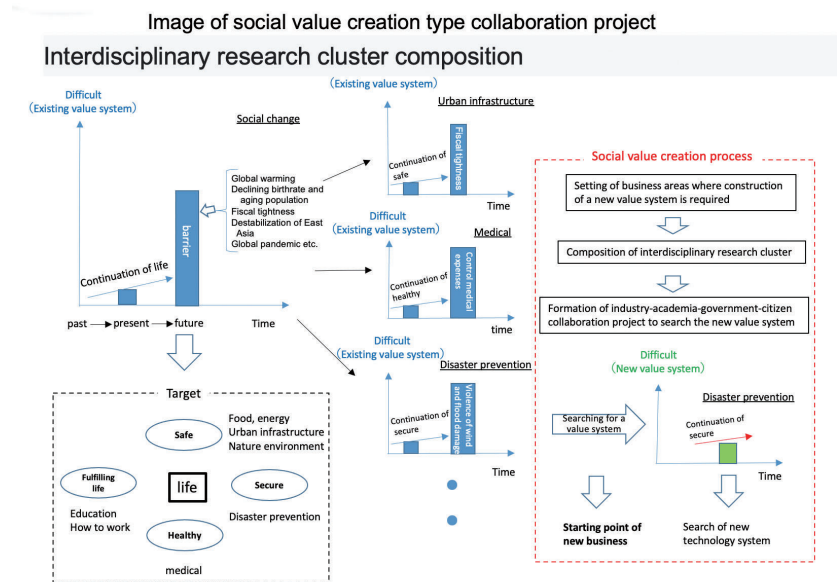


Image of social value creation type collaboration project

NanoFactory Research Platform



Project leader

Divisional Director / Prof. **Yuichi Harada**

NanoFactory is the first research platform in KOINE project division and it is aimed to establish nanofabrication technologies and its various applications, which can provide us to reveal behaviors and phenomena of materials in nano-scale.

In KOINE project division, we promote KOINE concept for many research fields to create innovative idea and explore feasibility for industrial or social reform.

| | | |
|----------------|---|--|
| Project name | Establishment of Nano-Scale 3D Fabrication technology | |
| Project leader | Divisional Director / Prof. Yuichi Harada | ROOM: 1F, GIC Bldg., Chikushi Campus PHONE : +81-92-583-7873 E-mail : yharada@gic.kyushu-u.ac.jp |



Conformal surface coating by atomic layer deposition technique and its applications.

Atomic layer deposition (ALD) is the technique to grow a single atomic layer digitally due to the self-terminating growth mechanism. ALD technique gives dense thin film without pin holes at rather low growth temperature and the thin film covers whole surface of the object conformally. Due to this features, ALD coating can be applicable not only for semiconductor materials, but also for plastic and even living matters, which gives various potential applications for unexplored industrial fields. Currently insulating materials are mainly used, however we succeeded to grow metallic materials such as aluminum. Furthermore ferroelectric and magnetic materials can be grown as well.

ALD technology as well as its various applications in NanoFactory research platform are stored in the knowledge base, which can be applicable for many different industrial and research purposes.

See the published various papers on ALD technology as shown below:
<https://www.researchgate.net/profile/Yuichi-Harada>

Promotion of KOINE research platforms

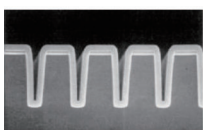
KOINE is the abbreviation of Kyudai global Open Innovation Network Engine, but it is also an English word to represents common language originated from ancient Greek. KOINE meeting provides the opportunities to meet up and discuss freely with people who have different backgrounds. Such discussion eventually brings us brilliant idea and can explore innovative industrial applications.

Bring us industrial or social complicated problems and we discuss and explore such problems in many different points of views.

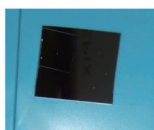
KOINE



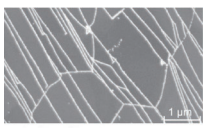
KOINE logo



a) Al₂O₃ film coating on an etched silicon substrate.



b) Superconducting Al film on a Si substrate.



c) Al₂O₃ film deposition onto graphene by standard ALD technique.



d) Homogenous Al₂O₃ film deposition onto graphene by two-step ALD technique.

KOINE Vision

- 1 Providing opportunities to discuss freely among people with different backgrounds, resulting in creating innovative idea based on their common cognition or KOINE.
- 2 Sharing idea and know-hows among members via information sharing system, open-source Jupyter.
- 3 Creation of Industrial innovation based on full-scale research collaborations and dynamical networks among members.
- 4 Educational atmosphere to produce excellent experts, such as open-minded researchers, skillful research managers and entrepreneurs under diverse environment.

Smart Community Research Platform



Smart Community member

KOINE Smart Community research platform is aimed to explore the feasibility for sustainable regional circulation society based on foods, energy and information.

| | | |
|--------------|--|--|
| Project name | Sustainable smart-town based on local foods, energy, and information | |
| Coordinator | Divisional Director / Prof. Yuichi Harada | ROOM: 1F, GIC Bldg., Chikushi Campus PHONE: +81-92-583-7873 E-mail: yharada@gic.kyushu-u.ac.jp |



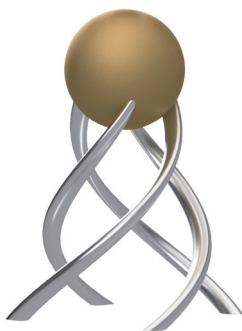
Research Subject

In the Cold Tech research platform, the main theme is how we can effectively use cold and we have found the good example that the integration of a green house and a data center can reduce the total thermal energy. Since then, the discussion was widened to consider the integration with private 5G, dc microgrid, and sustainable energy, to realize sustainable batteries, the integration with a local micro-mobility, how to use local big data to create various value-added business, and metaverse community where the real life is superimposed with the digital life.

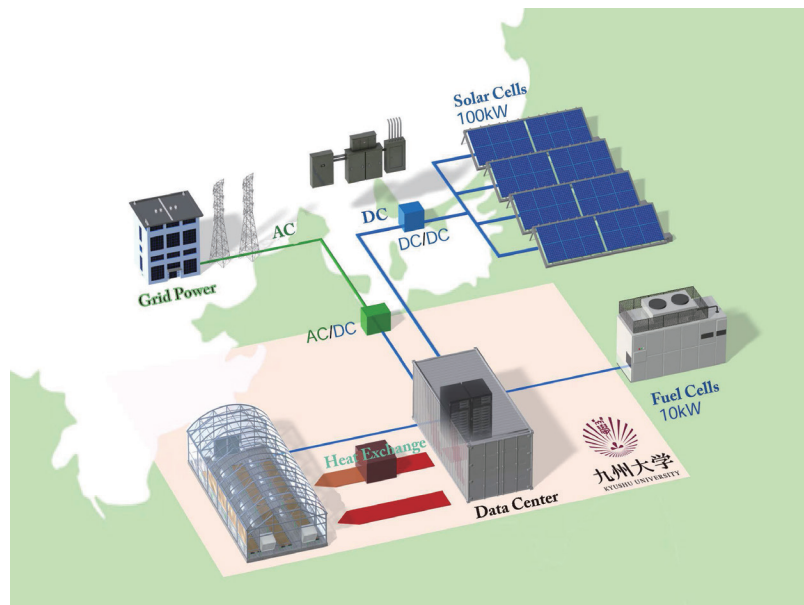
The central idea for all of discussion is to realize sustainable local community with keeping the good environment. This is the reason why we decided to rename the research platform from Cold Tech to Smart Community.

Smart Community research platform discuss how we can make up the sustainable social system with local resources and what kind of technical components are necessary. After making up the plan, we may explore the proof of concept on the system together with local communities. Recently we discuss the usage of abandoned cold heat from LNSs and LHGs, sustainable regional data center with effective energy usage, and business model with the integrated big data and datasphere.

KOINE



KOINE logo



Floor Maps

GIC Bldg., Chikushi Campus of Kyushu University

Information on Rental Spaces

Global Innovation Center in Chikushi Campus is a short 2-minute walk from JR Onojo Station and offers rental spaces furnished with basic facilities required for conducting experiments. Renters can also utilize shared facilities such as meeting rooms and shared equipment such as copy machines. This space is intended for a variety of uses, including as an R&D space and satellite spaces.

Location | Global Innovation Center (GIC), Kyushu University
6-1 Kasuga-Koen, Kasuga-City,
Fukuoka, 816-8580, JAPAN

Views of the rental spaces



Rental Space
(Lab room, 69m²)



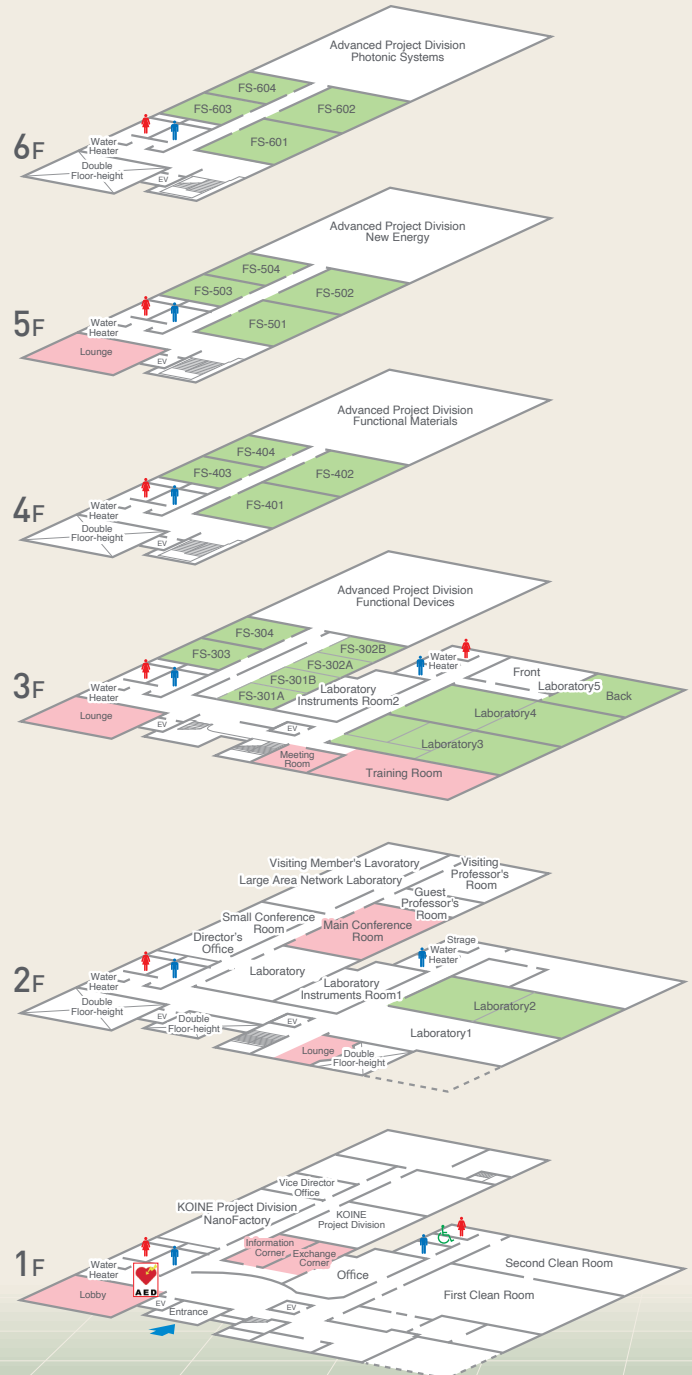
Rental Space
(Rental space, 35m²)

Facilities, etc. that can be used by space renters

Main Conference Room, Training Room, Meeting Room, Information Corner, Exchange Corner, etc.



3F Training Room (Approx. 60-person capacity)
• Equipment such as projectors, screens, etc.



| | | | |
|--|---|--|---|
| | Rental Space Laboratories used for university's staff selected from among applicants | | Rest Room |
| | Shared space | | Elevator |
| | | | AED (Automated External Defibrillator) |



GIC Advanced Design Project Bldg., Ohashi Campus of Kyushu University

Information on Rental Spaces

Advanced Design Project Building in Ohashi Campus offers 4 rooms on the 4th floor as rental spaces. The building is 7 minutes from Tenjin and 3 minutes from Nishitetsu Ohashi Station on foot, and provides convenient access to Hakata Station. It can be useful as a base for industry-academia-government collaboration.

Location | Advanced Design Project Building,
Global Innovation Center (GIC),
Kyushu University 4-9-1 Shiobaru,
Minamiku, Fukuoka, 815-8540, JAPAN

Views of the rental spaces



Joint Research Laboratory



Joint Research Laboratory

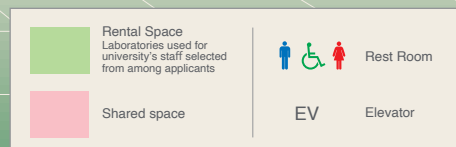
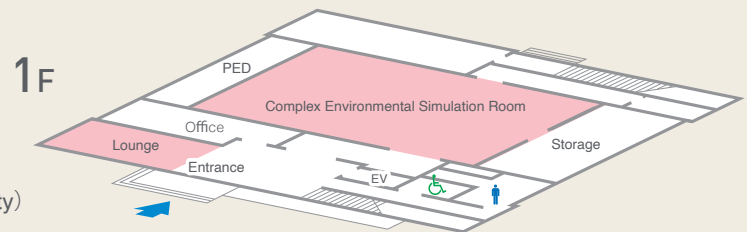
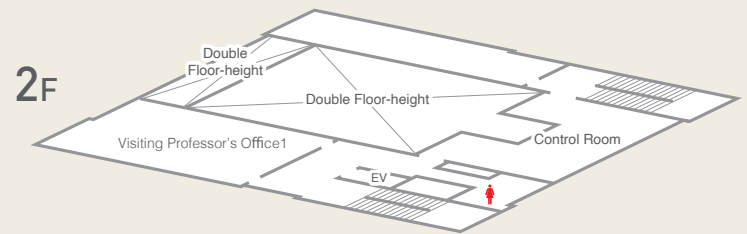
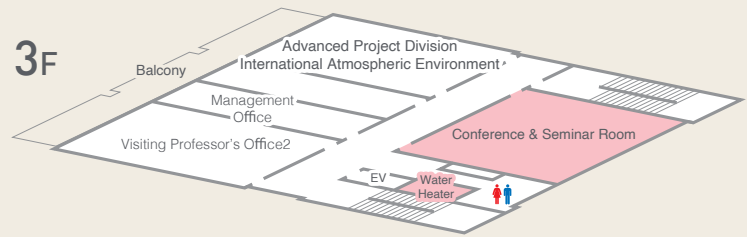
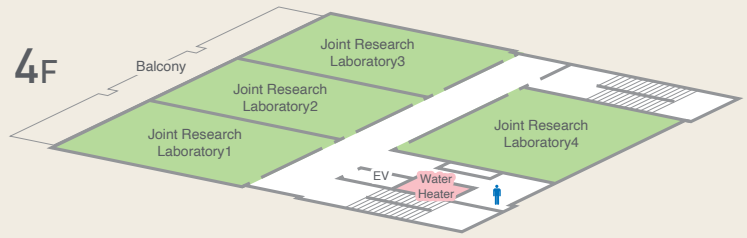
Facilities, etc. that can be used by space renters

Conference & Seminar Room, etc.



3F Conference & Seminar Room (Approx. 35-person capacity)

- Equipment such as multi projectors, screens, etc.
- Approx. 20 chairs can be added



Kyushu

